

# Reducing Flood Risk through Local Actions

Boston Harbor and North & South Shore  
Massachusetts Engagement Session 3

November 30, 2023



# Reducing Flood Risk through Local Actions

Cape, Islands, and South Coast  
Massachusetts Engagement Session 4

December 7, 2023



# Project Management Team

- Executive Office of Economic Development (EOED)
- Executive Office of Energy and Environmental Affairs (EEA)
- Department of Conservation and Recreation (DCR)
  - Flood Hazard Management Program
- Office of Coastal Zone Management (CZM)



# Agenda

- Project Overview
- Local Flood Risk Actions
  - Limitations and Restrictions
  - Zoning Bylaws
  - Policies and Procedures
  - Incentives, Exemptions, and Other Tools



# Local Floodplain Management Action Guide

Goal: Develop a guide for cities and towns to take impactful local actions to improve floodplain management standards and promote flood-resilient construction.



This project has three main steps:

Review existing floodplain management publications from local, state, federal, and private entities for recommendations for higher standards.

Engage state and local entities to get their recommendations for higher standards.

Develop the guide based on the recommendations.

# 1. Massachusetts State Building Code

- The Massachusetts State Building Code governs the design of buildings.
- Opportunities that fall into State Building Code improvements will be included in a separate project and presented for feedback, ideas, and suggestions in the future.



## 2. Considered Climate Change Projections

### Boston Harbor and North & South Shore Facts

- 50 Cities and Towns
- 2,354,600 People
- 627,800 Residential Properties

### Most Urgent Impacts in Boston Harbor and North & South Shore Regions

- Reduction in state and municipal revenues, including a reduced property tax base due to coastal flood risk
- Reduction in the Availability of Affordably Priced Housing from direct damage and the scarcity caused by increased demand

## 2. Considered Climate Change Projections

### Cape, Islands, and South Coast Facts

- 39 Cities and Towns
- 658,000 People
- 317,000 Residential Properties

### Most Urgent Impacts in Cape, Islands, and South Coast Regions

- Reduction in state and municipal revenues, including a reduced property tax base due to coastal flood risk
- Reduction in the Availability of Affordably Priced Housing from direct damage and the scarcity caused by increased demand
- Coastal erosion from sea level rise and storm surge, particularly in areas not protected by coastal wetlands.
- Coastal wetland degradation from sea level rise and storm surge.

## 2. Considered Climate Change Projections

### Boston Harbor



Highlights of Future Climate Projections from the 2022 Massachusetts Climate Change Assessment

(<https://www.mass.gov/info-details/massachusetts-climate-change-assessment>)



### Regional Climate Outlook

**2030**

#### **NEAR TERM**

The summer mean temperature could increase by 3.6°F from the historical period (1950-2013), worsening air quality.

**2050**

#### **MID-CENTURY**

Area affected by a 1 percent annual chance of a foot or more of coastal flooding increases by 3.6 times compared to current area.

**2070**

#### **MID-LATE CENTURY**

There could be 39 more days above 90°F, contributing to extreme heat health impacts.

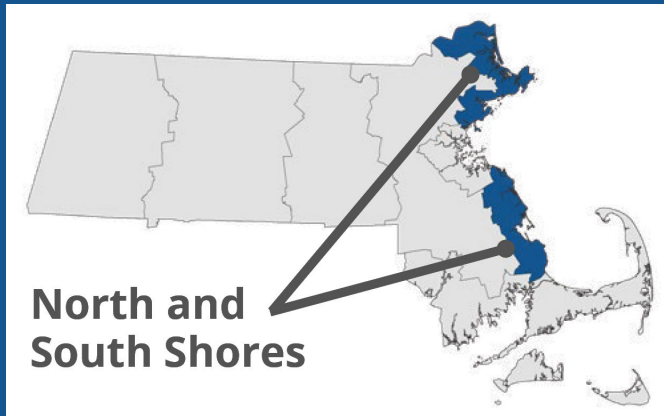
**2090**

#### **END OF CENTURY**

Tropical cyclone frequency could increase by nearly 50 percent, leading to damage from storm surge, heavy rainfall, and high winds.

