An Advisory Services Panel for Portland and South Portland's Waterfronts

Urban Land Institute
Advisory Services Program

Portland and South Portland, ME

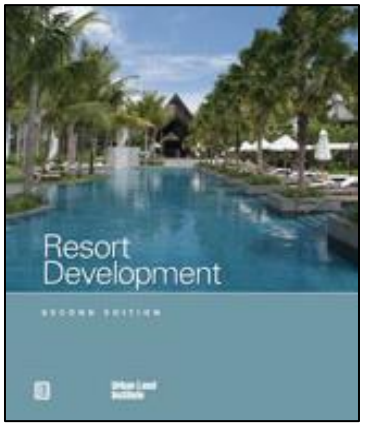
May 11 - 16, 2014

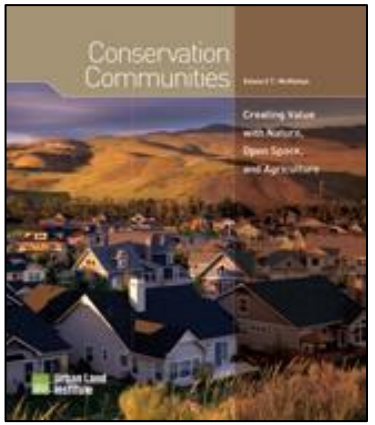
About the Urban Land Institute

- The mission of the Urban Land Institute is to provide leadership in the responsible use of land and in creating and sustaining thriving communities worldwide.

- ULI is a membership organization with nearly 32,000 members, worldwide representing the spectrum of real estate development, land use planning and financial disciplines, working in private enterprise and public service.

- What the Urban Land Institute does:
  - Conducts Research
  - Provides a forum for sharing of best practices
  - Writes, edits and publishes books and magazines
  - Organizes and conducts meetings
  - Directs outreach programs
  - Conducts Advisory Services Panels





The Advisory Services Program

- Since 1947
- 15 - 20 panels a year on a variety of land use subjects
- Provides independent, objective candid advice on important land use and real estate issues
- Process
  - Review background materials
  - Receive a sponsor presentation & tour
  - Conduct stakeholder interviews
  - Consider data, frame issues and write recommendations
  - Make presentation
  - Produce a final report

The Panel

- James DeFrancia (chair), Lowe Enterprises, Inc., Aspen, CO
- Stephen Antupit, CityWorks, Inc., Seattle, WA
- Dennis Carlberg, Boston University, Boston, MA
- Cori Packard Beasley, NYU Schack Institute of Real Estate, New York, NY
- Jessica Pavone, American Red Cross, New York, NY
- Byron Stigge, Level Infrastructure, New York, NY
- Richard Ward, Ward Development Counsel, LLC, St. Louis, MO
- Jeana Wiser, National Trust for Historic Preservation, Los Angeles, CA

Thanks to the following sponsors:

- City of Portland
  - ***"I Shall Rise Again"***

- City of South Portland
  - ***"Forward"***

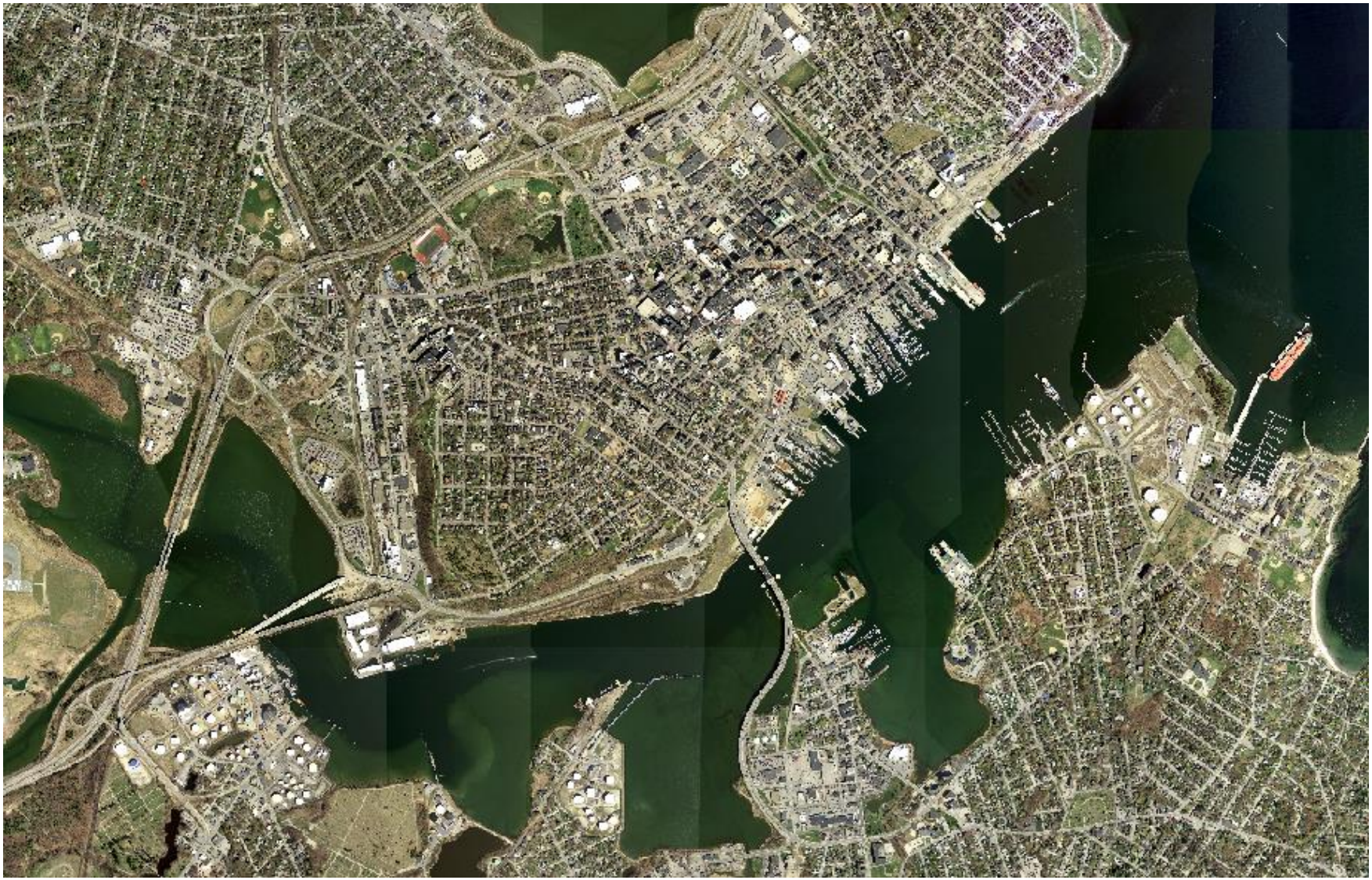
Thanks to Our Foundation Partner

THE KRESGE FOUNDATION

Special thanks to the following individuals for making this panel possible:

- **City of Portland:**
  - Jeff Levine
  - Bill Needleman
- **City of South Portland:**
  - Tex Haeuser
- **ULI Boston:**
  - Sara Barnat
  - Michelle Landers

The Study Area



Panel Assignment

- What are the primary risks associated with the Portland and S. Portland waterfronts based on:
  - Extreme storm events and
  - Sea-level rise?
- What level of sea level rise makes scientific and economic sense to plan for, given uncertainty and the existing land use patterns and sunk investments?
- What are some of the physical mitigation measures that can be applied to the waterfronts in the near term and long term?
- What real estate market considerations need to be taken into account as the cities develop a long term strategy for the waterfronts?
- How can the cities best balance their historical resources with resiliency strategies?
- What elements of the historical nature of our waterfront need to be incorporated into the future sustainability for the community?
- How can our transit system be used to provide evacuation prior to and during a major storm?
- What mechanisms and policies can we put into place now to mitigate impacts of climate change on energy costs and supply?
- How do we make the waterfront more accessible to the public and what amenities should the waterfront access provide?
- What public and private steps should be taken to increase the resiliency of Portland – South Portland port facilities?
- What zoning or other regulations should the cities enact that will increase resiliency without halting all new development?
- What public capital investments to address sea level rise and other climate change phenomenon will the cities need to make, and of these, which are critically needed as opposed to desirable?

Building Resilience through a More Diverse Economy

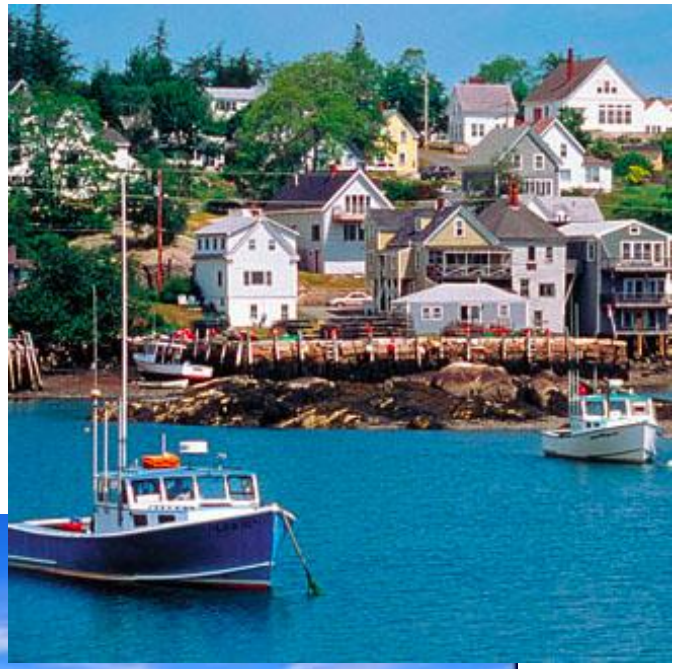
Richard Ward

Cori Packard Beasley

Building Resilience through a More Diverse Economy

Regional Economy

- Tourism
- Housing
- Fishing
- Warehousing & Distribution



Building Resilience through a More Diverse Economy

Waterfront Economy

- Fishing
- Marine Services
- Petroleum Storage & Transshipment
- Other Economies

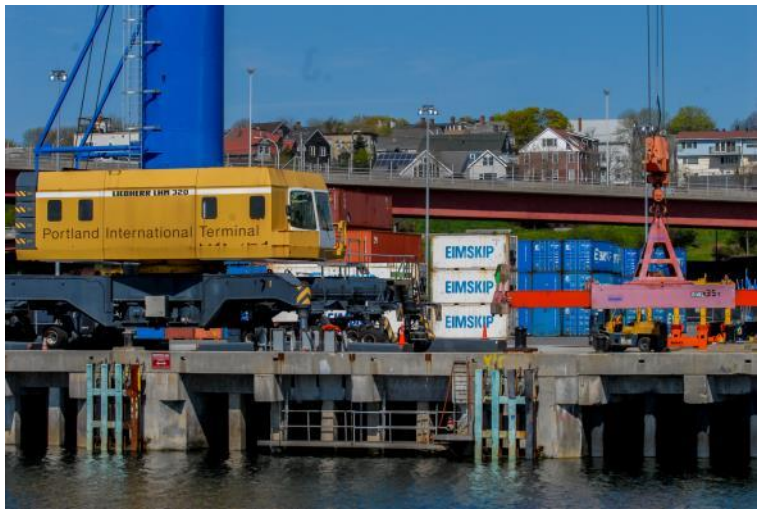
Building Resilience through a More Diverse Economy

