OAAC ADAPT
Sea Level Rise Design Criteria

January 11, 2024

Sub-Agenda

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Sea Level Rise science

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Review of Best Practices

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Sea Level Rise Criteria

04

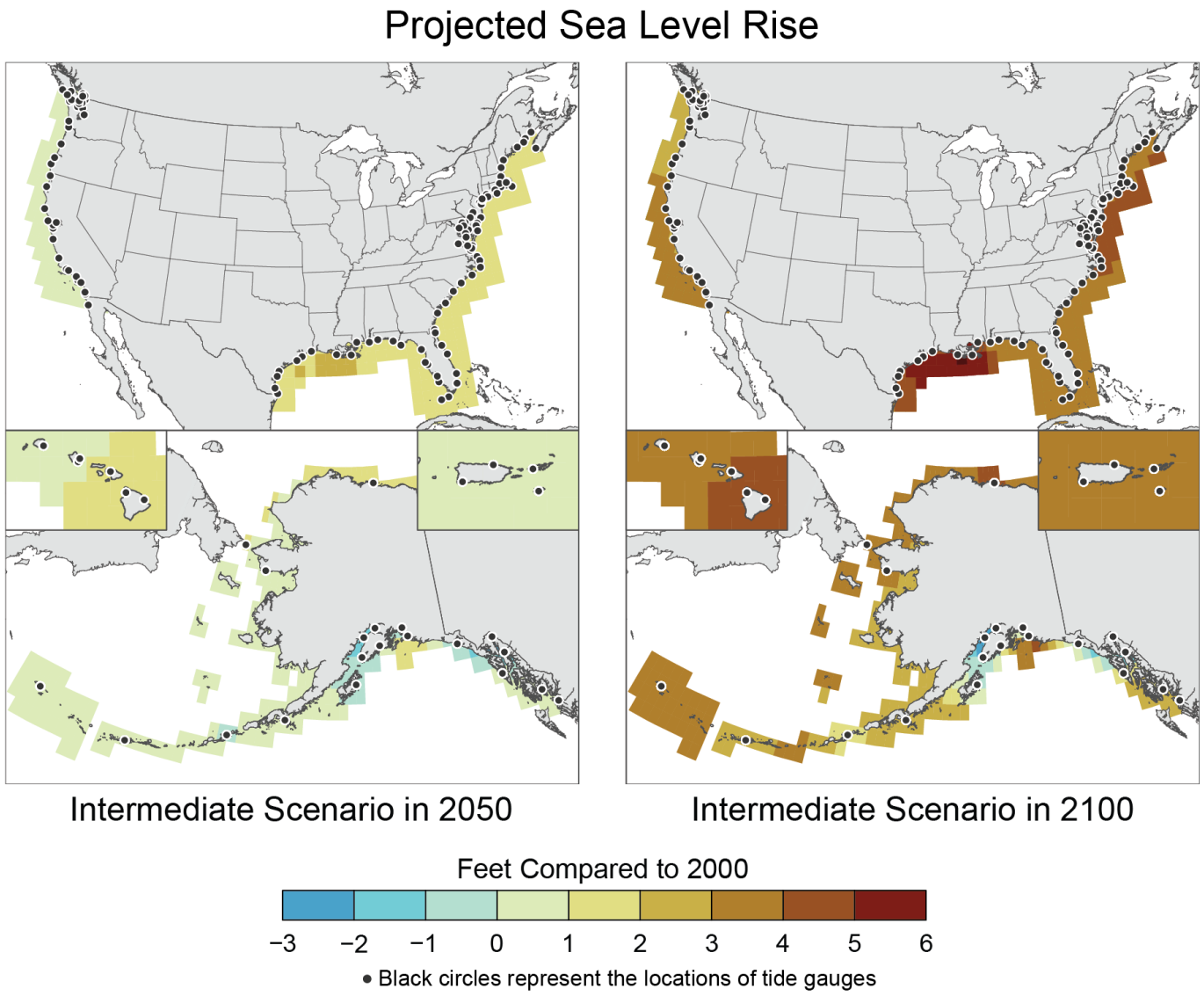
Site Specific Considerations

05

Summary / Conclusions

Sea Level Rise Science

Sea Level Rise varies along the US Coast

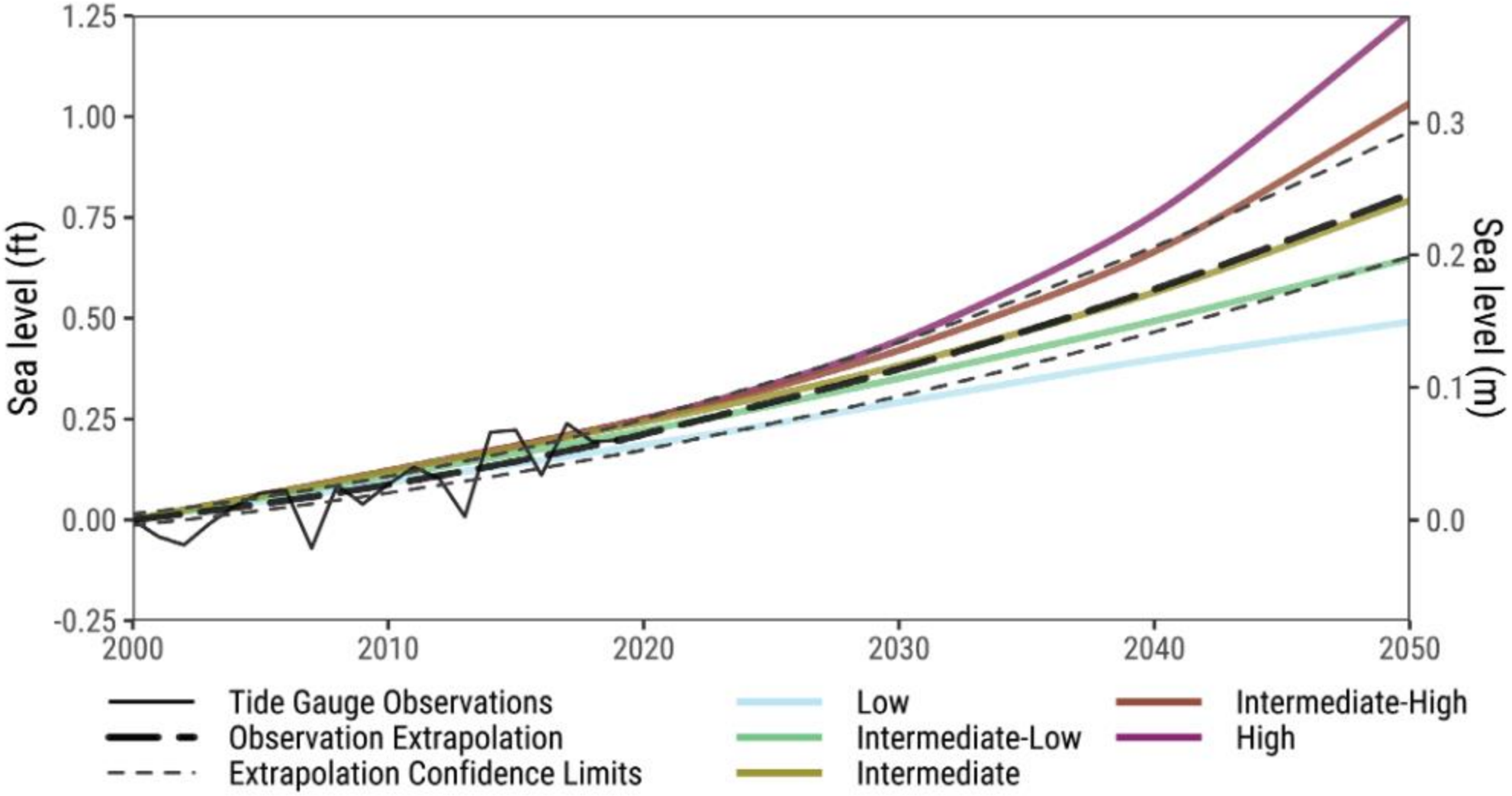


- Relative sea level rise is lower on the Pacific Coast than the Atlantic and Gulf Coasts, largely driven by the Pacific Decadal Oscillation
- The Pacific Coast is currently in a period of accelerating sea level rise