# 2. Considered Climate Change Projections

## North and South Shores



Highlights of Future Climate Projections from the 2022 Massachusetts Climate Change Assessment

(<https://www.mass.gov/info-details/massachusetts-climate-change-assessment>)

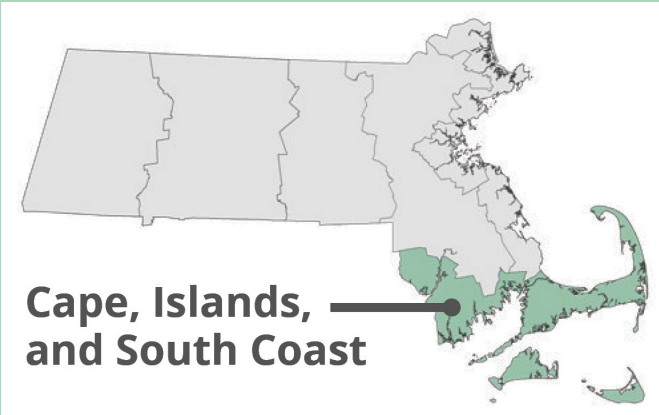


## Regional Climate Outlook

| 2030                                                                                                                                                  | 2050                                                                                                                                                           | 2070                                                                                                                                                          | 2090                                                                                                                                                                                           |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>NEAR TERM</b><br>The summer mean temperature could increase by 3.6°F from the historical period (1950-2013), causing impacts to local agriculture. | <b>MID-CENTURY</b><br>Area affected by a 5 percent annual chance of a foot or more of coastal flooding increases by nearly two times compared to current area. | <b>MID-LATE CENTURY</b><br>Sea surface temperatures could increase by 5°F, reducing marine fish catch and increasing risks from harmful bacterial infections. | <b>END OF CENTURY</b><br>Tropical cyclone frequency in the coastal New England region could increase by nearly 50 percent, leading to damage from storm surge, heavy rainfall, and high winds. |

## 2. Considered Climate Change Projections

### Cape, Islands, and South Coast



Highlights of Future Climate Projections from the 2022 Massachusetts Climate Change Assessment

(<https://www.mass.gov/info-details/massachusetts-climate-change-assessment>)



### Regional Climate Outlook

| 2030                                                                                                                                                                    | 2050                                                                                                                                                 | 2070                                                                                                                                              | 2090                                                                                                                                                         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>NEAR TERM</b><br>The summer mean temperature could increase by 3.6°F from the historical period (1950-2013), increasing tick activity and the risks of Lyme disease. | <b>MID-CENTURY</b><br>Sea surface temperatures increase by 3.1°F, reducing marine fish catch and increasing risks from harmful bacterial infections. | <b>MID-LATE CENTURY</b><br>The historical 10 percent annual chance daily rainfall event (2.4 to 4 inches) could occur five times more frequently. | <b>END OF CENTURY</b><br>Tropical cyclone frequency could increase by nearly 50 percent, leading to damage from storm surge, heavy rainfall, and high winds. |

## 2. Considered Climate Change Projections

### Most Urgent Impacts Statewide

- Damage to buildings from heavy rainfall and overwhelmed drainage systems
- Reduction in state and municipal revenues, including a reduced property tax base due to coastal and inland flood risk
- Reduction in the availability of affordably priced housing from direct damage and the scarcity caused by increased demand

## 2. Considered Climate Change Projections



ResilientMass identifies inland flooding as the most significant climate hazard in Massachusetts



Environmental justice and priority populations live near commercial and industrial buildings that have a 57% higher risk of flood damage than the rest of the state



By 2070, Massachusetts is expected to receive 12 to 42% more winter precipitation, and the frequency and intensity of precipitation events is also increasing

### 3. Improvements to Local Floodplain Management Regulations

When considering improvements, we look for options that reduce flood damage and risk.

We determine that regulating development was not the only way to reduce flood damage and risk.

There are also administrative options, such as improving compliance using incentives, exemptions, and other options that encourage flood risk reduction.

## 4. **Justifiable and Appropriate for Massachusetts Municipalities**

An option is considered justifiable and appropriate if:

1. It is identified multiple times during the publication review,
2. The project subject matter experts have seen it work in the past, and/or
3. The NFIP Community Rating System (CRS) awards points for the activity.
  - CRS is a federal program that discounts flood insurance premium rates for NFIP-participating communities
  - If CRS awards points for a floodplain practice, it indicates that the practice was evaluated and found to be beneficial to reducing flood risk



