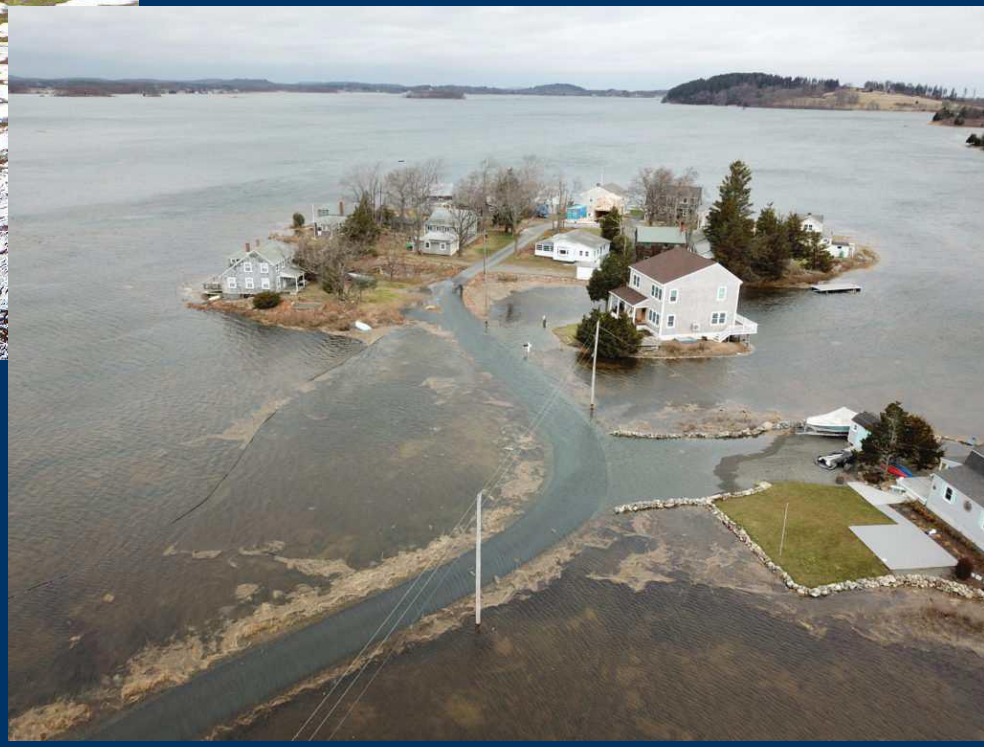
Land Subject to Coastal Storm Flowage

Lealdon Langley
Mass DEP

Rebecca Haney
MA CZM

Storms and Coastal Flooding Pose Hazards to Public Safety



…damage our infrastructure

…and cost billion$ in property damage,

Total for all events $369,806,003

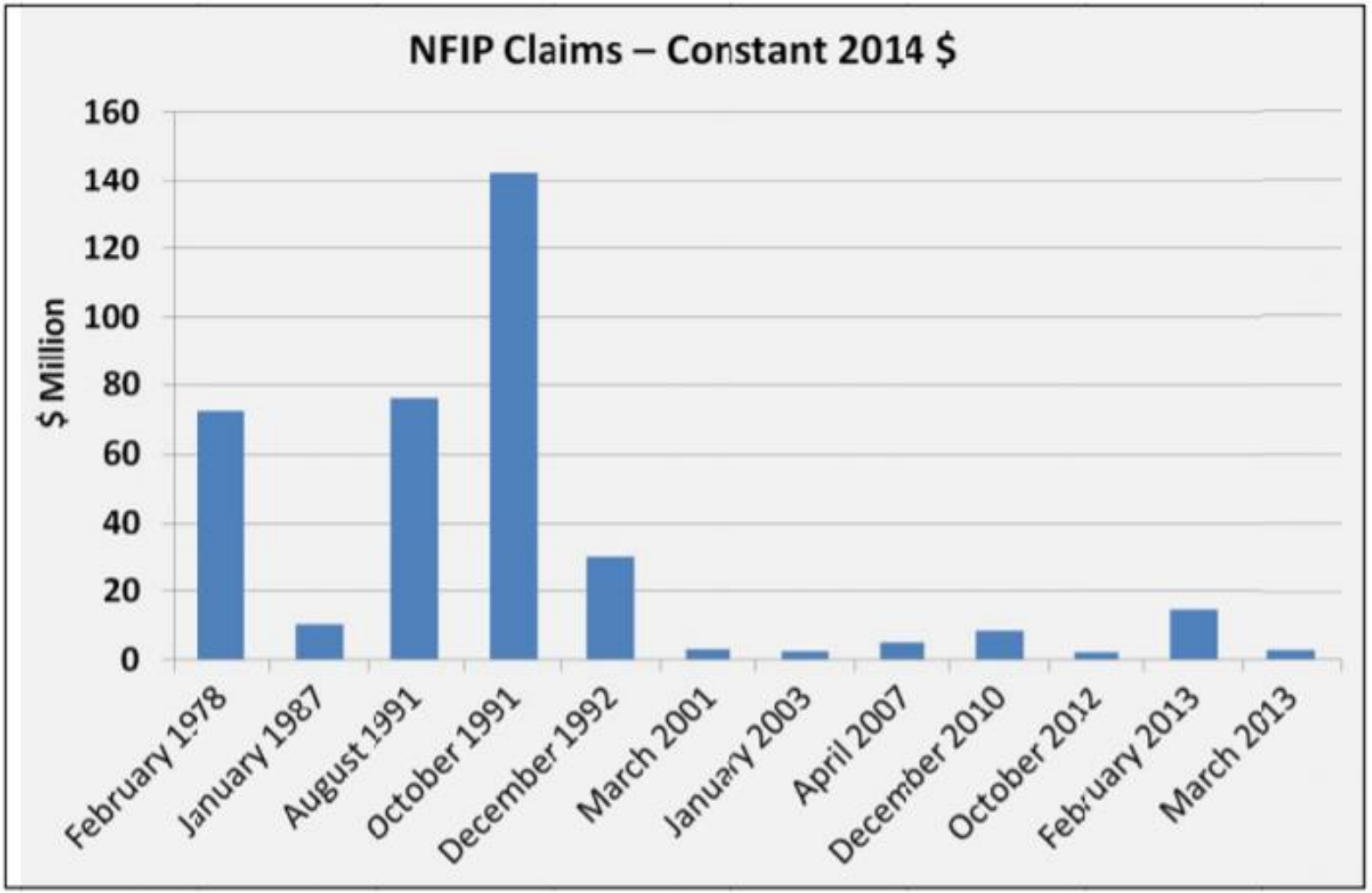
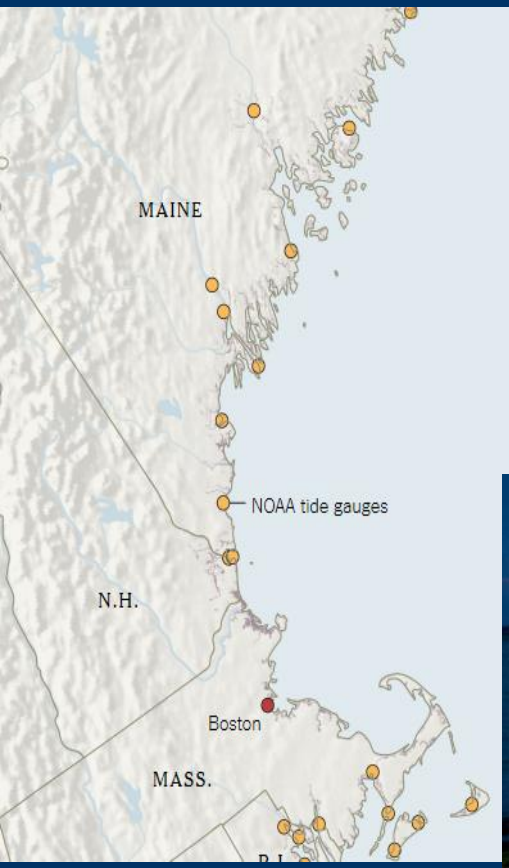


Figure 2: Massachusetts NFIP Claims in Coastal Communities (Constant 2014 dollars) Source: DCR Flood Hazard Management Program, July 2014.



A Sharp Increase In 'Sunny Day' Flooding

By JONATHAN CORUM SEPT. 3, 2016

Global warming and rising seas are increasing the amount of tidal flooding on the Atlantic and Gulf Coasts. Flood levels are different from city to city, but the trends are similar. Related Article

Boston
The city has not been hit by tidal flooding as hard as cities farther south, but it is working on a plan to combat flooding and sea-level rise.

The New York Times

Flooding of Coast, Caused by Global Warming, Has Already Begun

Scientists' warnings that the rise of the sea would eventually imperil the United States' coastline are no longer theoretical.

By JUSTIN GILLIS SEPT. 3, 2016

…and its frequency is increasing.

LSCSF Advisory Group

- Met in 2014 – 2015
- 2015-2018 Worked on FEMA map revisions
- Reconvened June 2018
- Plan to publish draft for public comment in 2019

Membership of the LSCSF Technical Advisory Group

• Dorothy McGlincy	MACC	ConCom Advocacy
• Richard Nylen, Esq.	NAIOP	Commercial Development
• Heidi Ricci	MassAudubon	Advocacy
• Glenn Wood	AMWS	Law
• Rebecca Haney	CZM	Coastal Geology
• Michelle Rowden	Salisbury Con Com	Wetlands
• Jim O'Connell	Private consulting	Coastal Geology
• John Ramsey	Private Consulting	Modeling/Engineering
• Timothy Jones	MassDEP	Wetlands Law/Policy
• Lealdon Langley	MassDEP	Wetlands/Policy
• Jill Provencal	MassDEP	Wetlands
• James Mahala	MassDEP	Coastal Processes
• Julia Knisel	CZM	Climate /Sea Level Rise
• Daniel Sieger	EOEEA	Assistant Secretary
• Stephanie Kruel	Private Consulting	Wetlands/Planning
• Sean Riley	Private Consulting	Engineering
• Seth Wilkinson	Private Consulting	Bio-Engineering
• Joy Duperault	DCR	Flood Plain Regulation

Contents

- Limited Project for Coastal Resiliency
- Preamble
- Definitions
- Define boundaries
- Performance standards
- Resiliency
- Redevelopment
- Does not include wildlife habitat standards

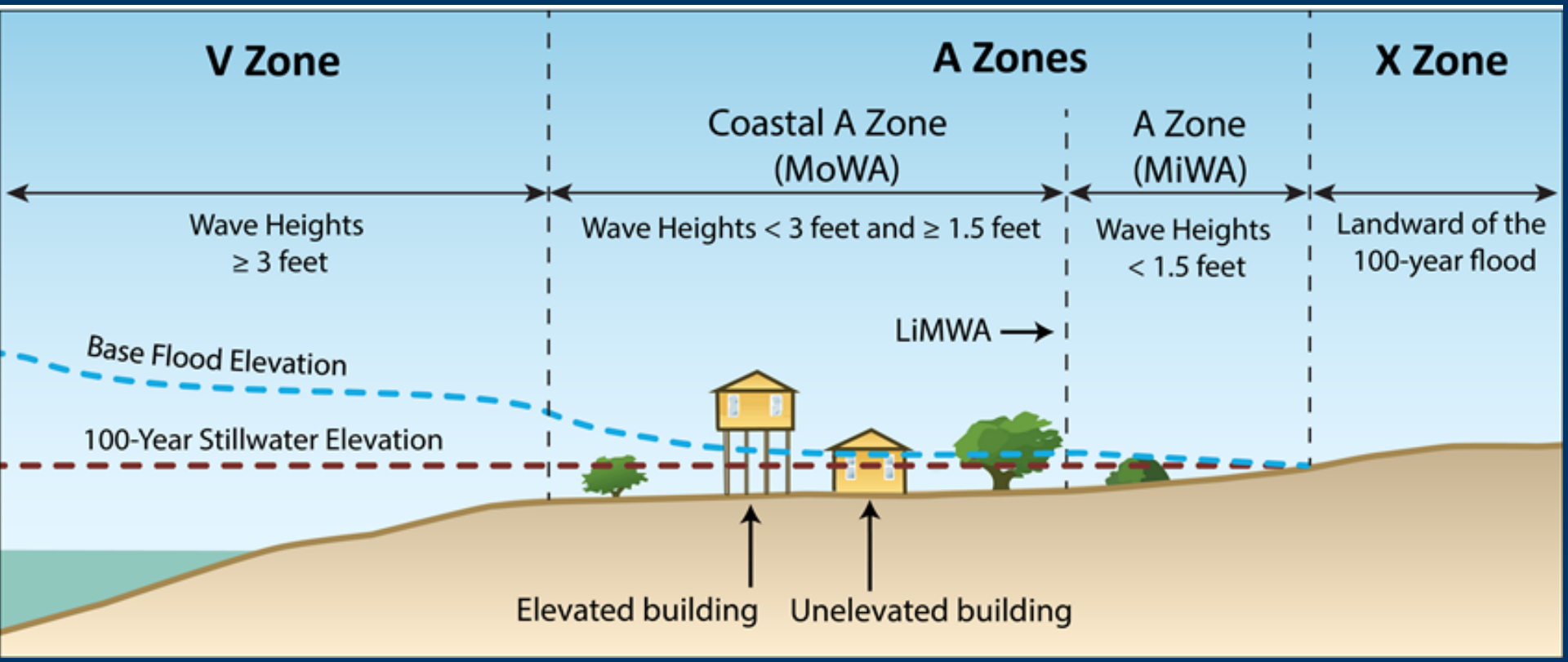
Critical characteristics of LSCSF that play a role in storm damage prevention and flood control

- Topography
- Vegetation
- Permeability of soils vs. impervious surfaces, e.g. roadways parking areas
- Constrict ion of flows that increase scour or increase velocity.

