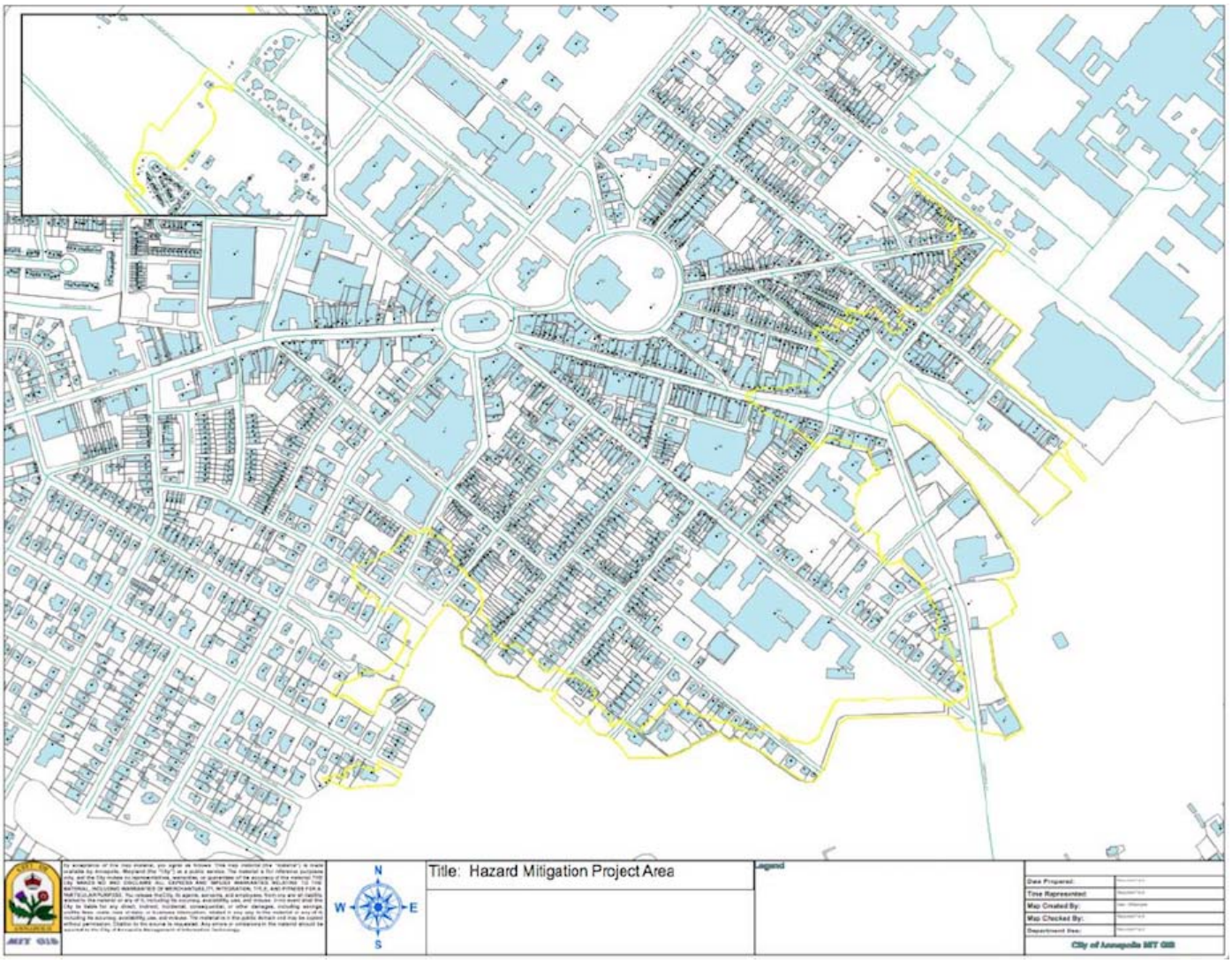
WEATHER IT TOGETHER:
A Cultural Resource Hazard Mitigation Plan

for the

City of Annapolis



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Pete Gutwald, Director of Planning and Zoning

Project Team:
Don M. Bain, P.E.
Lisa M. Craig
Michael Justin Dowling, RA
Eileen Fogarty
Alicia Moran
Rebecca Ramsay

Mayor Gavin Buckley

City Council:
Eleanor Tierney
Frederick M. Paone
Rhonda Pindell Charles
Sheila M. Finlayson
Marc Rodriguez
Shaneka Henson
Robert Savidge
Ross H. Arnett, III

And with thanks to Mayor Michael Pantelides and Alderman Joe Budge

Editors:
Jen Sparenberg
Roberta Laynor
Jane McWilliams
Sally Nash
Jean Russo

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FOREWORD

Ask anyone who's had the opportunity to visit Annapolis, and they will tell you how this historic Maryland seaport, with its distinctive colonial storefronts, beautiful and elegant State House, and large collection of 18th-century brick homes, offers an unrivalled glimpse into the nation's past. Today's visitors to this beloved tourist destination—and there are many!—can still walk the same brick sidewalks along the Severn River or enjoy a rich meal and flagon of ale at the same pubs and taverns as Americans did at the time of the nation's founding.

That is why we at the National Trust named Annapolis one of our National Treasures in 2014. It is a City with deep national and historic significance—and one that, due to the rising sea levels that are accompanying accelerating climate change, is now under threat.

Longtime Annapolis residents can testify to the transformations. In the early 1960s, the downtown area experienced nuisance flooding at high tide only three days a year. Today, flooding occurs between thirty and forty days a year. By 2030, according to a study by the Union of Concerned Scientists (UCS), it will flood every other day. By 2045, downtown will flood every single day.

These rising waters represent more than just a nuisance. They present clear risks to the City's many distinctive historic and cultural assets, from the nearly 275-year-old Sands House to local watering holes like Middleton's and McGarvey's, the sailboats at City Dock to the Alex Haley / Kunta Kinte Memorial downtown, and to all the public spaces around the historic market slip.

Thankfully, Annapolis's municipal leaders have recognized these risks, understand that these historic places are community and economic assets that must be protected for the long term, and have taken important, concrete steps to preserve the future of downtown Annapolis.

Under the guidance of Mayor Mike Pantelides and Chief of Historic Preservation Lisa Craig, the City has assembled the wide-ranging *Weather It Together* coalition to raise awareness of flooding dangers and come up with innovative mitigation and adaptation solutions. They have explored 21st-century technologies like GIS mapping and mobile LiDAR (Light Detection and Ranging) to survey historic resources in Annapolis and analyze the potential impacts of increased flooding. And with the Weather It Together

plan now before you, Annapolis becomes the first city in the United States to have created a cultural resource hazard adaptation and mitigation plan.

The challenges posed by rising seas and a warming climate will not affect Annapolis alone. The Union of Concerned Scientists (UCS) identified many communities along our coasts, as well as many beloved national landmarks, that are also under threat from these changes. Taken in whole, the preservation challenges before us can seem very daunting. But with this plan, and all of the hard work over the past few years, Annapolis is showing us a way forward—one based on clear-eyed analysis, thoughtful resilience planning, innovative technology, and creative partnerships.

The Sailing Capital has always been a shining beacon of our American past. With this plan, Annapolis now also lays out an important claim to our future.

With warmest regards,
STEPHANIE K. MEEKS
President and CEO, National Trust of Historic Preservation

National Trust for Historic Preservation®

DEPARTMENT OF THE NAVY
OFFICE OF THE SUPERINTENDENT
UNITED STATES NAVAL ACADEMY
121 BLAKE ROAD
ANNAPOLIS MARYLAND 21402-1300

September 7, 2017

The Honorable Michael Pantelides, Mayor of Annapolis and
The Annapolis City Council
160 Duke of Gloucester St.
Annapolis, MD 21401

Dear Mayor Pantelides and the Aldermen and Alderwomen of the Annapolis City Council:

I am writing to recognize your planning efforts related to sea level rise which have led to the development of the City's 'Weather It Together' initiatives. These efforts have been important to our own investigation of these issues at the U.S. Naval Academy (USNA). Our faculty research on the underlying science and anticipated effects of sea level rise have formed the baseline of the work developed by the USNA Sea Leve Rise Council. I am particularly pleased that key staff members from the City and USNA are collaborating on both of the working groups and sharing information and strategies. This partnership will continue to be important as the work on these issues evolve and develop.

The cultural landscape of our two National Landmarks are enduring and are worthy of the highest levels of concern and protection. I look forward to continuing this effort with you, and thank you for your unwavering support and leadership associated with sea level rise on the banks of the Severn.

Sincerely,

W. E. CARTER, JR
Vice Admiral, U.S. Navy
Superintendent

MARYLAND DEPARTMENT OF
PLANNING
MARYLAND HISTORICAL TRUST

Larry Hogan, Governor
Boyd Rutherford, Lt. Governor

Wendi W. Peters, Secretary
Ewing McDowell, Deputy Secretary

August 25, 2017

For thousands of years, humans have settled along Maryland's beautiful and bountiful waterways. Navigable bodies transported us long before we had roads, and our economy still depends on ports. Many of our most cherished historic communities lie along the Chesapeake Bay, rivers and tributaries. But because of this relationship to water, we routinely suffer hurricanes and floods. Climate change already exacerbates tidal flooding, storm surges and flash flooding in the state – and for some communities, sea level rise and subsidence create an existential threat.

As Maryland's State Historic Preservation Officer and the director of the Maryland Historical Trust, I am very pleased that our agency has had the opportunity to partner with the City of Annapolis in the *Weather It Together* project, the first effort in the country to plan for sea level rise and its effect on historic and cultural properties. We commend Mayor Pantelides, the City Council, the Historic Preservation Commission and the Historic Preservation Office for spearheading this excellent and visionary work, for which the Maryland Historical Trust Board of Trustees presented the City with a Maryland Preservation Award in 2016.

Balancing the goals of flood safety and the goals of historic preservation can be very complicated. Our state's historic buildings form the heart of many communities, and they often boost our economies – from small shops on Main Street to unique sites that attract heritage tourism dollars. But if preservationists are not part of local planning and preparedness, we will get left behind and risk losing the special places that make our communities "home."

Annapolis embraced this challenge head-on, and we, in turn, have based our guidance to other communities on the Annapolis model. The Maryland Historical Trust's assistance programs for hazard mitigation planning, climate planning and disaster response and recovery – pulled together under the name *Weather It Together*, courtesy of our friends in Annapolis – are implemented in close coordination with our sister agencies, including the Maryland Department of the Environment, the Maryland Emergency Management Agency and the Maryland Department of Natural Resources. Along with non-profit and private sector partners, this group forms the core of the Maryland Resiliency Partnership, an innovative effort that helps reconcile planning goals and find best practices that will serve communities holistically.

The *Weather It Together* project and the implementation of this plan will continue to inspire our programs and inform the work of historic communities across the country. We are grateful for the City's leadership, and we look forward to continuing our partnership into the future.

Sincerely,

Elizabeth Hughes

Elizabeth Hughes
Director, Maryland Historical Trust

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- National Park Service
- United States Army Corps of Engineers
- Urban Land Institute

Weather It Together Core Team

- American Institute of Architects - Maryland
- Annapolis Green
- Anne Arundel County Chamber of Commerce
- Anne Arundel County Planning and Zoning
- Back Creek Conservancy
- Chesapeake Bay Foundation
- City of Annapolis
    - City Council
    - Department of Planning & Zoning
    - Department of Public Works
    - Department of Recreation and Parks
        - Harbor Master
    - Heritage Commission
    - Historic Preservation Commission
    - Office of Emergency Management
    - Office of Law
    - Office of Management and Information Technology
    - Office of the Mayor and the City Manager
- Historic Annapolis
- Maryland Critical Areas Commission
- Maryland Department of the Environment
- Maryland Department of Natural Resources
- Maryland Department of Transportation
- Maryland Emergency Management Agency

- Maryland Historical Trust
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- United States Army Corps of Engineers
- United States Naval Academy Sea Level Rise Advisory Committee
- Urban Land Institute
- Urban Land Institute - Baltimore

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- Annapolis Summer Garden Theater
- Annapolis Waterfront Hotel
- Buddy's Crabs and Ribs
- City of Annapolis
- Federal House Bar & Grille
- Hammond Wilson Architects
- Hermmann Advertising |Branding |Technology
- Historic Annapolis Museum Store
- Michael Baker International
- Maryland Department of Natural Resources
- Maryland Emergency Management Agency
- Maryland Historical Trust
- Mills Fine Wine & Spirits
- Minutemen Press
- National Oceanic and Atmospheric Administration
- National Park Service
- National Trust for Historic Preservation
- Urban Land Institute (Baltimore and National)
- Watermark

Weather It Together Planning Charrette - White Paper Authors, Editors, and Facilitators

- Don Bain, P.E., Climate Engineer, SumSmart LLC
- Maria Broadbent, Environmental Policy, City of Annapolis
- Lisa Craig, Chief of Historic Preservation, Department of Planning & Zoning, City of Annapolis

- Michael Justin Dowling, Principal, Michael Dowling ARCHITECT
- Jennifer Eggleston, Management Assistant to the Office of the Associate Director for Cultural Resources, Partnerships and Science, National Park Service
- Eileen Fogarty, Principal, Fogarty Group
- Jennifer Herzog, Chesapeake Bay Foundation
- David Jarrell, Director, Department of Public Works, City of Annapolis
- Aaron Keel, EnviroProject
- Sharon Kennedy, Chair, Historic Preservation Commission, City of Annapolis
- Michele Kerns, Principal Archaeologist, Kerns CRM Consulting
- Doug Meyers, Chesapeake Bay Foundation
- Hollis Minor, Economic Development Manager, Department of Planning & Zoning, City of Annapolis
- Alicia Moran, Principal, AM Media + Marketing
- Sally Nash, Chief of Comprehensive Planning, Department of Planning & Zoning, City of Annapolis
- Anastasia Poulos, Archaeological Sites Planner, Cultural Resources Division, Anne Arundel County Office of Planning and Zoning
- Jen Sparenberg, Maryland Historical Trust, Maryland Department of Planning
- Stephanie Sperling, Consultant, Anne Arundel County Office of Planning and Zoning
- Stacey Underwood, United States Army Corps of Engineers, Baltimore District, Silver Jackets Program Coordinator
- John Page Welling, Chesapeake Bay Foundation
- Jennifer Wellock, Technical Reviewer/Historian, State Tribal and Local Plans and Grants Division, National Park Service
- Nell Ziehl, Chief, Office of Planning, Education and Outreach, Maryland Historical Trust, Maryland Department of Planning

Weather It Together Story Map

- Lisa Craig, Chief of Historic Preservation, Department of Planning & Zoning, City of Annapolis
- Bradley Dean, Michael Baker International
- Jane McWilliams, Author
- Alicia Moran, AM Media + Marketing
- Rebecca Ramsay, Archaeologist, US ICOMOS Exchange Program, City of Annapolis
- Jean Russo, Historic Annapolis

- Shawn Wampler, GIS Coordinator, Office of Management and Information Technology, City of Annapolis

Weather It Together **Cultural Resource Hazard Mitigation Planning Team**

- Don M. Bain, P.E., Climate Engineer, SumSmart LLC
- Lisa Craig, Chief of Historic Preservation
- Michael Justin Dowling, Principal, Michael Dowling ARCHITECT
- Eileen Fogarty, Principal, Fogarty Group
- Alicia Moran, Principal, AM Media + Marketing
- Rebecca Ramsay, Archaeologist, US International Council on Monuments and Sites (US/ICOMOS), International Exchange Program
- Jen Sparenberg, Hazard Mitigation Officer, Maryland Historical Trust

Weather It Together - Keeping History Above Water Sponsors

- Annapolis Waterfront Hotel
- City of Annapolis
- Four Rivers Heritage Area
- Historic Annapolis
- Maryland Historical Trust
- National League of Cities
- National Park Service
- National Trust for Historic Preservation
- Newport Restoration Foundation
- Preservation Maryland
- SERVPRO of Annapolis/Severna Park
- St. John's College
- Urban Land Institute
- Virginia Department of Historic Resources

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- Victoria Chance, University of Maryland
- John Englander, Oceanographer and Author of *High Tide on Main Street*
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- Jerry Martiyiko, Expert House Movers
- Captain Emil Petruncio, USNA
- Natasha Udu-gama, Thriving Earth Exchange (TEX)
- Stacey Underwood, USACE

PLAN SUMMARY

The Weather It Together Cultural Resources Hazard Mitigation Plan (CRHMP) took a community-based approach to hazard mitigation planning to support a more resilient and sustainable historic downtown for the near-term threats of tidal flooding and natural disasters and for the longer-term inevitability of sea level rise.

In working with stakeholder agencies, residents, business owners, property owners, and the greater community, the Weather It Together initiative focused on those downtown historic places that mattered most to the larger community. The plan envisions for Annapolis an adaptation approach that underscores the community's desire to protect the natural heritage of the Chesapeake Bay; prioritizes preservation of historic properties with significant community value; partners with public agencies and private stakeholders to reduce the costs and impacts associated with flood protection and flooding hazards; and promotes both short- and long-term strategies for flood protection.

As FEMA states through its "how-to" guidance, "while there is no one right planning process, there are several elements that are common to all successful planning endeavors, such as engaging citizens, developing goals and objectives, and monitoring progress. Select the approach that works best in your community."[1]

This plan has done just that by developing an overarching vision to guide the next five years of adaptation strategies or goals with measurable objectives implemented through projects with specific actions.

Vision Statement

By implementing *Weather It Together: A Cultural Resource Hazard Mitigation Plan* for the City of Annapolis, the historic Chesapeake Bay community will survive and thrive by building resilience, embracing sustainable development and adapting to hazards and natural disasters that threaten the Capital City's cultural and natural heritage.

[1] FEMA, "Integrating Historic Property and Cultural Resource Considerations Into Hazard Mitigation Planning State and Local Mitigation Planning How-To Guide" FEMA 386-6 / May 2005, pg. iii

Goals and Objectives

Goal 1
Implement a public awareness and engagement program.
Objectives
Inform property owners in the flood risk area about the flooding vulnerability of their properties, available technical assistance, incentives, and progress in flooding adaptation and hazard risk reduction.
Quantify economic vulnerabilities related to flooding and promote business opportunities for hazard mitigation and adaptation in the flood risk area.
Educate City staff and private property owners about the National Flood Insurance Program and the benefits of flood adaptation.
Goal 2
Lead building resilience efforts in flood adaptation and mitigation.
Objectives:
Assign a *Weather It Together* field team to assist Annapolis property owners and Chesapeake Bay communities in developing adaptation plans and strategies.
Implement model adaptation projects and hazard mitigation strategies for privately owned properties in the flood risk area.
Ensure GIS information is up-to-date and reflects changes in public infrastructure and the condition of properties and resources within the flood risk area.
Goal 3
Develop a disaster response & recovery plan to "Build Back Better".

Objectives:
Minimize economic loss to the downtown Historic District from natural hazards and disasters.
Develop preservation-sensitive options for a post-disaster regulatory response.
Minimize recovery time by preparing actively for response to natural disasters.
Goal 4
Align land use, economic development, environmental and regulatory activities to protect the City's historic character and cultural and natural assets while promoting economic vitality.
Objectives:
Integrate risk reduction and adaptation into the zoning and building permits process.
Ensure that visitors, residents, and businesses maintain access to the Historic District notwithstanding future flooding events.
Ensure City plans, policies, and procedures are guided by State and Local plans and programs addressing flooding hazards.
Encourage property owners to adapt, preserve, rehabilitate, restore, and reconstruct those places of high community value in response to flooding hazards.
Goal 5
Fund public improvements and incentivize private investment for flooding adaptation.

Objectives:
Prioritize the adaptation of properties in the flood risk area within the City's economic development plan.
Develop hazard mitigation and adaptation projects on publicly owned property in the flood risk area.

Projects

	Project Title	Description
1	Tools and Practices for Flood Preparedness and Adaptation	Find, develop, and share tools and leading practices for addressing flood risk and flood adaptation.
2	Natural Adaptation Measures	Determine feasibility, and implement where practical, natural responses to adapt to rising sea level and flooding.
3	Structural Adaptation Measures	Determine feasibility of elevating and redesign of infrastructure and barriers.
4	Public Awareness and Education	A program to educate residents, businesses, and other stakeholders on the expected flood risks and to promote preparedness and resiliency.
5	City Initiative for Flood Adaptation and Risk Management	Inform, train, and coordinate City departments on flood risk and adaptation measures for the benefit of Annapolis. (Exploit resources provided by FEMA and the National Flood Insurance Program including the Community Rating System).
6	Flood Preparedness and Adaptation Responses in City Plans and Policies	Integrate flood preparedness and adaptation response in City plans, codes, policies and incentives, aligning with county, state, and federal efforts and partners where practical.
7	Flood Disaster Recovery and Response Plan to "Build Back Better"	Develop a flood disaster recovery plan and response capability including trained City of Annapolis staff to promote rapid, efficient recovery and to rebuild in more resilient ways—to "Build Back Better."
8	Sea Level Rise Update to City of Annapolis Comprehensive Plan	Update the City of Annapolis Comprehensive Plan to include sea level rise, its increased risks for flooding, and need for adaptation responses.
9	Annapolis Data for Flood Risk and Adaptation	Build, update, and maintain Annapolis data resources including GIS, cultural, property, and infrastructure needed to support good decisions for flood risk management and adaptation planning.

List of Acronyms and Abbreviations

Acronym/Abbreviation	Meaning
BFE	Base Flood Elevation
DFE	Design Flood Elevation
DNR	Maryland Department of Natural Resources
CRHMP	Cultural Resource Hazard Mitigation Plan
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
GIS	Geographic Information System
HPD	Historic Preservation Division
KHAW	Keeping History Above Water
MDE	Maryland Department of the Environment
MEMA	Maryland Emergency Management Agency
MHT	Maryland Historical Trust
MSL	Mean Sea Level
NAVD88	North American Vertical Datum 1988
NFIP	National Flood Insurance Program
NHL	National Historic Landmark
NLC	National League of Cities
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NTHP	National Trust for Historic Preservation

NWS	National Weather Service
SDAT	State Department of Assessments and Taxation
SFHA	Special Flood Hazard Area
SLRAC	Sea Level Rise Advisory Council
UCS	Union of Concerned Scientists
ULI	Urban Land Institute
USACE	United States Army Corps of Engineers
US/ICOMOS	United States Committee International Council on Monuments and Sites
USNA	United States Naval Academy
WIT	Weather It Together

CHAPTER 1: LANDMARK AT RISK

"From sea to rising sea, a remarkable number of the places where American history was made are already under threat. The geographic and cultural quilt that tells the American story is fraying at the edges—and even beginning to be pulled apart—by the impacts of climate change."

- **Union of Concerned Scientists - *National Landmarks at Risk*, 2014**[2]

"While many communities are planning for the impacts of climate change to infrastructure, Annapolis is breaking new ground by specifically accounting for the historic places that are such an important part of [the] your city's fabric, cultural identity, and economy. By naming Annapolis a National Treasure, we are raising awareness of the threats posed by climate change to historic places nationwide."

- **Stephanie Meeks, President, National Trust for Historic Preservation, Oct. 23, 2014**[3]

Introduction

While recognition of the historic City of Annapolis is usually welcome—certainly, the local economy is dependent on the heritage traveler—Annapolis would rather have visitors uploading digital images of the beautiful City Dock backdrop with its symbolic domes and steeples, than photographs of tidal flood waters circling the feet of the statue of Alex Haley as he reads to children at the Kunta Kinte Memorial. Yet Mr. Haley has become the high water mark for flooding events in the City—events that represent an increasingly urgent call to action.

In 1965, downtown Annapolis was designated one of 43 National Historic Landmark Districts by the U.S. Department of the Interior. While Annapolis' collection of 18th-, 19th-, and 20th-century architecture is important to the entire nation, the Historic District is a major heritage tourism asset for the local economy. The map of the Historic District is shown below.

Economic studies of the value of historic preservation specifically identify the designation of Historic Districts, the accompanying regulatory overlays and tax

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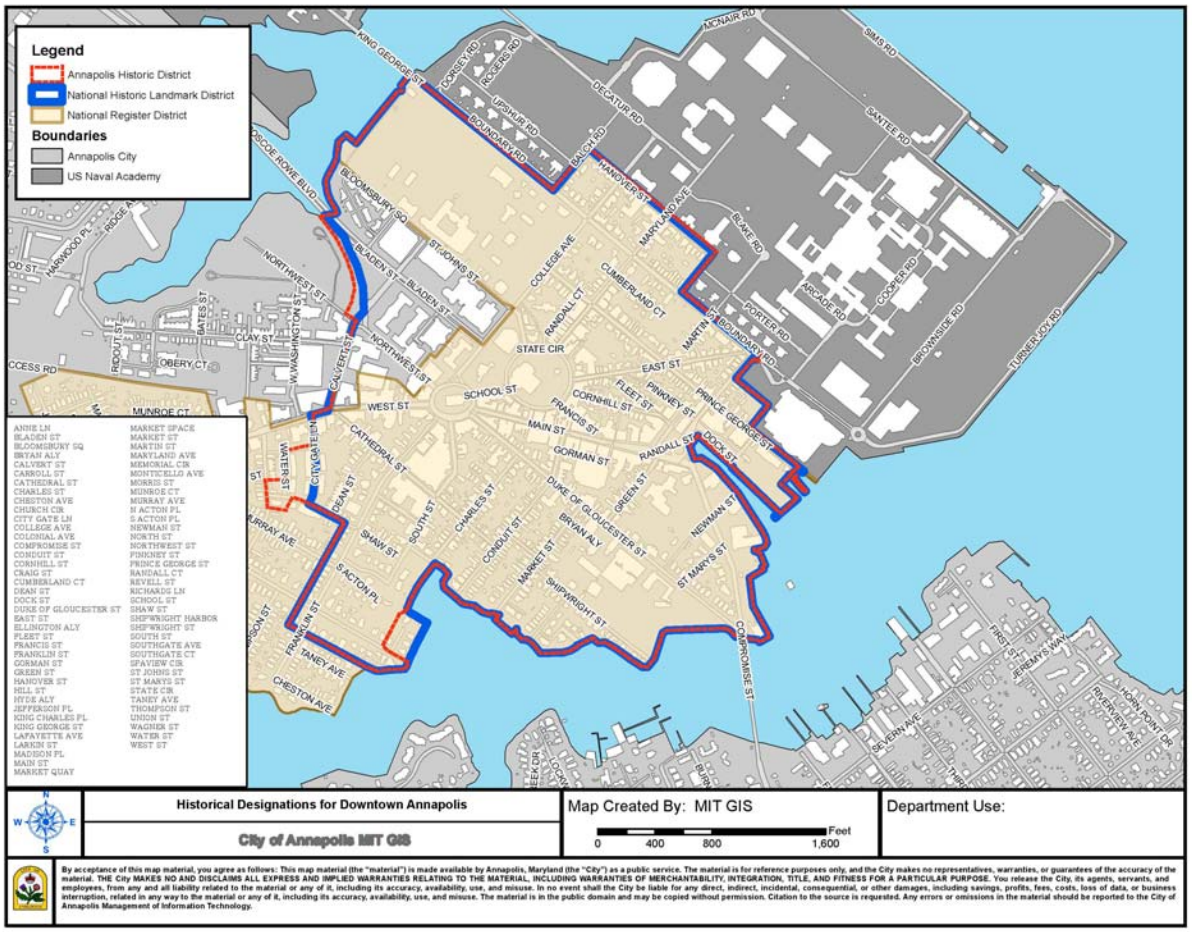
[2] Holtz, D., Markham, A., Cell, K. and Ekwurzel, B. 2014. *National Landmarks at Risk: How Rising Seas, Floods, and Wildfires Are Threatening the United States' Most Cherished Historic Sites.* Union of Concerned Scientists, Page 1.

[3] Prepared remarks, National Treasure designation event, Annapolis, MD

incentives, the specialized and localized use of trades workers, and the heritage traveler as contributing to stabilization and growth in property values and local economies. PlaceEconomics, an international firm specializing in economic analysis of heritage assets, provides compelling data demonstrating that designating a landmark or district as historic typically maintains, if not boosts, the value of the property. As an economic development tool, historic preservation has proved its worth. Nearly any way the effects are measured, be they direct or indirect, historic preservation tends to yield significant benefits to the economy.[4]



Historic Designations for Downtown Annapolis

In 1998, the year of the last completed economic study for the Annapolis Historic District, it was estimated that "2.25 million historic heritage visitors annually spend at

[4] Mason, Randall. *Economics and Historic Preservation: A Guide and Review of the Literature*, The Brookings Institution Metropolitan Policy Program. 2005

least $27.6 million in purchases, creating over 400 jobs and $7.2 million in wages."[5] Those numbers, while significant for the period, if adjusted for inflation would be estimated in 2017 dollars at $41.4 million in purchases and $10.8 million in wages. It is clear that to better estimate the value of heritage visitors to Annapolis, a new economic analysis must be completed, and very likely, will result in even greater values in spending and job creation.

Yet heritage tourism is only one of the factors used to measure the contribution of historic places to any community.

> *[Preservation] has proven to be an effective tool for a wide range of public goals including small business incubation, affordable housing, sustainable development, neighborhood stabilization, center city revitalization, job creation, promotion of the arts and culture, small town renewal, heritage tourism, economic development, and others.*[6]

An updated quantitative analysis of historic assets in Annapolis is currently underway as part of the Weather It Together initiative. Understanding what is at risk if there is no response to flooding means calculating sales tax, property tax and valuation, numbers of jobs and businesses, arts and cultural activities, knowledge and creative class contributions, cost of empty buildings or less than optimized use of buildings, indirect impacts of sales and services, and perceived aesthetic value of historic assets. This last quality is essential for visitors and for residents and business owners.

When Secretary of the Interior Stewart Udall visited Annapolis on July 7, 1965 to officially announce the designation of Annapolis as a National Historic Landmark, he warned, *"Annapolis must work now to preserve its historic heritage… otherwise it will simply share the weakness of so many cities in America—sameness."* Now in 2015, as we work to prepare the Historic District to respond to higher tides, we are again heeding a warning. It is not, perhaps, the prospect of unplanned, insensitive development that threatens destruction of the historic core, but the unpredictable, inescapable effects of the global concern of sea level rise.

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[5] Lipman Frizzell & Mitchell, LLC, *Economic & Fiscal Impact of Local Historic Districts in Maryland: Six Case Studies*, Maryland Association of Historic District Commissions. September 1, 1998

[6] Measuring Economic Impacts of Historic Preservation – A Report to the Advisory Council on Historic Preservation – Nov. 2011 - Donovan Rypkema and Caroline Cheong, Place Economics and Randall Mason, PhD University of Pennsylvania School of Design, Historic Preservation Program

Community Description

Annapolis - A Capital City

Annapolis is not a typical city, and the flood hazard study area (hereinafter "study area") chosen for the *Weather It Together: Cultural Resource Hazard Mitigation Plan* does not represent a typical downtown. When Annapolis was platted in 1695, the highest points were chosen for the capitol building, called the State House, and St. Anne's Church. One of the first planned cities in colonial America, Annapolis was designed in the baroque style by Governor Francis Nicholson.[7] From the public circle surrounding the State House and the smaller circle set aside for the Anglican church, a system of radial streets extended outward toward the harbor and the edges of the city.[8]

With few modifications, Annapolis developed in harmony with this original plan. Main Street, Maryland Avenue, and the City Dock, the center of the study area, were established as the economic heart of the City by the early 18th century.[9]

Annapolis' location as an historic colonial port and a major governmental and institutional center resulted in a city that today is the state capital, the commercial center for Anne Arundel County, the home of St. John's College and the U.S. Naval Academy (USNA), and the regional boating center for the Chesapeake Bay.[10]

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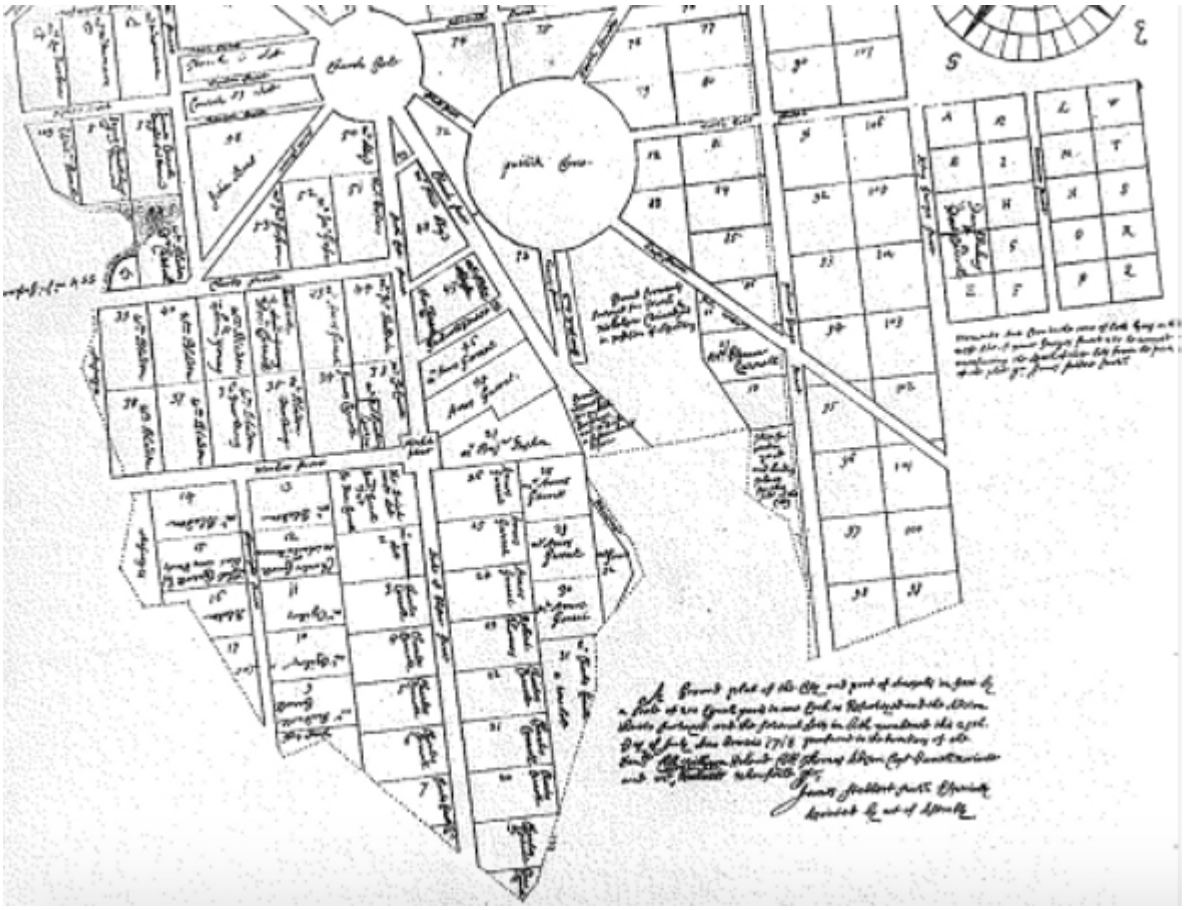
[7] Jane Wilson McWilliams, *Annapolis: City on the Severn* (Baltimore, Johns Hopkins University Press, 2011) p. 19.

[8] Maryland National Register Properties, Colonial Annapolis Historic District, Inventory No: AA137

[9] City of Annapolis Ward One Sector Plan, January 1993, p. 17.

[10] City of Annapolis Ward One Sector Plan, January 1993, p 17.



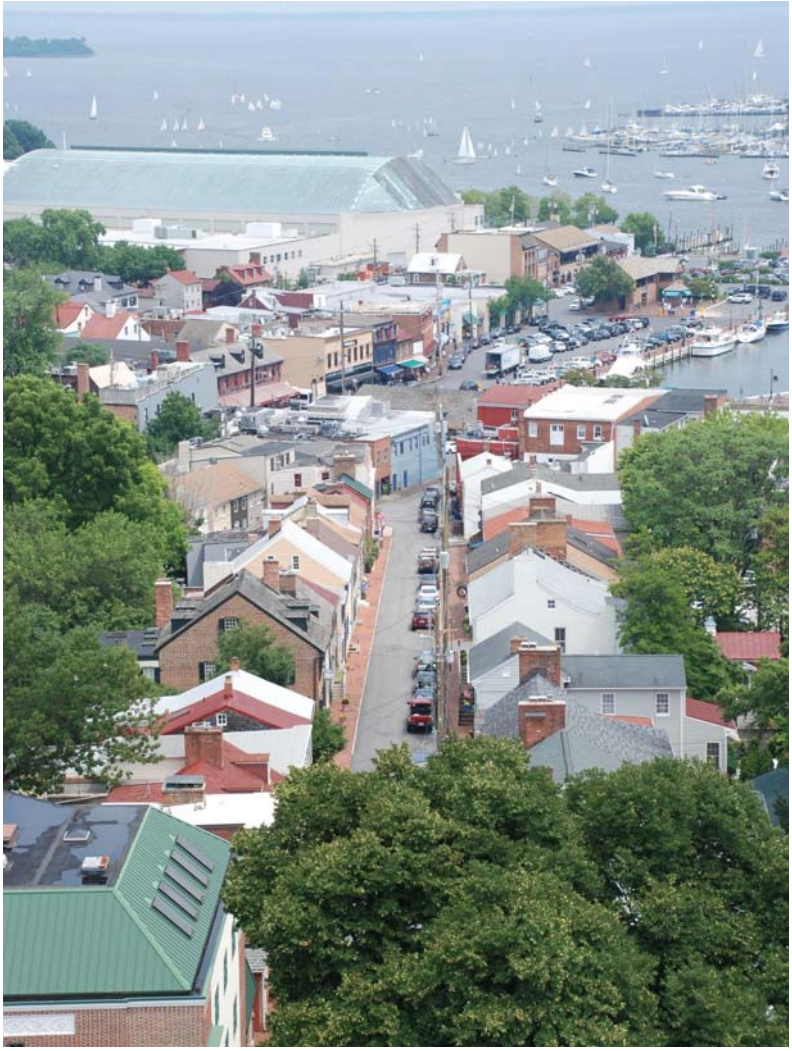
A Ground Plot of the City of Annapolis, by James Stoddert, 1718, copied by James Callahan, 1743.

Today, Annapolis is a compact city of 38,394 residents with 7.2 square miles of land coupled with 16.5 miles of both commercially active and livable waterfront along the Severn River and its tributaries. Annapolis' historic character, combined with its waterfront access, has made it a highly desirable place to live and work. Annapolis' location, within easy commuting distance from Washington, DC and Baltimore, has resulted in significant population and economic growth for the area immediately surrounding Annapolis in Anne Arundel County as well as increases in the median income for residents in both the City and the County.

One of the driving factors for Annapolis' continued growth and prosperity, despite the City being "built out," is the high quality of life associated with the Annapolis Historic District as well as its easy access to the water. Donovan Rypkema, principal with Place Economics, notes in *Historic Preservation as Economic Development*, that:

> *More than any other man-made element, historic buildings differentiate one community from all others. Many quality-of-life activities, museums, theaters, symphonies, are housed in historic buildings…the quality of…historic preservation says much about a*

community's self-image. A community's commitment to itself is a prerequisite for nearly all quality-of-life elements.[11]



View of City Dock from State House, 2017 *Photo credit: Michael Dowling*

The high quality of life experienced in the Historic District is reflected in its continued ability to attract strong residential and commercial investment, through the relatively high median income of its residents, and the highly assessed valuation of the residential properties. Attesting to the desirability and draw of the City's historic character, *Travel and Leisure* recognized Annapolis in 2014 in the top 20 *Best College Towns*. "This cobblestoned, history-steeped town is 140 years older than nearby D.C., and home to the U.S. Naval Academy—as well as ranked No. 14 by readers for its historical sites." *Conde Nast Traveler* in 2016 rated Annapolis one of the top 30 Best Small Town Cities in

[11] Donovan D. Rypkema, *The Economics of Historic Preservation*, 2008.

America. "History buffs, take note: Maryland's capital city is home to the U.S. Naval Academy and more than 50 well-preserved buildings that predate the Revolutionary War."

Assessing the Cultural and Economic Value of Heritage in Annapolis

The Annapolis Historic District has experienced long–term economic stability with a low vacancy rate and growth in assessed property valuation that has consistently exceeded the rest of the City. The assessed values of properties in the Historic District increased 571.4% during a twenty-year period with an average appreciation of 26% per year, which surpassed the remainder of the City by 6.3% annually.[12] Protecting the continued growth in property value, which is tied to the City's prosperity through property tax revenues means that the City and its property owners must cooperate to address threats to the local economy. To that end, understanding the threats posed by rising waters and mitigating against flood hazards have taken on new urgency. Nearly weekly nuisance flooding, whether caused by tidal action or extreme precipitation, is eroding the physical stability of these historic buildings and public spaces and the economic security of business owners, employees, and residents who rely on accessibility to downtown's historic places for their livelihoods and living.

"Annapolis is unique among American cities in its concentration of intact buildings and their undisturbed setting from the 17th, 18th, and 19th centuries. The historic past directly affects the lives of Annapolitans today. Along with Williamsburg, VA, Annapolis serves as a 'living microcosm' of the 1700s and early 1800s in the United States.[13]

Most of the downtown and waterfront areas were designated an historic landmark in 1965. In all, approximately 48 colonial-era buildings remain today, protected by the Historic District Overlay Zone. As the nation's first peacetime capital, Annapolis was the location for General George Washington's resignation as Commander in Chief of the Continental Army, the signing of the Treaty of Paris to end the Revolutionary War, and the homes of all four Maryland signers of the Declaration of Independence. The Maryland State House, at the heart of the historic district, rightfully claims status as the longest continuously operating statehouse in the nation with 2017 representing the 437th Session of the Maryland General Assembly. Surrounded by both stately townhomes and simple vernacular rowhouses, State House Circle, its twin Church Circle and the axial layout of streets and alleys, represent the most sophisticated town

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[12] Donovan D. Rypkema,"Economic and Fiscal Impacts of Local Historic Districts in Maryland," 9/1/98

[13] "Colonial Annapolis Historic District," National Historic Landmark Survey, National Park Service.

planning in early America. The historic homes, shops, brick sidewalks, and narrow alleys which remain from that time are maintained and in active use today.

Sands House, 130 Prince George Street, 2017 *Photo credit: Michael Dowling*

Some of the most influential early leaders of Annapolis owned property downtown, which visitors can still tour today. The Hammond-Harwood House, the William Paca House, the James Brice House, the Charles Carroll House, and the Chase-Lloyd House contribute significantly to the story of Annapolis, drawing tens of thousands of visitors annually.[14]

Annapolis hosts two nationally acclaimed educational institutions. St. John's College, chartered in 1784 (the third oldest college in the United States), was constructed with McDowell Hall (1799) at the heart of the historic brick campus with its Georgian, Colonial, Federal, Gothic Revival, and mid-century modern buildings. The United States Naval Academy, initially referred to as the "Naval School," consisted of fourteen buildings on ten acres in 1845.[15] Between 1900 and 1910, a comprehensive redevelopment program planned by nationally renowned architect Ernest Flagg added

[14] "National Register of Historic Places-Nomination:Colonial Annapolis Historic District"

[15] Miller, Marcia M. and Ridout V, Orlando, eds. *Architecture in Annapolis: A Field Guide*. Crownsville: Vernacular Architecture Forum and the Maryland Historical Trust Press, 1998

twenty-seven buildings. Of the ten buildings designed by Flagg in the Beaux-Arts style, two, namely Bancroft and Dahlgren Halls, are in the flood hazard area. These two large campuses with their well-planned and designed public spaces, embrace the smaller-scaled heart of Annapolis. Characterized by its active and vital residential neighborhoods, commercial storefronts, houses of worship, schools, and government buildings, downtown Annapolis is crowded with historic places, particularly in the study area.

View of Naval Academy from State House Dome, 2017 *Photo credit: Michael Dowling*

Landmark Districts in Annapolis

The Annapolis Historic District is a collection of nationally significant historic properties designated by the Secretary of the Interior "because they possess exceptional value or quality in illustrating or interpreting the heritage of the United States."[16] Only 2,500 historic sites bear this national distinction. The benefit of a National Historic Landmark (NHL) designation includes the requirement that federal agencies assess activities that will "directly and adversely affect" a NHL with "such planning and actions as may be necessary to minimize harm to such Landmark."[17] This review requirement will need to be considered for any proposed adaptation alternatives involving federal funding, licensing, or permitting.

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[16] National Park Service, National Historic Landmarks Program, National Park Service, US Dept. of the Interior, https://www.nps.gov/nhl/, July 29, 2017

[17] National Park Service, Frequently Asked Questions, National Park Services, US Dept. of the Interior, https://www.nps.gov/nhl/contact/faq.htm#11, January 30, 2015

There are nearly 1,350 properties in the NHL Colonial Annapolis Historic District. Within the study area 104 of the 140 properties surveyed are properties which "contribute" to (i.e. played a role or existed during) the period of historical significance, associated with the National Historic Landmark.

All "contributing properties" within the study area are also listed on the National Register of Historic Places (National Register). The National Register is the official list of the nation's historic buildings, districts, sites, structures, and objects worthy of preservation. It was established with the passage of the National Historic Preservation Act of 1966, one year after Annapolis was formally recognized by the Department of the Interior as a National Historic Landmark. The National Register program is overseen by the National Park Service and recognizes more than 90,000 properties for their significance in American history, architecture, art, archeology, engineering, and culture.

The Annapolis Historic District achieved national significance as a planned city, designed in 1695 by Governor Francis Nicholson. Known for its unusual Baroque town plan, Annapolis developed in "harmony with the original plan to emerge in the mid-18th century as the focal point of Maryland government, politics, and commercial activity and as a center of provincial wealth, culture, and taste." Host to the Continental Congress in 1783-84 (during which period the Treaty of Paris ending the Revolutionary War was ratified) and to the Annapolis Convention in 1786 which lead to the Constitutional Convention of 1787, Annapolis is significant at the national, state and local levels.

State significance is tied to the role of Annapolis as first a colonial capital and then the capital of the state, with the Maryland State House, (1771) still in use today. Locally, the City serves as the county seat for Anne Arundel County. Hence, the period of significance recognizes the architectural and historical development of Annapolis through four centuries, stretching from the town's plan by Francis Nicholson in 1965 to the construction of the Community Services Building in 1942 for use by the United Services Organization (USO) during World War II.

It is important to note that these dates (1695 - 1942) serve as bookends for the historic places at risk from flooding in the study area. Nicholson's plan of 1695, "the first complete and surviving Baroque urban plan"[18] in America accommodates the topography of what is a relatively small neck of land. From the major focal points of St.

[18] "Building in the Fourth Century, Dale E. Frens, AKA and J. Christopher Lang, 1994, pg. 13

Anne's at Church Circle to the State House at State Circle, radial streets extend out, but with a "natural eccentricity" rather than a strict formality due to the landform. Thus, if the streets, sidewalks and public spaces in the study area must be elevated to accommodate rising waters, the unique topography which defines the City's built form may be altered. Just so, the Community Services Building, rehabilitated as condominiums, requires the construction of raised terraces to serve as flood barriers for anticipated storm surge across Compromise Street.

