

City of Baltimore

Disaster Preparedness Project and Plan (DP3)

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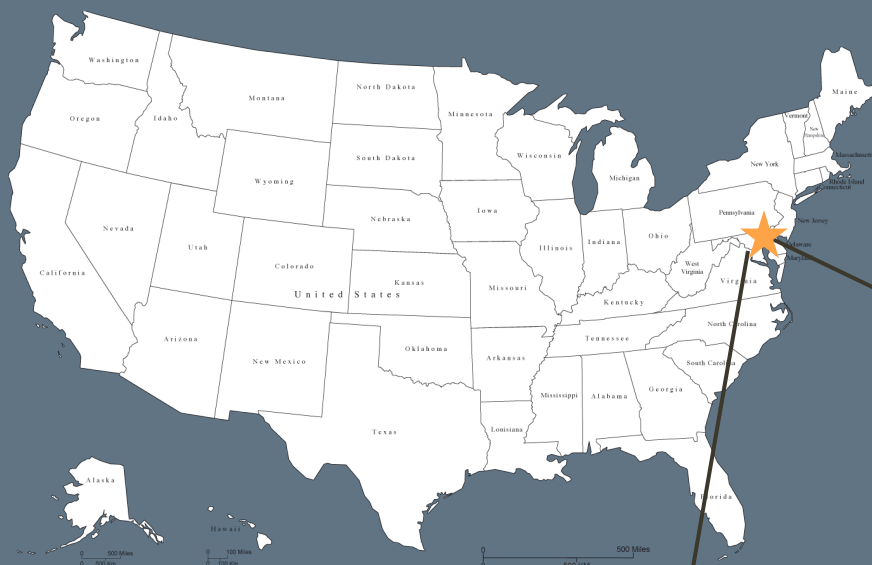
Overview



- 1. Baltimore City**
- 2. Adaptation and Hazard Mitigation
(Resiliency)**
- 3. Plan Development**
- 4. Community Input and Education**
- 5. Plan Adoption**
- 6. Implementation and Communication**



Baltimore City



Baltimore

Washington DC

Chesapeake Bay

Baltimore City Today



- Most heavily developed area in Maryland with a population of 620,000
- Port and waterfront remain extremely important assets
- Home to many Universities and Health Institutions
- Baltimore is highly vulnerable to many natural hazards, ranging from coastal storms and flooding to extreme heat and high winds. These types of extreme events will increase, both in frequency and intensity, over the coming years.





Climate Change Preparedness

Baltimore's Unique Approach

All Hazard Mitigation Plan

(Current and Historical Hazards)

+

= Resilience

Climate Adaptation Plan

(Adapt to new and predicted climate conditions)



Assess Methodology

FEMA



ICLEI





Plan Development

Process



Risk Assessment



Hazard Identification

- Hazard Identification
- Review Historical Impacts
- Conduct an Asset Inventory

Vulnerability Assessment

- Determine likelihood
- Determine economic, social, legal & environmental consequence

Impacts Assessment

- HAZUS Modeling
- Integrate projected climate conditions
- Identify weaknesses

Plan Development

- Vision, Goals, Strategies, Actions
- Prioritization
- Integration
- Plan for implementation & monitoring