Regulations would accommodate

- Repair and modification of coastal engineering structures
- Walkways, restoration projects and other projects that are benign or improve conditions
- Projects that facilitate navigation, and the launching and securing of vessels

FEMA Flood Zones



Function: Ability to Erode, Shift, Move, Buffer Wave Action

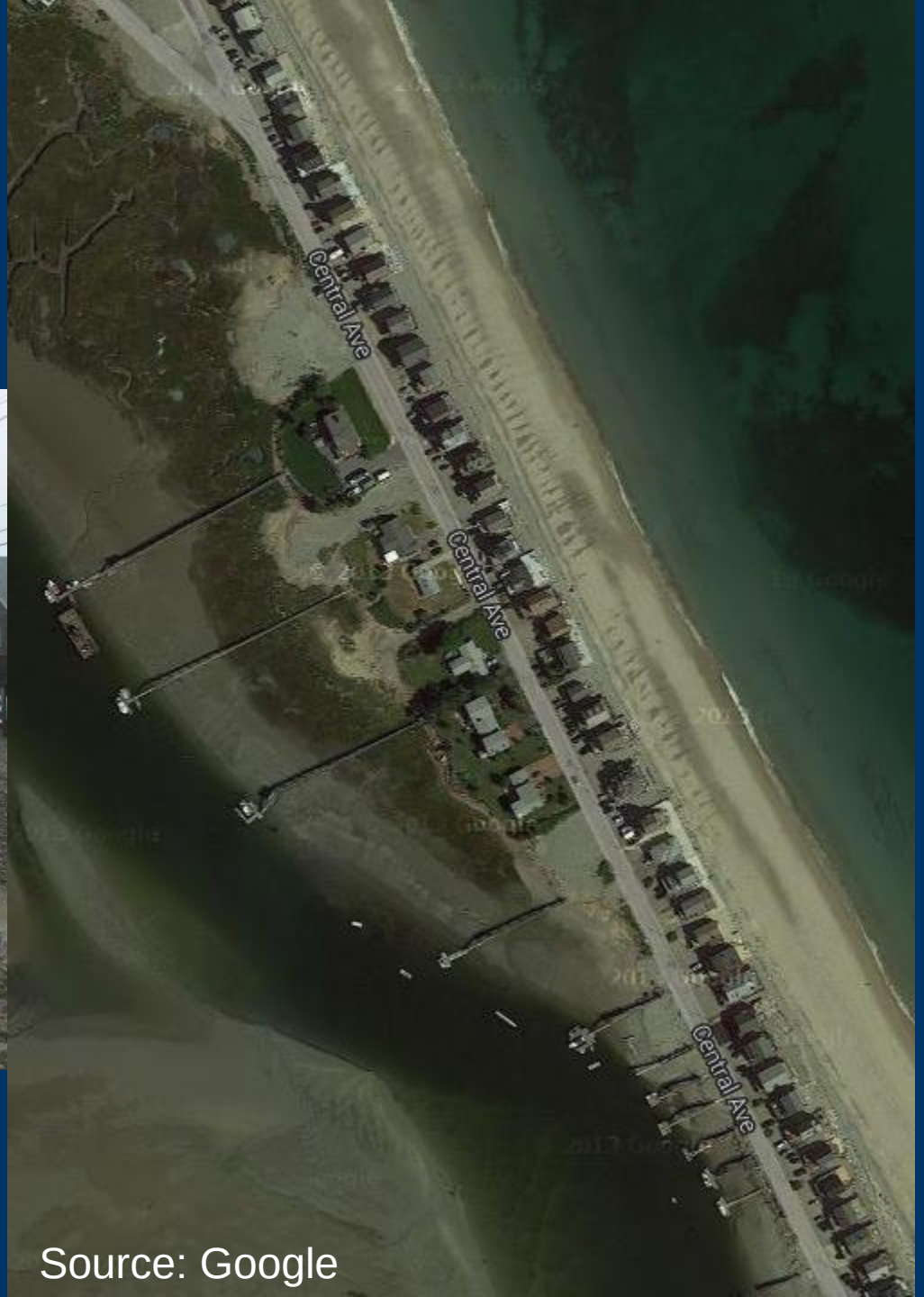
Scituate

Rockport

Friction Force Decreased

Function: Ability to Move, Shift, Migrate, Transport Sediment

Scituate
April, 2007



Source: Google

Function: Buffer Flood Water

Obstructions to Flow

Reduced Floodplain Function

Impacts to Roads & Utilities


Hull

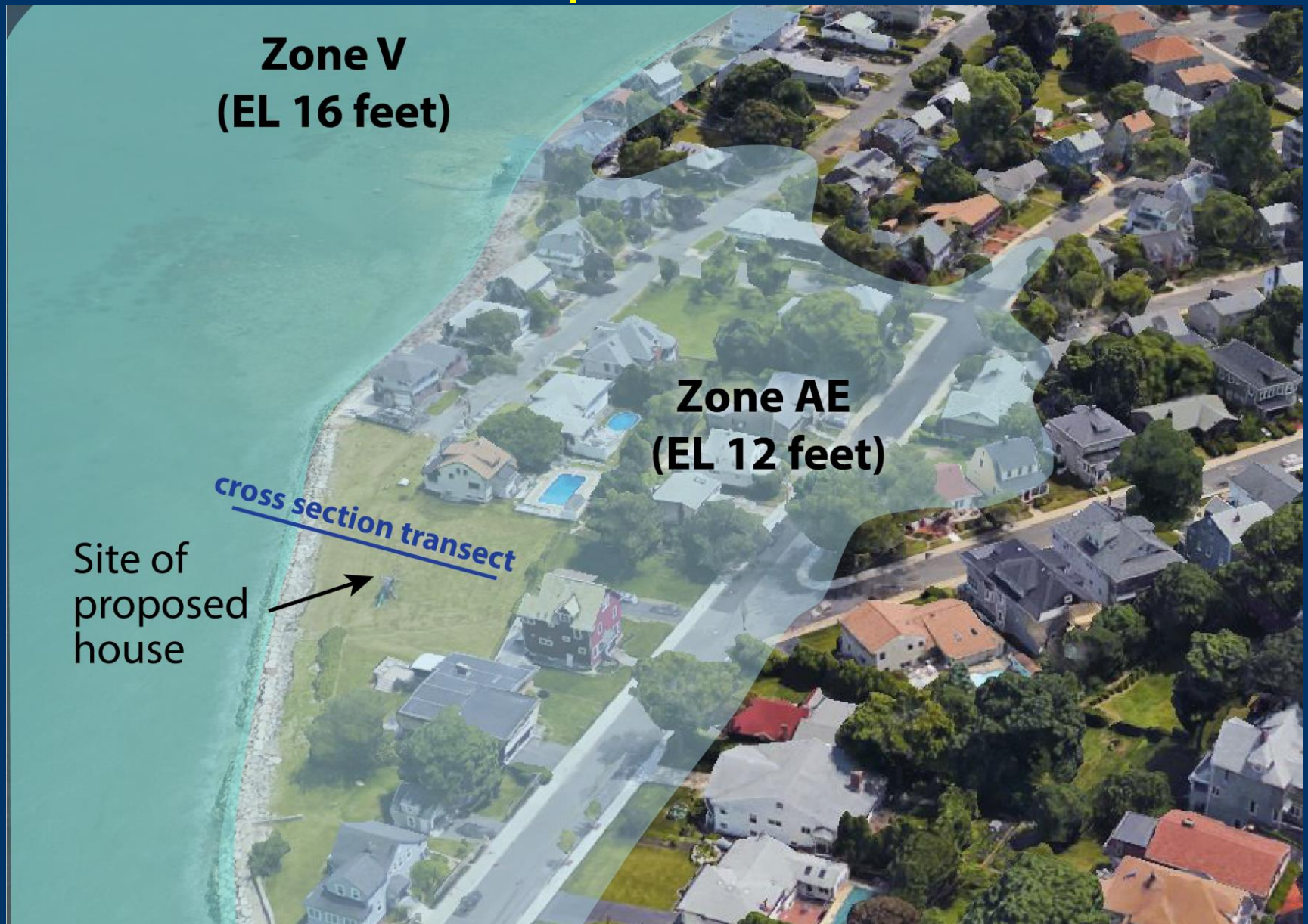

Westport


Oak Bluffs