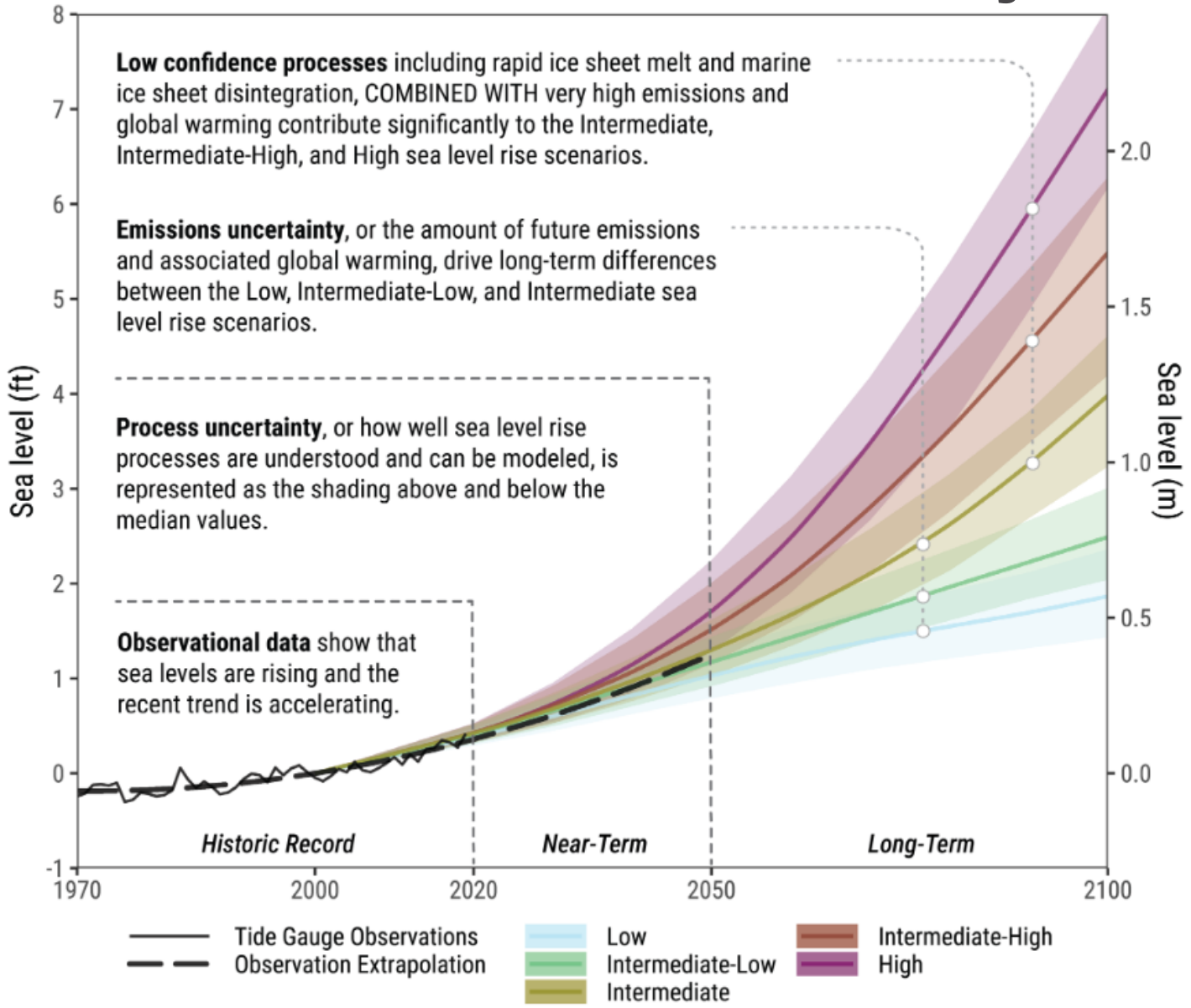
- Federal Interagency Sea Level Rise Task Force (Sweet et al. 2022)
- National Climate Assessment Coasts Chapter (May et al. 2023)

California Sea Level Rise

Observation-based Extrapolation trending with Intermediate Curve

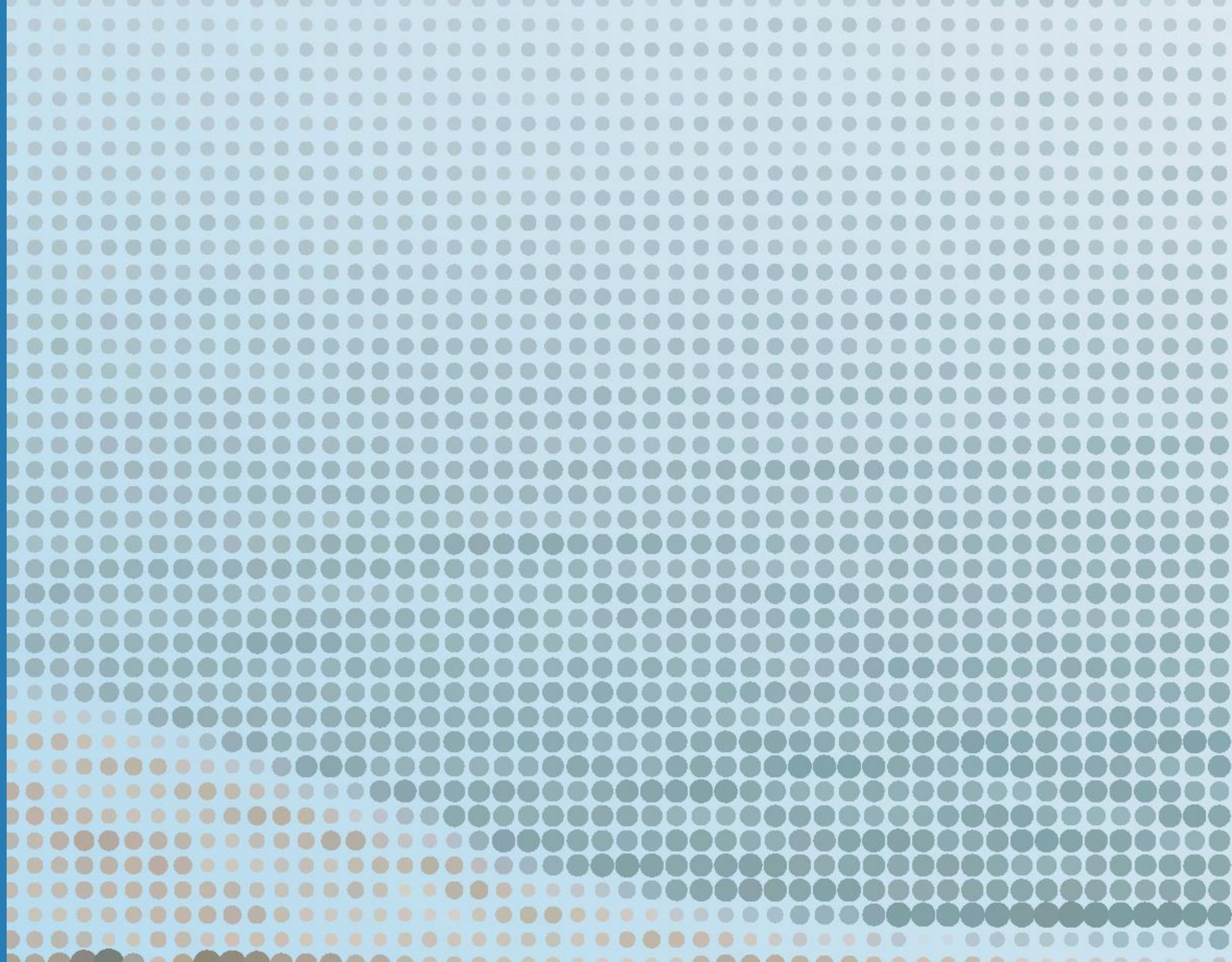


Future Sea Level Rise Uncertainty



- **3.4 feet by 2100** (Intermediate, Likely)
- **6.9 feet by 2100** (Plausible, High Impact, but Low Confidence – assumes both high emissions and rapid ice sheet melt)