Hazards in Baltimore



Coastal Storms

more severe

Floods

more extensive

Severe Thunderstorms

more severe

Wind

increase intensity

Winter Storms

less snow, more flooding

Extreme Heat/Drought

more severe and intense

Sea Level Rise

increased threat

Repetitive Loss & Critical Facilities



Considerations		
<u>Adult Day Care</u>	<u>EOC</u>	<u>Nursing Home</u>
<u>Assisted Living Facility</u>	<u>ETIB</u>	<u>Outpatient Facility</u>
<u>BCPSS Building</u>	<u>Federal Building</u>	<u>Park Building</u>
<u>BCPSS School</u>	<u>Fire Station</u>	<u>Police Station</u>
<u>BHCD Facilities</u>	<u>Grocery Store</u>	<u>Post Office</u>
<u>City Facilities</u>	<u>HABC Elderly or Disabled Housing</u>	<u>Recreation Center</u>
<u>City Hall</u>	<u>Hospital</u>	<u>Religious Building</u>
<u>Code Red Cooling Center</u>	<u>Hydro Structures</u>	<u>Residential Treatment Center</u>
<u>Commodity Distribution Site</u>	<u>Landmark Designated</u>	<u>Salt Dome</u>
<u>Correctional Facility</u>	<u>Library</u>	<u>Senior Center</u>
<u>Court House</u>	<u>Medical Laboratory</u>	<u>Shelter Evacuation</u>
<u>Dialysis Center</u>	<u>Monument</u>	<u>Shelter Homeless</u>
<u>Emergency Warning</u>	<u>Museum</u>	<u>Shopping Center</u>
<u>Employer Major</u>	<u>Non-acute Health Facility</u>	<u>Stadium</u>
		<u>University</u>

Process



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Advisory Committee



- 40 person committee of key stakeholders
- 11 City Agencies, 11 community representatives, four State Agencies, NGO's, Private sector, and Federal government
- Five meetings as a full committee + six as sub



Special Interest Groups



- Local Emergency Planning Committee
- Threat and Hazards Identification and Risk Assessment (THIRA)
- Local Universities
- Port Alliance and Maryland Port Authority
- Surrounding Counties and Cities
- State Agencies (MEMA, MDNR, MDE)
- Federal Agencies (FEMA, USACE)