- Healthcare
- Tech / Med-tech
- Higher-Ed
- Arts & Culture

Building Resilience through a More Diverse Economy

Recommendations:

- Diversification of economic base
- Encouraging growth of other sectors
  - Medical
  - Technology
  - Higher Ed
  - Arts & Culture
- Providing resilient infrastructure
- Incremental changes in the built environment to increase resilience



Risk Assessment

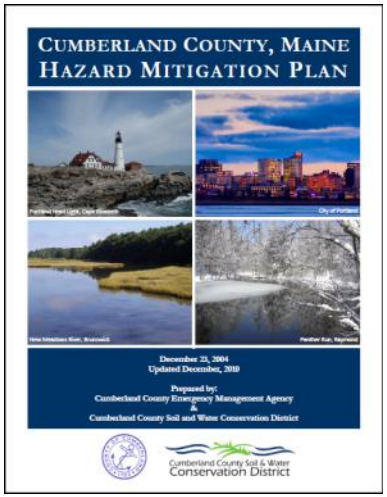
Byron Stigge

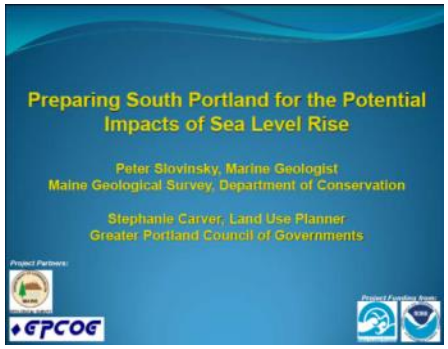
Risk Assessment

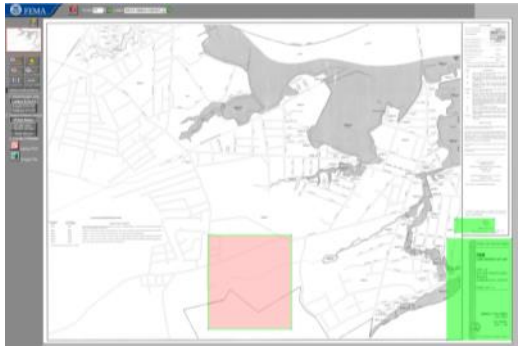
Comprehensive Risk Assessment Process

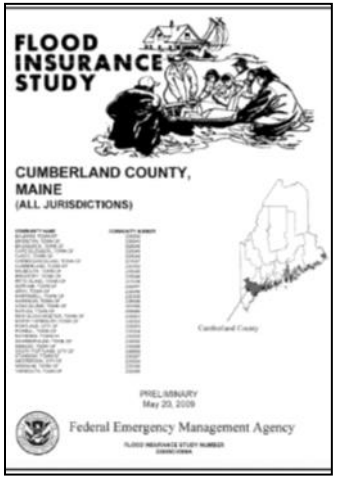
- Identify the Portland region's most significant risks to residents and businesses
- Calculate how risks are changing into Portland's future
- Allows understanding of which risks could be easily mitigated
- Identifies potential major risks to Portland's regional economic vitality

Assessment Work is Well Underway









Defining Risk

Flood Risk = Storm Probability X Storm Damage

- Probability of a given storm (10%, 1%, 0.2% storm events)
- Damages include direct physical damages and macro-economic impacts

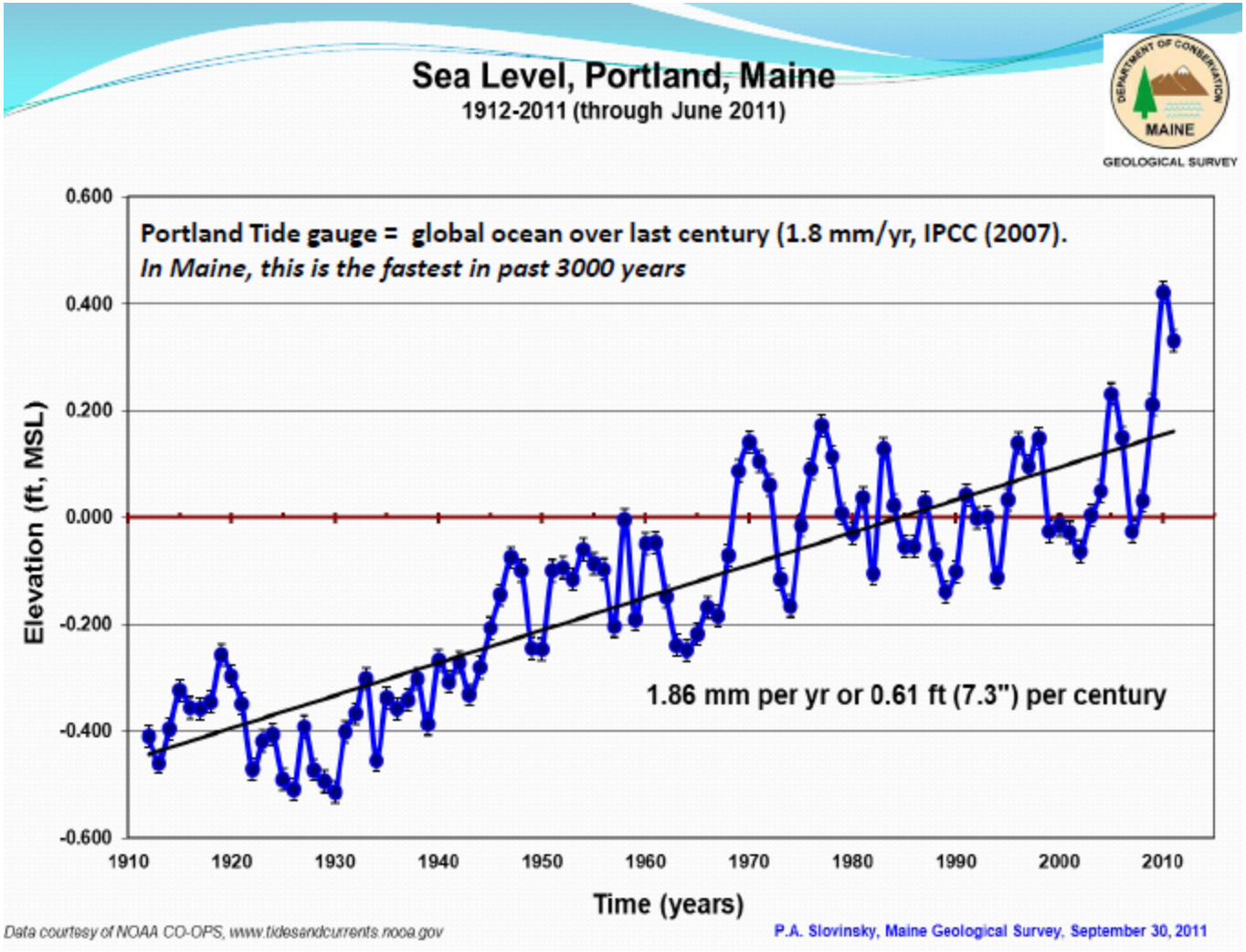
Storm Probability

Historical Data

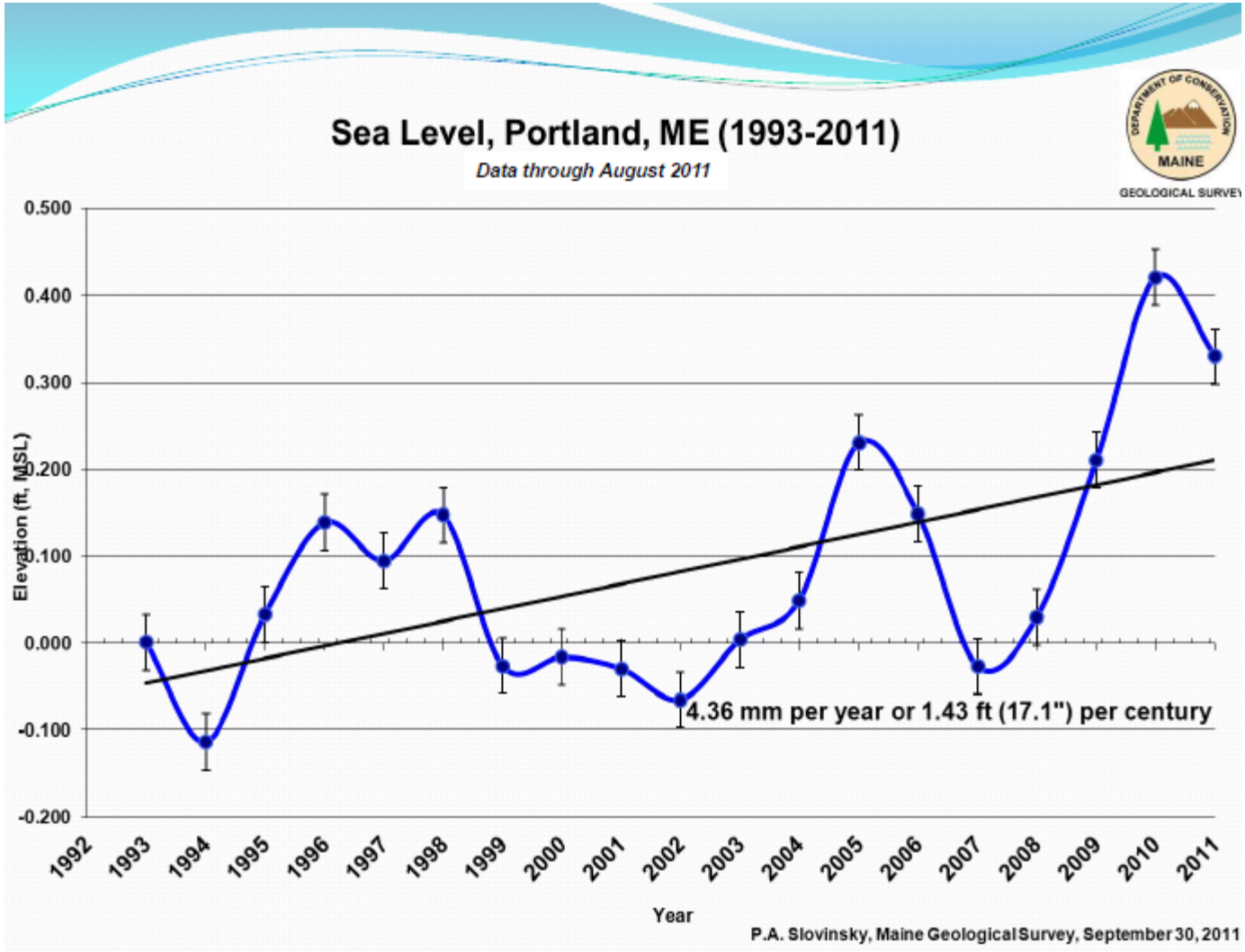
- 17 of 20 FEMA Disaster declarations since 1986 that include flooding

29-Jun-05	Flooding – 29 Mar to 3 May
25-May-06	Flooding – Mother's Day Storm
20-Apr-07	Flooding – St. Patrick's Day Storm
25-Apr-07	Flooding – Patriot's Day Storm
09-Sep-08	Floods – Southern Maine
09-Jan-09	Severe Wind & Flooding
30-Jul-09	Severe Rain Event – Flooding & Landslides
15-Apr-10	Severe Winter Storm – Flooding