# Limitations and Restrictions

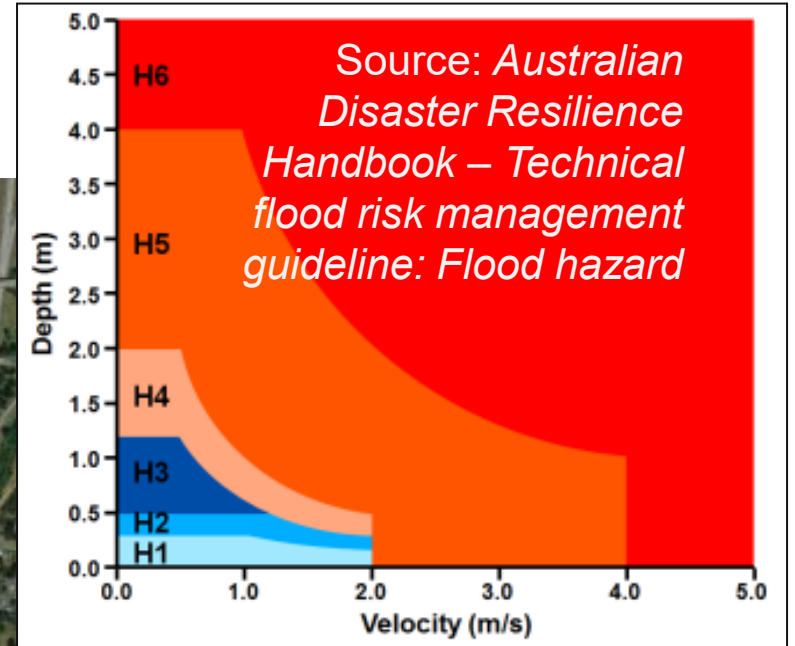


# Limitations and Restrictions

| Title                                                          | Description                                                                                                                                                                                                                                                                                                                         |
|----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Restrictions Based on Depth and Velocity</b>                | Restrict development, or just new construction, on sites where flood depths are greater than 4 to 5 feet and on sites where velocities are faster than 10 feet per second. This could include requiring applicants to assess locations on their parcels that are outside of mapped flood zones or where flood depths are shallower. |
| <b>Limit Development within the Flood Zone and/or Floodway</b> | Limit new development within the flood zone. This could include all development or a list of activities (new structures for human habitation, dry cleaners, septic systems, critical facilities, etc.).                                                                                                                             |
| <b>Limit Fill within the Flood Zone</b>                        | Limit fill or allow no fill within the flood zone.                                                                                                                                                                                                                                                                                  |



# Restrictions Based on Depth & Velocity



## Hazard Classifications

- **H6** – Unsafe for vehicles and people. All building types considered vulnerable to failure.
- **H5** – Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust building types vulnerable to failure.
- **H4** – Unsafe for people and vehicles.
- **H3** – Unsafe for vehicles, children, and the elderly.
- **H2** – Unsafe for small vehicles.
- **H1** – Caution, but generally safe for people, vehicles, and elevated buildings.



# Limit Development within the Flood Zone and/or Floodway

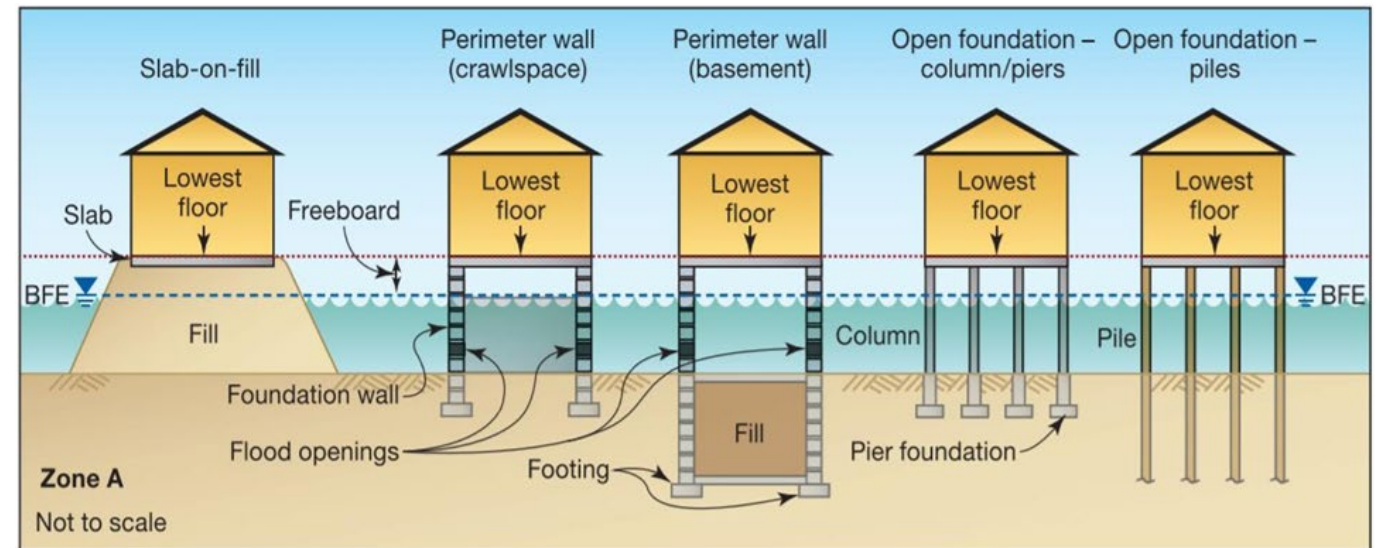
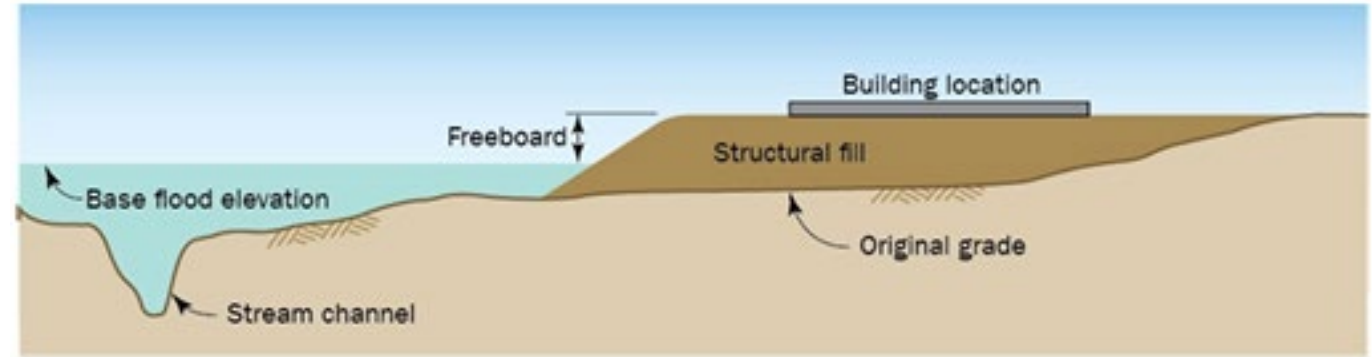
- Prohibit new structures for human habitation in the floodway or flood zone
- Prohibit certain development or activities (dry cleaners, septic systems, critical facilities, manufacturing and/or storage of hazardous materials)