The Annapolis Historic District

While numerous individual efforts resulted in the saving of many colonial-era buildings from demolition in the early 20th century, it was not until 1935 when the Company for the Restoration of Colonial Annapolis (CRCA) was formed to preserve the original colonial buildings and unique historic character of downtown Annapolis.

In 1952, Historic Annapolis, Inc. (HA) took up where CRCA left off, establishing itself as an advocate and agent for preservation in the City. Historic Annapolis launched the first architectural survey of what was to become the Colonial Annapolis Historic District. It was HA that worked with the State of Maryland to save a number of historic properties threatened with demolition, either through redevelopment pressures or neglect. The Shiplap House, once home and studio to early preservationist Francis Blackwell Mayer, 99 Main Street, the Market House and the building which now houses McGarvey's (all of which are properties in the study area) were protected and saved from demolition through the dynamic leadership of HA's president Anne St. Clair Wright.

St. Clair Wright is also to be credited with the designation of the historic district in 1965, which led to the passage of Annapolis' first Historic District Ordinance in 1968 and establishment of the first Historic District Commission in 1969. The legal basis for the establishment of the Annapolis historic district regulations is the State of Maryland Enabling Act for Historic Area Zoning, established in 1933. The stated goals of the regulations governing the Annapolis historic district are outlined in Article I of the City of Annapolis Historic District Zoning Ordinance which states:

The preservation of sites, structures, and districts of historical, cultural archaeological, or architectural significance together with their appurtenances and environmental settings is a public purpose.

It is the further purpose of this article to preserve and enhance the quality of life and to safeguard the historical and cultural heritage of Annapolis by:

- *preserving sites, structures, or districts which reflect the elements of the City's cultural, social, economic, political, archaeological, or architectural history;*
- *to strengthen the local economy;*
- *to stabilize and improve property values in and around such historic areas;*
- *to foster civic beauty, and;*
- *to preserve and promote the preservation and appreciation of historic sites, structures and districts for the education and welfare of the citizens of the City.*

It is the responsibility of the City of Annapolis Historic Preservation Commission "to safeguard Annapolis' heritage as reflected in its three centuries of historic architecture and its broadly visible waterfront."[20] Hence, the threat to historic buildings and archaeological resources posed by flood waters, so evident in the recurrent tidal flooding, extreme storm events, and the annual increase in sea level rise and subsidence, cannot be ignored. That is why the Annapolis Historic Preservation Commission supported the launch of the Weather It Together: Save Our Historic Seaport initiative under its mandate to "preserve and enhance the quality of life and safeguard the historical and cultural heritage of Annapolis."

Study Area

Situated on the Annapolis Neck Peninsula between the South and Severn Rivers, Maryland's Capital City—once the capital of the colony and subsequently of the State of Maryland—is a rare example of European town planning in North America. With a few changes, that 1695 baroque plan has shaped the urban landscape of this colonial city, showcasing the natural beauty of the Chesapeake Bay, framing the historic City Dock and surrounding four centuries of architectural treasures. It is important to consider Annapolis' history as a working waterfront town to appreciate the impact that tidal flooding, subsidence, and storm surges have on the City Dock area.

In Annapolis, documentation of storms goes back to 1667, the "Year of the Hurricane," when "A mighty wind destroyed four-fifths of (our) tobacco and corn and blew down

[20] "Building in the Fourth Century: Annapolis Historic District Design Manual," Prepared by Dale E. Frens AIA and J. Christopher Lang, 1994, edited and reviewed in 2007, 2009 and updated and expanded in 2011., p.8.

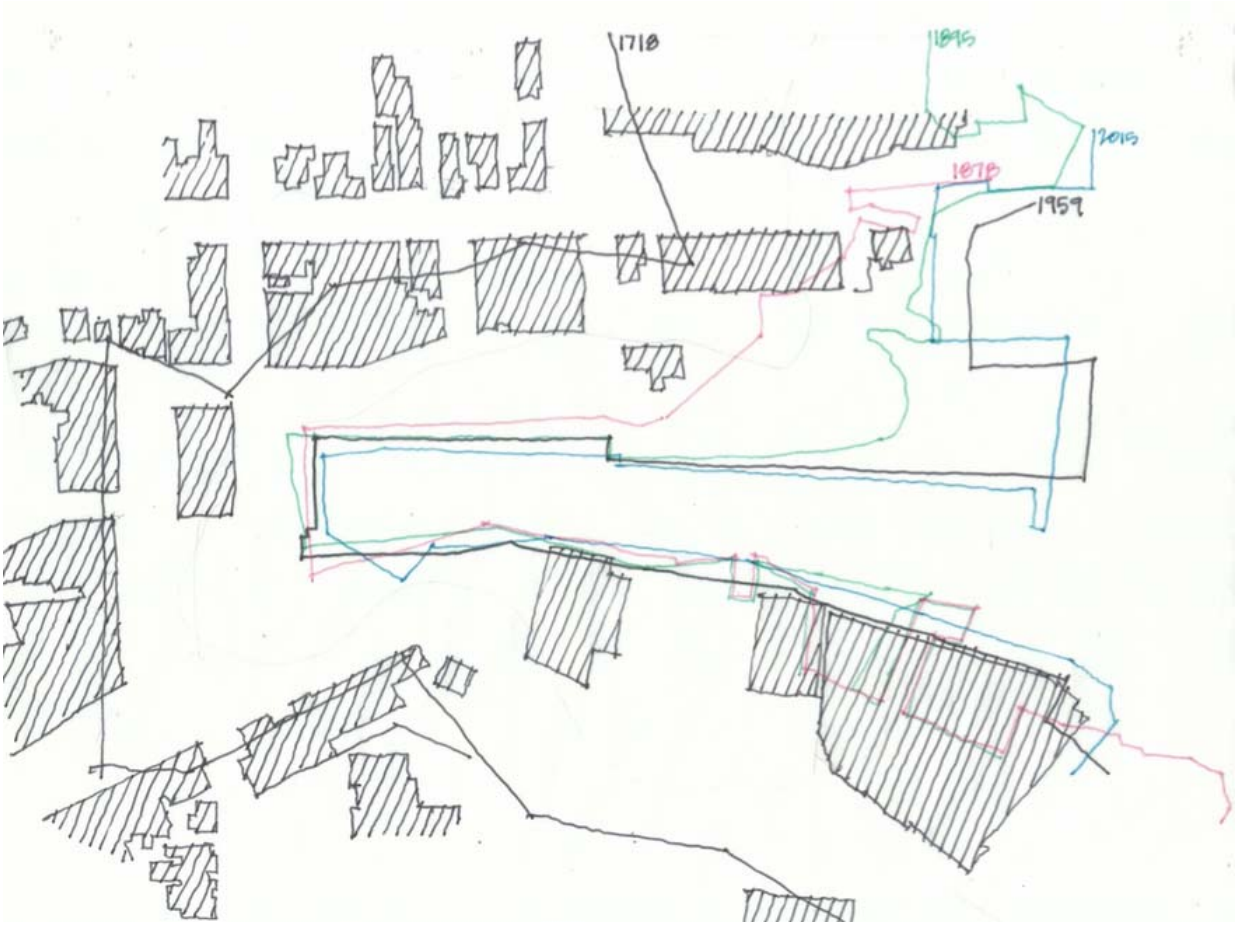
in two hours [many] houses in Virginia and Maryland."[21] Jumping ahead to Hurricane Isabel in 2003, which caused widespread tidal flooding, high tide in Annapolis was 6.4' (NAVD88), which is considered greater than the 100-year flood elevation.

According to NOAA's National Climate Data Center database, from 1950-2011 Anne Arundel County experienced 60 flood events, 2 hurricanes, 3 tropical storms, 19 tornadoes, 41 thunderstorm and high wind events, 41 lightning events, and 56 hailstorms. Many of these events caused property damage, injuries, and deaths. Between 1957-1963, Annapolis saw 3.8 days of nuisance flooding (i.e. occasional minor coastal flooding experienced during high tide) on average; between 2007-2013, Annapolis had on average 39.3 days of nuisance flooding.

It is within this context that the City of Annapolis' Weather It Together Planning Team is addressing the issue of protecting and adapting the City's cultural resources to an increasing risk from flooding. Focusing on the Annapolis City Historic District Overlay Zone, a defined study area has been devised to include properties at risk: the study area.

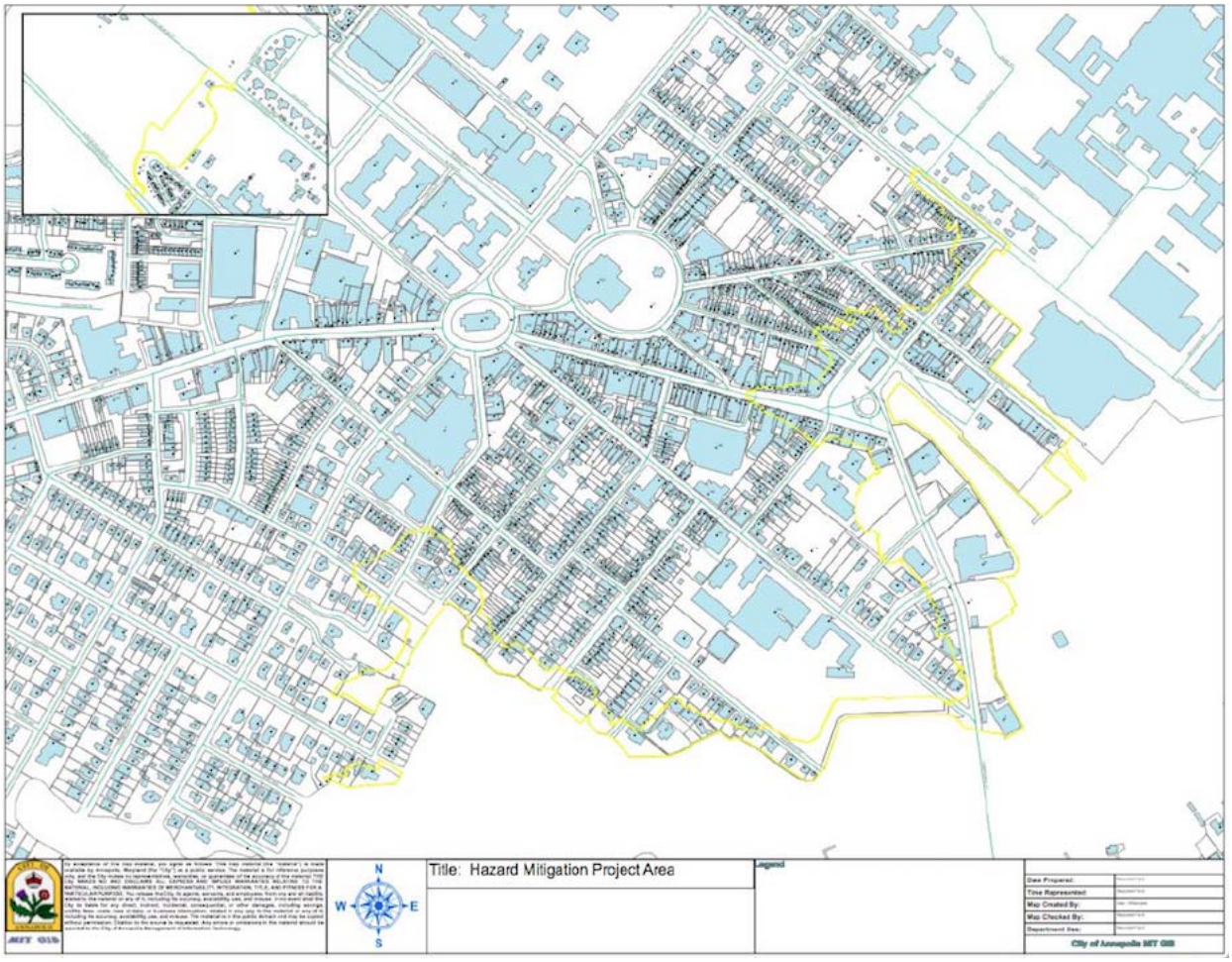
This area includes low-lying areas surrounding the City Dock and other portions of the Historic Overlay District. The topography of this part of Annapolis rapidly rises up away from the shoreline toward the hills occupied by the State House and St. Anne's Church; leaving a sometimes narrow coastal plain. This waterfront area incorporates the original harbor area as shown on early plans of the City, which has been modified over the years through fill and bulkhead construction.

[21] Letter from Colonial Secretary Thomas Ludwell to Virginia Governor Lord William Berkeley; Hurricanes and the Middle Atlantic, A Surprising History, Rick Swartz, Blue Diamond Books, Springfield, Virginia, 2007, pages 31-32.



Annapolis Harbor Development Map - *Drawing credit: Michael Dowling*

The study area, incorporating several parameters, is delineated by the ten-foot elevation contour line. The datum of the ten-foot contour is readily documented using the City's existing GIS information as superimposed on the buildings, roads, and other infrastructure locations, and is a recognizable benchmark.



Study Area Map

This area incorporates both the applicable 1% and 0.2% annual chance floodplain boundary as delineated on the 2015 FIRM (Map 24003C0251F, Panel 251 of 385.)

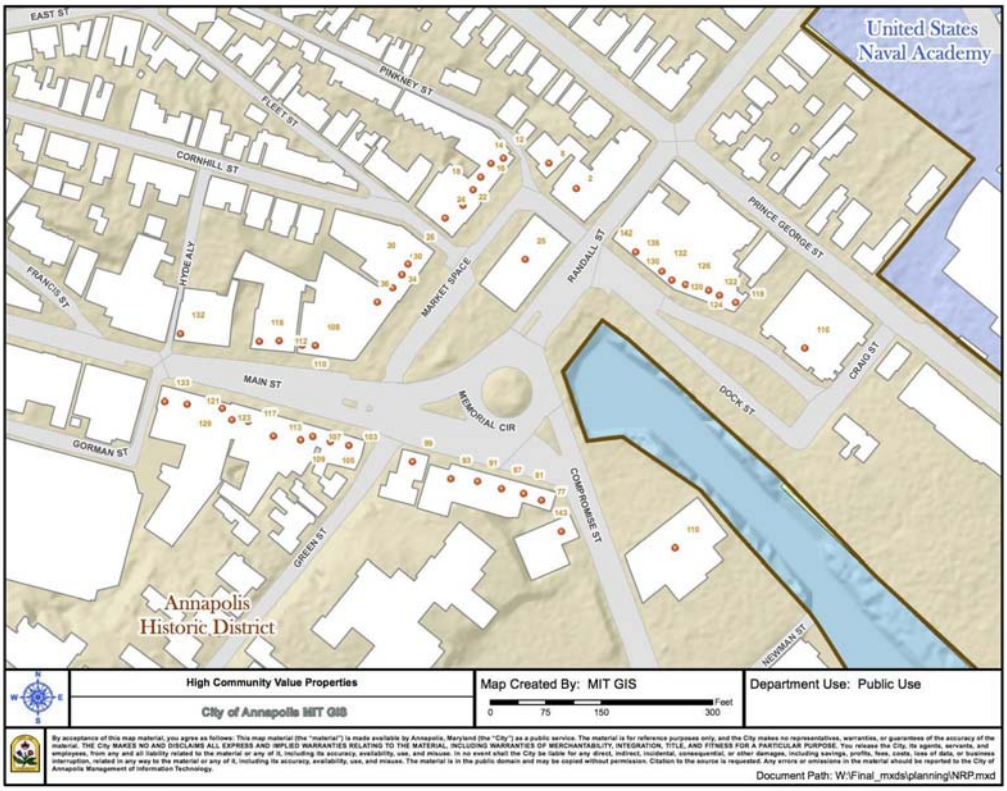
This study area boundary includes areas inundated by historic storm events such as the previously mentioned 2003 Hurricane Isabel and the hurricane of August 1933, both of which saw widespread flooding through Annapolis' waterfront neighborhoods.

The study area also allows coordination with ongoing efforts of the USNA as its facilities address this shared risk and exposure to sea level rise and flood hazards. Using the ten-foot contour allows for the inclusion of not only currently at-risk properties under the criteria mentioned above, but also includes a strategic risk and uncertainty buffer to allow response planning and the implementation process to adjust as sea levels rise and the exposure to storm surges and flooding continues.

Historic Properties Rated High for "Community Value"
The study area contains many buildings, both historic structures that contribute to Annapolis' national significance, as well as non-contributing structures (constructed after the 1942 end of the period of significance) that add to the physical context of the City's form, and the built and natural environment that provides various viewscapes to, through, and from the Historic District.

As these physical attributes are experienced by visitors and residents they define a character that is memorable and provides an image of Annapolis. It is this combination of the views, scale, rhythm, detail and physical layout that provides individuals with their unique characterization of the City.

Within the *Weather It Together* study area forty-five (45) properties have been given a "High Community Value Ranking." This FEMA-required ranking was determined with professional evaluation and community input through a series of online surveys, public meetings, workshops, and forums. The map below identifies properties in the study area that were determined to be of high community value.



High Community Value Properties

As the map indicates, the consensus of these surveys was to rank the area around the head of the City Dock, the Market House and lower Main Street as the character defining visual heart of Annapolis. Included in this area are the views towards landmarks and views outside of the study area; the harbor, Severn River and the Chesapeake Bay, Eastport across Spa Creek, and the views and vistas of the Maryland State House on State Circle, St. Anne's Church at the top of Main Street, the dome of the Naval Academy Chapel, and the chimneys and roofs of historic houses.

Economic Significance of the Historic District

The Annapolis historic district, including properties within the study area, is a key contributor to the City's economy, as well as that of Anne Arundel County and the State of Maryland. While this area represents only 3,688 residents (less than 10% of the City's population of 38,394) who reside within the study area, it generates close to 20% of the City's assessed value, despite the fact that the historic district contains the highest concentration of the City's tax-exempt properties. Other key economic considerations are as follows:

- Properties in the historic district consistently realize a higher rate (6.3%) of increased property value per year.
- More than one-quarter (26.9%) of the City's commercial properties are located in the Historic District, and their value represents 31.4% of the City's commercial assessable base.[22]

The economic vitality of the Historic District is critical to the City's future, if Annapolis is to retain its competitive edge in todays challenging tourism and real estate markets. The City must, therefore, work with property owners and residents to mitigate and adapt to the threat flooding poses to the historic downtown.

A Diverse Economy

Annapolis' economy has historically focused on government, education, maritime, hospitality, and leisure industries. Today, it is diversified with a mix of technology, retail, professional, and healthcare services. Still, a major part of the county's economy comes from the 6.89 million annual visitors attracted to Anne Arundel County and Annapolis by its vibrant and historic downtown.[23] Connie Del Signore, President and CEO of Visit Annapolis & Anne Arundel County sees Annapolis as the primary draw.

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[22] Donovan D. Rypkema," Economic and Fiscal Impacts of Historic Districts in Maryland", 9/1/98.

[23] The 2018 Annapolis Anne Arundel County Conference and Visitors Bureau Marketing Plan, July, 2017.

"History, architecture, colonial streetscapes and the beauty of the Chesapeake all combine to attract visitors to Annapolis and the greater Anne Arundel County," according to Del Signore.

Heritage Tourism

All of downtown Annapolis (one square mile) is a National Historic Landmark District. Within this historic downtown, restaurants, retail shops, museums, cultural attractions and recreational boating, along with the activities of National Historic Landmark United States Naval Academy create an inviting destination for world. Heritage Tourism[24] has become a major source of revenue for the City as heritage visitors generate greater economic impact -- they spend more per day, stay longer, and visit more places than tourists in general. The following statistics reflect the economic impact of the heritage traveler:

$62 more spent per day;
90% come with families;
55% spend nights away from home;
58% are employed full-time;
64% are visiting for the first time; and,
84% will return to bring others or "to take more time."[25]

According to *Visit Annapolis & Anne Arundel County*, the City's visitor bureau, Annapolis is one of Maryland's main tourism attractions, serving as a core destination for both day-trippers and overnight guests. The economic significance of the Annapolis Historic District can be measured, in part, by tourism's contribution to Anne Arundel County:

- Tourism is the fourth largest industry;
- Tourism wages total $932.3 million;
- 17% of private sector jobs are tourism jobs;
- Tourism's income tax and hotel property tax contributes over $22.8 million to the county's public education system;
- Each visitor generates $116 in tax receipts, $68 of which goes to state and local governments;

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[24] The National Trust for Historic Preservation defines Heritage Tourism as: "Traveling to experience the places, artifacts and activity that authentically represent the stories and people of the past. Heritage Tourism can include cultural, historic and natural resources'.

[25] *The Economics of Historic Preservation*, D. Rypkema.(Note: It should be noted that "Heritage or Cultural Tourism" has become an international growth industry, and a significant and growing part of the U.S. travel experience. William Norman, President and CEO of the Travel Industry Association of America.)

- Tourism tax revenues generate $87 million for the county; and,
- 70 cents of every $1.00 spent by travelers is retained within the county.[26]

Jobs and Revenue

The Historic District is a major generator of jobs and revenue for Annapolis, Anne Arundel County, and the State of Maryland. An estimated 2,800 small business jobs of the City's 32,465 jobs are located within the study area. The 73 businesses in the study area generate an estimated $319,588,033 in annual business activity:[27]

The study area, historically significant for its maritime industry, continues to be defined as a maritime center. Today the maritime industry is primarily recreational boating, fishing, sailing, and a racing hub with numerous events sponsored by the three yacht clubs located in Annapolis' harbor.[28] The two annual Annapolis Boat Shows are a great testament to the economic importance of the water to the local economy and the Historic District. Known worldwide, the Annapolis Boat Shows provide in excess of $112,000,000 (Visit Annapolis & Anne Arundel County, 2015) in annual economic benefit.[29]

The tourism, restaurant, and retail industries have grown in proximity to City Dock and its water-dependent activities. Within the study area there are 73 businesses contributing to Annapolis' economy. Thirty-eight (38) of these business, which are impacted by flooding on a regular basis, generate $166,360,894 in revenue. These businesses are at immediate risk due to ongoing hazard flooding.

While a detailed economic analysis was performed only for the 38 businesses that experience tidal flooding on a regular basis, it is certain that the boat shows and most, if not all, of the businesses in the study area are equally at risk from a 1% chance of annual flooding[30].

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[26] "The Economic Impact of Nuisance flooding on Annapolis," City of Annapolis Grant Proposal to FEMA, March 29, 2017.

[27] Extrapolation from detailed analysis of 38 businesses and the "Economic Impact of Nuisance Flooding'.

[28] Annapolis Yacht Club, Eastport Yacht Club and Severn Sailing Association.

[29]Cited in Paul Jacobs letter re: Crisis Flooding in Annapolis, from Visit Annapolis and Anne Arundel County, 2015.

[30] Definition for the 100 year and 500 year flood plain area.

Extrapolating from the detailed analysis of the 38 properties, it can be estimated that the revenue generated by all 73 businesses in the study area would generate approximately $319,588,033 in revenue. (This revenue estimate does not include the $112,000,000 estimated annual economic benefit generated by the Annapolis Boat Shows.) In addition, these 73 businesses represent $90,843,410 in total assessed value for commercial properties in the study area.

Not including Boat Show revenue, the direct economic value generated by the 38 businesses at risk from tidal flooding follows:

- Contributed $166,360,894 in annual business activity
- Employed 1,458 workers, earning an estimated $42,764,072 in annual income
- Housed in properties valued at $92,975,500
- Generated an estimated $973,443 in tax revenues[31]

Type and Value of Properties in the Study Area

Within the study area, there are a total of 156 properties, 104 of which are historic properties. These properties range in type from residential and commercial to educational and government buildings. The total assessed value for all the properties in the study area is $183,847,064, of which 65% is the value of Historic Properties.

Just as the businesses within the study area realize significant economic revenue for the City, County and State, the historic buildings in which they operate add both directly and indirectly, hundreds of millions of dollars to the region. Outside of property tax revenues, these buildings generate local jobs for the trade industry, provide student and workforce housing and space for nonprofit groups to meet. Thus, for the protection of these places and the people who are dependent on these buildings for their livelihood, living and civic engagement, it is imperative that the *Weather It Together* plan be implemented immediately to protect these resources at risk.

Housing and Demographics

The 2010 Census shows that Annapolis has continued to experience growth, investment, and neighborhood stability. The 2010 Census counted 38,394 city residents with 16,136 households in Annapolis. In the years since the 2010 Census, the Maryland Department of Planning (MDP) estimates that the City grew to 38,565 by 2013. Over the past century, Annapolis has enjoyed a moderate, but steady growth in population. A

[31] "Economic Impact of Nuisance Flooding in Annapolis:, City of Annapolis Grant Proposal to FEMA, March 29 2017.

spike in growth occurred with major expansion through annexation in the 1950s. The growth rate between the last two Censuses (2000-2010) was 7.1% (*Annapolis Comprehensive Plan*, 2009). A slowing growth rate had been predicted due to the built-out nature of this historic city. However, infill and redevelopment activity, such as the redevelopment of the old hospital site, challenge that assumption.

With the trend toward higher density residential projects, annexation, and development of small, infill sites throughout the City, it is anticipated that population will continue to grow at a slightly greater pace than predicted. The strong regional job market, coupled with the demand for housing in Annapolis, is fueling the increase in both rental and ownership units in the City.[32]

Population Characteristics

The population for the study area Census Tract is 3,686 with 1,719 households. The population in these households is largely adult, with 2,895 people older than 18 years old. This is also reflected in the study area Census Tract datum of an average household size of 1.92 persons.

This more mature and stable population presents an opportunity for the City of Annapolis to work long-term, through the recommended Resilience Office to involve these study area residents in implementing solutions to mitigate future flooding.

Income and Employment

The Census Tract for the study area can be characterized by an income level that is slightly higher than the City as a whole and employment that is primarily professional, management, business, and educational alongside the retail sales and restaurant service industry. Many of these businesses, their employees, and their livelihoods are directly threatened by the frequent flood events that occur in the study area.

The 2007-2011 American Community Survey reported that the per capita income for the City of Annapolis was $42,901 while the median household income was $82,481.

Employment

According to the 2007-2011 American Community Survey, 72% of the City's residents 16 years of age and over were considered a part of the labor force in 2011.

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[32] 2010 census data has been utilized for the City as a whole and for the 7061.01 Census Tract (which incorporates all of the study area). The 2007-2011 American Community Survey data was also used for comparison of income and employment.

The class of worker consisted primarily of private wage and salary workers (71%), government (24.2%), and self-employed workers (4.7%).[33]

Of the 3,242 persons over age 16 within the study area Census Tract, 2,133 (65.8%) were identified as being in the Civilian Labor Force in the 2010-2014 American Community Survey. The occupations and industries identified for the study area (see charts below) emphasize management, business, and science as well as services and sales with almost 50% in professional, finance, management, education, and health care.

STUDY AREA CENSUS TRACT EMPLOYMENT TABLE

	Estimate	%
Civilian employed population 16 years and over	**1,943**	**100%**
Management, business, science and arts occupations	1,073	55.2%
Service Occupations	337	17.3%
Sales and Office occupations	497	25.6%
Natural resources, construction, and maintenance occupations	12	.6%
Production, transportation, and Material moving occupations	24	1.2%

[33] 2007-2011 American Community Survey.

STUDY AREA CENSUS TRACT INDUSTRY TABLE

	Estimate	%
Civilian Employed Population 16 years and over	**1,943**	**100%**
Agriculture, forestry, fishing **and** hunting, mining	9	0.5%
Construction	42	2.2%
Manufacturing	62	3.2%
Wholesale Trade	70	3.6%
Retail Trade	126	6.5%
Transportation, and warehousing and utilities	28	1.4%
Information	39	2%
Finance and insurance, and real estate and rental and leasing	199	10.2%
Professional, scientific, and management, and administrative and waste	391	20.1%
Educational services, and Health Care and Social assistance	346	17.8%
Arts, entertainment, and recreation, and Accommodation and food services	217	11.2%
Other Services, except Public Administration	249	12.8%
Public Administration	165	8.5%

Housing Characteristics

Numerous studies have shown that historic preservation and Historic Districts stabilize neighborhoods by enhancing property values, encouraging reinvestment, maintaining or enhancing tax revenue collections, and providing housing and jobs.

Socially, historic preservation attracts people to their community, provides a sense of place, connects them to their neighbors and encourages public participation.[34]

Annapolis is no exception as it boasts a vibrant historic downtown with a continuing low vacancy rate for properties in the Census Tract for the study area. For the City of Annapolis as a whole, the 2010 Census identified 17,845 housing units with 89% occupied. The vacancy rate for all homeowner units in the City of Annapolis was 3.8%, with a higher vacancy rate of 7.3% for rental units. Fifty-four and a half percent (54.5%) of the housing stock citywide is owned-occupied and 45.5% is rental, with a median home value for 2013 of $356,300. In the study area, 85% of all housing units were occupied in 2010, with 40.5% owner occupied and 59.5% renter occupied.

The following chart depicts the 2010 Housing Units by Type within the study area:

HOUSING OCCUPANCY FOR HISTORIC DISTRICT CENSUS TRACT

	Number	Percent
Total Housing Units	**2,023**	**100%**
Occupied Units	1,719	85%
Vacant Units	304	15%
Homeowner Vacancy Rate	(%)	3.7%
Rental Vacancy Rate	(%)	9.5%

[34] *The Economics of Historic Preservation*, D. Rypkema.

HOUSING TENURE FOR HISTORIC DISTRICT CENSUS TRACT

	Number	Percent
Occupied Housing Units	**1,719**	**100%**
Owner-Occupied Housing Units	697	40.5%
Renter-Occupied Housing Units	1,022	59.5%
Population in Owner-Occupied units	1,486	
Population in Renter-Occupied Units	1,811	
Average Household size Owner-Occupied	2.13	
Average Household size Renter-Occupied	1.77	

In conclusion, the study area remains stable with moderate growth and a strong job market. The incomes in the study area are slightly higher than the City at large with management, professional and business services leading the employment categories. The historic area continues to experience a low vacancy rate with 85% occupancy of which 40.5% is owner occupied and 59.5% is rental. The potential for future flooding and ongoing storm surge threatens the stability of this healthy historic residential neighborhood as well as the commercial properties.

Responding to the Threat

Just as data has been gathered on the historic and economic assets at risk in the study area, scientific data on the rate and elevation of sea level rise and the increased number of nuisance flooding days has been collected for analysis in the *Weather It Together* plan. As Annapolis experiences the highest rate of flooding of any community on the Atlantic Coast, higher tides, subsidence, and extreme precipitation is a concern for those who live beyond the 16.5 miles of city waterfront, along the 11,684 miles of shoreline that shape the Chesapeake Bay.

With its expansive coastline, low-lying topography, and growing coastal population, this area is among the most vulnerable places in the nation. Many reports note the complete disappearance of Chesapeake Bay islands. "Since the colonial-era at least 13 islands in the Chesapeake, some of more than a thousand acres and with established

communities, have been completely erased from the map of the Bay due to a combination of sea level rise induced erosion and inundation."[35]

The Governor's Commission on Climate Change issued the *Maryland Climate Action Plan* in 2008 to address sea level rise and coastal storms with the purpose of protecting the state's future economic well-being, environmental heritage, and public safety through legislative and policy actions. Among those actions is promoting state-and-local-level "programs and policies aimed at the avoidance and reduction of impact to the existing built environment, as well as to future growth and development in vulnerable coastal areas."

The *Maryland Climate Action Plan* evaluated three possible responses to sea level rise: protect, retreat/relocate, and abandon. 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 focuses on protecting existing structures and infrastructure.[36]

As Annapolis celebrated its 50th anniversary as a National Historic Landmark in 2015, efforts were well underway to ensure protection of the historic landmark city for the next 50 years. City, state, and federal government leaders gathered at the U.S. Naval Academy (USNA) at a Congressional forum, "Climate Change at the Water's Edge" on July 17, 2015, to discuss the costly disruption of flooding on coastal communities, the endangering of natural ecosystems, and the threat to national security. Heritage partners in Annapolis renewed the commitment to implementing protective measures to strengthen the community's response to climate change.

Annapolis is responding to the threats of natural and manmade disasters by updating the citywide *Natural Hazard Mitigation Plan* (HMP) to address various risks prevalent in the region. The accelerating rate of sea level rise and the devastation seen in the aftermath of Hurricane Sandy have created a sense of urgency in Annapolis for amending the HMP to include the protection of cultural resources. *Weather It Together:*

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[35] MD DNR, Summary and Analysis of the Report "The Economic Cost of Sea Level Rise to Three Chesapeake Bay Communities" Jeffrey Michael, PhD Towson University Prepared by MD DNR Coastal Zone Management Division – July 2004

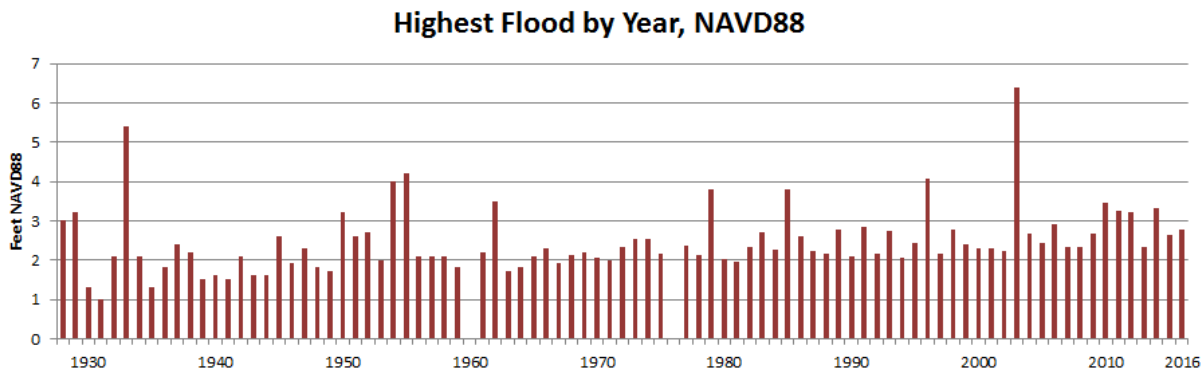
[36] Comprehensive Strategy for Reducing Maryland's Vulnerability to Climate Change Phase I: Sea-level rise and coastal storms – Report of the MD Commission on Climate Change Adaptation and Response Working Group – 2008

A Cultural Resource Hazard Mitigation Plan for the City of Annapolis addresses this concern. It identifies, assesses, and attempts to avoid or lessen potential loss to historic resources due to natural disasters, primarily threats from sea level rise, subsidence (i.e., the lowering of the land surface), tidal flooding, and extreme storm events.

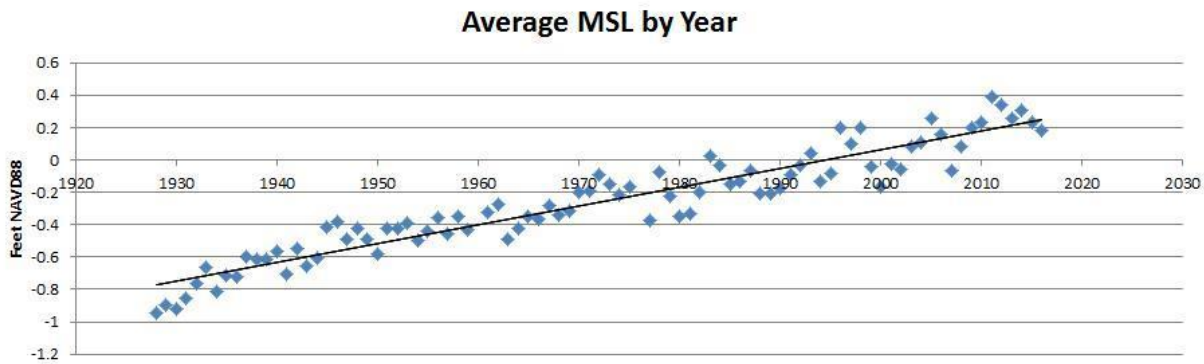
CHAPTER 2: HAZARD TYPE - COASTAL FLOODING

Annapolis Flood Risk and Sea Level Rise

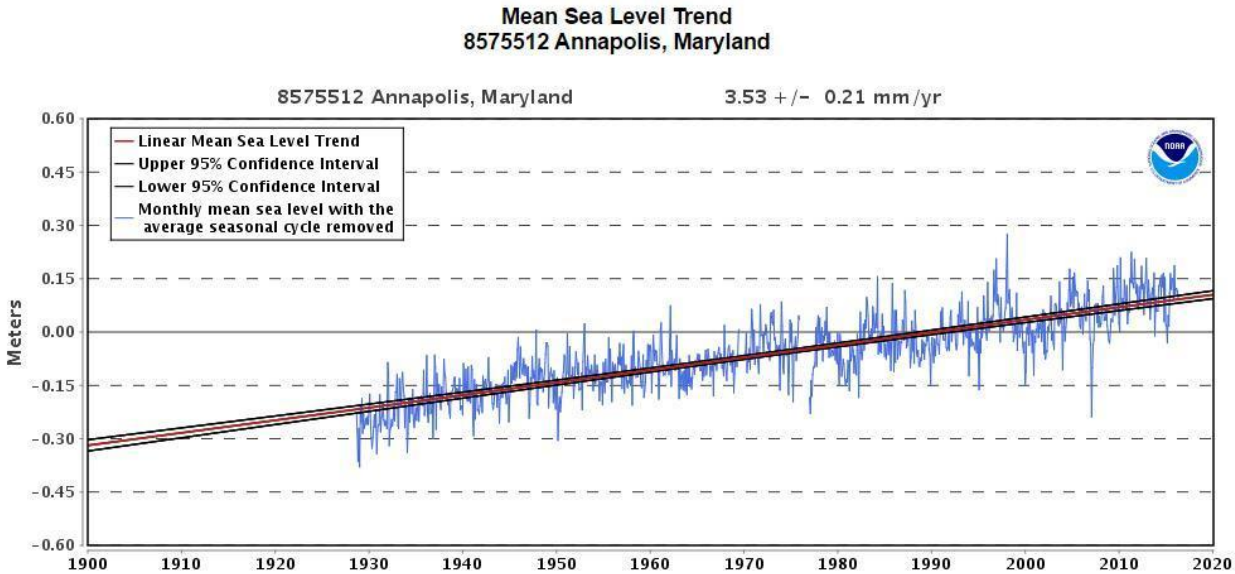
Annapolis is well-equipped to understand flooding events and flood history. The National Oceanic and Atmospheric Administration (NOAA) operates a tide metering station at the U.S. Naval Academy that measures water level every 6 seconds. NOAA provides historical data for Annapolis dating back to 1928 via its website, https://tidesandcurrents.noaa.gov/sltrends/sltrends_station.shtml?stnid=8575512 .



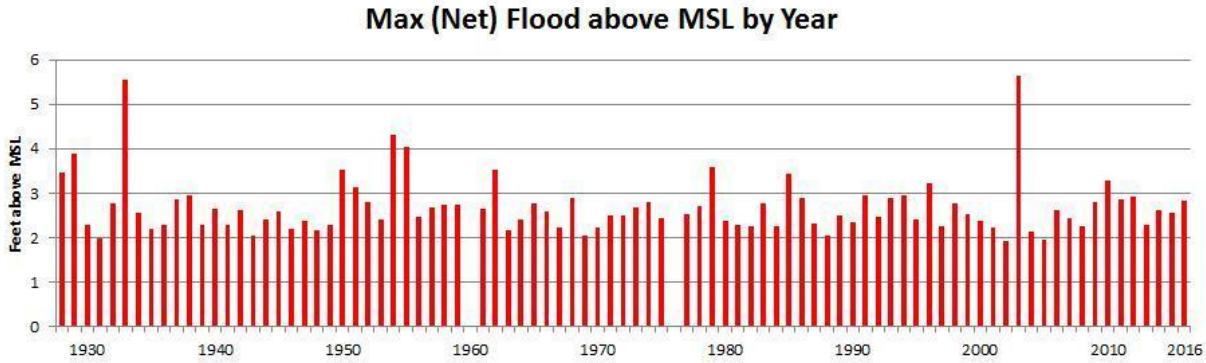
The figure shows the highest observed water in each year since 1928 (except 1960 and 1976). Notice the floods from storm surges in 2003 (6.4 feet, Hurricane Isabel) and 1933 (5.4 feet).



The average or mean sea level (MSL) over the same time period reveals a trend of rising sea level. The trend in sea level rise is clear and relatively consistent over the 20th century as shown in NOAA's historical analysis of sea level rise at Annapolis.



The sea level rise trend is buried in the flood history shown in the first figure. If the sea level trend is removed from the flood history, the net flood on top of the rising sea can be seen.



Of note is the 1933 storm (5.6 feet above the average or mean sea level for 1933, MSL_{1933}) and Hurricane Isabel in 2003 (5.6 feet above MSL_{2003}). Both storms produced nearly identical storm surges. However, Hurricane Isabel's storm surge arrived on a 2003 sea that was almost one foot higher than the 1933 sea.

In order to describe floods and flood risks, it is helpful to understand definitions of the elevations used. Most elevations used in this report and in the most recent FEMA flood maps express elevations in relation to the North American Vertical Datum 1988, or NAVD88. This is a standard reference that is used to make measured elevations across most of North America consistent. For example, 4.8 feet NAVD88 means an elevation

4.8 feet above the reference North American Vertical Datum 1988 and means the same in Annapolis as it does in Seattle.

Potential flood elevations are used to describe flood risk. A flood with **1 chance in 100 of occurring in single year** is the 1:100 annual probability flood or 1% annual chance flood. Sometimes the 1:100 annual probability flood or 1 % annual chance flood is referred to as the 100 year flood, however, this is not technically correct. The elevation that water from a calculated (hence theoretical) 1% annual chance flood would equal *or exceed* is the 1% annual chance flood elevation. Higher still is the 0.2% annual chance flood elevation, the elevation that water from a calculated 1:500 annual probability flood would equal *or exceed*.

The 1% annual chance flood elevation is codified into the National Flood Insurance Program (NFIP). For the NFIP, a 1% annual chance flood is called a base flood and a 1% annual chance flood elevation is called the Base Flood Elevation (BFE). The NFIP formally defines flood hazard areas, Special Flood Hazard Areas (SFHA), based on the 1% annual chance flood elevation or BFE, "as the area that will be inundated by the flood event having a 1% chance of being equaled or exceeded in any given year."

People often refer to the area on a map or in a region where the land surface elevation is equal to or less than the BFE as the flood plain. The NFIP more formally breaks SFHAs into zones depicted on Flood Insurance Rate Maps (FIRM). As the name implies, flood insurance rate maps are used to determine flood insurance rates for the NFIP and by lenders for determining if flood insurance is a requirement for a mortgage on a particular property.

In 2015, FEMA conducted a Flood Insurance Study (FIS) that calculated flood probability levels for the Annapolis region. Near Annapolis's City Dock, the BFE was calculated in 2015 to be 4.5 feet NAVD88 (http://map1.msc.fema.gov/data/24/S/PDF/24003CV000B.pdf?LOC=1dc829932e8099d61bebb83981a195fd).

Recall that BFE is the elevation that a calculated 1% annual chance flood will reach *or exceed*. *Or exceed* is important to remember. Annapolis has experienced at least 2 floods that exceeded the BFE in the last 100 years. The demonstrated implication is that properties above the so-called flood plain may experience a flood.

Design Flood Elevation, DFE, is the elevation used for designing new structures and in building codes. DFE includes a margin or *freeboard* above the BFE. Consistent with

current norms, Annapolis utilizes a DFE that is BFE plus two feet. Note that a FEMA technical advisory group has recommended that DFE be raised to BFE plus three feet.

The National Weather Service, NWS, also measures and tracks flood elevations in Annapolis. These include NWS Flood Stage and NWS Moderate Flood Stage. The NWS Flood Stage elevation is used to track the days of nuisance flooding in Annapolis that have attracted national attention. Nuisance flooding is defined as flooding that creates inconvenience but generally does not directly damage property. Note that nuisance flooding, due to extraordinarily high tides, occurs regularly on sunny days in Annapolis.

Top 10 U.S. Areas with an Increase in Nuisance Flooding*

	"Nuisance level": Meters above mean higher high water mark	Average nuisance flood days, 1957–1963	Average nuisance flood days, 2007–2013	Percent Increase
Annapolis, MD	0.29	3.8	39.3	925

From NOAA, U.S. Climate Resilience Toolkit, https://toolkit.climate.gov/topics/coastal-flood-risk/shallow-coastal-flooding-nuisance-flooding

Current (2017) Annapolis flood elevations are listed in the following table:

Elevations near City Dock, NAVD88	Flood Elevation Name
1.63 feet	NWS Flood Stage. See https://water.weather.gov/ahps2/hydrograph.php?wfo=lwx&gage=apam2
2.53 feet	NWS Moderate Flood Stage, NWS
3.6 feet	10% annual chance flood elevation (1 chance in 10 in any given year of flooding to or beyond this elevation).*
4.5 feet	1% annual chance flood elevation (1 chance in 100 in any given year of flooding to or beyond this elevation).*
5 feet (4.5 feet rounded up)	Base Flood Elevation, BFE, according to FEMA Flood Insurance Rate Map (2015)
5.8 feet	0.2% annual chance flood elevation (1 chance in 500 in any given year of flooding to or beyond this elevation).*
6.4 feet	Hurricane Isabel flood height in 2003 (observed at NOAA's Annapolis tide metering station at 11:54 on 09/19/2003; see https://tidesandcurrents.noaa.gov/datums.html?id=8575512). Note that Isabel flood exceeded the 0.2% annual chance flood elevation.
7 feet	Design Flood Elevation, DFE

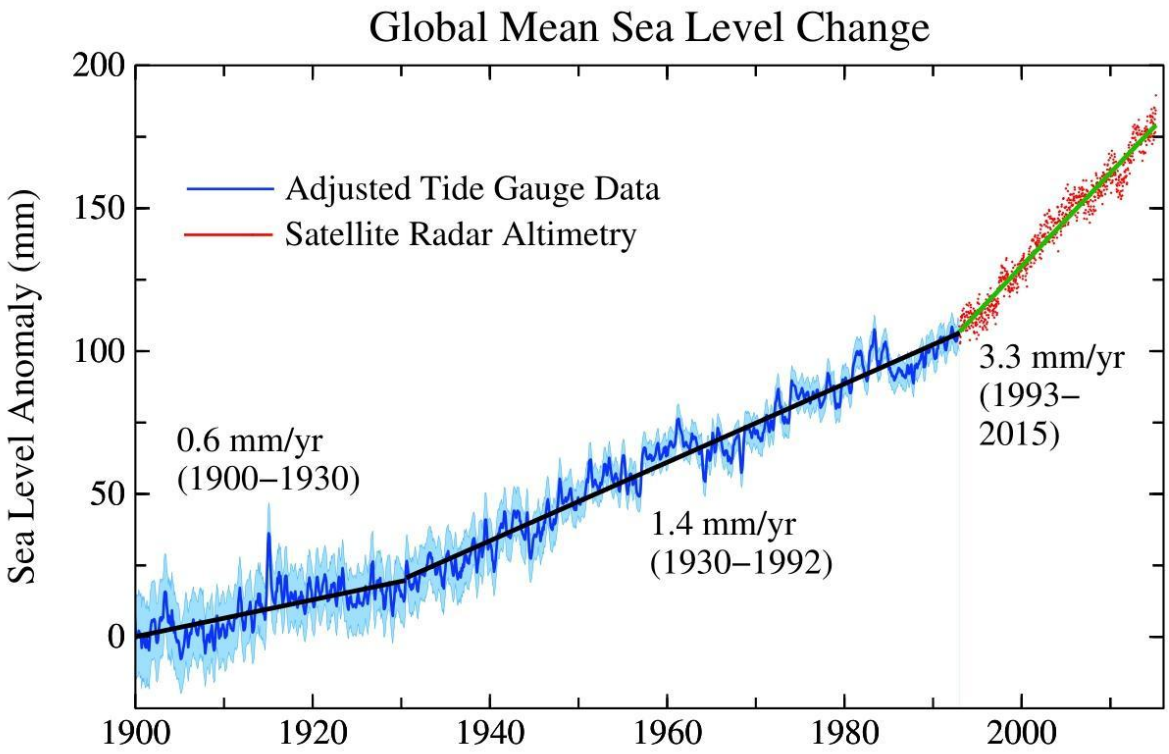
** Elevation data from Transect 50, FEMA Flood Insurance Study Number 24003CV000B, February 18, 2015*

Parking lot near City Dock flooded by seawater at 2 feet NAVD88
Photo credit: Lisa Greico, City of Annapolis

With rising sea levels and calculated flood elevations, the likelihood of flood occurrences is increasing. In other words, the 1% annual chance flood elevation calculated in 2025 can be expected to be higher than the 1% annual chance flood elevation calculated in 2015.