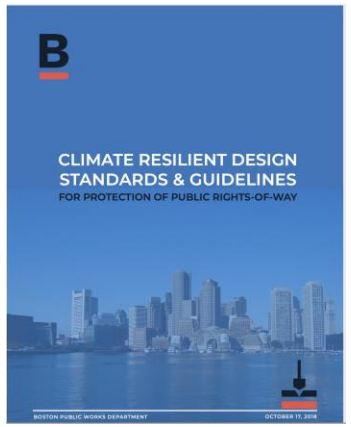
Review of Best Practices

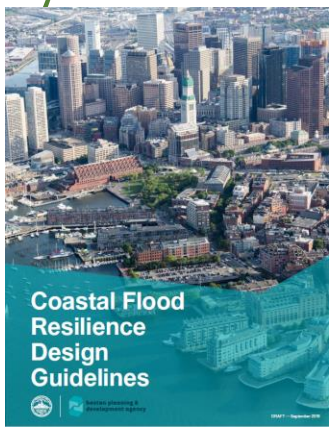


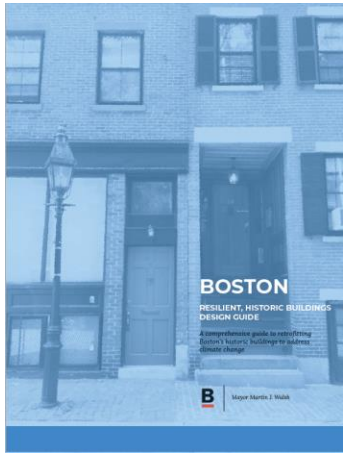
Review of Best Practices

Precedents from other Jurisdictions

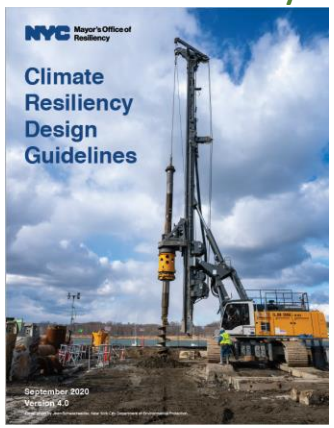
Climate Ready Boston



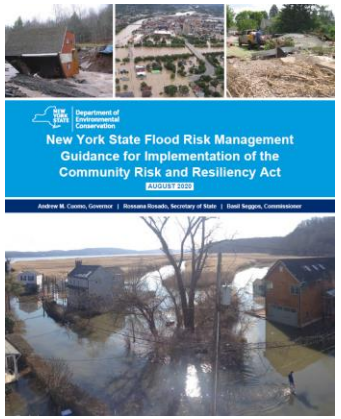




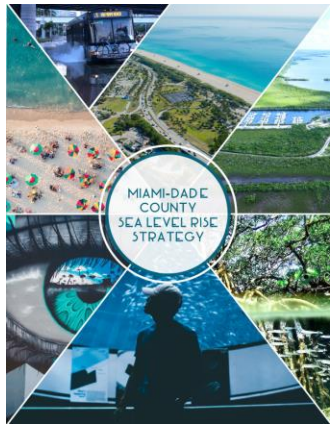
New York City



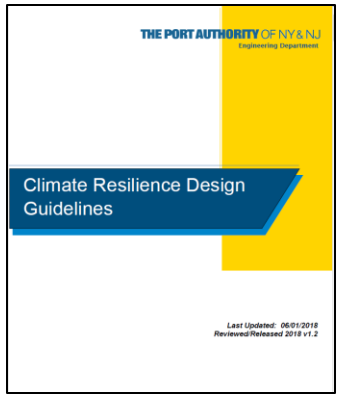
New York State



Miami



Port Authority NY/NJ



San Francisco

SFO

PORT OF SAN FRANCISCO

- Miami has the most progressive criteria
- 2080
  - 4 feet of SLR
  - ✓ Future groundwater rise
  - ✓ Future increase in extreme precipitation
- 2100
  - ✓ 6 feet of SLR plus…

Process for Defining Coastal Flood Infrastructure Elevation

A

Select baseline sea level rise curves upon which to base initial evaluation

B

Select a year through which new flood defenses are desired to perform

C

Select a base level of performance for flood defenses

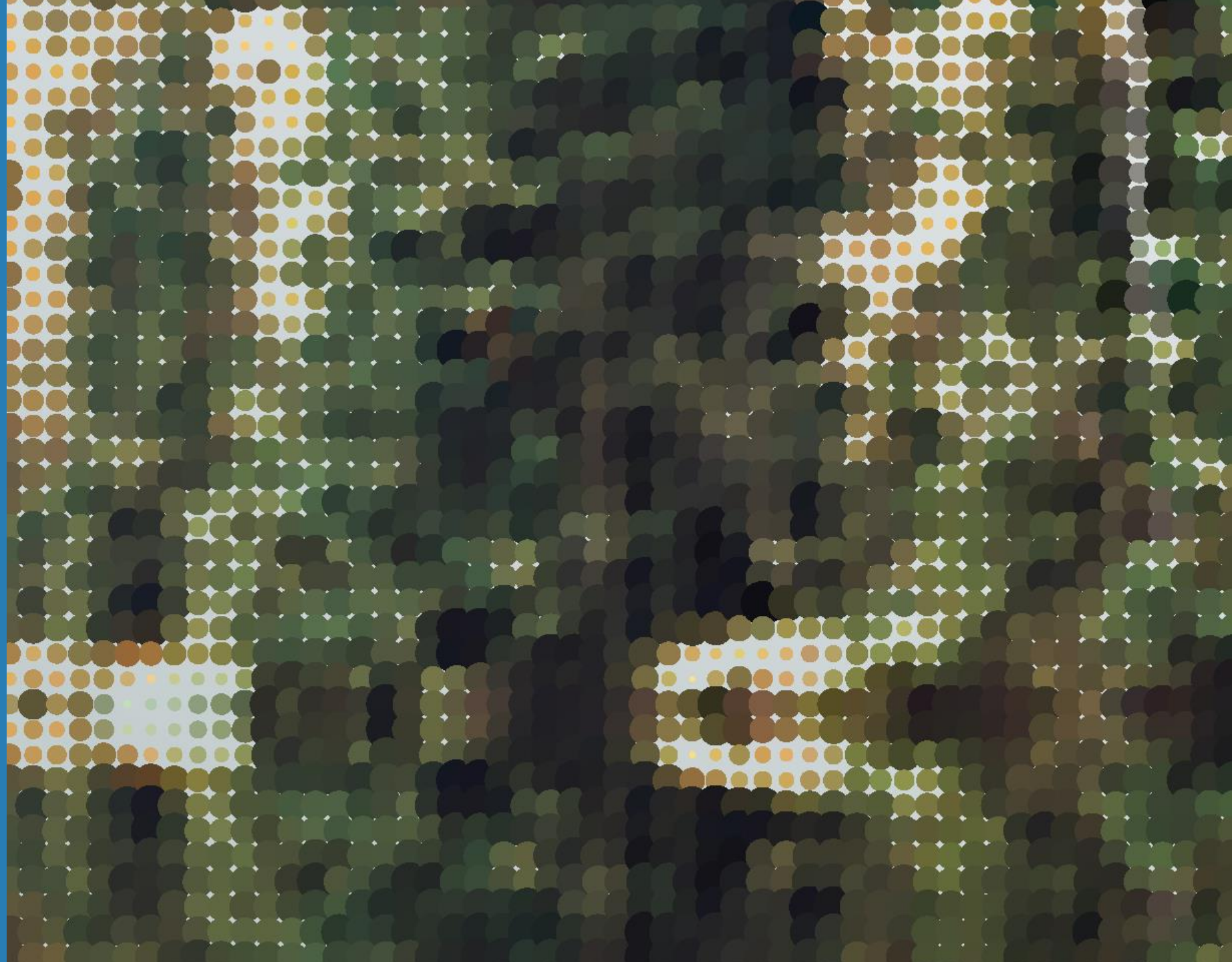
D

Identify most stringent base flood performance definition

E

Translate to a flood resilience project elevation and future adaptation elevation