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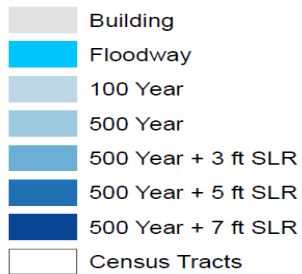
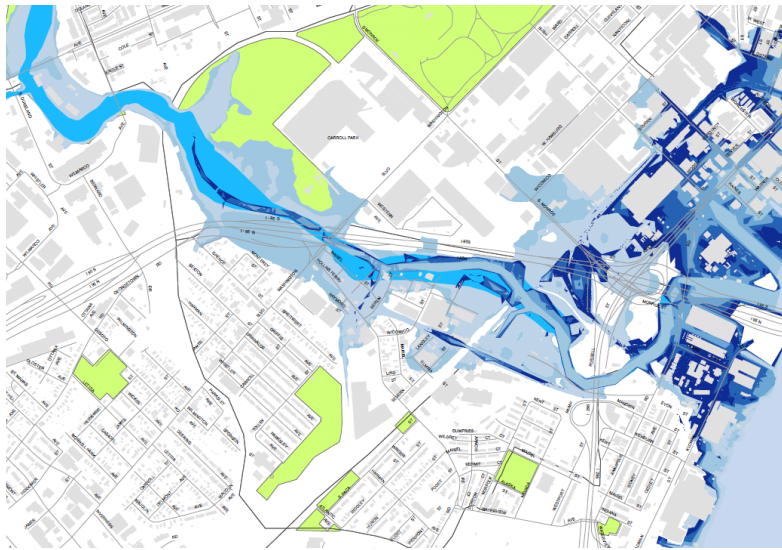
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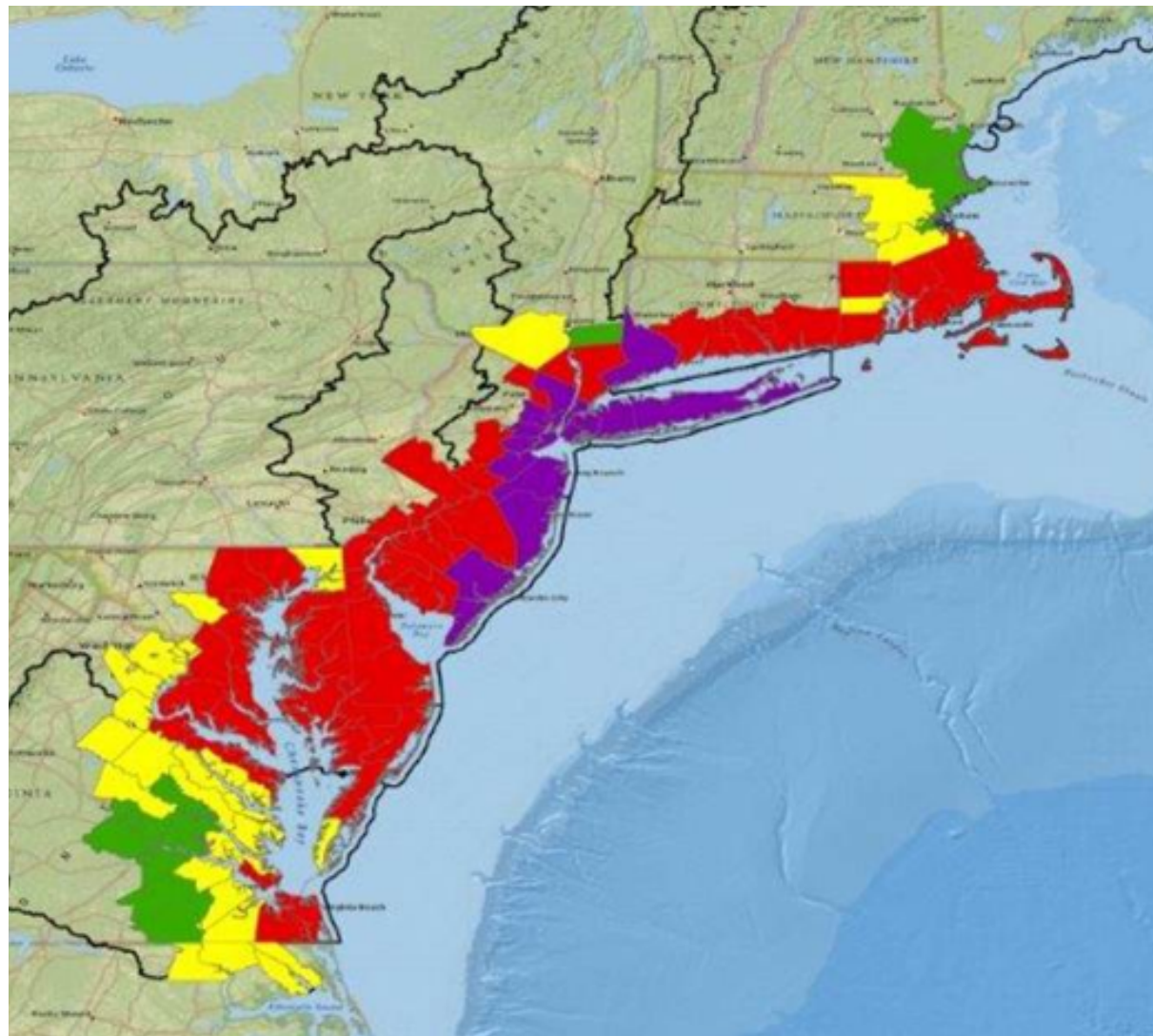
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Climate Modeling