BFE as determined by a flood insurance study and depicted on a FEMA flood insurance rate map is static and fixed at the date of the study. It remains fixed until a new flood insurance study is conducted and the FEMA flood maps are updated. This fixed and static feature of BFE is a result of the FEMA update process, and does not fully reflect increasing flood risk caused by rising seas.

The sea is continuing to rise at an accelerated rate. This implies that future floods will arrive on a higher sea.



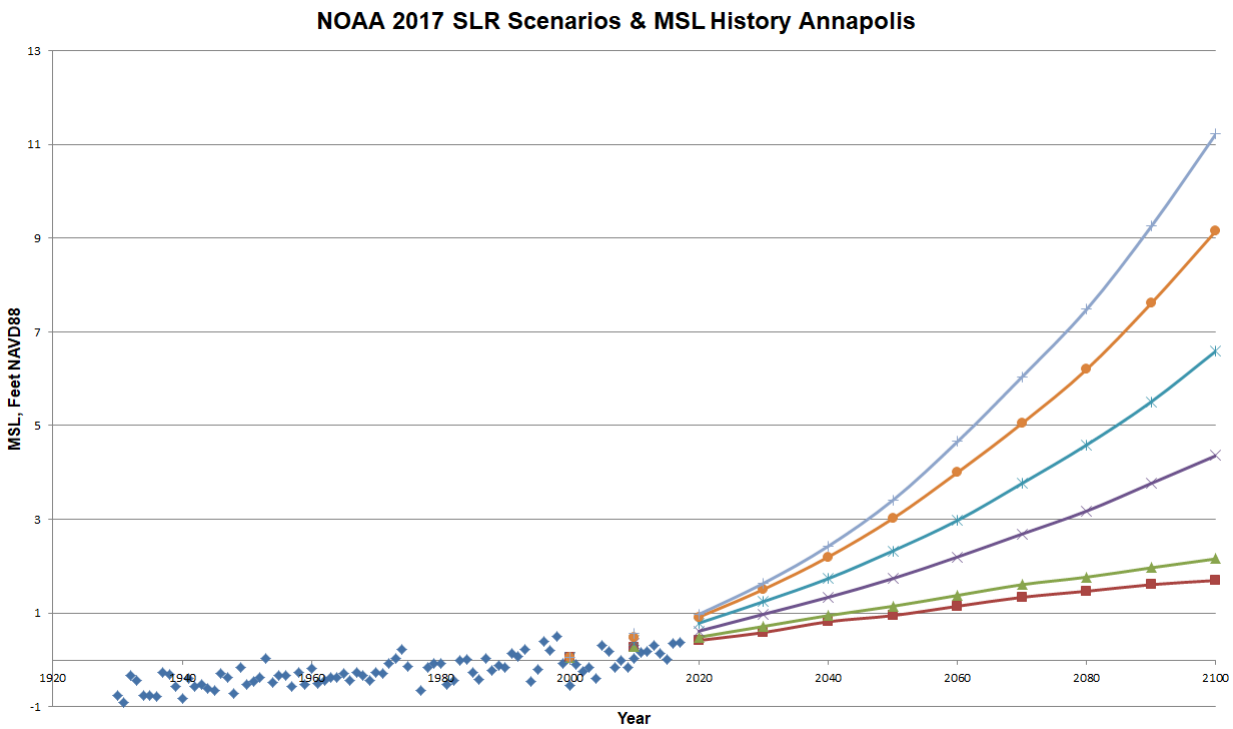
J. Hansen et al., 2016: Ice melt, Sea Level Rise and Superstorms[37]

Many factors contribute to local sea level rise but three are most prominent: thermal expansion as the oceans warm, melting of land ice, and local land subsidence. Land subsidence in Maryland is estimated to be 0.067 inches per year, or about 7 inches over a century. Global sea level rise from thermal expansion continues. Global sea level rise from ice melt in Antarctica and Greenland is accelerating.

Science indicates the sea will eventually rise in response to current temperature conditions to levels above any elevations discussed in this report. However, science cannot directly predict the path and timing the sea will take as it rises higher. Rather, scenarios for sea level rise were developed based on plausible sea level events in nature. These scenarios are used by the National Climate Assessment, NOAA, and U.S. Army Corps of Engineers (USACE) for planning.

[37] Hansen, J., Sato, M., Hearty, P., Ruedy, R., Kelley, M., Masson-Delmotte, V., Russell, G., Tselioudis, G., Cao, J., Rignot, E., Velicogna, I., Tormey, B., Donovan, B., Kandiano, E., von Schuckmann, K., Kharecha, P., Legrande, A. N., Bauer, M., and Lo, K.-W.: Ice melt, sea level rise and superstorms: evidence from paleoclimate data, climate modeling, and modern observations that 2 °C global warming could be dangerous, Atmos. Chem. Phys., 16, 3761-3812, https://doi.org/10.5194/acp-16-3761-2016, 2016.

In January 2017, NOAA published a new set of sea level rise scenarios to be used in the next update to the U.S. National Climate Assessment. This technical report, led by Dr. William Sweet, a NOAA scientist and Annapolitan, published sea level rise scenario data localized to Annapolis—meaning it includes local effects such as land subsidence.[38] The new scenarios are shown here along with the measured history of sea level for Annapolis.



NOAA Technical Report NOS CO-OPS 083, Global and Regional Sea Level Rise Scenarios for the United States, Sweet et.al, January, 2017

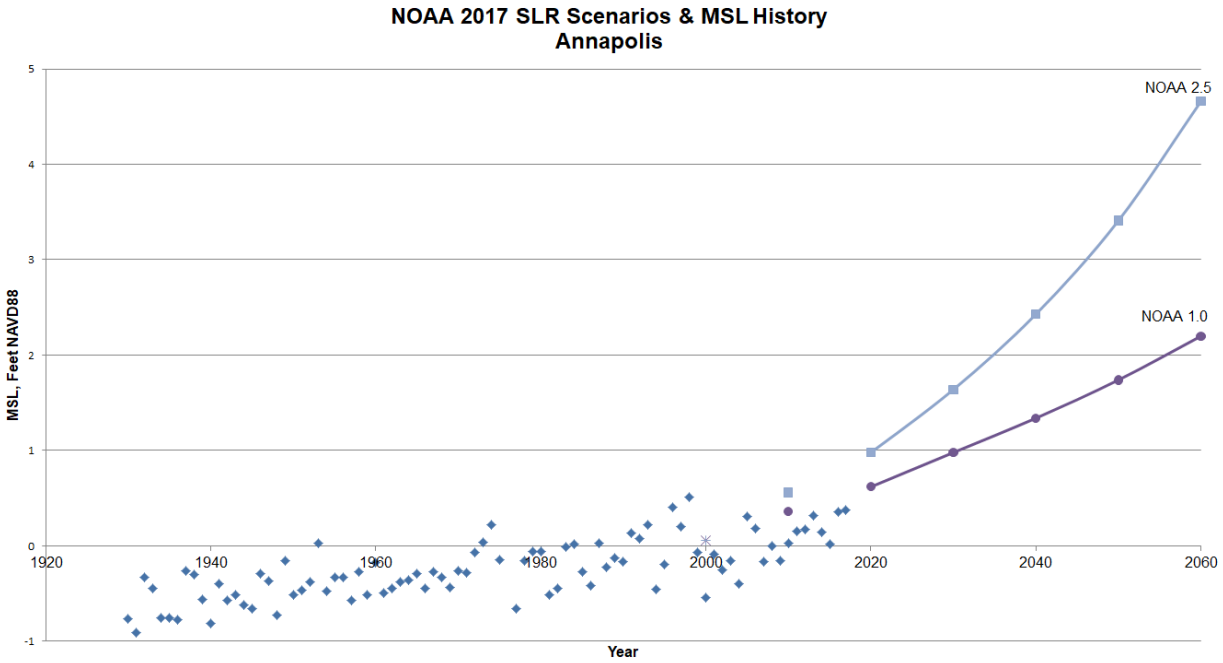
Things to keep in mind about these scenarios:

- Nature may not follow smooth lines as evidenced by the Annapolis sea level history prior to 2017.
- Surprises, such as collapse of a major ice system in Antarctica, could result in a jump from one scenario to another.
- New scenarios and revisions will be published in the future as the science develops. Always confirm that you are using the most current sea level rise scenarios.

[38] Sweet, William V., "Global and Regional Sea Level Rise Scenarios for the United States," NOAA Technical Report NOS CO-OPS 083, January, 2017.
https://tidesandcurrents.noaa.gov/publications/techrpt83_Global_and_Regional_SLR_Scenarios_for_the_US_final.pdf

For the purposes of the *Weather It Together* plan, two scenarios were selected from which to consider consequences: NOAA 1.0 (~1.7 feet by 2050) and NOAA 2.5 (~3.4 feet by 2050). While there is no reason to think NOAA 2.5 *will* occur, it would be irresponsible to disregard the possibility since the scientific community has identified and published it as plausible. During the next 10 or 20 years, choice of scenario may not be material to the decisions that need to be made, since most decisions anticipated in the next 5 years by this planning effort do not change materially with choice of different sea level rise scenarios.

NOAA sea level rise scenarios are named by the number of meters of global sea level rise at year 2100. For example, NOAA 1.0 is a scenario where 1.0 meters of global sea level rise occurs by year 2100, NOAA 2.5 is 2.5 meters of global sea level rise, and so on.



Annapolis Sea Level History and NOAA (2017) Sea Level Rise Scenarios 1.0 and 2.5

The *Weather It Together* plan will be updated in 5 years and these or new scenarios will be re-assessed then. Adaptation decisions will also be made by the City of Annapolis between now and the next plan publication date. For example, a storm water system update project is currently under consideration for the study area. The engineering contractor for the project indicates the system will be designed for a 40-year useful life. Assuming that the project is approved and completed by 2020, design useful life would extend to 2060. This indicates that sea level rise scenarios through 2060 (as shown in the

graph) and potential floods that will ride on top of sea level may inform project design decisions.

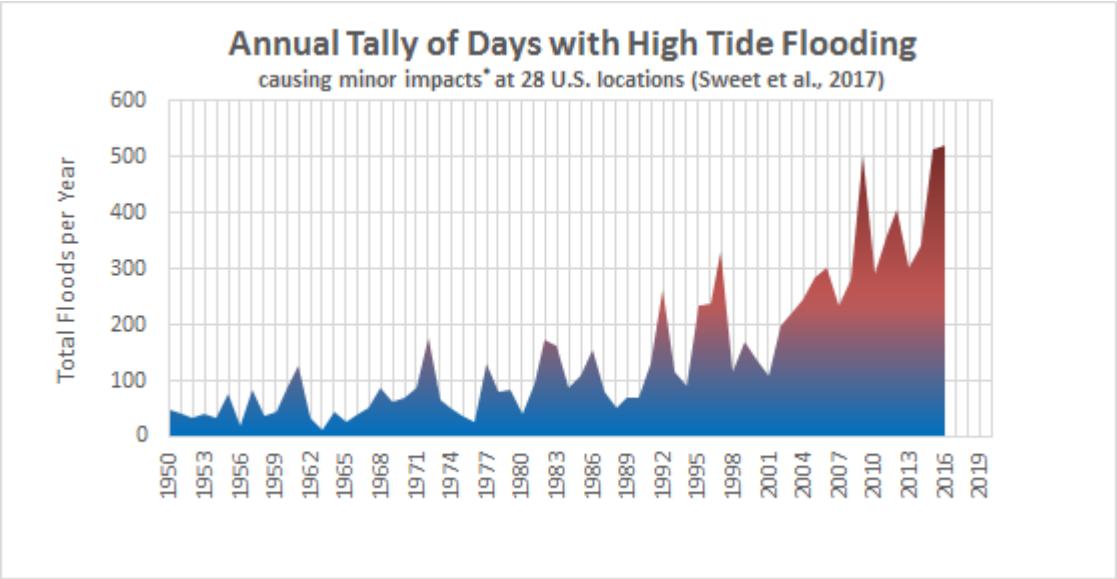
Here is what is known:

- Sea level is rising and the rate of rise is accelerating. This is known from measurements.
- Properties and elevations that currently flood will experience more frequent and deeper flooding. This is demonstrated by the measured increase in nuisance flooding in Annapolis, and
- Additional properties with elevations near the elevations of properties that currently experience flood on top of seas in 2017 will experience unprecedented flooding in the future.

There are at least two ways to describe how the published science will affect people in Annapolis.

First, flooding experienced in 2017 can be described by the annual frequency of flooding. NOAA and the National Weather Service keep track of nuisance flood events. Nuisance floods are waters that rise above a certain, locally-defined threshold elevation (1.63 feet NAVD88 for Annapolis near City Dock). *Nuisance* connotes inconvenience but no substantial damage to structures. NOAA reported an average of 3.8 days per year with nuisance floods in Annapolis during the period 1957–1963. During the period 2007–2013, Annapolis experienced an average of 39.3 days with nuisance floods, a 925% increase and the City with the greatest increase according to a 2014 NOAA technical report (see http://www.noaanews.noaa.gov/stories2014/20140728_nuisanceflooding.html).

A more recent NOAA report shows the trend at 28 U.S. locations.



(Sweet et.al. 2017)

The level of flooding shown in the following picture may occur at high tide every day by the 2040s, under the NOAA 1.0 scenario.[39]

[39] William V. Sweet, John J. Marra, Gregory Dusek, National Oceanic and Atmospheric Administration's Center for Operational Oceanographic Products and Services and National Centers for Environmental Information, 2016 State of U.S. High Tide Flooding and a 2017 Outlook. https://www.ncdc.noaa.gov/monitoring-content/sotc/national/2017/may/2016_StateofHighTideFlooding.pdf

Flooding at Annapolis City Dock at 2 feet NAVD88, April, 2017 *Photo credit: Alicia Moran*

Second, floods are increasing in elevation. As sea level rises, floods on top of a rising sea also rise and move farther inland and upslope, threatening properties not currently experiencing flooding.

To illustrate, consider the familiar flood elevation of two feet NAVD88 shown in the above photo. Today, two of the 140 properties in the study area for which the Weather It Together team has elevation data flood at two feet NAVD88. The same conditions that result in those two feet of flooding and two flooded properties in 2017, will produce ~3.7 feet of flood and flood 23 properties by the 2050s under the NOAA 1.0 scenario (~5.4 feet of flood and flood 45 properties under the NOAA 2.5 scenario).

Many people living in Annapolis have vivid memories of flooding from Hurricane Isabel, (2003) which rose to 6.4 feet NAVD88. At 6.4 feet, 60 out of 140 properties with known elevations in the study area would flood. If an Isabel-equivalent storm surge happens in 2050, 95 out of 140 properties would flood in the NOAA 1.0 scenario and 118 out of 140 properties (84%) would flood in the NOAA 2.5 scenario.

CHAPTER 3: CONSIDERING CULTURAL RESOURCES IN HAZARD MITIGATION PLANNING

Branded early on as *Weather It Together,* this hazard mitigation planning effort engaged a variety of stakeholders at the community, state, and national level. The process began in 2013 when the City of Annapolis secured funding to develop the plan from the National Trust for Historic Preservation, Preservation Maryland (the statewide preservation organization), the Maryland Historical Trust (the state historic preservation office) and the Maryland Department of Natural Resources. It follows the approach recommended by the Federal Emergency Management Agency's (FEMA's) "how-to guide" for state and local government mitigation planning, entitled *Integrating Historic Property and Cultural Resource Considerations into Hazard Mitigation Planning* (FEMA 386-6).[40]

With completion of this critical planning effort, this historic city has successfully updated the *Annapolis Natural Hazard Mitigation Plan* (HMP), incorporating as an addendum, *Weather It Together: A Cultural Resource Hazard Mitigation Plan (*CRHMP). Updating the Annapolis HMP to incorporate a CRHMP results not just in a model hazard mitigation plan, but a model planning process, which is replicable for other historic communities planning for flooding hazards.

FEMA defines hazard mitigation planning as "the process of determining how to reduce or eliminate the loss of life and property damage resulting from natural and manmade hazards."

Annapolis is using FEMA guidance for hazard mitigation planning to craft the nation's first comprehensive cultural resource plan to address the threat of flooding to a historic coastal community. Tailoring this preservation plan for the Annapolis National Historic Landmark District to meet the requirements of a hazard mitigation plan has required significant work on the part of dozens of local professionals, hundreds of technical experts and thousands of individuals engaged with *Weather It Together*.

[40] For purposes of this plan, all references to FEMA guidance are in reference to the "how-to" publication for cultural resource hazard mitigation planning, unless otherwise stated.

This significant commitment of resources from public and private stakeholders has resulted in the City of Annapolis serving as a model community for cultural resource hazard mitigation planning. Thus, while the *Weather It Together* plan serves as a starting point for Annapolis' own resiliency efforts, the document plays a leading role as a model community-based planning process for other historic coastal communities. Of course, the FEMA framework for incorporating cultural resources in hazard mitigation is a critical a starting point, but the measures used by Annapolis -- how the historic survey was conducted, community members engaged, property vulnerability assessed, costs and losses estimated, properties prioritized, and adaptation strategies evaluated -- established a practical, replicable approach to hazard mitigation planning for historic communities. Enough so that the resulting Annapolis CRHMP establishes goals and objectives with project-specific actions, work products, cost estimates, timeframes and staffing to support the plan's implementation over the coming five-year period.

Within the FEMA framework there are four phases in the development of a cultural resource hazard mitigation plan. These phases and the individual steps represent an integration of the historic preservation planning and hazard mitigation planning processes.

Phase One: Organize Resources

- Step One: Assess Community Support
    - Determine Community Awareness of Historic Properties and Cultural Resources
    - Identify Resources Available for Hazard Mitigation
- Step Two: Build the Planning Team
- Step Three: Engage the Public

Phase Two: Assess Risks

- Step One: Identify the Hazards
- Step Two: Profile the Hazards
- Step Three: Inventory Historic Property and Cultural Resource Assets
    - Assess vulnerability potential
    - Research past disasters
    - Conduct a survey
    - Establish Preservation Priorities
- Step Four: Estimate Losses
    - Determine the extent of damages
    - Calculate the total loss for each hazard

Phase Three: Develop a Mitigation Plan

- Step One: Develop Mitigation Goals and Objectives
    - Review and analyze the risk assessment findings
    - Formulate goals
    - Determine objectives
    - Gather public input
- Step Two: Identify, Evaluate, and Prioritize Actions
    - Identify alternative mitigation actions
        - Mitigation Action Category #1: Prevention
        - Mitigation Action Category #2: Property and Resource Protection
        - Mitigation Action Category #3: Structural Diversions
        - Mitigation Action Category #4: Public Education and Awareness
        - Mitigation Action Category #5: Natural Resource Protection for Historic Landscape Features and Archeological Sites
    - Identify and analyze State and local mitigation capabilities
    - Evaluate, select, and prioritize specific mitigation actions
        - Evaluate alternative mitigation actions
        - Select mitigation actions
        - Prioritize selected mitigation actions
- Step Three: Prepare an Implementation Strategy
    - Identify how mitigation actions will be implemented
        - Identify parties, define responsibilities, and confirm partners
        - Identify resources to implement the actions
        - Define the time frame for implementing the actions
    - Document the implementation strategy
- Step Four: Incorporate Historic Property and Cultural Resource Protection Efforts into the Hazard Mitigation Plan

Phase Four: Implement the Plan and Monitor Progress

- Step One: Consider sensitivity of information
- Step Two: Consider required Regulatory Review
- Step Three: Consider interagency coordination Agreements
- Step Four: Consider evaluating and updating the plan
- Step Five: Updating the inventory data

Phase One: Organize Resources

Step One: Assess Community Support

Every successful local planning effort begins with collaboration, data collection and community engagement. Whether collaboration begins between City agency staff or

between City staff and community leaders, communication, coordination, and data collection require sensitivity to the existing program or organizational priorities of each partner and the community. FEMA's guidance suggests bringing local and state partners from both public and private sectors into the planning dialogue early to help set the direction for the hazard mitigation planning process. The FEMA guidance as to which players to engage served as the starting point for the Annapolis planning effort.

Clearly, cultural resource identification and vulnerability assessment work must be advised by those deeply involved in heritage. The relationship between the City's Historic Preservation Division (HPD) staff and the National Trust for Historic Preservation (NTHP) initiated the project with the two organizations identifying the impacts of sea level rise as the most significant long-term threat to the National Historic Landmark District.

Additionally, the Maryland Historical Trust's Cultural Resources Hazard Mitigation Planning Program is aimed at protecting historic places, archaeological sites, and cultural landscapes from the effects of natural hazards, such as flooding, wind and coastal erosion. The Maryland Commission on Climate Change, in its 2016 Annual Report identified Building Resilience as one of four priorities for implementation of the State Climate Action Plan. This priority calls for the State "to advance Maryland's ability to address known threats and future vulnerabilities to climate change, adaptation and response efforts; to increase and broaden public and private partnerships; address the challenge that low-income and otherwise vulnerable communities will likely be disproportionately impacted by climate change; assess the impacts that climate change will likely have on the State's economy, revenues and investment decisions; and continue to deliver and refine tools and assistance for local governments."

The evidence for community acknowledgement of the concern for rising seas is evident in existing City plans. For example the *Annapolis Comprehensive Plan* states:

> *Sea level has risen approximately one foot along Maryland's coastline in the last century. A general prediction estimates a rise of 1 meter by the end of this century. Areas extremely critical to the overall character of Annapolis and most susceptible to flooding include the downtown City Dock area, portions of Eastport, and the Naval Academy. As proven in the aftermath of the flooding caused by Hurricane Isabel in 2003, these areas are already susceptible to significant damage related to flooding as a result of storm surges.*

Additionally the Natural Hazard Mitigation Plan states:

> *Determining tolerable risk for a specific property includes consideration of the investment involved, potential danger to life, access to safe areas in the event of a flood, and a host of other factors. The Planning Committee agreed upon the following flood mitigation goals:*
> *· --Protection of Human Health*
> *·-- Limitation of Economic Damages to the City of Annapolis*
> *· --Preservation of the Architectural Character and Historical Significance of the City of Annapolis.*

The City of Annapolis 2009 *Comprehensive Plan* and the 2012 *Annapolis Natural Hazard Mitigation Plan* were both crafted with significant community input. Concerns for the impact of flooding and sea level rise on health, the economy and the historic resources in Annapolis led to a call in both plans for further analysis and options for minimizing the threat. With a baseline for community need established, City preservation, planning, and emergency management staff began a cooperative planning initiative.

Understanding Sea Level Rise Impacts on Historic Properties

In post-Isabel Annapolis, the implications of flooding received preliminary funded by the Maryland Department of Natural Resources (DNR) Coast Smart Communities Program. Two reports were issued in 2011. The first, titled "Flood Mitigation Strategies for the City of Annapolis, MD: City Dock and Eastport Area," and "Regulatory Response to Sea Level Rise and Storm Surge Inundation, City of Annapolis, Maryland" these two reports used current flood data to determine the potential location and height of flooding and possible mitigation strategies (primarily structural) to minimize the impact on the historic City Dock and Eastport locations. The reports specifically identified sea level rise, subsidence, tidal (nuisance) flooding, and coastal storms as putting the environmental, economic, and built resources of Annapolis increasingly at risk.

In addition, while Anne Arundel County had completed a DNR-funded project[41] which did identify the specific number of historic sites at risk from flooding, it did not include an inventory or threat assessment for cultural resources in Annapolis. Indeed, the Annapolis studies highlighted the need to "identify and protect historic resources," thereby establishing next steps of assessing and mitigating risk to historic properties.

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[41] 2010: Sea Level Rise Strategic Plan for Anne Arundel County: Phase I Vulnerability Assessment & 2011: Sea Level Rise Strategic Plan for Anne Arundel County

Deciding what planning framework would work for development of a cultural resource plan for flooding in the Historic District required research. Initially, project staff thought that either a local preservation plan or an addendum to the comprehensive plan would be the best approach. However, in researching plans that addressed flooding and cultural resource protection it was clear that only FEMA has developed standardized guidance for the United States to address the impact of flooding hazards and other natural disasters on cultural resources[42] taking into consideration the Secretary of the Interior's Standards for Rehabilitation[43] and the required compliance review processes established under the National Historic Preservation Act.[44]

Defining the Study Area

It was determined very early on by the Weather It Together Planning Team that with limited capacity and resources and the need to respond to the urgent issue of tidal flooding, that the hazard mitigation analysis be limited to flooding hazards. While flooding impacts properties outside the Historic District, it was decided that the 2018 *Natural Hazard Mitigation Plan* update would incorporate flood protection for historic resources, knowing that lessons applied downtown could be used in other flood prone neighborhoods such as Eastport. The boundary for the historic survey and vulnerability assessment was further narrowed to an easily mapped 10 foot contour, incorporating the area of tidal flooding, the 100-year floodplain (i.e., the land that is predicted to flood during a 100-year storm, which has a 1 percent chance of occurring in any given year), the 500 year floodplain (.02 percent chance) and a small buffer for storm surge. Once the study area was identified, the began the simultaneous process of surveying historic resources, engaging stakeholders and the public, involving subject experts to assess technical needs and securing funding to move forward with the planning process.

The process developed by the Weather It Together Planning Team to assess losses and establish community value, set mitigation or adaptation priorities, and develop goals for the mitigation plan specific to the study area is outlined below in the following methodology.

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[42] FEMA, Integrating Historic Property and Cultural Resource Considerations Into Hazard Mitigation Planning, FEMA 386-6 / May 2005

[43] Department of the Interior, National Park Service, Secretary of the Interior's Standards for Rehabilitation, https://www.nps.gov/tps/standards/rehabilitation/rehab/stand.htm

[44] National Historic Preservation Act of 1966 as amended through 2006, http://www.achp.gov/docs/nhpa%202008-final.pdf

Identify Resources Available for Hazard Mitigation

It was clear to the planning team that resources to continue the necessary research, documentation, and assessment work required by the FEMA guidance would need to be secured. These resources included professional experts in the science of sea level rise, hazard mitigation, adaptation, cultural and natural resource protection, etc. Funding, Geographic Information Systems (GIS) technology, and leading practices in flooding adaptation were also essential. Lastly, engaging community members - unarguably the most critical resource - required a marketing and communications strategy. The team began with research.

Resources: Research and Outreach

To prepare Annapolis for the certainty of sea level rise, the Planning Team conducted extensive research referencing international best practices for flooding adaptation. This included everything from the United Nations' *Sendai Framework for Disaster Risk Reduction*[45] to the National Institute of Standards and Technology's *Community Resilience Planning Guide for Buildings and Infrastructure Systems*[46] to the Urban Land Institute Boston/New England's *The Urban Implications of Living With Water.*

The bulk of the outreach activities were focused on Annapolis. Over the past three years, more than 3900 individuals participated in 31 Annapolis-based events. No fewer than 350,000 viewers, readers, and listeners were exposed to *Weather It Together* through regional (i.e. Baltimore/Washington area) radio, print, and television coverage. Additionally, the Weather It Together and HPAnnapolis Facebook pages, disseminate weekly, if not daily, information about flood hazards and flood preparedness to over 1050 followers.

Resources: Funding Partners

During and after the Core Team meetings, City Staff conducted follow-on meetings with agency or private-sector representatives to discuss potential partnerships through funding or in-kind assistance. These ongoing discussions with major project partners (i.e. ULI, USACE, Michael Baker, SERVPRO, MHT, DNR, NLC, MEMA, NTHP) resulted in a series of grant awards or direct in-kind technical assistance totaling $410,000.

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[45] Sendai Framework for Disaster Risk Reduction 2015, p.203

[46] National Institute of Standards and Technology, Community Resilience Planning Guide for Buildings and Infrastructure Systems

Many of the *Weather It Together* project partners, recognizing the City's leadership in facilitating the sea level rise conversation, have provided $97,000 in funding support for *Keeping History Above Water: Annapolis,* an international conference on adaptation alternatives for historic coastal communities co-hosted by the City of Annapolis in late 2017. Annapolis was selected by the Newport Restoration Foundation, the founder of *Keeping History Above Water*, to co-host the 2017 KHAW conference, which served as a significant public education opportunity for professionals, property owners, and residents in Annapolis, the Chesapeake Bay region, and beyond.

While the Weather It Together Planning Team and elected City leaders know that completion of the *Weather It Together* plan depended on a significant investment of financial, technical, and human resources, it is the buy-in and involvement of the community that will support implementation of adaptation alternatives outlined in this plan.

Resource: Community Stakeholders

Critical to the effectiveness of the *Weather It Together* initiative is involvement of property owners, residents, and businesses. Over a period beginning in February 2013 to November 2017, over 175 meetings were hosted by City staff to engage these stakeholders along with professional experts, government agencies and nonprofit partners, in developing the Annapolis planning model for protecting the Historic District against natural hazards. Some meetings were between City staff, and in other cases, between City, County, State, and Federal agency staff, but many included members of the public who had a vested interest in planning for hazard flooding.

What the Planning Team learned from these meetings was just as important as what was shared. The most important meetings were those hosted on a nearly monthly basis with the Weather It Together Core Team (Core Team). Members of the Core Team, sometimes upwards of 45 individuals representing 29 separate government agencies, non-profit organizations, or private businesses gathered in Council Chambers to share best practices in hazard mitigation, provide essential data on sea level rise, review impacts on natural and cultural resources, and explain the financial implications of flooding related to financing mitigation projects, flood insurance, and property valuation. A full list of Core Team organizations and their representatives is provided in the Acknowledgements.

Core Team meetings accounted for approximately 10% of the public engagement efforts for Weather It Together. Some of the topics covered flooding impacts, data analysis,

and best practices for mitigation planning and protection. Topics for the Core Team meetings are listed below:

- archaeology
- historic sites
- natural resources
- insurance
- emergency preparedness
- business continuity
- sea level rise science
- floodplain management
- highway transportation
- economic incentives
- public health
- flood recovery
- flood protection
- grant programs
- legal implications
- financing mitigation and adaptation
- GIS data management and mapping
- 3D laser imaging and documentation
- non-structural adaptation.

"Whether you have an established team or are in the process of forming one, it is important to assess the team members' expertise and capabilities to address historic properties and cultural resource considerations and fill in any gaps."

- Integrating Historic Property and Cultural Resource Considerations Into Hazard Mitigation Planning (FEMA 386-6 / May 2005)

Step Two: Build the Planning Team

FEMA's guidance regarding planning team expertise is well heeded, if the planning process begins within the hazard mitigation planning process. However, in Annapolis, the process began with a working group that included the Historic Preservation Division at the City of Annapolis and the Mid-Atlantic Office of the National Trust for Historic Preservation. In this planning effort, it was clear that experts in "historic properties and cultural resources" were needed beyond the cultural resource expertise provided by these two organizations.

<u>City of Annapolis Partners</u>

It is essential to engage elected officials and community leaders from the beginning of the planning process. Both individually and as a whole, the Annapolis City Council is a mainstay in the planning process with the Aldermen from Ward One and Ward Eight serving as ongoing members of the Weather It Together Core Team, as well as the Chair of the Public Safety Committee and the Economic Matters Committee participating in numerous public presentations. As a whole, the Annapolis City Council conducted two work sessions highlighting progress on *Weather It Together*, the Public Safety Committee heard updates on the City's Natural Hazard Mitigation Plan, including the CRHMP, the

majority of the Council participated in the National Treasure media event, the Englander Lecture, the Town Hall meeting, and the Community Forum.

Critical to the future implementation of the plan are those agencies involved in the maintenance and management of the resources within areas susceptible to flooding hazards. Therefore, while the Core Team very early on included the Office of Emergency Management, it followed that representatives from Planning and Zoning (including building inspections), Public Works, Environmental Policy, Harbormaster, Management Information Technology, and the Mayor's Office would engage as Weather It Together Core Team members.

Historic Preservation Partners

The Maryland Historical Trust (MHT), another key state agency partner in the MRP, is also an essential *Weather It Together* partner. With a strong emphasis in the State's Climate Action Plan on the protection of cultural resources, it was clear that the City of Annapolis could use the Climate Action Plan's priority of Building Resilience "to deliver and refine tools and assistance for local governments," as a means to model for other historic coastal communities a cultural resource approach to hazard mitigation planning.

The MHT's Certified Local Government coordinator and planner supported a critical survey grant to complete intensive level survey work on 50 properties within the study area while at the same time offering the assistance of MHT's climate change coordinator, who provided critical technical support to the Weather It Together Planning Team (Planning Team) as they gathered data and drafted the CRHMP.

The National Trust and Preservation Maryland both provided critical funding for community engagement activities. A community engagement plan was developed, updated, and revised through the planning process. As opportunities for new outreach activities were presented, the plan was modified to accommodate previously unexplored opportunities for civic engagement.

For example, Weather It Together capitalized on the success of the National Trust's *This Place Matters* initiative in numerous ways:

- When the mobile marketing campaign rolled into Annapolis during the 2015 U.S. Sailboat Show, preservation staff promoted the Weather It Together program at the *This Place Matters* exhibit space;
- When the City hosted the 2015 Town Hall, *This Place Matters* staff hosted an exhibit table;

- Weather It Together interns took photos of themselves at various sites in the City Dock area, posting to the *This Place Matters* Instagram page;
- Weather It Together communications staff hosted a *This Place Matters* visual preference survey at the Maryland Municipal League 2015 conference's Annapolis Main Street booth; and
- Weather It Together hosted an online survey entitled *This Place Matters* to assess public sentiment toward the various alternatives for the protection of historic sites from the impacts of flooding.

The National Park Service engaged as a member of the Weather It Together Core Team in 2013 through the Technical Services Division and their GIS program, providing helpful data and methods for completing disaster assessments. NPS staff also served as white paper authors and facilitators on the topic of public awareness and education. Weather It Together was also represented on numerous NPS-hosted panels at national conferences. This collaboration led to the Virginia Department of Historic Resources who is contracting with the City to utilize the Keeping History Above Water: Annapolis forum in its resiliency planning activities through a Hurricane Sandy recovery grant from the National Park Service.

The US National Committee of the International Council on Monuments and Sites (US/ICOMOS), an international voice for the impacts of climate change on cultural heritage sites, particularly inscribed world heritage sites, brought Weather It Together Core Team members onto its Climate Change and Heritage knowledge network to share best practices and promote the *Weather It Together* plan, and provided through its international exchange program a young professional to research flooding adaptation and build the Weather It Together story map.

<u>Sea Level Science Partners</u>

During preliminary discussions with the City of Annapolis, the National Trust engaged with the Union of Concerned Scientists (UCS) regarding a report still in draft form entitled *National Landmarks at Risk: How Rising Seas, Floods, and Wildfires are Threatening the United States' Most Cherished Historic Sites,* which was published in May 2014. UCS is an international non-governmental organization of scientists and community activists promoting a healthy planet and safer world. Following *National Landmarks at Risk,* UCS released *Encroaching Tides: How Sea Level Rise and Tidal Flooding Threaten US East and Gulf Coast Communities over the Next 30 Years (2014).*

Annapolis served as the cover story of the publication due to the significant level of flood risk that threatens the cultural resources of the Annapolis Historic District and the U.S. Naval Academy. UCS also engaged the City of Annapolis as one of only two U.S. communities invited to participate in the Pocantico Summit in February 2015, which ultimately led to the *Pocantico Call to Action on Climate Impacts and Cultural Heritage.* This call to action was drafted by representatives of more than twenty local, national, and international organizations who came together at the Pocantico Center of the Rockefeller Brothers Fund to consider strategies and develop an action agenda for preserving and continuing cultural heritage in a changing climate.[48] The strategies discussed at this gathering align with the needs of communities, like Annapolis, at risk from climate-related hazards. Annapolis' leadership on addressing sea level rise through Weather It Together is reflected in a major tenet of the Pocantico document:

> *Individuals and institutions around the world [will] collaborate with existing communities to maintain and preserve cultural heritage through support of a number of community empowerment projects. These projects will be models for how communities can successfully maintain their cultural heritage in the face of changing climate risks. We ask the international community to provide resources and implement policies that lessen the harm to cultural heritage. We challenge these supporters to unite and share these lessons to increase the likelihood that communities become more resilient worldwide.*

Collaboration, community empowerment, sharing of best practices on an international scale and providing resources and policies to lessen the harm and increase resiliency for cultural resources is what the *Weather It Together* plan hopes to achieve. The Pocantico call to action inspired the Weather It Together Core Team to engage even more stakeholders in the planning process.

While participating in the City Dock Master Plan meetings hosted by the City of Annapolis Planning and Zoning Department, HPD staff learned from representatives of the United States Naval Academy that post-Isabel recovery efforts, while extremely costly, were tolerable when measured against the construction costs of a permanent sea wall, specifically in light of the increase rate of tidal flooding and the unknown rate of future sea level rise. It was that aversion to a structural solution of a sea wall without analysis of alternative adaptation strategies that demonstrated the importance of including the USNA as a planning partner. The USNA Architect along with the U.S. Naval Facilities Command staff became early Weather It Together Core Team members

[48] The Pocantico Call to Action on Climate Impacts and Cultural Heritage http://www.ucsusa.org/global-warming/solutions/pocantico-call-action-climate-impacts-and-cultural-heritage

because of this shared interest in protecting historic assets and ensuring the continued conduct of their mission.

Weather It Together has continued to benefit from the in-kind assistance of partner jurisdiction, the USNA. The civilian and uniformed personnel have generously offered technical expertise in engineering, facilities planning, and data management. USNA leadership also invited the City of Annapolis public works and preservation staff to serve on the USNA Sea Level Rise Advisory Council (SLRAC), the mission of which is:

> *to develop a Sea Level Adaptation Plan for the Superintendent of the Naval Academy on matters pertaining to flooding due to sea level rise and severe weather events in the Annapolis area. This plan, developed in coordination with the City of Annapolis, the State of Maryland and key federal agencies, will suggest a path forward for planning for the impacts of sea level rise on the Naval Academy through 2100.*

By sharing both data and solutions for hazard flooding, the City and USNA leadership will work together to more effectively and efficiently respond to and recover from flooding hazards impacting Annapolis' shoreline.

Technical Assistance: Government Partners

Annapolis is fortunate to have had funding and technical support from the Federal Emergency Management Agency, through the Maryland Emergency Management Agency, in making operational the model guidance offered in FEMA's "how-to" guide for cultural resource hazard mitigation planning. However, that funding, which came during the 3rd year of the Weather It Together initiative, began with MEMA's participation in the Weather It Together Core Team meetings. MEMA[49] was a consistent participant in the monthly Core Team meetings and introduced FEMA Region 3 cultural resource management (CRM) and mitigation planners to this model planning effort.

The US Army Corps of Engineers (USACE), in conjunction with the Weather It Together Planning Team, provided their expertise in cultural resource survey and provided building-by-building flood elevation studies for 270 vulnerable properties in both the Historic District and the Eastport area. USACE personnel followed up with model flood mitigation strategies for 16 prototypical properties in the Historic District study. The success of this work is further reinforced by the fact that the USNA is now working

[49] Mark James, State Hazard Mitigation Officer, MEMA (currently Mitigation Planner with Michael Baker International's Resilience Action Partners).

with the USACE to complete flood elevation analysis of all vulnerable properties within the flood hazard area of the lower Yard.

The Maryland Department of the Environment (MDE) was an early participant in the Weather It Together Core Team, bringing staff expertise and agency resources to the discussion surrounding definition of the flood hazard area, mapping, scenario modeling, and the National Flood Insurance Program (NFIP). MDE served as a conduit for two educational presentations by NFIP federal agency staff to the Annapolis business community and resident associations. In addition, MDE connected the Weather It Together Planning Team with other organizations involved in adaptation and mitigation planning for sea level rise, including the Silver Jackets, the Maryland Association of Floodplain and Stormwater Managers, and the Maryland Resiliency Partnership (MRP).

The Maryland Department of Natural Resources *Coast Smart* staff identified the Weather It Together planning effort as a potential national model for adaptation planning for sea level rise. With DNR's support, the City of Annapolis was successful in securing funding from the National Oceanic and Atmospheric Agency (NOAA) to secure the necessary GIS technology, complete a vulnerability assessment, and develop a CRHMP framework and a draft handbook on designing for cultural resource protection in the face of sea level rise. With the intensive level survey underway, a Coast Smart grant secured, and a community engagement plan drafted, the Weather It Together Planning Team began an intensive campaign of public outreach and global research into preservation-sensitive adaptation strategies for coastal communities.

Technical Assistance - Private Sector Partners

Another significant collaborator in the Weather It Together messaging campaign emerged from the 2014 PastForward conference in Savannah, GA, hosted by the National Trust. John Englander, oceanographer, author of *High Tide on Main Street*, and principal of Englander & Associates[50] spoke on the science of sea level rise, its impending economic impacts, and the opportunities to design historic communities for a more resilient future. With great interest in supporting Annapolis' planning efforts, Englander accepted an invitation to work with Annapolis and brought in professionals from banking, climate engineering, and public policy for an intensive 3-day technical assistance visit to Annapolis.

[50] Englander & Associates, http://www.johnenglander.net/

Other national and international private-sector partners continue to contribute technical and financial assistance to community engagement work. Those who have assisted through the more than three years of public forums, workshops, and media events include:

- SERVPRO (Annapolis/Severna Park), who have attended faithfully the Weather It Together Core Team meetings, included Weather It Together presenters at Regional meetings, donated funding for Keeping History Above Water, and staffed informational tables and presentations and many Weather It Together public events;
- Michael Baker International whose communication, design, and floodproofing experts have shared adaptation strategies, digital documentation models, and pro-bono services in establishing the Weather It Together story map, a key public education and engagement tool for implementation of the *Weather It Together* plan;

<u>Technical Assistance - Nonprofit Partners</u>

The State of Maryland recognized the effectiveness of the Weather It Together community engagement process with a 2016 Maryland Preservation Award for Excellence in Community Engagement and Education. But, this award-winning process would not have succeeded without two other essential national partners, the Urban Land Institute (ULI), along with its local ULI - Baltimore Chapter, and the National League of Cities (NLC). These non-profit organizations have provided funding to secure experts in sea level rise, engineering, design, real estate, and public policy to provide technical assistance and participate in community forums.

ULI's Urban Resilience program and NLC's Sustainable Cities Institute, have repeatedly hosted the City's participation at local and national conferences, leadership summits, advisory panels, and webinars. This engagement with other City leaders and staff working on resiliency planning has provided the Weather It Together Planning Team with practical applications of flooding adaptation, community engagement, sustainable development, and data collection and management. With NLC and ULI serving as lead sponsors for the *Keeping History Above Water* conference, this sharing of best practices continues at an international scale.

The environmental community is a key player in any effort to reduce the negative impacts of sea level rise on the Chesapeake Bay. At the Congressional hearing in July 2015, President Will Baker represented the Chesapeake Bay Foundation (CBF). It was that participation that led to the involvement of CBF scientists and communications staff in the Weather It Together Core Team. Since that time, CBF has presented on the benefits of using a natural resource-based approach to flooding adaptation, drafting a

white paper and facilitating a natural resource roundtable at the Weather It Together planning charrette. Other local environmental advocacy organizations participating in Weather It Together include:

- Annapolis Green—an Annapolis nonprofit that connects residents, organizations, and businesses who care for the environment—has showcased Weather It Together at numerous Green Drink events and through their weekly radio talk show, Living Green in Annapolis, on WNAV.
- Climate Stewards of Greater Annapolis, who have hosted numerous community meetings showcasing the work of Weather It Together and team partners.
- Back Creek Conservancy, a vocal participant in Weather It Together Core Team meetings and the Weather It Together planning charrette.

Business Partners

With 60% of the properties in the study area zoned commercial, it is clear that local business owners are threatened by increased flooding. In addition, properties currently under redevelopment need the most up-to-date information on the long-term hazard risk of sea level rise. Weather It Together's Core Team includes the key business organizations in the City, as well as individual business owners, contractors, and vendors. A few of the most engaged contributors to Weather It Together, through sponsor support, in-kind services, technical assistance, and advocacy, include: ACE Hardware, Buddy's Crabs and Ribs, Annapolis Developers, LLC, Annapolis Boat Shows, Annapolis Waterfront Hotel, Annapolis Yacht Club, Hammond Wilson Architects, Herrmann Advertising | Branding | Technology, Nationwide Insurance: Peter B. Crilly and Associates, O2 Holdings/Lafayette Financial, Severn Savings Bank, SPEIGHT Studio Architects, and Watermark.

Civic Partners

With 147 properties in the study area at risk, involvement of residents in adapting Annapolis to a future of rising waters requires engagement of those residents most in harm's way. The Ward One Resident Association is represented on the Weather It Together Core Team and has hosted numerous public meetings engaging residents on Weather It Together-sponsored discussions on flood insurance, hazard preparedness, and building adaptation.

Historic Annapolis serves as steward for a number of properties within the study area. Beginning with the *What's Your View? Forums for City Dock* series of community forums hosted in late 2015, Historic Annapolis' goal is to help City officials with decision-making on the impact of climate change and redevelopment pressures on City Dock.

The January 2016 report that resulted from those discussions provided the Weather It Together Planning Team with additional feedback prioritizing what historic places and public spaces held the greatest community value. Historic Annapolis continues serving on the Weather It Together Core Team and as with the Annapolis Summer Garden Theater is currently developing a plan for adapting their property (Sands House) to future flooding.

While not all of the stakeholders are represented at all Weather It Together Core Team meetings, they are kept informed about opportunities to participate in public presentations through a Weather It Together distribution list as well as Weather It Together social media outlets, specifically the Weather It Together Facebook page and website. Stakeholder representatives provide important exposure for Weather It Together locally and outside the region. This has resulted in no less than $95,000 in cash funding and $120,000 of in-kind support for planning and public engagement activities over the past 24 months.