Sea Level Rise Criteria for OACC



Recommended Flood Protection Infrastructure Elevations

Near Term

A

Likely sea level rise for design
Plausible, High Impact for adaptation considerations

B

2080: ~35- to 50-year lifespan
Design: 2 feet SLR Adaptation +3 additional feet SLR

C

1% annual chance extreme tide (~3.4 feet above MHHW
1% annual chance total water level (with wave, variable)

D

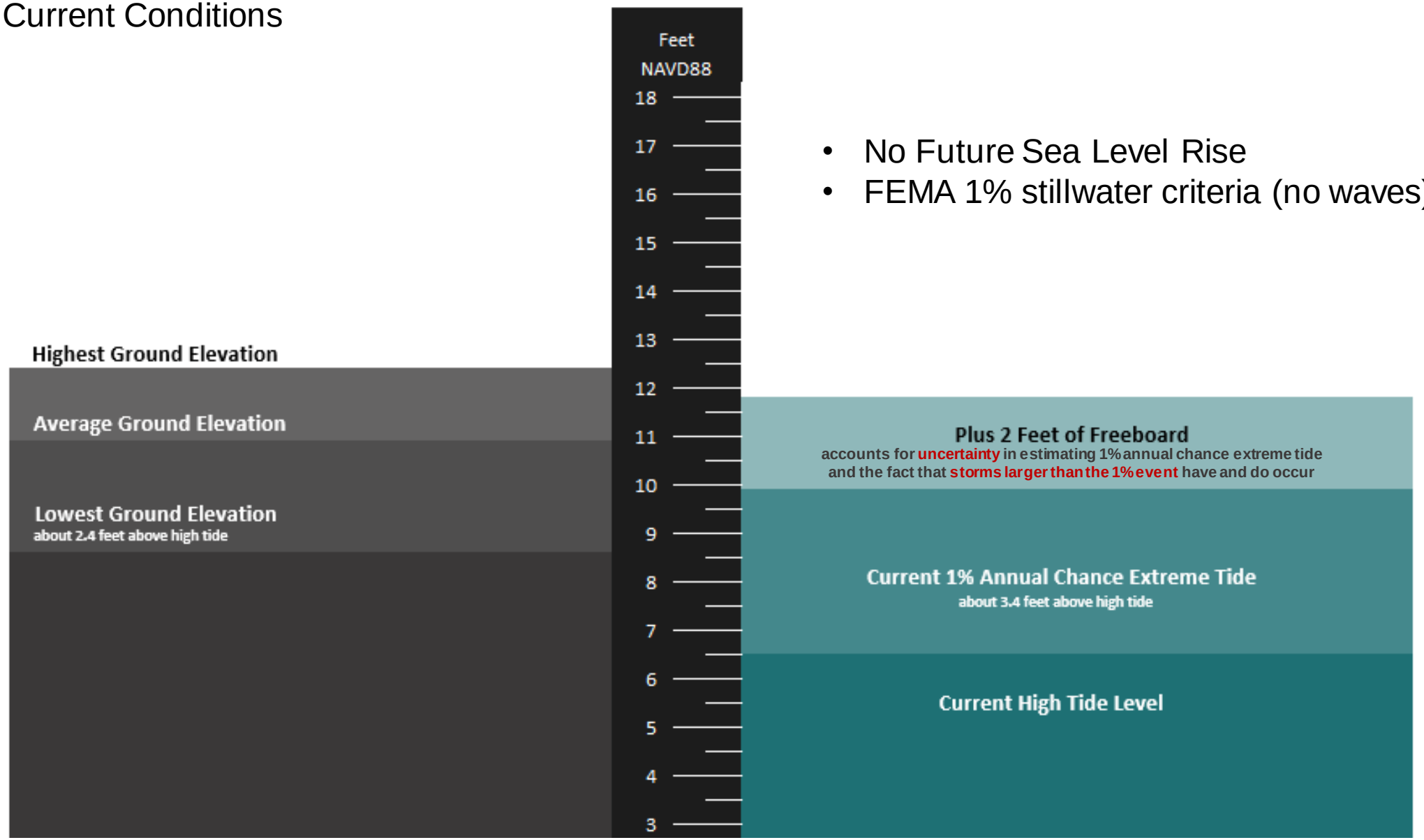
FEMA accreditation, removal of structures from SFHA;
2 feet of Freeboard included

E

Design: 13.8 feet NAVD88
Adaptation: 16.8 feet NAVD88
(based on stillwater elevations only)

Northern Bay Farm Near-term Flood Protection Elevation Targets

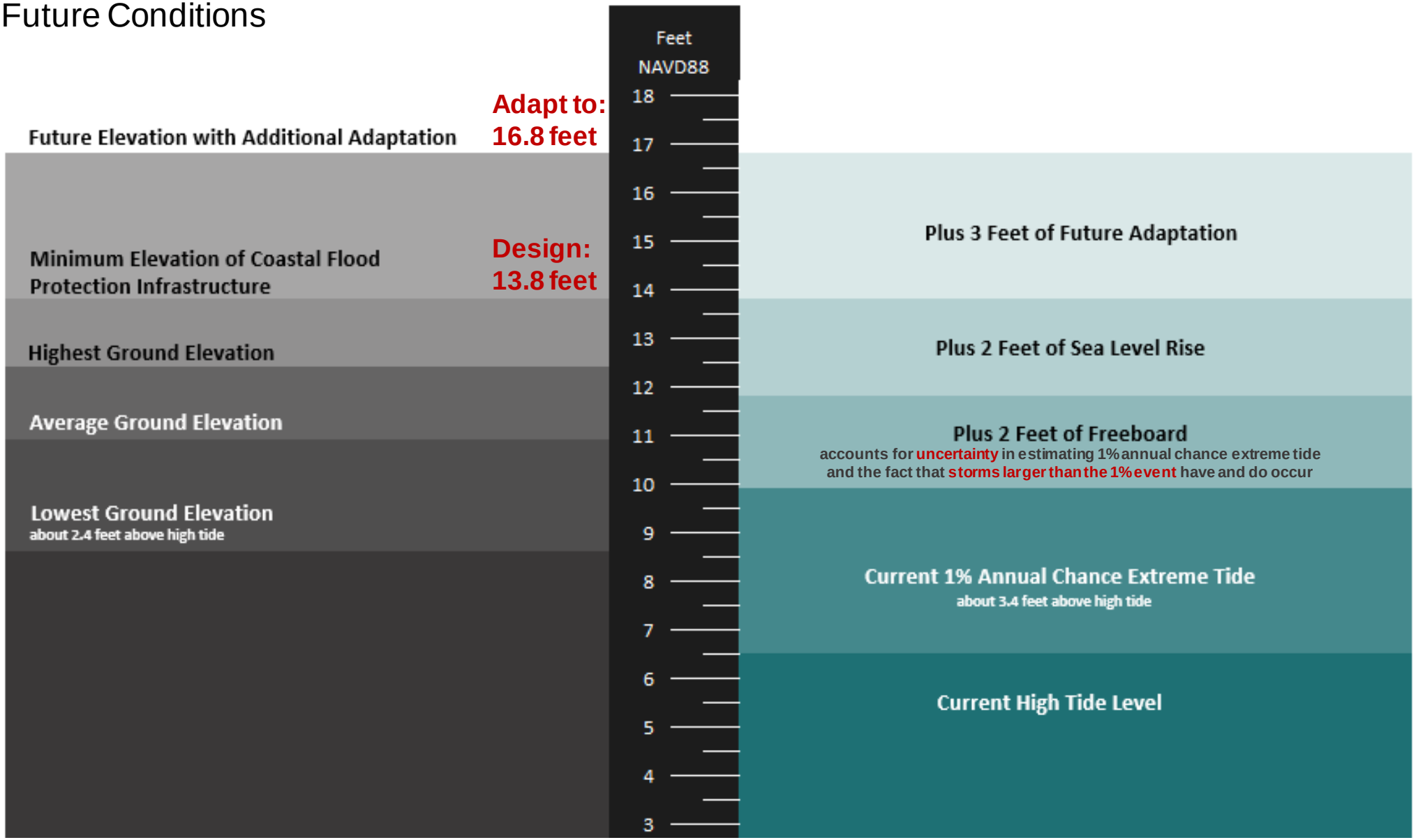
Current Conditions



- No Future Sea Level Rise
- FEMA 1% stillwater criteria (no waves)

