

How to Identify Zones in the Land Subject to Coastal Storm Flowage (LSCSF) from FEMA Maps



FEMA Coastal Flood Zone Definitions

- **Zone VE – Areas of 100-year flood with velocity waves**
 - Wave height 3 feet or greater
 - Wave runup depth 3 feet or greater
 - Primary frontal dune (first dune landward of the beach)
- **Zone AE – Areas of 100-year flood**
 - May be coastal or riverine
 - Coastal can contain up to 2.9 feet wave height
 - Coastal flood elevations at top of wave envelope
 - **Moderate Wave Action Area (MoWA)**
 - Portion of A Zone with 1.5 – 3.0' waves and moving water
 - Also known as Coastal A Zone
 - **Minimal Wave Action Area (MiWA)**
 - Less than 1.5' waves, possible moving water
 - **Limit of Moderate Wave Action (LiMWA)**
 - Delineates the landward extent of the MoWA
 - LiMWA's were update/added to FEMA flood maps in MA in 2017
- **AO Zone**
 - Overwash area with flow depths of 1 to 3 feet

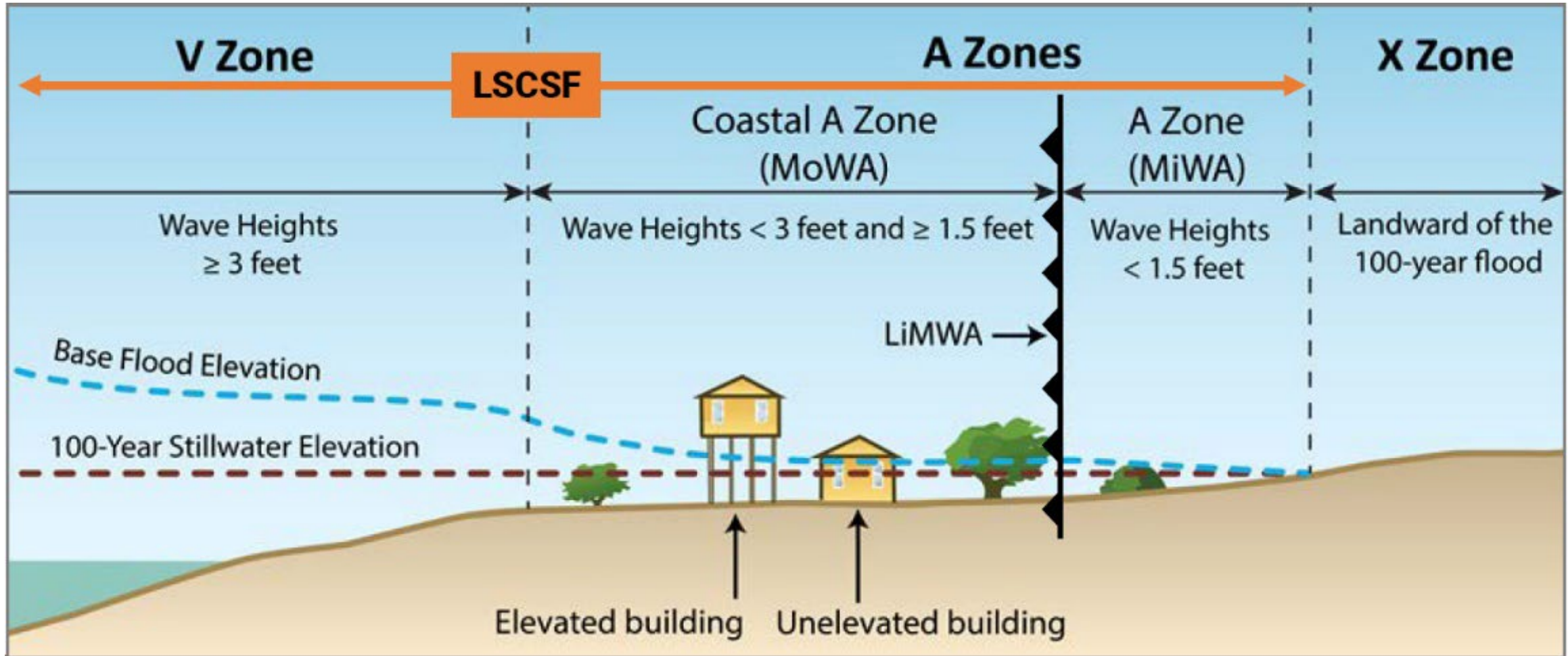


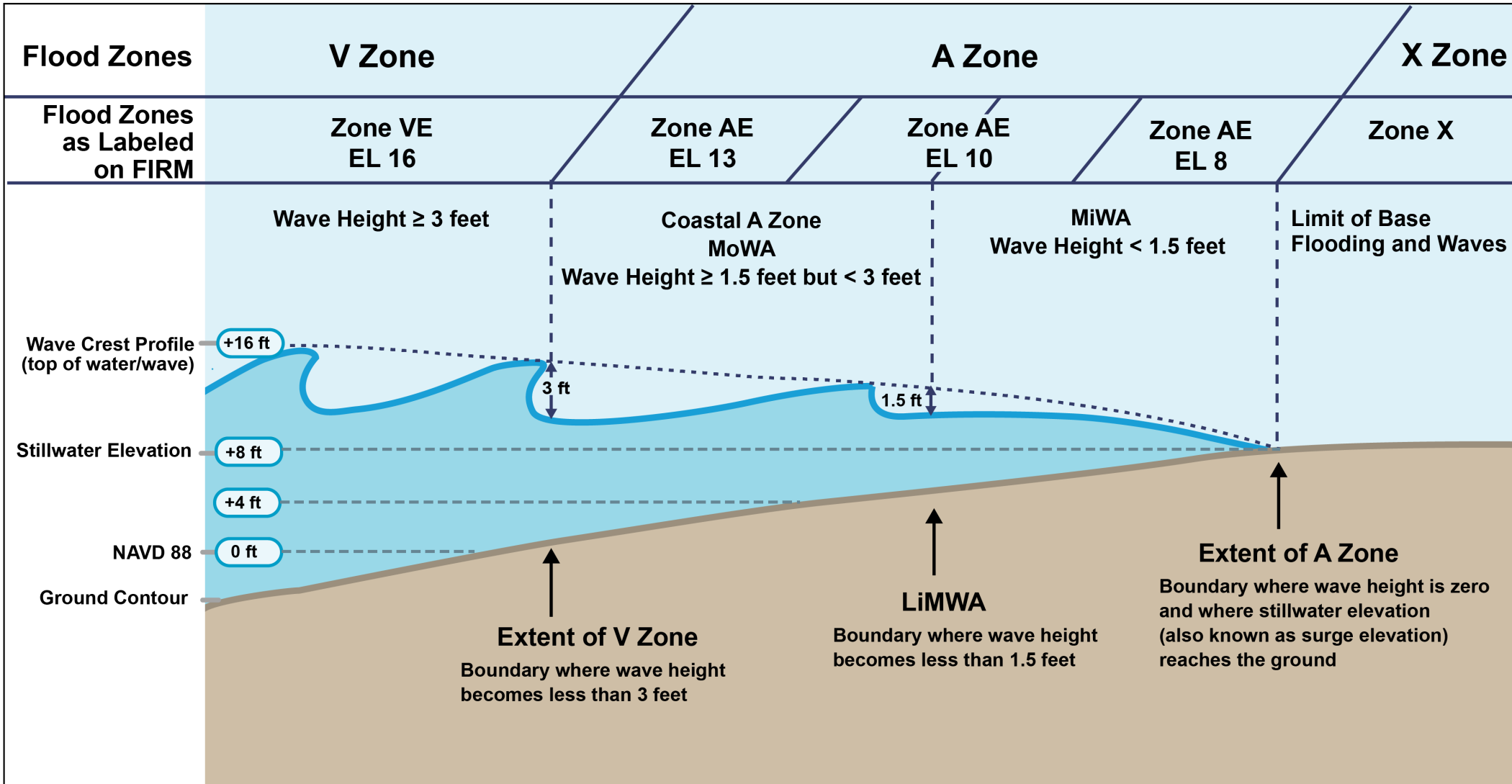
Photo Credit: CZM

FEMA Map Service Center: msc.fema.gov

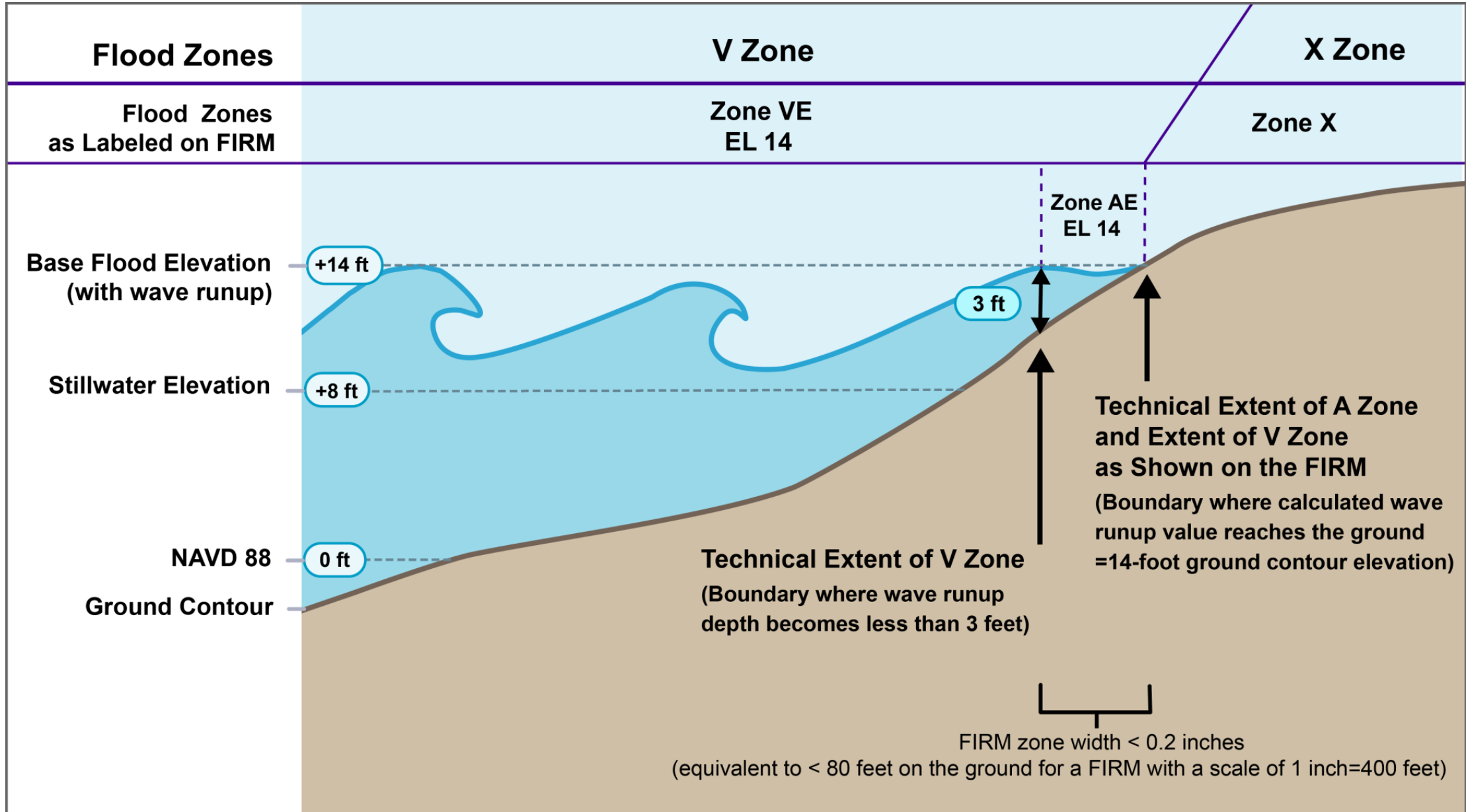
FEMA Coastal Flood Zone Definitions

- Shaded Zone X – Areas of 500-year flood
- Unshaded Zone X – “Areas of minimal flooding”





The "Invisible A Zone"



General Points to Consider

- Maps are a graphic representation of engineering data
- Detailed information generated only at specific transects
- Effective maps are based on sea level and shoreline position at the time the flood study was conducted (FIS available in the Map Service Center).



Graphic:
FEMA

Example 1: LiMWA, MoWA and MiWA

Location: North Shore Boulevard,
East Sandwich

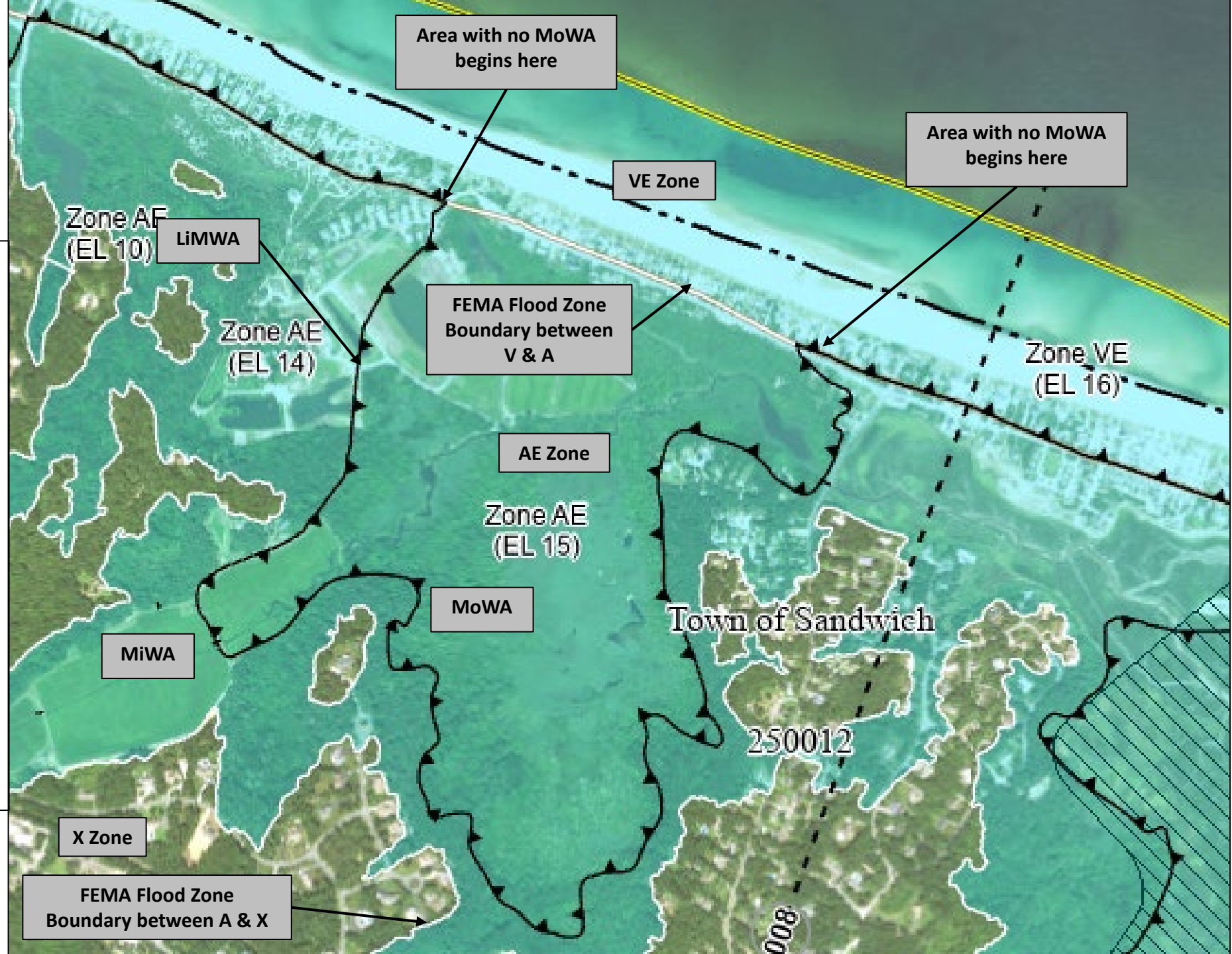
White lines = flood zone boundaries

LiMWA = boundary between MoWA and MiWA. Triangles point towards higher hazard area.

Zone AE and VE elevations (EL) are Base Flood Elevation.