Step Three: Engage the Public

Having assessed a number of approaches used by partner organizations and proposed by members of the Annapolis CRHMP public engagement committee, a public outreach strategy was developed to ensure maximum community participation. Key professionals involved in the outreach effort included:

- MainStreets Annapolis Partnership (now the Downtown Annapolis Partnership) which provided public relations staff to assist with messaging and media to reach the business community;
- City of Annapolis Public Information Office and the Management & Information Technology Department who worked with the Historic Preservation Division to support the project's technical communication needs;
- Herrmann Advertising, a local advertising and communications firm which provided pro-bono designs services, creating the Weather It Together brand;
- Jim Nuttle, Inc., a graphic recorder for the 2016 planning charrette and 2017 Keeping History Above Water conference;
- AM Media + Marketing is included as a member of the Weather It Together Planning Team to manage social media, coordinate with the City on the Weather It Together webpage, author media releases and arrange media interviews with local, national and international experts on sea level rise;
- Public Engagement Associates provided in-kind electronic polling services for the 2017 Community Forum, a critical communication tool in determining a hierarchy for the 48 proposed mitigation alternatives;

- Michael Baker International's Innovation Lab provided pro-bono support to MIT and the Historic Preservation Division in creating the *Landmark At Risk* storymap for the Weather It Together webpage.

Implementation of the CRHMP will require an ongoing program of public awareness and education, communicating to the public new or elevated hazards and risks, building support for implementation of mitigation actions, sharing policy and regulatory changes and economic incentives, and informing residents on progress made in the CRHMP's implementation.

Public Engagement Activities

The following activities were part of the public engagement strategy implemented beginning in October, 2014 and concluding in November 2017.

- Dialogue events with cultural institutions
- Presentations to civic and business organizations
- Visual preference survey and workshops
- City council hosted Town Hall and community forum meetings
- Meetings with individual business & property owner
- Postcard mailings & flyer distribution for public events
- Social media via Twitter, Pinterest, Facebook, YouTube
- Interactive website (including a storymap) to engage residents/visitors in the discussion
- Articles, columns and letters published in *The Capital*
- State and national conference presentations
- Eblasts and blogs for stakeholder organizations
- City Council committee and work session presentations
- Keeping History Above Water conference
- Monthly Core Team meetings (open to the public)

Phase Two: Assess Risks

Having identified the long-term threat of rising waters as the primary hazard for the Historic District, the Weather It Together Planning Team applied the criteria for survey, assessment, and evaluation of hazard mitigation alternatives for flooding that is used to assess the impacts of other unexpected hazards such as hurricanes, earthquakes, or urban fire. As the Planning Team discovered, the FEMA model can work in both short- and long-term hazard planning when it comes to assessing properties for vulnerability, whether from shorter-term tidal flooding or longer-term sea level rise.

Step One: Identify the Hazards

During early Planning Team meetings, the hazards identified as relevant to the Historic District included: hurricanes, coastal storms, urban fire, earthquakes, tornados, and flooding (i.e. tidal flooding, extreme precipitation, subsidence, and sea level rise). It was decided that the research, documentation and funding priority for completion of the CRHMP would focus on the greatest hazard to the downtown, flooding.

Step Two: Profile the Hazards

Having identified flooding as the primary hazard for the CRHMP, the Weather It Together Planning Team had to complete Worksheet #3 profiling the impact of flooding hazards on specific building characteristics. This included an extensive data sheet for each property in the study area that addresses building characteristics, specifically information on the construction date, use, number of stories, structural system, exterior material, condition and whether the property has a basement. However, with the additional data gathered through the flood elevation study completed by the USACE, information on the first floor elevation and lowest opening elevation was also included to inform the vulnerability of each individual property in the study area.

Step Three: Inventory Historic Property and Cultural Resource Assets

While the necessary human, technical and financial resources were being gathered, the public engaged and the hazards identified and profiled, the process of surveying those historic resources[51] within the project study area which had not yet received an intensive level survey began. It was necessary to learn more about the individual property's historic, cultural or architectural significance, the conditions that make each building vulnerable to flooding, and the subsequent damage to the materials and structural system that could result from a major inundation event.

To determine the significance and vulnerability of resources in the study area, the Weather It Together Planning Team followed the FEMA recommended inventory and risk assessment process:

1. Assess each cultural resource's vulnerability potential
2. Research past disasters
3. Survey the hazard prone area

[51] For purposes of this document the term "historic resource" or "historic property" refers to the definition used in the National Register of Historic Places of "any prehistoric or Historic District, site, building, structure, or object significant in American history, architecture, engineering, archeology, and culture."

4. Establish preservation priorities

Conduct Survey and Assess Flood Vulnerability

Since the Weather It Together Planning Team had already identified the relevant hazards for the Historic District and determined that the threat of flooding (ie coastal storms, tidal flooding, subsidence, extreme precipitation) was the one most relevant to the current hazard mitigation plan update, the team used both the Maryland Historic Property Inventory form and the FEMA vulnerability assessment worksheets (see Appendix E) for complete a historic resource inventory for the study area.

The Weather It Together Planning Team employed the National Register of Historic Places format for intensive level survey.[52] This involved gathering data on the location, appearance, significance, integrity, and boundaries of each property sufficient to evaluate the properties historic, architectural, archaeological and cultural significance. This survey process aligns with FEMA Worksheets #3 & #4 in collecting data as to the building type, material, construction date, function, condition and significance of the inventoried property. However, FEMA guidance in Worksheets #3, #4, and #5 requires additional assessment of the property's distance from the (flood) hazard zone, a vulnerability assessment and the potential for economic loss (loss of structure, contents, and use), displacement cost, economic importance, owner interest in mitigation, and public sentiment for the resource. All of this information is then tallied for a total community value score. That scoring process provides for the prioritization of properties within the study area, the fourth and last step in the inventory process.

The survey resulted in the identification of 104 historic properties within the study area. There were an additional 43 properties identified as not contributing to the period of significance for the Annapolis Historic District, nevertheless, the Weather It Together Planning Team completed vulnerability assessments for these properties as well.

Research Past Disasters

An analysis of past disasters, specifically coastal storm events, was gathered from City public works and emergency management records along with historic periodicals and other published works. A summary document profiling relevant information from each storm is attached as an Appendix G.

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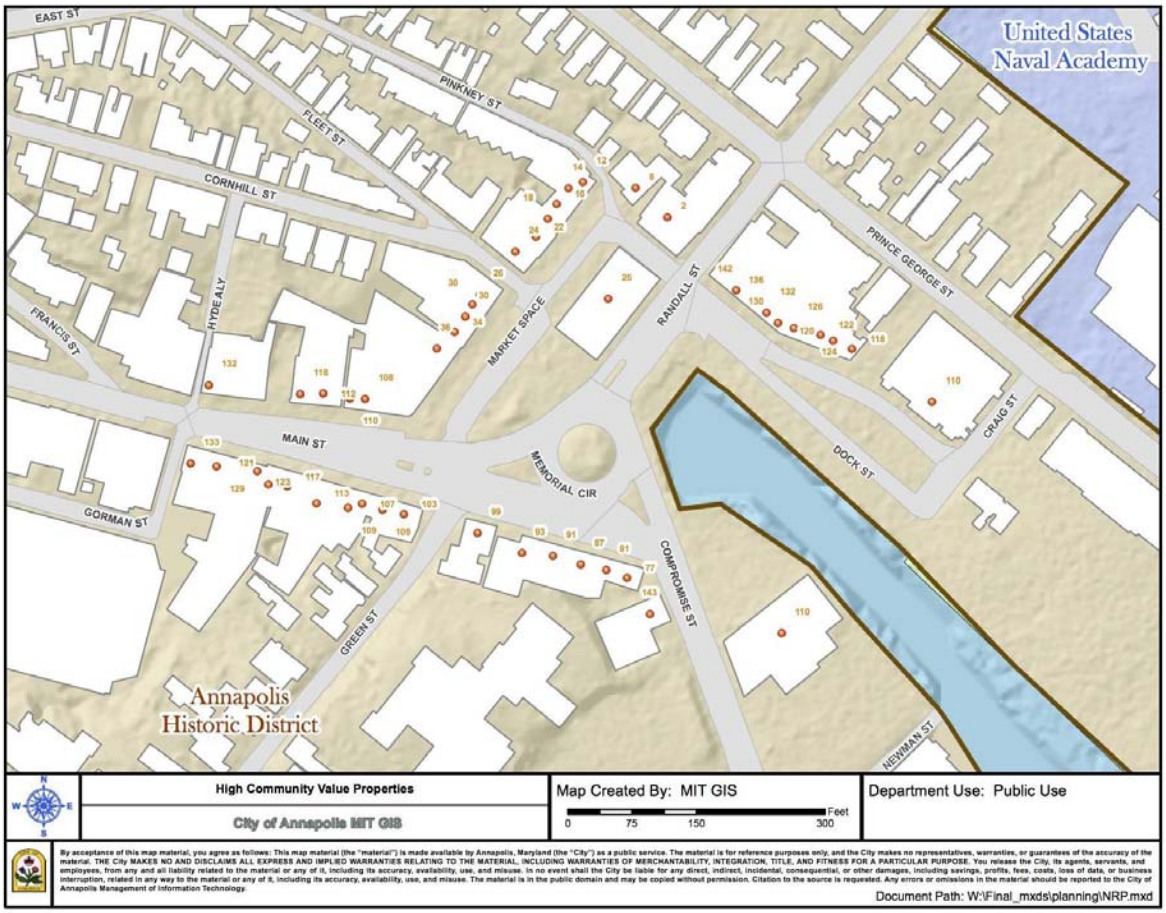
[52] Intensive level survey under the National Register is "a close and careful look at the area being surveyed." It is design to identify precisely and completely all historic resources in the area. It generally involves detailed background research, and a thorough inspection and documentation of all historic properties in the field.

Conduct a Flood Elevation Survey

Additional work, not anticipated or addressed in the FEMA guidance, specific to the issue of flooding, was the much needed flood elevation survey for each property within the study area. The USACE Cultural Resource and Flood Management Teams stepped forward during the historic resource survey to offer their services in cultural resource and flood elevation survey. In addition, at the request of the project architect, they also developed model flood mitigation strategies for 16 prototype buildings in the study area. The USACE issued a report providing property owners with guidance on basic minimal actions (repointing masonry foundations, creating positive drainage, and improving ventilation), dry floodproofing options (door, window, and perimeter barriers; window wells; backflow preventers), wet floodproofing options (using concrete floors, placing electrical and mechanical systems above the base flood elevation), and more aggressive actions (such as creating berms, elevating buildings, relocating buildings) that might be appropriate for individual buildings. The report presents the pros and cons of each measure, including a cost-benefit analysis, considering such matters as the level of expertise needed, potential for addressing nuisance flooding, effect on insurance rates, and whether the work will qualify for a property tax credit. This assessment report was essential to the final step in the inventory process, determining preservation priorities.

Establish Preservation Priorities

Critical to the preservation prioritization process was the development of a GIS database and associated risk mapping. With expertise from the City's Management and Information Technology Division (MIT) and using information obtained through online surveys, a planning charrette and a workshop co-sponsored by the City of Annapolis and Historic Annapolis, the Weather It Together Planning Team prioritized 47 properties in the study area as having high community value. Three of these properties (the Pumping Station, the Harbormaster's Building and the Market House) are also recognized as critical facilities in the larger HMP. All of these properties, with the exception of the Harbormaster's Building, are considered contributing to the Annapolis Historic District. Their locations are identified on the map below.



High Community Value Properties

Step Four: Estimate Loses

Determine Damages and Calculate Loss

Economic losses resulting from a major flood event[53] have been calculated for both residential and commercial properties in the study area with total number of stories documented through field observation. (See FEMA Worksheet #3.) This calculation is based on the following considerations: loss to structure, loss of contents, loss of function, and relocation cost. Formulas were based on construction industry standards for rehabilitation and restoration, insurance industry guidelines for content loss, retail and restaurant statistics for square foot sales, and local real estate information for temporary relocation rental expenses. Calculations were based on building data from the Maryland State Department of Assessments and Taxation (SDAT).

[53] A major flood event would be defined as impacting the ground floor of every building in the study area, but NOT anticipating the complete loss of any one building.

Economic loss and replacements costs were calculated as follows:

- **Rehabilitation construction costs** are based on local construction values. Costs include fixed equipment, finishes etc., but not fixtures, fittings, and equipment (FFE) not incorporated into the structure.
- **Contents value** is factored at 50% of improvement value per information from insurance consultants affiliated with the National Trust for Historic Preservation.
- **Improvement value** has been modified to only include the affected level.
- **Residential displacement costs** include a figure for an equivalent rental apartment and the ongoing carrying cost of a mortgage.
- **Commercial displacement costs** include loss of sales, which is based on retail and restaurant sales per square feet. The figures included are based on research from *Real Estate Issues* magazine, and other online sources. However, based on post-disaster evidence from other communities, some stores and restaurants may not relocate temporarily, but may relocate permanently or close.

Phase Three: Develop a Mitigation Plan

In drafting the CRHMP, the team once again reviewed the existing community planning documents. In 2009, Annapolis included in its comprehensive plan the following recommendations for responding to sea level rise:

- Evaluate risks from sea level rise in decisions involving land use along the waterfront,
- Determine the costs and benefits of public decision-making in mitigating property damage,
- Evaluate the need and options for protecting historic structures and waterfront areas,
- Allow administrative review and approval or provide for an emergency meeting of the Historic Preservation Commission, and
- Require floodproofing to the extent feasible while preserving the historic building exterior.

The two sea level rise and hazard mitigation studies previously mentioned highlighted the need for barriers around critical infrastructure, including City Dock, but no plan for implementation was included. Thus, the *Weather It Together* CRHMP brings together the various recommendations into a unified planning document specifically for use in the Historic District.

Step One: Develop Mitigation Goals and Objectives

Implementation of the CRHMP will rely on the partnerships established with participating agencies, nonprofit organizations, affected property owners, business owners and residents. Information gathered during the risk assessment phase - reports on sea level rise and flooding published by partner agencies and organizations, USACE flood elevation assessment for the Historic District, data provided by UCS, USNA, NOAA, NPS and the City's GIS staff, and community feedback from public meetings, surveys and workshops - was incorporated into the final CRHMP document.

Review and Analyze the Risk Assessment Findings

Following the FEMA guidance, the Planning Team identified the specific flood threats, determined the historic property types and reviewed the community values and estimated losses to identify the most vulnerable properties. A list of problem statements was then created based on the findings. Each of the problem statements was grouped into the five mitigation categories - prevention, property and resource protection, structural diversions, public education and awareness, and natural resource protection for historic landscape features and archaeological sites—and goals were developed to respond to the problem statements.

Formulate Goals and Determine Objectives

In order to develop goals, objectives, and actions for implementation within the framework of a five-year CRHMP, the team first crafted a vision to support the protection of historic and cultural assets within the study area and address the impacts of flooding on the larger economy.

Vision Statement

By implementing Weather It Together: A Cultural Resource Hazard Mitigation Plan *for the City of Annapolis, the historic Chesapeake Bay community will survive and thrive by building resilience, embracing sustainable development and adapting to hazards and natural disasters that threaten the Capital City's cultural and natural heritage.*

This became the global vision under which the team developed the strategies or goals to guide the plan's development and implementation.

The five goals developed for the CRHMP align with FEMA's adaptation alternatives for flooding hazards and address the problem statements developed by the Weather It Together Planning Team throughout the planning process.

Goals

Beyond the technical research and community input, a number of already published policy and planning documents influenced the selection of the specific goals for the CRHMP. The three most influential documents were the *Maryland Commission on Climate Change 2016 Annual Report* (MCCC 2016 Report), the 2016 *Maryland Hazard Mitigation Plan* (HMP), and the United Nations Office for Disaster Risk Reduction publication "Build Back Better" in support of the Sendai Framework for Disaster Risk Reduction - 2015-2030 (Sendai Framework).

The MCCC 2016 Report identified four priorities. While the first three dealt primarily with tracking, reporting and reducing Greenhouse Gas emissions, the fourth served as a touchstone for the CRHMP vision and greatly informed the plan's goals regarding building resilience, economic development and public engagement.

Building Resilience. To advance Maryland's ability to address known threats and future vulnerabilities to climate change, adaptation and response efforts will work to increase and broaden public and private partnerships; address the challenge that low-income and otherwise vulnerable communities will likely be disproportionately impacted by climate change; assess the impacts that climate change will likely have on the State's economy, revenues and investment decisions; and continue to deliver and refine tools and assistance for local governments.

The 2016 Maryland HMP included six overarching themes. The last theme specifically addresses partnership opportunities for resilience, environmental sustainability and the protection of cultural and historic resources.

Intense effort between all stakeholders to maximize opportunities for collaboration and excitement over future hazard mitigation opportunities to ensure the safety of Maryland's citizens, protection of property, environmental sustainability, community resiliency, and the preservation of Maryland's cultural and historic resources for future generations.

Specific to the Sendai Framework the Annapolis CRHMP goal to develop a response and recovery plan to "build back better" was influenced by the Sendai goal to:

Prevent new and reduce existing disaster risk through the implementation of integrated and inclusive economic, structural, legal, social, health, cultural, educational, environmental, technological, political, and institutional measures that prevent and reduce hazard exposure and vulnerability to disaster, increase preparedness for response and recovery, and thus strengthen resilience.

The Planning Team crafted a series of goals statements aligning with these three formative planning documents, the problem statements, and community priorities and shared them with the Weather It Together Core Team at a stakeholders meeting early in 2017. The following goals were finalized by the Weather It Together Planning Team in Spring of 2017 and shared with the public at the June 2017 Community Forum.

- Implement a public awareness and engagement program
- Lead building resilience efforts in flood adaptation and mitigation
- Develop a disaster response and recovery plan to "build back better"
- Align land use, economic development, environmental and regulatory activities to protect the City's historic character and cultural and natural assets while promoting economic vitality.
- Fund public improvements and incentivize private investment for flooding adaptation

Determine Objectives

Each of the goals required measurable steps to attain the goal identified. These objectives are built upon specific implementation strategies for adaptation that resulted from the Planning Charrette in each of the five mitigation categories. There are a total of fifteen objectives, which are referenced within the Plan Summary and throughout the CRHMP.

Gather Public Input

With draft goals and objectives completed, the Weather It Together Core Team was once again consulted. It was determined that specific adaptation actions would need to be identified for each objective and these action items would be provided to the public for comment through both an online survey and a community forum. Dozens of action items were discussed and evaluated.

Step Two: Identify, Evaluate, and Prioritize Actions

Identify Alternative Mitigation Actions

As stated previously, FEMA guidance specifically identifies five specific categories of mitigation action. All of these actions allow for the adaptation of historic properties and cultural resources to flooding hazards. The adaptation actions addressed in the Weather It Together CRHMP focus on public awareness and engagement, preventative measures, structural and non-structural adaptation of buildings and public spaces, natural resource protection and archaeology, and recovery. Some of the actions address

multiple categories. Therefore, the Weather It Together Planning Team grouped the actions into project areas as follows:

Tools and Practices for Flood Preparedness and Adaptation. Find, develop and share tools and leading practices for addressing flood risk and flood adaptation.
Natural Adaptation Measures. Determine feasibility, and implement where practical, natural responses to adapt to rising sea level and flooding.
Structural Adaptation Measures. Determine feasibility of elevating and redesign of infrastructure, buildings and barriers.
Public Awareness and Education. A program to educate residents, businesses and other stakeholders on the expected flood risks and to promote preparedness and resiliency.
City Initiative for Flood Adaptation and Risk Management. Inform, train and coordinate City departments on flood risk and adaptation measures for the benefit of Annapolis. (Exploit the resources provided by FEMA and the National Flood Insurance Program including the Community Rating system).
Flood Preparedness and Adaptation Responses in City Plans and Policies. Integrate flood preparedness and adaptation response in City plans, codes, policies and incentives, aligning with county, state and federal efforts and partners, where practical.
Flood Disaster Recovery and Response Plan to "Build Back Better." Develop a flood disaster recovery plan and response capability including trained City of Annapolis staff to promote rapid, efficient recovery and to rebuild in more resilient ways - to "Build Back Better."
Sea Level Rise Update to City of Annapolis Comprehensive Plan. Update the City of Annapolis Comprehensive Plan to include sea level rise, its increased risks for flooding and need for adaptation responses.
Annapolis Data for Flood Risk and Adaptation. Building, update and maintain Annapolis data resources including GIS, cultural, property and infrastructure needed to support good decisions for flood risk management and adaptation planning.

With the projects identified and specific actions evaluated within each of the adaptation categories, the Weather It Together Planning Team solicited input from both the Core Team and the community in order to finalize and prioritize the adaptation alternatives referenced in this document.

<u>Identify and Analyze State and Local Mitigation Capabilities</u>
Two of the project's key funders—the Maryland Department of Natural Resources and the Maryland Historical Trust—both indicated that their reason for funding *Weather It*

Together was to use the project as a model for other communities. The Department of Natural Resources, in its written comments evaluating the City of Annapolis grant request, stated that it "sees the project as having potential transferability to other vulnerable, historic communities," particularly the GIS capability to assist "first responders in the field with immediate updates and damage assessment capabilities."

The State of Maryland's Climate Change Action Plan (Climate Action Plan) identifies sea level rise as a threat to Maryland's coastal communities and outlines a comprehensive strategy for reducing Maryland's vulnerability to flooding hazards. As previously stated, State agency stakeholders who are part of the Weather It Together Core Team have expectations for the work their agencies have funded and the technical assistance they have provided in Annapolis. These expectations regarding state and local coordination are specifically addressed in the Climate Action Plan:

- State and local governments must commit resources and time to assure progress.
- Develop state-wide sea-level rise planning guidance to advise adaptation and response planning at the local level.
- Develop and implement state and local adaptation policies (i.e., protect, retreat, abandon) for vulnerable public and private sector infrastructure.
- Require the integration of coastal erosion, coastal storm, and sea-level rise adaptation and response planning strategies into existing state and local policies and programs.
- Strengthen coordination and management across agencies responsible for human health and safety.
- Give state and local governments the right tools to anticipate and plan for sea level rise and climate change.

Actions identified in the Climate Plan which informed specific adaptation projects and actions to flooding hazards in Annapolis include:

- Take action now to protect human habitat and infrastructure from future risks.
- Strengthen building codes and construction techniques for new infrastructure and buildings in vulnerable coastal areas.
- Minimize risks and shift to sustainable economies and investments.
- Recruit, foster, and promote market opportunities related to climate change adaptation and response.
- Identify high priority protection areas and strategically and cost-effectively direct protection and restoration actions.
- Promote and support sustainable shoreline and buffer area management practices.

- Update and maintain statewide sea-level rise mapping, modeling, and monitoring products.
- Use new and existing educational, outreach, training and capacity building programs to disseminate information and resources related to climate change and sea-level rise.

The State of Maryland is poised to assist the City of Annapolis with adapting to longer term sea level rise with its stated commitment under the Maryland DNR *Coast Smart* Communities program to:

- Increase resilience and reduce the long-term vulnerability to flooding, storm surge and sea level rise.
- Connect communities to resources, training and information.
- Provide grants to local government to understand, plan and implement projects to promote resilience to flood impacts.
- Develop and promote mapping and assessment tools.

The stated vision for the Weather It Together CRHMP is for the City of Annapolis "to survive and thrive by building resilience, embracing sustainable development and adapting to hazards and natural disasters that threaten the Capital City's cultural and natural heritage." For purposes of the Weather It Together CRHMP *resilience* is defined as "the ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions."[54]

Evaluate, Select, and Prioritize Specific Mitigation Actions

There are three means by which adaptation or mitigation actions are evaluated. Per the FEMA guidance the three alternative methods for evaluating actions include:

- Preservation hierarchy and areas of highest risk
- STAPLEE criteria
- Benefit-cost analysis

Preservation Hierarchy and Highest Risk

The Weather It Together Planning Team utilized a visual preference survey, findings from the USACE elevation survey, professional analysis of the intensive level survey for historic significance of contributing properties in the study area, input from the

[54] Resilience as defined by the Rockefeller Foundation 100 Resilient Cities Initiative

Weather It Together Core Team a Town Hall meeting, a Planning Charrette, a Community Forum and an online survey to determine the preservation hierarchy, which properties rated highest in historic significance, public sentiment, economic importance and total community value.[55]

STAPLEE

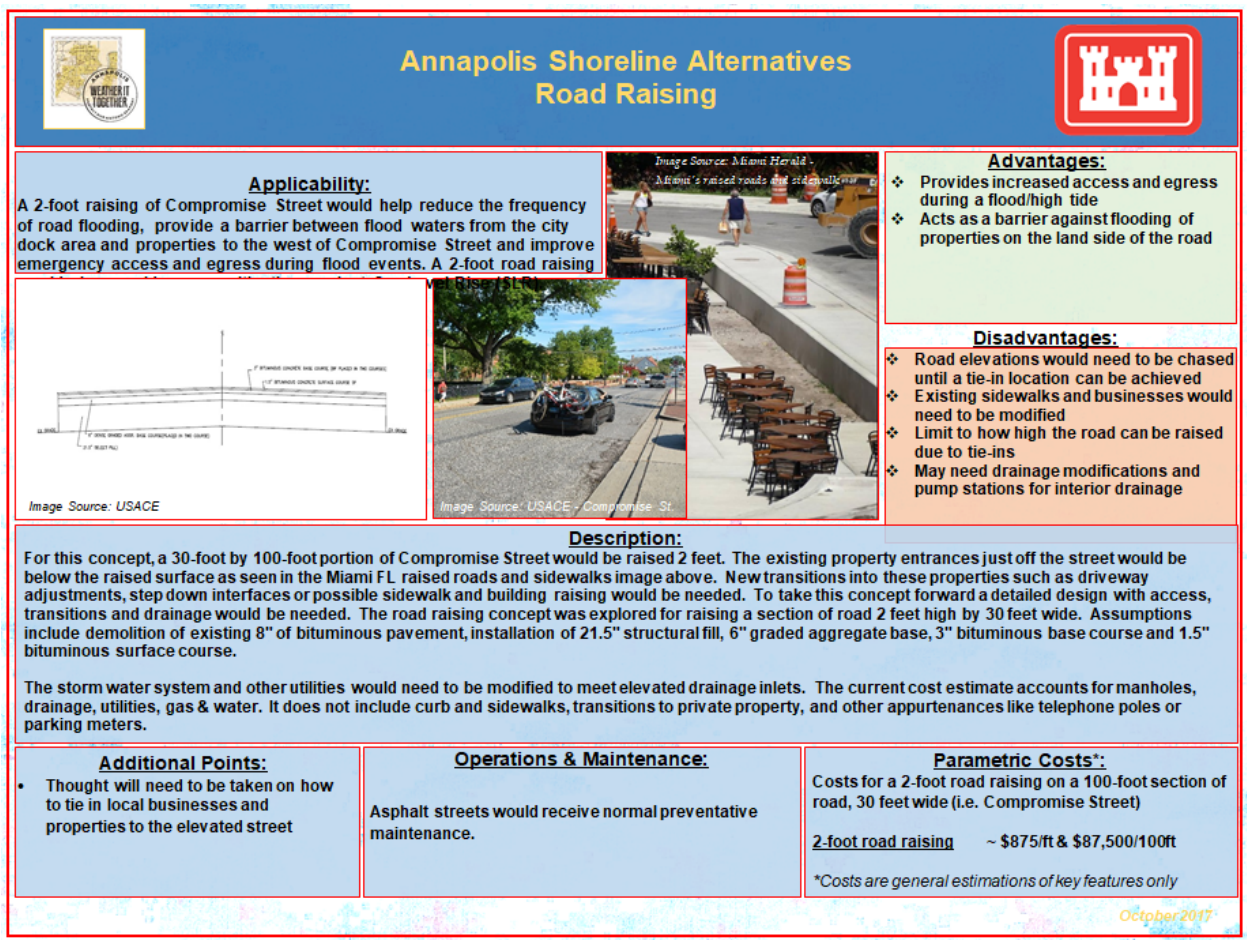
The actions identified by the Weather It Together Planning Team and prioritized by state agency stakeholders and community members, were evaluated using the FEMA STAPLEE criteria. STAPLEE is a cost/benefit analysis tool and includes considerations for Social, Technical, Administrative, Political, Legal, Environmental and Economic issues. The STAPLEE method measures adaptation (and mitigation) actions against the STAPLEE criteria and a plus or minus is placed in each category that the action affects in a positive or negative way. The action with the most pluses rates higher in priority.[56]

Benefit-Cost Estimates

Actions were grouped into nine recommended projects. Early-stage cost and benefit estimates were prepared for each.

[55] See Appendix E: FEMA 386-6 Worksheet #4 Determine Community Value for Historic Property and Cultural Resource Assets

[56] See FEMA 386-6 Worksheet #7 Evaluate Alternative Mitigation Actions for Historic Properties and Cultural Resources and Appendix H



Annapolis Shoreline Alternatives
Road Raising

Applicability:
A 2-foot raising of Compromise Street would help reduce the frequency of road flooding, provide a barrier between flood waters from the city dock area and properties to the west of Compromise Street and improve emergency access and egress during flood events. A 2-foot road raising

Image Source: USACE

Image Source: Miami Herald - Miami's raised roads and sidewalks

Image Source: USACE - Compromise St.

Advantages:
- Provides increased access and egress during a flood/high tide
- Acts as a barrier against flooding of properties on the land side of the road

Disadvantages:
- Road elevations would need to be chased until a tie-in location can be achieved
- Existing sidewalks and businesses would need to be modified
- Limit to how high the road can be raised due to tie-ins
- May need drainage modifications and pump stations for interior drainage

Description:
For this concept, a 30-foot by 100-foot portion of Compromise Street would be raised 2 feet. The existing property entrances just off the street would be below the raised surface as seen in the Miami FL raised roads and sidewalks image above. New transitions into these properties such as driveway adjustments, step down interfaces or possible sidewalk and building raising would be needed. To take this concept forward a detailed design with access, transitions and drainage would be needed. The road raising concept was explored for raising a section of road 2 feet high by 30 feet wide. Assumptions include demolition of existing 8" of bituminous pavement, installation of 21.5" structural fill, 6" graded aggregate base, 3" bituminous base course and 1.5" bituminous surface course.

The storm water system and other utilities would need to be modified to meet elevated drainage inlets. The current cost estimate accounts for manholes, drainage, utilities, gas & water. It does not include curb and sidewalks, transitions to private property, and other appurtenances like telephone poles or parking meters.

Additional Points:
- Thought will need to be taken on how to tie in local businesses and properties to the elevated street

Operations & Maintenance:
Asphalt streets would receive normal preventative maintenance.

Parametric Costs*:
Costs for a 2-foot road raising on a 100-foot section of road, 30 feet wide (i.e. Compromise Street)

2-foot road raising ~ $875/ft & $87,500/100ft

*Costs are general estimations of key features only

October 2017

1 of 8 Factsheets Prepared by Weather It Together and USACE Detailing Adaptation Alternatives with Costs

Select and Prioritize Mitigation Actions

The Weather It Together Planning Team sought input from community members and public and private stakeholders to develop 48 action items for consideration by the Core Team. Those action items were refined and categorized into nine project areas for implementation under the five goals and fifteen objectives.

Step Three: Prepare an Implementation Strategy

Implementation of the CRHMP is tied to the required five-year update of the Natural Hazard Mitigation Plan. It is essential that action be taken to meet the stated goals and objectives prior to the next City of Annapolis Comprehensive Plan update to ensure acceptance of the next five-year plan by FEMA.

Identify How Mitigation Actions will be Implemented

FEMA recommends that the plan incorporate a mitigation strategy to identify the following:

- Parties, responsibilities and partners
- Resources to implement actions
- Time frame for implementation of actions.

The Weather It Together Planning Team analyzed local and state planning documents, identified necessary funding and personnel resources, assessed community priorities and developed an implementation timeline and budget, which is included in the CRHMP.

Document the Implementation Strategy

The plan was edited and evaluated by members of the Weather It Together Core Team, edits were made by the Weather It Together Planning Team and the final document presented to the City of Annapolis Office of Emergency Management for distribution to MEMA/FEMA in December 2017. Presentation of the CRHMP to the Maryland Historical Trust and the Annapolis City Council will occur in 2018.

Step Four: Incorporate Historic Property and Cultural Resource Protection Efforts into the Hazard Mitigation Plan

It was determined by the Weather It Together Planning Team and the Office of Emergency Management that the CRHMP would be developed as a stand-alone document appended to the updated 2018 City of Annapolis Natural Hazard Mitigation Plan. In this way, the Weather It Together CRHMP can serve as a model document for other CRHMPs.

Phase Four: Implement the Plan and Monitor Progress

The Sendai Framework is a 15-year, voluntary, non-binding agreement which recognizes that the State has the primary role to reduce disaster risk but that responsibility should be shared with other stakeholders including local government, the private sector, and others. It aims for the following outcome: The substantial reduction of disaster risk and losses in lives, livelihoods, and health and in the economic, physical, social, cultural, and environmental assets of persons, businesses, communities, and countries.

- Sendai Framework for Disaster Risk Reduction 2015-2030
- The United Nations office for Disaster Risk Reduction

As one of the model documents referenced by the Weather It Together Planning Team, the Sendai Framework for Disaster Risk Reduction[57] neatly articulates the shared responsibility of government to work with the private sector to reduce risk and loss "in lives, livelihoods, and health" and of "economic, physical, social, cultural, and environmental assets." Thus, implementation of the CRHMP and monitoring its progress is a leading responsibility of the City of Annapolis. FEMA provides some guidance as to the necessary considerations local government must address in the CRHMP implementation. Key steps and recommendations are included in the CRHMP.

Step One: Consider Sensitivity of Information

As recommended in the CRHMP, an archaeological survey of the downtown study area must be conducted to identify vulnerable cultural resources and determine the potential risk from flooding hazards and natural disasters. Location of archaeologically significant resources must be protected to ensure that the context of these culturally-rich sites are not disturbed by non-professionals. This may require a fuller discussion with the Maryland Historical Trust and non-disclosure agreements with private property owners.

Step Two: Consider Required Regulatory Review

There are included various recommendations for changes in City policies and regulations to reduce risks to property and the local economy in the event of a flooding disaster. These changes, as well as the CRHMP itself, will likely need to be reviewed by the Maryland Historical Trust, Historic Annapolis (an easement holding organization), and the various state agencies which own property or oversee state regulations applicable in the Annapolis flood zones and the Historic District.

Step Three: Consider Interagency Coordination Agreements

The CRHMP calls for a cooperative agreement with the USNA to formalize data sharing on sea level rise and share information on proposed mitigation activities. It is likely that other agreements will need to be developed between the City, County and State in order to efficiently execute some of the recommendations made by the planning team.

[57] The Sendai Framework for Disaster Risk Reduction 2015 - 2030, United National Office for Disaster Risk Reduction

Step Four: Consider Evaluating and Updating the Plan

At a minimum, the CRHMP will need to be updated within the 5-year planning cycle update of the HMP. However, annual monitoring of the CHRMP to determine completion of specific actions and objectives is essential and should be addressed through the City Council annual reporting process and through the Certified Local Government report requirements of the Maryland Historical Trust.

Step Five: Updating the Inventory Data

A hallmark of the CRHMP is the data-rich inventory completed for the Weather It Together initiative. This database is a "living" framework for collecting and analyzing resource vulnerabilities, economic values, and cultural importance. Additional intensive level documentation on study area properties and data from a yet-to-be-initiated archaeological survey will need to be incorporated into the database. Findings from the PlaceEconomics Cultural Resource Economic Study now underway should also be added with the completion of the final report in mid-2018. Lastly, as the science of sea level rise evolves, the USNA, USACE and FEMA can provide to the City update projections for flooding that may alter the risk assessment and flood elevation data for study area properties.

CHAPTER 4: ADAPTATION IN OUR LANDMARK CITY

The Weather It Together Planning Team prepared a set of implementable ideas and actions that citizens, property owners, businesses, government officials, and other stakeholders may undertake to:

- Reduce the risk of flood
- Reduce of the consequences of flood
- Improve existing and planned building stock and infrastructure
- Build awareness and resilience in the community
- Foster economic development while adapting to flood risk

Actions are activities that require time, work-effort (labor), and budget. Hence they require definition, justification, and approval before becoming actions that are implemented. The FEMA methodology offers the STAPLEE criteria as a means to vet actions. Good ideas, on the other hand, were or can be implemented immediately without material, time, labor, or budget consequences. Identifying ideas and actions was informed by the following:

- Science, engineering, architecture, urban planning, natural resources, sustainability, cultural resources, historic preservation, economics, and local, state and federal government
- A stakeholder-driven process that spanned 3 years and engaged with more than 3,900 people at 75+ events, a process that is ongoing
- Leading practices observed from other cities, organizations, and conferences
- The FEMA 386-6 planning process from *Integrating Historic Property and Cultural Resource Considerations into Hazard Mitigation Planning, State and Local Mitigation Planning How-To Guide*.

Ideas and Actions

The Annapolis Weather It Together Planning Team identified 48 actionable ideas (see Appendix B).

Example 1 – Invite FEMA to educate Annapolis Residents and Business Owners about the National Flood Insurance Program
For example, a good idea surfaced to invite FEMA to educate Annapolis residents and business owners on the National Flood Insurance Program. Rather than wait for the idea be published as part of a plan, Weather It Together presented public workshops

where FEMA delivered informational materials and worked individually with home- and business owners to answer questions.

Example 2 – Review Annapolis Capital Improvement Program for Flood Risk
Another example of a good idea was to review the Annapolis Capital Improvement program for any elements that would be better informed by the sea level rise and flood risk data developed as a part of the Weather It Together initiative. "Just get started" was the Planning Team's action, rather than waiting for the final CHRMP to be produced.

Recommended Projects

Analysis revealed many instances where actions have affinity with other actions, most often in terms of the same or similar expertise required, resources required, stakeholders served, and time requirements. Actions that showed affinity and promise were grouped together and discussed as a set of recommended projects.

	Project Title	Description
1	Tools and Practices for Flood Preparedness and Adaptation	Find, develop, and share tools and leading practices for addressing flood risk and flood adaptation.
2	Natural Adaptation Measures	Determine feasibility, and implement where practical, natural responses to adapt to rising sea level and flooding.
3	Structural Adaptation Measures	Determine feasibility of elevating and redesign of infrastructure and barriers.
4	Public Awareness and Education	Educate residents, businesses, and other stakeholders on the expected flood risks and to promote preparedness and resiliency.
5	City Initiative for Flood Adaptation and Risk Management	Inform, train, and coordinate City departments on flood risk and adaptation measures for the benefit of Annapolis. (Exploit resources provided by FEMA and the National Flood Insurance Program including the Community Rating System).

6	Flood Preparedness and Adaptation Responses in City Plans and Policies	Integrate flood preparedness and adaptation response in City plans, codes, policies and incentives, aligning with county, state, and federal efforts and partners where practical.
7	Flood Disaster Recovery and Response Plan to "Build Back Better"	Develop a flood disaster recovery plan and response capability including trained City of Annapolis staff to promote rapid, efficient recovery and to rebuild in more resilient ways—to "Build Back Better."
8	Sea Level Rise Update to City of Annapolis Comprehensive Plan	Update the City of Annapolis Comprehensive Plan to include sea level rise, its increased risks for flooding, and need for adaptation responses.
9	Annapolis Data for Flood Risk and Adaptation	Build, update, and maintain Annapolis data resources including GIS, cultural, property, and infrastructure needed to support good decisions for flood risk management and adaptation planning.

Project 1: Tools and Practices for Flood Preparedness and Adaptation[58]

The hazard of rising sea levels is an incremental, ever increasing hazard to the cultural resources of the Annapolis Historic District. Just as the issue is incremental, adaptation and mitigation measures must adapt and be part of a logical system that can change and be built upon as the effects of rising water become more severe.

The CRHMP study area includes all properties in the Annapolis Historic District within the 1% annual chance delineated flood plain. This is a portion of the Colonial Annapolis National Register District put in place in 1965. Within the study area there are 156 properties, 104 of which are contributing historic resources to the Historic District and

[58] A White Paper Addressing the Adaptation Alternatives as a Result of Sea Level Rise in Annapolis', Historic District: Protecting Private Property, *Prepared for City of Annapolis "Weather It Together" Planning Charrette, April 30, 2016*, *Contributors: Michael Dowling, Architect*, April 2016, 6 Pages

are of national importance. The total assessed value of all the study area properties exceeds 183 million dollars, of which the historic properties make up over 65% (120 million dollars).

A further breakdown of the study area indicates that there are 74 residential properties, 44 of which are historic, and 73 commercial properties, 54 designated as historic. There are more than 76 properties at high risk of a flood event (defined by having a first floor elevation of seven feet (FEMA BFE with 2' of freeboard or below) in the study area.

Cultural resources have unique exposures to damage from flooding hazards. Historic building fabric consists of materials such as lime mortar, historic brick, plaster, heavy timber framing, etc., which are more easily compromised by saltwater and brackish water inundation than many of their contemporary equivalents. Additionally, the method and means of construction, including wood species, craftsmanship and detail, are difficult, and sometimes impossible, to replicate and replace in kind.

One important aspect of historic preservation is that it is a history of change. The built environment has constantly unfolded as a response to new needs and changes to the built and natural environment. In light of the ongoing and increasing threat of rising sea levels and storm surges, approaches to mitigate flooding damage must recognize the unique aspects of the historic fabric of the study area, but, at the same time, recognize that certain traditional approaches to historic preservation (such as building elevation) may have to be re-examined in light of the threat of the possible ultimate destruction of these valuable resources.

Responding to and addressing this hazard is a viable mitigation approach. Without short and long term planning, both in the public and private sectors, high tide will be lapping at the thresholds of many properties within the near future, and the first floor of many buildings will only be available for kayak tours within a little more than a century.

Cost Considerations for Not Preparing for Continued Sea Level Rise[59]

Loss of business, sales, rental, lost income: Any flood event disrupts business activities and sales while clean-up and repairs are completed. While a single flood event may be a

[59] A White Paper Addressing the Economic Implications of Sea Level Rise on Annapolis' Historic District: the Cost to Communities of Preparing vs. Not Preparing, *Prepared for City of Annapolis "Weather It Together" Planning Charrette, April 30, 2016, Contributors: Michael Dowling, Architect,* April 2016, 5 Pages

minor disruption, as the base sea level rises, the frequency and duration of flood events increases. This, in turn, results in more frequent cleanup costs and increasing frequency and duration of lost income days for businesses.

Loss to Building Structure: Minor flooding requires clean up, but major damage to the building structure requires demolition and removal of damaged building fabric and disposal of ruined equipment (restaurant and electrical switchgear and many other types of equipment cannot be reused once flooded). Additionally, repeated flood events will mean recurring and additional expenses. Since increasing prices to offset increased costs is not realistic for most firms, businesses will see profits erode and losses climb.

Loss of Tourism: As historic structures and context are damaged and destroyed, visitation declines; moreover, the inconvenience of visiting at high water could discourage visitors.

Insurance: Increased exposure to periodic flood damage will lead to an increase in the cost of insurance and the expected inability to obtain insurance. Self-insurance expenses will rise and continued out-of-pocket losses are expected.

Loss of Value: Continued flooding has a negative impact on a building's value both as an asset to the owner and for its market value. Potential buyers may be unable to obtain flood insurance for a property and consequently be unable to obtain financing. Property values will decrease. The negative effect on property values and retail sales would also lead to a loss of government income from property and sales taxes, which in turn could negatively affect City services.

Loss of Historic Resources and Neighborhood Character: Annapolis' character is largely based on the many historic buildings that comprise the City's urban fabric. Damage to these character-defining structures will have an immediate effect on Annapolis' neighborhoods for residents and diminish its appeal as a visitor destination and as an important architectural and historical legacy of the City, state, and nation. Many of these structures are extremely vulnerable to flood damage. Interior plaster is easily destroyed when submerged in water, especially saltwater, centuries old framing will rot, wood frame structures shift on their foundations through hydrostatic pressure, and old brick and oyster lime mortar disintegrate when immersed, leading to structural damage that can telegraph through the entire structure.

Effects of Hurricane Sandy on masonry in Crisfield, MD *Photo credit: Lisa Craig*

Property Owners should be able to address the current situation of increasing nuisance flooding (both in frequency and severity) with the additional possibility of storm flooding by "shelter in place" strategies, as planning proceeds to address the long-term issue and its effects.

At the same time, pre-planning for longer term and more extensive community-wide approaches, both structural and non-structural and in both the public and private arenas, must begin.

Residential and commercial property owners and tenants must have access to current best practices to harden their structures to mitigate the effects of flood hazard events. A flood event similar in magnitude to Hurricane Isabel could result in more than $250 million of negative impact on residential and commercial properties, through property loss, content damage, loss of business, and relocation expenses.

Mitigation adaptation measures must be sensitive to the character and context of the Annapolis Historic District and specific guidelines must be incorporated into HPC review criteria.

Guidelines for existing buildings in the Historic District must initially address preventive maintenance, enhanced retrofitting, and preventive rehabilitation. Requirements for new and infill construction must meet the requirements of current building, life safety, and floodplain codes and ordinances.

While these guidelines may have specific details appropriate for buildings in the Historic District, they would be applicable to any property in the City exposed to flood hazards.

The above are approaches that should be completed within existing building structures, but given the extent of future sea level rise and increased risk of major flooding, more intensive approaches may be required.

In some circumstances, elevating an historic property's first floor may be the best mitigation solution to protect the resource from flooding and sea level rise. The aim is to raise the first floor above design flood elevation without elevating the entire building. Commercial properties with high first floor ceilings can elevate the floor to above required level using internal access steps and ramps.

Raising buildings to an appropriate elevation above the expected flood level is possible for both frame and masonry buildings in the Historic District. Individual, free standing buildings can be elevated as desired by the owner, but Annapolis' cityscape includes many attached party wall buildings—this would require coordination, cooperation, and cost sharing by each of the property owners.

The cost of physically raising buildings ($90 a square foot) is only part of the cost; additional costs include additional foundation and structural work, stairs and ramps, and the connection and reconnection of electrical, plumbing, and other building systems, which will add an additional $50-75 per square foot to the project costs.[60] Elevating existing buildings on private property is only part of the cost. Public infrastructure will have to be modified and adapted to the new building elevation. This

[60] Jerry Matyiko, Expert House Movers of Md., Inc., Field Discussion and Correspondence

would be a major public works project and will require extensive planning and design as well as coordination with adjacent property owners.

The issue of elevating historic structures is a challenge. While raising a building changes the historic relationship of the structure to its site, given the tragic losses of the physical heritage that could occur through sea level rise and coastal flooding, it may be the most appropriate preservation direction to take. A minimal rise in elevation (between 8 and 16") could be accomplished easily: one or two risers added to stairs, additional courses in a foundation. The visual change in elevation could be mitigated through site grading and other measures.

Because preservation includes the history of change, the reasons for elevating a building could be part of an interpretative narrative of a property (the Sands House on Prince George Street, for example, was elevated by 14" early in the twentieth century).