Northern Bay Farm Near-term Flood Protection Elevation Targets

Future Conditions



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Long Term

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B
2100+
Design: 3.5 feet SLR Adaptation: +3.5 feet SLR

C
No Change

D
Unknown what the long-term National Flood Insurance Program will be; Freeboard may be optional

E
Design: 13.8 to 15.8 feet NAVD88
Adaptation: 16.8 to 18.8 feet NAVD88 adaptation
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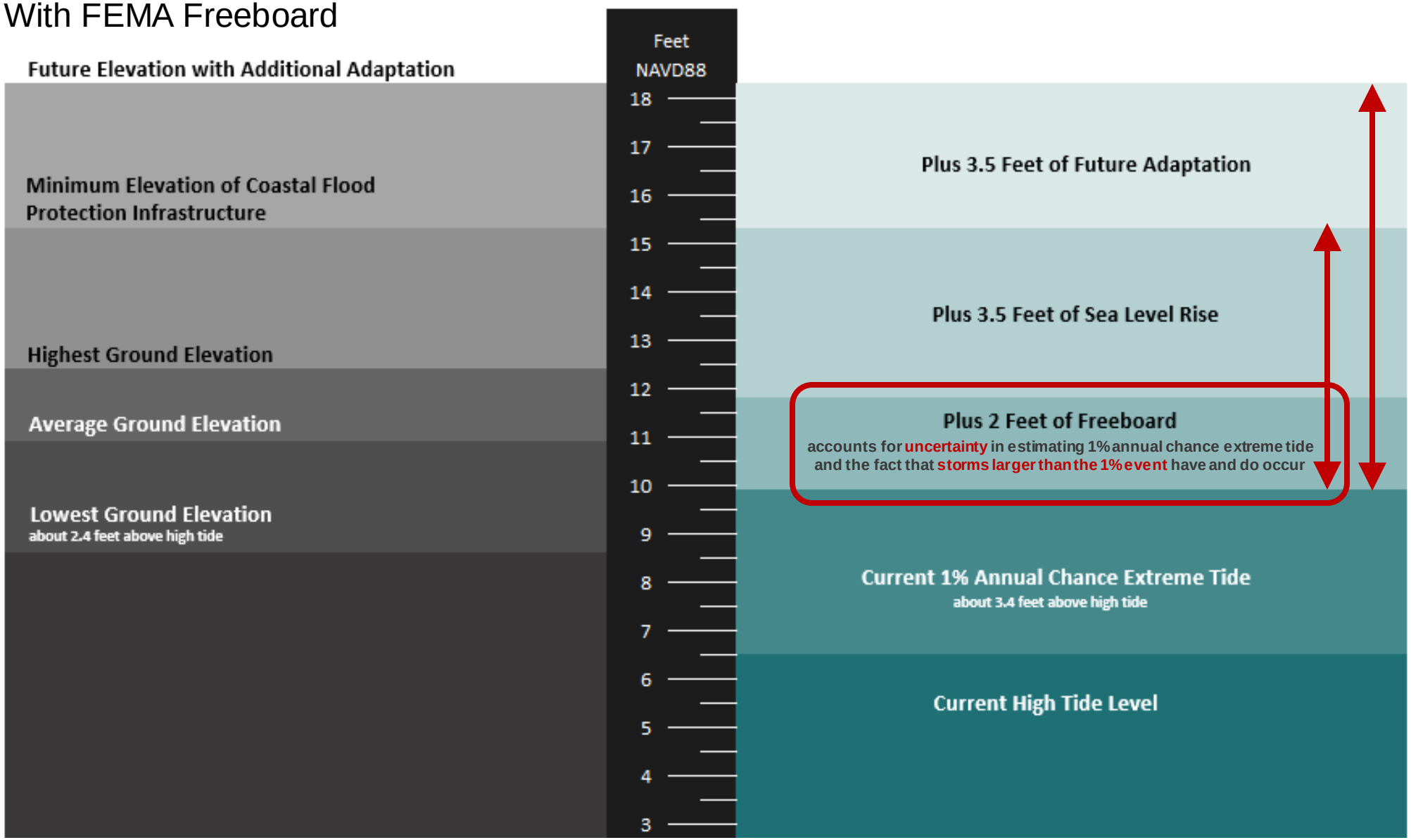
Northern Bay Farm Long-term Flood Protection Elevation Targets