# Limit Fill within the Flood Zone

- Prohibit the use of fill to elevate buildings.
- Regulate the content and compaction of fill based on anticipated future use to support buildings.
- Regulate the % of each lot that can have fill placed on it.





# Zoning Bylaws



# Zoning Bylaws

| Title                                            | Description                                                                                                                                                                                                         |
|--------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Flood Hazard Setbacks</b>                     | Limit development within a specified distance from a body of water (typically the stream bank, stream centerline, floodway edge, or landward boundary of a mapped floodplain).                                      |
| <b>Dry Land Access</b>                           | Require new subdivisions and developments to have a “dry land access” to allow safe entry and exit of emergency vehicles during flooding up to the base flood conditions.                                           |
| <b>Protect New Buildings from Local Drainage</b> | Require the ‘finished floor’ of all new buildings to be at or above a specific number of inches above the adjacent grade or the crown of the nearest road or street.                                                |
| <b>Low-Impact Overlay Districts</b>              | Develop an overlay zone for flood zones to control the impact of allowed uses. Low-impact uses could include agriculture, conservation, forestry, passive recreation, and low-density residential zoning districts. |
| <b>Adopt Additional Flood Risk Maps</b>          | Communities may adopt other flood risk data products (studies and maps) in addition to FEMA’s FIS and FIRM and regulate using the most restrictive data (widest extent or highest elevation).                       |