Preventative Maintenance

Ongoing maintenance helps preserve the integrity of historic structures. If existing materials are regularly maintained and deterioration is significantly reduced or prevented, the integrity of the building's materials and workmanship is protected. Proper maintenance is the most cost effective method of extending the life of a building. Well-maintained properties tend to suffer less damage from storms, high winds, and even small earthquakes. Keeping the roof sound, armatures and attachments such as shutters tightened and secured, and having joints and connections functioning well, strengthens the ability of older buildings to withstand natural occurrences.[61]

Enhanced Retrofitting

Basic retrofitting measures and adaptations of existing buildings to be considered for near term adaptation and mitigation can be accomplished with minimal adverse effect on a building and its historic fabric. Most of these adaptations are small, permanent modifications of the building, while others are measures that are temporary event-related procedures that need to be planned ahead of time and kept accessible for implementation during hazard threat warnings.

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[61] *Building a Resilient City: Integrating Historic Property and Cultural Resources Considerations into Annapolis' Hazard Mitigation Plan,* Annapolis Weather It Together, Draft Guidelines, 2015; City of Annapolis, Department of Planning and Zoning, Historic Preservation Division; Karen Theimer-Brown, Lisa M. Craig, Michael Dowling

Preventive Rehabilitation
More intensive measures to be included in longer-term mitigation and adaptation building planning for potentially threatened buildings. These include major changes and additions to the building fabric and the adjacent site.
Historic buildings often share important features such as landscaping, alleyways, orientation, and setback—the distance between buildings and the street. These contributing features often help to define a neighborhood's historic significance. Relocation should be carried out with care to ensure that the relationship between individual buildings within a neighborhood is maintained.

Demonstration Projects
The USACE prepared a Non-Structural Mitigation Assessment (2015) of 16 prototypical properties in the study area in conjunction of their elevation analysis of 147 structures. These buildings include both frame and masonry construction, detached and party-wall buildings, and residential and commercial uses.

The Weather It Together Planning Team in conjunction with the City of Annapolis, Annapolis HPC, Historic Annapolis, Preservation Maryland, and other preservation organizations conducted community-based polling and focus group analysis to determine structures and groups of structures considered to be of high value in defining the historic context of the Annapolis experience. These 47 structures thus identified include 18th, 19th and 20th century sites, concentrated adjacent to the head of the harbor, Market Space, and Main Street.[62]

Owners of these significant historic structures that have been identified as having high community value, are to be solicited to volunteer to take part in demonstration projects that incorporate flood protection efforts that can be accomplished in the Annapolis historic context. These interventions and retrofit details would include dry and wet flood proofing measures as described by FEMA and other approaches as they are developed.

The Executive Director of the Annapolis Summer Garden Theatre has expressed interest in being one of the demonstration projects; this building at 143 Compromise Street

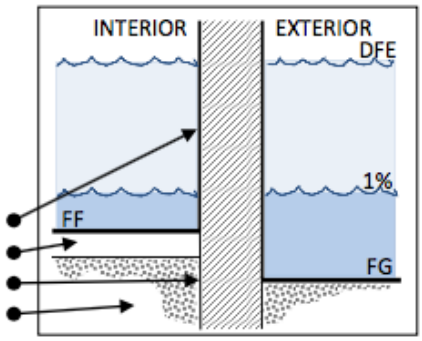
[62] Nonstructural Mitigation Assessment for the City of Annapolis Historic District, Annapolis, Maryland, 2015; Planning Division, U.S. Army Corps of Engineers, Baltimore District

offers a unique combination of masonry and frame construction in one historic building.

STRUCTURE FACT SHEET
141-143 Compromise Street

Structure Info/Data

Name/Description:	Annapolis Summer Garden Theatre
Address:	141-143 Compromise Street
Occupancy type:	Theater (Assembly)
No of Stories:	2 ½
Building Construction:	
Exterior Walls:	Masonry.....
Floor Construction (1st Flr):	Concrete.....
Foundation:	Masonry.....
Grade/Crawlspace/Basement:	Grade.....



BUILDING SECTION (at Grade)
Not to Scale

Structure/Flood Elevations Table

FG	LO	FF	Δ FF-FG	1%	DFE	Δ 1%-FF	Δ DFE-FF	Δ 1%-FG	Δ DFE-FG
2.92	3.83	3.83	0.91	4.50	8.20	0.67	4.37	1.58	5.28

Abbreviations: FG – Finish Grade [low point]; LO – Low Opening; FF – First Floor; 1% - One Percent Exceedance Flood [100 yr]; DFE - Design Flood Elevation; Δ -Delta/Difference

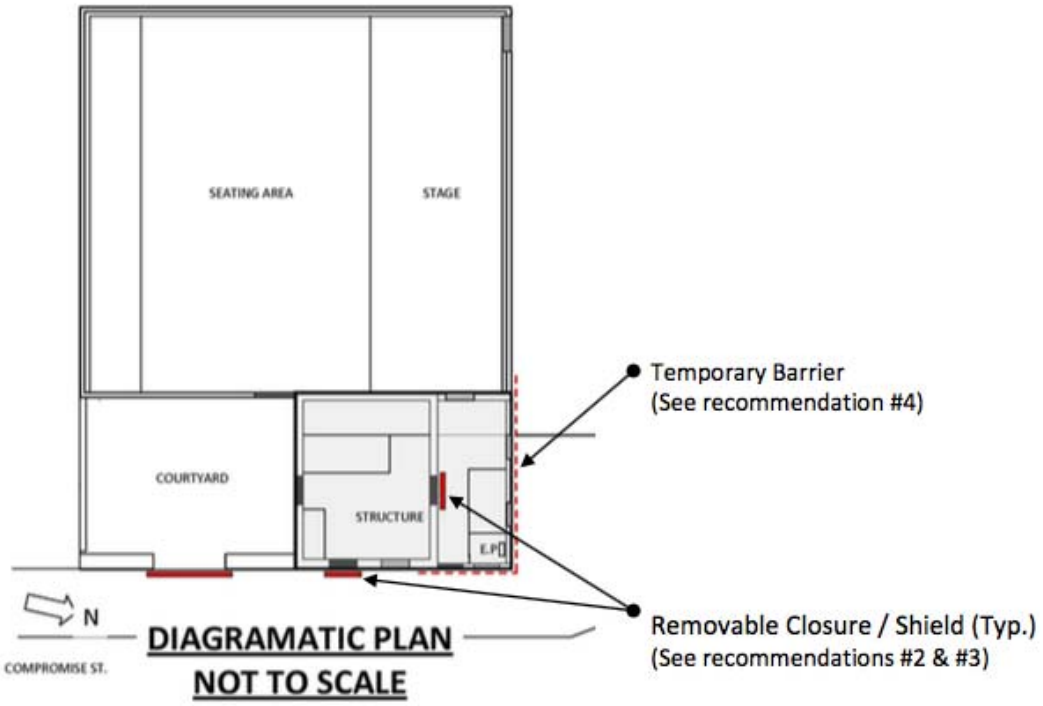
Structure Photographs

East & North Elevations

North & West Elevations

Interior Detail

Nonstructural Mitigation Analysis *U.S. Army Corps of Engineers*



Nonstructural Mitigation Concept Solutions *U.S. Army Corps of Engineers*

Sources of planning and capital funding, or alternative tax-credit cost mitigation, for implementation of high priority demonstration projects will be explored at the city, state and national level.

Disaster Response

As part of the ongoing Hazard Mitigation effort, the City of Annapolis will develop information to be made available to property owners, tenants, and renters to plan and prepare for possible flood hazard events. These would include both pre-event (such as moving electronics, valuables, furniture, decorative arts, etc. to a higher level) and post event efforts.

Post Event[63]
Follow all emergency rules, laws, and regulations
Turn off all utilities—even if the power is out
Wear protective clothing, gloves, goggles, and a respirator or mask
Document building damage in notes and photos before moving anything or beginning clean up
Stabilize any unstable structures with temporary bracing
Use caution when pumping basement water
Keep building properly ventilated
Sewage can back flow into your home during storm related flooding—avoid contaminated areas
Clean everything that got wet with a disinfectant
Allow saturated materials to dry using natural ventilation
Check for foundation and chimney damage—look for any cracks, bulges, misalignments, bowing or separation
Replace any soil eroded from around foundation
Use caution when removing lead-based paint or any products containing asbestos
Have the electrical system inspected
Secure property, salvage architectural materials that can help with restoration later
Install temporary roof coverings so replacement can be evaluated
Find guidance and housing assistance at FEMA's Disaster Recovery Centers after a national disaster

Project 1: Tools and Practices for Flood Preparedness and Adaptation
Actions:
Collect and disseminate data and case studies on the socio-economic impacts of flood events on employees and businesses within the flood risk area.

[63] National Trust for Historic Preservation Booklet No. 82, 1993, Treatment of Flood-Damaged Older and Historic Buildings, and provided courtesy of the New Bern Historic Preservation Commission.

Develop a how-to workbook for community-based cultural resource hazard mitigation and adaptation planning.
Develop design guidelines for preservation-sensitive flood adaptation of historic properties and archaeological resources in Annapolis.
Work with the Maryland Resilience Partnership to develop a needs statement, project description and budget for a Maryland-based flooding adaptation technical field team.
Recruit owners of high community value properties and assist in designing and securing financing for hazard mitigation or adaptation.
Establish Annapolis-based Weather It Together field teams to assist property owners in pre-disaster preparedness and post-disaster recovery.

Natural Stormwater Management: Street End Park, Fourth Street *Photo credit: Michael Dowling*

Project 2: Natural Adaptation Measures

Natural solutions for coastal flood and erosion protection are showing good benefits around the country. Bulkheads, seawalls, and other hardened structures have been the

traditional response to coastal threats and make sense in the substantially built environment such as the area around City Dock. However, it is becoming evident that hard structures often increase erosion along adjacent shorelines, incur significant maintenance costs and bring surprising risk if they fail. Where they make sense, natural solutions provide many of the same benefits as their structural counterparts.

Annapolis stakeholders made it clear that they are interested in exploring the feasibility of natural solutions in sections of the Annapolis coastline where reasonable. Timing is favorable to explore these possibilities as the Maryland Department of Natural Resources has just recently announced (2016) programs for coastal resiliency. (See http://news.maryland.gov/dnr/2016/06/06/new-report-assesses-marylands-coastal-resilience/). The Critical Areas Commission, Chesapeake Bay Foundation, Department of Natural Resources, National Wildlife Federation, and others all provide options and resources to protect for the short-term. "Soft" adaptation options, already underway in Annapolis to mitigate impact, can be expanded upon. These include:

Living shorelines that help calm and absorb waters—salt marshes are a natural shoreline that are native to the Annapolis area and can be used to help buffer the community. Also, oyster reefs can be used to dissipate wave energy. The reefs will grow as the water rises.

Green infrastructure, which also help mitigate flooding from heavy rain, can help lessen the impact of rising tides if more water is caught at the top of Annapolis' Main Street versus running down the street to combine with rising waters. Rain gardens and larger bio-retention gardens on public and private property can capture and contain water where it falls. There are also ways to restore natural drainage options within covered marsh areas.

Increasing tree canopy, and creating green roofs and walls in and around the community can again help mitigate the damage of heavy rains, as these features may capture stormwater to prevent it from joining rising flood waters. The evaluation of all adaptation measures must take into consideration their impact on the natural environment and the species that are part of that environment. Changing saline content and water temperatures will have an impact not just on the shorelines but also on the species of microbes, plants, fish, and other wildlife.

This plan proposes a project, Natural Adaptation Measures, to explore feasibility of natural approaches for the Annapolis shoreline.

Project 2: Natural Adaptation Measures **Actions:**
Conduct feasibility studies for construction of permanent structural and natural barriers adaptable to rising waters

Project 3: Structural Adaptation Measures[69]

Structural adaptation measures are capital projects that follow a lifecycle that includes feasibility study, design, construction, operation and maintenance. Typically these projects take years to develop fully. They start with a feasibility study to determine if the adaptation measure is practical, justified, and worthy of a public decision to fund.

Stakeholders have expressed interest in structural adaptation measures such as raising the existing City Dock bulkheads, seawalls, and raising public infrastructure such as Compromise Street and the streets and parking areas around City Dock. The USNA may choose to consider such measures and it is prudent to coordinate efforts as the City and Academy share a waterline.

[69] Structural Flood Risk Management Measures White Paper, *Prepared for City of Annapolis "Weather It Together" Planning Charrette, April 30, 2016*, *Contributors: Stacey Underwood, U.S. Army Corps of Engineers, Baltimore District and David Jarrell, City of Annapolis Department of Public Works*, 26 April 2016, 7 Pages

Annapolis City Dock Bulkhead, May, 2017 *Photo credit: Don Bain*

Stormwater Improvements—Storm Drain System

The City must find ways to prevent high tides from causing flooding by backing up into the storm drain system.

Improvements to stormwater infrastructure typically propose techniques that address present-day rainfall runoff rates in an effort to reduce or eliminate flooding. These improvements are often done in conjunction with the installation of stormwater best management practices to reduce pollutants.

The City of Annapolis is currently in the planning and preliminary design phase of a public works project to retrofit the stormwater system that discharges into the harbor at the City Dock. This project is intended to prevent high tides from backing up into the storm drain system and causing localized flooding. Backflow preventers/flap valves, pumping stations, realigning or replacing stormwater pipes, and storage options

(retention facilities) will be included to keep the water from backing up into the storm drain system.

Flood Barriers

The City must find ways to reduce risk of flooding from sea level rise and large storms with permanent and semi-permanent structural flood proofing measures.
While reducing the risk of flooding to these areas, any recommended measures must sustain waterfront views and the aesthetics of the downtown Historic District. The following permanent and semi-permanent structural measures offer a variety of options for the City to consider.

A floodwall/seawall is a permanent or semi-permanent engineered structure, usually constructed of reinforced concrete or a sheet pile with concrete cap, designed to prevent the encroachment of flood waters, and used for urban and intensely developed areas. Floodwall construction requires high ground at either end of its run into which to terminate. Pumps may need to be installed for proper interior drainage from groundwater seepage and storm and rainwater. Floodwalls are used to reduce the risk of coastal storm surge flooding by confining flood waters and keeping them from reaching buildings and infrastructure. Floodwalls can be made with various facades to be aesthetically pleasing. If a high level of flood protection is required, a high floodwall can block views and may require openings and closure structures for access through the wall. Floodwalls and seawalls have a high cost of construction and may alter local hydrology.

Alternative alignments of a floodwall could be considered by the City, either where the current seawall runs along City Dock or be set back closer to the surrounding buildings. Designs could include an aquarium glass wall as an alternative to a full solid wall. Additionally, landscaping, natural plantings, walking paths, benches, and planters can add aesthetic and health contributions to a floodwall project. Any proposed flood wall/seawall design needs to be investigated extensively and engineered to ensure hydrologic effectiveness.

Permanent floodwalls should be constructed with robust foundations so that the wall may be raised in the future if needed to accommodate additional sea level rise. Semi-permanent floodwalls can also be constructed to provide aesthetic views of the waterway, or of the City from the water and surrounding areas. There are a variety of new products that allow a low floodwall to be constructed, and then the height of wall increased either manually or hydraulically just prior to a flood event.

Floodwalls typically require openings for access during non-flood events: for roads, driveways, walkways, and access to docks. Closure structures are built as part of the project. These are left open during dry times and are closed prior to flood events. Types of closure structures include stop logs, swing gates, and slide (roller) gates. Some can be closed quickly, such as the swing and slide gate, when there is little warning time; others, such as the stop log, take longer to close.

Considerations for floodwalls and seawalls include:

- Aesthetics/view/access are a priority and challenge
- Unique designs exist to blend with downtown aesthetics
- Permanent wall can be low, and higher wall could be manually or hydraulically erected prior to flood
- Lower walls could be built with adequate foundation to allow increased height over time
- Walls must tie into high ground
- Closure structures are required where openings are needed for access.

Other Structural Improvements

As part of a flood risk management project, other alternatives, such as temporary flood barriers, raising roads, and raising walkways and bridges, can be considered. A combination of measures should be evaluated.

Temporary/portable flood barriers are available that can be erected prior to a flood event to prevent floodwaters from reaching critical areas. Each of these options works differently and some are not as effective as others. Use of these devices for flood events must be evaluated in detail for the location and flood circumstances. Typically, these flood barriers require advance warning, provide a temporary low level of protection from flooding and are removed when the threat is over. Some flooding may occur as they are being activated. Because of the types of materials used and need for installation, there is a higher risk of failure than with a permanent structure.

Raising streets and roads within the public right-of-way is an option. It is an incremental process that can provide a barrier to flood waters, protecting many (not all) structures in the City Dock area of the study area. Access to adjacent properties will be changed and must be addressed in the overall project design and specifications. Utilities, services, and sanitary and storm sewers located in the right of way will have to be adjusted, and storm water inlets added. Incremental lifts of the street level surface can be added in the future as conditions change. The interface between a raised street

surface and the adjacent sidewalk and building entry elevations is of prime consideration along with changes to surface runoff and drainage from adjacent buildings and properties.

Adjacent property owners must consider elevating their properties as the street level is raised. In early stages of elevating the streets, the offset may be acceptable, but this will change with rising sea levels. The cost of physically raising buildings is only part of the cost; additional costs include additional foundation and structural work, stairs and ramps, and the connection and reconnection of electrical, plumbing, and other building systems.

The issue of elevating streets in a historic context is a challenge. Raising streets and buildings changes the historic relationship of the structure to its site, and vistas and viewsheds will be obscured and changed. Visual analysis must be part of the planning of any such projects, and intense cooperation between the City and private property owners must be achieved.

This CRHMP recommends conducting feasibility studies, as supported by the stakeholder input. Recommended project(s) include feasibility studies and public design sessions as shown in the following table.

Project 3 : Structural Adaptation Measures **Actions:**
Conduct a feasibility study for raising and redesigning public infrastructure in the immediate vicinity of the Annapolis shore, for example Compromise Street, Market Space and City Dock ~5 feet, to reduce flood risk and to create a barrier to storms.
Conduct a feasibility study for increased height of the existing City Dock bulkhead for 2050 sea level rise based on anticipated high tide elevation of 2.9 feet (NAVD88).
Work with scientists, economists, investors, engineers and policy experts to assess studies and identify adaptation alternatives that will be cost effective and feasible for implementation in Annapolis.
Finance implementation of the CIP City Dock Flood Mitigation project to include closure valves, pumping stations, installation of new stormwater drainage pipes and lining of existing pipes.
Lead a community design charrette to develop adaptation alternatives for public space in Annapolis

Project 4: Public Awareness and Education

Authentic, historic properties within a vibrant city help create a unique place-making experience for visitors and residents alike. Annapolis' cultural and historic assets provide inviting settings for popular eateries and commercial uses. One of the first steps the project team too was to create a visual preference survey to help identify the areas and places of visual and community importance.

The survey was completed by nearly 400 people, including residents and those who live outside the community but who work or visit the state capital and seat of county and city government. Throughout 2016, City sponsored *Preservation 50* lectures and events interacted with Weather It Together in recognition of the 50th Anniversary of the National Historic Preservation Act and the designation of Colonial Annapolis as a National Historic Landmark District. Special community lectures and award programs focused on the city's architectural heritage, its cultural resources and best practices to protect historic properties.

2016 National Preservation Conference Weather It Together led by Michael Dowling
Photo Credit: Karen Theimer Brown

To support a FEMA funding request for the protection of the Annapolis City Dock area from storm surge/ flooding, the City of Annapolis evaluated a very specific subset of buildings, both historic and non-historic, and measured the economic impacts of loss of use. This study included a small, targeted analysis focused on the following economic impact measures related to business operations and employment. The City economic development office, with input from local businesses, tabulated loss of revenue for key industries within the study area; loss of wages; tax revenue loss (e.g., sales, property, employment, etc.); and property values (projected permanent loss of property values/taxes). The total annual economic impact of just 27% of the properties in the study area in sales, wages and tax revenues is $210,098,409.

Conversely a total annual revenue reduction due to 39.3 days of nuisance flooding is estimated at $4,109,320. Total annual wage reduction due to 39.3 days of nuisance flooding was calculated to be $1,056,331. Thus, the total potential daily loss in sales and wages to flooding comes to $131,442 per day.
Positioning Weather It Together as an opportunity to preserve properties and protect the local economy from rising tides and natural hazards, galvanizes public support for this City initiative. The City's public education strategy has therefore been one of a positive messaging coupled with sobering statistics. The focus on economic opportunities for local businesses to provide flood-based solutions benefits not only Annapolis but other coastal and waterway communities.

During a day-long planning charrette more than 100 engaged citizens explored flooding adaptation alternatives. This community engagement further refined the Weather It Together messaging strategy, identifying targeted communities (i.e. business owners, employees, natural resource-based organizations, property owners,, architects and engineers) and communication methods (i.e. Weather it Together webpage, storymap, public meetings, design charrette, public art) for a public awareness and education program.

Since November of 2013, Weather It Together has hosted nearly monthly Weather It Together Core Team stakeholder meetings, a town hall (250 people), a community forum (125 people), special lectures, and large public events such as the John Englander lecture and book signing at St. John's College, which drew a crowd of more than 600. Members of the Weather It Together Planning Team have spoken at local and state government public meetings, civic and nonprofit events, and state and national conferences, culminating with the second annual *Keeping History Above Water* conference, co-hosted by the City of Annapolis and the Newport Restoration

Foundation, which drew 280 attendees from 24 states and 3 nations to share case studies and best practices in the adaptation of historic coastal communities.

Still, as the tides continue to rise there is work yet to do to engage and educate decision makers and community stakeholders in the hard decisions and substantive actions that must be taken to protect this culturally-rich and economically-vibrant historic seaport.

Leading with solutions, the Weather It Together initiative is a proactive approach recommending forward-looking actions for implementation by residents, property and business owners, agencies and elected officials to:

- reduce or manage flood risk
- adapt to rising tides and flood waters
- protect and grow the city's economic, environmental and social interests.

Building Public Awareness

To instigate societal change in the face of rising seas, Weather It Together recognizes that all individuals who live, work and play in Annapolis represent the affected community. The success of Weather It Together adaptation strategies is reliant on building public awareness for the affected community. To continue the dialogue on flooding impacts and prevention, the initial stakeholder community of cultural resource professionals, organizations and property owners was broadened to include government agencies and deepened to engage individual business owners, residents, civic groups and natural resource advocates. A series of surveys and stakeholder group meetings gathered new information and established priorities from each special interest community, helping to shape the final plan.

All of the communities represented in Weather It Together were exposed through lectures, meetings, and workshops to national experts and thought-leaders on sea level rise, natural hazards and cultural and natural resource protection. Coupled with a data-rich, fact-based analysis produced by the Weather It Together Planning Team in close consultation with NOAA, USNA, MEMA, DNR and MHT, this tailor-made information was presented to educators, architects, environmentalists, riverkeepers, Rotarians, business and community associations, City staff, elected officials, historic preservationists, and civic groups.

Weather It Together presentations and adaptation measures are informed by a simple message - the necessity to act now. There is time to plan, to reduce risk, and to turn flood hazards into flood response and prevention opportunities for planners,

preservationists, environmentalists, business owners, residents, and design and building industry professionals.

Engage the Public in Flood Preparedness and Adaptation

Annapolis has an aging population, a growing Hispanic population, and disparate socioeconomic populations. Flood hazards and sea level rise will cause concern for public health, the economy, natural resource protection, transportation, property value, and public infrastructure. Annapolis must prioritize response to short- and long-term impacts of sea level rise on the city's shoreline and and its stakeholder communities. Public engagement is an ongoing part of the CRHMP with specific timelines and outcomes identified.

During 2016 and 2017 the Weather It Together Planning Team coordinated three intensive workshops on FEMA's National Flood Insurance Program. These meetings were specific to residential and commercial property owners and business owners, providing information on flood zones, flood insurance coverage and risks associated with not purchasing flood insurance. Pre- and post workshop surveys showed that the educational programming did have an impact based on resident and business owner follow-up, which included seeking quotes, buying flood insurance, and expanding coverage, even to the purchase of business continuity coverage. These programs also created public pressure by elected officials on the City to join the Community Rating System (CRS) and reduce the cost of flood insurance for private property owners.

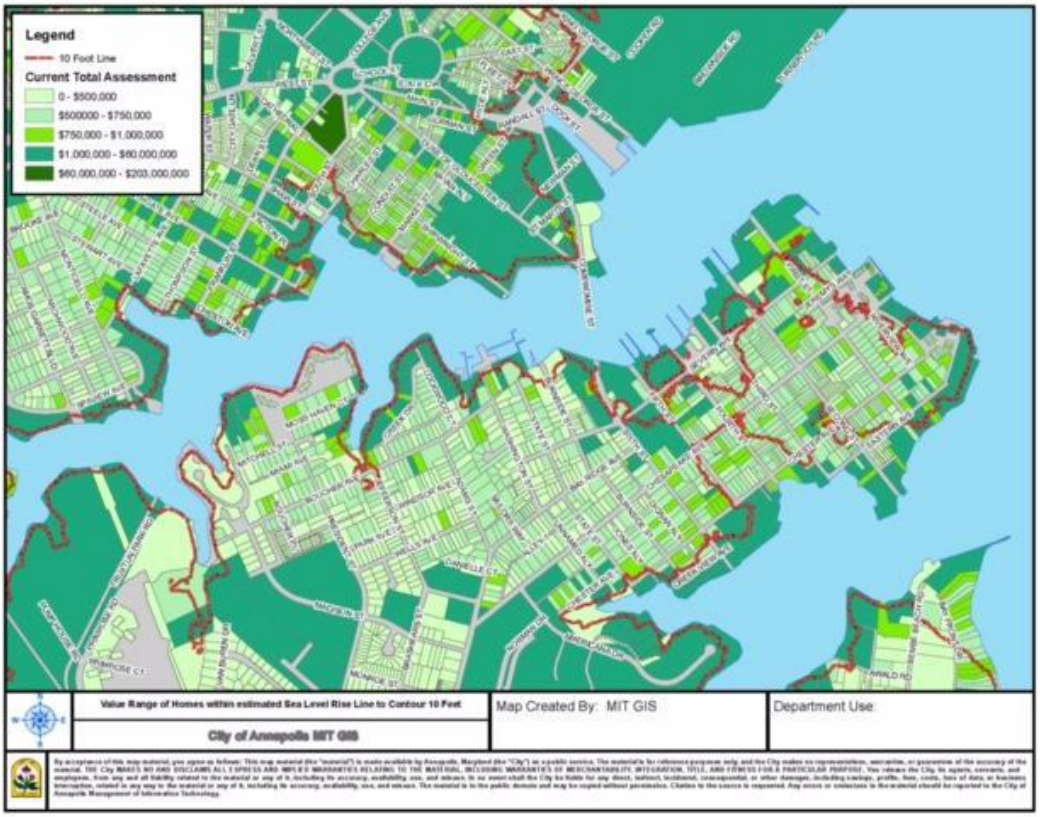
Over the next five years, the Weather it Together initiative will expand public engagement to more diverse property owners, especially those outside of the Historic District, to provide adaptation strategies for property owners, residents and businesses both within and outside the city's flood zones. A particular emphasis is on creating new and expanding the existing tax incentives for hazard mitigation improvements. Specific actions for continued public awareness are listed below:

Project 4: Public Awareness and Engagement **Actions:**
Develop and implement a community engagement program to share leading practices for flood adaptation of privately-owned properties.
Develop an educational program that illustrates and interprets past flood events and depicts future flood elevations.
Provide information to business owners on resources available to support business continuity and disaster preparedness.

Research and communicate economic data on the impact of flood events and the costs of flood adaptation to public and private-property owners, residents, business owners and civic organizations.
Conduct Keeping History Above Water conference to gather and disseminate current data and leading best practices in flood adaptation and cultural/archaeological resource protection.

Project 5: Flood Preparedness and Adaptation Responses in City Plans and Policies

Daily flooding and sea-level rise threaten the functioning and economic viability of the historic downtown, its businesses, and residents. The situation in Annapolis is compelling as a significant amount of the low-lying land in the City is subject to the potentially 2+ feet of flooding, storm surge, and sea level rise projected over the next thirty years. The flood–prone areas of Annapolis are primarily high-value residential and commercial properties, as shown in the figure below.



Map of Assessed Values of Real Estate, Source: 2016

Annapolis has put in place several laws to protect buildings in the floodplain and to move development away from the edge of the Chesapeake Bay. Several of the forward-thinking actions that the City of Annapolis has undertaken include:

- City Building Code requirement, 17.11.179—Flood Protection Elevation. The code requires the base flood elevation plus two feet of freeboard. Freeboard is a factor of safety that compensates for uncertainty in factors that could contribute to flood heights.
- Adoption of the Maryland State Chesapeake Bay Critical Area requirements in the Annapolis Zoning Code. The Zoning Code restricts building 100 feet from the water and restricts the amount of impervious surface on the property. The City has augmented these regulations with extensive requirements to limit disturbance of the natural habitat and existing trees near the water and to vegetate the area with natural species.
- The City requires environmental site design per Maryland Department of the Environment regulations for stormwater management. This practice encourages green infrastructure such as green roofs, bioswales, and rain gardens.
- Creation of Maritime Zoning Districts adjacent to the Chesapeake Bay. The City has zoned a portion of its waterfront land for water-dependent and water-compatible uses such as boatyards, yachting centers, and marinas. These water-dependent uses are far more effective in absorbing storm surge and flooding than residential or office structures.

The Annapolis CRHMP builds on this foundation by strengthening existing land use and zoning policies and creating a clear direction for the rebuilding and rehabilitation of historic structures after a hazard-related disaster. This approach recommends policies with performance standards that guide the City's actions, and land use regulatory actions that are designed to prevent or reduce the construction of buildings in areas prone to flooding and storm surge and to promote the building of more flood-resilient buildings in those areas. The recommended policies, standards, and regulatory actions are to be implemented through performance standards, the building code, zoning code and subdivision regulations, Critical Areas requirements, site design review, Historic District review, easements, floodplain buffers, and open space requirements.

FEMA's "how-to" guidance on incorporating historic properties and cultural resources into hazard mitigation planning, identifies the need for performance standards, stating "ensuring compliance with performance standards will help reduce the likelihood that design elements of historic buildings and other structures located in hazard-prone areas

will experience hazard-related damage." As important as the performance standards are, FEMA alerts localities to the need for creative design so that character-defining features of these structures can be maintained while bringing them up to an enhanced code or performance standard.

In Annapolis, a significant characteristic of the Historic District is the consistent rhythm of the colonial buildings at the street level, with their stoops and porches and street level windows. A challenge for Annapolis is to ensure that there is a path forward for rebuilding structures after a catastrophe in a way that contributes to the city's historic character and streetscape.
To achieve this, any new flood adaptation standards for the retrofit and rehabilitation of historic buildings should incorporate flexibility in design. For example, design flexibility may require relief in the height or building envelope in order to recoup lost space due to freeboard requirements.

Photo credit: Michael J. Dowling

Guiding Principles and Policies for Performance Standards

To address this issue, Annapolis has identified the following Guiding Principles and Policies, originally identified by the Urban Land Institute, for inclusion in the CRHMP:

- Provide flexible options for development standards and criteria to afford opportunities to recoup lost ground space;
- Craft guidelines that will promote an active and consistent street frontage in conjunction with meeting FEMA regulations for the ground floor level;
- Always design projects for flexibility to accommodate ground floor flooding; and,
- Detail a storm surge (sea level rise) strategy for each project site with specific performance standards for that property.

Performance standards are the mechanism used to provide the flexibility and site-specific standards needed to implement these "Guiding Principles and Policies." The study area lies within the Historic District Overlay, governed by City Code Section 21.56, and the Critical Areas Overlay District, Section 21.54.010.

Within the Critical Area Overlay District, the site area is designated as an "Intensely Developed Area," which incorporates policies and performance standards to address a range of issues regarding storm water management and impervious surfaces. However, flooding and storm surge are not a component of the regulatory framework for Critical Areas as mandated by the State of Maryland.

Performance standards specific to the mitigation alternatives associated with storm surge and frequent flooding could be clearly delineated through a mechanism similar to the Site Design Plan Review, Section 21.22. This section of the City of Annapolis Zoning Code incorporates performance standards for purposes of: "Encouraging orderly development and the relationship between the built and natural environment." Policies and performance standards currently address a range of development issues including:

- Compatibility with surrounding character;
- Achieving maximum safety and efficiency;
- Minimizing adverse effects; and,
- Minimizing modification to natural features including slopes and soils.

Within this context, performance standards should be crafted to provide flexible development options to recoup, through additional height or modified setbacks, space lost due to freeboard requirements for mitigating flooding. Performance standards could also be designed to ensure a consistent street frontage while accommodating ground floor flooding.

Local governments have a wide range of regulatory tools at their disposal to direct development away from hazard-prone areas. These tools may take the form of:

1. Building Code requirements to mitigate against frequent flooding hazards;
2. Incentives to encourage investment in appropriate "infill areas" in order to relieve development pressure from areas subject to flooding; or
3. Zoning or subdivision regulations, which limit the density, development envelope, and scale of new construction in proximity to areas subject to flooding.

Hazard Mitigation through Building Codes

In Annapolis, the "owner of real property who intends to construct, enlarge, alter, repair, move, demolish, or change the occupancy of a building or structure" is required to apply for a Building Permit in compliance with Title 17 of the Annapolis City Code. The International Existing Building Code, 2012 Edition, is adopted as the Existing Building Code of the City of Annapolis. All exterior projects in the Historic District, and hence all exterior projects in the study area, require a Certificate of Approval in accordance with Chapter 21.62 of the Zoning Code.

The City of Annapolis has already modified its building code to include reference to requirements for construction in the Floodplain in Chapter 17.11.

Historic Properties in the Annapolis Special Floodplain Hazard Area

The City of Annapolis, by resolution, committed to the requirements of the National Flood Insurance Program and was accepted in the program on November 4, 1981. In the Statement of Purpose in Chapter 17 of the Annapolis Code, there are several objectives that relate directly to the protection and enhancement of the study area, including:

- Encouraging the utilization of appropriate construction practices in order to prevent or minimize flood damage in the future;
- Reducing financial burdens imposed on the community by discouraging unwise design and construction of development in areas subject to flooding;
- Minimizing prolonged business interruptions;
- Reinforcing the understanding that those who build in and occupy special flood hazard areas should assume responsibility for their actions; and,
- Meeting community participation requirements of the National Flood Insurance Program as set forth in the Code of Federal Regulations at 44 Section 59.22.

Annapolis has been at the forefront of flood mitigation for historic structures as it is the first jurisdiction to require that all properties within the designated floodplain in the Historic District be "referred to the Chief of Historic Preservation for a determination of: i. historic structure status as defined in Section 17.111.209; and ii. any applicable tax credits pursuant to Section 6.04.230" per City Code Section 17.11.310."

This authority allows the Chief of Historic Preservation to "review any repair, alteration, addition, rehabilitation, or other improvement of historic structures to be subject to the requirements of Chapter 17, unless a determination is made that the proposed work will not preclude the structure's continued designation as a historic structure."

Historic structures within the floodplain study area are further protected as the "Department of Planning and Zoning shall have the power to consider and authorize or deny variances... only if it is determined to not be contrary to the public interest and where, owing to special conditions of the lot or parcel, a literal enforcement of the provisions of this chapter, an unnecessary hardship would result."

This authority granted the Chief of Historic Preservation ensures that property owners are encouraged and incentivized from the onset to adapt their historic buildings for flooding.

Modifications to Current Building Code Language

One of the main issues facing historic properties in the study area subject to flooding is the definition in the Building Code for "Substantial Renovation and Redevelopment." Section 17.11 of the code currently defines "Substantial Renovation" as "greater than 50% of the assessed improvement value according to the State Department of Assessment Taxation Data." If the improvement is greater than 50%, the project is required to meet all Building Code and Life Safety requirements for new structures.

In the study area, renovations to historic structures frequently exceed the 50% threshold due to the cost of remodeling historic buildings. This definition of "Substantial Renovation" can trigger compliance with current code requirements for relatively minor improvements or for renovations resulting from frequent flooding events, making maintenance of historic structures cost prohibitive. More relevant thresholds, such as the appraisal of the improvement value of the structure, should be considered as an alternative and less onerous approach.

A second issue for evaluation is the ability of properties in the Historic District to request exemptions from the Floodplain requirements. Consideration should be given to requiring flood hazard mitigation design elements in all historic properties subject to storm surge and inundation from flooding.

An ongoing challenge to rebuild quickly occurs after every flooding event. The Development Review process needs to incorporate a post-event expedited approval process for building permits, Historic District certifications, and all necessary site design and zoning review processes.

Zoning Approaches for Hazard Mitigation

Local zoning ordinances offer a variety of tools by which properties can be either regulated or incentivized to meet certain development goals, in this case, additional flood protection. Utilizing easements, acquisitions, and downzoning are approaches used in some flood-prone areas; however, these approaches are less feasible in Annapolis due to the existing low scale of buildings, limited lot size, built-out conditions, existing density, and financial constraints. Nevertheless, Annapolis does have both regulatory tools and incentives available through the Zoning Code.

Because the impacts of storm surge and flooding do not typically affect the entire jurisdiction, overlay zoning can be an effective way to target specific properties or areas that meet certain criteria, such as vulnerability to flooding. Annapolis has used its Zoning Code successfully to protect the Historic District through the Historic Preservation Overlay and to limit development along the Chesapeake Bay through the Chesapeake Bay Critical Area Overlay.

Overlay Zones and Special Districts

Given the success of these existing overlay districts, Annapolis can identify additional zoning tools or development standards to apply to the study area in the form of either an overlay or a new district. A report titled "Model Sea-Level Rise Overlay Zone: For Maryland Local Governments" outlines two sub-districts for areas subject to frequent flooding and storm surge that could have some applicability in Annapolis. First, a "Floodplain Conservation District" (FCD) for highly vulnerable areas with sensitive natural resources would limit and restrict redevelopment. The second sub-district, the "Floodplain Accommodation District" (FAD), would be designed to allow for continued development while "requiring that structures be sited and built to be more resilient to impacts. The FAD may include areas with intense to moderate existing development, some ecologically sensitive resources and limited viability for hard-

shoreline armoring." A few of the tools identified in this sub-district which would be applicable to the study area in Annapolis include:

- Downzoning—limit the type of new development or requiring that more intense uses obtain special use permits;
- Increased setbacks—apply erosion-based or tiered setbacks for waterfront properties;
- Increased freeboard—require additional freeboard consistent with estimates for projected SLR; and,
- Limits to building size and density allowances—require smaller, less dense development than would be allowed by the base zoning.

Incentive Zoning

Zoning incentives can be used to encourage existing property owners to take additional steps to protect their property, as well as to direct new development away from flood prone areas. Some examples of incentives that could be used in Annapolis include:

- Bonus Floor Area—for this incentive to be effective, sites need sufficient land area to provide setbacks from the water and to expand their footprint;
- Transfer of Development Rights—to transfer development rights, a receiving area must be identified that can accommodate additional density. Infill sites or "Opportunity" sites identified in the Annapolis Comprehensive Plan could serve as receiving areas. Development Agreements must be established between property owners in the "sending" and "receiving" areas;
- On-site parking reduction—a reduction of or exemption from on-site parking requirements in areas subject to flooding or storm surge is a strong incentive as reducing on-site parking typically permits greater density or more developable land. Alternative sites for parking located within walking distance will need to be identified;
- Exemptions from required densities—this tool is useful in denser urban areas with greater height or where there are large waterfront parcels available;
- Continuation of non-conforming uses—this incentive would be significant to the property owner. The City would have to determine if the rebuilding of the non-conforming uses or structures could be done in a manner that would not further exacerbate the potential for future and more frequent flooding; and,

- Variances—variances that can be granted administratively provide an opportunity for greater flexibility in designing around the potential impact of future flooding.

Development Review in the Historic District and the Building Permit Processes as Tools for Hazard Mitigation

One of the most critical issues facing Annapolis is "How do we provide a path forward for rebuilding structures after a catastrophe?" Specifically, how can the City encourage rebuilding in a way that protects structures in the future and complies with FEMA regulations while contributing to the historic character? There must be a process in place that expedites the permits while providing certainty to the property owner. The CRHMP incorporates several of the principles identified by the Urban Land Institute[70] for guidance in creating new permitting processes. These principles are also used in developing Performance Standards. They include:

- Create certainty through development standards and clear approval processes to ensure that projects impacted by rising sea levels or flooding can be completed in a predictable time schedule;
- Provide flexible options for development standards and criteria to afford opportunities to recoup lost ground level space;
- Craft guidelines that will promote an active and consistent street frontage in conjunction with meeting FEMA regulations for the ground level floor;
- Always design projects for flexibility to accommodate ground floor flooding;
- Detail a seal level rise/ flooding strategy for each project with performance standards; and,
- Projects which include a long-term plan to address flooding should initially address safety requirements, then focus on implementing the plan incrementally over time, employing a multitude of approaches.

Land Use Plans and Economic Development Strategies

Local Governments can direct the amount, type, location, scale, and intensity of future development through sensitive land use policies. Land use policies create a roadmap for directing growth and identifying the necessary capital improvements, and transportation facilities necessary to accompany that growth. Land Use policies must always begin with safety as the primary guiding principle. In the case of Annapolis, that means safety from natural hazards such as flooding or storm surge.

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[70] Tackling Sea Level Rise: New ULI-SF Report Cites Best Practices for Resilient Planning and Development, sf.uli.org/views/tackling-sea-level-rise. Urban Land Institute

Economic Development strategies support the economic vitality of communities through both land use regulations and financial incentives. Linked to each other, land use and economic development strategies can determine the long-term health and livability of communities. In Annapolis, the long-standing health and success of the historic downtown area is predicated upon the interdependence of the business and residential communities.

The policy direction and authority for land use regulations and economic development strategies flow from the Annapolis Comprehensive Plan. The Comprehensive Plan defines the City's expectations for the type, location, and intensity of future growth.

Existing Land Use Characteristics for the Historic District Study Area
The study area is located entirely within the Annapolis Historic District, which is essentially land-locked and built-out with very limited possibility for further development at its downtown core. Within one square mile, downtown Annapolis is the focus of principal economic and governmental activity, the location of a major national military academy and the destination for millions of visitors annually.[71]

Land use in the study area consists of residential (71.9%), commercial (21.3%) and maritime (6.7%) sectors. The zoning districts applied in the study area are conservative in nature, designed to protect and maintain existing buildings, lot sizes, and uses. The zones have generally succeeded in preserving a vibrant mix of uses within the unique urban fabric of a registered landmark city. The C1, Conservation Residential and the C2, Conservation Business zones allow "a compatible mixture of businesses and home crafts and shops, unique to the early development of the city" with the preservation of residential neighborhoods. As discussed under the Zoning section of this report, the study area falls within two Overlay Zones, The Historic District Overlay zone and the Critical Area Overlay zone.

The effect of these Overlay Zones is to maintain the historic skyline and buildings while setting new structures back from the waterfront. As discussed under the Zoning section, the Historic District Overlay zone may need to provide targeted flexibility to allow for limited increases in elevation associated with meeting FEMA and Floodplain Management Ordinance requirements. The table below outlines actions needed to achieve this project:

[71] Annapolis Ward One Sector Study, p19

Project 5: Flood Preparedness and Adaptation responses in City Plans and Polices Actions:
Develop a how-to workbook for community-based cultural resource hazard mitigation and adaptation planning.
Develop design guidelines for preservation-sensitive flood adaptation of historic properties and archaeological resources in Annapolis.
Develop a process for expedited review and amend HPC & related zoning review procedures and rules for post-disaster recovery from declared disaster events.
Review and evaluate preservation-sensitive methods for flood adaptation, and revise City's building code to require such methods for flood-proofing designated historic properties in the flood risk area.
Revise Historic District Design Guidelines to incorporate adaptation techniques accepted by FEMA as compliant with the floodplain management regulations and the Secretary of the Interior's Standards for Rehabilitation.
Amend the Historic Preservation Ordinance and HPC Rules of Procedure to incorporate an expedited post-disaster design review process for properties in a disaster declaration area.
Complete and update the intensive level survey documentation for historic properties in the flood risk area.
Update Zoning ordinance to encourage and incentivize hazard mitigation and flood adaptation techniques.
Lead a community design charrette to develop adaptation alternatives for public space in Annapolis.
Extend the Annapolis historic property tax credit to include qualifying flood adaptation projects for all properties in the Annapolis Historic District.
Evaluate the need for creating a flood adaptation property tax credit to other flood risk areas of the City.

Project 6: Sea Level Rise Update to City of Annapolis Comprehensive Plan

The Comprehensive Plan provides the unique opportunity to ensure that the City's land use, economic development, environmental, and transportation policies reinforce one another and are clear in their direction to minimize future development in hazard-prone areas. While several of the Comprehensive Plan policies encourage "infill" development, investment and new construction in the City continues to take place immediately adjacent to the waterfront, particularly given its desirability for high-end

residential development. A cohesive Land Use Strategy, which incentivizes new construction to be built away from areas subject to hazards, such as flooding, needs to be incorporated into the 2020 *Annapolis Comprehensive Plan* update. This Land Use Strategy should provide incentives through zoning adaptation alternatives for existing historic properties as well new construction.

Incentivize Water-Dependent Uses and Public Open Spaces

Annapolis continues to be blessed with a thriving maritime industry with a focus today on recreational boating and related activities. The maritime industry in the study area includes marinas and yacht clubs with a host of recreational boating activities. These water-dependent uses and activities can better accommodate flooding and are far more compatible with the storm surge that occurs at the waterfront than residential, commercial, or office structures. However, maritime uses must compete for this waterfront land with more intensive and less "water-compatible" residential and commercial uses. Additional zoning land use incentives should be identified to give priority to these water-dependent uses and discourage other uses in areas subject to flooding hazards.

Public open spaces also can absorb the ebb and flow of storm surge without the financial loss that are associated with these events when high-value private properties and structures are involved. There is an opportunity for the City to review the Annapolis City Dock Master Plan to identify further opportunities for expanding both public open spaces and water-dependent uses at City Dock. These activities could include but not be limited to the following:

- Maximizing public access to the waterfront throughout the City Dock area;
- Incorporating a variety of open spaces for people to congregate;
- Replacing hardscape surfaces adjacent to the waterfront with natural plantings and/or pervious surfaces; and,
- Accommodating boats of all types and sizes.

Multi-faceted Transportation Action Plan

Annapolis' current parking arrangements and transportation policies and programs do not anticipate hazards from frequent flooding nor do they emphasize alternate modes of water-dependent transportation. As a result, future flooding events could disrupt access to and movement around downtown Annapolis for an extended period.

Parking and hardscape at City Dock *Photo Credit: Leo Wilson*

Excessive parking covers much of the City Dock area, which is subject to constant flooding. Alternative locations for paved parking could minimize potential conflicts along the waterfront resulting from frequent flooding. Other hazard mitigation strategies to reduce runoff and property loss associated with parking in this low-lying area include:

- Integrating stormwater management into surface and structural parking approaches
- Minimizing the amount of paving by introducing landscaping, natural features, and pervious paving approaches.

A multi-faceted Transportation Action Plan that moves visitors, resident, employees, and retailers throughout downtown Annapolis, while anticipating future flooding events, must be developed. Annapolis has a unique opportunity to greatly expand movement around the City by water. These alternative modes—water taxi and passenger boat—are currently limited primarily to tourists, but could certainly be developed as an alternative means of accessing the Downtown. The Transportation Action Plan should focus on removing barriers and creating economic incentives to

promote reliable alternative modes of transportation including water-dependent or water-compatible modes.