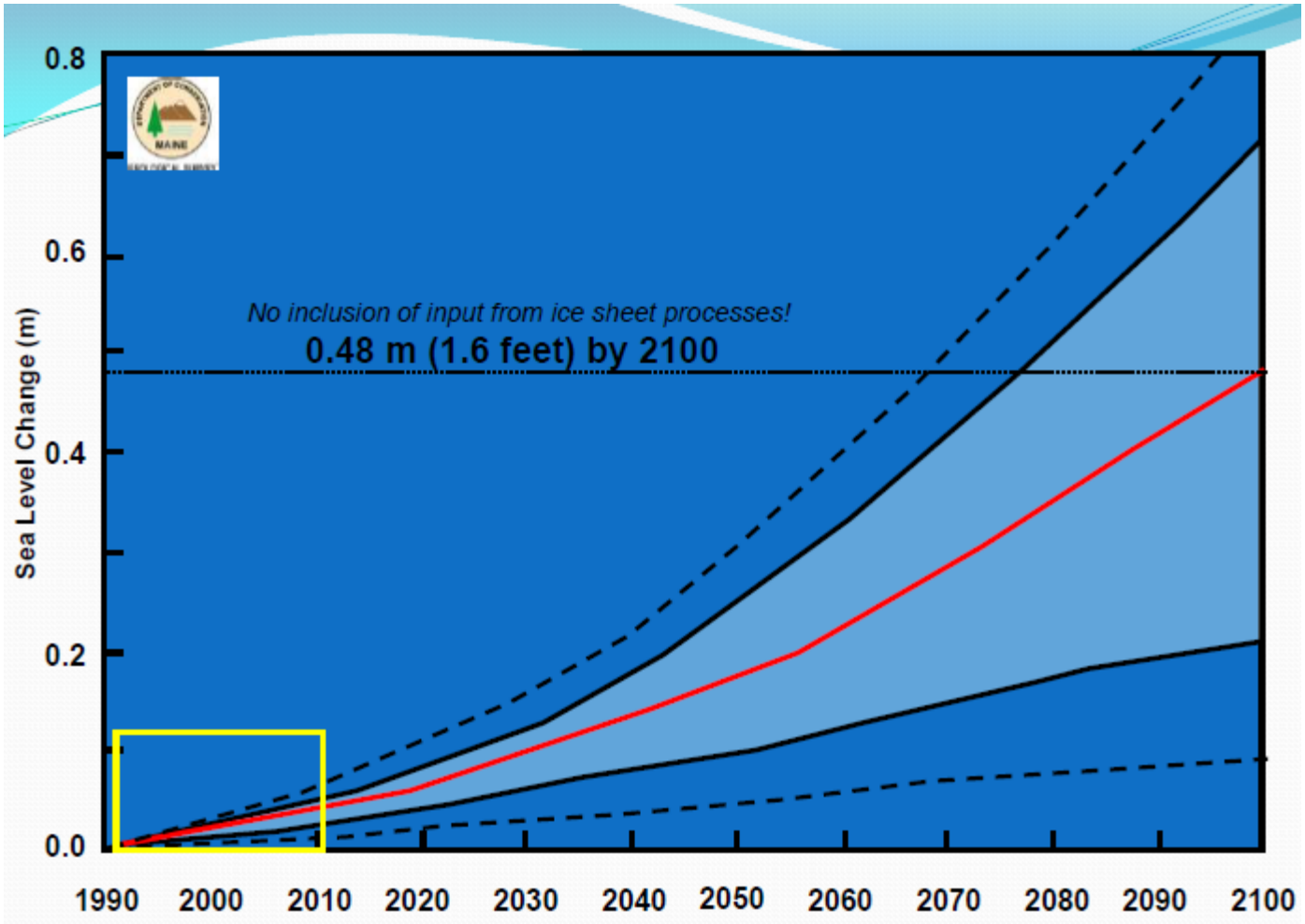
Sea Level Rise – 100 Year Historical Data



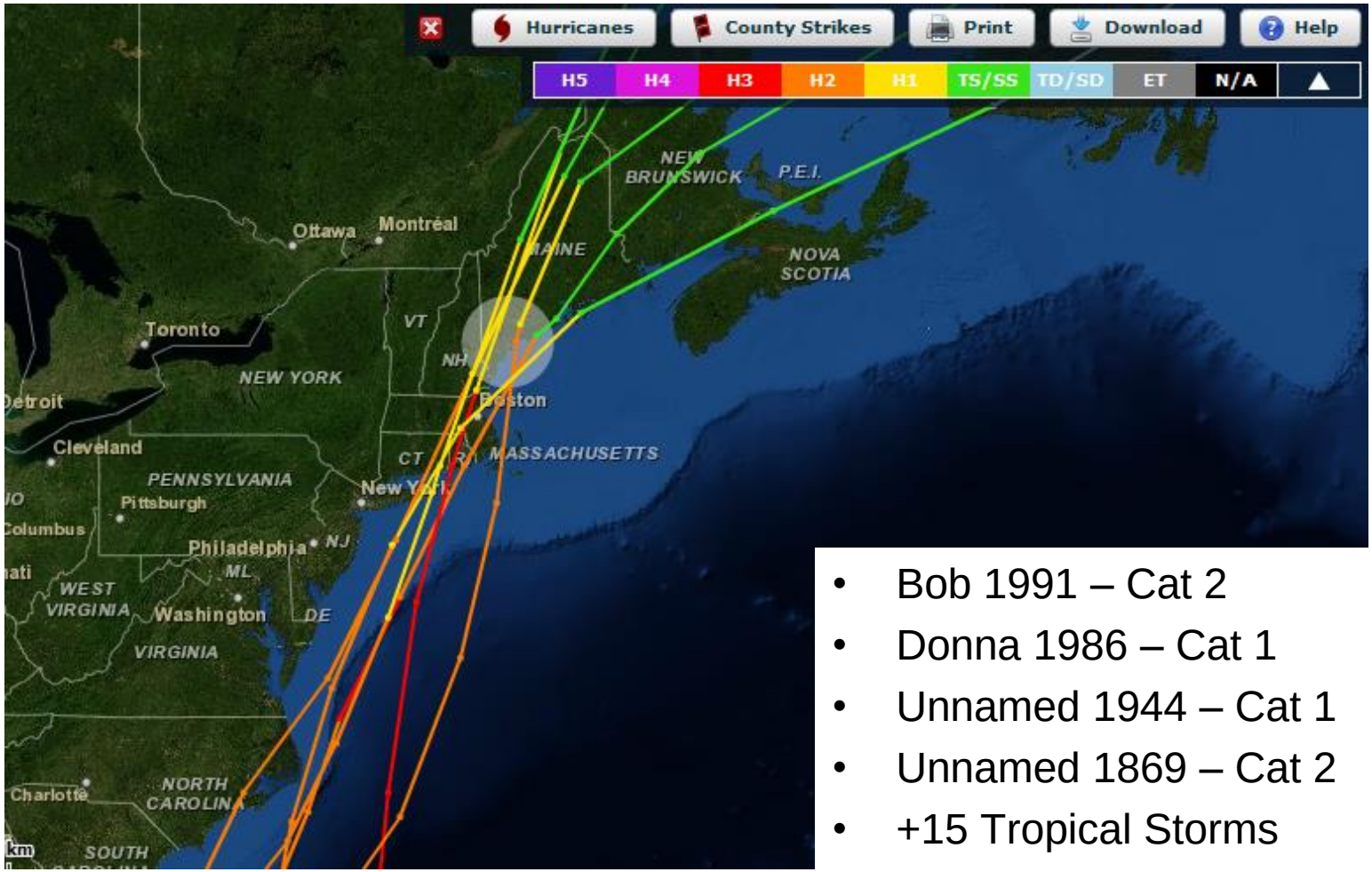
Sea Level Rise – 20 Year Historical Data



Sea Level Rise – Future Predictions



Hurricanes



- Bob 1991 – Cat 2
- Donna 1986 – Cat 1
- Unnamed 1944 – Cat 1
- Unnamed 1869 – Cat 2
- +15 Tropical Storms

Rainfall Return Period

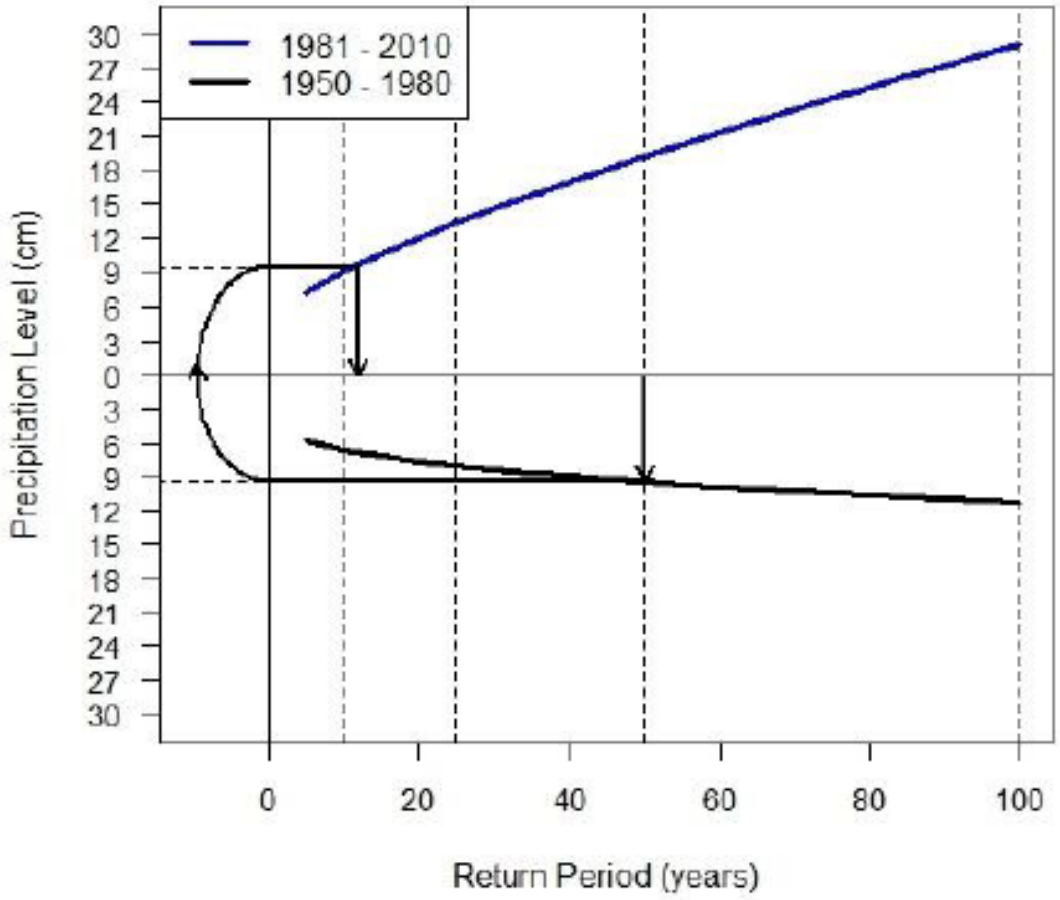
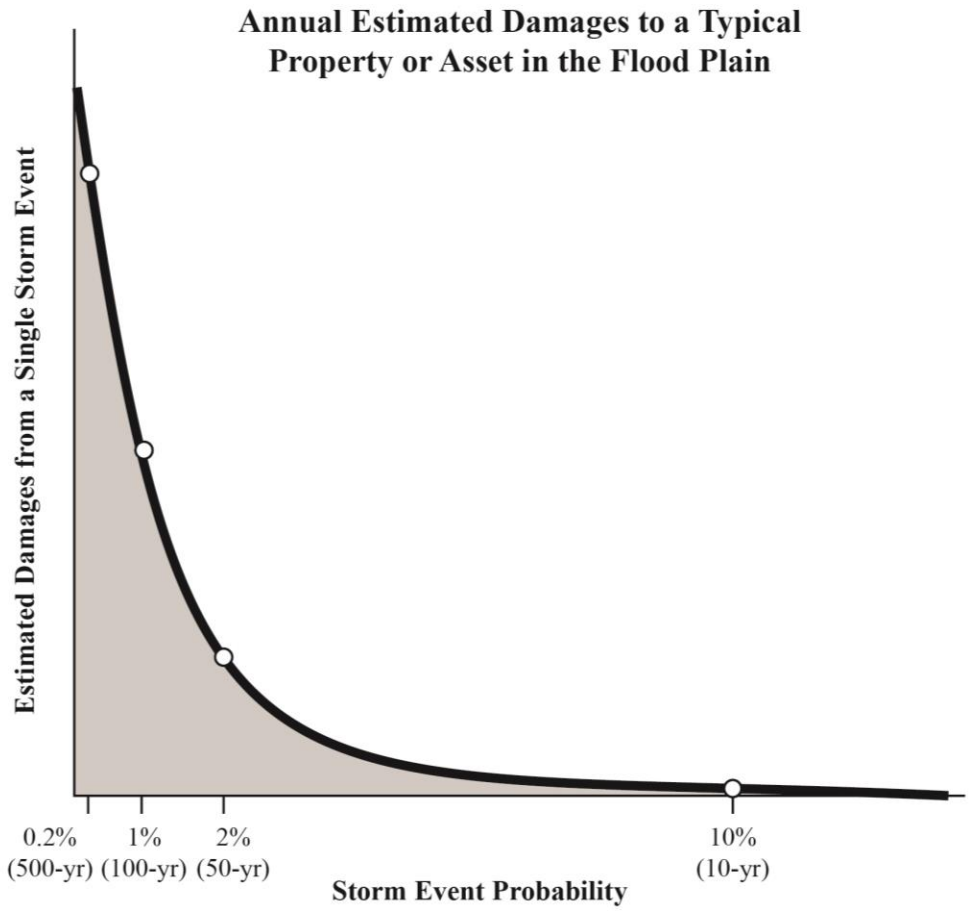