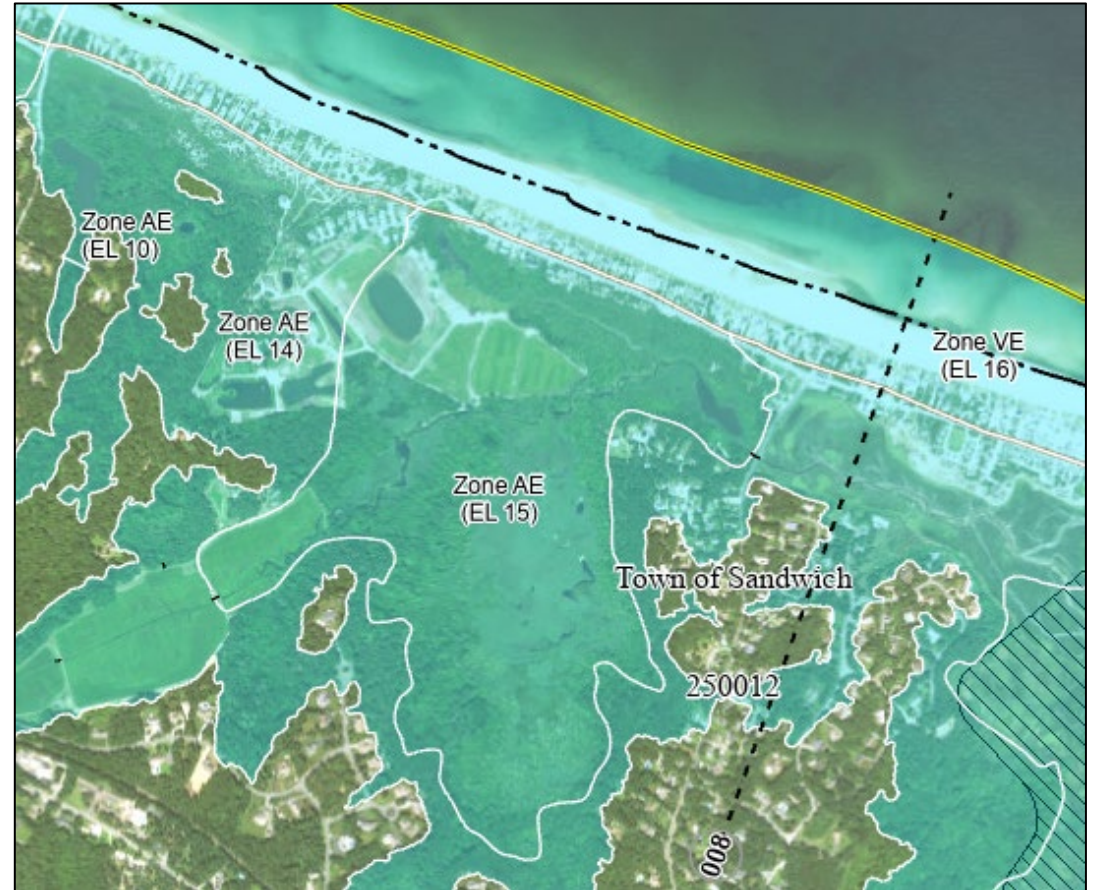
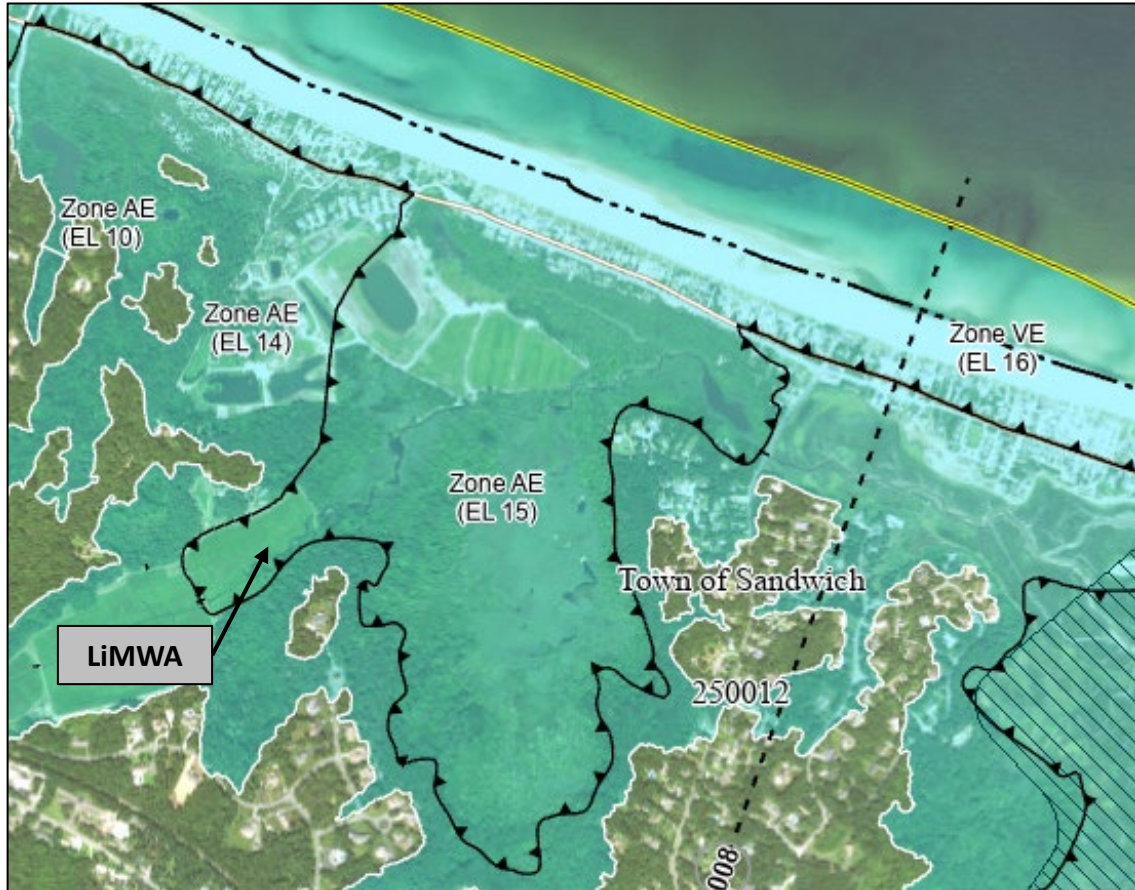
Note: In some cases, there is no MoWA as the LiMWA divides the V Zone and MiWA only.

Tip: The NFHL viewer allows you to toggle on/off the LiMWA layer to verify that the LiMWA line coincides with the V/A boundary in some places.



Example 2: Toggle LiMWA in the Viewer

Location: North Shore Boulevard, East Sandwich



Tip: The NFHL viewer allows you to toggle on/off the LiMWA layer to verify that the LiMWA line coincides with the V/A boundary in some places.