USACE Study

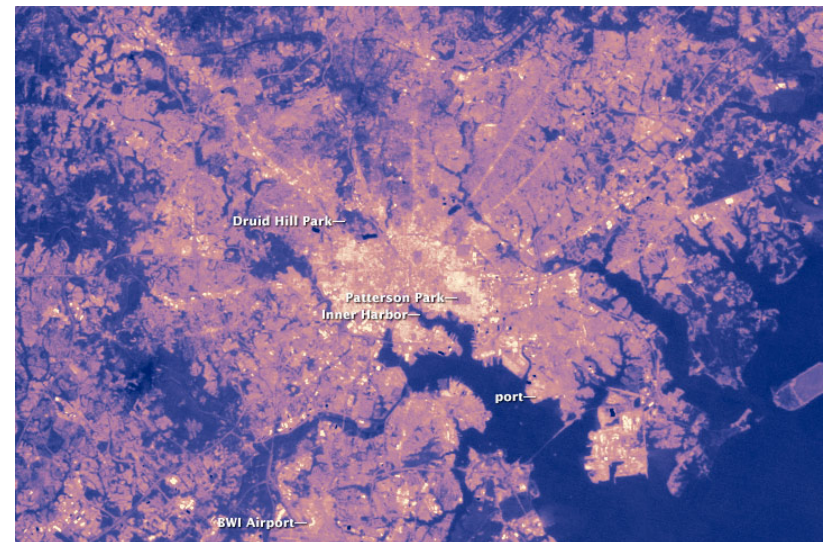
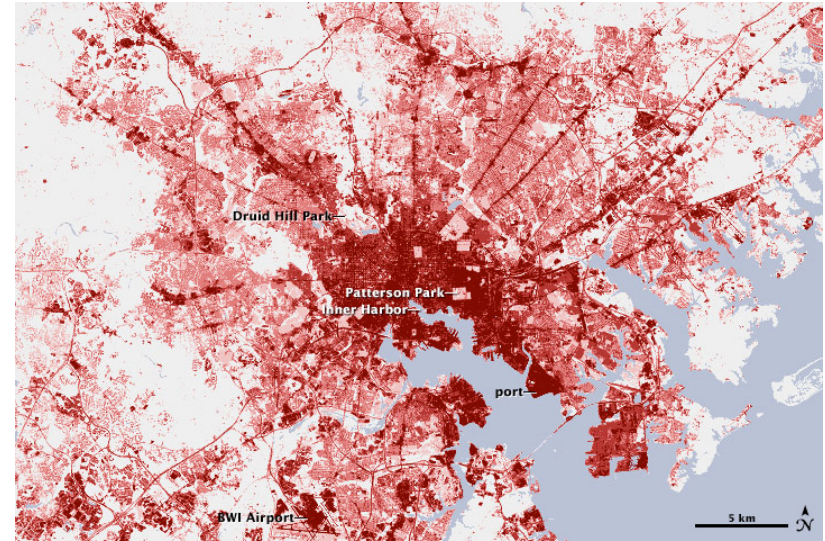


Utilize the
USACE
Hurricane
Sandy Study
to support
our findings
and climate
modeling

Mapping

Heat modeling and identification of areas where UHI effect is greatest

Also had our FEMA flood maps update during development of the Plan



Process



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Six Goals



1. Protect the health, safety and welfare of Baltimore City residents and visitors
2. Prevent damage to structures, infrastructure, and critical facilities
3. Build resilience and disaster prevention and planning into all programs, policies, and infrastructure (public and private)
4. Enhance the City of Baltimore's adaptive capacity and build institutional structures that can cope with future conditions that are beyond past experience
5. Promote hazard mitigation and climate adaptation awareness and education throughout the City of Baltimore
6. Become a Community Rating System (CRS) classified community

Document Structure



- **Chapter 1:** Introduction
- **Chapter 2:** Mitigation and Adaptation
- **Chapter 3:** Hazard Identification
- **Chapter 4:** Risk and Vulnerability Assessment
- **Chapter 5:** Strategies and Actions
- **Chapter 6:** Implementation Guidelines