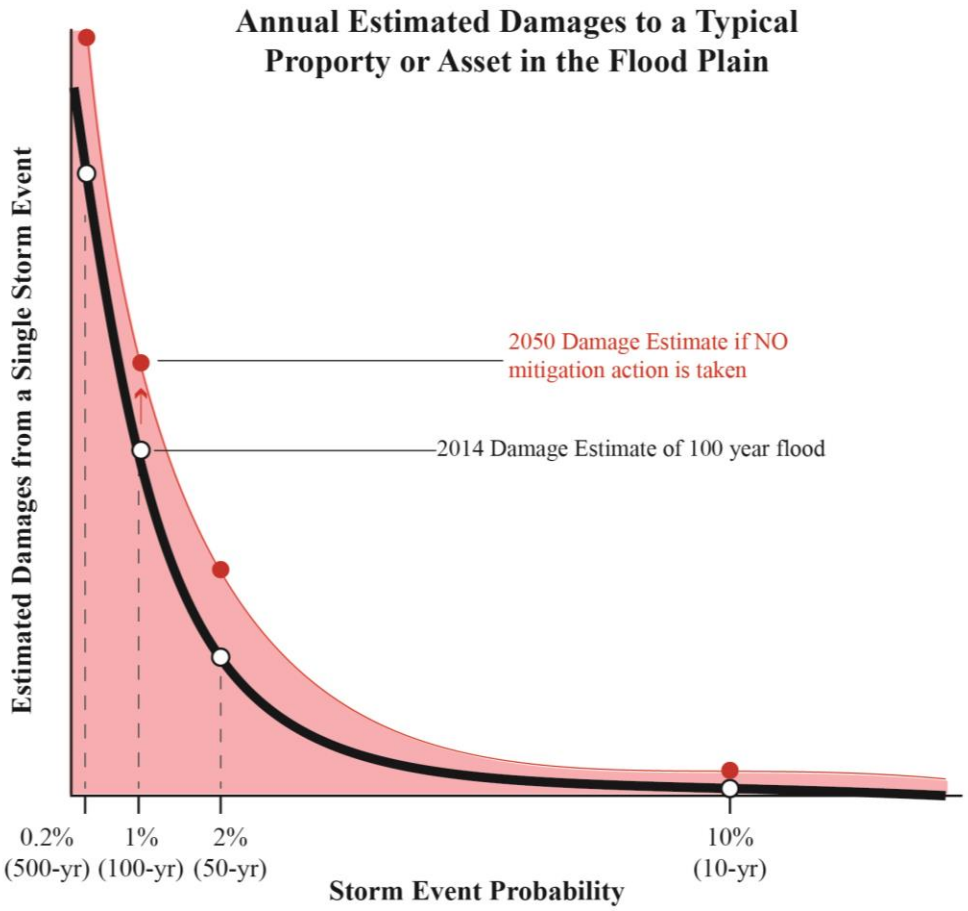
Figure 2. Precipitation return levels for Brassua Dam, Maine

Dandy and Jain, *Extreme Rainfall In A Changing Climate: New Analysis And Estimation Considerations For Infrastructure Design*, Univ of Maine, 2013

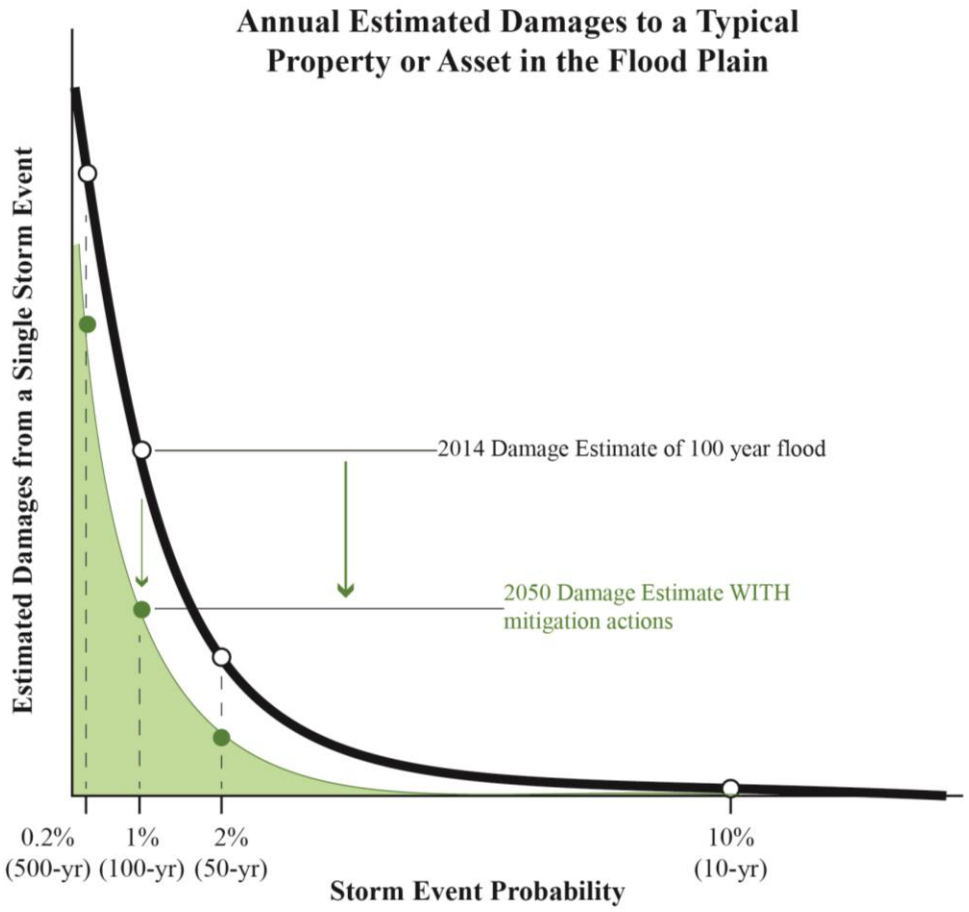
Damage Curve for a Typical Property



Damage Curve for a Typical Property



Damage Curve for a Typical Property



Types of Direct Damages

Infrastructure	Commercial/Industrial	Residential
Asset Damage (Repair Cost)	Building Damages (Repair Cost)	Building Damages (Repair Cost)
	Inventory Loss	Personal Property Loss
	Loss of Business Rev	Displacement Costs
		Loss of Life

Types of Indirect Damage

Infrastructure	Commercial/Industrial	Residential
Costs from Loss Service	Loss of Employee Wage	Personal Debt/ Bankruptcy
	Job Loss	Reduced Home Values
		Increase Insurance Rates