Economic Development Strategies

As described under the Community Profile section of this report, a major part of Annapolis' economy comes directly from the 6.89 million annual visitors to Anne Arundel County and Annapolis and the historic downtown. The Historic District itself creates value for Annapolis' downtown as it establishes the context for business growth and for the appeal of the high quality of life associated with residential areas. Within this National Historic Landmark, restaurants, retail shops, museums, the U.S. Naval Academy, and recreational boating activities continue to draw visitors from around the United States. This year-round activity has generated an estimated 1,458 jobs in Annapolis' downtown area. While the downtown represents only 10% of the city's population, it generates close to 20% of the entire city's assessed value and 31.4% of the city's commercial base.

The following table summarizes an overview of Annapolis

NAICS code	2012 NAICS Description	Number of establishments	Value of revenue ($1,000)	Annual payroll ($1,000)	Number of employees
22	Utilities	1	N/A	N/A	N/A
31-33	Manufacturing	37	$65,525	$14,928	324
42	Wholesale trade	62	$423,435	$22,350	404
44-45	Retail trade	488	$1,508,120	$172,177	7,230
48-49	Transportation and warehousing (excluding railroads)	25	$49,791	$11,866	255
51	Information	64	N/A	$98,885	1,370
52	Finance and insurance	135	N/A	$73,053	898
53	Real estate and rental and leasing	98	$115,283	$25,666	449

54	Professional, scientific, and technical services	373	$417,472	$164,811	2,143
56	Administrative, waste management and remediation services	63	$92,286	$35,137	614
61	Educational services	21	$37,842	$7,393	180
62	Health care and social assistance	188	$228,280	$90,110	2,422
72	Accommodation and food services	194	$299,527	$91,570	4,975
81	Other services (except public administration)	208	$271,665	$90,921	2,381
Totals		**1,957**	**$3,509,226**	**$898,867**	**23,645**

Source: U.S. Census Bureau 2012: Economic Census, Economic Census of Island Areas, and Non Employee Statistics

Revenue Generated from the Study Area

The study area itself continues to thrive today as a working and recreational maritime center for the East Coast. The study area includes the Annapolis Yacht Club, a Maritime Museum, marinas, a boat yard, and City Dock. The international Annapolis Power and Sail Boat Shows alone, located within the study area, generate in excess of $112,000,000 annually in economic benefit.[72]

In proximity to the maritime industry and the waterfront, the tourism, restaurant, and retail industries have grown significantly. Within the actual study area, there are 73 businesses contributing to the Annapolis economy. Of these 73 businesses, a detailed analysis of the economic impact of 38 businesses has been determined to generate $166,360,894 in annual revenue. These businesses were selected for study as the group most frequently affected by nuisance flooding.

We can extrapolate from this detailed analysis of the 38 properties that the annual revenue generated by the 78 businesses in the study area would be approximately $341,477,624 in addition to the $96,688,333 total assessed value of all commercial

[72] Attributed to information provided by the Annapolis Boat Show in 2015 to Visit Annapolis & Anne Arundel County.

property in the study area. This figure does not include the $112,000,000 in additional economic benefit generated by the Annapolis boat shows located in the study area.

An analysis of these 38 businesses showed the following annual business activity and earnings:

- Directly contribute $166,360,894 annual business activity;
- Employ 1,458 workers employed earning $42,764,072 in annual labor income;
- Housed in properties valued at $92,975,500; and,
- Directly generate an estimated $973,443 in tax revenues.

Current Function / Use	Est. Revenues	% Est. Revenues
FB - Food & Beverage	$112,911,292.00	67.87%
LH - Leisure & Hospitality	$25,341,000.00	15.23%
PB - Professional & Business Services	$13,248,592.00	7.96%
RT - Retail	$14,860,010.00	8.93%
Total	**$166,360,894.00**	**100.00%**

Source: Hollis – Economic Impact of Nuisance Flooding Grant Proposal to FEMA, March 29, 2017.

All of these 38 businesses are subject to nuisance flooding and storm surge. Implementation of the CRHMP is critical for these businesses to be able to prosper and contribute to the economic health of downtown Annapolis.

Photo credit: Alicia Moran

Historic Property Tax Incentives for Hazard Mitigation

Annapolis' Historic Preservation Division is the only jurisdiction that provides an historic property tax incentive for hazard mitigation. A tax credit "shall be applied to those expenses having to do with exterior features of a structure and all those interior improvements required for...hazard mitigation as determined to be qualified by the Chief of Historic Preservation."

To incentivize commercial and residential property owners to adapt their structures to future Sea Level Rise events, the City encourages both local businesses and residents to apply for tax credits for expenses associated with hazard mitigation. This proactive approach provides an essential financial inducement for the 38 businesses in the study area to mitigate against future flooding events.

It is essential to ensure that Annapolis' economic health be sustained for the future by securing public and private funding for economic development strategies that promote flooding adaptation and mitigation in the downtown's flood risk areas. To promote Annapolis' downtown with its vibrant businesses, thriving heritage tourism, and active

maritime industry, the financial benefits and contributions of these industries must be documented. The costs associated with flooding and loss of these activities with their national draw must be made clear to local, state and federal policy makers. The next critical action must be the identification, prioritization, and funding of the infrastructure necessary for downtown Annapolis to mitigate and survive a major flooding event.

Toward this end, the following actions have been incorporated into the CRHMP:

Project 6: Sea Level Rise to the City's Update to the Comprehensive Plan **Actions:**
Review all existing City plans and capital improvement activities to ensure consistency with state flood adaptation, hazard mitigation, and preservation plans
Identify and prioritize water-dependent uses and public open spaces for those low-lying areas of the Annapolis waterfront subject to flooding.
Identify opportunities for expanding both public open spaces and water-dependent uses at the City Dock.
Incorporate development of a multi-faceted transportation action plan that promotes reliable alternative modes of transportation including water-dependent or water-compatible modes.
Complete an economic analysis of the value of the Historic District to the local/state/regional economy.
Establish and update annually a baseline for determining costs and financial impacts of a ”no action” scenario on flood adaptation in the Historic District.
Collect and disseminate data and case studies on the socio-economic impacts of flood events on employees and businesses within the flood risk area.
Update and expand the economic analysis of historic preservation and heritage tourism to include the maritime industry.
Finance implementation of the CIP City Dock Flood Mitigation project to include closure valves, pumping stations, installation of new stormwater drainage pipes and lining of existing pipes.
Conduct a feasibility study for raising and redesigning public infrastructure in the immediate vicinity of the Annapolis shore, for example Compromise Street, Market Space and City Dock ~5 feet, to reduce flood risk and to create a barrier to storms.
Conduct a feasibility study for construction of permanent structural and natural barriers adaptable to rising waters.

Project 7: Flood Disaster Recovery and Response Plan to "Build Back Better"

When flood disaster strikes, the first order of business is to protect lives and property. As the water recedes, priorities become restoring services, homes, and businesses. Resources and capital rush in following a disaster. Having an effective plan—one that incorporates current design standards and future needs for increasing flood risk—for rebuilding is critical. Having no plan runs the risk of rebuilding to the ideas and risks of the 1950s or earlier, rather than the 2050s.

"Build Back Better" means having a plan:

- Using current standards and leading practices
- Accommodating future sea level rise and increasing flood risk
- Supporting economic growth and social and environmental stewardship

This plan recommends a project called Flood Disaster Recovery and Response Plan to "Build Back Better." This plan is intended to jumpstart rebuilding investment and regulatory approvals in a smart way.

Project 7: Flood Disaster Recovery and Response Plan to "Build Back Better" Actions:
Train a disaster-response technical assistance team, with experience and specialization in historic properties and archaeological resources, to mobilize and activate for triage after natural disasters.
Work with scientists, economists, investors, engineers and policy experts to assess studies and identify adaptation alternatives that will be cost effective and feasible for implementation in Annapolis.
Develop a cooperative agreement with the USNA to ensure data sharing, coordinated action and, when feasible, shared funding and project design and implementation, to address flood impacts
Develop and disseminate leading practices in flood adaptation through a memorandum of understanding process with other jurisdictions.
Develop and provide to all cultural institutions and historic property owners within the flood risk area, a disaster-preparedness tool kit

Develop a process for expedited review and amend HPC & related zoning review procedures and rules for post-disaster recovery from declared disaster events.

Project 8: City Initiative for Flood Adaptation and Risk Management

Daily life in City government is about policies, codes, and people putting them in practice as they interact with the public. Flood risk affects all of these activities. Because policies, codes, and practices are interconnected, it is vitally important to understand impacts across departments and codes. For example:

- Elevating a structure for floodproofing may have implications for building height restrictions.
- Installing a door dam for flood protection may create a fire and safety problem.

The Weather It Together Planning Team strongly recommends reviewing City Codes, policies, and processes for a consistent and conflict-free approach to flood risk adaptation.

Because sea level rise in accelerating, it is perceived as a new threat. Flood protection is treated as a special expertise. Yet careful study by the Annapolis Weather It Together Planning Team reveals that sea level rise and flood adaptation are addressed best by bringing awareness and knowledge into all the responsibilities that City department staff undertake in their professions every day. For example, the following questions illustrate how much more resilient Annapolis will be if they are asked in the normal, contemporaneous course of planning, reviews, and approvals, rather than as a separate, after-the-fact flood hazard review:

- Given that the new Annapolis Storm Water project has a design life of 40 years, what are the elevations of sea level that may be experienced by 2060 (2020 + 40 years) and what should the elevations be for best survival of pump systems and electrical controls being designed now?
- Is a home or business owner or architect applying for a building permit in the zone expected to experience increased flooding in the next 30 years aware that simple changes to elevation of electrical panels, water heaters, and HVAC systems can make the property much more resilient to flood risk with little impact to costs up front?
- Is the owner of a property in a flood zone applying for a new land use permit aware that if flooding increases as expected, that the City may be unable to deliver some services to the property within 30 years (the term of a typical mortgage)?

These questions illustrate the need and ultimate cost savings associated with training City departments so that they may act in the best interests of all stakeholders.

Tidal flooding in Annapolis *Photo credit: Amy McGovern/flickr*

While sea level rise and flooding may seem to be new and special threats worthy of dedicated activities and resources, the City must include consideration of all of these threats into all of its functions. The police department models a good example today in deploying signs and parking meter covers before flood events.

This plan's recommendations for integrating flood adaptation across City activities and functions is a project called City Initiative for Flood Adaptation and Risk Management.

Project 8: City Initiative for Flood Adaptation and Risk Management
Actions:
Provide training workshops on the benefits / costs of the National Flood Insurance Program.
Adopt the *Weather-It-Together* plan as the Resilience Office work plan.
Secure and manage private and public funding for implementing the Weather It Together plan priorities.
Develop and conduct required annual training for all City Department heads and managers regarding flood adaptation, risk reduction, and disaster-response.
Establish a CRS working group consisting of staff from each City agency to support entry into the CRS and achieve and maintain a 5-Star rating.
Secure funding to contract for start-up of CRS documentation.

Project 9 : Annapolis Data for Flood Risk and Adaptation

Envision Heritage Team laser scanning downtown Annapolis, University of Florida Historic Preservation Program *Photo credit: Michael Dowling*

Effective city planning and operations decisions depend on accurate data. Prior to this planning effort, the City of Annapolis had a wealth of property, demographic, and GIS data. The quantity and demand for this data are increasing dramatically. This planning activity added substantially to the data, including property elevations, economic models, flood data, and sea level rise scenarios. All are required to support good adaptation decisions.

The Weather It Together Planning Team recommends supporting the City of Annapolis data management services and activities. This activity is organized as a project or series of projects called Annapolis Data for Flood Risk and Adaptation. This includes archaeological resources.

Archaeological Resources

To create resilient cultural resources, adaptation considerations and strategies need to go beyond historic properties. Archaeological resources are also an important component of Annapolis' cultural resource base due to the City's long land use and settlement history. However, due to the nature of a built environment, these resources are currently understudied. This dichotomy between archaeological and built heritage resources was recently highlighted during archaeological monitoring for the Annapolis City Dock bulkhead repair project.[73] Archival and background research showed that no archaeological resources were previously recorded within the Annapolis City Dock area.[74] However, results of archaeological monitoring revealed artifacts and remains of numerous historic structures such as seawalls, wharves, and building foundations. Although limited in scope, this monitoring work revealed important information regarding past land use and occupation within the City Dock and harbor areas. As summarized in the City Dock Bulkhead report, "the buried historic assets of Annapolis are just as important to the history of the City as the standing structures and should be treated accordingly."[75]

An action has been identified to address this gap in Annapolis' cultural resources inventory and additional survey work will be undertaken in implementation of the CRHMP. A Phase I and II[76] archaeological survey will be completed for the National Register Historic District, with special emphasis on the study area. This data will be used to evaluate and prioritize adaptation strategies for those archaeological resources most vulnerable to flood hazards based on site significance and level of threat. For archaeological resources, these might include site stabilization and protection through intentional fill, riprap installation, vegetation rehabilitation, barrier construction, and wetland and coastal system restoration. Regular monitoring of archaeological sites to

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[73] Kerns, M. 2016. *Archaeological Monitoring for the Annapolis City Dock Bulkhead Repair Project March 1-25, 2016.* KernsCRM prepared for the City of Annapolis, Department of Public Works.

[74] Kerns 2016: 5.

[75] Kerns 2016:40.

[76] Trader, P. and Wilson, J. 2015. *Guidelines for Phase I, II and III Archaeological Investigations and Technical Report Preparation.* Prepared by the West Virginia State Historic Preservation Office. [http://www.wvculture.org/shpo/techreportguide/guidelines.pdf] - Pg 3-5

access their changing vulnerability should also be implemented, ideally through community-led stewardship programs. In worst case scenarios, where there are no viable adaptation strategies, archaeological excavation, information recovery and documentation (Phase III[77]) may be appropriate.

Through completion of the Phase I archaeological survey, public and private landowners, including the City of Annapolis, are better positioned to assess adaptation strategies to ensure the least impact on cultural resources, consistent with statutory regulations within the Historic District.

Project 9: Annapolis Data for Flood Risk and Adaptation **Actions:**
Develop and maintain the Weather It Together matrix, including a cultural, economic and technical matrix to measure, evaluate and inform stakeholders in flood adaption work.
Identify and seek funding for Historic American Building Survey (HABS) recordation of a minimum of three high community value properties in the flood risk area.
Incorporate the community value ranking for properties & public spaces in the flood risk area into the GIS information system.
Complete Phase I archaeological survey to include vulnerability assessment for natural and archaeological resources and update GIS information system.
Update and expand the economic analysis of historic preservation and heritage tourism to include the maritime industry.
Complete and update the intensive level survey documentation for historic properties in the flood risk area.
Complete a 3-D laser documentation project for the flood risk area.

[77] Trader, P. and Wilson, J. 2015. *Guidelines for Phase I, II and III Archaeological Investigations and Technical Report Preparation.* Prepared by the West Virginia State Historic Preservation Office. [http://www.wvculture.org/shpo/techreportguide/guidelines.pdf] - Pg 3-5

Project Costs and Implementation Strategy

The Annapolis Weather It Together Planning Team identified actions that were then gathered and aligned to goals and objectives of the CRHMP planning program and grouped by recommended project as described above.

Preliminary costs for each recommended project were developed. This was done by soliciting input from a group of experienced professionals well-versed on the actions. The method included:

- Preliminary scope assumptions
- Number of days of City Annapolis staff time required at $800 per day
- Number of days of outside professional's time required at a blended rate of $1400 per day
- Number of days of volunteer's time required at $0 in-kind and $40 per day for parking, catering, etc. (note that in-kind time may need to be valued for some grant funding)
- Materials (printing, audio-visuals, room rentals, etc.)
- Bid/purchased packages (e.g. engineering feasibility studies from companies)
- Contingency of 10% or less (if available information supports reduction).

The recommended projects are summarized with preliminary cost estimates as follows:

	Project Title	Description	Preliminary Cost Estimates, $1000s
1	Tools and Practices for Flood Preparedness and Adaptation	Find, develop, and share tools and leading practices for addressing flood risk and flood adaptation.	$121
2	Natural Adaptation Measures	Determine feasibility, and implement where practical, natural responses to adapt to rising sea level and flooding.	$323
3	Structural Adaptation Measures	Determine feasibility of elevating and redesign of infrastructure, buildings, and barriers.	$517

4	Public Awareness and Education	Educate residents, businesses, and other stakeholders on the expected flood risks and to promote preparedness and resiliency.	$243
5	City Initiative for Flood Adaptation and Risk Management	Inform, train, and coordinate City departments on flood risk and adaptation measures for the benefit of Annapolis. (Exploit resources provided by FEMA and the National Flood Insurance Program including the Community Rating System).	$133
6	Flood Preparedness and Adaptation Responses in City Plans and Policies	Integrate flood preparedness and adaptation response in City plans, codes, policies and incentives, aligning with county, state, and federal efforts and partners where practical.	$285
7	Flood Disaster Recovery and Response Plan to "Build Back Better"	Develop a flood disaster recovery plan and response capability including trained City of Annapolis staff to promote rapid, efficient recovery and to rebuild in more resilient ways—to "Build Back Better."	$210
8	Sea Level Rise Update to City of Annapolis Comprehensive Plan	Update the City of Annapolis Comprehensive Plan to include sea level rise, its increased risks for flooding, and need for adaptation responses.	$423

9	Annapolis Data for Flood Risk and Adaptation	Build, update, and maintain Annapolis data resources including GIS, cultural, property, and infrastructure needed to support good decisions for flood risk management and adaptation planning.	$291 (includes $95 study already contracted)

The recommended projects are doable within the next 5 years, the plan update interval. Of course, projects depend on being justified, securing budget and resources, and managed to schedule. To that end, actions were further evaluated using the FEMA-recommended STAPLEE criteria. STAPLEE refers to appraising how each of the actions would fare according to measures:

	Criteria
S	Social
T	Technical
A	Administrative
P	Political
L	Legal
E	Economic
E	Environmental.

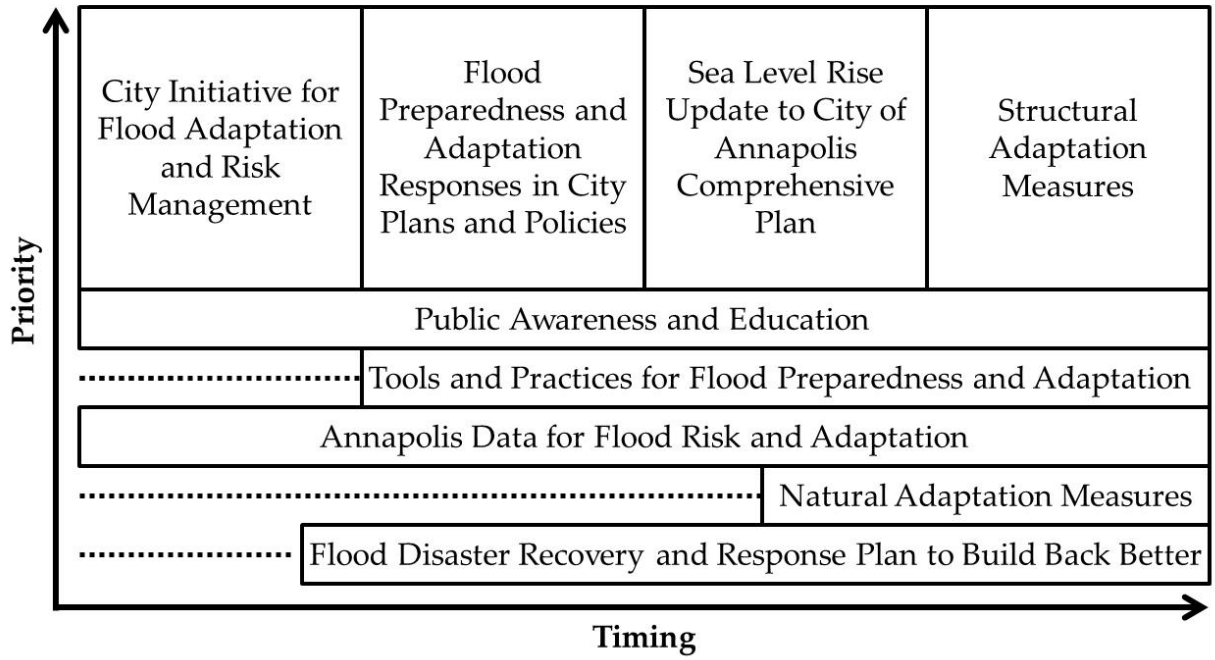
The STAPLEE criteria can be a reason to decide not to take an action. Or, they can illuminate areas where more effort may be required to approve an action or make an action more effective.

The Weather It Together actions with their STAPLEE evaluations, grouped by recommended project, are provided in Appendix H. This is a living list to be maintained or kept evergreen and used through the next planning interval.

The Weather It Together Planning Team recommends an implementation strategy based on urgency or priority and on an order of projects that makes best sense in terms

of efficiency. For example, updating the City of Annapolis regulations is the highest priority recommended project. However, informing and training City of Annapolis planning, zoning, code, finance and legal staff of the nature and risk posed by sea level rise is a prerequisite in order for these essential personnel to effectively participate in reconciling City Codes and land use zoning and permitting.

Suggested priority and timing of recommended projects are depicted in the following graphic and explained below.



City Initiative for Flood Adaptation and Risk Management
This is a high priority. Flood risk and adaptation should be integrated into all City departments rather than be a separate and distinct department. Educating regulators, building inspectors, public works, legal, finance, planning and zoning, emergency response and administration is critical in order for these departments/functions to meaningfully participate and make good decisions in the rest of the programs.

Flood Preparedness and Adaptation Responses in City Plans and Policies
This is highest priority. Annapolis has been nationally recognized as one of the cities experiencing the greatest increases in high tide flooding. Current City codes have inconsistencies (e.g. raise structures to reduce flood risk v. height restrictions). Further, granting land use and building permits in the flood risk area is creating future liabilities

and potential public safety concerns. Fiduciary and ethical responsibilities require this to be addressed as soon as possible. City Initiative for Flood Adaptation and Risk Management is a prerequisite so that City of Annapolis Planning and Zoning, building codes and legal staff may substantially participate in this project activity.

Sea Level Rise Update to City of Annapolis Comprehensive Plan
The upcoming update to the City of Annapolis Comprehensive Plan should proceed according to its schedule. It must address sea level rise, increased flood risk and need for adaptation responses, i.e. the activities identified in this report. City Initiative for Flood Adaptation and Risk Management is a prerequisite so that professionals responsible for the comprehensive plan are trained and fully aware of the risks. Flood Preparedness and Adaptation Responses in City Plans and Policies is a co-requisite since codes and land use permitting are linked with the comprehensive plan.

Structural Adaptation Measures
These are large, expensive public works projects. The recommended projects in this plan are only the feasibility study phase. Feasibility of raising City Dock Bulkheads, parking and public spaces and Compromise street should be studied concurrently with the stormwater system improvement project as the engineers will face consistent issues and co-dependencies across all these projects.

Public Awareness and Education
This is a relatively low cost activity that should continue. It is an essential prerequisite for an informed and engaged electorate and City staff.

Tools and Practices for Flood Preparedness and Adaptation
Implement on an on-going basis. Start after City of Annapolis identifies a manager responsible for stewarding tools and practices.

Annapolis Data for Flood Risk and Adaptation
This should be implemented on an ongoing basis. The team recommends expanding the responsibilities and budget of the city's GIS function to include these activities and data repositories.

Natural Adaptation Measures
Implement on an opportunistic basis as property owners address flooding adaptation. There is a dependency on public awareness and education.

Flood Disaster Recovery and Response Plan to "Build Back Better"
Two major storms produced devastating flooding in Annapolis in the last 100 years. This will almost certainly happen again. Unfortunately, there is no predicting what year the next devastating flood will arrive. As illustrated by the 2017 hurricane season, there is an inrush of reconstruction activity and finance immediately after search and rescue activities are completed. Rebuilding to plans and standards generally of the 1950s would be a second tragedy. Consequently, it is essential to complete this Flood Disaster Recovery and Response Plan to "Build Back Better" as soon as the City of Annapolis can muster the resources. City Initiative for Flood Adaptation and Risk Management and Public Awareness and Education are pre- or co-requisites to this activity.

Validating Project Priorities

The Weather It Together Planning Team solicited input from stakeholders to inform priorities among the recommended projects. This was done at a well-attended, public open house held at the Annapolis Waterfront Hotel on June 15, 2017. All recommended projects were presented, a number of survey questions were asked and responses were collected using wireless input devices handed out to stakeholders.

The survey questions were not designed to solicit priority among the recommended projects. In fact, the sense of the room was that all recommended projects are appropriate. The highest engagement, inferred by the number of buttons pressed by stakeholders in the audience, was for:

- City Initiative for Flood Adaptation and Risk Management
- Flood Preparedness and Adaptation Responses in City Plans and Policies
- Flood Disaster Recovery and Response Plan to "Build Back Better"
- Public Awareness and Education.

APPENDICES

Appendix A: National Register of Historic Places (Individually Listed Properties)

- Artisan's House MIHP AA-645
- James Brice House MIHP AA-485
- Chase-Lloyd House MIHP AA-628
- Governor William Paca House and Garden MIHP AA-657
- Hammond-Harwood House MIHP AA-626
- House by the "Town Gates" MIHP AA-709
- John Callahan House MIHP AA-680
- Maryland State House MIHP AA-685
- Mount Moriah African Methodist Episcopal Church MIHP AA-506
- Old City Hall and Engine House MIHP AA-581
- Patrick Creagh House MIHP AA-654
- Peggy Stewart House MIHP AA-724
- Universal Lodge No. 14 MIHP AA-2391
- Upton Scott House MIHP AA-726

Appendix B: Actionable Ideas

Planning activities for this plan engaged the public in over seventy-five events, engaged over fifteen civic and private organizations, five federal agencies, six state agencies, and nine City departments. Over the course of work, the Weather It Together Planning Team gathered suggestions and ideas most applicable to Annapolis. Those that required additional resources and budget became actions as listed in the Appendix H. Those that could be implemented immediately or in the course of current City functions are listed here, in no particular order.

Ref.	Actionable Ideas
1	Invite FEMA to educate Annapolis residents and business owners on the National Flood Insurance Program.
2	Review the Annapolis Capital Improvement program for any elements that would be better informed by the sea level rise and flood risk data developed as part of the Weather It Together initiative.
3	Provide written notice to private property owners in the flood risk area outlining their vulnerability status, particularly owners of repetitive loss properties.
4	Regularly update the Weather It Together website with model adaptation methods, design options, and online links to resources for flood proofing and hazard risk reduction for private properties.
5	Use social, broadcast, and print media to share information and updates on public improvements for flooding adaptation and hazard risk reduction in the flood risk area.
6	Define specific roles and structures for ongoing stakeholder implementation of the plan.
7	Access funding and technical support from FEMA's High Water Mark Initiative to increase awareness of flood risk.
8	Promote the use of tax incentives in adaptation improvements for properties in the flood risk area.

9	Promote business opportunities related to flooding adaptation and disaster preparedness as an ongoing element of the City's economic development strategy.
10	Seek joint state and federal funding support through coordination with the USNA for mutually beneficial and dependent flood adaptation efforts.
11	Inform property owners about insurance premium savings realized upon Annapolis' entry into the NFIP Community Rating System.
12	Require training and certification for HPD Staff and other Resilience Program Staff as Certified Floodplain Managers
13	Create a Resilience Officer function reporting directly to the City Manager that will serve as City of Annapolis point person for *resilience building* activities with stakeholders.
14	Secure funding and policy partners for plan implementation.
15	Engage with Rockefeller Foundation 100 Resilient Cities, and National League of Cities Sustainable Cities parties to identify leading best practices for successful resiliency planning and implementation strategies.
16	Serve as staff lead for addressing Sea Level Rise in Annapolis.
17	Contact MEMA for information/training on CRS process.
18	Include CRS as a component of each City Department work plan.
19	Adopt a common planning elevation for sea level rise through participation in the USNA Sea Level Rise Advisory Council.
20	Seek guidance from the NPS and MHT on leading practices for flooding adaptation of historic properties consistent with the Secretary of the Interior's Standards.
21	Promote model adaptation projects in the flood risk area locally and at the state and national levels.

22	Communicate economic study findings on job and revenue loss, business opportunities, and insurance risks to residents, business owners, and civic organizations citywide.
23	Engage with U.S. International Committee on Monuments and Sites to identify leading practices internationally for public improvements, policies, and financing that supports sensitive flooding adaptation strategies for cultural resources.
24	Share data and coordinate action with USNA to address sea level rise impacts to the Annapolis shoreline.
25	Incorporate historic preservation into the City Disaster Response and Recovery Plan.
26	Investigate and disseminate to businesses lessons learned in disaster recovery from Ellicott City and other Main Street Historic Districts.
27	Provide technical assistance to individual businesses to support development of continuity plans for businesses/cultural institutions in flood risk area.
28	Review approaches of other historic communities (i.e. New Orleans, Galveston, and Charleston) to expedite building review and approval under disaster declarations.
29	Develop, and post on the *Weather It Together* website, a list of public agencies and private firms experienced in disaster response and recovery, emergency preparedness, and hazard mitigation and adaptation.
30	Identify and map appropriate locations for material/artifact recovery and material/construction staging to ensure access for remediation and construction crews involved with building rehabilitation.
31	Map street and parking access alternatives for post-event recovery and disseminate to business owners, property owners, and technical assistance team.
32	Through implementation of the Comprehensive Plan, develop a land use strategy that employs financial and zoning tools to implement hazard mitigation.

33	Incorporate CRHMP findings into final Comprehensive Maritime Planning Study.
34	Require property owners within the flood risk area undertaking substantial improvement to seek guidance from the City's Historic Preservation Division regarding hazard mitigation and/or adaptation design approaches and tax credits.
35	Require all City Departments to incorporate hazard mitigation and adaptation strategies for publicly-owned facilities into their annual work plans, proposed ordinances, and budget requests.
36	Implement a Resiliency Checklist to be included in the planning process for Capital Improvement projects to ensure projects are aware of potential future flood hazard risks, considerations, and potential adaptation actions.
37	Incorporate alternative parking locations as well as landscaped and pervious parking approaches along with other stormwater management solutions to minimize the potential conflicts from surface and structured parking in waterfront areas.
38	Integrate sea level rise adaptation into Comprehensive Plan priorities.
39	Identify and recommend activities and funding to implement the findings of the economic analysis.
40	Promote the use of state and federal historic income tax credits for adaptation projects for contributing properties in the Annapolis National Register Historic District.
41	Seek state and federal funding for capital improvement and planning projects to include stormwater and flood management infrastructure improvements.
42	Connect financial institutions with business and property owners to identify funding and investment opportunities.
43	Support natural resource mitigation and green infrastructure adaptation alternatives as economic driver.
44	Attract new funding sources through seeking green and climate bonds for public improvements.

45	Review stormwater management plan to ensure design projects minimize additional flooding impact.
46	Coordinate with the US Army Corps of Engineers and the USNA on the assessment and design of stormwater systems to address flooding of the Annapolis shoreline.
47	Incorporate flooding adaptation improvements into Main Street road replacement design.
48	Evaluate all planned capital improvements on an on-going basis to determine how flooding adaptation can be incorporated.

Appendix C: Weather It Together Team (FEMA Worksheet #1)

Academics – St. John's College
Academics – United States Naval Academy
American Institute of Architects
American Society of Landscape Architects
Annapolis Green
Annapolis Historic Preservation Commission
Annapolis Maritime Industry
Archaeological consultants
Architectural Historian
Back Creek Conservancy
Chesapeake Bay Foundation
City of Annapolis Department of Planning
City of Annapolis Economic Development
City of Annapolis Emergency Management
City of Annapolis Planning Office
City of Annapolis Police and public safety
City of Annapolis Public Works
Communications Consultants
Community Business Association Members
Critical Area Commission
Elected officials
FEMA
Georgetown Law Center
Heritage and Cultural Commission
Historians
Historic Annapolis
Historic Preservation Office
Historic Preservation Planner
Insurance Industry Representative
Local business owners
Maryland Department of Environment
Maryland Department of Natural Resources
Maryland Department of Planning
Maryland Department of Transportation
Maryland Emergency Management Agency
Maryland Floodplain Managers
Maryland Historical Preservation Office
Maryland State Archivist
Maryland State Department of Education
Military installation representatives
National League of Cities
National Park Service
National Trust for Historic Preservation
NIST
NOAA
Oceanographer
Preservation Maryland
Residents
Rotarians
ServPro Flood Remediation Experts
Students from local schools
U.S. Army Corps of Engineers
Urban Land Institute

Appendix D: FEMA Worksheets #3 and #5 (Matrix)

FLOOD HAZARD MATRIX
Worksheets 3 and 5

#	Street	MHT Inventory Note 1	Date of Construction	Use	First Floor Elevation Note 2	Lowest Opening Elevation Note 2	Total Square Footage Note 3	Number of Stories	Basement	Structural System	Primary Exterior Material	Current Function / Use	Current Condition	Owner Interest In Mitigation	Assessed Value Improvements SDAT	Level of Property Vulnerability Note 4
11	ACTON PL	N/A	1928	Residential	6.5	6.5	2798	2.5	Yes	Woodframe	Stucco	Residential	GRAD Above Average		321800	Medium
79	CHARLES ST	-1708 AA-1709	1910	Residential	11.4	8.5	1140	2	Yes	Wood Frame	Wood Shingles	Residential	GRAD Below Average		93900	Medium
77	CHARLES ST	AA-1707	1923	Residential	9.2	4.2	2011	2.5	Yes	Wood frame	wood shingles	Residential	GRAD Below Average		162400	Medium
75	CHARLES ST	N/A	2006	Residential	7.0	7.0	5043	2.5	Yes	Wood Frame	Wood Clapboa	Residential	GRAD Very Good		748900	Medium
74	CHARLES ST	AA-380	1882	Residential	9.8	6.1	2056	2.5	Yes	Wood Frame	Wood Shingle	Bed and Breakfast	GRAD Below Average		201500	Medium
72	CHARLES ST	N/A	1983	Residential	7.4	3.4	2292	2	Yes	Wood Frame	Wood Clapboa	residential	GRAD Above Average		249700	Medium
70	CHARLES ST	N/A	1983	Residential	8.7	3.0	2288	2	Yes	Wood Frame	Wood Clapboa	Residential	GRAD Above Average		252300	Medium
60	COLLEGE AVE	Pending	1934	Other			0	3	No	Wood Frame	Wood Shingle	Boat house/School	GRAD Average		177473400	High
80	COMPROMISE ST	N/A	1968	Commercial	6.7	6.7	117079	6	No	Masonry	Brick	Hotel	GRAD Average		31895500	Medium
137	COMPROMISE ST	N/A		commercial			2040	2	no	Woodframe	Wood Panel	Theater	GRAD Below Average		80500	High
110	COMPROMISE ST	N/A		Commercial	3.0	3.0	11378	1	no	Masonry	Brick/Mix	Store Retail	GRAD Average		1612700	High
100	COMPROMISE ST	N/A		Commercial	3.0	3.0	0	2	no	Masonry	Brick	Social Club	GRAD Very Good		505100	High
0	COMPROMISE ST	N/A	1963	Commercial	5.2	5.2	16838	4	NO	Frame/Steel	Clapboard	Marina	GRAD Above Average		2889200	Medium
143	COMPROMISE ST	N/A	c1800	Commercial	3.8	3.8	2040	2	No	Masonry / Woo	Brick / Wood Si	Entertainment	GRAD Below Avera	Yes	80500	High
10	COMPROMISE ST	N/A		Residential				2	Yes	Masonry	Brick	Residential	GRAD Good			High
7	COMPROMISE ST			Residential	11.2	7.2	3234	2	No	Masonry	Brick	Residential	GRAD Average		636600	Medium
5	COMPROMISE ST	N/A	1999	Residential	11.2	7.2	3631	2	Yes	Masonry	Brick	Residential	GRAD Superior		960900	Medium
3	COMPROMISE ST	N/A	1947	Residential	6.5	5.8	3065	3	No	Masonry	Brick	Residential	GRAD Average		316800	Medium
107	COMPROMISE ST															High
76	CONDUIT ST	AA-1684	1913	Residential	11.7	4.4	1776	2.5	Yes	Wood Frame	Wood Shingle	Residential	GRAD Below Average		239400	Medium
74	CONDUIT ST	AA-1683	1906	Residential	4.0	4.0	1482	2.5	Yes	Masonry Foun	Wood Clapboa	Residential	GRAD Below Average		142500	High
67	CONDUIT ST	AA-1664	1908-1913	Residential	13.2	5.6	1660	2.5	Yes	Frame	Wood Clapboa	Residential	GRAD Below Average		149500	Medium
65	CONDUIT ST	AA-1663	1908-1913	Residential	8.5	3.8	1816	2.5	No	Frame	Wood shingles	Residential	GRAD Below Average		153100	Medium
63	CONDUIT ST	Pending	1915	Residential	8.5	2.5	2152	2.5	Yes	Wood Frame	Wood Clapboa	Residential	GRAD Above Average		199700	Medium
#	Street	MHT Inventory	Date of Construction	Use	First Floor Elevation	Lowest Opening Elevation	Total Square Footage	Number of Stories	Basement	Structural System	Primary Exterior Material	Current Function / Use	current_condition	Owner_interest_mit	Assessed Value Improvements SDAT	Level of Property Vulnerability
142	DOCK ST	AA-548	1880	Commercial	3.7	3.7	5720	2	No	Masonry Brg W	Brick / Metal / (	Commercial / Office	GRAD Below Average		349500	Medium
126	DOCK ST	AA-1239	1875	Commercial			6026	3	No	Masonry	Brick/wood Sto	Restaurant	GRAD Good		363800	High
136	DOCK ST	AA-457	1850	Commercial	1.8	1.8	4320	3	No	Masonry	Brick	Restaurant/Restaur	GRAD Below Average		984700	High
132	DOCK ST	AA-457	1825	Commercial	3.2	3.2	2340	2	No	Masonry	Brick	Restaurant	GRAD Good		264700	High
130	DOCK ST	N/A		Commercial	2.1	2.1	780	1	No	Masonry	Brick	Restaurant	GRAD Below Average		45000	High
124	DOCK ST	AA-455	1900	Commercial	2.2	2.2	6026	3	No	Masonry	Brick	Store Retail	GRAD Below Average		363800	High
122	DOCK ST	A-1239 AA-456	1875	Commercial	2.2	2.2	6026	3	No	Masonry	Brick	Restaurant	GRAD Below Average		363800	High
120	DOCK ST	AA-456	1916	Commercial	2.0	2.0	1612	2	No	Masonry	Stucco/Brick	Store Food Store	GRAD Below Average		92600	High
118	DOCK ST	AA-455	1891-1897	Commercial	2.0	2.0	3542	2	No	Masonry	Brick	Restaurant	GRAD Economy		184000	High

110 DOCK ST	AA-455	1930	Commercial	3.2	3.2	11446	2	No	Masonry	Stucco	Store Shopping Cen	GRAD	Below Average		564700	High
12 DOCK ST	N/A	1960	Commercial	1.5	1.5	4550	2	Yes	Masonry Brg W	Wood	Restaurant	GRAD	Average		937800	High
10 DOCK ST	N/A		Commercial			10556	2	No	Masonry	Brick	Restaurant	GRAD	Below Average		2808500	High
6 DOCK ST	AA-455	1940's	Commercial	3.0	3.0	3246	3	No	Masonry	Brick	Retail	GRAD	Good		973800	High
4 DOCK ST	AA-455	1974	Commercial	2.6	2.6	3950	3	No	Masonry	Brick	Store Retail	GRAD	Below Average		296100	High
1 DOCK ST	N/A		Commercial	3.6	3.6		2	No	Masonry	Brick	Commercial	GRAD	Average			High
8 DOCK ST	N/A	1960	Commercial			10556	2.5	No	Masonry	Brick	Restaurant	GRAD	Average		1698000	High
13 EAST ST	N/A	N/A	Other	8.5	8.5	3078	1	NO	Masonry	Stucco	Garage/Office	GRAD	Below Average		42900	Medium
16 EAST ST	AA-1803	1891-1897	Residential	9.6	7.9	2114	2	NO	Frame	Stucco	Residential	GRAD	Below Average		130500	Medium
6 FLEET ST	AA-1265	1885-1889	Commercial	7.0	7.0	2751	2	No	Wood Frame	Wood Clapboa	Store Retail/Vacant	GRAD	Below Average		160200	Medium
14 FLEET ST	N/A	1946	Residential	10.1	10.1	2280	3	No	Masonry/Wooc	Wood Clapboa	Residential	GRAD	Average		162600	Medium
10 FLEET ST	AA-1266	1975	Residential	9.0	9.0	835	2	No	Wood Frame	Wood Clapboa	Residential	GRAD	Below Average		82900	Medium
8 FLEET ST	AA-1265	1885-1889	Residential	6.7	6.7	2751	2	No	Wood Frame	Wood Clapboa	Office	GRAD	Below Average		160200	Medium
12 FLEET ST	AA-1267	1885-1889	Residential	9.6	9.6	840	2	NO	Wood Frame	Wood Clapboa	Residence / SFD	GRAD	Below Average		71800	Medium
193 GREEN ST	AA-521	1819	Commercial	10.3	7.4	1264	2	NO	Wood Frame/B	Brick Wood	Restaurant	GRAD	Below Average		261000	Medium
195 GREEN ST	N/A		Commercial			4488	2	No	Masonry	Brick	Store Retail/Vacant	GRAD	Below Average		279100	High
151 KING GEORGE ST	N/A	1980	Residential	9.5	9.5	1456	2	Yes	Wood Frame	Wood Clapboa	Residential	GRAD	Average		133100	Medium
149 KING GEORGE ST	AA- 1112	1880	Residential	9.5	9.5	1392	2	Yes	Wood Frame	Wood Clapboa	Residential	GRAD	Very Good		137600	Medium
147 KING GEORGE ST	AA-1111	1913-1921	Residential	6.3	6.3	1080	2	No	Woodframe	Stucco	Residential	GRAD	Below Average		68900	Medium
145 KING GEORGE ST	AA-1110	1891-1897	Residential	7.1	7.1	1120	2	No	Masonry	Stucco	Residential	GRAD	Below Average		67800	Medium
143 KING GEORGE ST	AA_1109	1891-1897	Residential	6.3	6.3	1204	2	No	Frame	stucco	residential	GRAD	Below Average		76500	Medium
139 KING GEORGE ST	Pending	1885-1891	Residential	6.4	5.0	2568	2.5	No	Masonry Brg W	Wood Shingles	Residential	GRAD	Below Average		149500	Medium

#	Street	MHT Inventory	Date of Construction	Use	First Floor Elevation	Lowest Opening Elevation	Total Square Footage	Number of Stories	Basement	Structural System	Primary Exterior Material	Current Function / Use	current_condition	Owner_interest_mit	Assessed Value Improvements SDAT	level_property_vulnerability
100	MAIN ST	\&criteria2=AL	1908 - 13	Commercial	5.7	5.7	7354	2	No	Mas. Brg Wall /	Brick / Metal / (	Commercial / Rest /	GRAD Below Average		593100	Medium
99	MAIN ST	AA-542	1792 - 98	Commercial	5.1	5.1	3803	3	No	Masonry Brg W	Brick / Slate	Institutional / Comr	GRAD Average		490000	Medium
128 (A)	MAIN ST	N/A		Commercial	7.7	7.7	4488	2.5	No	Masonry	Brick	Store Retail	GRAD Below Average		279100	Medium
132	MAIN ST	AA-547	1800	Commercial	8.8	8.8	2984	2.5	No	Masonry	Brick	Store Retail	GRAD Good		300300	Medium
123	MAIN ST	N/A	1900	Commercial	7.6	7.6	27372	3	No	Masonry	Brick	Store Retail	GRAD Below Average		2429300	Medium
121	MAIN ST	N/A	1979	Commercial	7.6	7.6	3000	2	No	Masonry	Brick/Stucco	Store Retail/ Vacant	GRAD Below Average		288000	Medium
118	MAIN ST	AA-544	1858-1877	Commercial	8.2	8.2	3860	3	No	Masonry	Stucco	Store Retail	GRAD Below Average		328400	Medium
117	MAIN ST	AA-543	1850	Commercial	7.4	7.4	2376	2	No	Masonry	Brick/Stucco	Store Retail	GRAD Below Average		155100	Medium
113	MAIN ST	AA- 542	1819-1821	Commercial	7.7	7.7	9633	2	No	Masonry	Brick	Restaurant/Restaur	GRAD Average		2839200	Medium
112	MAIN ST	AA-541	1897-1903	Commercial	6.5	6.5	16740	4	No	Masonry	Brick	Store Retail	GRAD Below Average		2747700	Medium
109	MAIN ST	AA-539	1790-1798	Commercial	7.2	7.2	2338	2	No	Masonry	Brick	Spa	GRAD Below Average		187600	Medium
108	MAIN ST	AA-538	1903-1908	Commercial	6.1	6.1	2400	3	No	Masonry	Brick	Store Retail	GRAD Below Average		224900	Medium
107	MAIN ST			Commercial	6.0	6.0	2154	2	No	Masonry	Brick	Store Retail with Ap	GRAD Below Average		141700	Medium
105	MAIN ST	AA-537	1816-1820	Commercial	6.1	6.1	4488	2	No	Masonry	Brick	Store Retail	GRAD Below Average		279100	Medium
103	MAIN ST	AA-537	1816-1820	Commercial	5.5	5.5	4488	2	No	Masonry	Brick	Store Retail	GRAD Below Average		279100	Medium
93	MAIN ST	AA-534	1970	Commercial	3.9	3.9	10113	4	No	Masonry	Brick	Bank	GRAD Below Average		1638300	High