Sectors + Sub-Sectors



Infrastructure

Energy

Liquid Gas

Communication

Transportation

Waterfront

Wastewater

Stormwater

Solid Waste

Policy

Buildings

City Codes

Structural

Non-Structural

Natural Systems

Urban Parks &
Forests

Water Supply
and
Management

Public Services

Emergency
Preparedness
& Response

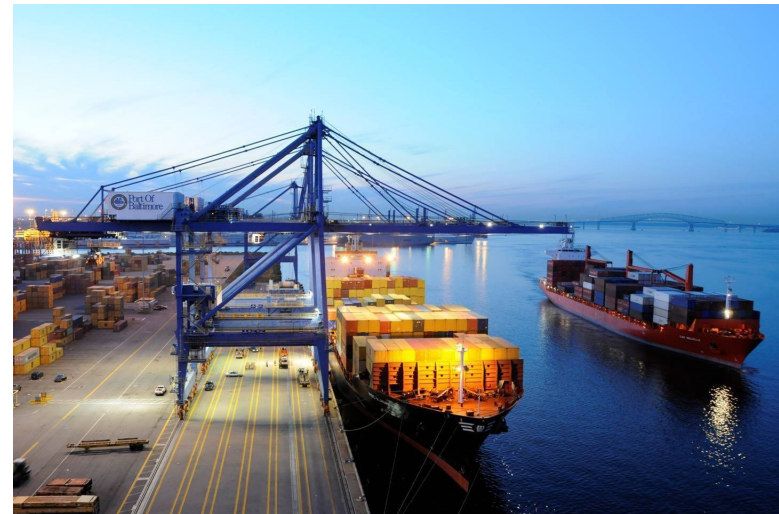
Health

Education &
Outreach

Food System

Additional Considerations

- Historic Buildings and Areas
- Engineering Studies on Critical Facilities
- Health Impact Assessment
- Response and Recovery
- Port Considerations





Community Input and Engagement

Neighborhood Meetings



Five meetings centered on flooding and SLR

Three in tidal flooding areas

Two in non-tidal flooding areas

Focus on current flooding, potential flooding, behavior change, and preparedness



Neighborhood Meetings



- Three meetings focused on extreme heat
- Survey members of the community
 - Gather input
 - Focus on potential increase in high heat days, behavior change, and preparedness



Workshops



Work with the EPA to host a meeting focused on flooding for city employees, county representatives, and reservoir representatives



Town Hall Events





Plan Adoption

Disaster Preparedness Plan

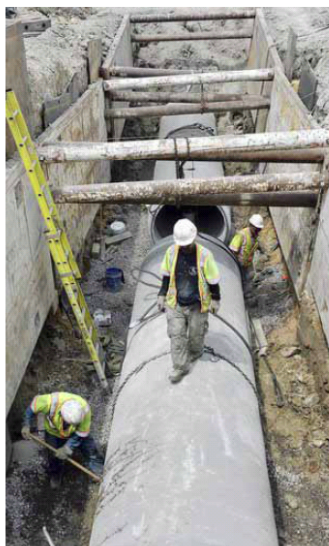
Adopted unanimously in October, 2013



DESIGN AND PLANNING PROJECT

Document that evaluates and improves all pipes' ability to withstand cold

System is dated and in need of upgrades. It is important to build extreme weather resilience and disaster prevention into water and wastewater systems by using both adaptation and mitigation actions. Additionally, structural and infrastructural upgrades must be made to reduce loss of water supply from the distribution system.



Baltimore Water Pipe

Source: BaltimoreSun

1. Replace old and malfunctioning pipes with new pipes or retrofit existing pipes with new lining

Pipes that have already begun experiencing problems, or older pipes which are more vulnerable to the impacts of hazards, should be upgraded using the best available technology.

2. Evaluate and utilize new technology that allows for greater flexibility in pipes as they are replaced

It is essential to prepare for future changes in hazard events and proactively upgrade pipe systems to prevent cracking and bursting.

IMPLEMENTATION GUIDELINES

Lead Agency	DPW
Stakeholders	DOT, DPW, Water and Wastewater Utilities
Alignment with Goals	Goal 3
Connection with Existing Efforts	CAP; CRS; MD DNR; ESF-3; ESF-4
Timeframe	



STORMWATER

IN-16 Enhance and expand stormwater infrastructure and systems

Future changes in precipitation frequency and intensity may require reconsideration of the design of existing stormwater infrastructure systems.

Increase resiliency and disaster prevention measures related to stormwater systems by enhancing drainage systems in stream corridors and improving and repairing stormwater conveyance pipes and outfalls.

1. Implement the requirements of Baltimore's MS4 (separate stormwater and sewer system) permit (S)
5. Review and revise storm drain design on a continuous basis, to accommodate projected changes in intense rainfall (O)

The City of Baltimore operates under a Municipal Separate Stormwater and Sewer System (MS4) permit, which protects water-quality and requires that Baltimore prevents pollution as much as possible. It is critical that the requirements of these permits are fully met.