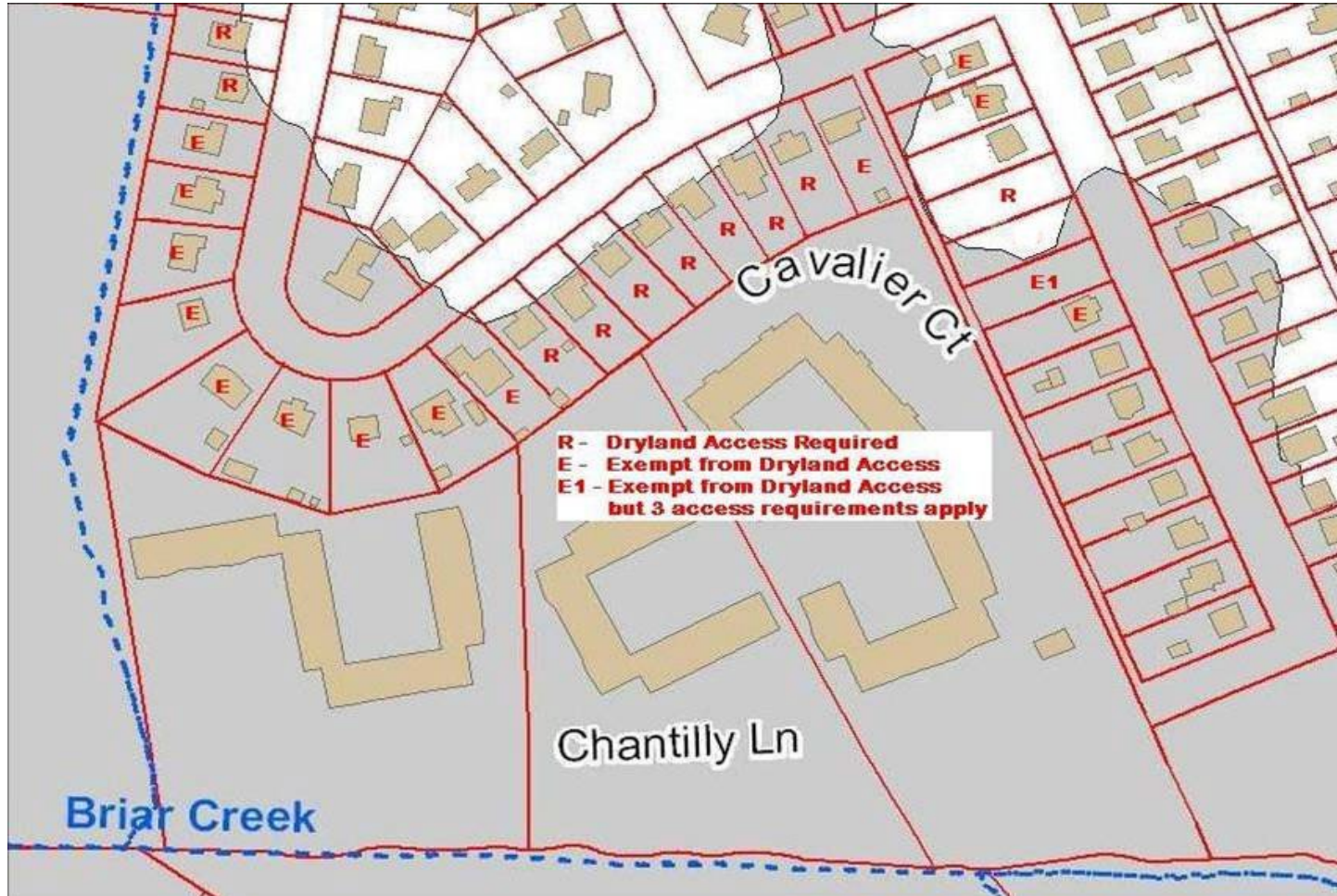
# Flood Hazard Setbacks

- Setbacks prohibit or limit development within a specified distance from a flood zone or property boundary.
- Setbacks provide an added margin of safety by guiding development away from high risk areas.
- Setbacks can be paired with other options (special permits or incentives) to further guide development away from high risk areas.