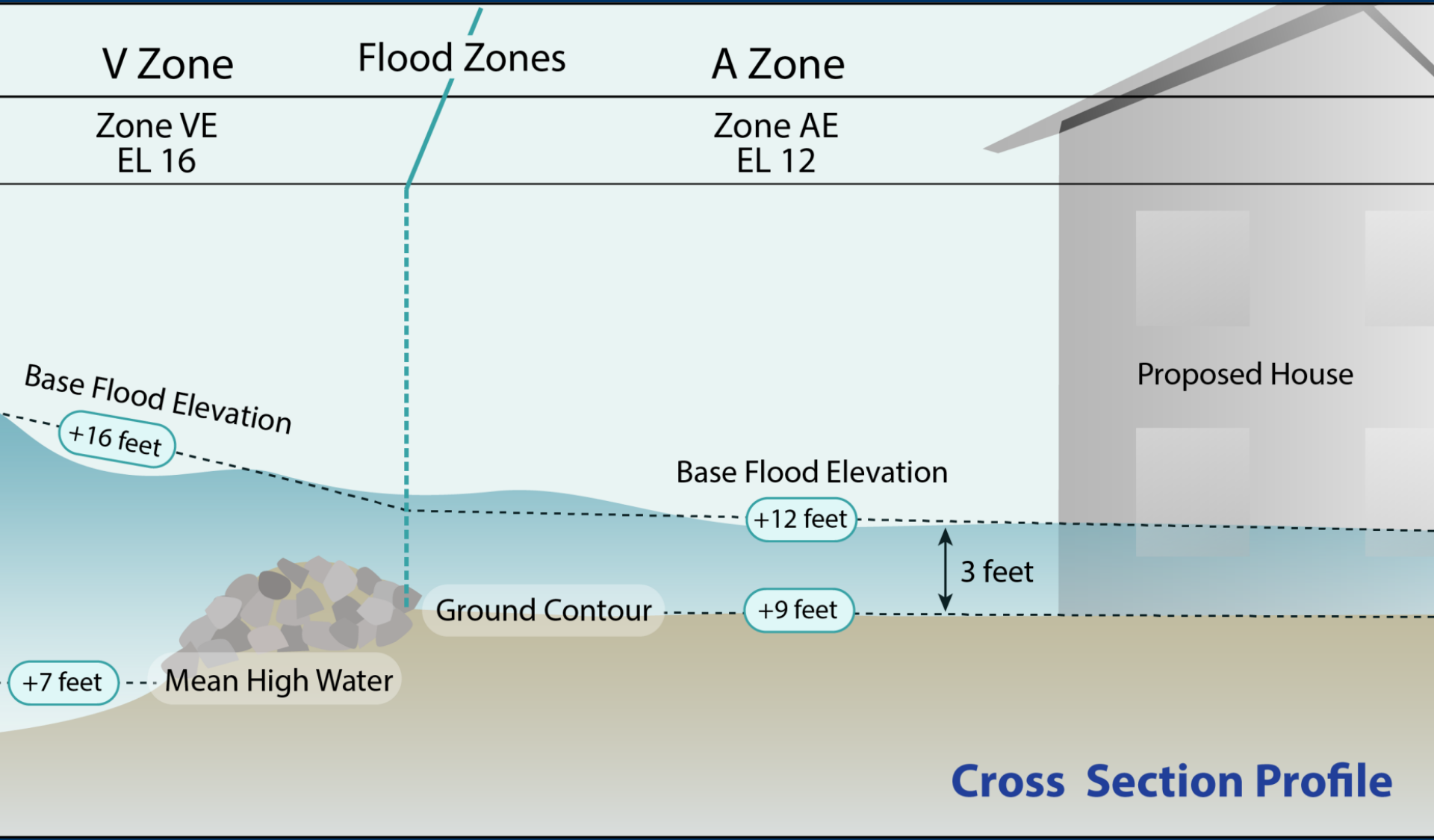

Scituate

Impacts to Public Health & Safety

Scenario #1: New Development in a Densely Developed A Zone

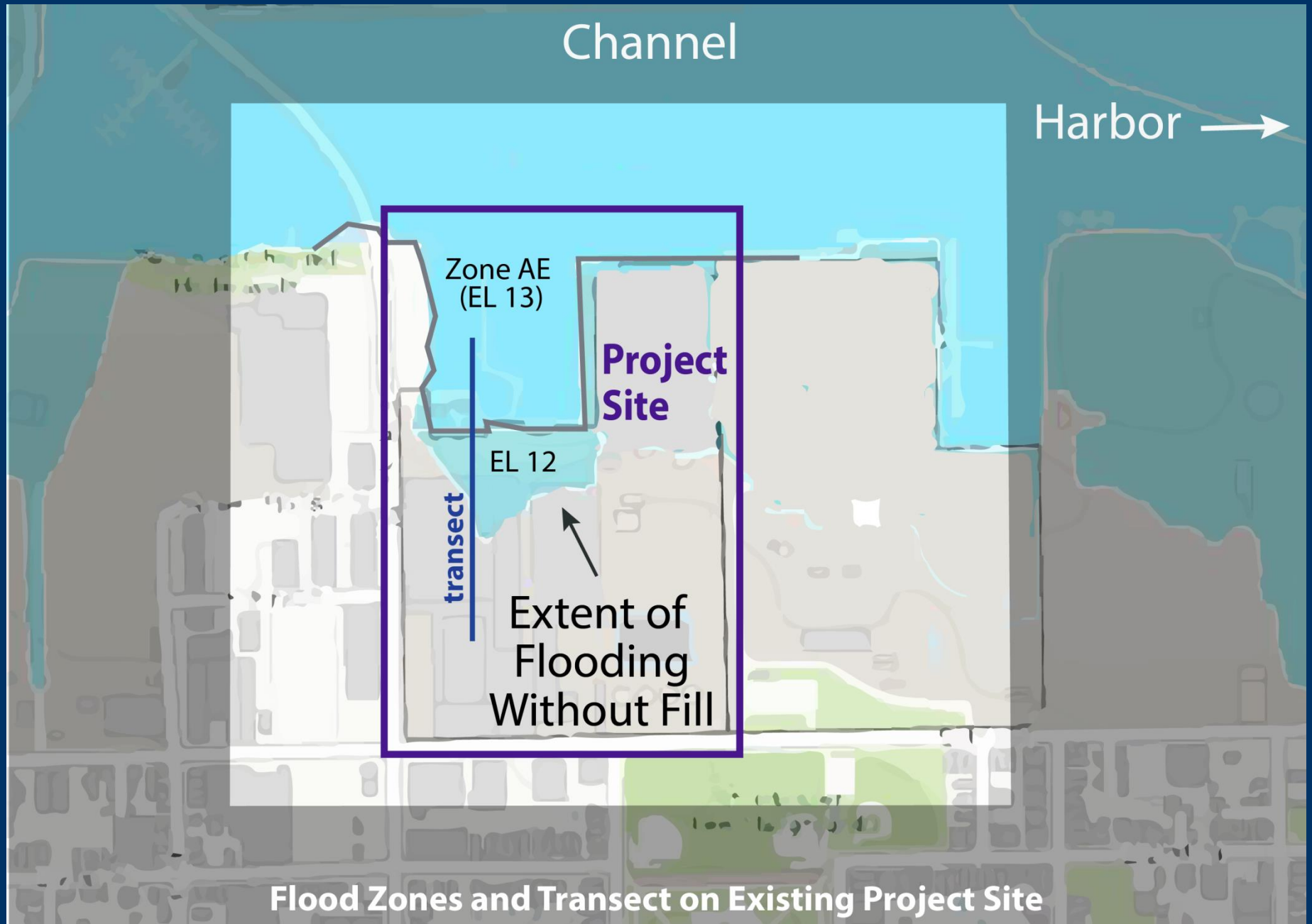


Scenario #1


V Zone
Flood Zones
A Zone
Zone VE
EL 16
Zone AE
EL 12
Proposed House
Base Flood Elevation
+16 feet
Base Flood Elevation
+12 feet
3 feet
Ground Contour
+9 feet
+7 feet
Mean High Water
Cross Section Profile

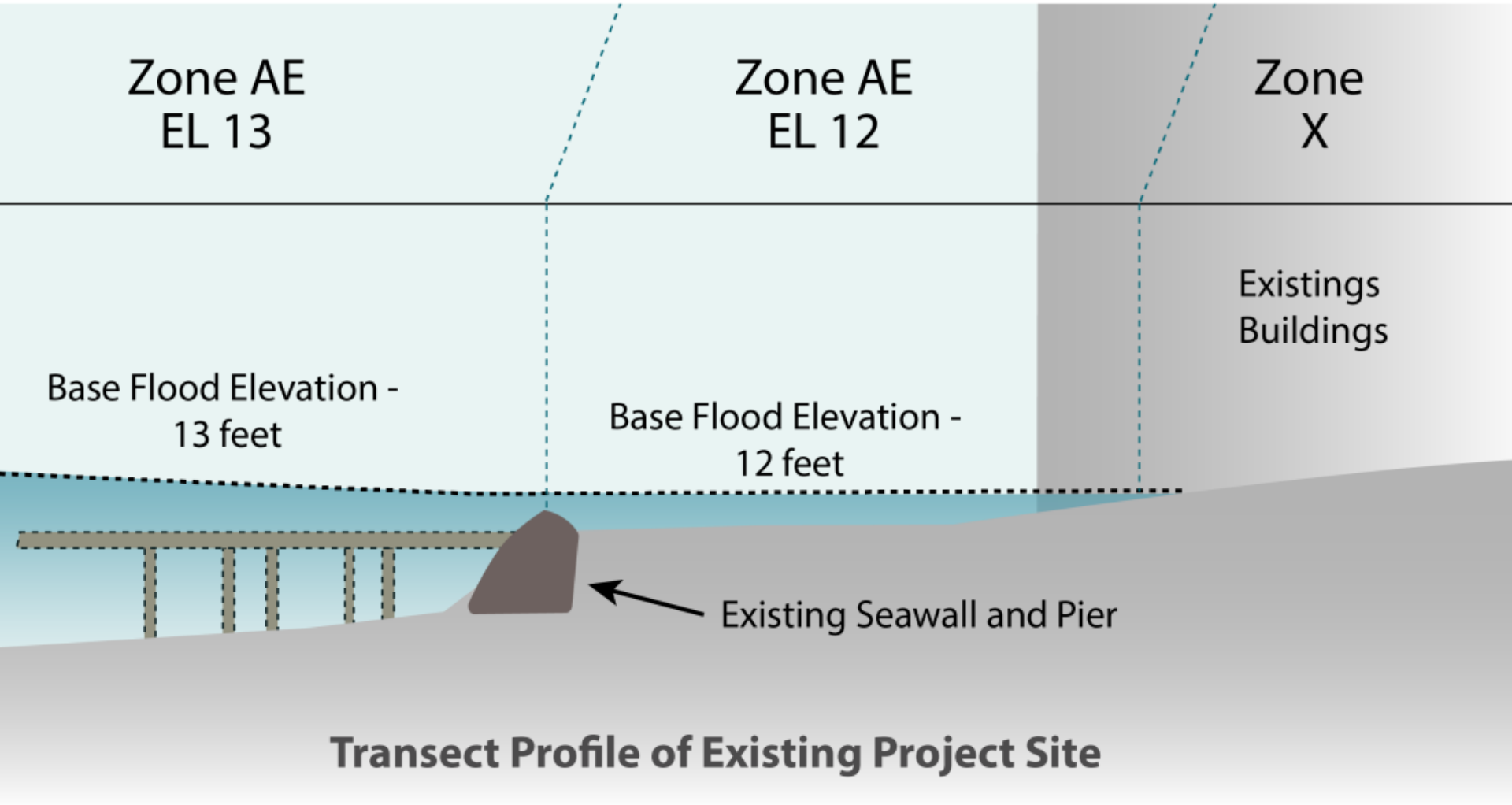

Zone V
(EL 16 feet)
Zone AE
(EL 12 feet)
cross section transect
Site of
proposed
house

Scenario #2: Urban Redevelopment A Zone

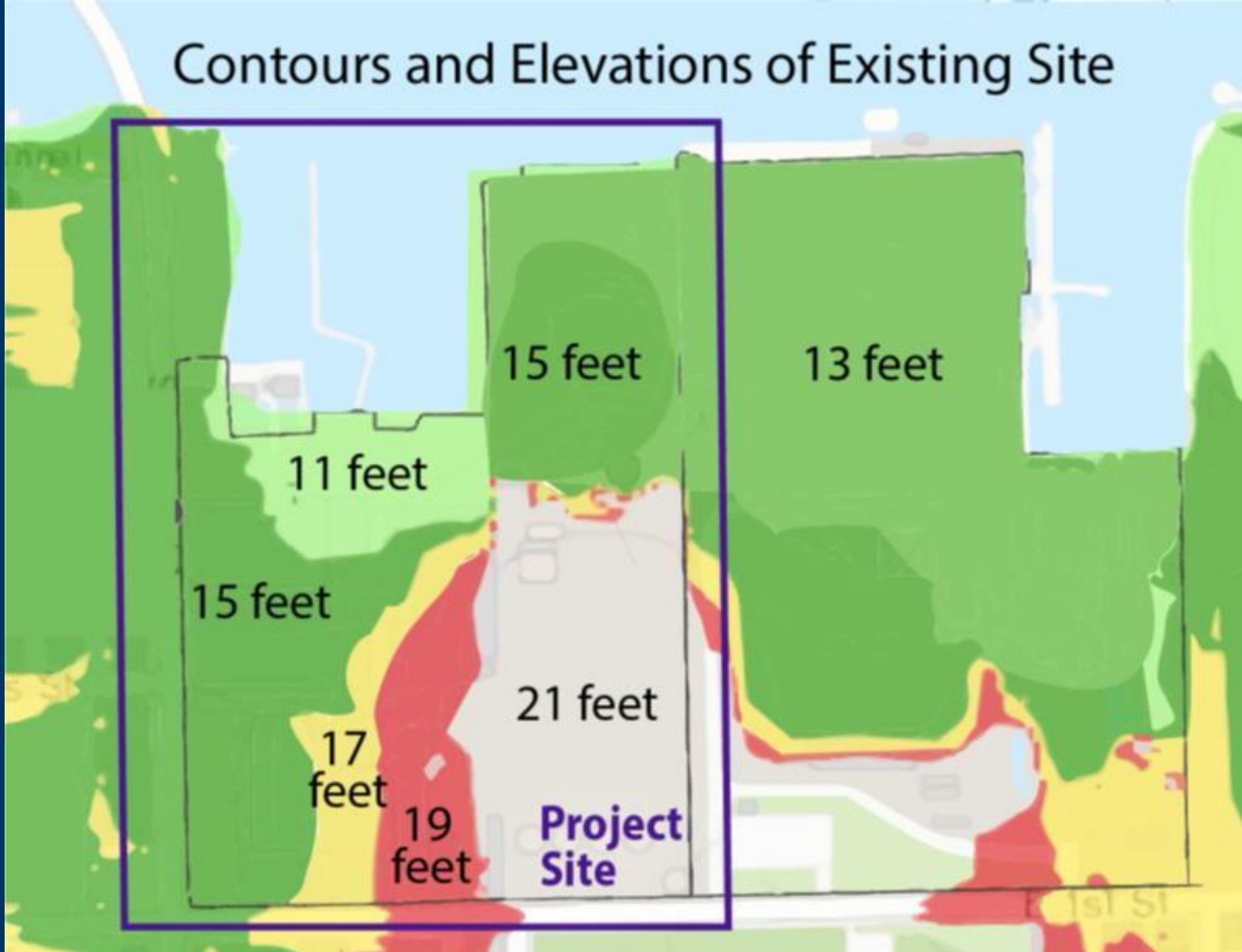


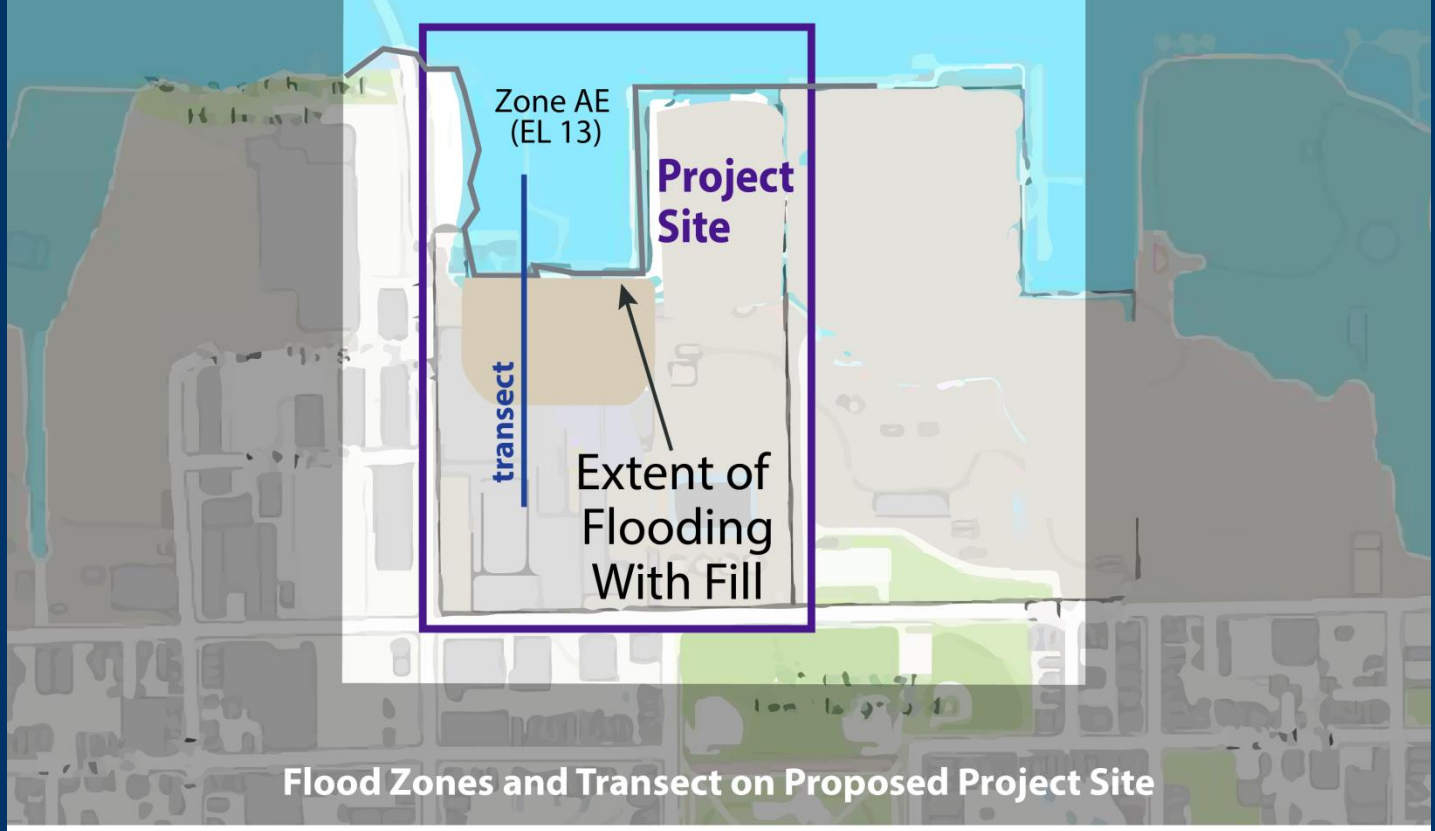
Flood Zones and Transect on Existing Project Site