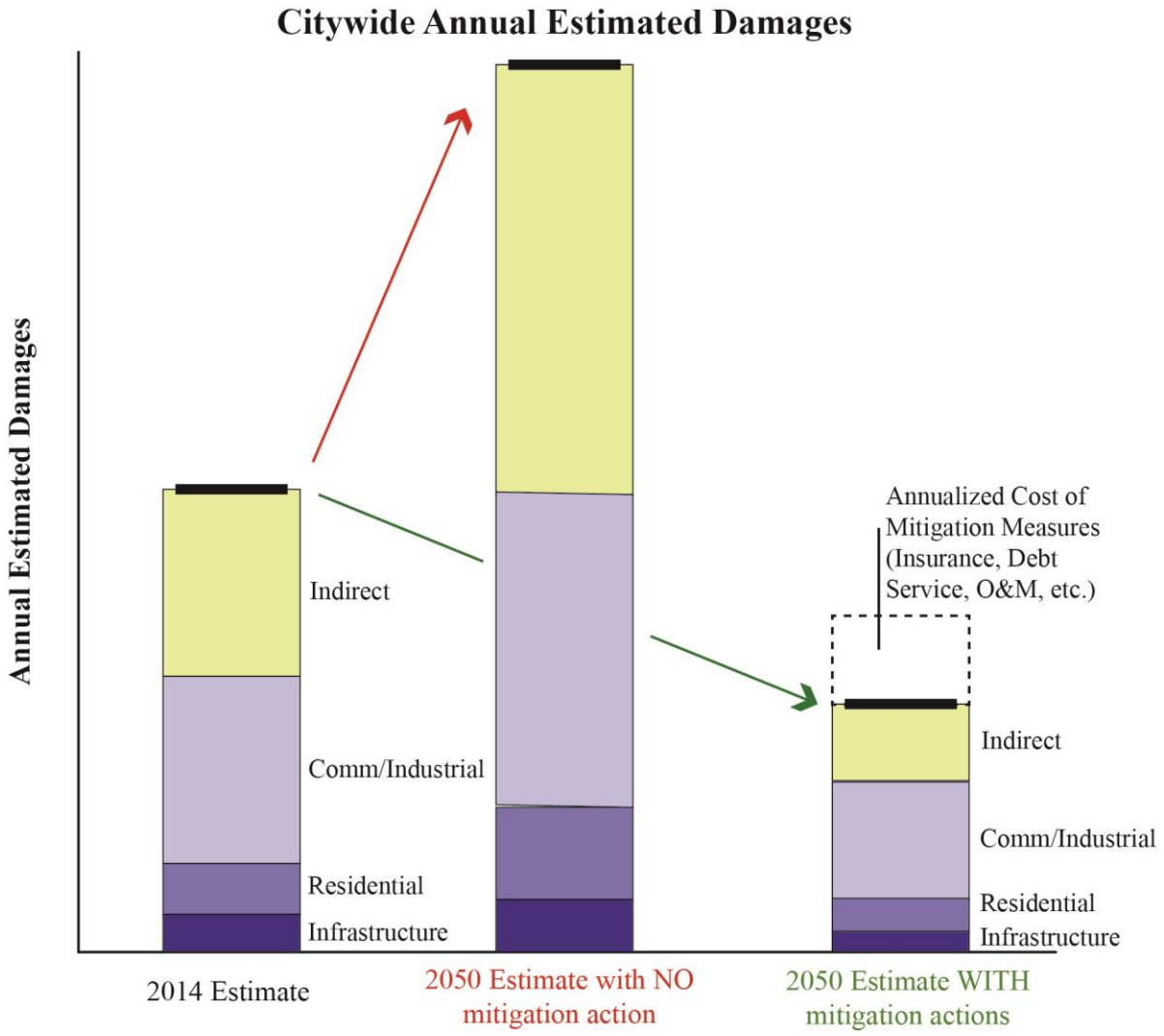
Other Macro-Economic Impacts

- City Reputation for being high risk
- Total loss of high value industry

Assets at Risk in Portland

	South Portland	Portland
Infrastructure	Electrical Substation and Small Peaker Plant in Mill Creek Wastewater Treatment Plant Sanitary Pump Stations	Gas Primary Pump Station
Commercial/Industrial	Oil Storage and Distribution Facilities Marinas Portland Pipeline	Waterfront Businesses on Piers Commercial Street Retail Eimskip Facility New rail line to Eimskip Back Cove businesses
Residential	Willard Beach neighborhood Mill Creek neighborhood Misc residential units	Condos on Piers Back Cove neighborhoods

Annual Estimated Damages



Comprehensive Risk Assessment Recommendations

- Create a Comprehensive Risk Assessment that studies the broader indirect and macro-economic impacts from increased storm frequency and sea level rise.
- Develop a process to regularly perform a risk assessment for all city-managed infrastructure assets.
- Integrate results and conclusions from Risk Assessment into all aspects of the Comprehensive Planning process.
- Use results to create programs to inform residents and businesses on the importance of flood mitigation.
- Use results to apply for a variety of grants and funding sources such as flexible FEMA hazard mitigation grants.

Planning and Development Strategies

Dennis Carlberg
Stephen Antupit

Built Environment: Planning and Development Strategies

- Storm Surge Mitigation

Built Environment: Planning and Development Strategies

- Land Use Protection

Built Environment: Planning and Development Strategies

- Street Network

Built Environment: Planning and Development Strategies

- Parking Management

Built Environment: Planning and Development Strategies

- Stormwater Management

Built Environment: Planning and Development Strategies

- Historic Preservation

Built Environment: Planning and Development Strategies

- Utilities

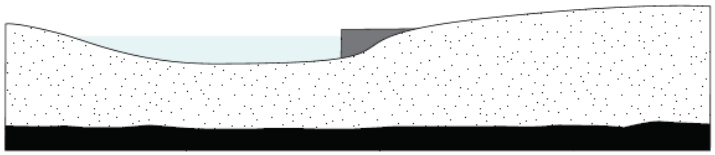
Built Environment: Planning and Development Strategies

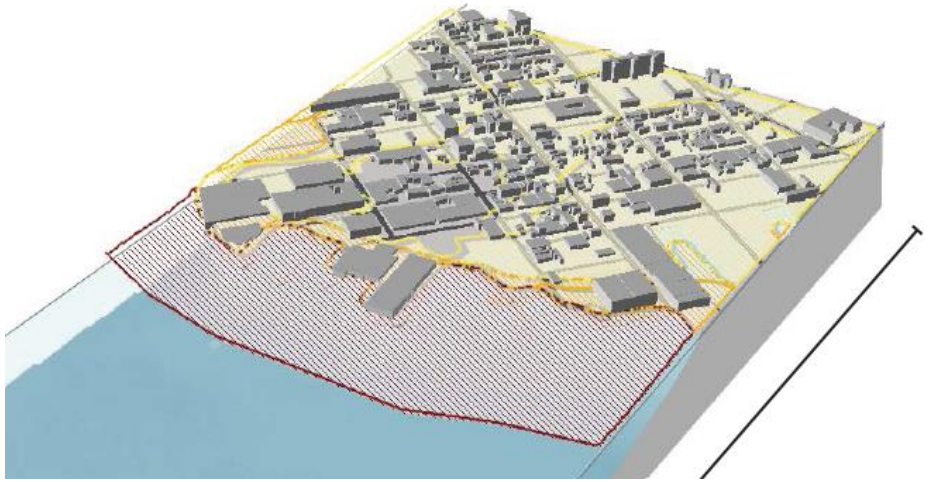
- Portland
  - Direct Development to Pier
    - Physical Buffer that is Resilient
    - Allows Economic Vitality
    - Allows Waterfront to Continue to Evolve

- South Portland
  - Development opportunities as land use changes
    - Physical Buffer that is Resilient
    - Allows Economic Vitality
    - Allows Waterfront to Continue to Evolve
    - Example of Mill Creek area

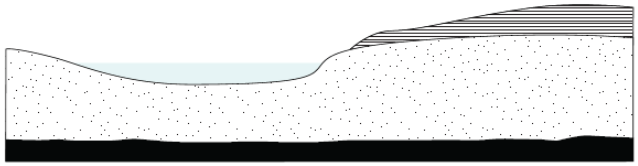
Land Typologies

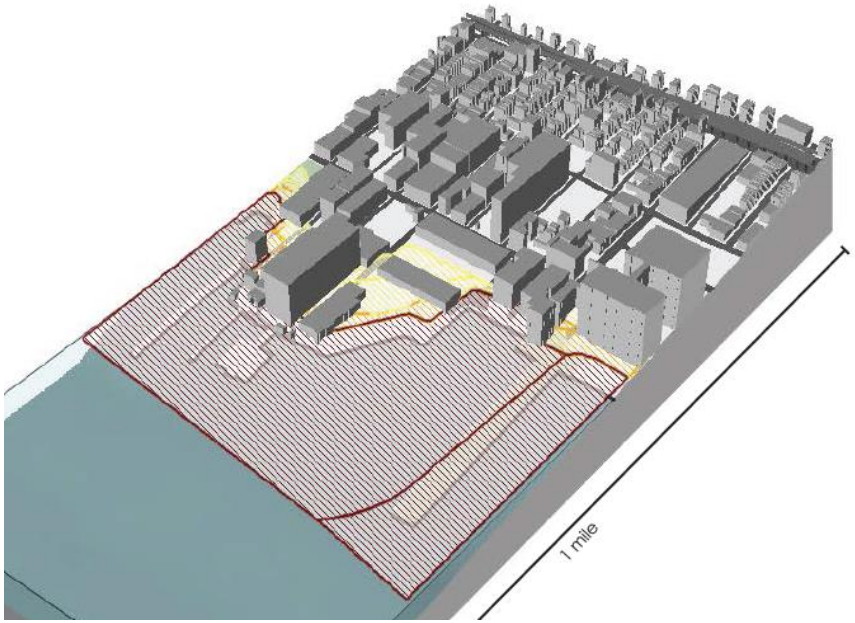
BAY PLAINS / INDUSTRIAL / MEDIUM DENSITY RESIDENTIAL





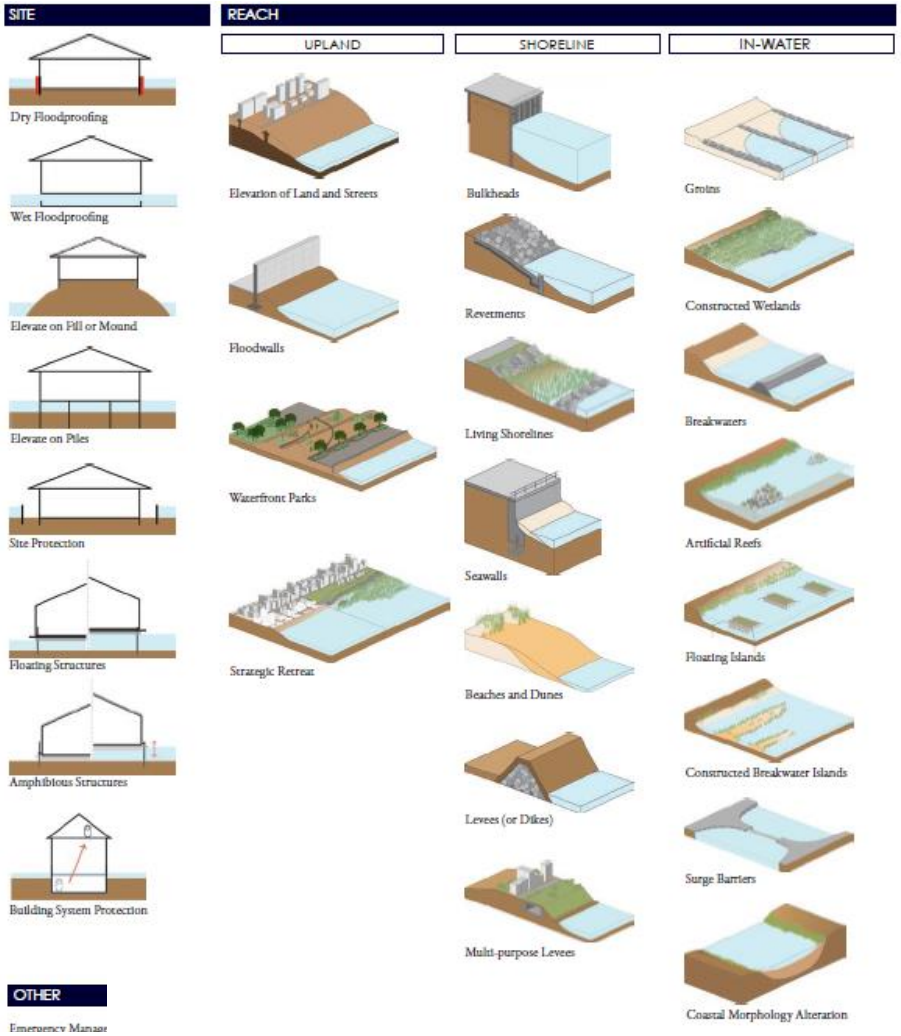
BAY SLOPES / INDUSTRIAL





Adaptive Strategies

- Wet Floodproofing
- Dry Floodproofing
- Elevate on Fill
- Elevate on Piers
- Site Protection
- Floating Structure
- Amphibious Structure



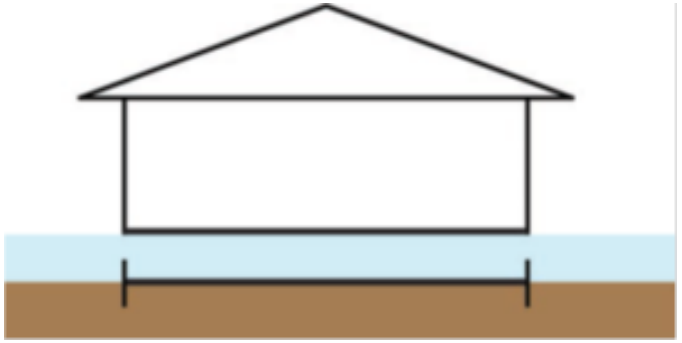
Wet Floodproofing

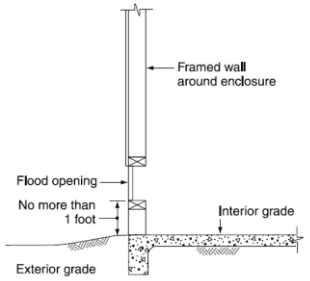
Storm Surge (High)	●
Storm Surge (Low)	●
Wave Force	○

Applicability to Building Type

A	1-2 Family Detached	●
B	1-2 Family Attached	●
C	Low-Mid Rise Residential, Commercial, Mixed	◐
D	High-Residential, Commercial, Mixed	◐
E	Industrial	◐

The space below the design flood elevation is constructed with flood-damage resistant materials in combination with flood vents to allow water to enter the structure and allow hydrostatic pressures to equalize.