# Dry Land Access

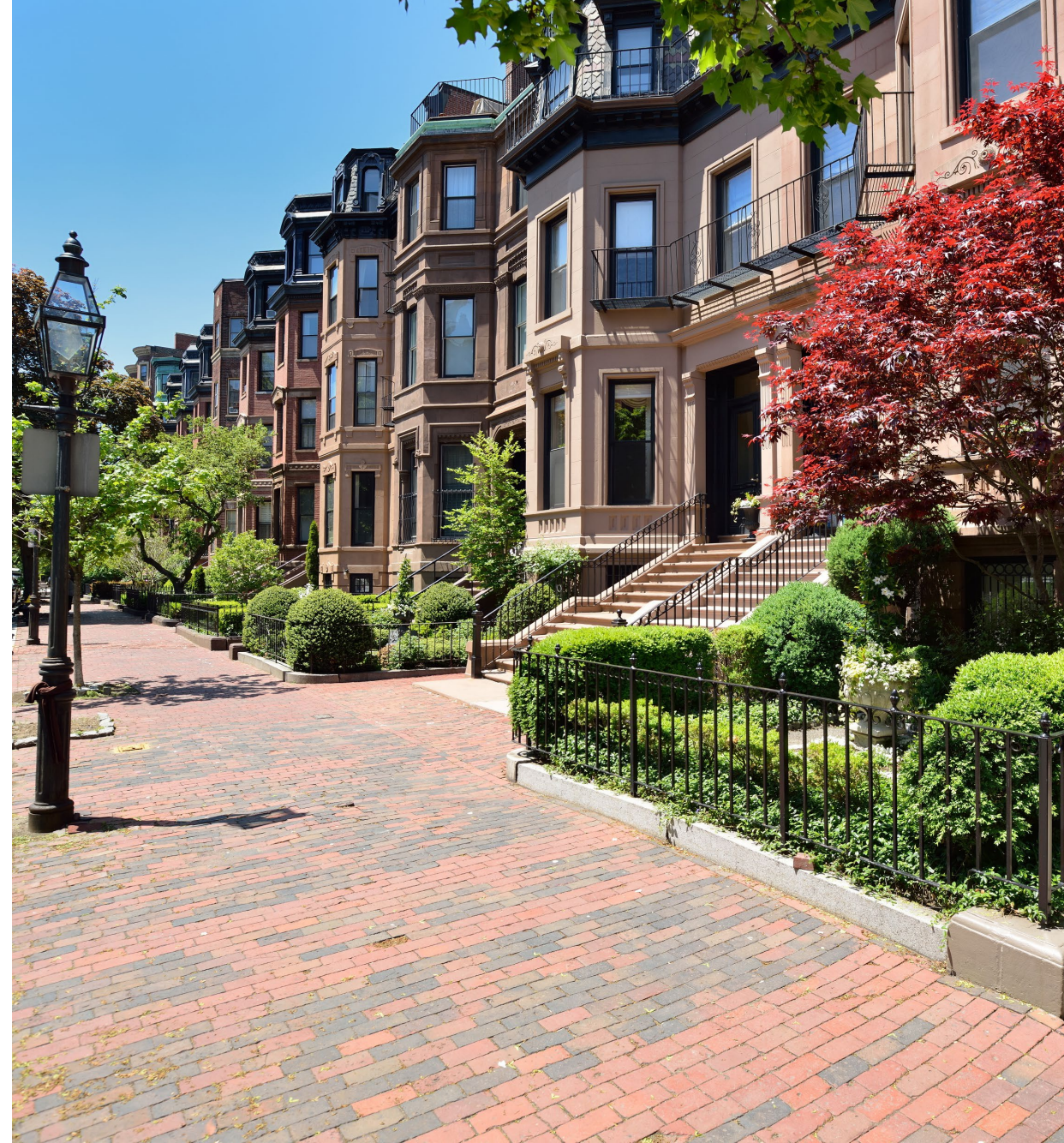


- Require new subdivisions and developments to have a “dry land access” to allow safe entry and exit of emergency vehicles during flooding up to the base flood conditions.



# Protect New Buildings from Local Drainage

- Require the ‘finished floor’ of all new buildings to be at or above a specific number of inches above the adjacent grade or the crown of the nearest road or street.
  - More than 20% of NFIP claims are outside the flood zone.
  - This would be communitywide regardless of flood zone.