The City's storm drains will require continual revision to incorporate new and projected changes in intense rainfall. This will ensure that the storm drains maintain adequate capacity.

2. Prioritize storm drain upgrades and replacement in areas with reoccurring flooding (S)

While proximity to a floodplain or floodway can increase vulnerability to flooding, certain measures can reduce this vulnerability. Inadequate or older pipes, which cannot accommodate the excessive amounts of stormwater, should be upgraded so as to handle extreme rainfall and storm surge events.

3. Install backflow-prevention devices or other appropriate technology along waterfront to reduce flood risk (M-L)

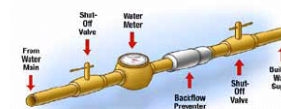
Backflow-prevention devices are used to ensure that water does not flow back through drainage infrastructure. Through the installation of backflow-prevention devices, the City can improve the performance of the drainage network and prevent risk of flooding impact along the waterfront.

4. Preserve and protect natural drainage corridors (S)

It is important to utilize natural drainage corridors and green infrastructure to capture more stormwater runoff and enhance the ability of the existing infrastructure to cope with environmental changes.

IMPLEMENTATION GUIDELINES







Lead Agency	DPW
Stakeholders	Community Groups, DOT, DPW, MOEM, MDNR, NGOs, Private Developers, Stormwater Utility
Alignment with Goals	Goals 1, 3, and 6
Connection with Existing Efforts	CRS; MD DNR
Timeframe	



Backflow Preventer

Source: Demar Plumbing/NYC

Identify Connections

IMPLEMENTATION GUIDELINES	
Lead Agency	DPW
Stakeholders	DOT, DPW, Water and Wastewater Utilities
Alignment with Goals	Goal 3
Connection with Existing Efforts	   CAP; CRS; MD DNR; ESF-3; ESF-4
Timeframe	  

Emergency Support Functions

Governmental and certain private sector capabilities that provide support, resources, and services needed to save lives, protect property and environment, restore essential services and critical infrastructure and help communities.

Climate Action Plan

Increasing resiliency of the electricity system and increasing energy conservation efforts

Example Strategies/Actions



IN-12: Enhance the resiliency of the city's waterfront to better adapt to impacts from hazard events and climate change

1. Raise bulkhead height along shoreline areas most at risk
2. Utilize vegetation and stone to stabilize and armor unprotected shorelines
3. Encourage the development of integrated flood protection systems that use structural (engineering) and non-structural (wetlands) measures
4. Review and enhance coastal area design guidelines to better mitigate the impacts of flooding
5. Enhance and strengthen waterfront zoning and permitting

IN-4: Protect and manage compressed liquefied natural gas sites and (city) fueling stations before and during hazard events

1. Work with BGE to ensure existing preparedness plans for Spring Gardens liquefied natural gas site incorporate its vulnerability to present and predicted flooding, storm surge and sea level rise
2. Adopt building code that requires anchoring of 50 gallon storage tanks or larger
3. Support the Maryland Public Service Commission's effort to accelerate replacement of aging natural gas infrastructure which will harden the system against flooding



Next Steps- Implementation

- Identify overlaps with existing planning efforts
- Prioritize Strategies and Actions with lead stakeholders

[illegible]

Stakeholder Meetings



Government

- City Agencies
- State and Federal Partners
- Surrounding Counties and Cities



Neighborhoods

- Community Groups
- Non-Profit Groups
- Volunteer Groups



Other Partners

- Local Businesses
- Institutions (Universities, Hospitals, Museums)

Benefits



- Develop a comprehensive system for addressing existing and future impacts
- Capitalize on hazard mitigation requirements to gain support from agency directors for adaptation
- Model both historic and predicted hazard scenarios
- Helps ensure adaptation strategies are incorporated into the Capital Improvement Planning (CIP) Process
- Funding opportunities through a variety of grants related to hazard mitigation, floodplain management, and climate adaptation
- Stakeholders support in implementation

View the Plan



The full Disaster Preparedness Project and Plan can be found at the following webpage:

www.baltimoresustainability.org/resources

Specific information on Implementation of the Plan in afternoon session tomorrow

Questions?

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