Scenario #2: Urban Redevelopment A Zone

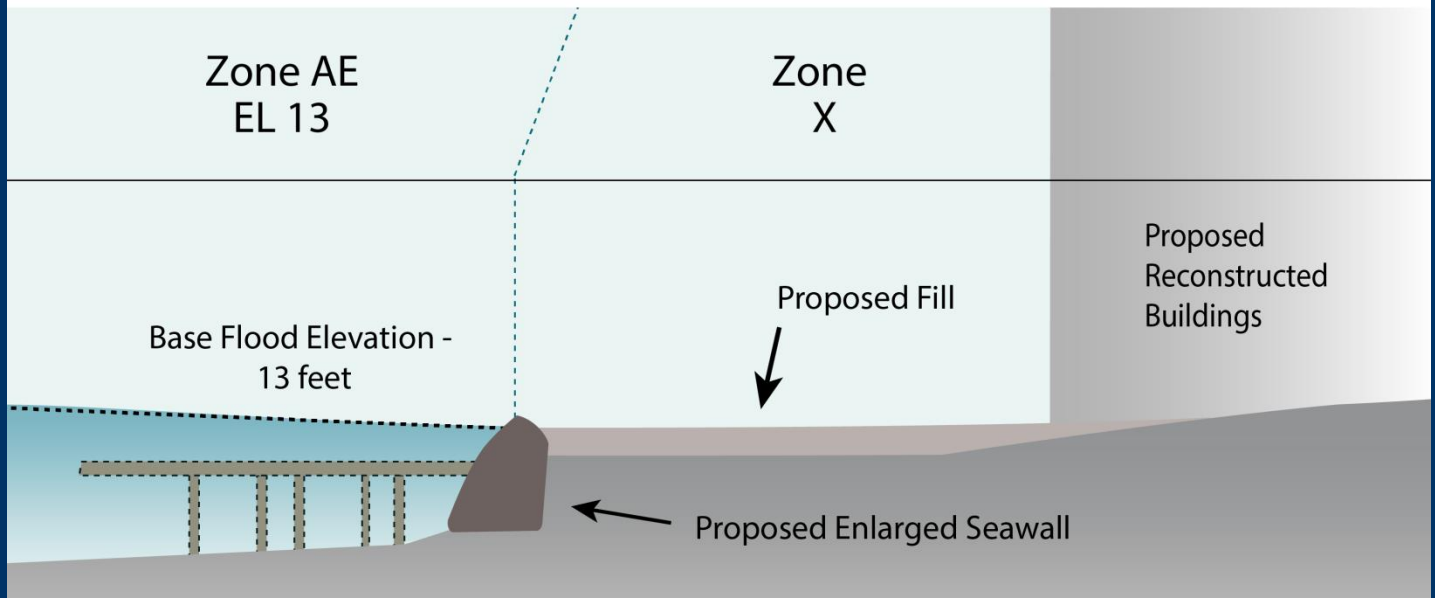


Contours and Elevations of Existing Site

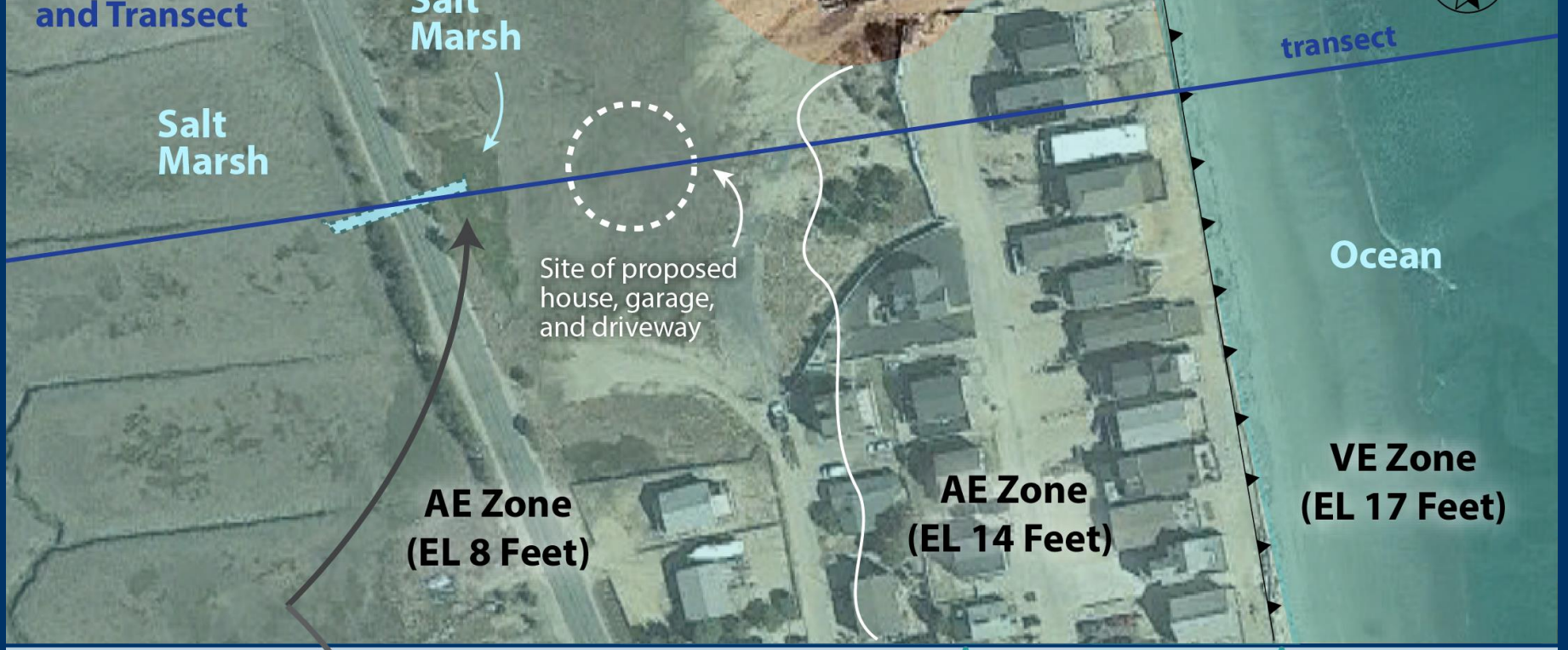


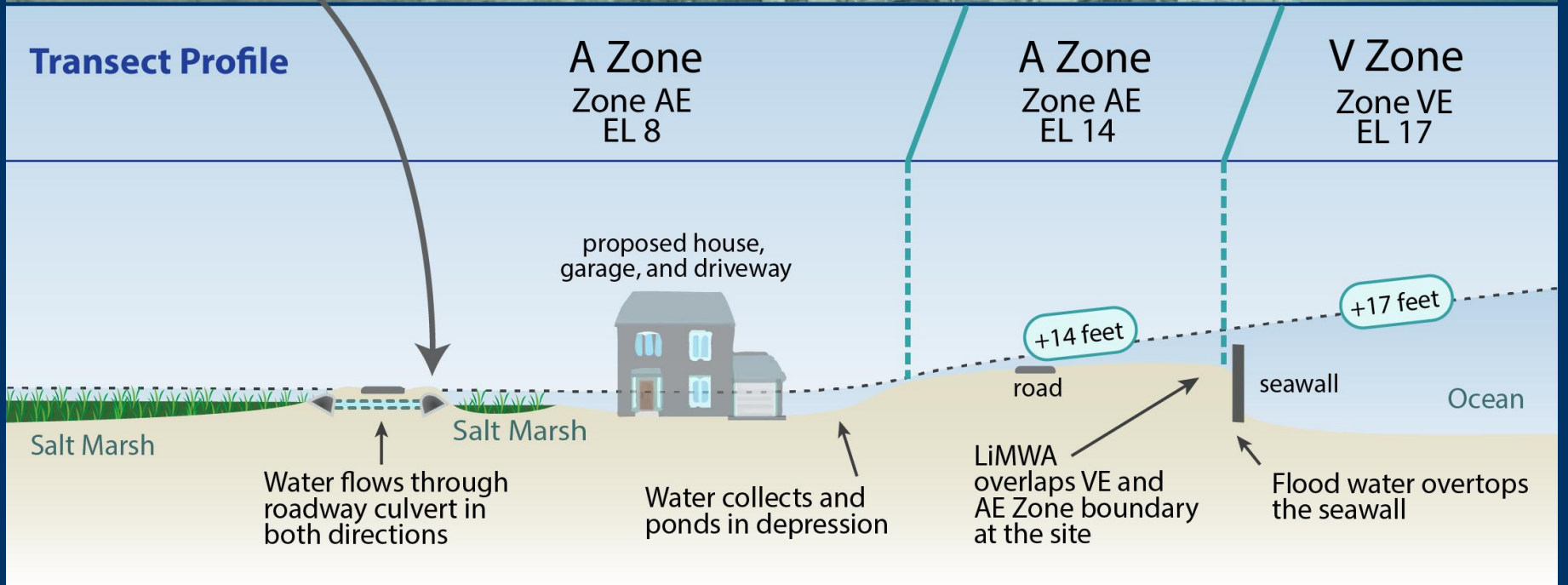


Flood Zones and Transect on Proposed Project Site

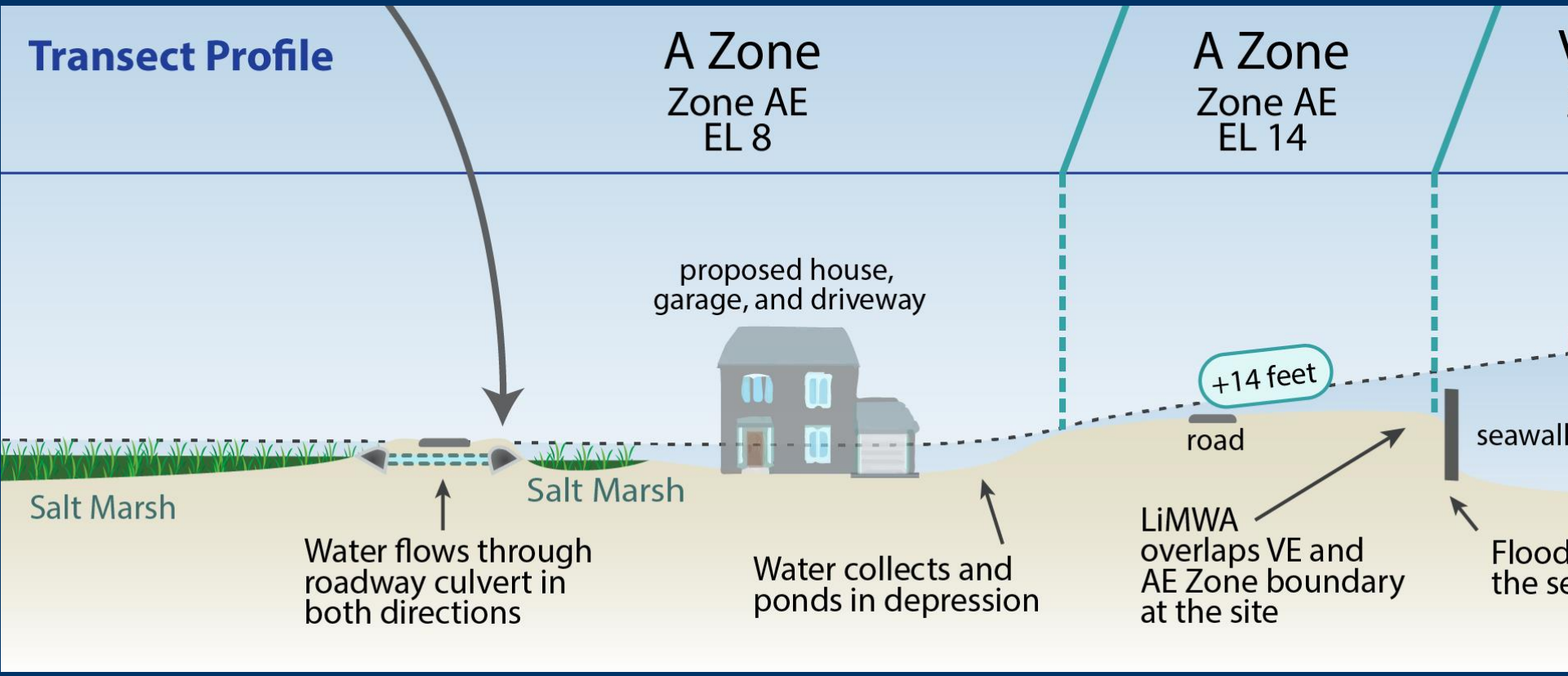


Scenario #3: New Development in a Hydraulically Restricted A Zone

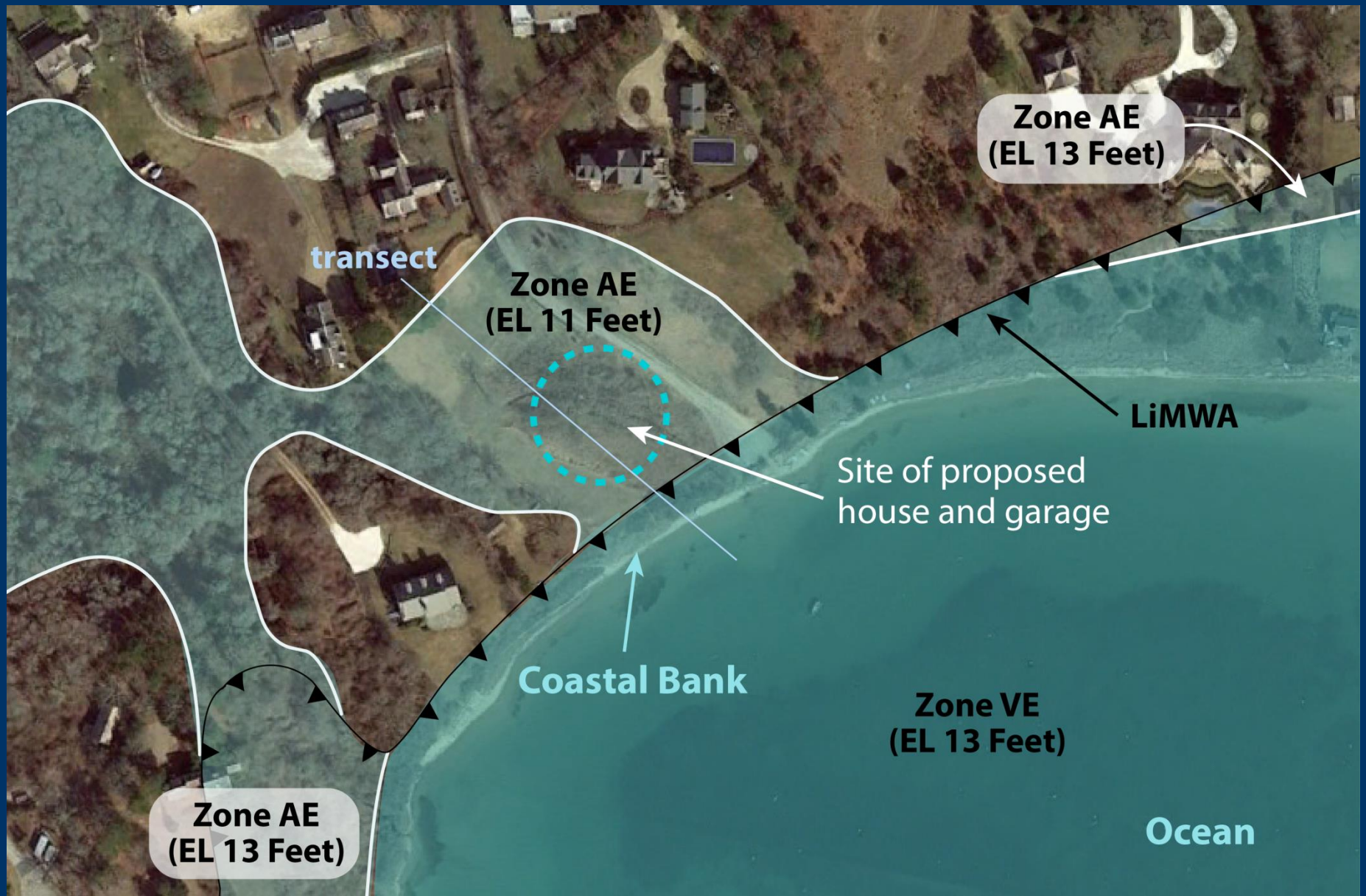

and Transect
Salt Marsh
Salt Marsh
transect
Site of proposed house, garage, and driveway
Ocean
AE Zone (EL 8 Feet)
AE Zone (EL 14 Feet)
VE Zone (EL 17 Feet)

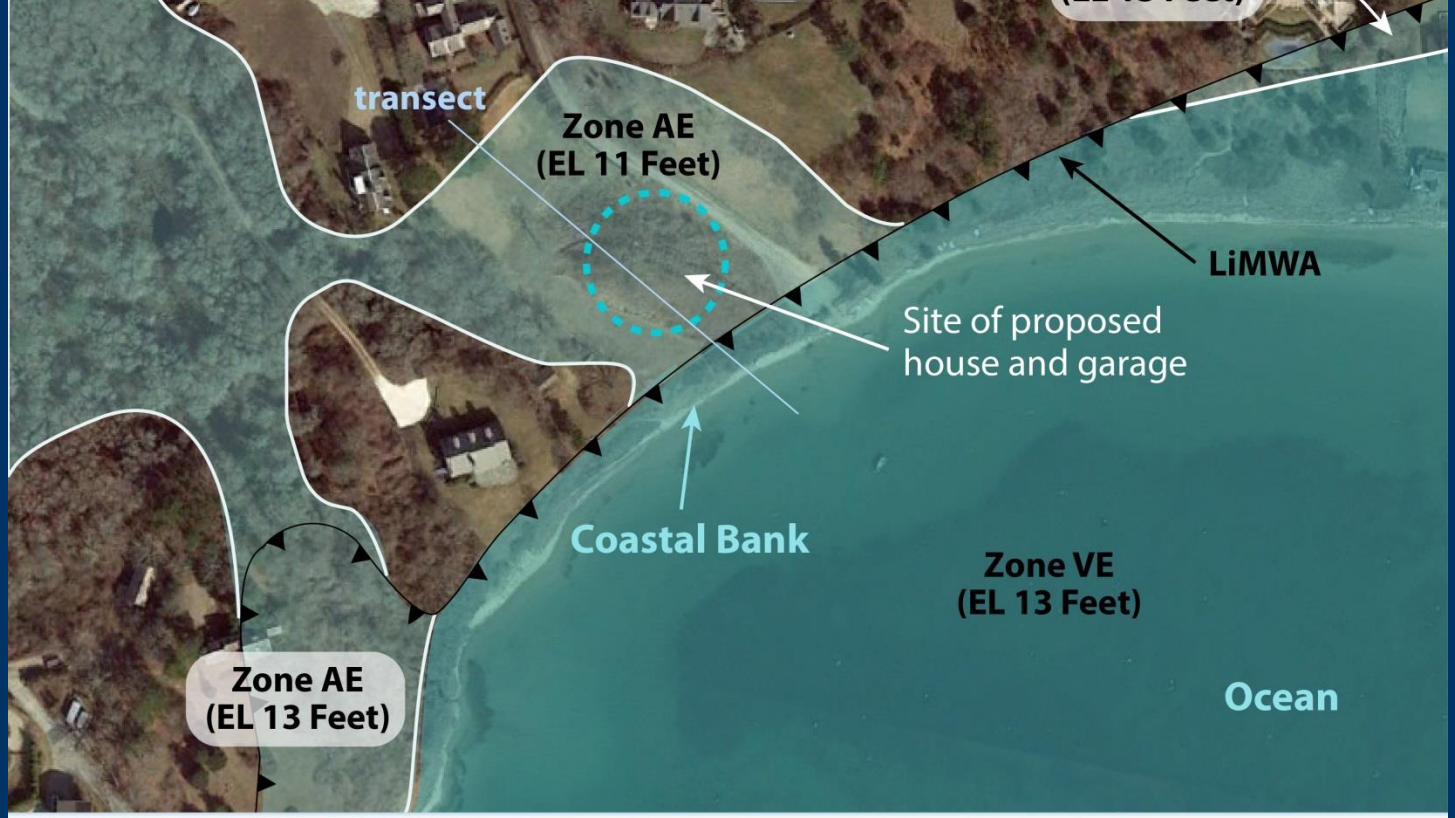

Transect Profile
A Zone
Zone AE
EL 8
A Zone