87	MAIN ST	N/A	Commercial	3.5	3.5	3250	1	No	Masonry	Brick	Store Liquor	GRAD	Below Average		292000	High
81	MAIN ST	AA-533	1820 Commercial	3.6	3.6	2550	2.5	No	Masonry	Brick	Restaurant	GRAD	Average		171800	High
110	MAIN ST		Commercial			2400	3	No	Masonry	Brick	Store Retail	GRAD	Below Average		224900	High
77	MAIN ST	AA-532	1790 commercial	4.8	4.8	1860	2.5	No	Masonry Brg W	Brick / Shingles	retail/storage	GRAD	Average		151800	High
91	MAIN ST	AA-534	1970 Commercial			10113	4	No	Masonry	Brick	Bank	GRAD	Below Average		1638300	High
6	MARKET QUAY	N/A	1970 Residential	4.7	4.7	2772	2	No	Masonry	Brick	Residential	GRAD	Above Average		336800	High
5	MARKET QUAY	N/A	1970 Residential	4.4	4.4	3200	2.5	No	Masonry	Brick	Residential	GRAD	Above Average		328200	High
4	MARKET QUAY	N/A	1970 Residential	4.7	4.7	2400	2	No	Masonry	Brick	Residential	GRAD	Above Average		277700	High
3	MARKET QUAY	N/A	1970 Residential	5.1	5.1	3200	2.5	No	Masonry	Brick	Residential	GRAD	Above Average		327600	Medium
2	MARKET QUAY	N/A	1970 Residential	5.3	5.3	2400	2	No	Masonry	Brick	Residential	GRAD	Above Average		283800	Medium
1	MARKET QUAY	N/A	1970 Residential	4.7	4.9	2772	2	No	Masonry	Brick	Residential	GRAD	Above Average		260100	High
26	MARKET SPACE	AA-596	1771 Commercial	3.6	3.6	4886	3	No	Masonry	Brick	Restaurant/Restaur	GRAD	Average		1264800	High
2	MARKET SPACE	AA-1817	1754 Commercial	4.3	4.3	5628	2	no	Masonry Brg W	Brick	Commercial / Rest /	GRAD	Average		1508800	High
14	MARKET SPACE	AA-593	1907 Commercial			3888	3	no	Masonry	Brick	Restaurant	GRAD	Below Average		697400	High
36	MARKET SPACE	AA-1821	1884 Commercial	4.2	4.2	9444	2	no	Masonry	Brick	Store Retail	GRAD	Below Average		738600	High
34	MARKET SPACE	AA-1820	1885-1891 Commercial	4.6	4.6	1306	3	no	Masonry	Brick	Store Retail	GRAD	Below Average		152600	High
25	MARKET SPACE	N/A	Commercial	4.2	4.2	0	1	no	Wood Frame	Wood Shingles	Restaurant	GRAD	Average		421100	High
24	MARKET SPACE	AA-2397	1954 Commercial	5.2	5.2	1675	2.5	no	Masonry	Brick	Restaurant	GRAD	Below Average		454800	Medium
18	MARKET SPACE	AA-1818	1901 Commercial	3.7	3.7	2368	2	no	Wood Frame	Wood Shingles	Restaurant/Office	GRAD	Below Average		194100	High
16	MARKET SPACE	AA-594	1901 Commercial	4.0	4.0	1584	2	no	Masonry	Wood Shingles	Vacant	GRAD	Below Average		89200	High
12	MARKET SPACE	AA-2396	1873-1903 Commercial	5.1	5.1	2214	2	no	Masonry	Brick	Restaurant	GRAD	Below Average		134600	High
8	MARKET SPACE	AA-591	1878 Commercial	5.4	5.4	2860	2	no	Masonry	Brick	Restaurant	GRAD	Below Average		384600	Medium
22	MARKET SPACE	AA-595	1821-1844 Residential;			3234	2.5	no	Masonry	Brick	restaurant	GRAD	Below Average		636600	High
30	MARKET SPACE (B)	AA-1819	1884 Commercial			7986	3	no	Masonry	BRICK/WOOD	Store Retail with Ap	GRAD	Below Average		500300	High
30	MARKET SPACE(A)	AA-1819	1884 Commercial			7986	3	no	Masonry	Brick/Wood	Store Retail with Ap	GRAD	Below Average		500300	High

#	Street	MHT Inventory	Date of Construction	Use	First Floor Elevation	Lowest Opening Elevation	Total Square Footage	Number of Stories	Basement	Structural System	Primary Exterior Material	Current Function / Use	current_condition	Owner_interest_mit	Assessed Value Improvements SDAT	Level of Property Vulnerability
9	PINKNEY ST	AA-1241	1880	Attached Hous	7.6	7.6	1336	2	No	Wood Frame	Wood Siding	Residence / SFD	GRAD	Low	75600	Medium
11	PINKNEY ST	Pending	1885	Commercial	8.9	8.9	7986	2	No	Masonry Brg W	Wood Clapboa	Store Retail with Ap	GRAD	Below Average	500300	Medium
4	PINKNEY ST	AA-1259	1819-1836	Detached Build	6.9	6.9	714	1	No	Masonry	Brick	Historic Site	GRAD	Average	391100	Medium
15	PINKNEY ST	AA-1243	1875	Residential	12.0	12.0	1320	2	No	Wood Frame	Wood Clapboa	Residential	GRAD	Average	165800	Medium
8	PINKNEY ST	AA-1258	1875	Residential	10.6	10.6	980	2	No	Woodframe	Wood Clapboa	Residential	GRAD	Average	118500	Medium
6	PINKNEY ST	AA-1258	1875	Residential	10.6	10.6	980	2	No	Woodframe	Wood Clapboa	Residential	GRAD	Average	127400	Medium
139	PRINCE GEORGE ST	AA-1159	1880	Commercial	8.7	6.7	3224	3	No	Masonry	Stucco	Retail/Residential/R	GRAD	Below Average	171400	Medium
137	PRINCE GEORGE ST	N/A		Commercial	6.9	6.9	3122	2.5	No	Masonry	Stucco	Restaurant	GRAD	Below Average	237800	Medium
133	PRINCE GEORGE ST	AA-1158	1790	Commercial	6.5	6.5	3122	2.5	No	Masonry	Stucco	Restaurant	GRAD	Below Average	237800	Medium
131	PRINCE GEORGE ST	AA-1158	1790	Commercial	6.6	6.6	8932	2	No	Masonry	Stucco	Office	GRAD	Below Average	978400	Medium
125	PRINCE GEORGE ST	N/A		Commercial	5.3	5.3	8932	2	No	Masonry	brick	Office	GRAD	Below Average	978400	Medium
87	PRINCE GEORGE ST	N/A	1960	Commercial	2.9	2.9	10556	2	No			Restaurant	GRAD	Average	1698000	High
134	PRINCE GEORGE ST	AA-1193	1900	Commercial	10.7	7.9	2910	2.5	Yes	Wood Frame	Wood Clapboa	Bed and Breakfast	GRAD	Average	481700	Medium
110	PRINCE GEORGE ST	AA-651	1786	Commercial	7.3	4.8	8488	2.5	Yes	Masonry / Woo	Brick	Hotel	GRAD	Average	1232500	Medium

119	PRINCE GEORGE ST	AA-1155	1880	Commercial	6.6	6.6	3542	3	No	Wood Frame	Wood Shingles	Office Vacant/ Apar	GRAD	Average		184000	Medium
69	PRINCE GEORGE ST	AA-1152	1875	Other	3.4	3.4	2240	2	No	wood frame	Shingles	Residence / SFD	GRAD	Economy		229000	High
145	PRINCE GEORGE ST	AA-1160	1910	Residential	12.1	10.5	1476	2.5	Yes	Masonry	Stucco	MISC Residence Co	GRAD	Average		134700	Medium
142	PRINCE GEORGE ST	AA-653	1783-1785	Residential	12.4	9.3	3077	2.5	Yes	Masonry	Stucco	Residential	GRAD	Above Average		558000	Medium
130	PRINCE GEORGE ST	AA-652	1694/1768	Residential	7.3	6.6	2740	2	No	Wood Frame	Wood Siding /	Residence / SFD	GRAD	Average		213100	Medium
126	PRINCE GEORGE ST	AA-1192	1880	Residential	7.1	7.1	2604	3	No	Wood Frame	Wood Shingles	Apartments	GRAD	Average		126700	Medium
124	PRINCE GEORGE ST	AA-1191	1890	Residential	15.4	13.7	5739	2	Yes	Wood Frame	Wood Clapboa	Apartments	GRAD	Average		249700	Medium
123	PRINCE GEORGE ST	AA-1157	1877-1885	Residential	6.2	6.2	1220	2.5	Yes	Masonry	Stucco	Residence Comm/Ir	GRAD	Below Average		56700	Medium
121	PRINCE GEORGE ST	AA-1156	1850	Residential	6.8	6.8	1512	2.5	No	Woodframe	Shingles	Residence Comm/Ir	GRAD	Below Average		74200	Medium
118	PRINCE GEORGE ST	AA-1190	1900	Residential	6.1	6.1	2243	3	No	Woodframe	Woodshingles	Residence / SFD	GRAD	Below Average		111400	Medium
48	RANDALL ST	AA-1627	1850	Commercial	6.7	6.7	2196	2	No	Frame	Wood Clapboa	Store Retail with Of	GRAD	Below Average		126600	Medium
47	RANDALL ST	AA-1627	1850	Commercial	5.6	5.6	8932	2	No	Masonry	Brick/Stucco	Retail/Vacant	GRAD	Below Average		978400	Medium
45	RANDALL ST	N/A		Commercial	6.0	6.0	240	1	No	Wood Frame	Beadboard	Retail	GRAD	Low		7000	Medium
42	RANDALL ST	AA-1626	1880	Commercial	6.3	6.3	2196	2	No	Masonry	brick	Store Retail with Of	GRAD	Below Average		126600	Medium
41	RANDALL ST	N/A		Commercial	5.9	5.9	3122	1	No	Masonry	Stucco	Restaurant	GRAD	Below Average		237800	Medium
8	RANDALL ST	Pending	1930-1959	Commercial	7.5	7.5	2672	2	No	Masonry	Brick	Loft/Research&Dev	GRAD	Below Average		237600	Medium
40	RANDALL ST	N/A		Commercial			3224	2.5	No	Masonry	Stucco	Store Retail with Ap	GRAD	Below Average		171400	High
25	RANDALL ST	AA-1618	1908-1913	Residential	12.3	9.4	1424	2.5	Yes	Masonry	Stucco	Residential	GRAD	Average		85500	Medium
23	RANDALL ST	AA-1617	1908-1913	Residential	12.9	12.9	2958	3	Yes	Wood Frame	Wood Clapboa	Apartments	GRAD	Below Average		228800	Medium
21	RANDALL ST	AA-1616	1936	Residential	12.4	12.4	4416	2.5	No	Woodframe	Wood clapboar	Residential	GRAD	Below Average		391100	Medium
19	RANDALL ST		1936	Residential	12.4	12.4	4416	2.5	Yes	Woodframe	Wood clapboar	Residential	GRAD	Below Average		391100	Medium
12	RANDALL ST	AA-1621	1885-1891	Residential	10.0	7.5	1218	2	No	Masonry	Stucco	Residential	GRAD	Below Average		103300	Medium
10	RANDALL ST	AA-1620	1885-1891	Residential	11.1	9.1	1280	2	No	Woodframe	Wood Clapboa	Residential	GRAD	Below Average		101200	Medium

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17	REVELL ST	N/A	2007	Residential	2.5	-1.0	3279	2	No	Wood Frame	Wood Shingles,	Residential	GRAD Very Good		658200	High
8	SHAW ST	N/A	2006	Residential	8.7	7.7	3174	2	No	Wood Frame	Wood Clapboa	Residential	GRAD Very Good		535000	Medium
7	SHIPWRIGHT HBR	N/A	1986	Residential	7.8	5.3	4468	2	No	Frame/Concret	Stucco	Residential	GRAD Above Average		501500	Medium
5	SHIPWRIGHT HBR	N/A	2001	Residential	7.2	4.7	4293	2.5	Yes	Wood Frame	Wood Clapboa	Residential	GRAD Very Good		700800	Medium
3	SHIPWRIGHT HBR	N/A	1957	Residential	0.0	0.0	2750	2	No	Wood frame	stucco	Residential	GRAD Average		251400	High
1	SHIPWRIGHT HBR	N/A	1946	Residential	7.1	7.1	3108	2	NO	Frame	Stucco	Residential	GRAD Above Average		350500	Medium
1	SHIPWRIGHT ST	N/A	1945	Commercial	5.8	2.7	3348	2.5	NO	Wood Frame/C	Clapboard	Marina	GRAD Average		366900	Medium
1(B)	SHIPWRIGHT ST	N/A	2008	residential			3858	2	NO	Wood Frame	Clapboard	Marina	GRAD Below Average		455500	High
1(A)	SHIPWRIGHT ST	N/A	2008	residential			3858	2	NO	Wood Frame	Clapboard	Marina	GRAD Below Average		455500	High
3	SHIPWRIGHT ST	N/A	N/A	Residential	5.1	3.4	2750	1	NO	N/A	NA	Municipal Property	NA		9700	Medium
16	SOUTH ST	N/A	2006	PARK			4066	1	No	NA	NA	Park	GRAD Very Good		651000	High
24	SOUTH ST		2006	Residential	9.2	8.2	1872	2.5	No	Woodframe	Clapboard	Residential	GRAD Very Good		336900	Medium
22	SOUTH ST	N/A	2006	Residential	9.0	9.0	1872	2.5	No	Masonry Brg W	Brick/ Wood cl	Residential	GRAD Very Good		334900	Medium
20	SOUTH ST	N/A	2006	Residential	8.3	8.3	1872	2.5	No	Masonry Brg W	Brick/ Wood cl	Residential	GRAD Very Good		333500	Medium

19	SOUTH ST	N/A	2006	Residential	8.6	8.1	2436	2.5	Yes	Frame	Clapboard	Residential	GRAD	Very Good	448000	Medium
18	SOUTH ST	N/A	2006	Residential	8.5	8.5	2304	2.5	No	Frame	Clapboard	Residential	GRAD	Very Good	399000	Medium
17	SOUTH ST	N/A	2006	Residential	8.3	7.8	2730	2.5	No	Masonry Brg W	Brick/ Wood Cl	Residential	GRAD	Very Good	472400	Medium
15	SOUTH ST	N/A	2006	Residential	8.3	7.8	2706	2.5	No	Masonry Brg W	Brick/ Wood cl	Residential	GRAD	Very Good	469100	Medium
13	SOUTH ST	N/A	2006	Residential	8.3	7.8	2300	2.5	Yes	Frame	Board	Residential	GRAD	Very Good	425300	Medium
11	SOUTH ST	N/A	2006	Residential	6.9	6.9	4951	2.5	NO	Frame	Board	Residential	GRAD	Very Good	748200	Medium
9	SOUTH ST	N/A	2006	Residential	7.4	7.4	4306	2.5	Yes	Frame	Board	Residential	GRAD	Very Good	673200	Medium
9	SOUTHGATE AVE	AA- 1454	1908-1913	Residential	21.7	17.6	1472	2.5	Yes	Masonry	Brick	Residential	GRAD	Average	179700	Medium
3	SOUTHGATE AVE	AA-1451	1919	Residential	6.6	6.6	3740	2	Yes	Woodframe	Wood Shingle	Residential	GRAD	Above Average	481100	Medium
1	SOUTHGATE AVE	AA-1450	1915	Residential	0.0	0.0	4901	2	No	Masonry Foun	Granite/ Wood	Residential	GRAD	Very Good	909500	High
9	ST MARYS ST	Pending	1942	Detached Inst E	7.7	7.7	13440	2	No	Masonry Brg W	Brick / Slate	Government / Vaca	GRAD	Average	211800	Medium
															$280,690,200	

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Note 1 Historic Site Identification as listed in the Maryland Historical Trust's Maryland Inventory of Historic Structures, http://mht.maryland.gov/research_mihp.shtml

Note 2 Field Survey Elevation Information by the United States Amy Corps of Engineers, 2014

Note 3 Database Information from the Maryland State Department of Assessments and Taxation, https://sdat.dat.maryland.gov/RealProperty/Pages/default.aspx

Note 4 Using the FIRM AE Zone Base Flood Elevation of 5.0' as the base for high vulnerability

Note 5 (SDAT Improvement Value / Number of Stories = Value of Affected Area) X 50%

Note 6 (SDAT Floor Area / Number of Stories = First Level Area) X Square Foot Construction Restoration Cost

Note 7 Restaurant: SDAT Floor Area X Industry Average Sales Per Month X Months Displaced

Note 8 Cost of Relocation X Period of Displacement

Note 9 Determined with professional evaluation and community input through a series of online surveys, public meetings, workshops, and forums.

Note 10 Designation of Properties Importance in the Annapolis Historic District

Total Assessment SDAT Note 3	Land Value SDAT Note 3	Improvement Value SDAT Note 3	Loss to Contents Note 5	Loss to Structure Note 6	Loss of Function Note 7	Displacement Cost Note 8	Total Loss for Flood Hazard	Integrity	Risk Level / Vulnerability	Community Value Ranking Note 9
$1,713,400	$1,391,600	$321,800	$64,360	$279,800	N/A	$41,800	$385,960	High	Medium	Medium
$490,733	$402,800	$93,900	$23,475	$142,500	N/A	$41,800	$207,775	Medium	Medium	Medium
$736,000	$573,600	$162,400	$32,480	$201,100	N/A	$41,800	$275,380	Medium	Medium	Medium
$1,802,767	$1,076,400	$748,900	$149,780	$504,300	N/A	$41,800	$695,880	High	Medium	Low
$1,192,600	$991,100	$201,500	$40,300	$205,600	N/A	$41,800	$287,700	High	Medium	Medium
$1,602,967	$1,353,400	$249,700	$62,425	$286,500	N/A	$41,800	$390,725	Medium	Medium	Medium
$1,401,933	$1,149,800	$252,300	$63,075	$286,000	N/A	$41,800	$390,875	Low	Medium	Medium
$202,871,467	$26,553,000	$1,774,734			$0			Medium	High	Medium
$33,671,633	$4,284,000	$31,895,500	$2,657,958	$6,341,779	$7,024,740	$2,500,000	$18,524,478	Low	Medium	Low
$1,306,200	$1,229,200	$80,500	$20,125	$331,500	$367,200	$100,000	$818,825	Low	High	Medium
$3,234,567	$1,634,600	$1,612,700	$806,350	$3,697,850	$4,096,080	$6,600	$8,606,880	Low	High	Medium
$2,462,500	$1,957,400	$505,100	$126,275	$0	$0	$100,000	$226,275	Low	High	Low
$2,086,800	$1,903,000	$183,800	$361,150	$1,368,088	$1,515,420	$250,000	$3,494,658	Medium	Medium	Low
$1,306,200	$1,229,200	$80,500	$20,125	$331,500	$850,000	$61,200	$1,183,750	Medium	Medium	Low
					N/A	$41,800	$41,800	Medium	High	High
$1,541,633	$1,025,000	$636,600	$159,150	$404,250	N/A	$41,800	$605,200		Medium	Low
$1,514,267	$643,600	$960,900	$240,225	$453,875	N/A	$41,800	$735,900	Low	Medium	Low
$1,655,700	$1,338,900	$316,800	$52,800	$255,417	N/A	$41,800	$350,017	Medium	Medium	Low
							$0		High	Low
$787,900	$571,600	$239,400	$47,880	$177,600	N/A	$41,800	$267,280	High	Medium	Medium
$1,489,900	$1,347,400	$142,500	$28,500	$148,200	N/A	$41,800	$218,500	high	Medium	Medium
$549,500	$409,500	$149,500	$29,900	$166,000	N/A	$41,800	$237,700	Medium	Medium	Medium
$554,100	$410,600	$153,100	$30,620	$181,600	N/A	$41,800	$254,020	Medium	Medium	Medium
$1,562,500	$1,362,800	$199,700	$39,940	$215,200	N/A	$41,800	$296,940	High	Medium	Medium
Total Assessment	Land Value	Improvement Value	Loss to Contents	Loss to Structure	Loss of Function	Displacement Cost	Total Loss for Flood Hazard	Integrity	Risk Level / Vulnerability	Community Value Ranking
$1,440,133	$1,101,700	$349,500	$87,375	$929,500	$2,383,333	$171,600	$3,492,008	High	Medium	High
$1,509,567	$1,158,400	$363,700	$60,633	$652,817	$2,410,400	$6,600	$3,130,450	High	High	High
$1,754,333	$1,013,000	$984,700	$164,117	$468,000	$1,728,000	$6,600	$2,366,717	High	High	High
$1,277,367	$1,020,600	$264,700	$66,175	$380,250	$1,404,000	$6,600	$1,857,025	High	High	High
$925,133	$992,700	$45,000	$22,500	$253,500	$936,000	$6,600	$1,218,600	High	High	High
$1,509,567	$1,158,400	$363,700	$60,633	$652,817	$723,120	$6,600	$1,443,170	High	High	High
$1,509,567	$1,158,400	$363,700	$60,633	$652,817	$2,410,400	$6,600	$3,130,450	High	High	High
$1,089,133	$999,500	$92,500	$23,150	$261,950	$1,450,800	$6,600	$1,742,500	High	High	High
$1,443,667	$1,266,200	$183,900	$46,000	$575,575	$2,125,200	$6,600	$2,753,375	High	High	High

$2,073,900	$1,671,400	$564,700	$141,175	$1,859,975	$2,060,280	$6,600	$4,068,030	Low	High	High
$2,104,000	$1,166,200	$937,800	$234,450	$739,375	$2,730,000	$6,600	$3,710,425	Low	High	Low
			$702,125	$1,715,350	$6,333,600	$6,600	$8,757,675	Low	High	Low
			$162,300	$351,650	$389,520	$6,600	$910,070	Medium	High	Low
$1,304,133	$1,017,000	$296,100	$49,350	$427,917	$474,000		$951,267	Medium	High	Low
			$0	$0	$0	$6,600	$6,600	Low	Medium	Low
$2,888,767	$1,230,900	$1,698,000	$339,600	$1,372,280	$5,066,880	$6,600	$6,785,360	Medium	High	
$386,033	$359,800	$42,900	$21,450	$1,000,350	N/A	$147,744	$1,169,544	Low	Medium	Medium
$380,500	$300,100	$130,500	$32,625	$264,250	N/A	$41,800	$338,675	High	Medium	Medium
$431,000	$270,800	$160,200	$40,050	$447,038	$495,180	$6,600	$988,868	high	Medium	Medium
$436,633	$300,900	$162,600	$27,100	$190,000	N/A	$41,800	$258,900	High	Medium	Medium
$361,300	$295,000	$82,900	$20,725	$104,375	N/A	$41,800	$166,900	High	Medium	Medium
$431,000	$270,800	$160,200	$40,050	$343,875	N/A	$66,024	$449,949	High	Medium	Medium
$350,267	$295,000	$71,800	$17,950	$105,000	N/A	$41,800	$163,550	Height	Medium	Medium
$529,700	$268,700	$261,000	$65,250	$205,400	$758,400	$6,600	$1,035,650	High	Medium	Medium
$1,172,300	$893,300	$279,000	$69,775	$729,300	$807,840	$6,600	$1,613,515	High	High	Medium
$427,933	$300,300	$133,100	$33,275	$182,000	N/A	$41,800	$257,075	High	Medium	Low
$435,300	$303,400	$137,600	$34,400	$174,000	N/A	$41,800	$250,200	High	Medium	Medium
$382,433	$331,100	$68,900	$17,225	$135,000	N/A	$41,800	$194,025	High	Medium	Medium
$382,133	$332,200	$67,800	$16,950	$140,000	N/A	$41,800	$198,750	high	Medium	Medium
$388,367	$323,500	$76,500	$19,125	$150,500	N/A	$41,800	$211,425	High	Medium	Medium
$679,200	$550,000	$146,300	$29,900	$256,800	N/A	$41,800	$328,500	High	Medium	Medium

Total Assessment	Land Value	Improvement Value	Loss to Contents	Loss to Structure	Loss of Function	Displacement Cost	Total Loss for Flood Hazard	Integrity	Risk Level / Vulnerability	Community Value Ranking
$1,733,100	$1,140,100	$593,000	$148,275	$1,195,025	$4,412,400	$6,600	$4,662,387	high	Medium	Medium
$1,495,833	$1,020,400	$490,000	$81,667	$411,992	$45,636	$6,600	$1,632,146	High	Medium	High
$1,172,300	$893,300	$279,000	$55,820	$583,440	$646,272	$6,600	$1,292,132	High	Medium	High
$1,167,200	$866,900	$300,300	$60,060	$387,920	$429,696	$6,600	$884,276	High	Medium	High
$3,607,033	$1,201,300	$2,429,300	$404,883	$2,965,300	$3,284,640	$6,600	$6,661,423	Medium	Medium	High
$1,095,400	$807,500	$287,900	$72,000	$487,500	$540,000	$6,600	$1,106,100	Medium	Medium	Low
$1,081,733	$811,700	$328,400	$54,733	$418,167	$463,200	$6,600	$942,700	Medium	Medium	High
$1,118,300	$963,200	$155,100	$38,775	$386,100	$427,680	$6,600	$859,155	High	Medium	High
$3,737,100	$1,048,100	$2,839,200	$709,800	$1,565,363	$5,779,800	$6,600	$8,061,563	High	Medium	High
$2,725,800	$987,000	$1,738,800	$343,463	$1,360,125	$1,506,600	$6,600	$3,216,788	High	Medium	High
$982,933	$800,700	$187,600	$46,900	$379,925	$420,840	$6,600	$854,265	High	Medium	High
$1,111,800	$886,900	$224,900	$37,483	$260,000	$288,000	$6,600	$592,083	High	Medium	High
$945,167	$804,800	$141,700	$35,425	$350,025	$387,720	$6,600	$779,770		Medium	High
$1,172,300	$893,300	$279,000	$69,775	$729,300	$807,840	$6,600	$1,613,515	High	Medium	High
$1,172,300	$893,300	$279,000	$69,775	$729,300	$807,840	$6,600	$1,613,515	high	Medium	High
$2,328,033	$1,114,100	$1,342,200	$204,788	$821,681	$910,170	$6,600	$1,943,239	high	Medium	Low

$1,410,300	$1,126,200	$292,000	$146,000	$1,056,250	$5,850,000	$6,600	$7,058,850	high	High	High
$1,115,533	$1,023,600	$171,700	$34,360	$331,500	$1,224,000	$6,600	$1,596,460	High	Medium	High
$1,111,800	$886,900	$224,900	$37,483	$260,000	$288,000	$6,600	$592,083		High	High
$1,273,733	$1,126,500	$151,800	$30,360	$241,800	$267,840	$6,600	$1,139,000	High	Medium	High
$2,328,033	$1,114,100	$1,342,200	$204,788	$821,681	N/A	$121,356	$1,147,825	High	High	Low
$1,361,333	$1,040,000	$336,800	$84,200	$346,500	N/A	$41,800	$472,500	High	Medium	Low
$1,328,200	$1,000,000	$328,200	$65,640	$320,000	N/A	$41,800	$427,440	High	Medium	Low
$1,277,700	$1,000,000	$277,700	$69,425	$300,000	N/A	$41,800	$411,225	High	Medium	Low
$1,327,600	$1,000,000	$327,600	$65,520	$320,000	N/A	$41,800	$427,320	Low	Medium	Low
$1,283,800	$1,000,000	$283,800	$70,950	$300,000	N/A	$41,800	$412,750	Low	Medium	Low
$1,340,100	$1,080,000	$260,100	$65,025	$346,500	N/A	$41,800	$453,325	Low	Medium	Low
$2,130,867	$1,087,100	$1,264,800	$210,800	$529,317	$1,954,400	$6,600	$4,827,187	High	Medium	High
$2,356,067	$1,180,500	$1,508,800	$377,200	$914,550	$4,690,000	$6,600	$5,689,640	High	Medium	High
$1,165,200	$1,007,300	$290,500	$116,233	$421,200	$1,555,200	$6,600	$2,099,233	High	High	High
$1,829,533	$1,199,500	$738,600	$184,650	$1,534,650	$1,699,920	$6,600	$3,425,820	High	Medium	High
$1,210,767	$1,061,900	$152,600	$25,433	$141,483	$156,720	$6,600	$330,237	High	Medium	High
$1,692,900	$1,271,900	$421,100	$210,550		$0	$6,600	$217,150	Low	Medium	High
$1,433,800	$1,068,600	$454,800	$90,960	$217,750	$804,000	$6,600	$1,119,310	High	Medium	High
$1,204,833	$1,016,000	$194,000	$48,525	$384,800	$1,420,800	$6,600	$1,860,725	High	Medium	High
$875,000	$785,800	$89,200	$22,300	$257,400			$279,700	High	Medium	High
$934,600	$800,000	$134,600	$33,650	$359,775	$1,328,400	$6,600	$1,728,425	Medium	Medium	High
$1,403,400	$1,052,600	$384,600	$96,150	$464,750	$1,716,000	$6,600	$2,283,500	High	Medium	High
$1,541,633	$1,025,000	$636,600	$127,320	$323,400	$1,552,320	$6,600	$2,009,640	medium	High	High
$1,297,833	$1,145,600	$176,100	$83,383	$865,150	$958,320	$6,600	$1,913,453	High	High	Medium
$1,297,833	$1,145,600	$176,100	$83,383	$865,150	$958,320	$6,600	$1,913,453	High	High	Medium

Total Assessment	Land Value	Improvement Value	Loss to Contents	Loss to Structure	Loss of Function	Displacement Cost	Total Loss for Flood Hazard	Integrity	Risk Level / Vulnerability	Community Value Ranking
$963,300	$889,400	$75,600	$18,900	$217,100	$0	$30,000	$231,300	High	Medium	Medium
$1,297,833	$1,145,600	$176,100	$125,075	$1,297,725	$1,437,480	$6,600	$2,866,880	High	Medium	Medium
$808,500	$434,300	$391,100	$195,550	$178,500	$257,040	$6,600	$286,620	High	Medium	Medium
$455,467	$306,600	$165,800	$41,450	$165,000	N/A	$41,800	$248,250	High	Medium	Medium
$396,900	$295,000	$118,500	$29,625	$122,500	N/A	$41,800	$193,925	High	Medium	Medium
$405,633	$295,000	$127,400	$31,850	$122,500	N/A	$41,800	$196,150	High	Medium	Medium
$1,184,767	$1,018,800	$171,400	$28,567	$349,267	$386,880	$6,600	$771,313	High	Medium	Medium
$1,268,033	$1,050,100	$237,800	$47,560	$405,860	$1,498,560	$6,600	$1,958,580	High	Medium	Medium
$1,268,033	$1,050,100	$237,800	$47,560	$405,860	$1,498,560	$6,600	$1,958,580	High	Medium	Medium
$2,231,900	$1,253,500	$978,400	$244,600	$1,451,450	N/A	$214,368	$1,910,418	Medium	Medium	Medium
$2,231,900	$1,253,500	$978,400	$244,600	$1,451,450	N/A	$214,368	$1,910,418	Medium/Low	Medium	Low
$2,888,767	$1,230,900	$1,698,000	$424,500	$1,715,350	$6,333,600	$6,600	$8,480,050		High	Low
$960,033	$567,700	$481,700	$96,340	$378,300	$419,040		$893,680	High	Medium	Medium
$1,564,433	$411,200	$1,232,500	$246,500	$1,103,440	$7,073,333	$254,640	$8,650,448	High/ Med	Medium	Medium

$1,443,667	$1,266,200	$183,900	$30,667	$383,717	N/A	$56,672	$471,055	High	Medium	Medium
$1,294,300	$1,065,300	$229,000	$57,250	$364,000	N/A	$41,800	$463,050	MED	High	Medium
$540,300	$405,600	$134,700	$26,940	$147,600	N/A	$41,800	$216,340	High	Medium	Medium
$926,100	$405,300	$558,000	$111,600	$307,700	N/A	$41,800	$461,100	High	Medium	Medium
$788,000	$574,900	$213,100	$53,275	$342,500	N/A	$41,800	$496,375	Medium	Medium	High
$474,000	$347,300	$126,700	$21,117	$217,000	N/A	$41,800	$279,917	High	Medium	Medium
$627,300	$377,600	$249,700	$62,425	$717,375	N/A	$41,800	$821,600	High	Medium	Medium
$573,700	$517,000	$56,700	$11,340	$122,000	N/A	$41,800	$175,140	High	Medium	Medium
$474,267	$400,500	$74,200	$14,840	$151,200	N/A	$41,800	$207,840	high	Medium	Medium
$689,800	$578,400	$111,400	$18,567	$186,917	N/A	$41,800	$247,283	High	Medium	Medium
$682,567	$559,400	$126,600	$31,650	$356,850	$395,280	$6,600	$790,380	Medium	Medium	Medium
$2,231,900	$1,253,500	$978,400	$244,600	$1,451,450	$1,607,760	$6,600	$3,310,410	Low	Medium	Medium
$242,067	$252,000	$7,000	$3,500	$78,000	$86,400	$6,600	$174,500	Med	Medium	Medium
$682,567	$559,400	$126,600	$31,650	$356,850	$395,280	$6,600	$790,380	Med	Medium	Medium
$1,268,033	$1,050,100	$237,800	$118,900	$1,014,650	ucker	$6,600	$1,140,150	Low	Medium	Medium
$994,167	$1,025,000	$237,600	$59,400	$434,200	N/A	$41,800	$535,400	Med/Low	Medium	Medium
$1,184,767	$1,018,800	$171,400	$34,280	$419,120	$464,256	$6,600	$924,256	Medium	High	Medium
$483,933	$414,800	$85,500	$17,100	$142,400	N/A	$41,800	$201,300	Medium	Medium	Medium
$823,500	$698,200	$201,800	$38,133	$246,500	N/A	$41,800	$326,433	High	Medium	Medium
$808,500	$434,300	$391,100	$78,220	$441,600	N/A	$41,800	$561,620	high	Medium	Medium
$808,500	$434,300	$391,100	$78,220	$441,600	N/A	$41,800	$561,620		Medium	Medium
$386,933	$300,100	$103,300	$25,825	$152,250	N/A	$41,800	$219,875	Med/Low	Medium	Medium
$385,500	$300,900	$101,200	$25,300	$160,000	N/A	$41,800	$227,100	high	Medium	Medium

Total Assessment	Land Value	Improvement Value	Loss to Contents	Loss to Structure	Loss of Function	Displacement Cost	Total Loss for Flood Hazard	Integrity	Risk Level / Vulnerability	Community Value Ranking
$2,132,900	$1,474,700	$658,200	$164,550	$409,875	N/A	$41,800	$616,225	High	High	Low
$1,232,233	$711,900	$535,000	$133,750	$396,750	N/A	$41,800	$572,300	High	Medium	Low
$1,121,300	$619,800	$501,500	$125,375	$558,500	N/A	$41,800	$725,675	Medium	Medium	Low
$2,212,600	$1,512,600	$700,800	$140,160	$429,300	N/A	$41,800	$611,260	Low	Medium	Low
$954,900	$703,500	$251,400	$62,850	$343,750	N/A	$41,800	$448,400	Medium	High	Low
$1,699,200	$1,348,700	$350,500	$87,625	$388,500	N/A	$41,800	$517,925	Medium	Medium	Low
$2,401,500	$2,034,600	$366,900	$73,380	$435,240			$508,620	Med	Medium	Low
$1,988,733	$1,777,700	$455,400	$113,875	$482,250	N/A	$41,800	$637,925	Low	High	Low
$1,988,733	$1,777,700	$455,400	$113,875	$482,250	N/A	$41,800	$637,925	Low	High	Low
$295,700	$286,000	$9,700	$4,850	$687,500	N/A	N/A	$692,350	NA	Medium	Low
$1,360,367	$723,800	$651,000	$65,100	N/A	N/A	N/A	$65,100	NA	High	Low
$723,667	$400,000	$336,900	$67,380	$187,200	N/A	$41,800	$296,380		Medium	Low
$719,767	$400,000	$334,900	$66,980	$187,200	N/A	$41,800	$295,980	Low	Medium	Low
$718,367	$400,000	$333,500	$66,700	$187,200	N/A	$41,800	$295,700	Low	Medium	Low

Total Assessment	Land Value	Improvement Value	Loss to Contents	Loss to Structure	Loss of Function	Displacement Cost	Total Loss for Flood Hazard	Integrity	Risk Level / Vulnerability	Community Value Ranking
$833,533	$400,000	$448,000	$89,600	$243,600	N/A	$41,800	$375,000	Med	Medium	Low
$784,167	$400,000	$399,000	$79,800	$230,400	N/A	$41,800	$352,000	Med	Medium	Low
$858,067	$400,000	$472,400	$94,480	$273,000	N/A	$41,800	$409,280	Low	Medium	Low
$854,733	$400,000	$469,100	$93,820	$270,600	N/A	$41,800	$406,220	Low	Medium	Low
$810,733	$400,000	$425,300	$85,060	$230,000	N/A	$41,800	$356,860	Medium	Medium	Low
$1,799,067	$1,073,300	$748,200	$149,640	$495,100	N/A	$41,800	$686,540	Medium	Medium	Low
$1,730,667	$1,075,500	$673,200	$134,640	$430,600	N/A	$41,800	$607,040	Medium	Medium	Low
$1,381,600	$1,201,900	$179,700	$35,940	$147,200	N/A	$41,800	$224,940	High	Medium	Medium
$1,853,200	$1,372,400	$481,100	$120,275	$467,500	N/A	$41,800	$629,575	High	Medium	Medium
$2,390,333	$1,481,300	$909,500	$227,375	$612,625	N/A	$41,800	$881,800	High	High	Medium
$2,625,633	$2,414,600	$211,800	$52,950	$1,680,000	N/A	$322,560	$2,136,150	Med/High	Medium	Medium
$427,928,930	$164,795,700	$95,491,434	$18,248,376	$84,911,006	$117,976,437	$8,035,932	**$231,143,978**			

Appendix E: FEMA Worksheet #4

FLOOD HAZARD MATRIX
Worksheet 4

#	Street	Historic Designation Note 10	Geographic Context of Significance	Level of Significance	Public Sentiment Note 9	Economic Importance	Degree of Integrity/Value
11	ACTON PL	Contributing	National	High	Medium	Medium	Medium
79	CHARLES ST	Contributing	National	Medium	Medium	Medium	Medium
77	CHARLES ST	Contributing	National	Medium	Medium	Medium	Medium
75	CHARLES ST	Noncontributir	None	High	Low	Medium	Medium
74	CHARLES ST	Contributing	National	High	Medium	Medium	Medium
72	CHARLES ST	Contributing	National	Medium	Medium	Medium	Medium
70	CHARLES ST	Contributing	National	Low	Medium	Medium	Medium
60	COLLEGE AVE	Contributing	National	Medium	Medium	Medium	Medium
80	COMPROMISE ST	Noncontributir	None	Low	Low	Medium	Medium
137	COMPROMISE ST	Contributing	National	Low	Medium	High	Medium
110	COMPROMISE ST	Contributing	National	Low	Medium	High	Medium
100	COMPROMISE ST	Noncontributir	None	Low	Low	High	Medium
0	COMPROMISE ST	Noncontributir	None	Medium	Low	High	Medium
143	COMPROMISE ST	Noncontributir	None	Medium	Low	High	Medium
10	COMPROMISE ST	Contributing	National	Medium	High	Medium	High
7	COMPROMISE ST	Noncontributir	None	Low	Low	Medium	Medium
5	COMPROMISE ST	Noncontributir	None	Low	Low	Medium	Medium
3	COMPROMISE ST	Noncontributir	None	Low	Low	Medium	Medium
107	COMPROMISE ST	Noncontributir	None	Medium	Low	Medium	Medium
76	CONDUIT ST	Contributing	National	High	Medium	Medium	Medium
74	CONDUIT ST	Contributing	National	high	Medium	Medium	Medium
67	CONDUIT ST	Contributing	National	Medium	Medium	Medium	Medium
65	CONDUIT ST	Contributing	National	Medium	Medium	Medium	Medium
63	CONDUIT ST	Contributing	National	High	Medium	Medium	Medium

#	Street	Historic Designation	Geographic Context of Significance	Integrity	Community Value Ranking	Economic Importance	Degree of Integrity/Value
142	DOCK ST	Contributing	National	High	High	Medium	High
126	DOCK ST	Contributing	National	High	High	High	High
136	DOCK ST	Contributing	National	High	High	High	High
132	DOCK ST	Contributing	National	High	High	High	High
130	DOCK ST	Contributing	National	High	High	High	High
124	DOCK ST	Contributing	National	High	High	High	High
122	DOCK ST	Contributing	National	High	High	High	High
120	DOCK ST	Contributing	National	High	High	High	High
118	DOCK ST	Contributing	National	High	High	High	High
110	DOCK ST	Contributing	National	Low	High	High	High
12	DOCK ST	Noncontributir	None	Low	Low	High	Medium
10	DOCK ST	Noncontributir	None	Low	Low	High	Medium
6	DOCK ST	Noncontributir	None	Medium	Low	High	Medium
4	DOCK ST	Noncontributir	None	Medium	Low	High	Medium
1	DOCK ST	Noncontributir	None	Low	Low	High	Medium
8	DOCK ST	Contributing	National	Medium		Medium	Medium
13	EAST ST	Contributing	National	Low	Medium	Medium	Medium
16	EAST ST	Contributing	National	High	Medium	Medium	Medium
6	FLEET ST	Contributing	National	high	Medium	High	Medium
14	FLEET ST	Contributing	National	High	Medium	Medium	Medium
10	FLEET ST	Contributing	National	High	Medium	Medium	Medium
8	FLEET ST	Contributing	National	High	Medium	Medium	Medium
12	FLEET ST	Contributing	National	Height	Medium	Medium	Medium
193	GREEN ST	Contributing	National	High	Medium	Medium	Medium
195	GREEN ST	Contributing	National	High	Medium	High	Medium
151	KING GEORGE ST	Noncontributir	None	High	Low	Medium	Medium
149	KING GEORGE ST	Contributing	National	High	Medium	Medium	Medium

147	KING GEORGE ST	Contributing	National	High	Medium	Medium	Medium
145	KING GEORGE ST	Contributing	National	high	Medium	Medium	Medium
143	KING GEORGE ST	Contributing	National	High	Medium	Medium	Medium
139	KING GEORGE ST	Contributing	National	High	Medium	Medium	Medium
		Contributing	National				
#	Street	Historic Designation	Geographic Context of Significance	Integrity	Community Value Ranking	Economic Importance	Degree of Integrity/Value
100	MAIN ST	Contributing	National	high	Medium	High	Medium
99	MAIN ST	Contributing	National	High	High	High	High
128 (A)	MAIN ST	Contributing	National	High	High	High	High
132	MAIN ST	Contributing	National	High	High	High	High
123	MAIN ST	Contributing	National	Medium	High	High	High
121	MAIN ST	Noncontributir	None	Medium	Low	High	Medium
118	MAIN ST	Contributing	National	Medium	High	High	High
117	MAIN ST	Contributing	National	High	High	High	High
113	MAIN ST	Contributing	National	High	High	High	High
112	MAIN ST	Contributing	National	High	High	High	High
109	MAIN ST	Contributing	National	High	High	High	High
108	MAIN ST	Contributing	National	High	High	High	High
107	MAIN ST	Contributing	National		High	High	High
105	MAIN ST	Contributing	National	High	High	High	High
103	MAIN ST	Contributing	National	high	High	High	High
93	MAIN ST	Noncontributir	None	high	Low	High	Medium
87	MAIN ST	Contributing	National	high	High	High	High
81	MAIN ST	Contributing	National	High	High	High	High
110	MAIN ST	Contributing	National		High	Medium	High
77	MAIN ST	Contributing	National	High	High	Medium	High
91	MAIN ST	Noncontributir	None	High	Low	High	Medium
6	MARKET QUAY	Noncontributir	None	High	Low	Medium	Medium
5	MARKET QUAY	Noncontributir	None	High	Low	Medium	Medium
4	MARKET QUAY	Noncontributir	None	High	Low	Medium	Medium
3	MARKET QUAY	Noncontributir	None	Low	Low	Medium	Medium

2	MARKET QUAY	Noncontributir	None	Low	Low	Medium	Medium
1	MARKET QUAY	Noncontributir	None	Low	Low	Medium	Medium
26	MARKET SPACE	Contributing	National	High	High	High	High
2	MARKET SPACE	Contributing	National	High	High	High	High
14	MARKET SPACE	Contributing	National	High	High	High	High
36	MARKET SPACE	Contributing	National	High	High	High	High
34	MARKET SPACE	Contributing	National	High	High	High	High
25	MARKET SPACE	Contributing	National	Low	High	High	High
24	MARKET SPACE	Contributing	National	High	High	High	High
18	MARKET SPACE	Contributing	National	High	High	High	High
16	MARKET SPACE	Contributing	National	High	High	High	High
12	MARKET SPACE	Contributing	National	Medium	High	High	High
8	MARKET SPACE	Contributing	National	High	High	High	High
22	MARKET SPACE	Contributing	National	medium	High	Medium	High
30	MARKET SPACE (B)	Contributing	National	High	Medium	High	Medium
30	MARKET SPACE(A)	Contributing	National	High	Medium	High	Medium
#	Street	Historic Designation	Geographic Context of Significance	Integrity	Community Value Ranking	Economic Importance	Degree of Integrity/Value
9	PINKNEY ST	Contributing	National	High	Medium	Medium	Medium
11	PINKNEY ST	Contributing	National	High	Medium	High	Medium
4	PINKNEY ST	Contributing	National	High	Medium	Medium	Medium
15	PINKNEY ST	Contributing	National	High	Medium	Medium	Medium
8	PINKNEY ST	Contributing	National	High	Medium	Medium	Medium
6	PINKNEY ST	Contributing	National	High	Medium	Medium	Medium
139	PRINCE GEORGE ST	Contributing	National	High	Medium	High	Medium
137	PRINCE GEORGE ST	Contributing	National	High	Medium	High	Medium
133	PRINCE GEORGE ST	Contributing	National	High	Medium	High	Medium
131	PRINCE GEORGE ST	Contributing	National	Medium	Medium	High	Medium
125	PRINCE GEORGE ST	Noncontributir	None	Medium/Low	Low	High	Medium
87	PRINCE GEORGE ST	Noncontributir	None		Low	High	Medium

134	PRINCE GEORGE ST	Contributing	National	High	Medium	High	Medium
110	PRINCE GEORGE ST	Contributing	National	High/ Med	Medium	Medium	Medium
119	PRINCE GEORGE ST	Contributing	National	High	Medium	High	Medium
69	PRINCE GEORGE ST	Contributing	National	MED	Medium	Medium	Medium
145	PRINCE GEORGE ST	Contributing	National	High	Medium	Medium	Medium
142	PRINCE GEORGE ST	Contributing	National	High	Medium	Medium	Medium
130	PRINCE GEORGE ST	Contributing	National	Medium	High	Medium	High
126	PRINCE GEORGE ST	Contributing	National	High	Medium	Medium	Medium
124	PRINCE GEORGE ST	Contributing	National	High	Medium	Medium	Medium
123	PRINCE GEORGE ST	Contributing	National	High	Medium	Medium	Medium
121	PRINCE GEORGE ST	Contributing	National	high	Medium	Medium	Medium
118	PRINCE GEORGE ST	Contributing	National	High	Medium	Medium	Medium
48	RANDALL ST	Contributing	National	Medium	Medium	High	Medium
47	RANDALL ST	Contributing	National	Low	Medium	High	Medium
45	RANDALL ST	Contributing	National	Med	Medium	High	Medium
42	RANDALL ST	Contributing	National	Med	Medium	High	Medium
41	RANDALL ST	Contributing	National	Low	Medium	High	Medium
8	RANDALL ST	Contributing	National	Med/Low	Medium	High	Medium
40	RANDALL ST	Contributing	National	Medium	Medium	High	Medium
25	RANDALL ST	Contributing	National	Medium	Medium	Medium	Medium
23	RANDALL ST	Contributing	National	High	Medium	Medium	Medium
21	RANDALL ST	Contributing	National	high	Medium	Medium	Medium
19	RANDALL ST	Contributing	National		Medium	Medium	Medium
12	RANDALL ST	Contributing	National	Med/Low	Medium	Medium	Medium
10	RANDALL ST	Contributing	National	high	Medium	Medium	Medium
		Contributing	National				
#	Street	Historic Designation	Geographic Context of Significance	Integrity	Community Value Ranking	Economic Importance	Degree of Integrity/Value
17	REVELL ST	Noncontributir	None	High	Low	Medium	Medium
8	SHAW ST	Noncontributir	None	High	Low	Medium	Medium

Appendix F

WEATHER IT TOGETHER: CITY COORDINATION AND COMMUNITY ENGAGEMENT February 2013 - November 2017						
DATE	**LOCATION**	**MEETING OR EVENT**	**TOPIC**	**ATTENDANCE**	**External**	**Internal**
2/11/13	Annapolis	Meeting: CRHMP Core Team	Mitigation & Response Planning for Disaster in Annapolis Historic District	City Agency Staff (DPW, OEM, P&Z, DNEP, PIO), WORA, DAP	X	X
3/13/13	Annapolis	Meeting: Planning Team	Public Engagement Strategy	NTHP & City of Annapolis		X
4/19/13	Annapolis	Meeting: Planning Team	GIS Mapping	City Staff		X
4/22/13	Annapolis	Meeting: CRHMP Core Team[78]	FEMA Guidance	City Staff, WORA, DAP, MEMA, DNR, MHT	X	X
6/24/13	Annapolis	Meeting: Planning Team	Review FEMA Guidance	City Staff, MEMA & FEMA Region 3		X
8/7/13	Annapolis	Meeting: Planning Team	Call with AA County	City & County Planning Staff		X
9/17/13	Annapolis	Meeting: Planning Team	Review FEMA Hazard Survey Process	City Staff & HPD Consultants		X
10/3/13	Easton	Conference: Eastern Shore Land Conservancy	Annapolis CRHMP Presentation	Chesapeake Bay region representatives	X	

[78] Hosted by the City of Annapolis on a monthly basis excepting months when another major Weather It Together public meeting takes place.