Example 3A: Seawall with no MoWA

Location: Revere
Beach Boulevard,
Revere

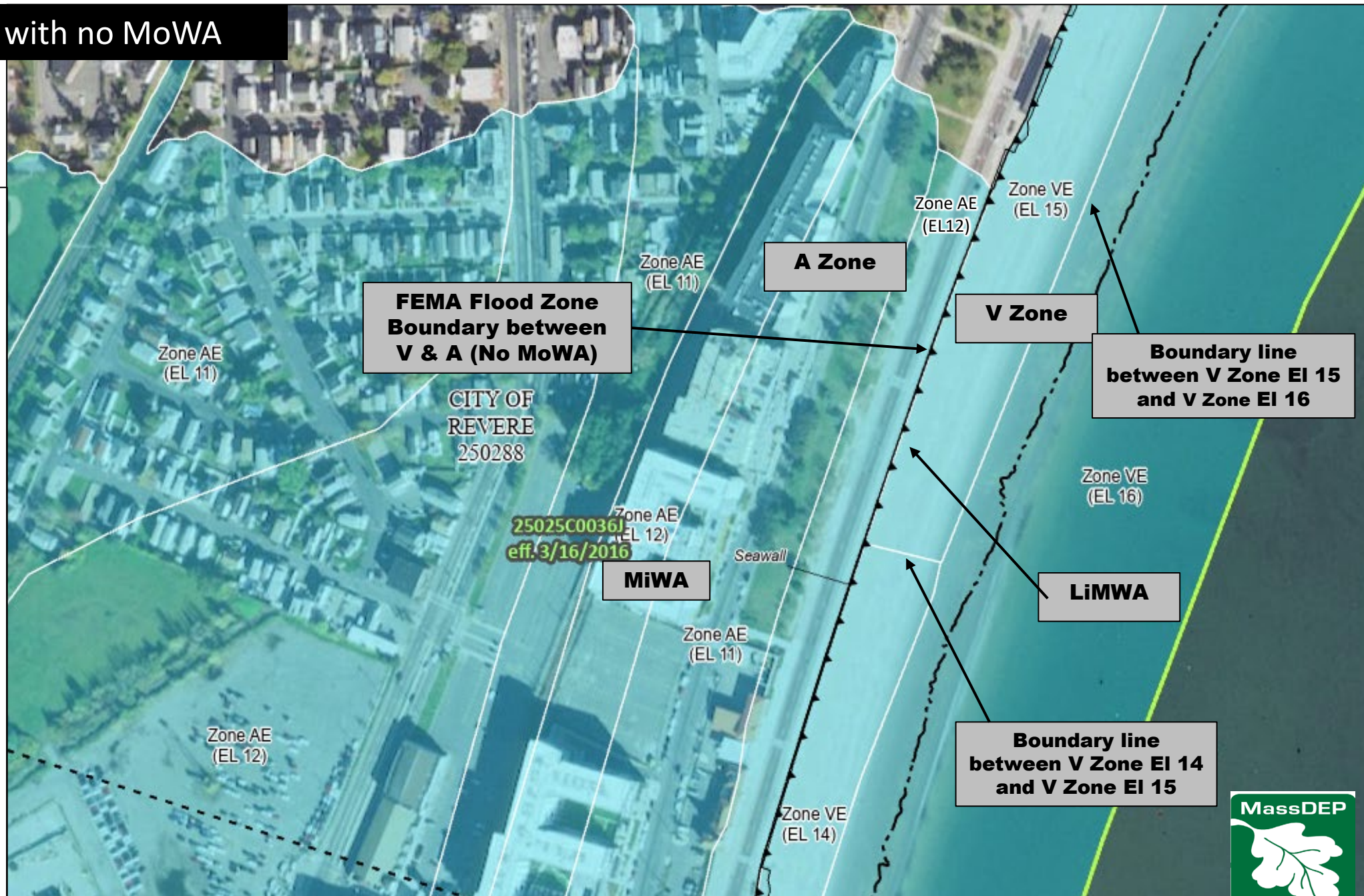
White lines = flood zone boundaries

LiMWA = boundary between MoWA and MiWA. Triangles point towards higher hazard area.

Zone AE and VE elevations (EL) are Base Flood Elevation.

Note: In some cases, there is no MoWA as the LiMWA divides the Zone V and MiWA only.

Tip: The NFHL viewer allows you to toggle on/off the LiMWA layer to verify that the LiMWA line coincides with the V/A boundary in some places.



Example 3B: Seawall with no A Zone (no MiWA and no MoWA)

Location: Winthrop
Parkway, Revere

White lines = flood zone boundaries

LiMWA = boundary between MoWA and MiWA. Triangles point towards higher hazard area.

Zone AE and VE elevations (EL) are Base Flood Elevation.



- Letter of Map Amendment (LOMA)

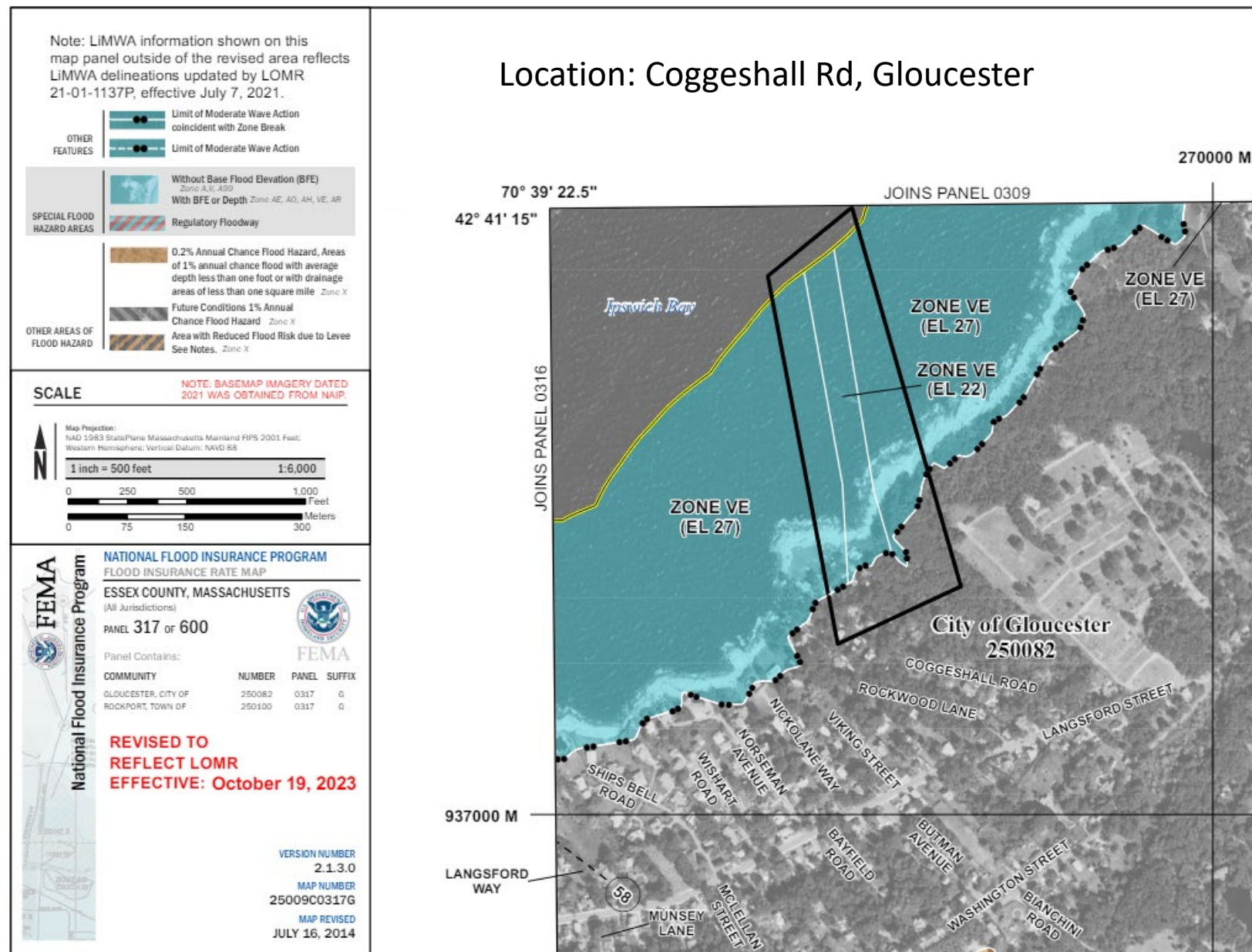
- ☐ Interpretation of what the current FIRM depicts for a specific site

- Letter of Map Revision (LOMR)

- ☐ Request to change the FIRM based on new, site-specific data and engineering analysis.

- Do not use a revised flood zone or base flood elevation that is less restrictive than the FIRM until the written LOMC decision is issued by FEMA.

- To use evidence of higher flood elevations, credible evidence must be provided. For example, a photograph showing flooding with identifiable landmarks.



Example 4: No A Zone & Letter of Map Revision (LOMR)