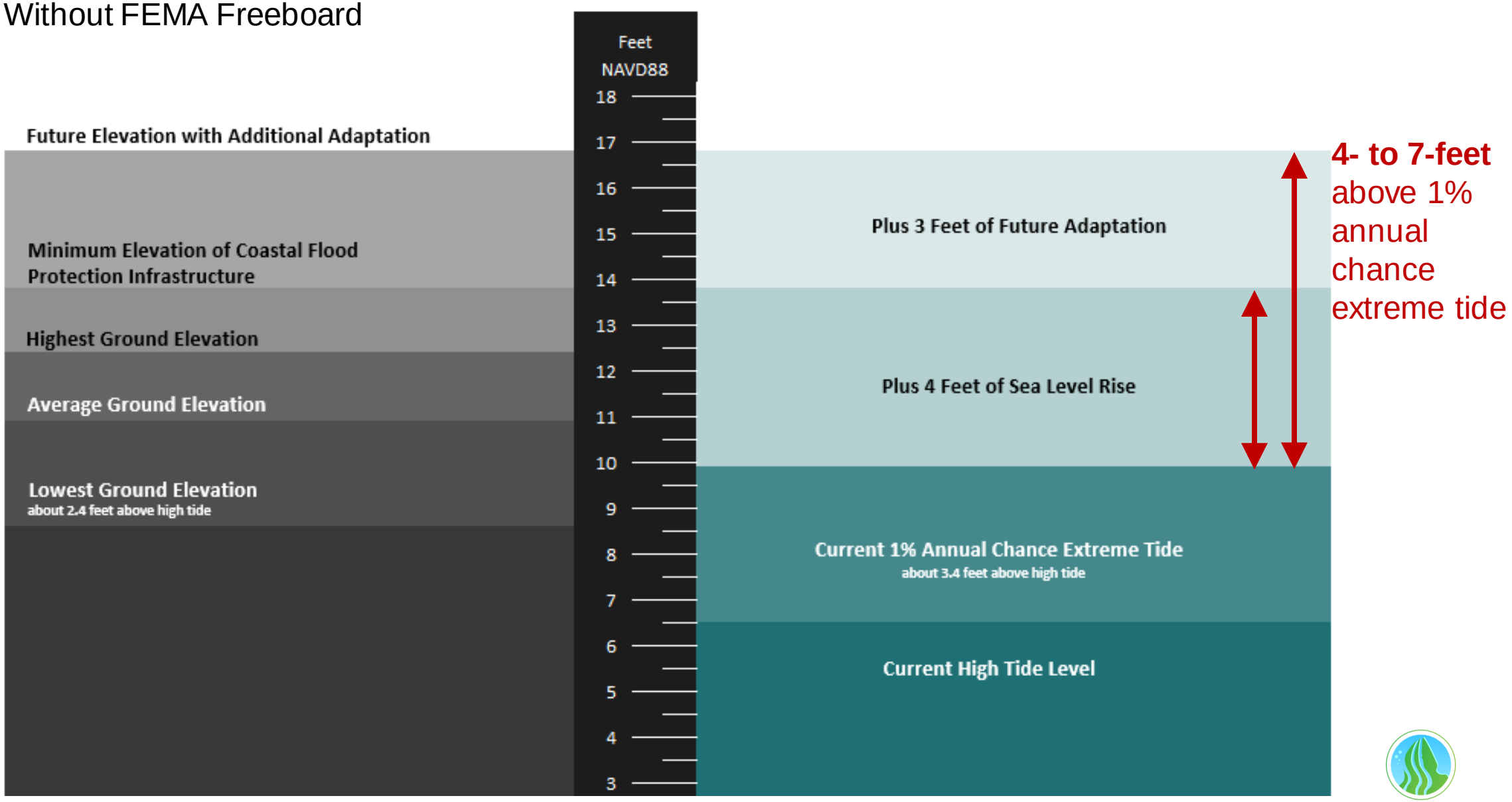
With FEMA Freeboard



5- to 9-feet above 1% annual chance extreme tide

Northern Bay Farm Long-term Flood Protection Elevation Targets

Without FEMA Freeboard



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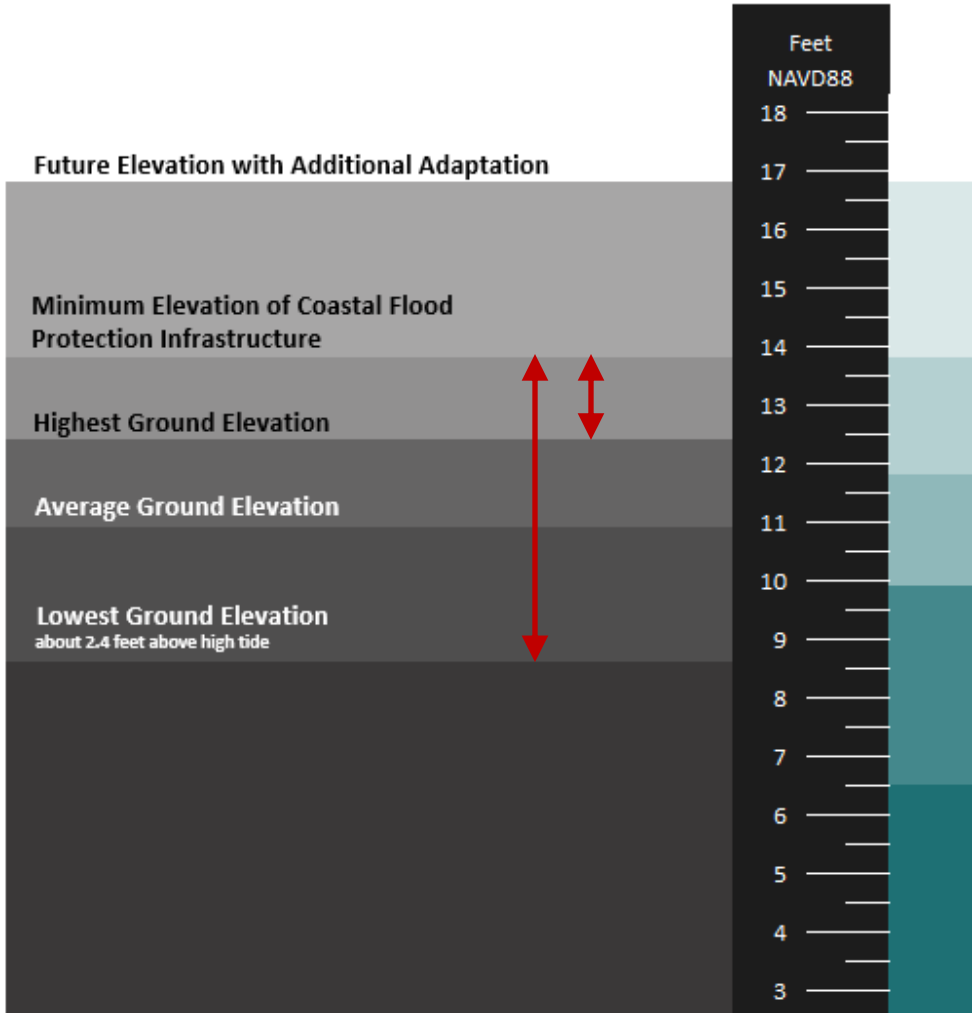
Site Specific Considerations

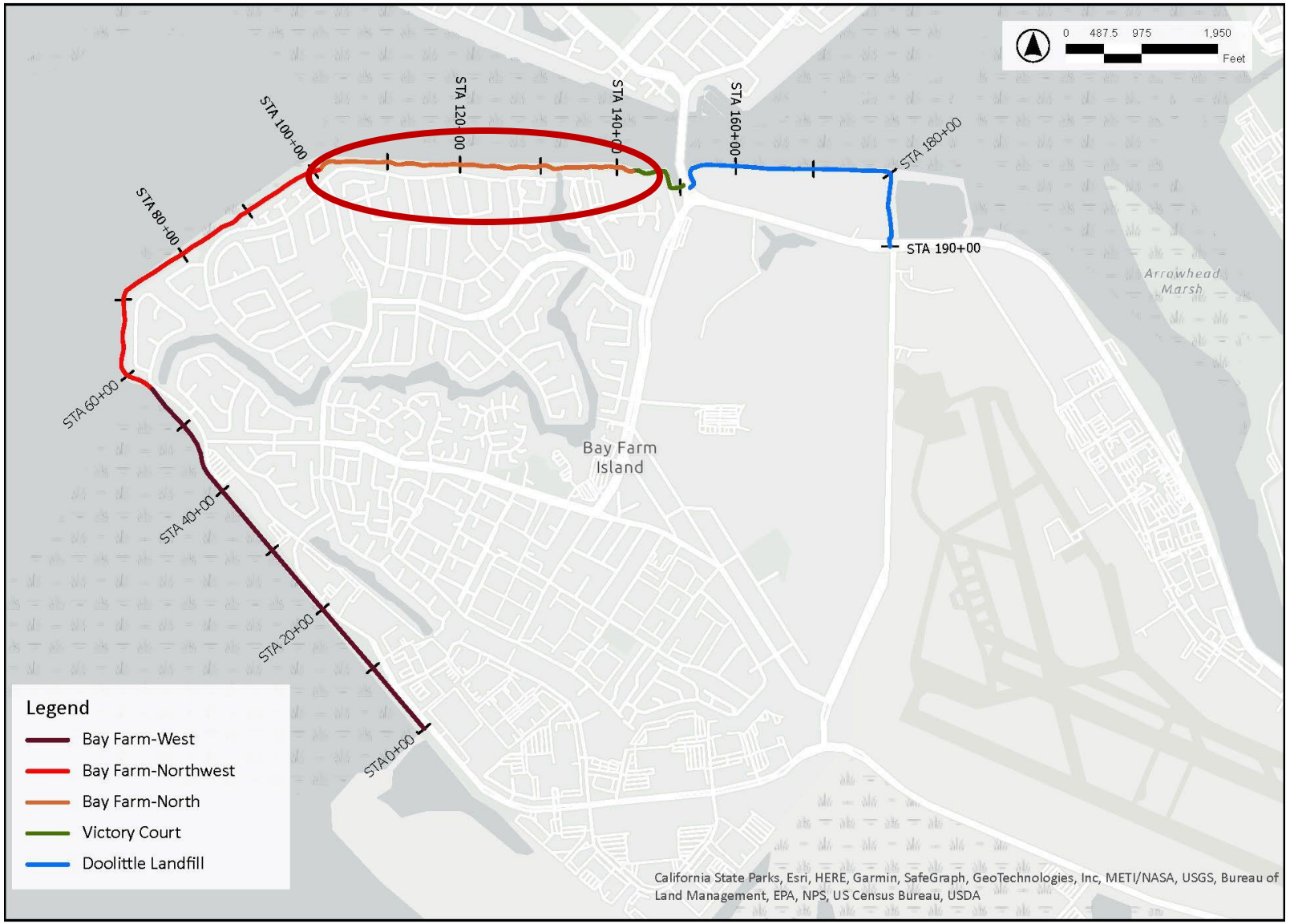
Site Specific Considerations for Northern Bay Farm

It is not always one and done, site considerations and constraints matter



- Minimum coastal flood protection elevation is **13.8 feet NAVD88**
- Flood protection could be **1.4 feet** to **5.3 feet** above inland ground elevations
- May inform structure selection (e.g., earthen levee vs. floodwall). 5.3 feet floodwalls may be acceptable?
- Design height of flood protection infrastructure may require review of alignment topography and other potential constraints (e.g., urban realm consideration, space limitations)