Zone AE
EL 14
V Zone
Zone VE
EL 17
proposed house, garage, and driveway
+14 feet
+17 feet
road
seawall
Ocean
Salt Marsh
Salt Marsh
Water flows through roadway culvert in both directions
Water collects and ponds in depression
LiMWA overlaps VE and AE Zone boundary at the site
Flood water overtops the seawall

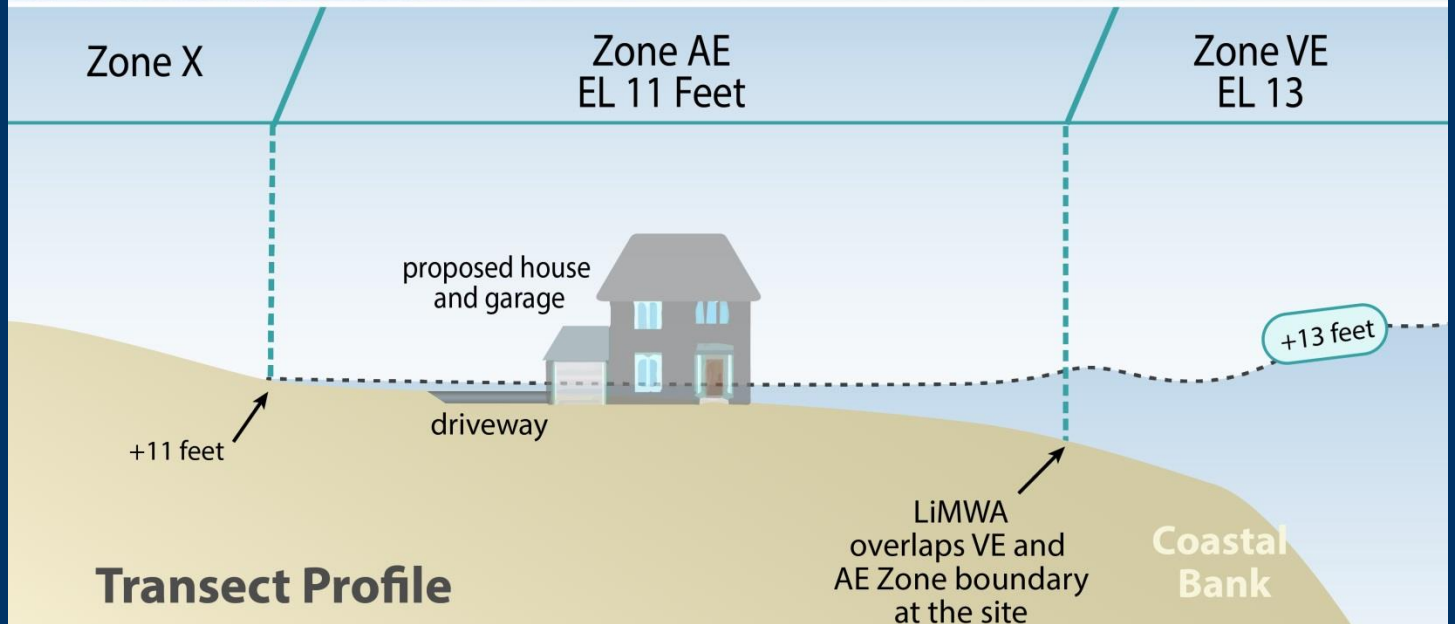
Scenario #3


Transect Profile
A Zone
Zone AE
EL 8
A Zone
Zone AE
EL 14
proposed house,
garage, and driveway
+14 feet
road
seawall
Salt Marsh
Salt Marsh
Water flows through
roadway culvert in
both directions
Water collects and
ponds in depression
LiMWA
overlaps VE and
AE Zone boundary
at the site
Flood
the se