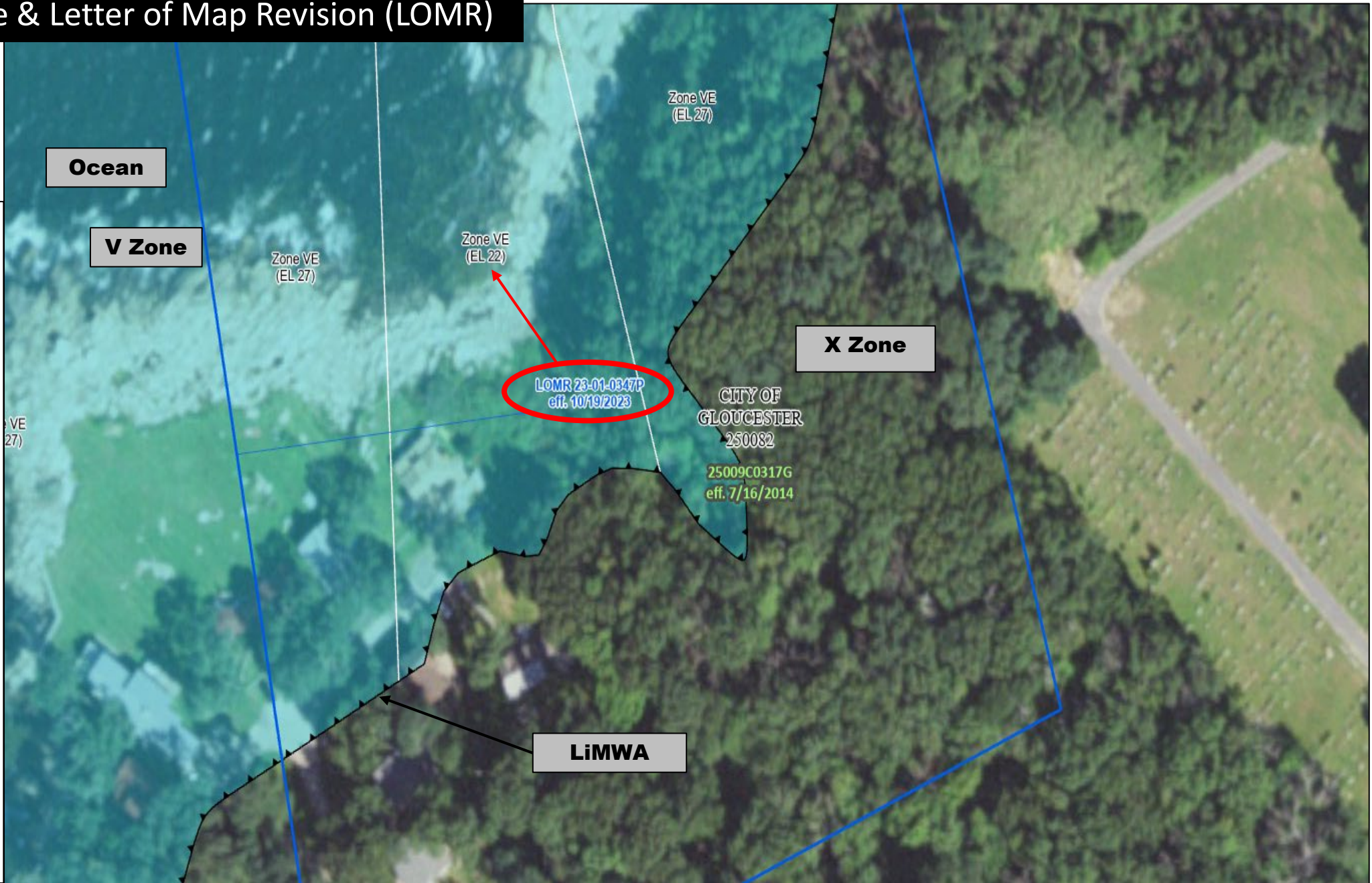
Location: Coggeshall Rd, Gloucester

White lines = flood zone boundaries

LiMWA = boundary between MoWA and MiWA. Triangles point towards higher hazard area.

Zone AE and VE elevations (EL) are Base Flood Elevation.

- Note:
1. In some cases, there is no A Zone, and therefore no MiWA or MoWA as the LimWA divides the V and X Zones only.
 2. Letter of map revision in the VE E122 area, see next slide.
 3. Calculations approved by FEMA to revise the V Zone elevation at 22 within the LOMR defined area.
- Tip: The NFHL viewer allows you to toggle on/off the LiMWA layer to verify that the LiMWA line coincides with the V/A boundary in some places.



Example 5: MoWA/MiWA Boundaries

Location: Black Pond Rd,
Plymouth

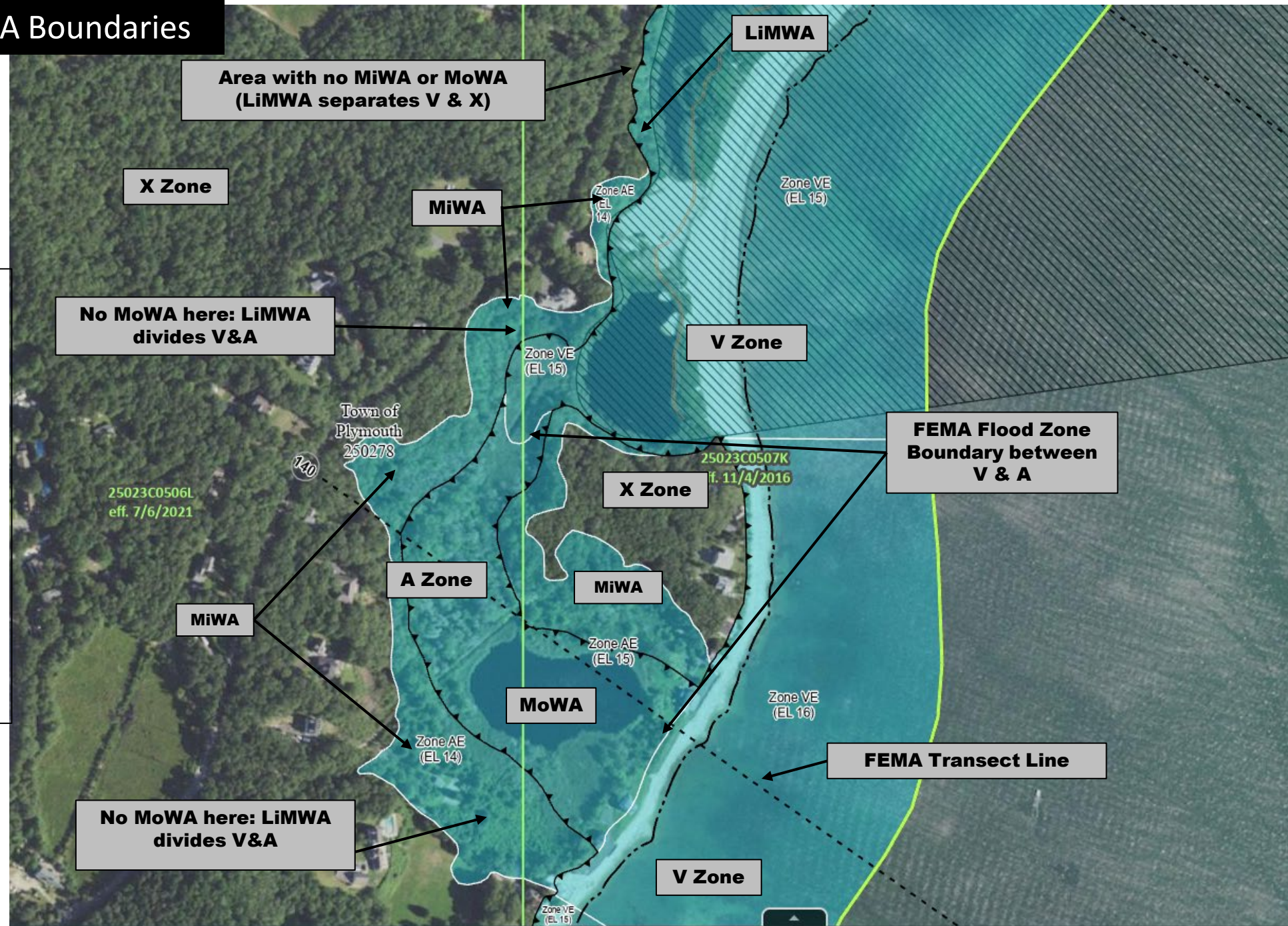
White lines = flood zone boundaries

LiMWA = boundary between MoWA and MiWA. Triangles point towards higher hazard area.

Zone AE and VE elevations (EL) are Base Flood Elevation.

Note:

1. FEMA Transect line is where the detailed mapping analysis is done.



Example 6: MoWA/MiWA Boundaries

Location: Ellisville Harbor
State Park, Plymouth

White lines = flood zone boundaries

LiMWA = boundary between MoWA and MiWA. Triangles point towards higher hazard area.

Zone AE and VE elevations (EL) are Base Flood Elevation.