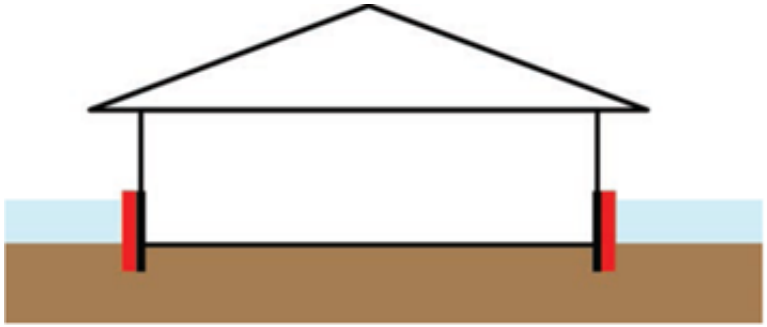
Dry Floodproofing

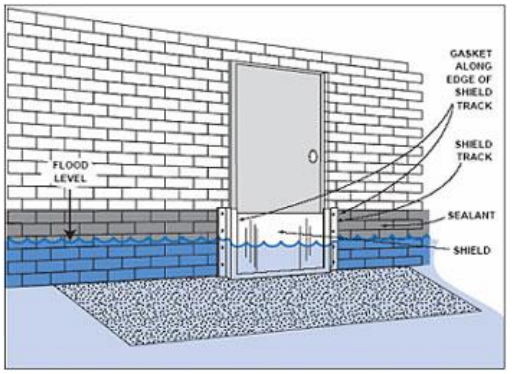
Storm Surge (High)	◐
Storm Surge (Low)	●
Wave Force	○

Applicability to Building Type

A	1-2 Family Detached	○
B	1-2 Family Attached	○
C	Low-Mid Rise Residential, Commercial, Mixed	◐
D	High-Residential, Commercial, Mixed	●
E	Industrial	○

In dry floodproofing, the building structure is designed to resist water loads and infiltration. Water resistant materials are used, in combination with water-tight gates at entry points.





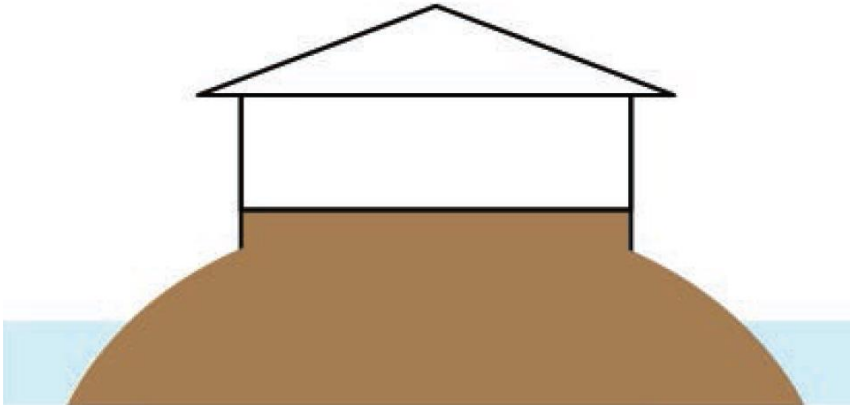
Elevate on Fill

Storm Surge (High)	●
Storm Surge (Low)	●
Wave Force	○

Applicability to Building Type

A	1-2 Family Detached	◐
B	1-2 Family Attached	◐
C	Low-Mid Rise Residential, Commercial, Mixed	◐
D	High-Residential, Commercial, Mixed	◐
E	Industrial	◐

The building site is raised to a height above the design flood elevation through the addition of fill.



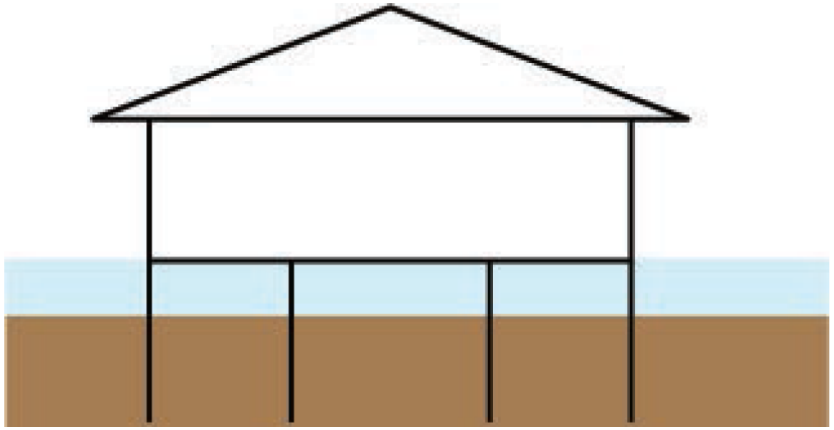
Elevate on Piers

Storm Surge (High)	●
Storm Surge (Low)	●
Wave Force	●

Applicability to Building Type

A	1-2 Family Detached	◐
B	1-2 Family Attached	◐
C	Low-Mid Rise Residential, Commercial, Mixed	◐
D	High-Residential, Commercial, Mixed	◐
E	Industrial	◐

The building is raised above the design flood elevation through construction on piles that extend below ground.



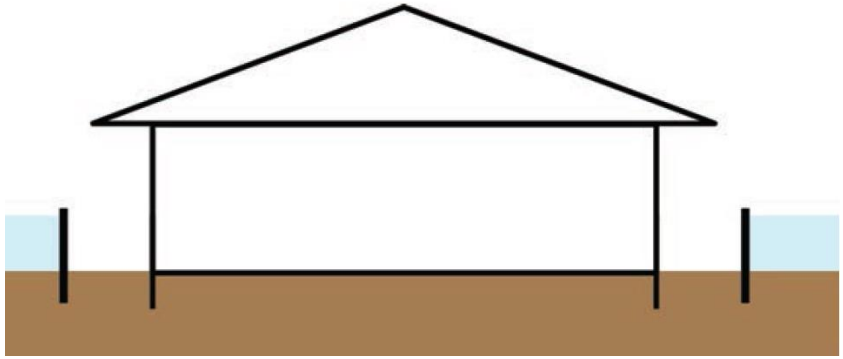
Site Protection

Storm Surge (High)	◐
Storm Surge (Low)	◐
Wave Force	◐

Applicability to Building Type

A	1-2 Family Detached	○
B	1-2 Family Attached	○
C	Low-Mid Rise Residential, Commercial, Mixed	●
D	High-Residential, Commercial, Mixed	●
E	Industrial	●

The use of floodwalls (deployable or permanent) or a berm on the exterior of building or around the site's perimeter to prevent water infiltration.



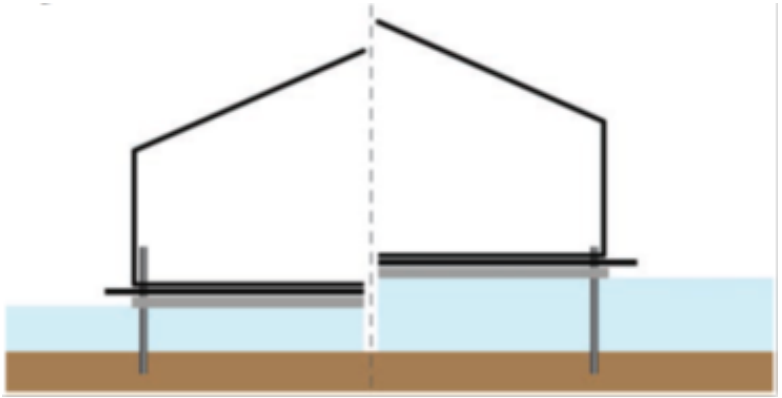
Floating Structure

Storm Surge (High)	●
Storm Surge (Low)	●
Wave Force	○

Applicability to Building Type

A	1-2 Family Detached	○
B	1-2 Family Attached	○
C	Low-Mid Rise Residential, Commercial, Mixed	○
D	High-Residential, Commercial, Mixed	○
E	Industrial	○

A floating structure is one that floats on the water at all times and is designed to move vertically with tidal fluctuations and storm surge.