Scenario #4: New Development in a less densely developed A Zone

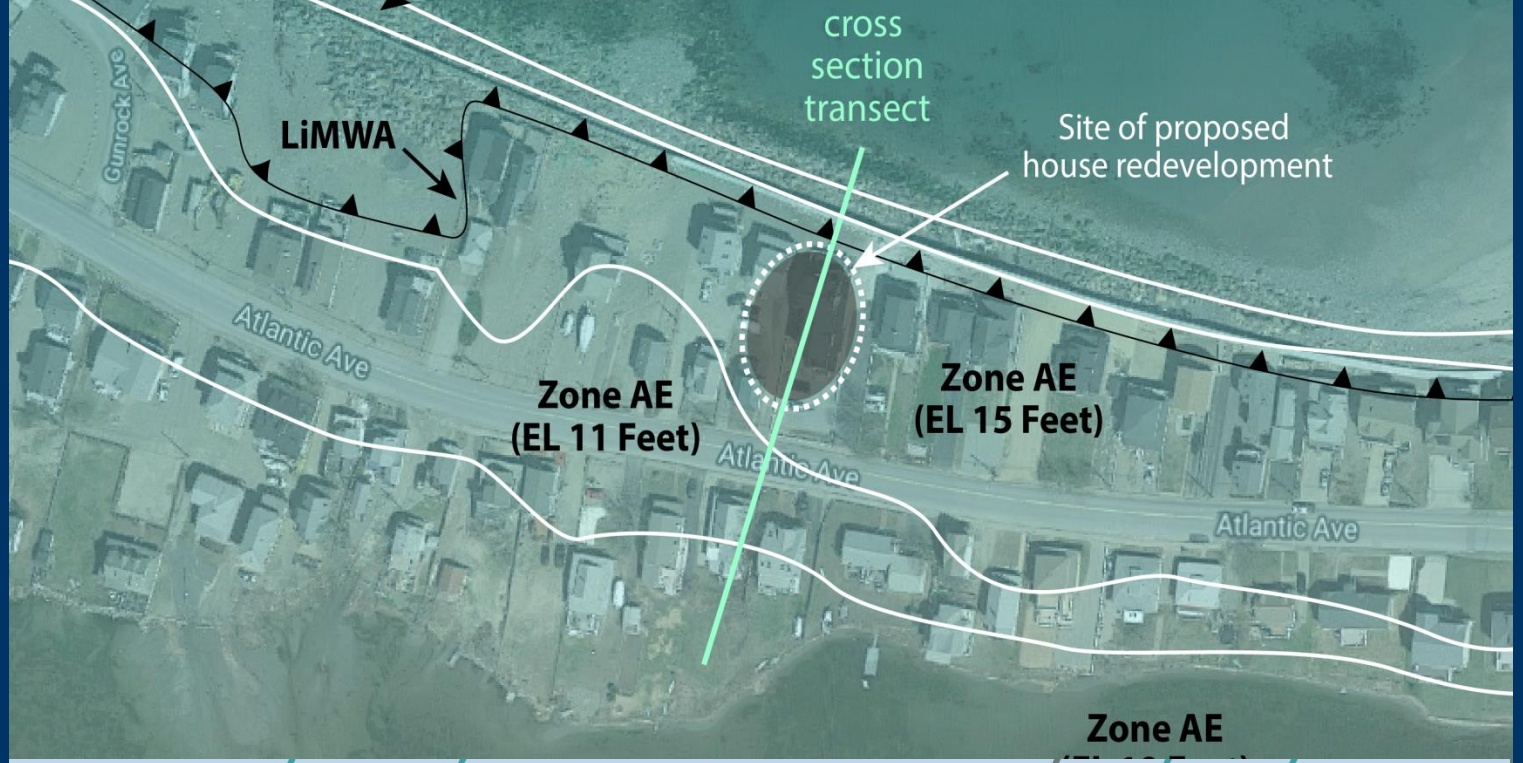


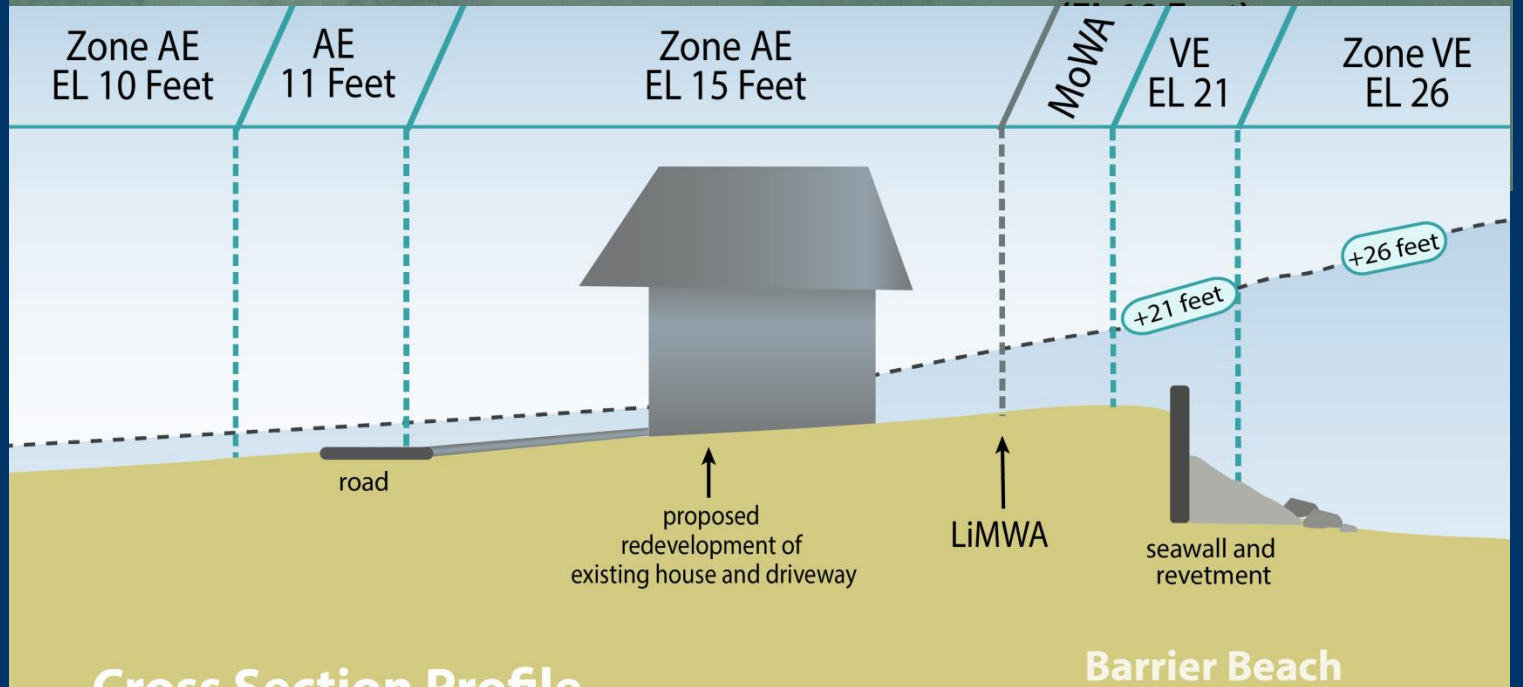




Transect Profile

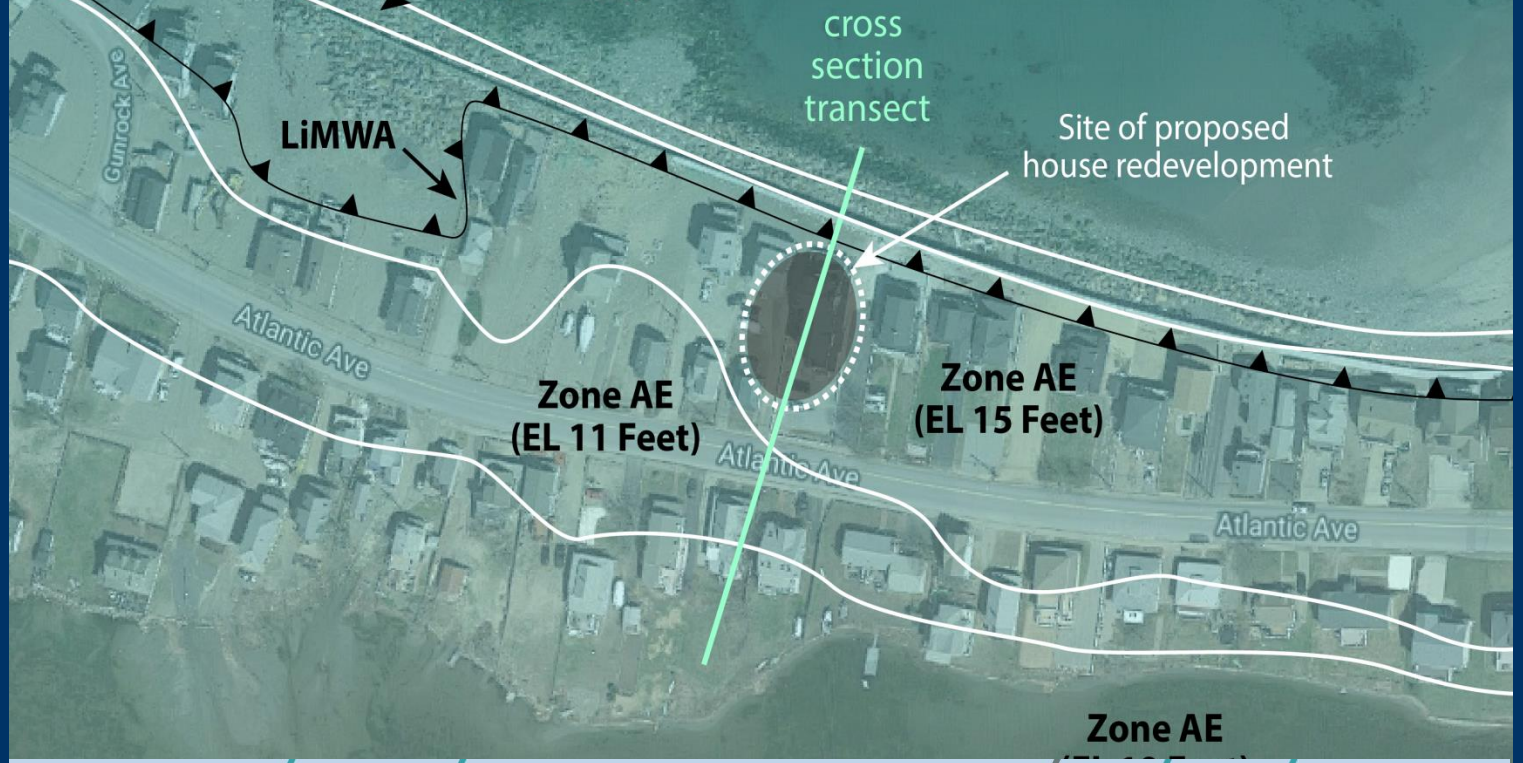
Scenario 5: Redevelopment on a developed barrier beach, A Zone(MiWA)

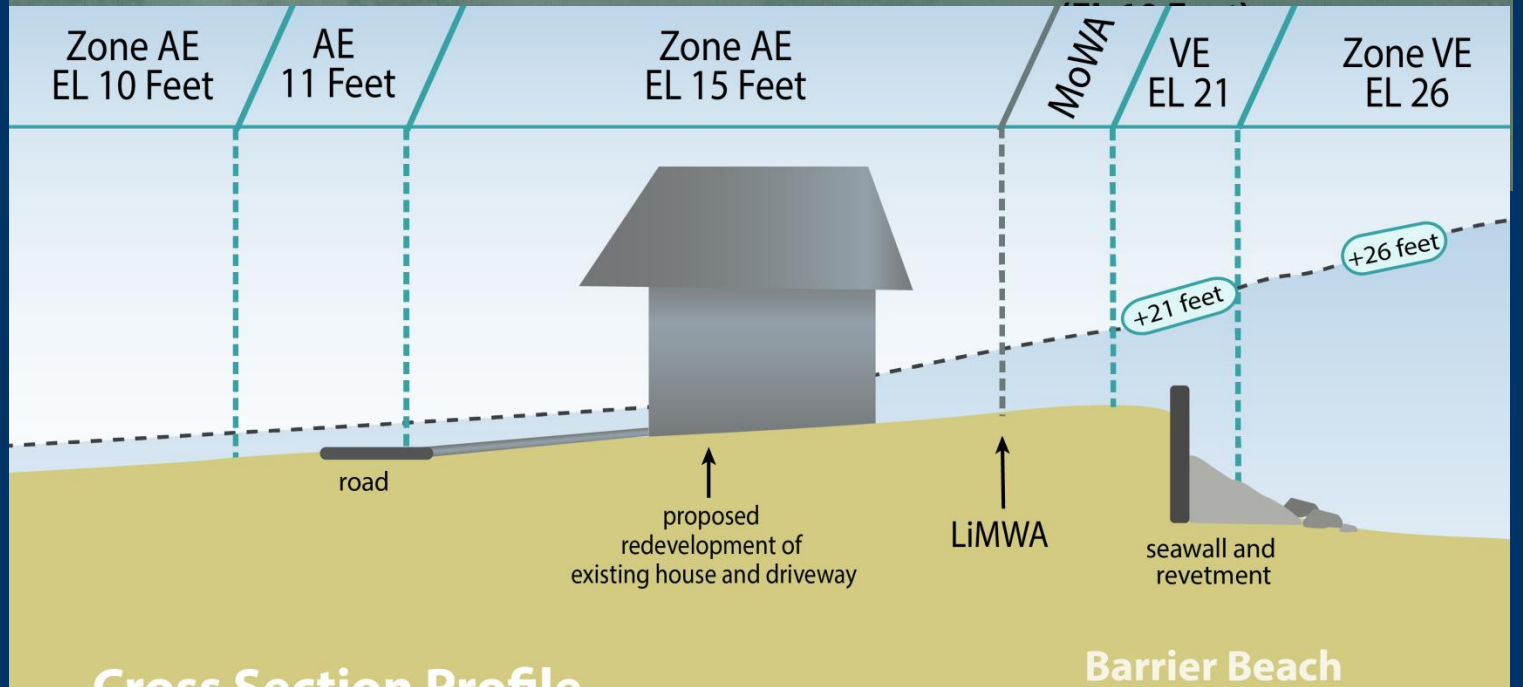

cross
section
transect
LiMWA
Site of proposed
house redevelopment
Gunrock Ave
Atlantic Ave
Zone AE
(EL 11 Feet)
Zone AE
(EL 15 Feet)
Atlantic Ave
Atlantic Ave
Zone AE