11/14/13	Annapolis	Meeting: CRHMP Core Team	FEMA Guidance	City Staff, Aldermen, DAP, MEMA, DNR, MHT	X	X
12/18/13	Annapolis	Meeting: Planning Team	Review DNR Coast Smart program	City Staff		X
1/16/14	Annapolis	Meeting: Planning Team	Coast Smart Grant	City Staff and DNR		X
1/24/14	Annapolis	Meeting: Planning Team	Budget	City Staff		X
1/31/14	Annapolis	Meeting: Planning Team	National Treasure Status	City Staff and NTHP		X
2/13/14	Annapolis	Meeting: CRHMP Core Team	Vulnerability Assessment	City Staff, Aldermen, DAP, MEMA, NTHP, DNR, MHT	X	X
3/4/14	Annapolis	Meeting: Planning Team	Findings: *Landmarks at Risk*	City Staff, UCS, NTHP		X
3/11/14	Annapolis	Meeting: Planning Team	Discussion: *Encroaching Tides*	City Staff, UCS, NTHP		X
3/13/14	Annapolis	Meeting: CRHMP Core Team	UCS Reports & USNA SLR Analysis	City Staff, Aldermen, DAP, MEMA, NTHP, DNR, MHT, USNA	X	X
4/4/14	Annapolis	Meeting: Planning Team	USACE Elevation Survey	City Staff, DNR, USACE		X
4/10/14	Annapolis	Meeting: CRHMP Core Team	UCS Reports	City Staff, Aldermen, DAP, MEMA, NTHP, MHT, DNR, USNA, USACE	X	X

4/17/14	Annapolis	Meeting: City Council Work Session	Annapolis CRHMP Presentation	City Staff, City Council, USNA	X	X
5/12/14	Annapolis	Meeting: Planning Team	Tour of Study Area	City Staff & HPD Consultants		X
5/19/14	Annapolis	Meeting: Planning Team	Public outreach plan	City Staff, MHT, MHC		X
6/5/14	Towson, MD	Forum: MDP Planners Roundtable	Annapolis CRHMP Presentation	Maryland Planning Directors and Staff	X	
6/11/14	Annapolis	Meeting: Brown Bag Lunch	Annapolis CRHMP Presentation	City Staff & General Public	X	X
6/12/14	Annapolis	Meeting: CRHMP Core Team	Public outreach plan	City Staff, WORA, Aldermen, DAP, MEMA, NTHP, MHT, DNR, USNA, USACE	X	X
6/13/14	Annapolis	Site Visit: Planning Team	Study Area Site Tour	City Staff, NTHP		X
8/4/14	Annapolis	Meeting: Annapolis History Consortium	Annapolis CRHMP Presentation	AHC members	X	
8/5/15	Annapolis	Meeting: Planning Team	USACE: Site Visit & Survey	City Staff, USACE		X
9/2/14	Annapolis	Meeting: Planning Team	Tidal flooding	City Staff & HPD Consultant		X

10/9/14	Annapolis	Meeting: CRHMP Core Team	Annapolis CRHMP Presentation	City Staff, Aldermen, WORA, DAP, MEMA, NTHP, MHT, DNR, USNA, USACE	X	X
10/9/14	Annapolis	Forum: DNR Coastal Community Exchange	Annapolis CRHMP Presentation	MD *Coast Smart* project leaders, DNR, MEMA	X	X
10/16/14	Annapolis	Meeting: Planning Team	CRHMP Branding	City Staff, DAP, HPC		X
10/23/14	Annapolis	Press Event	National Treasure Designation by NTHP	Core Team, City Staff, local & state elected officials & general public	X	X
10/28/14	Newark, DE	Conference: MD/DE Regional APA	*Weather It Together* Presentation	MD/DE Planners, consultants, state agency staff	X	
10/30/14	Annapolis	Meeting: Planning Team	GIS data collection & mapping for study area	City Staff, NPS		X
11/12/14	Savannah, GA	Conference: NTHP Past/Forward	Disaster preparedness workshop	Weather It Together Project Lead	X	
11/13/14	Savannah, GA	Conference: NTHP Past/Forward	*Weather It Together* Presentation	Project Lead and MHT	X	
11/22/14	Annapolis	Press Event: Environment Maryland	*Weather It Together* Presentation	Project Lead	X	

12/12/14	Arlington, VA	Conference: Association of Climate Change Officers	*Weather It Together* Presentation	Local, state & federal agency staff, consultants on climate change	X	
1/15/15	Annapolis	CRHMP Core Team Meeting	*Weather It Together* Presentation	City Staff, WORA, Aldermen, DAP, MEMA, NTHP, MHT, DNR, USNA, USACE	X	X
1/20/15	Annapolis	Meeting: Severn River Association & Climate Stewards of Greater Annapolis	*Weather It Together* Presentation	Project Lead, USC, General Public	X	
2/2-2/4/15	Pocantico, NY	Climate Change & Cultural Resource Leadership Summit	*Weather It Together* Presentation	Weather It Together project lead, local, state, & national cultural resource leaders, UCS, Rockefeller Fund	X	
2/11/15	Annapolis	Meeting: City Council Public Safety Committee	*Weather It Together* Presentation	Public Safety Committee, City Staff	X	X
2/12/15	Annapolis	Meeting: Senator Mikulski Staff	*Weather It Together* Presentation	City staff & elected officials		X
2/13/15	Baltimore, MD	Meeting: City of Baltimore	*Weather It Together* Presentation	Weather It Together project lead, MHT, City of Baltimore staff	X	

2/19/15	Annapolis	Meeting: Planning Team	City update of Flood Management ordinance	City Staff, MDE, MEMA		X
2/20/15	Annapolis	Meeting: Planning Team	Joint SLR planning with USNA	City Staff & USNA		X
3/11 - 3/12//15	Stevensville, MD	Workshop: Silver Jackets	*Weather It Together* Presentation	City Staff & Silver Jackets member cities and state agencies	X	
3/18/15	Crownsville, MD	Meeting: Cultural Resource Hazard Mitigation Program	Program Update	Weather It Together project lead, MHT, MDE, MEMA, MDP		X
3/19/15	Annapolis	CRHMP Core Team Meeting	NPS Presentation	City Staff, WORA, Aldermen, DAP, MEMA, NTHP, MHT, DNR, USNA, USACE, MDE, NPS, MD Archives, HA	X	X
3/30/15	Atlanta, GA	Conference: National Main Street Center	*Weather It Together* Presentation	Main Street Managers, business & commercial property owners	X	
4/3/15	Annapolis	Meeting: Planning Team	Hazard Mitigation Design Guidelines	City Staff & HPD Consultant		X
4/10/15	Annapolis	Meeting: Vulnerability Assessment	Business Owners	Ward One & Eight Aldermen, DAP, Downtown & Eastport businesses		

3/19/15	Annapolis	CRHMP Core Team Meeting	*Weather It Together* Presentation	City Staff, Aldermen, DAP, MEMA, NTHP, MHT, DNR, USNA, USACE, MDE, NPS, MD Archives, HA	X	X
4/28 - 5/1/15	San Diego, CA	Conference: California Preservation Foundation	*Weather It Together* Presentation	City & state agencies, cultural resource professionals and non-profit leaders	X	
5/7/15	Annapolis	Meeting: Planning Team	ULI Grant	City staff & ULI-Baltimore Staff		X
5/8/15	Baltimore, MD	Conference: American Public Works Association - Mid-Atlantic Chapter	*Weather It Together* Presentation	Engineers, environmental planners & public works professionals	X	
5/11 - 5/15/15	St. Louis, MO	Conference: National Adaptation Forum	*Weather It Together* Presentation	Environmental, engineering, planning professionals	X	
6/2015	Annapolis	Site Visit: USACE Flood Management Team	Eastport Flood Elevation Survey	City Staff & USACE		X
6/11/15	Annapolis	CRHMP Core Team Meeting	*Weather It Together* Presentation	City Staff, Aldermen, DAP, MEMA, NTHP, MHT, DNR, USNA, USACE, MDE, NPS, MD Archives, HA	X	X

6/17/15	Crownsville, MD	Meeting: Cultural Resource Hazard Mitigation Program	Program Update	Weather It Together project lead, MHT, MDE, MEMA, MDP		X
6/28 - 6/29/15	Ocean City, MD	Conference: Maryland Municipal League	Main Street Booth Visitor Survey on priority sites for flood protection	City & State agencies & elected officials	X	
7/2/15	Annapolis	Meeting: USNA SLRAC	James Murley, South Florida Regional Planning Council	City Staff, USNA		X
7/8/15	Annapolis	Radio Interview: WNAV / Living Green	*Weather It Together* Presentation	Weather It Together Project Lead	X	
7/9/15	Annapolis	Town Hall & Open House:	*Weather It Together: Protect Our Historic Seaport*	Weather It Together Core Team & General Public (150+)	X	
7/24/15	Annapolis	Meeting: Planning Team	Comprehensive flood management strategy	City Staff & USACE & HPD Consultant		X
7/28/15	Kansas City, MO	Conference: Missouri Main Street	*Weather It Together* Presentation	Main Street Managers & elected officials	X	
8/3/15	Annapolis	Forum: Historic Annapolis	*Weather It Together* Presentation	Annapolis elected officials & community leaders	X	X

8/14/15	Baltimore	Meeting: ULI - Baltimore	*Weather It Together* Presentation	ULI Members	X	
9/1/15	Annapolis	Webinar: National Park Service	*Weather It Together* Presentation	State Historic Preservation Offices and Certified Local Government Communities	X	
9/10/15	Annapolis	CRHMP Core Team Meeting	*Weather It Together* Presentation	City Staff, Aldermen, DAP, MEMA, NTHP, MHT, DNR, USNA, USACE, MDE, NPS, MD Archives, HA	X	X
9/17/15	Crownsville, MD	Meeting: Cultural Resource Hazard Mitigation Program	Program Update	Weather It Together project lead, MHT, MDE, MEMA, MDP		X
9/17/15	Annapolis	Meeting: USNA SLRAC	*Weather It Together* Update	City Staff & USNA		X
9/29/15	Annapolis	Meeting: City Hall	John Englander	City Staff & elected officials		X
9/29/15	Annapolis	Meeting & Site Visit: USNA	John Englander	City Staff, elected officials, USNA, Weather It Together Planning Team		X

9/30/15	Annapolis	Forum: Emergency Preparedness Month	*Preparing Your Business and Building for Natural Hazards*	Businesses and Property Owners	X	
10/12/15	Annapolis	Exhibit Booth: Market Space	NTHP *This Place Matters*	NTHP, Weather It Together Planning Team & General Public	X	
10/15/15	Annapolis	Work Session: City Council	*Weather It Together* Update	City Council and Office of Emergency Management	X	X
10/19/15	Savannah, GA	Lecture: Savannah College of Art & Design	*Weather It Together* Presentation	Students & cultural resource professionals	X	
11/5/15	Annapolis	Tour: NTHP Past/Forward Conference	*Weather It Together* / USNA Site Visit	Cultural resource professionals, planners & property owners	X	
11/12/15	Washington, DC	Lecture: NTHP Headquarters	*Weather It Together* Presentation	Cultural resource, legal & communication professionals	X	
12/9/14	Annapolis	Meeting: Hatcher Group	*Weather It Together* Presentation	County & State agency directors, foundations & state elected officials		X
12/10/15	Annapolis	CRHMP Core Team Meeting	*Weather It Together* Presentation	City Staff, Aldermen, DAP, MEMA, NTHP, MHT, DNR, USNA, USACE, MDE, NPS, MD Archives, HA, CBF, MDH, AA County	X	X

12/17/15	Easton	Meeting: Coast Smart Program Managers	*Weather It Together* Presentation	DNR, MEMA, MDE, MHT, elected officials, Coast Smart project managers	X	X
12/28/15	Annapolis	Meeting: Planning Team	Flood Insurance	Weather It Together Planning Team & Nationwide		X
1/11/16	Annapolis	Meeting: Planning Team with Place Economics	Economic Analysis\	City Staff & Planning Team		X
1/12/16	Annapolis	Work Session: County Council	*Weather It Together* Presentation	County Council, DPW, Ward One Alderman, USNA, OEM	X	
1/21/16	Annapolis	Work Session: City Council	Annapolis *Weather It Together* Update	City Council, OEM	X	
1/28/16	Annapolis	Presentation: Rotary Club	John Englander	Rotary Club members & business leaders	X	
1/28/16	Annapolis	Meeting: The Capital Editorial Board	John Englander & Mayor Pantelides	Publisher, Editor, Writers and Citizen members	X	
1/29/16	Annapolis	Interview: WRNR Morning Show with Rob Timm	John Englander *High Tide on Main Street*	General Public (est. 158,000 listeners)	X	
1/29/16	Annapolis	Meeting: Maritime Business Owners	John Englander	Maritime Business Owners		X

1/29/16	Annapolis	Meeting: Preservation Roundtable	John Englander	Local Historians / Historic Preservationists	X	
1/29/16	Annapolis	Interview: WBAL	John Englander	General Public (ext. 162,500 viewers)	X	
1/30/16	Annapolis	Lecture: St. John's College	John Englander: Future of Annapolis	General Public (est. 580)	X	
2/3/16	Denver, CO	Conference: Preservation Colorado	*Weather It Together* Presentation	State agencies & cultural resource managers	X	
2/24/16	Annapolis	Interview: Watershed Moments (hosted by Rhonda Pindell Charles)	Historic Preservation & Weather It Together	General Public	X	
2/24/16	Annapolis	Meeting: Chamber of Commerce/Environmental Committee	*Weather It Together* Presentation	Business Leaders in AA County	X	
2/24/16	Annapolis	Meeting: Watersheds Network	*Weather It Together* Presentation	Watershed Stewards Leadership		X
3/10/16	Washington, DC	Forum: US/ICOMOS Cultural Heritage & International Disasters	*Weather It Together* Presentation	State and National leaders in cultural resource protection and climate change	X	

3/16/16	Annapolis	Ceremony: MHT Awards	*Weather It Together* Excellence in Community Engagement	Local and State cultural resource leaders	X	
3/24/16	Annapolis	Meeting: Planning Team	Planning Charrette	Planning Charrette Team		X
3/29/16	St. Augustine, FL	Forum: Flagler College	*Weather It Together* Presentation	General Public	X	
4/7/16	Annapolis	Meeting: Climate Stewards of Greater Annapolis	*Weather It Together* Presentation	Climate Steward Members	X	
4/10 - 4/14/16	Newport, RI	Conference: Keeping History Above Water	*Weather It Together* Presentation	Ward One & Eight Aldermen, OEM, MIT, Weather It Together Planning Team, MHT, Local, State, National & International cultural resource professionals	X	
4/21/14	Annapolis	Meeting: Critical Area Commission	*Weather It Together* Presentation	Local, State Critical Area Commission Staff	X	
4/22/14	Norfolk, VA	Site Visit & Meeting: City of Norfolk	*Weather It Together* Presentation	Ward One Aldermen, CBF, City Staff, City of Norfolk Staff	X	
4/30/16	Annapolis	Planning Charrette	*Facing the Challenge - Sea Level Rise Adaptation Planning for the Annapolis Waterfront*	Annapolis Residents & Property Owners (115)	X	

5/11/16	Annapolis	Workshop: FEMA Region 3	*Weather It Together* Presentation	FEMA Region 3 Staff, MEMA, MDE & City staff	X	X
5/24/16	Milwaukee, WI	Conference: National Main Street Center	*Weather It Together* Presentation	Main Street Managers & CLG Staff	X	
5/26/16	Annapolis	CRHMP Core Team Meeting	*Weather It Together* Presentation	City Staff, Aldermen, DAP, MEMA, NTHP, MHT, DNR, USNA, USACE, MDE, NPS, MD Archives, HA, CBF, MDH, AA County, Esri, ULI, Watershed Stewards	X	X
6/6/16	Washington, DC	Forum: District Architecture Center	*Weather It Together* Presentation	DC & MD Architects & Planners, ULI	X	
6/11/16	Annapolis	Interview: Ecuador Film team	*Weather It Together* Site Tour	Weather It Together Planning Team, US State Dept., Ecuador Film Team	X	
6/16/16	Annapolis	CRHMP Core Team Meeting	*Weather It Together* Presentation	City Staff, Aldermen, DAP, MEMA, NTHP, MHT, DNR, USNA, USACE, MDE, NPS, MD Archives, HA, CBF, MDH, AA County	X	X
6/28/16	Annapolis	Green Drinks	*Weather It Together* Presentation	Annapolis Green members & general public	X	

7/14/16	Annapolis	CRHMP Core Team Meeting	*Weather It Together* Presentation	City Staff, Aldermen, DAP, MEMA, NTHP, MHT, DNR, USNA, USACE, MDE, NPS, MD Archives, HA, CBF, MDH, AA County	X	X
7/14/16	Washington, DC	Forum: American Architectural Foundation - Thought Leadership	*Weather It Together* Presentation	Federal agency, National nonprofit leaders in cultural resource management	X	
7/18/16	Arlington, VA	Forum: Association of Climate Change Officers - East Coast Climate Strategies	*Weather It Together* Presentation	Private and public sector engineers, scientists, planners, natural resource, facilities managers	X	
7/21/16	Annapolis	Meeting: USNA SLRAC		USNA & City Staff		X
7/28/15	Mobile, AL	Forum: National Alliance of Preservation Commissions	*Weather It Together* Presentation	City Staff, MHT & NPS	X	
7/26/16	Annapolis	Webinar: National league of Cities - Leadership in Community Resilience	*Weather It Together*	Weather It Together Planning Team, NLC Staff & 10 NLC Resilient Cities	X	
8/2/16	St. Augustine FL	Conference: Florida Prehistoric Archaeology Network	*Weather It Together*	Univ. of FL, Flagler College, City agencies, archaeologists, planners	X	X

9/1/16	Annapolis	Meeting: Planning Team	Newport Restoration Foundation selection of Annapolis for KHAW	Weather It Together Planning Team, NRF, NTHP, NPS, UCS, MHT		X
9/15/16	Easton, MD	Meeting: Adaptation & Recovery Working Group	*Weather It Together* Presentation	Weather It Together Planning Team, MHT, MDE, DNR, MEMA, MDH, ESLC, UMD, City Agencies	X	
9/21/16	Thurmont, MD	Conference: Scenic Byways	*Weather It Together* Presentation	Tourism, Heritage Area and Scenic Byway Directors	X	
9/28/16	Annapolis	Interview: WNAV Living Green	Emergency Preparedness Month & *Weather It Together*	General Public	X	
9/30/16	Annapolis	Screening: Citizens Climate Lobby	*Facing the Surge:* Commentary by Weather It Together	Citizens Climate Lobby members & general public	X	
10/15/16	Towson, MD	Conference: MD/DE APA	*Weather It Together* presentation	Planners, City officials, natural resource managers	X	
10/20/16	Linthicum Heights, MD	Conference: Maryland Association of Floodplain and Stormwater Managers	Keynote & Panel: *Weather It Together*	City, state & federal agencies & consulting firms	X	

11/10/16	Ellicott City, MD	Meeting: Howard County Planning & Citizen Advisory Group	*Weather It Together* presentation	County agency staff, Howard County Executive staff & councilman, civic leaders	X	X
1/29/16	Annapolis	Meeting: USNA SLRAC		USNA, Weather It Together Planning Team, City Staff		X
12/1/16	Annapolis	Meeting: Weather It Together Core Team		Weather It Together Core Team +	X	
12/6/16	Annapolis	Presentation: PALS UMD Landscape Studio	*City Dock Adaptation Strategies for Sea Level Rise*	Weather It Together Planning Team & General Public	X	
1212/16	San Francisco, CA	Conference: American Geophysical Union	Thriving Earth Exchange / NLC Workshop Roundtable: Annapolis *Weather It Together*	City leaders, agencies & nonprofits	X	
12/29/16	Annapolis	Meeting: Planning Team	Goals & Objectives & STAPLEe	Weather It Together Planning Team		X
1/24 - 1/25/17	Annapolis	Meetings: NFIP	Flood Insurance for Residential, Commercial and Business Owners	Weather It Together Planning Team, FEMA/NFIP, MDE, WORA, DAP, Chamber of Commerce & property owners	X	X

1/27/17	Annapolis	Meeting: USNA/SLRAC	Bob Kopp presentation on latest SLR data	Weather It Together Planning Team, USNA, City Staff		X
2/3/17	Sarasota, FL	Workshop: Florida Trust for Historic Preservation	Weather It Together Presentation	Architects, City staff, cultural resource managers	X	
3/3/17	Pensacola, FL	Workshop: Florida Trust for Historic Preservation	*Weather It Together* presentation	Architects, City staff, cultural resource managers	X	
3/9/17	Annapolis	Regional Meeting: SERVPRO	*Weather It Together* presentation	Recovery & restoration business owners	X	
3/22/17	Annapolis	Meeting: Weather It Together Planning Team	Review of Weather It Together objectives & actions for archeological resources	Planning Team, city, county & state archaeologists, MHT		X
4/13/17	Annapolis	Meeting: Planning Team	Discussion with economic & engineering professionals from NIST	Planning Team, NIST, USNA/SLRAC members		X
4/20/17	Annapolis	Workshop: ULI Land Use Leadership Training	*Weather It Together* presentation	ULI members in planning, real estate, architecture & government	X	
5/6/17	New York City	Conference: American Planning Association	*Weather It Together* presentation	Weather It Together Planning Team & planners, consultants, architects	X	

5/18/17	St. Petersburg, FL	Conference: Florida Trust for Historic Preservation	Weather It Together presentation	cultural resource managers, architects, archaeologists, City & state government	X
5/25/17	Crownsville, MD	Workshop: MHT Weather It Together Hazard Mitigation Workshop	*Weather It Together* presentation	MHT, MEMA, FEMA, planners, CLG staff & commissioners, elected officials	X
6/7/17	Annapolis	Meeting: Maryland AIA Chapter	*Weather it Together* presentation	Architects & consultants	X
6/13/17	Cambridge, MD	Meeting: Dorchester County	*Weather It Together presentation*	Dorchester County government, tourism & property owners	X
6/13/17	Washington , DC	Conference: Preservation Law / Georgetown Law Center & National Trust	*Weather It Together presentation*	Attorneys, planners, cultural resource managers	X
6/15/17	Annapolis	Community Forum: Prioritizing Adaptation Alternatives	Natural Hazard Mitigation Plan update & *Weather It Together* presentation & polling	Weather It Together Planning Team & Core Team, Annapolis residents, property owners	X
7/12/17	Annapolis	Interview: WNAV Living Green	Keeping History Above Water & Weather It Together	General Public	X

7/9-7/10/17	New York City	Technical Assistance Panel: ULI	Advisor on resiliency for waterfront design & development	ULI, developers, NYC City staff		X
7/16/17	Washington, DC	Symposium: US/ICOMOS International Exchange Program	Weather It Together presentation	Weather It Together Planning Team, IEP participants, federal agencies	X	
7/17/17	Annapolis	Site Visit: PEW Charitable Trusts	Weather It Together tour and presentation	Weather It Together Planning Team, Pew Team		X
7/24/17	Baltimore	Planning Session	Annapolis Rapid Coastal Assessment	Weather It Together Team, USACE Team	X	X
7/25/17	Annapolis	Work Session	Weather It Together	Weather It Together Team		X
7/31/17	Annapolis	Site survey at City Dock and Annapolis Coastline	Annapolis Rapid Coastal Assessment	Weather It Together Team, USACE Team	X	X
10/6/17	Annapolis	Findings Presentation	Annapolis Rapid Coastal Assessment, Adaptation Alternatives	Weather It Together Team, USACE Team	X	X
10/29 - 11/2/17	Annapolis	Conference: Keeping History Above Water: Annapolis	Conference management & *Weather It Together* panel, USNA panel	Weather It Together Core Team, residents, city, state, federal & international leaders in design, cultural/natural resource management and public policy	X	

Apendix G: A History of Chesapeake Bay Hurricanes & Tropical Storms in Annapolis

This compilation of documented references to storm history in the Chesapeake Bay and Annapolis area, was researched, documented and shared for purposes of the Weather It Together planning effort by historian, Jane Wilson McWilliams, author of *Annapolis: City on the Severn* and edited by Lisa M. Craig. Bibliographic references are noted at the end of the document.

1667 - The "Year of the Hurricane." A severe storm tracked through the Chesapeake region on Sept. 6. An official report noted, "A mighty wind on (Sept. 6) destroyed four-fifths of (our) tobacco and corn and blew down in two hours [many] houses in Virginia and Maryland." A benchmark storm for generations.

1724 – A severe tropical storm hit the Chesapeake on August 12. Crops of tobacco and corn were damaged in Virginia, along with houses and vessels. [Researcher's Note: Ludlum has no info from Maryland. Mentions Nicolson letter from South Carolina in August and ship damaged in offshore storm on 19th.]

1745 – On August 4, a "Severe storm passed over Annapolis doing great damage. A house was struck, severely injuring a man and his wife. Other areas around town were also damaged."

1752 – On October 1 a hurricane was reported on the Chesapeake Bay. One boat sank off Kent Island and the ferryman drowned. Rain the day before was so heavy that water broke mill dams and damaged mills and bridges. The bridge near Upper Marlborough was broken.

1754 – A violent storm out of southeast with heavy winds and rain and high tides 14 to 15 inches blew through Annapolis on October 23. "Perpendicularly, higher than the high Tide last week." It did "much damage" to warehouses near Dock.

1769 – On September 7, a hurricane tracked through Maryland. "Worst wind and rain of any memory." In lower Maryland, tobacco houses down, crops were damaged, mills were broken and carried away by water. "Rain beat through many Houses in this City, the Walls of which were 14 Inches thick." Great damage was done to buildings, corn, hay, fodder, tobacco. "Will be felt this winter."

1775 - A "most violent storm" in Annapolis this night (September 2) "for several hours blew a mere hurricane" with heavy rain, water 3 foot above high tide, copper on state house torn up, "market-house blown down". Damage in other parts of Maryland was "considerable." This is referred to as Independence Hurricane.

1821 - The Norfolk and Long Island Hurricane tracked over the Maryland shore on September 3. It produced hurricane-force winds along the coast and a destructive storm wave that inundated the barrier island where Ocean City is now located.

1861 - About this date (November 5) a great storm "swept over our whole coast" and is supposed to have injured the fleet for the Southern Expedition. Tide and flood in Annapolis brought water "quite over most of our Market Square." "Hasn't been this high for 15 or more years."

1876 - The Centennial Gale on September 16 and 17 caused the highest tides in generations throughout the Chesapeake Bay region and damaging winds throughout the eastern half of Maryland. It also caused considerable crop damage and uprooted trees. Referenced later as similar in power and scope to Hurricane Isabel in 2003.

1878 - The Great October Gale on the 23rd played havoc with the Chesapeake Bay region. Isolated hurricane-force gusts, especially on the bay, resulted in considerable crop and structural damage. The steamer *Express* sank near Point Lookout with a loss of 16 lives in one of the bay's deadliest disasters.

1889 - One of the state's most destructive coastal storms, this hurricane stalled and dissipated off the coast between September 8 and 12. Severe flooding was reported in Ocean City. "The sea inundated the island".

1896 - A hurricane raced through central Maryland on September 29. This storm ranked as one of the state's most destructive windstorms. Hurricane-force gusts along a 50-mile east-west band struck the Washington, D.C., area and passed through Frederick en route to Pennsylvania. Considerable moderate to extreme property damage was reported. "The abomination of desolation was on every side," according to an account from Sandy Spring, Maryland.

1903 - One of Ocean City's notable hurricanes. The storm stalled and dissipated off the coast from October 8 through 11, swamping the resort.

1915 - A tropical storm tracked through central Maryland on August 3. In Annapolis, it was the worst storm in years. The state capital sustained wind damage and flooding.

1928 - Remnant systems August 11-12 and August 16-17 deluged central sections of the state. More than a foot of rain fell in the Washington, D.C., suburbs. A total of 8.67 inches of rain in Washington, D.C. and a total of 12.76 inches of rain in 30 hours in nearby Cheltenham on August 11-12.

1932 – On November 9, a storm flooded the waterfront, washed away piers, washed over USNA seawall, lower end of Prince George St. flooded. The front of McNasby's was swept away, ferries did not run. It was called the Cuban hurricane with 1000 reported dead and Cuba hard hit.

1933 - The Chesapeake and Potomac Hurricane made landfall in North Carolina on August 23 before tracking through Virginia and central Maryland. Pounding surf carved the Ocean City Inlet. Gales occurred throughout the state. Most sections saw widespread flooding from torrential rain. Weakening as it moved northward, the storm still had wind and wave action strong enough to create an inlet at Ocean City, Maryland.

1935 - The remnants of the Great Labor Day Hurricane deluged the Eastern Shore from September 4-6. A total of 16.63 inches of rain reported in Easton. Severe flooding in Federalsburg led to nearly half the population of 2,000 displaced. One of the central Eastern Shore's worst natural disasters.

1944 - The Great Atlantic Hurricane passed about 50 miles off the coast on September 14 bringing hurricane force winds to Ocean City.

1954 - Hurricane Hazel on October 15 swept the eastern half of Maryland, having made landfall in South Carolina. Heavy rains pounded the west. Washington National Airport reported a record sustained wind of 78 mph, a gust of 98 mph. Gusts near 100 mph were commonplace throughout the Chesapeake Bay region. Severe flooding along the bay and its

tidal tributaries with flash flooding in western Maryland where 3-6 inches of rain fell. Overall, six deaths and about $11 million in damage were reported.

1955 - Hurricanes Connie and Diane on August 12 and 18, respectively. Strong gales from Connie sunk the tour schooner *Levin J. Marvel* about 20 miles south of its home port of Annapolis with 14 passengers drowned. Combined heavy rain from Connie and Diane caused major flooding in central Maryland, particularly along the Potomac River.

1972 - Hurricane Agnes on June 21-23 caused widespread record flooding and one of the state's most destructive natural disasters. Thousands of evacuations. Referred to as an "ecological calamity" for the Chesapeake Bay. This storm threatened dams, caused extensive road closures and evacuations, thwarted the rail industry and severely damaged the seafood industry due to its ecological impacts on the bay. Agnes was responsible for 128 deaths, the most of which were in Maryland, totaling 19.

1975 - The remnants of Hurricane Eloise pelted the state from September 23-26. Heavy flooding throughout central Maryland.

1979 - Hurricane David produced a tornado outbreak on September 5-6. The Baltimore metropolitan area experienced disastrous flash flooding.

1985 - Hurricane Gloria tracked about 50 miles offshore on September 27. Extensive damage to the Ocean City boardwalk. Several inches of rain fell on the eastern half of Maryland. An offshoot to Hurricane Juan caused severe flooding in western Maryland and along the Chesapeake Bay on November 4-5.

1996 - Hurricane Fran brought gales and heavy rain to the state on September 5. A track west of the Chesapeake Bay and lengthy high winds caused severe flooding along the bay and lower Potomac River.

1999 - Hurricane Floyd dumped more than 10 inches of rain on the Eastern Shore and along the Chesapeake Bay on September 16-17. Chestertown collected 14 inches. Annapolis had 11.60 inches. Floyd's eye passed through Ocean City, with a low barometric pressure of 28.88 inches. Flooding occurred in 11 of the 23 Maryland counties impacting the Patuxent River Watershed and most of the Delmarva Peninsula.

2003 - Hurricane Isabel tracked through the state on September 18, bringing widespread gales. More than nine hours of high winds created extreme flooding along the Chesapeake Bay and its tidal tributaries. Isolated gusts near hurricane force in the Chesapeake region.

2004 - Hurricanes Frances (September 8), Ivan (September 17) and Jeanne (September 28) brought tornado outbreaks and flooding, particularly to central and western Maryland.

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Appendix H: Weather It Together STAPLEE - Actions (FEMA Worksheets #6, #7, #8)

FEMA STAPLEE Criteria Worksheet (see FEMA 386-3, FEMA 386-6)

Annapolis CRHMP

						Social		Technical			Administrative			Political			Legal			Economic				Environmental					
	Goal		**Objective**		**Action or Project**	Community Acceptance	Effect on Segment of Population	Technical Feasibility	Long-term Solution	Secondary Impacts	Staffing	Funding Allocated	Maintenance/ Operations	Political Support	Local Champion	Public Support	State Authority	Existing Local Authority	Potential Legal Challenge	Benefit of Action	Cost of Action	Contributes to Economic Goals	Outside Funding Required	Effect on Land/ Water	Effect on Endangered Species	Effect on HAZMAT/ Waste Sites	Consistent with Community Environmental Goals	Consistent with Federal Laws	Project Group
1	**Implement a public awareness and engagement program.**	1	Inform property owners in the flood risk area about the flooding vulnerability of their properties, available technical assistance, incentives, and progress in flooding adaptation and hazard risk reduction.	1	Develop and implement a community engagement program to share leading practices for flood adaptation of privately-owned properties.	+	+	+	+	+	-	-	+	+	+	+	+	+	+	+	+	+	+	N/A	N/A	N/A	+	+	4
				2	Develop an educational program that illustrates and interprets past flood events and depicts future flood elevations.	+	+	+	-	-	-	-	-	-	+	+	+	+	-	+	+	-	+	N/A	N/A	N/A	+	+	4
			Quantify economic vulnerabilities related to flooding and promote business opportunities for hazard mitigation and adaptation in the flood risk area.	1	Provide information to business owners on resources available to support business continuity and disaster preparedness.	+	+	+	+	N/A	-	-	-	+	+	-	-	+	+	+	-	+	-	N/A	N/A	N/A	+	+	4
				2	Research and communicate economic data on the impact of flood events and the costs of flood adaptation to public and private-property owners, residents, business owners and civic organizations.	+	-	+	-	-	-	-	-	+	+	+	+	+	+	+	-	+	-	N/A	N/A	N/A	+	+	4
			Educate City staff and private property owners about the National Flood Insurance Program and the benefits of flood adaptation.	1	Provide training workshops on the benefits / costs of the National Flood Insurance Program.	+	+	+	+	+	+	-	-	+	+	+	+	+	+	+	+	+	+	N/A	N/A	N/A	N/A	+	8
2	**Lead building resilience efforts in flood adaptation and mitigation.**	1	Assign a *Weather It Together* field team to assist Annapolis property owners and Chesapeake Bay communities in developing adaptation plans and strategies.	1	Adopt the *Weather It Together* plan as the Resilience Office work plan.	+	+	+	+	+	-	+	+	+	+	-	+	+	+	+	-	+	+	N/A	N/A	N/A	N/A	+	8
				2	Secure and manage private and public funding for implementing the *Weather It Together* plan priorities.	+	+	+	+	+	-	+	+	+	+	-	+	+	+	+	-	+	+	N/A	N/A	N/A	N/A	+	8
				3	Develop and conduct required annual training for all City Department heads and managers regarding flood adaptation, risk reduction, and disaster-response.	+	+	+	-	+	-	-	-	-	+	-	+	+	+	+	-	N/A	+	N/A	N/A	N/A	+	+	8

				4	Establish a CRS working group consisting of staff from each City agency to support entry into the CRS and achieve and maintain a 5-Star rating.	N/A	+	+	+	+	-	+	+	+	+	-	+	+	+	+	-	+	+	N/A	N/A	N/A	N/A	+	8
				5	Secure funding to contract for start-up of CRS documentation.	+	+	+	N/A	N/A	-	-	-	+	+	N/A	+	+	+	+	-	N/A	-	N/A	N/A	N/A	N/A	+	8
				6	Develop and maintain the *Weather It Together* matrix, including a cultural, economic and technical matrix to measure, evaluate and inform stakeholders in flood adaption work.	+	+	+	+	+	-	-	-	+	+	+	N/A	-	N/A	+	+	+	+	+	+	+	+	+	9
				7	Develop a cooperative agreement with the USNA to ensure data sharing, coordinated action and, when feasible, shared funding and project design and implementation, to address flood impacts.	+	+	+	+	+	-	-	-	+	+	+	N/A	-	N/A	+	+	+	+	+	+	+	+	+	7
				8	Develop and disseminate leading practices in flood adaptation through a memorandum of understanding process with other jurisdictions.	+	+	+	+	+	-	-	-	-	+	-	+	-	+	+	+	+	+	N/A	N/A	N/A	N/A	+	7
				9	Complete an economic analysis of the value of the historic district to the local/state/regional economy.	+	+	+	+	+	+	+	N/A	+	+	+	+	+	+	+	+	+	+	N/A	N/A	N/A	+	+	6
				10	Establish and update annually a baseline for determining costs and financial impacts of a "no action" scenario on flood adaptation in the historic district.	+	+	+	-	-	-	-	N/A	+	+	+	+	+	+	+	+	+	+	N/A	N/A	+	+	+	6
				11	Collect and disseminate data and case studies on the socio-economic impacts of flood events on employees and businesses within the flood risk area.	+	+	+	-	-	-	-	N/A	+	+	+	+	+	+	+	+	+	+	N/A	N/A	N/A	+	+	1,6
		2	Implement model adaptation projects and hazard mitigation strategies for privately owned properties in the flood risk area.	1	Develop a how-to workbook for community-based cultural resource hazard mitigation and adaptation planning.	+	+	+	+	+	-	-	-	-	+	-	+	+	+	+	-	+	-	+	N/A	N/A	+	+	1,5
				2	Develop design guidelines for preservation-sensitive flood adaptation of historic properties and archaeological resources in Annapolis.	+	+	+	+	+	-	-	-	-	+	-	+	+	+	+	-	+	-	+	N/A	N/A	+	+	1,5
				3	Lead a community design charrette to develop adaptation alternatives for public space in Annapolis.	+	-	+	+	+	-	-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	3,5
				4	Conduct *Keeping History Above Water* conference to gather and disseminate current data and leading best practices in flood adaptation and cultural/archaeological resource protection.	+	+	+	-	+	+	+	+	+	+	-	+	+	+	+	+	+	+	N/A	N/A	N/A	+	N/A	4
				5	Work with scientists, economists, investors, engineers and policy experts to assess studies and identify adaptation alternatives that will be cost effective and feasible for implementation in Annapolis.	-	+	+	-	+	-	-	-	-	+	-	+	+	+	+	-	+	-	+	+	+	+	+	3,7

				6	Work with the Maryland Resilience Partnership to develop a needs statement, project description and budget for a Maryland-based flooding adaptation technical field team.	+	+	+	-	+	-	-	-	-	+	-	+	+	+	+	-	+	-	N/A	N/A	N/A	+	N/A	1
				7	Establish Annapolis-based *Weather It Together* field teams to assist property owners in pre-disaster preparedness and post-disaster recovery.	+	+	+	-	+	-	-	-	-	+	-	+	+	+	+	-	+	-	N/A	N/A	N/A	+	N/A	1
				8	Recruit owners of high community value properties and assist in designing and securing financing for hazard mitigation or adaptation.	+	+	+	-	-	-	-	-	-	+	+	-	-	+	+	-	+	-	+	N/A	N/A	+	N/A	1
				9	Identify and seek funding for Historic American Building Survey recordation of a minimum of three high community value properties in the flood risk area.	+	+	+	-	+	-	-	-	-	+	-	N/A	N/A	+	+	-	+	-	N/A	N/A	N/A	N/A	+	9
		3	Ensure GIS information is up-to-date and reflects changes in public infrastructure and the condition of properties and resources within the flood risk area.	1	Incorporate the community value ranking for properties & public spaces in the flood risk area into the GIS information system,	+	+	-	-	+	-	-	-	-	+	-	-	+	+	+	-	+	-	N/A	N/A	N/A	N/A	N/A	9
				2	Complete Phase I archaeological survey to include vulnerability assessment for natural and archaeological resources and update GIS information system.	+	+	-	-	+	-	-	-	-	+	-	-	+	+	+	-	+	-	N/A	N/A	N/A	N/A	N/A	9
3	**Develop a disaster response & recovery plan to "Build Back Better"**	1	Minimize economic loss to the downtown Historic District from natural hazards and disasters.	1	Develop and provide to all cultural institutions and historic property owners within the flood risk area, a disaster-preparedness tool kit.	+	+	+	+	+	-	-	-	+	+	+	+	+	+	+	-	+	-	N/A	N/A	N/A	+	+	7
			Develop preservation-sensitive options for a post-disaster regulatory response.	1	Develop a process for expedited review and amend HPC & related zoning review procedures and rules for post-disaster recovery from declared disaster events.	+	+	+	+	+	-	-	-	-	+	+	+	+	-	+	-	+	-	N/A	N/A	N/A	N/A	N/A	5,7
			Minimize recovery time by preparing actively for response to natural disasters.	1	Train a disaster-response technical assistance team, with experience and specialization in historic properties and archaeological resources, to mobilize and activate for triage after natural disasters.	-	+	+	+	+	-	-	-	-	-	+	-	-	-	+	-	+	-	+	N/A	+	+	+	7
4	**Align land use, economic development, environmental and regulatory activities to protect the City's historic character and cultural and natural assets while promoting economic vitality.**	1	Integrate risk reduction and adaptation into the zoning and building permits process.	1	Review and evaluate preservation-sensitive methods for flood adaptation and revise the City's building code to require such methods for floodproofing of designated historic properties in the flood risk area.	-	-	+	-	+	-	-	-	-	+	-	-	-	-	+	-	-	-	N/A	N/A	N/A	+	N/A	5
				2	Revise Historic District design guidelines to incorporate adaptation techniques accepted by FEMA as compliant with the flloodplain management regulations and the Secretary of the Interior's Standards for Rehabilitation.	-	-	+	+	+	-	-	-	-	+	-	-	-	+	+	-	+	-	N/A	N/A	N/A	N/A	+	5

				3	Review all existing City plans and capital improvement activities to ensure consistency with State flood adaptation, hazard mitigation and preservation plans.	+	+	+	+	+	-	-	-	-	+	-	+	+	+	+	-	+	-	N/A	N/A	+	+	+	6
			Ensure that visitors, residents, and businesses maintain access to the historic district notwithstanding future flooding events.	1	Identify and prioritize water-dependent uses and public open spaces for those low-lying areas of the Annapolis waterfront subject to flooding.	-	+	+	+	-	-	-	-	-	+	-	+	-	-	+	-	+	-	+	N/A	N/A	+	+	6
				2	Identify opportunities for expanding both public open spaces and water-dependent uses at City Dock.	-	+	+	+	-	-	-	-	-	+	-	+	-	-	+	-	+	-	+	N/A	N/A	+	+	6
			Ensure City plans, policies, and procedures are guided by State and Local plans and programs addressing flooding hazards.	1	Incorporate development of a multi-faceted transportation action plan that promotes reliable alternative modes of transportation including water-dependent or water-compatible modes.	+	+	+	+	-	-	-	-	-	+	-	-	+	+	+	-	+	-	+	N/A	N/A	+	-	6
				2	Update Zoning ordinance to encourage and incentivize hazard mitigation and flood adaptation techniques.	+	+	+	+	+	-	-	-	-	+	-	+	-	-	+	-	+	-	+	N/A	+	+	+	5
				3	Amend the Historic Preservation Ordinance and HPC Rules of Procedure to incorporate an expedited post-disaster design review process for properties in a disaster declaration area.	+	+	+	+	+	-	-	-	-	+	-	+	+	-	+	-	+	+	N/A	N/A	N/A	N/A	+	5
			Encourage property owners to adapt, preserve, rehabilitate, restore, and reconstruct those places of high community value in response to flooding hazards.	1	Update and expand the economic analysis of historic preservation and heritage tourism to include the maritime industry.	+	+	+	-	-	-	-	-	-	+	-	+	+	-	-	-	+	+	N/A	N/A	N/A	N/A	+	9,6
				2	Complete and update the intensive level survey documentation for historic properties in the flood risk area.	+	-	+	+	+	-	-	-	-	+	-	+	+	+	-	-	-	-	N/A	N/A	N/A	N/A	+	9,5
				3	Complete a 3-D laser documentation project for the flood risk area.	+	N/A	+	+	+	-	-	-	-	+	-	+	+	+	+	-	-	-	N/A	N/A	N/A	N/A	+	9
5	**Fund public improvements and incentivize private investment for flooding adaptation**	1	Prioritize the adaptation of properties in the flood risk area within the City's economic development plan	1	Extend the Annapolis historic property tax credit to include qualifying flood adaptation projects for all properties in the Annapolis Historic District.	+	+	+	+	+	-	-	-	+	+	+	-	+	-	+	-	+	+	N/A	N/A	N/A	+	N/A	5
				2	Evaluate the need for creating a flood adapation property tax credit to other flood risk areas of the City.	+	+	-	-	+	-	-	-	-	+	-	-	+	+	+	-	+	-	N/A	N/A	N/A	N/A	N/A	5
		2	Develop hazard mitigation and adaptation projects on publicly owned property in the flood risk area.	1	Finance implementation of the CIP City Dock Flood Mitigation project to include closure valves, pumping stations, installation of new stormwater drainage pipes and lining of existing pipes.	-	-	+	+	-	-	-	-	-	-	-	-	-	-	+	-	-	+	-	N/A	+	-	+	3,6
				2	Conduct a feasibility study for raising and redesigning public infrastructure in the immediate vicinity of the Annapolis shore, for example Compromise Street, Market Space and City Dock ~5 feet, to reduce flood risk and to create a barrier to storms.	-	-	+	+	-	-	-	-	-	-	-	-	-	-	+	-	-	+	-	N/A	+	-	+	3,6

				3	Conduct a feasibility study for construction of permanent structural and natural barriers adaptable to rising waters.	-	-	+	+	-	-	-	-	-	-	-	-	-	-	+	-	+	+	-	N/A	+	-	+	2,6
				4	Conduct a feasibility study for increased height of the existing City Dock bulkhead for 2050 sea level rise based on anticipated high tide elevation of 2.9 feet (NAVD88).	+	-	+	+	-	+	-	-	+	-	-	+	+	-	+	-	-	+	-	N/A	+	N/A	+	3