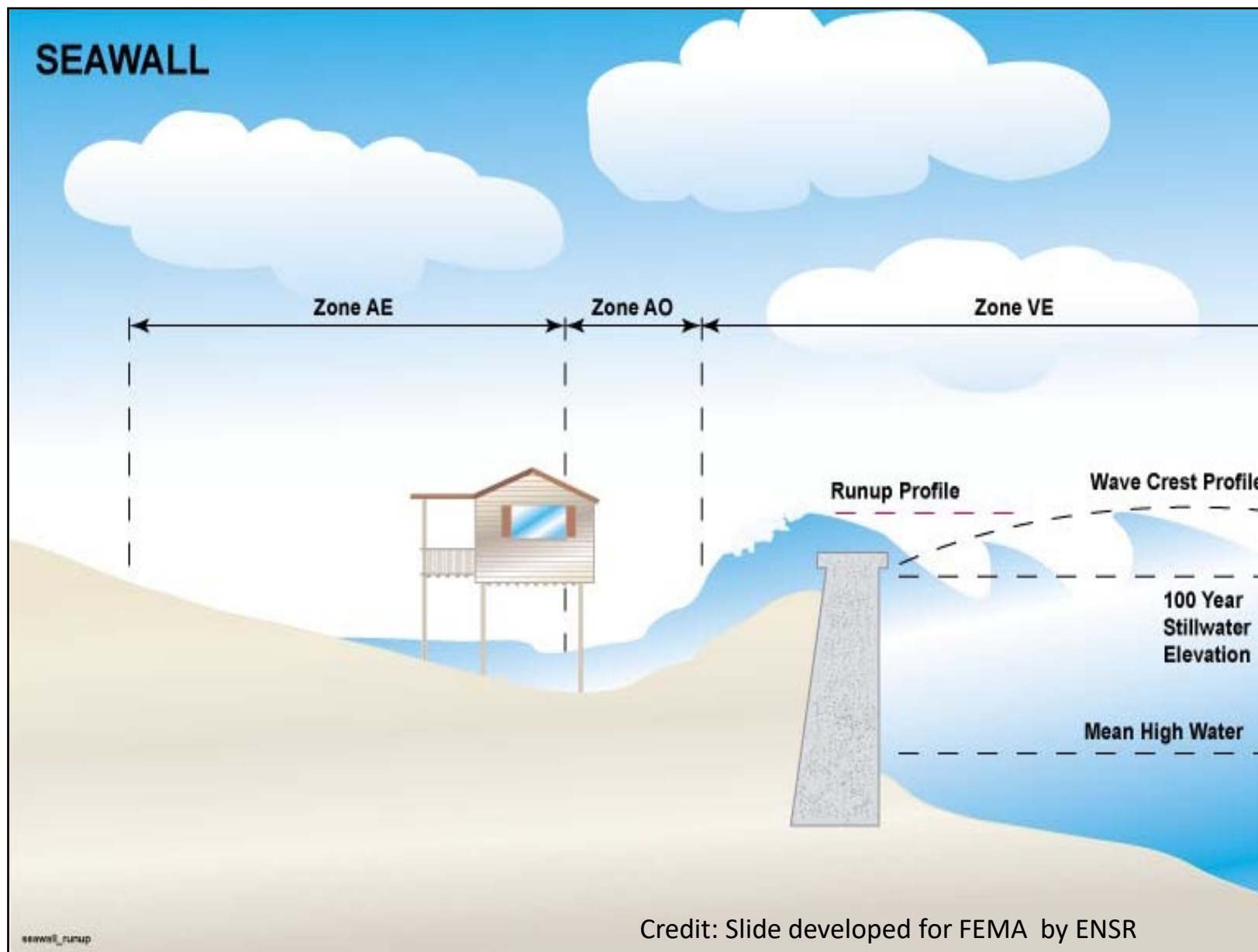
Note: In some areas, the LiMWA divides the Zone V and Zone X only and there is no A Zone, and therefore no MiWA or MoWA.



What is Zone AO?

Zone AO – “Overwash” areas with flow depths of 1 to 3 feet, with directional flow during flood events, and is often found on barrier beaches.

- Generally coastal with sloping ground
- Flow velocities can vary greatly
- Flow paths are typically not well defined
- *In proposed LSCSF regulations: AO Zone will have the same performance standards as the MoWA.*



Credit: Slide developed for FEMA by ENSR



Example 7: No MoWA, AO Zone Present

Location: Atlantic Ave, Salisbury

White lines = flood zone boundaries

LiMWA = boundary between MoWA and MiWA.
Triangles point towards higher hazard area.

Zone AE and VE elevations (EL) are Base Flood Elevation.

Notes:

1. In some cases, there is no MoWA as the LiMWA divides the Zone V and MiWA only.
2. In new LSCSF regulations: AO Zone will have the same perf standards as the MoWA. The AO Zone is considered an overwash area with directional flow during flood events. Often found on barrier beaches.

Tip: The NFHL viewer allows you to toggle on/off the LiMWA layer to verify that the LiMWA line coincides with the V/A boundary in some places.



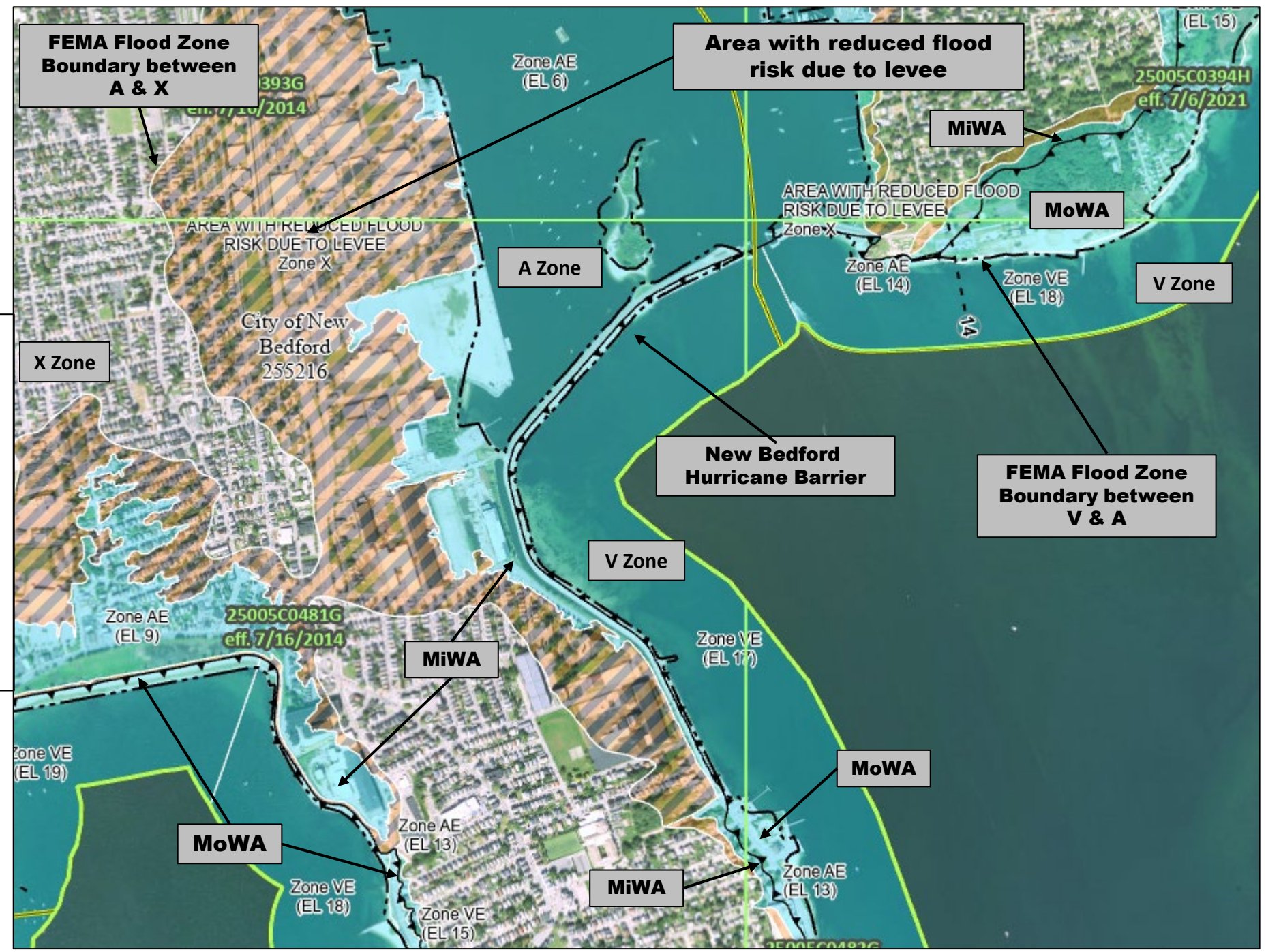
Example 8: Levee

Location: Harbor & Cove Streets, New Bedford

White lines = flood zone boundaries

LiMWA = boundary between MoWA and MiWA. Triangles point towards higher hazard area.

Zone AE and VE elevations (EL) are Base Flood Elevation.