Zone AE
EL 10 Feet
AE
11 Feet
Zone AE
EL 15 Feet
MoWA
VE
EL 21
Zone VE
EL 26
+26 feet
+21 feet
road
proposed
redevelopment of
existing house and driveway
LiMWA
seawall and
revetment
Barrier Beach

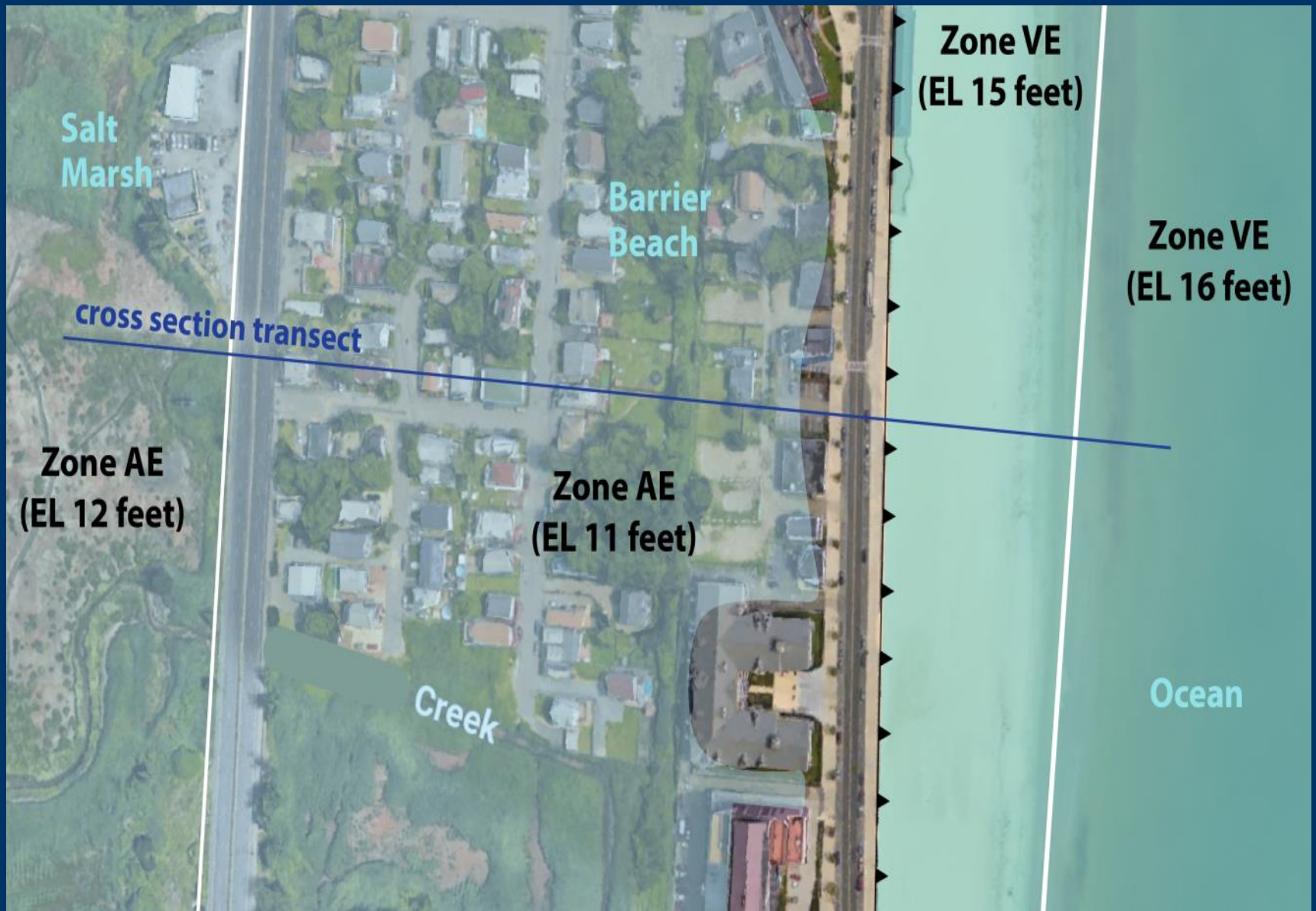
Overwash

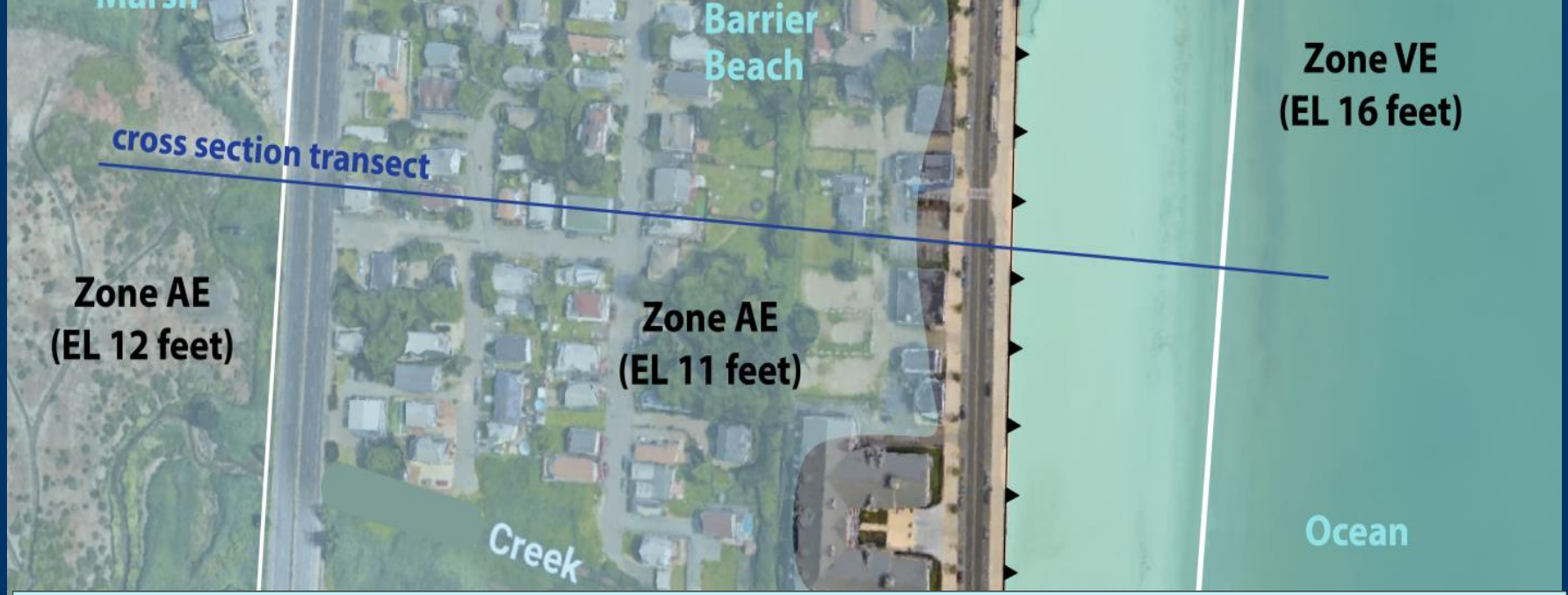
Pavement damage

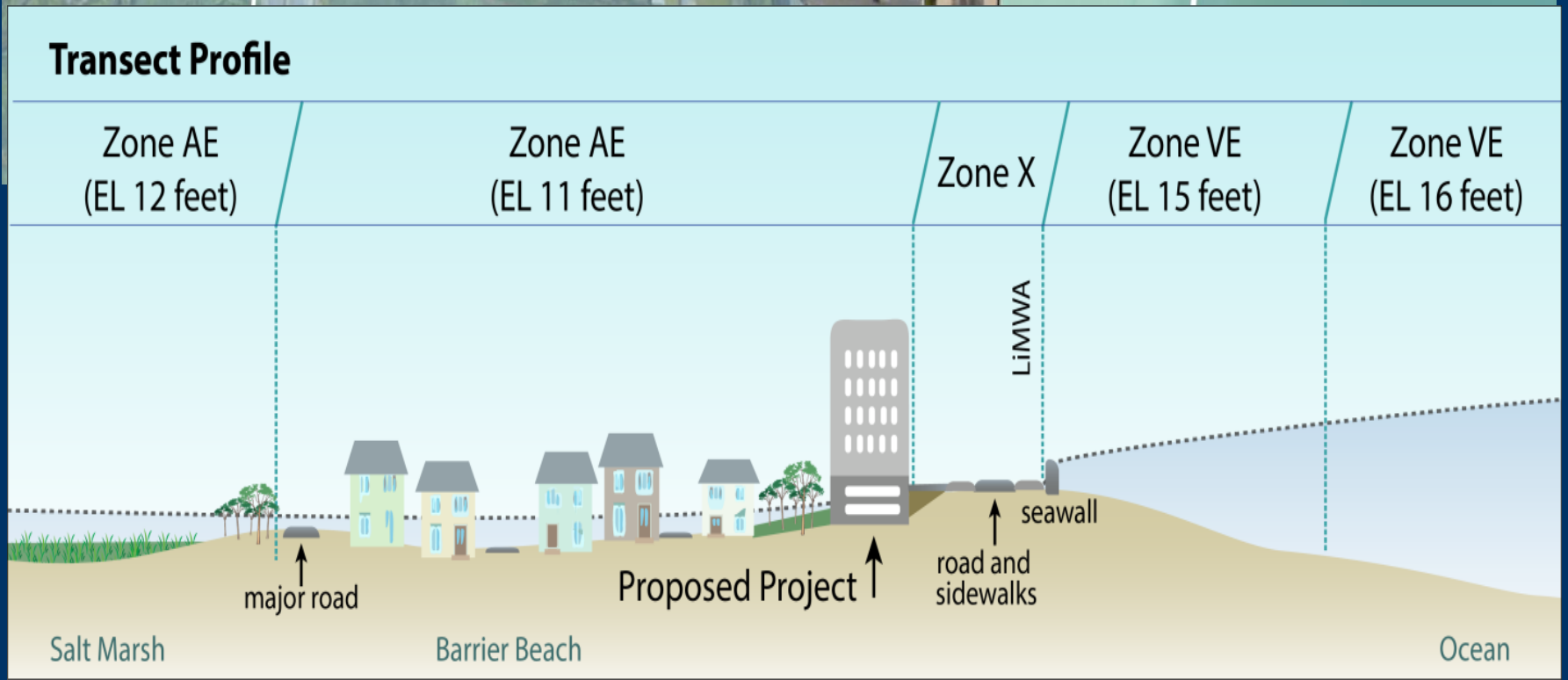

cross
section
transect
LiMWA
Site of proposed
house redevelopment
Gunrock Ave
Atlantic Ave
Zone AE
(EL 11 Feet)
Zone AE
(EL 15 Feet)
Atlantic Ave
Atlantic Ave
Zone AE


Zone AE
EL 10 Feet
AE
11 Feet
Zone AE
EL 15 Feet
MoWA
VE
EL 21
Zone VE
EL 26
+26 feet
+21 feet
road
proposed
redevelopment of
existing house and driveway
LiMWA
seawall and
revetment
Barrier Beach