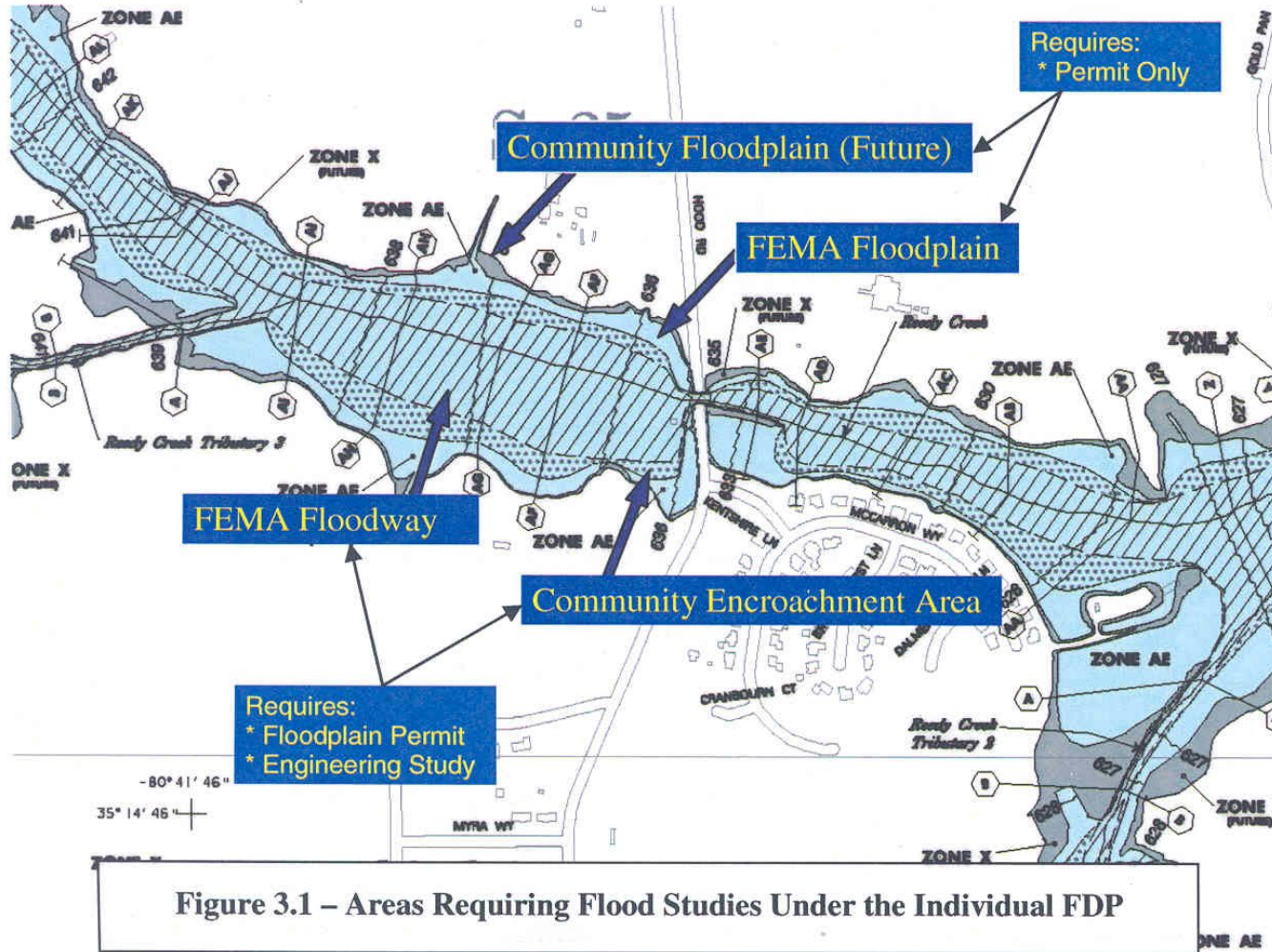
# Low-Impact Overlay District

- Shifts development away from the flood zone by controlling the allowed uses in the overlay zone.
- Low impact uses include:
  - Agriculture
  - Conservation
  - Passive recreation
    - Parks
    - Ballfields
  - Low-density residential
  - Impervious Surface Restrictions





# Adopt Additional Flood Risk Maps



- Adopting maps in addition to FIRMs allows communities to manage known flood risks.
- Possible Maps to Adopt:
  - Erosion Zones
  - Future Condition Floodplains
  - Sea Level Rise
  - Surge Maps
  - Inundation Mapping