Example 9: Quiz

Location: Swampscott

X Zone

V Zone

A Zone

LiMWA →

MoWA →

MiWA →

AO Zone

FEMA Flood Zone Boundary between V & A →

FEMA Flood Zone Boundary between A & X →



White lines = flood zone boundaries

LiMWA = boundary between MoWA and MiWA. Triangles point towards higher hazard area.

Zone AE and VE elevations (EL) are Base Flood Elevation.

Example 9: ANSWER

Location: Swampscott

In the proposed LSCSF regulations:
AO Zone has the same performance standards as the MoWA.

The AO Zone is considered an
overwash area with directional flow
during flood events.



White lines = flood zone boundaries

LiMWA = boundary between MoWA and MiWA. Triangles point towards higher hazard area.

Zone AE and VE elevations (EL) are Base Flood Elevation.



Example 10: Quiz

Location: Scituate

A Zone

V Zone

X Zone

LiMWA

MiWA

MoWA

FEMA Flood Zone Boundary between A & X

FEMA Flood Zone Boundary between V & A



White lines = flood zone boundaries

LiMWA = boundary between MoWA and MiWA. Triangles point towards higher hazard area.

Zone AE and VE elevations (EL) are Base Flood Elevation.



Example 10: ANSWER

Location: Scituate

MoWA

No MoWA as the LiMWA separates the V and A



White lines = flood zone boundaries

LiMWA = boundary between MoWA and MiWA. Triangles point towards higher hazard area.

Zone AE and VE elevations (EL) are Base Flood Elevation.



Example 10: Toggle the LiMWA

Location: Scituate

FEMA Map Service Center: msc.fema.gov

White lines = flood zone boundaries

LiMWA = Limit of Moderate Wave Action

To Toggle the LiMWA on/off in the viewer:

1. Click/open the layer list
2. Open the NFHL dropdown
3. Click/unclick Limit of Moderate Wave Action



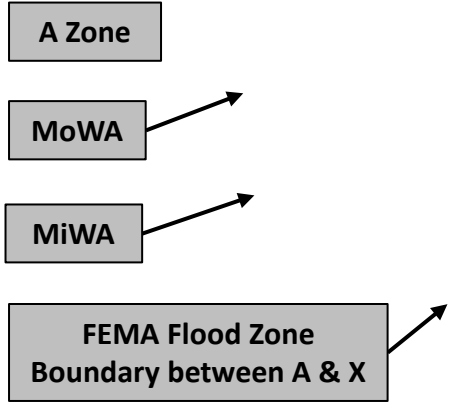
The screenshot shows the FEMA NFHL Viewer interface. The map displays flood zones for Scituate, Massachusetts, including Zone AE (EL 15) and Zone VE (EL 18). A red dashed line indicates the Limit of Moderate Wave Action (LiMWA). A box labeled 'LiMWA On' is positioned over the red dashed line, and a box labeled 'LiMWA Off' is positioned below it. A 'Seawall' is also labeled on the map. The 'Layer List' panel on the right shows various layers, with 'NFHL' selected. Three numbered callouts point to the 'Layer List', the 'NFHL' dropdown, and the 'Limit of Moderate Wave Action' checkbox.

1. Open Layer List
2. Open the NFHL dropdown
3. Click/unclick Limit of Moderate Wave Action

Layer	Checked
Effective FIRM Panels	<input checked="" type="checkbox"/>
NFHL	<input checked="" type="checkbox"/>
NFHL Availability	<input checked="" type="checkbox"/>
FIRM Panels	<input type="checkbox"/>
LOMRs	<input checked="" type="checkbox"/>
LOMAs	<input type="checkbox"/>
Political Jurisdictions	<input checked="" type="checkbox"/>
Profile Baselines	<input checked="" type="checkbox"/>
Water Lines	<input type="checkbox"/>
Cross-Sections	<input checked="" type="checkbox"/>
Base Flood Elevations	<input checked="" type="checkbox"/>
Levees	<input checked="" type="checkbox"/>
Submittal Info	<input type="checkbox"/>
Coastal Transects	<input checked="" type="checkbox"/>
Transect Baselines	<input checked="" type="checkbox"/>
General Structures	<input checked="" type="checkbox"/>
River Mile Markers	<input checked="" type="checkbox"/>
Water Areas	<input type="checkbox"/>
PLSS	<input type="checkbox"/>
Limit of Moderate Wave Action	<input type="checkbox"/>
Flood Hazard Boundaries	<input checked="" type="checkbox"/>
Flood Hazard Zones	<input checked="" type="checkbox"/>

Example 11: ANSWER

Location: Rockport



No Zone A, the LiMWA separates the Zone V from the Zone X.

No MiWA and no MoWA

White lines = flood zone boundaries

LiMWA = boundary between MoWA and MiWA. Triangles point towards higher hazard area.

Zone AE and VE elevations (EL) are Base Flood Elevation.



Delineating (or Reviewing Delineation of) Flood Zones on Site Plans

Zone A/X or V/X Zone boundary

(landward extent of 1% chance flood)

- Use flood and ground elevations
 - Use same datum for all elevations
 - Newer FIRMs typically referenced to NAVD 88
 - Use best available topography (e.g., site survey, LIDAR)
 - Flood elevation of the most landward flood zone
 - BFE on FIRMs is rounded to the nearest foot

Methodology described on p. 1-83 in: [Applying the Massachusetts Coastal Wetlands Regulations: A Practical Manual for Conservation Commissions to Protect the Storm Damage Prevention and Flood Control Functions of Coastal Resource Areas](#) (aka the Coastal Manual)



Delineating (or Reviewing a Delineation of) Flood Zones on Site Plans

Zone V/A Zone boundary

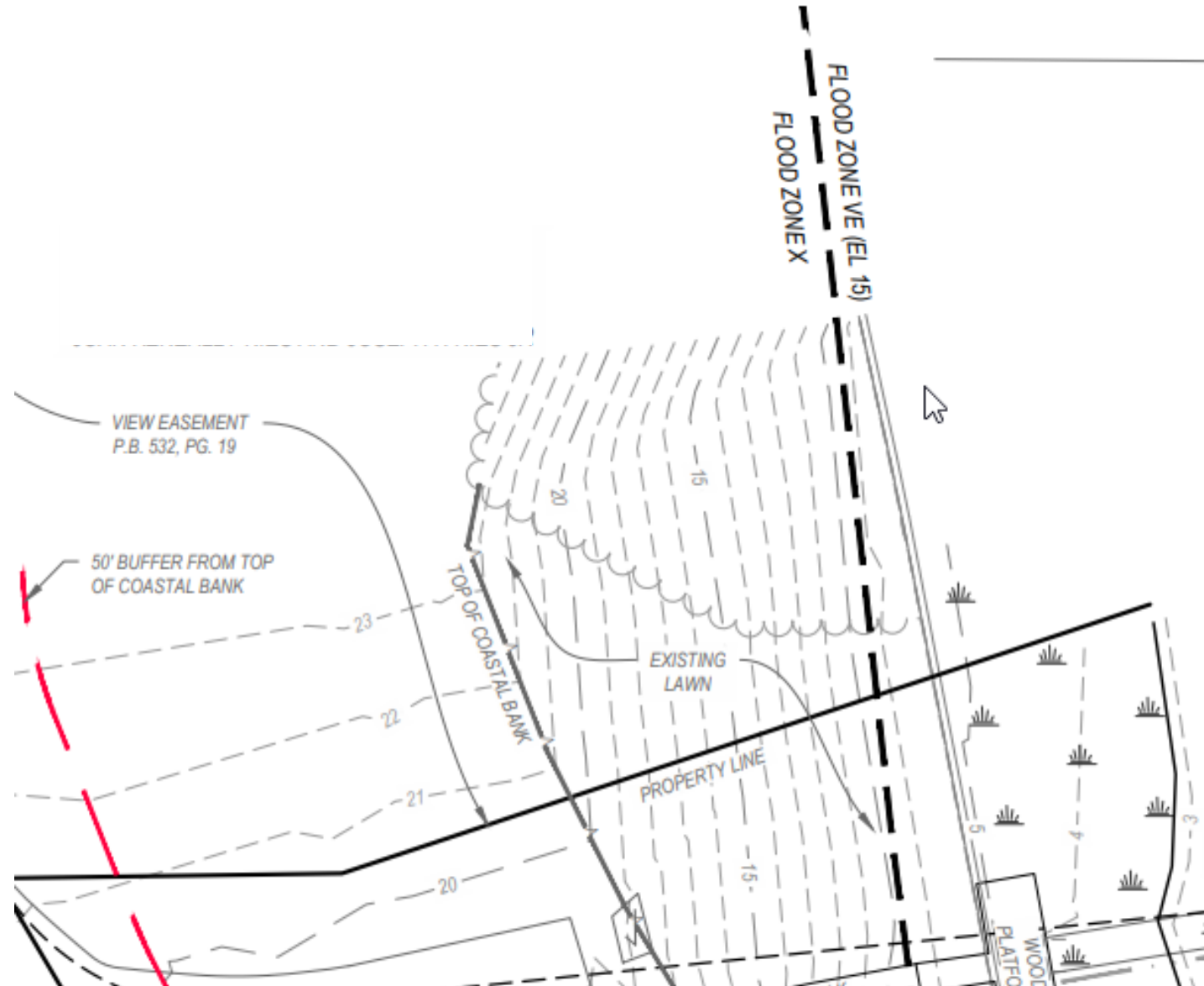
- Can't be determined by ground elevation
- Must use the location of the boundary on the FIRM
- What is shown on the FIRM can be based on:
 - Wave height
 - Wave runup
 - Splash zone behind a coastal engineering structure (typically 30' from the seaward face)
 - Primary Frontal Dune
- Use the same technique to delineate the LiMWA line