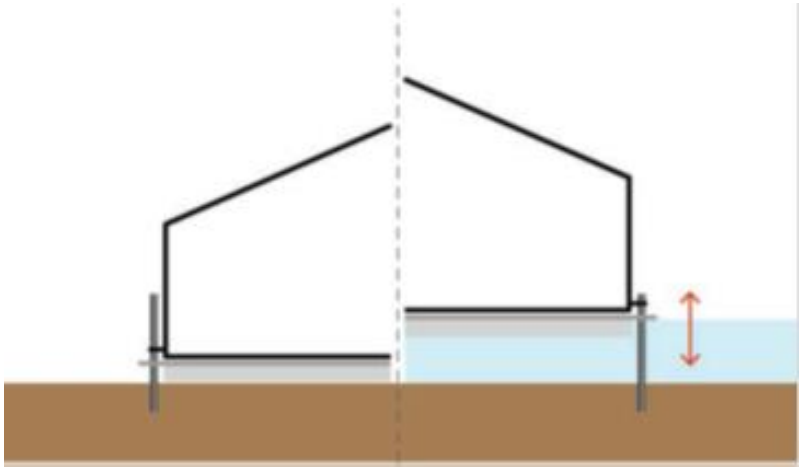
Amphibious Structure

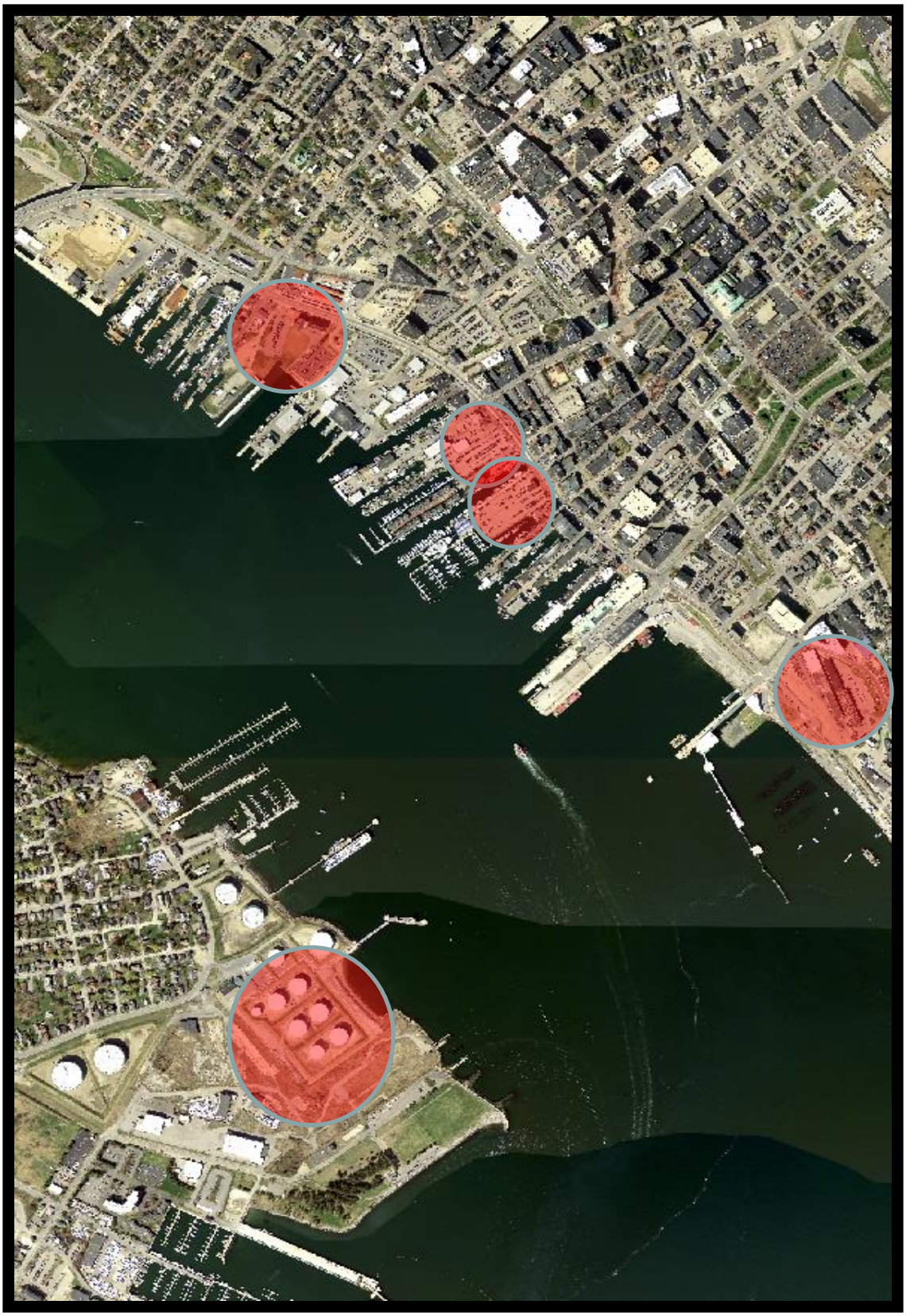
Storm Surge (High)	●
Storm Surge (Low)	●
Wave Force	○

Applicability to Building Type

A	1-2 Family Detached	○
B	1-2 Family Attached	○
C	Low-Mid Rise Residential, Commercial, Mixed	○
D	High-Residential, Commercial, Mixed	○
E	Industrial	○

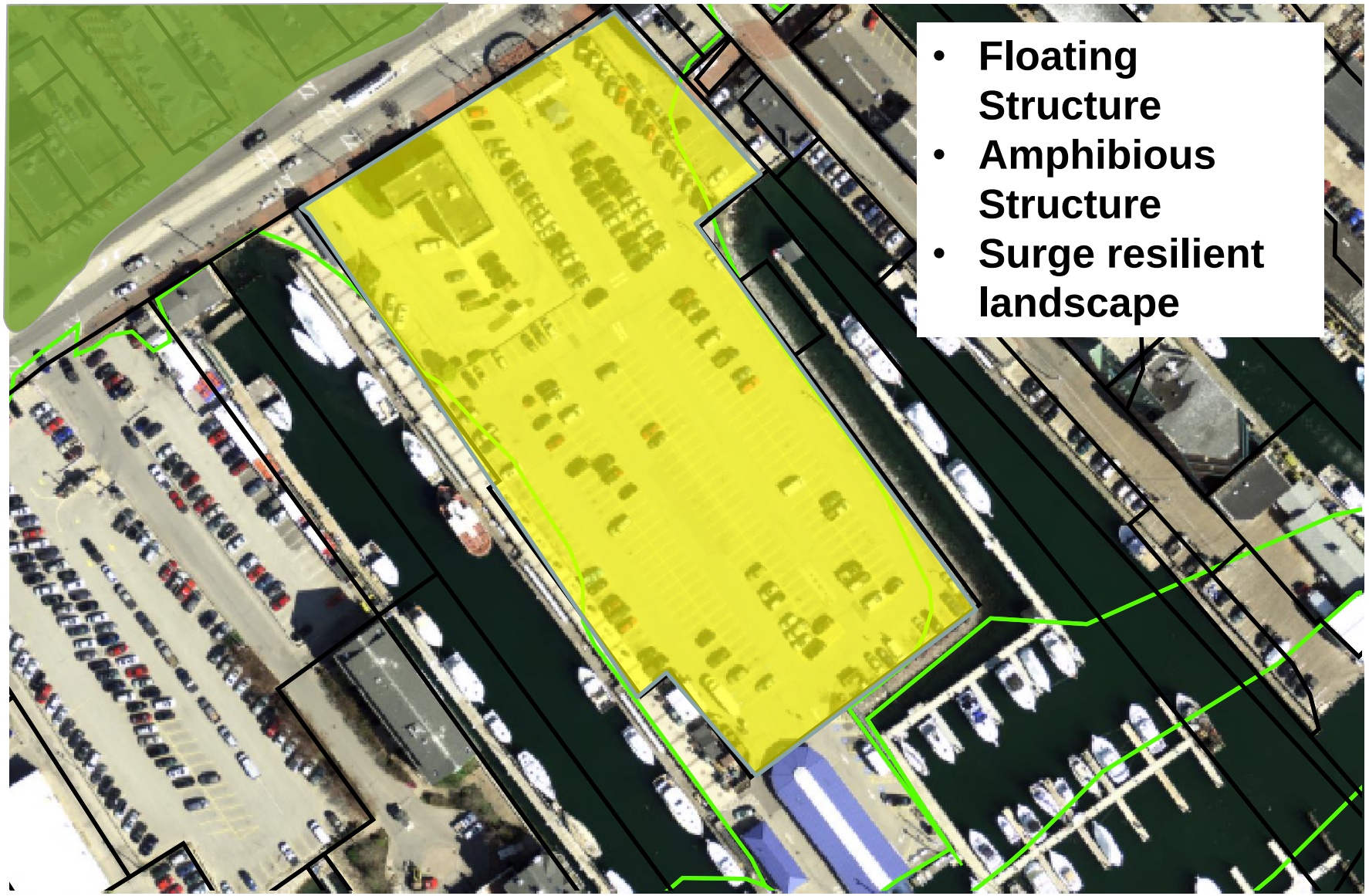
An amphibious structure is a building built on dry land that can float in the event of the site being flooded.