Bay Farm Island Shoreline Reaches



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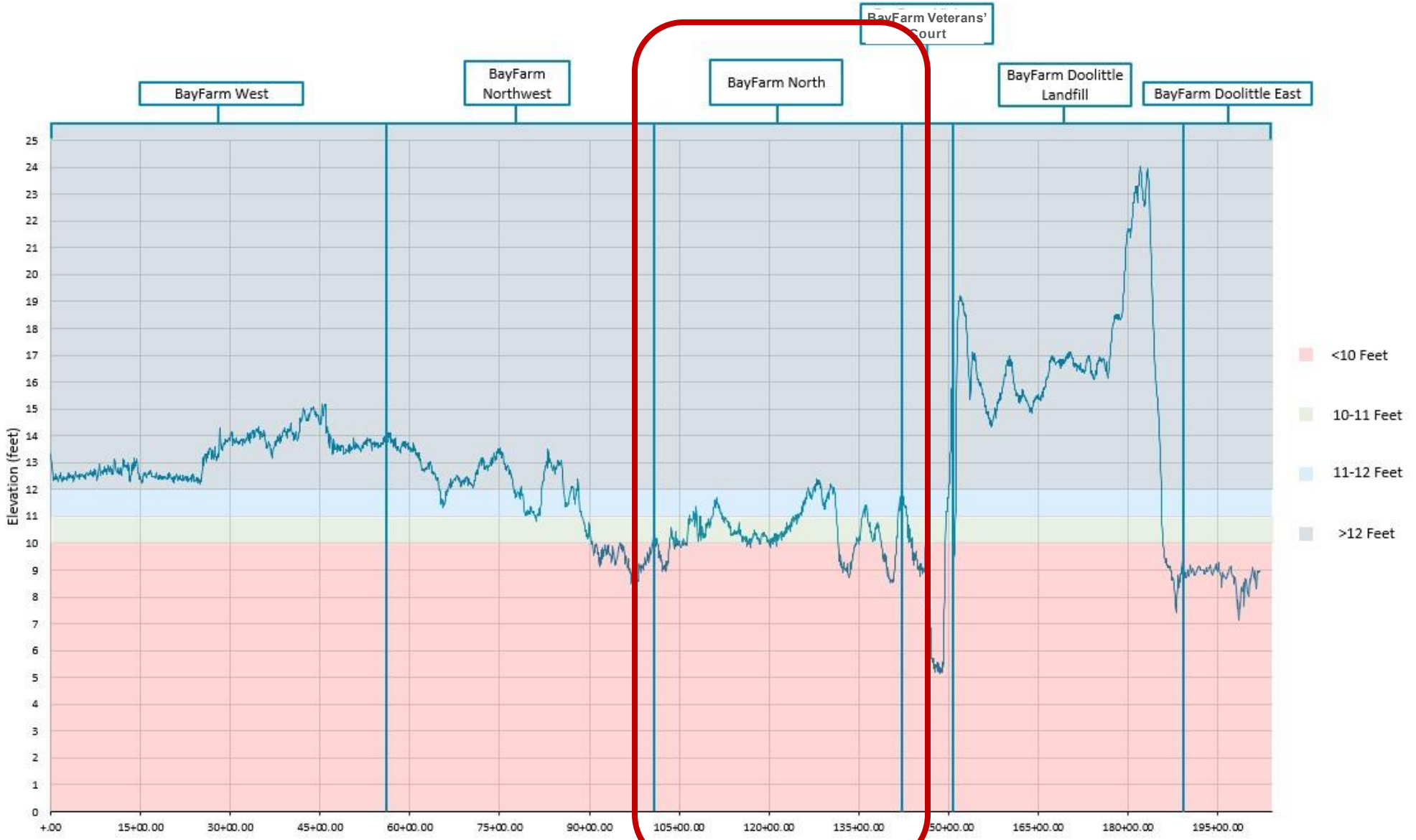
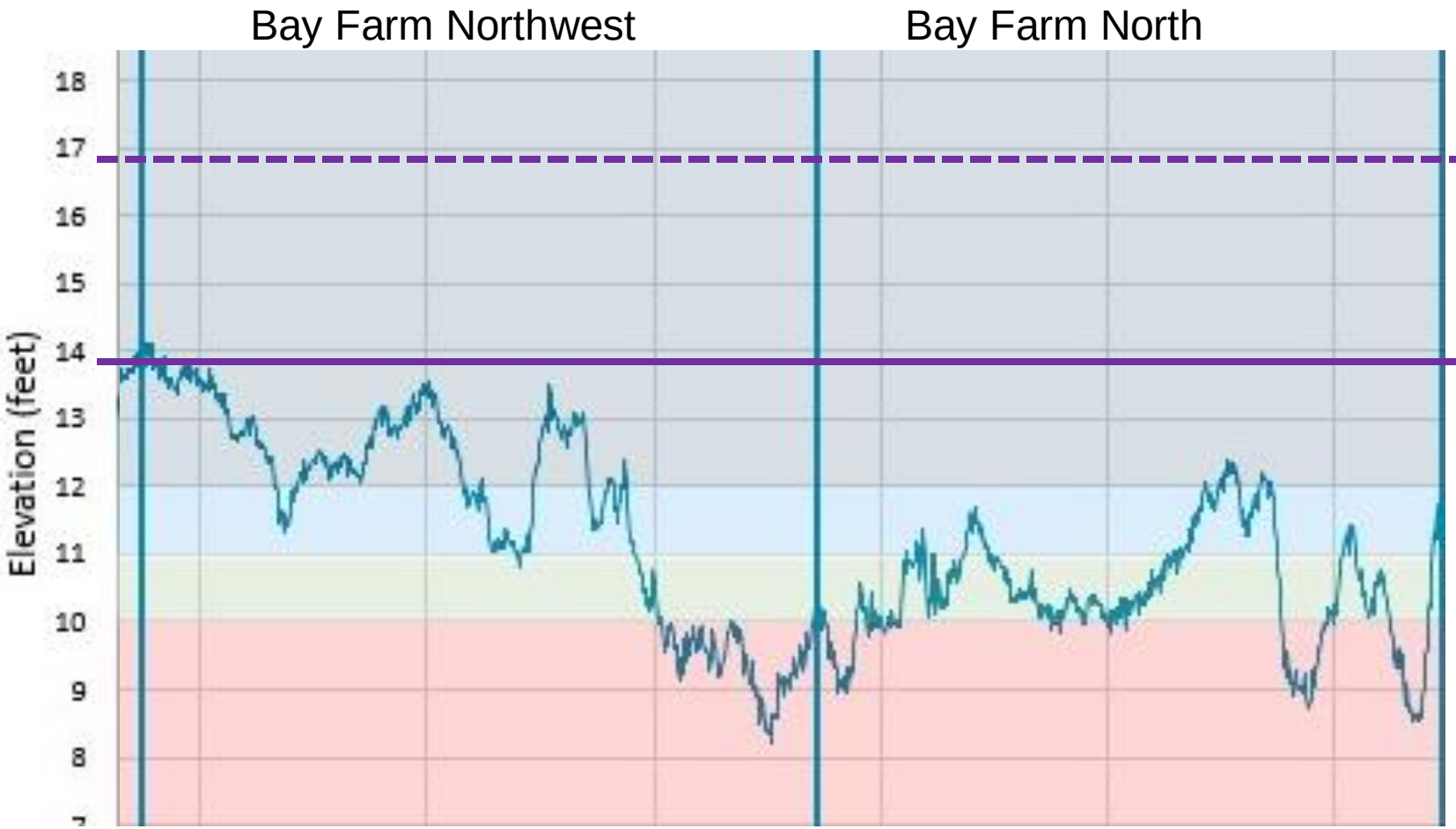