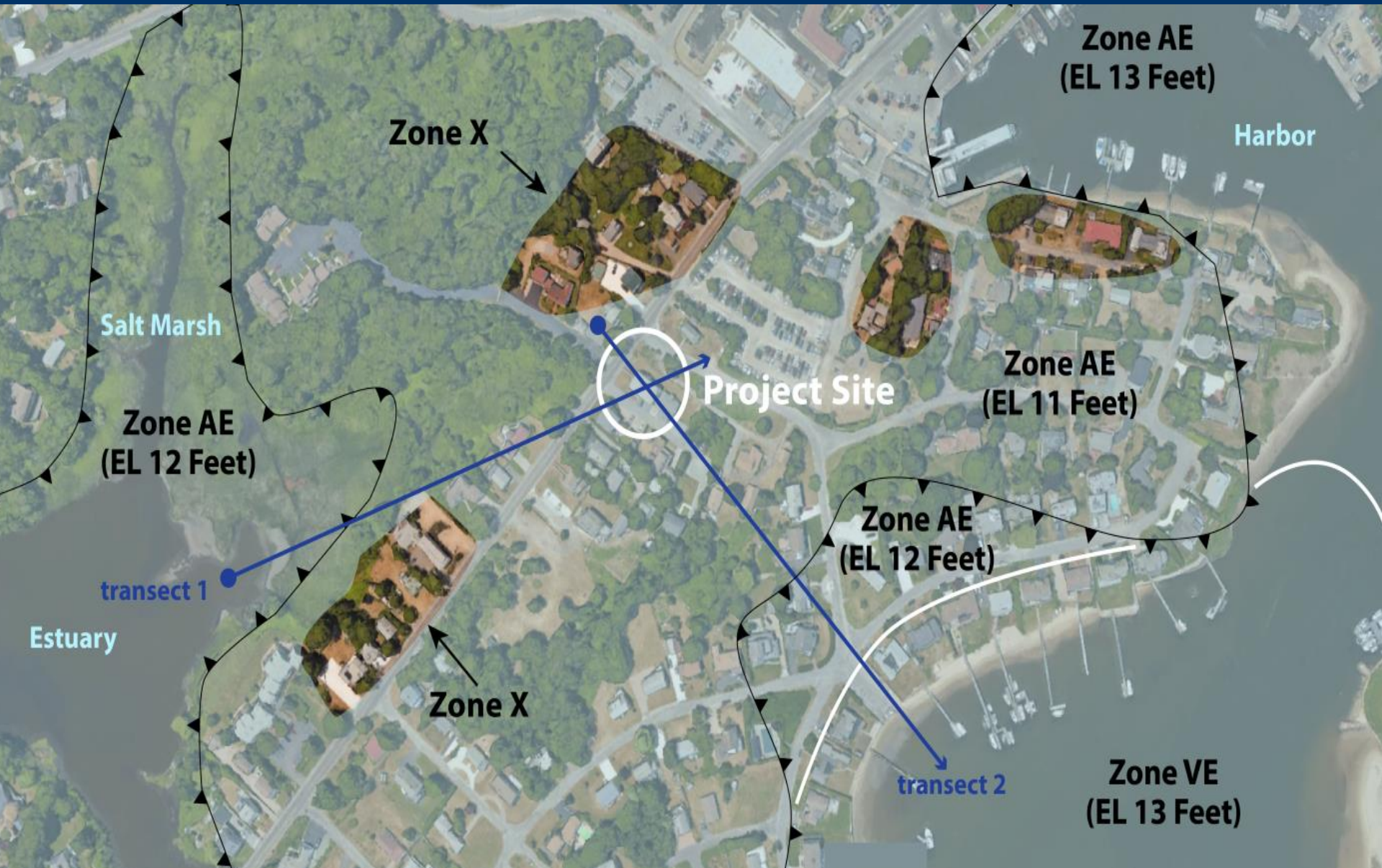
Scenario 6: Redevelopment in a Densely Developed Barrier Beach, A Zone (MiWA)

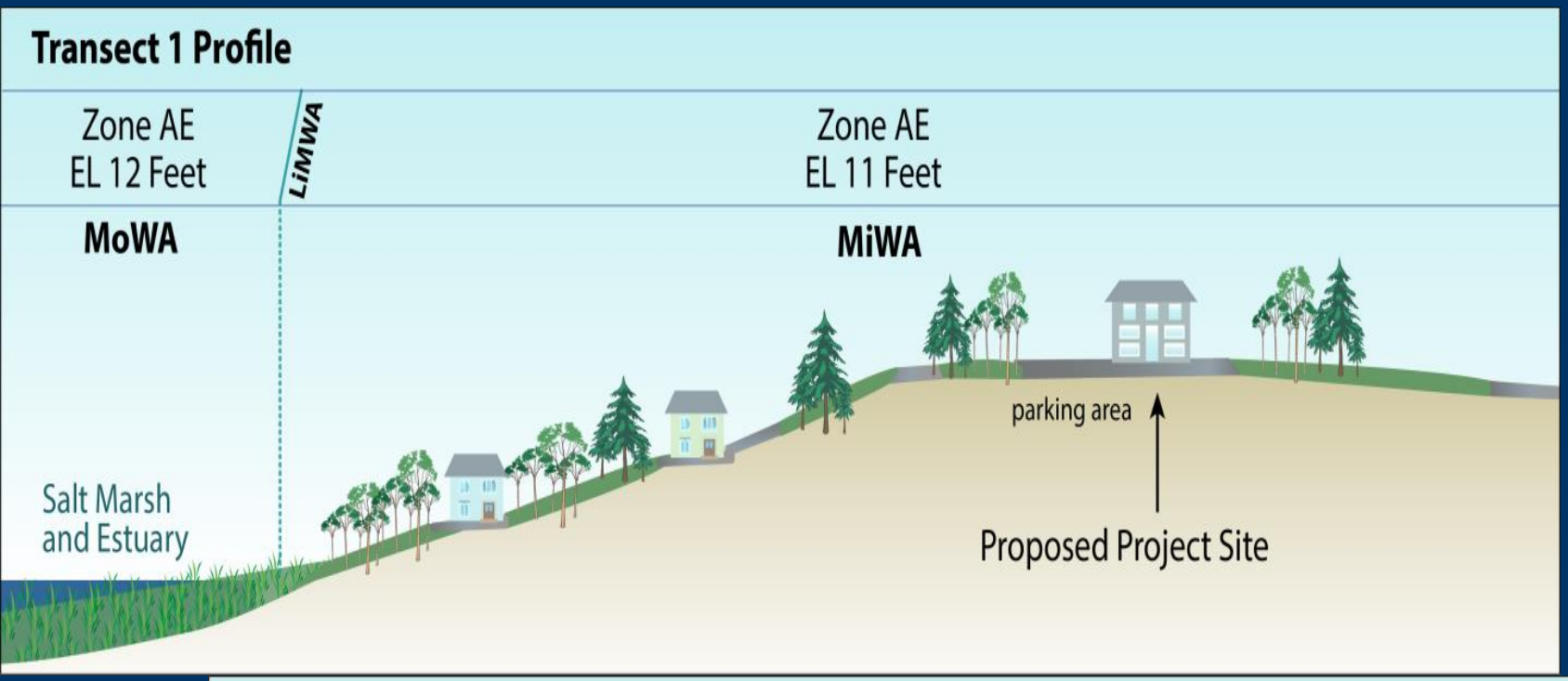


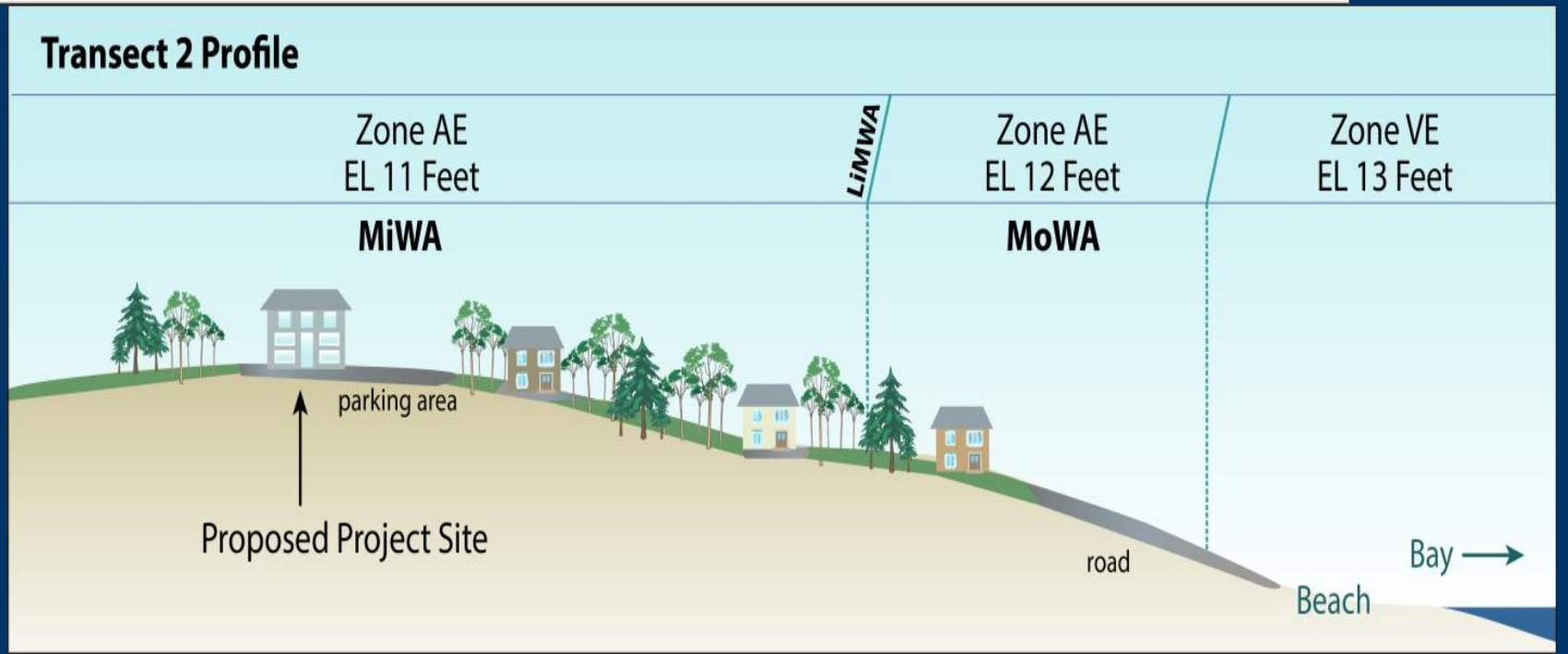

Barrier
Beach
Zone VE
(EL 16 feet)
cross section transect
Zone AE
(EL 12 feet)
Zone AE
(EL 11 feet)
Creek
Ocean


Transect Profile
Zone AE
(EL 12 feet)
Zone AE
(EL 11 feet)
Zone X
Zone VE
(EL 15 feet)
Zone VE
(EL 16 feet)
LiMWA
seawall
road and
sidewalks
major road
Proposed Project
Salt Marsh
Barrier Beach
Ocean

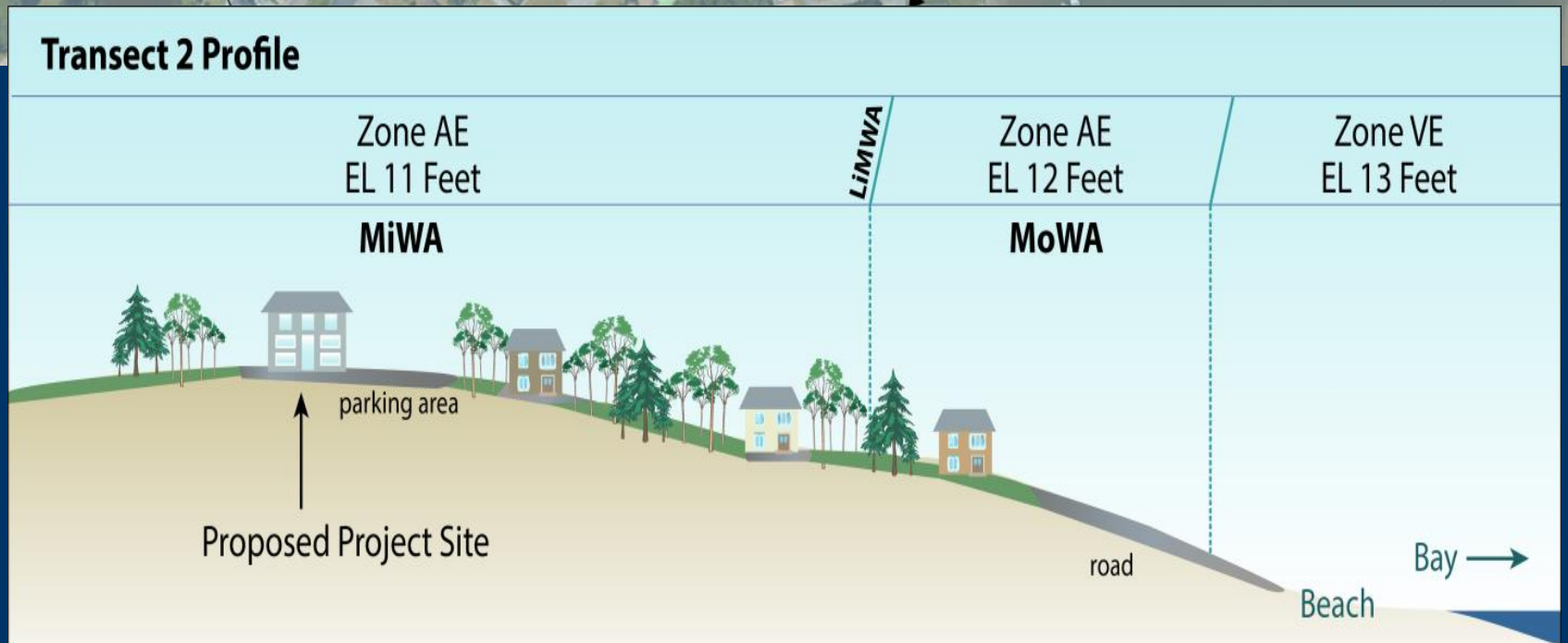
Scenario 7: Redevelopment of a Commercial Building in an A Zone (MiWA)




Transect 1 Profile
Zone AE
EL 12 Feet
LiMWA
Zone AE
EL 11 Feet
MoWA
MiWA
parking area
Salt Marsh
and Estuary
Proposed Project Site


Transect 2 Profile
Zone AE
EL 11 Feet
LiMWA
Zone AE
EL 12 Feet
Zone VE
EL 13 Feet
MiWA
MoWA
parking area
Proposed Project Site
road
Bay
Beach


Salt Marsh
Zone AE
(EL 12 Feet)
Project Site
Zone AE
(EL 11 Feet)
Zone AE
(EL 12 Feet)
transect 1
Estuary
Zone X
transect 2
Zone VE
(EL 13 Feet)


Transect 2 Profile
Zone AE
EL 11 Feet
LiMWA
Zone AE
EL 12 Feet
Zone VE
EL 13 Feet
MiWA
MoWA
parking area
Proposed Project Site
road
Bay
Beach