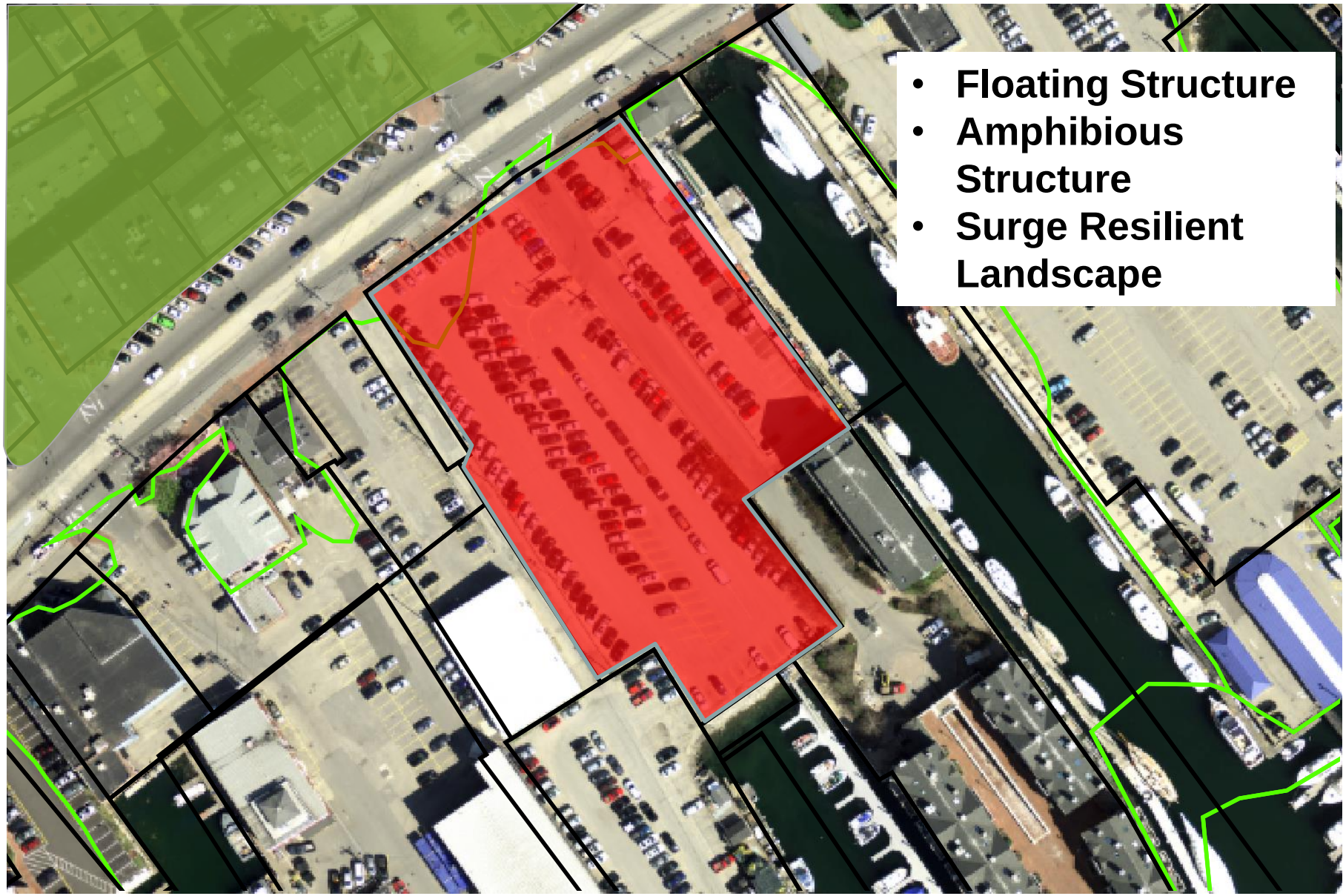



• Dry Floodproofing
• Wet Floodproofing
• Elevate on Fill
• Green Infrastructure

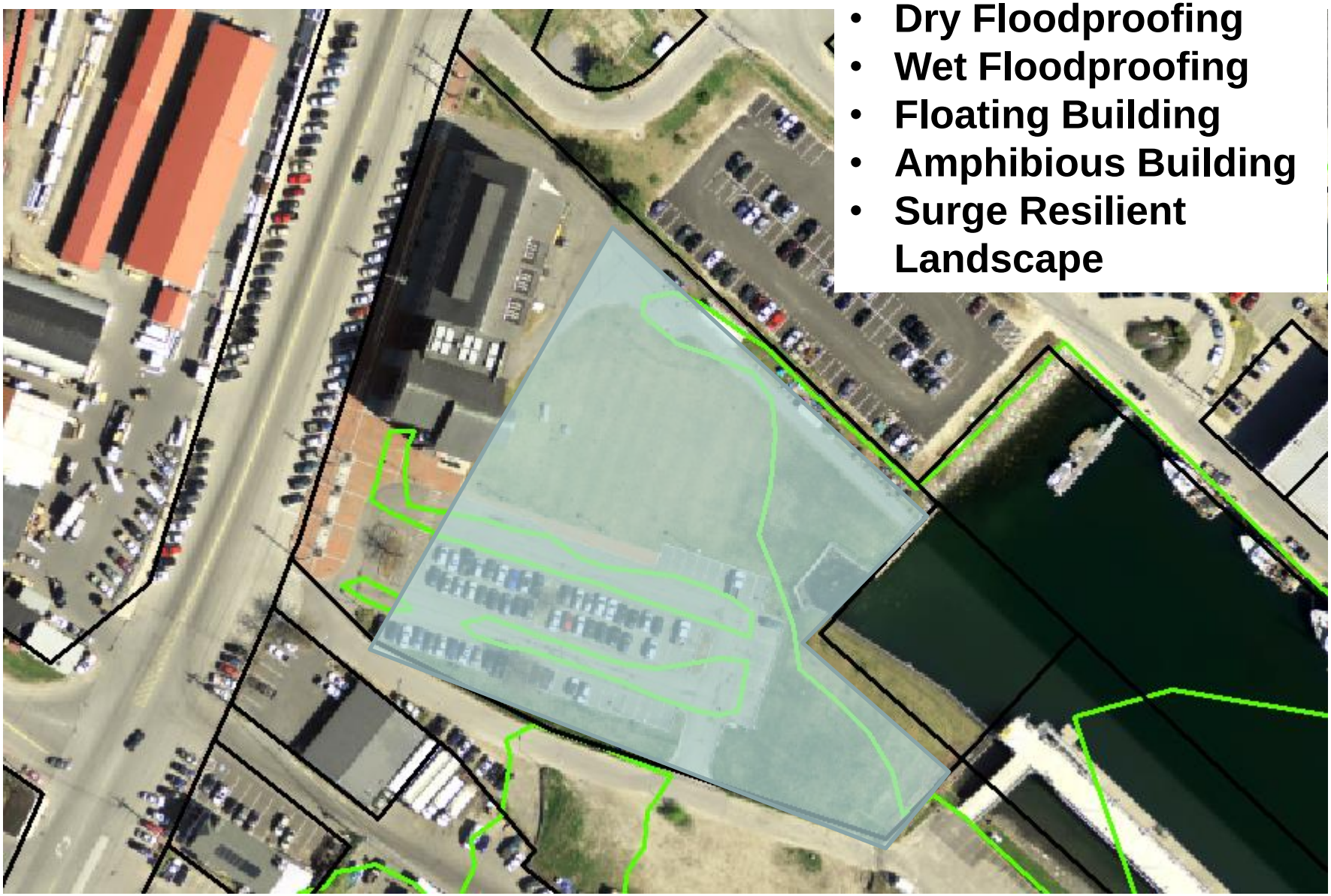
Example 1



Example 2 – Historic District Protection

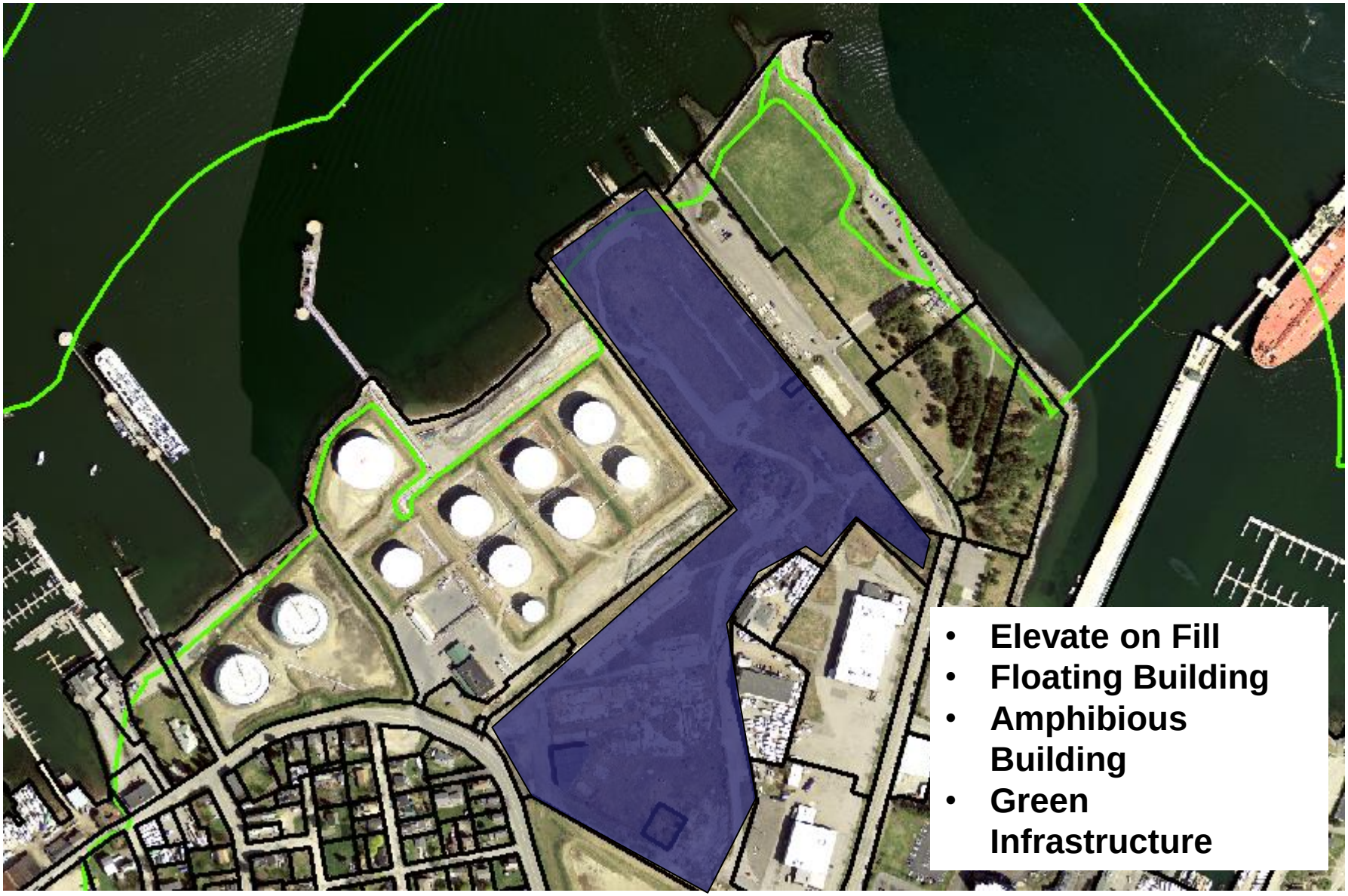


Example 3 - Historic District Protection



- Dry Floodproofing
- Wet Floodproofing
- Floating Building
- Amphibious Building
- Surge Resilient Landscape

Example 4


• Elevate on Fill
• Floating Building
• Amphibious Building
• Green Infrastructure

Example 5

Mill Creek Area Flood Protection and Development Strategy

- Assets
  - Treatment Facility
  - Peaker Plant
  - Load Station
  - Shopping Centers
  - Marina
  - Residential

- Approach
  - Integrated Flood Protection Strategy for redevelopment and peninsula protection
  - Take advantage of existing infrastructure
  - Leverage Federal $ for Critical Infrastructure
  - Flood walls, bulkheads, dikes, trails, berms, deployables and other physical mitigation measures

Example 6

Leadership & Governance

Jessica Pavone
Jeana Wiser

Leadership & Governance

- Climate Risk
  - Long term
  - Variable
  - Cross jurisdictional
  - Confusing in Community

- Local Governments
  - Long term planning
  - Institutional Knowledge
  - Comparative strengths and weaknesses

- Governance Structures
  - Climate Risk Data Group
  - Resilience Working Group

Climate Risk Data Group

- Non-Regulatory
- Honest Broker, Neutral Trusted Advisor
- Sources best available climate data
- Regular updates as climate data evolves
- Communication and Dissemination
- Goals
  - Shared understanding of climate data
  - Buy-in on basis for decision-making around climate risk and resilience planning

Sea Grant Maine

Gulf of Maine Research Institute

Resilience Working Group

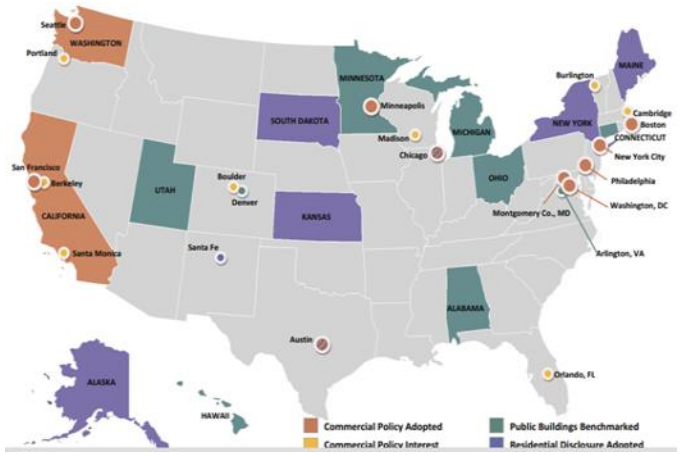
- To collaborate and coordinate on joint solutions to shared waterfront concerns
- Composed of Business, NGO, Government from Portland and South Portland

- <u>Core Responsibilities</u>
  - Waterfront Flood/Storm Risk Exposure Assessment
  - Alignment and Coordination on Infrastructure Planning and Funding Requests
  - Leadership and Advocacy on Insurance Issues
  - Integrated Land/Sea approach
    - Transportation, Parking, Land Use

- Existing Local Examples of Collaboration

Other Areas of Focus

- Development Codes and Standards
  - Local permitting and implementation of resilience standards
  - Regular update process as climate data evolves
- Energy Benchmarking
  - Demand reduction and efficiency
  - Resilient Energy Infrastructure and High Performance Buildings
- Historic Preservation



Historic Preservation Best Practices - Annapolis

– Cultural Resources Hazard Mitigation Plan

Wrap Up: Key Recommendations and Action Items

- Diversify Economic Base
- Create Climate Risk Data Group
- Create Resilience Working Group

Questions?