Methodology described on p. 1-82 in: [Applying the Massachusetts Coastal Wetlands Regulations: A Practical Manual for Conservation Commissions to Protect the Storm Damage Prevention and Flood Control Functions of Coastal Resource Areas](#) (aka the Coastal Manual)



Reviewing Delineation of Flood Zones on Site Plans

- VE/X flood zone boundary is incorrectly scaled from FEMA Flood Map.
- It should be delineated at the ground contour corresponding to the Base Flood Elevation for the landward most flood zone (Elevation 15)





Contacts:

Nate Corcoran, Coastal Policy Analyst, MassDEP
Wetlands Program

nate.corcoran@mass.gov

<https://www.mass.gov/guides/wetlands-information>

Rebecca Haney, Coastal Geologist,
MA Office of Coastal Zone Management

rebecca.haney@mass.gov

www.mass.gov/czm

Mia McDonald, Training, Outreach & Circuit Rider
Coordinator for MassDEP Wetlands

mia.mcdonald@mass.gov

Questions?



Photo Credit: CZM



Coastal Floodplain Outreach Materials

- ArcGIS Story Map
- Poster
- Video
- Brochures available in English, Arabic, Spanish and Portuguese!

COMING SOON!



<https://www.mass.gov/info-details/wetlands-information>

ما الذي يجعل السهول الفيضية الساحلية بهذه الأهمية؟

هل أنا موجود في سهل فيضي ساحلي؟

تضم ولاية Massachusetts العديد من أنواع السهول الفيضية الساحلية - بدءاً من المستنقعات المالحة والشواطئ الساحلية، وحتى الأنهار العذبة والمناطق النضوية وريفية المتقدمة.

تؤدي السهول الفيضية الساحلية وظائف أساسية من أجلنا، ومن أجل الحياة البرية، ومن أجل البيئة كذلك، ونذكر منها:

توفر بعض أجزاء السهول الفيضية الساحلية العديد من فوائد الحياة البرية الأخرى مثل:

عندما تتداخل مناطق موارد الأراضي الرطبة الأخرى (مثل المستنقعات المالحة) مع السهول الفيضية الساحلية، فإنها توفر موئلاً للحياة البرية وصياد الأسماك.

Por que as Planícies Aluviais Costeiras são importantes?

As planícies aluviais costeiras abrangem muitas funções essenciais para nós, para a vida selvagem e para o meio ambiente.

Permitem que a vegetação existente atue como um filtro para a poluição.

As planícies aluviais costeiras funcionam como uma barreira contra a força do oceano, pois absorvem o impacto das ondas e protegem as áreas continentais da erosão costeira, de inundações e dos danos causados pelas tempestades.

Estoy en una Planicie Aluvial Costera?

Massachusetts possui muitos tipos de planície aluvial costeira - desde marismas e praias costeiras até rios de maré e áreas urbanas e rurais desenvolvidas.

Algumas partes de nossa planície aluvial costeira, como as Reservas Great Marsh ou Belle Isle Marsh, são importantes refúgios para os peixes e a vida selvagem. O solo dessas áreas absorve e retém carbono, filtra a água e protege as áreas continentais da erosão, dos danos causados pelas tempestades e de inundações.

Outras áreas da planície aluvial são mais desenvolvidas, e abrigam importantes centros comerciais, industriais e históricos. Revere é uma das cidades com maior ritmo de crescimento de Massachusetts e, em grande parte, localiza-se dentro da planície aluvial costeira. O histórico Município de Plymouth depende da planície aluvial costeira como forma de proteção contra os danos causados pelas inundações, controle das inundações decorrentes da força das chuvas, e promoção do turismo e da economia marinha.

Saber se você está em uma planície aluvial costeira é importante para compreender os riscos de inundações e tempestades. A medida que o nível do mar aumenta, os riscos de inundações em muitas planícies aluviais costeiras mudam. É possível conferir os riscos de inundação atuais e futuros no ícon de mapa neste mapa interativo.

¿Por qué son importantes las Llanuras Aluviales Costeras?

Las llanuras aluviales costeras proporcionan muchas funciones esenciales para nosotros, para la vida silvestre y para el medio ambiente.

Permitem que la vegetación existente actúe como un filtro para prevenir la contaminación.

Las llanuras aluviales costeras proporcionan un amortiguador contra la fuerza del océano, absorbiendo la energía de las olas, protegiendo áreas interiores de la erosión costera, las inundaciones y los daños causados por las tormentas.

¿Estoy en una Llanura Aluvial Costera?

Massachusetts tiene muchos tipos de llanuras aluviales costeras, desde marismas de sal y playas costeras, hasta ríos de marea y áreas urbanas y rurales desarrolladas.

Algunas partes de nuestras llanuras aluviales costeras, como el Gran Pantano o el Pantano Belle Isle, proporcionan refugios importantes para peces y vida silvestre. Sus suelos absorben y atrapan carbono, filtran el agua y protegen áreas interiores de la erosión, los daños causados por las tormentas y las inundaciones.

Otras áreas dentro de la llanura aluvial están más desarrolladas y apoyan centros comerciales, industriales e históricos importantes. Revere es una de las ciudades de más rápido crecimiento en Massachusetts y está en gran parte situada dentro de la planície de inundación costera. La histórica Ciudad de Plymouth depende de la planície de inundación costera para proporcionar protección contra daños causados por tormentas y control de inundaciones, y para apoyar el turismo y la economía marina.

Saber si te encuentras en una llanura aluvial costera es importante para entender los riesgos de inundación y tormenta. A medida que suben los niveles del mar, los riesgos de inundación en muchas llanuras aluviales costeras están cambiando. Puedes verificar tu riesgo actual y futuro de inundación costera usando nuestro mapa interactivo y código QR.

Why are coastal floodplains important?

Coastal floodplains provide many essential functions for us, for wildlife, and for the environment.

When other wetland resource areas (like salt marsh) overlap coastal floodplains, they provide habitat for wildlife and fisheries.

Coastal floodplains infiltrate flood water into low-lying areas and permeable soils during storms and extreme high tides.

Coastal floodplains help to protect coastal communities from sea level rise.

Allowing existing vegetation to act as a filter to prevent pollution.

Coastal floodplains provide a buffer against the force of the ocean, absorbing wave energy, protecting inland areas from coastal erosion, flooding and storm damage.

Some parts of our coastal floodplain, like the Great Marsh or Belle Isle Marsh provide important refuges for fish and wildlife. Their soils absorb and trap carbon, filter water, and protect inland areas from erosion, storm damage and flooding.

Other areas within the floodplain are more developed, and support important commercial, industrial, and historic hubs. Revere is one of the fastest growing cities largely situated within coastal floodplains. The historic Town of Plymouth relies on the coastal floodplain to provide storm damage protection and flood control from the force of storms, and to support the tourism and marine economy.

Knowing if you are located in a coastal floodplain is important for understanding flood and storm risks. As sea levels rise, flood risks in many coastal floodplains are changing. You can check your current and future coastal flood risk using our interactive map and QR code.

This project was made possible in part by a Wetland Program Development Grant from the U.S. Environmental Protection Agency (Region One), Section 104 (b)(3) of the Federal Clean Water Act.