# Policies and Procedures



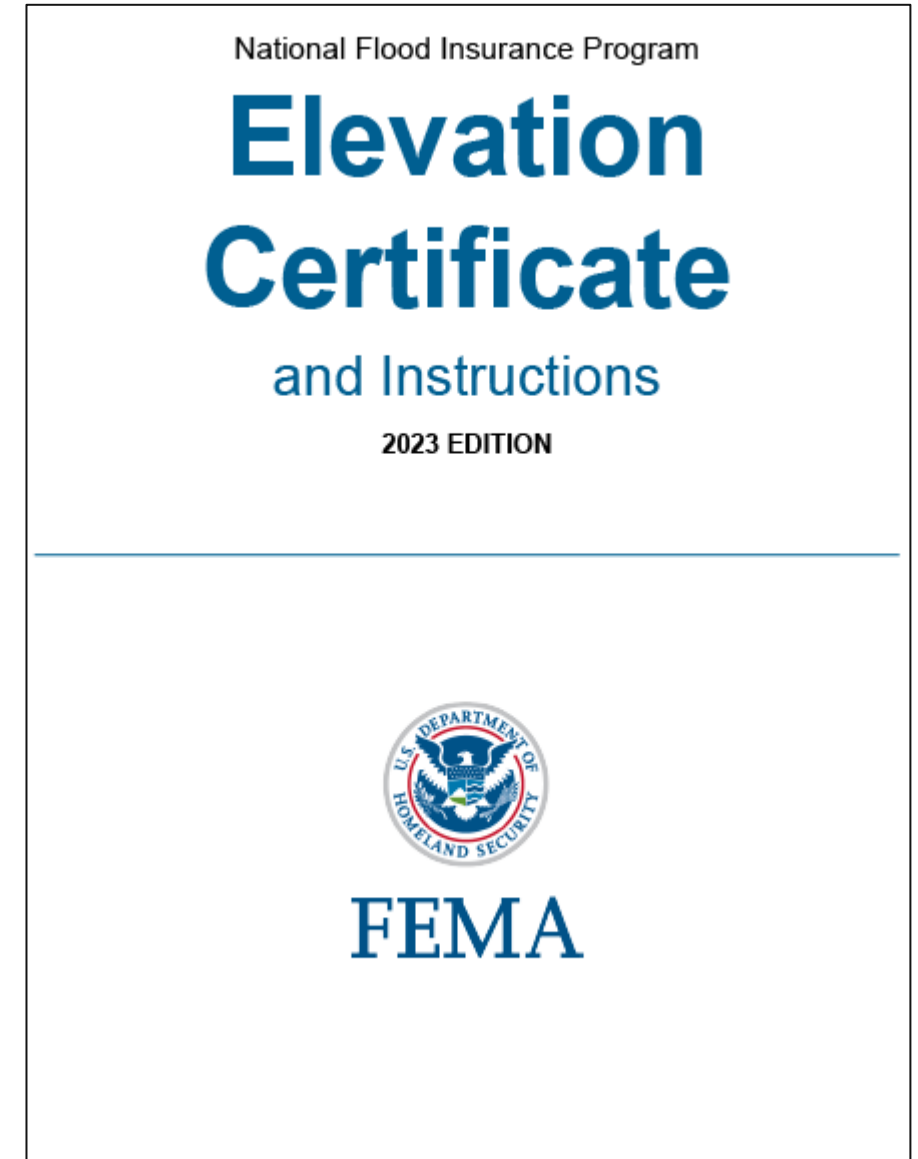
# Policies and Procedures

| Title                                                                                           | Description                                                                                                                                                                                                                                                                                                    |
|-------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>FEMA Certificates: Elevation Certificate and Dry Floodproofing Certificate</b>               | Require use of FEMA Elevation Certificates and FEMA Dry Floodproofing Certificates.                                                                                                                                                                                                                            |
| <b>Non-Conversion Agreements for Enclosures Under Elevated Buildings, with Deed Restriction</b> | Require property owners to sign non-conversion agreements to acknowledge the restrictions on use of enclosures below elevated buildings and to agree not to modify or convert the enclosures. The non-conversion agreement is then recorded with the property deed to inform future owners of use limitations. |
| <b>Interlocal Agreements for Administration</b>                                                 | Develop model interlocal agreements that can be used by two or more municipalities to cooperate on administration of floodplain management bylaws.                                                                                                                                                             |



# FEMA Certificates: Elevation Certificate and Dry Floodproofing Certificate

- Require use of FEMA Elevation Certificates and FEMA Dry Floodproofing Certificates.
  - FEMA forms have all the information needed to verify compliance and provide the certificate of occupancy.
  - Using the same form makes the information easier to find with each submittal.





# Non-Conversion Agreements for Enclosures Under Elevated Buildings, with Deed Restriction

- Require property owners to sign non-conversion agreements to acknowledge the restrictions on use of enclosures below elevated buildings and to agree not to modify or convert the enclosures.
  - Allowed uses include building access, vehicle parking, and storage.
  - Could also require periodic inspection of the enclosure to ensure compliance.
- The non-conversion agreement is then recorded with the property deed to inform future owners of use limitations.



# Interlocal Agreements for Administration

- Develop interlocal agreements between municipalities to cooperate on administration of floodplain management bylaws.





# **Incentives, Exemptions, and Other Tools**



# Incentives, Exemptions, and Other Tools

| Title                                      | Examples                                                                                                                                                                                      |
|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Freeboard Incentives</b>                | <ul style="list-style-type: none"><li>• Permit fee reductions/waivers</li></ul>                                                                                                               |
| <b>Special Permits</b>                     | <ul style="list-style-type: none"><li>• Density bonuses</li><li>• Flexibility with setback and frontage requirements</li><li>• Allowing higher height limits for elevated buildings</li></ul> |
| <b>Exemptions or Streamlined Approvals</b> | <ul style="list-style-type: none"><li>• Alternate permitting procedures</li><li>• Site plan reviews</li></ul>                                                                                 |
| <b>Tax Benefit or Rewards</b>              | <ul style="list-style-type: none"><li>• Tax incentives</li><li>• Conservation easements</li><li>• Floodplain/drainage easements</li></ul>                                                     |
| <b>Elevation Grant Assistance</b>          | <ul style="list-style-type: none"><li>• Home elevation programs</li></ul>                                                                                                                     |
| <b>Other Tools</b>                         | <ul style="list-style-type: none"><li>• Quotient/points systems</li><li>• Cluster subdivisions</li></ul>                                                                                      |



# Hull, Massachusetts

|                                         | Freeboard Incentive Example                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Description:</b>                     | For residential and commercial building elevation, or new construction projects, building department permit fees will be reduced by \$500 (or by the cost of the permit, if lower than \$500) if an Elevation Certificate is provided to verify the building is elevated a minimum of 2 feet above the highest state requirement for the flood zone.                                                                                                                                                                           |
| <b>Explanation &amp; Effectiveness:</b> | Towns do not have the right to require that property owners build higher than building code requirements, but they can encourage owners to add additional freeboard. In 2009, Hull voted to enact the state's first freeboard incentive program to encourage elevation that accounts for future coastal storms and sea level rise. Since then, up to 80 percent of permit requests have included two or more feet of freeboard and qualified for the credit providing more safety for their property during storms and floods. |

An aerial photograph of a coastal town with a mix of residential houses and commercial buildings. A road with yellow and white lane markings runs through the town, with a few cars visible. To the right of the road is a large, green marshy area with a winding waterway. The ocean is visible in the background under a clear blue sky.

# Thank you

# Q&A