Bay Farm Island Shoreline and Flood Protection Elevations

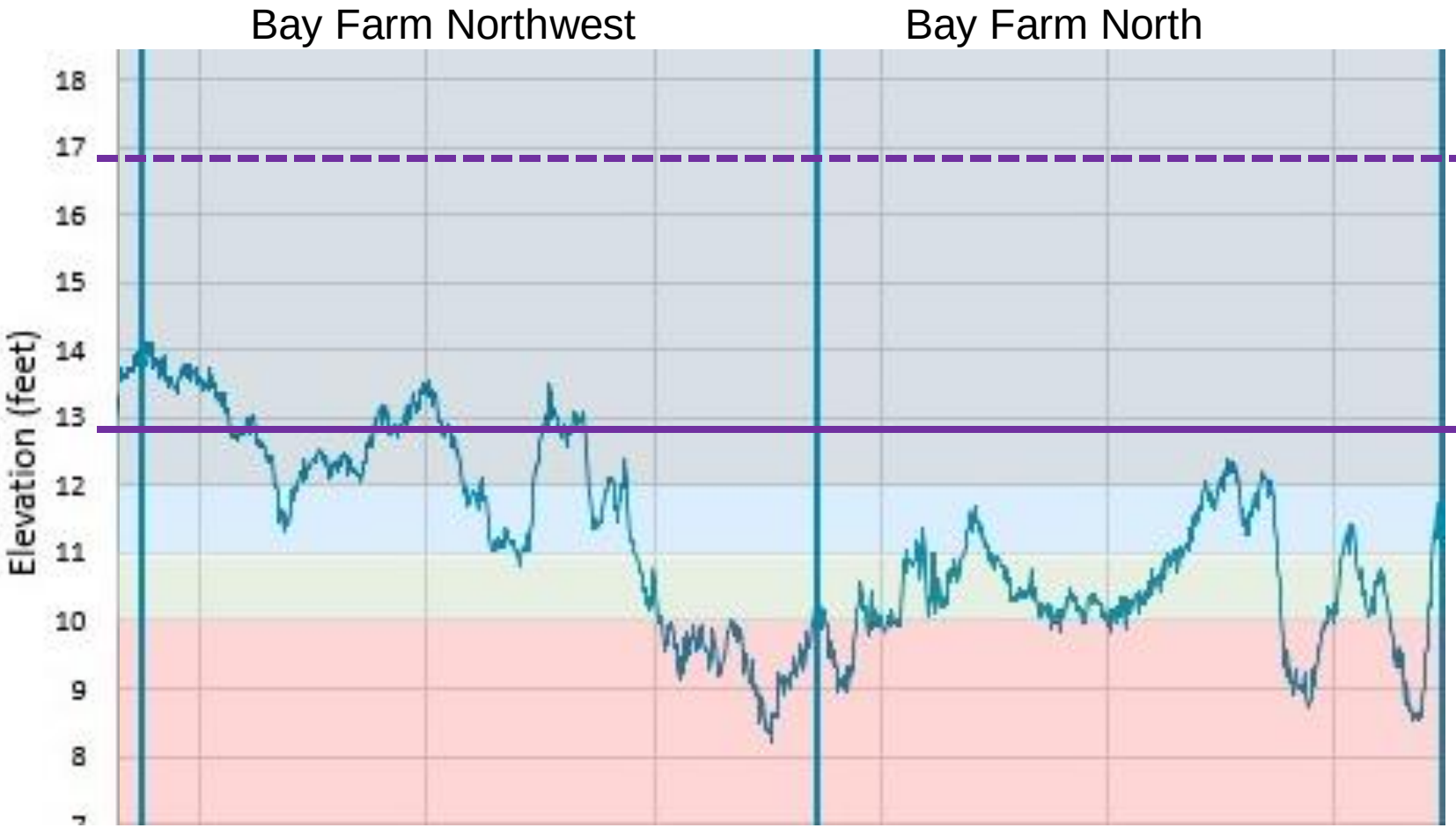


Additional 3 feet of SLR
Future Adaptation Elevation

13.8 feet (FEMA + 2 feet SLR)
Minimum Coastal Flood Protection Elevation

- Earthen berm more likely where > 3.5 feet of elevation needed
- Inland areas may require pump stations

Bay Farm Island Shoreline and Flood Protection Elevations

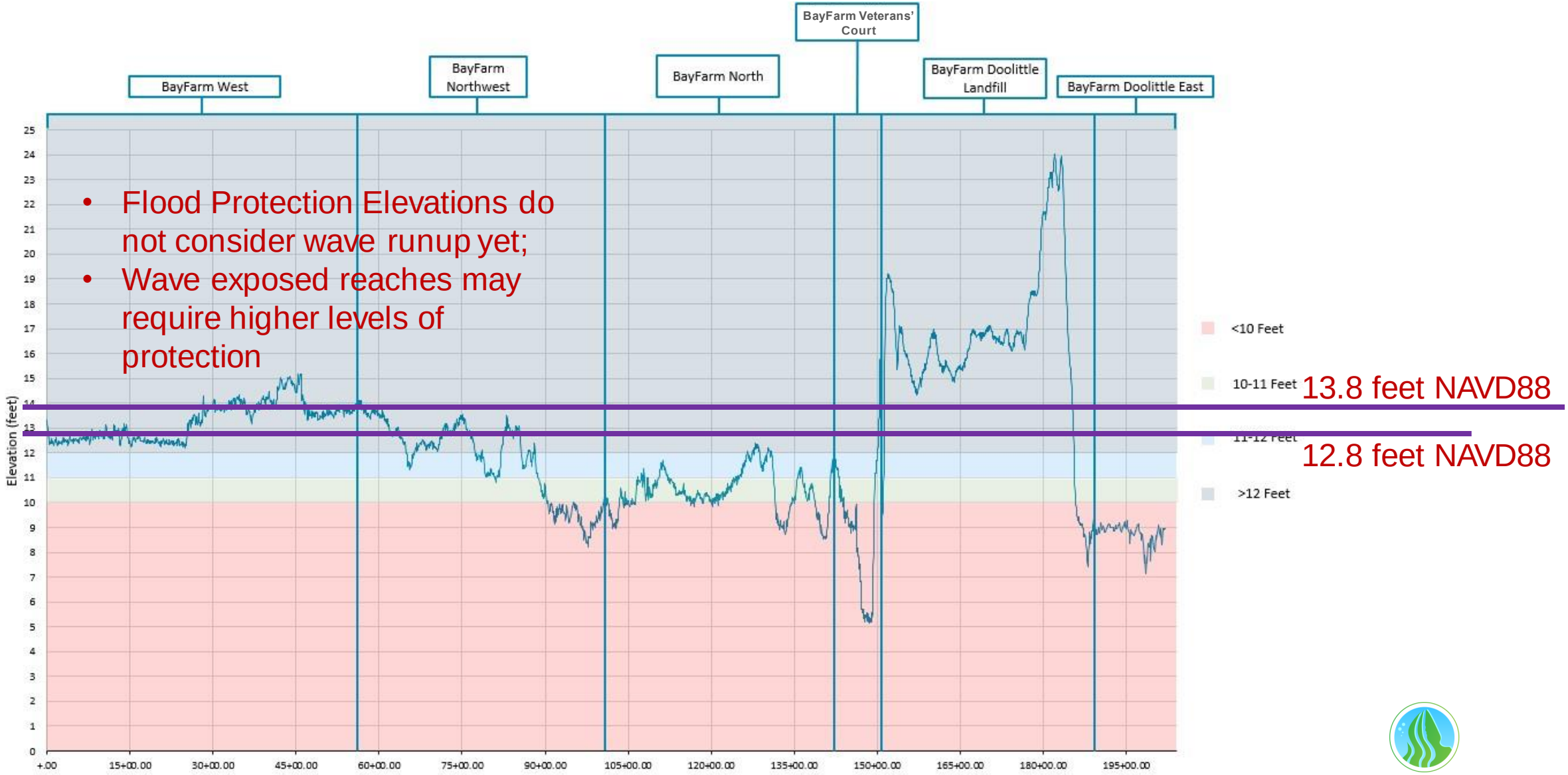


Additional 4 feet of SLR
Future Adaptation Elevation

12.8 feet (FEMA + 1 feet SLR)
Minimum Coastal Flood Protection Elevation

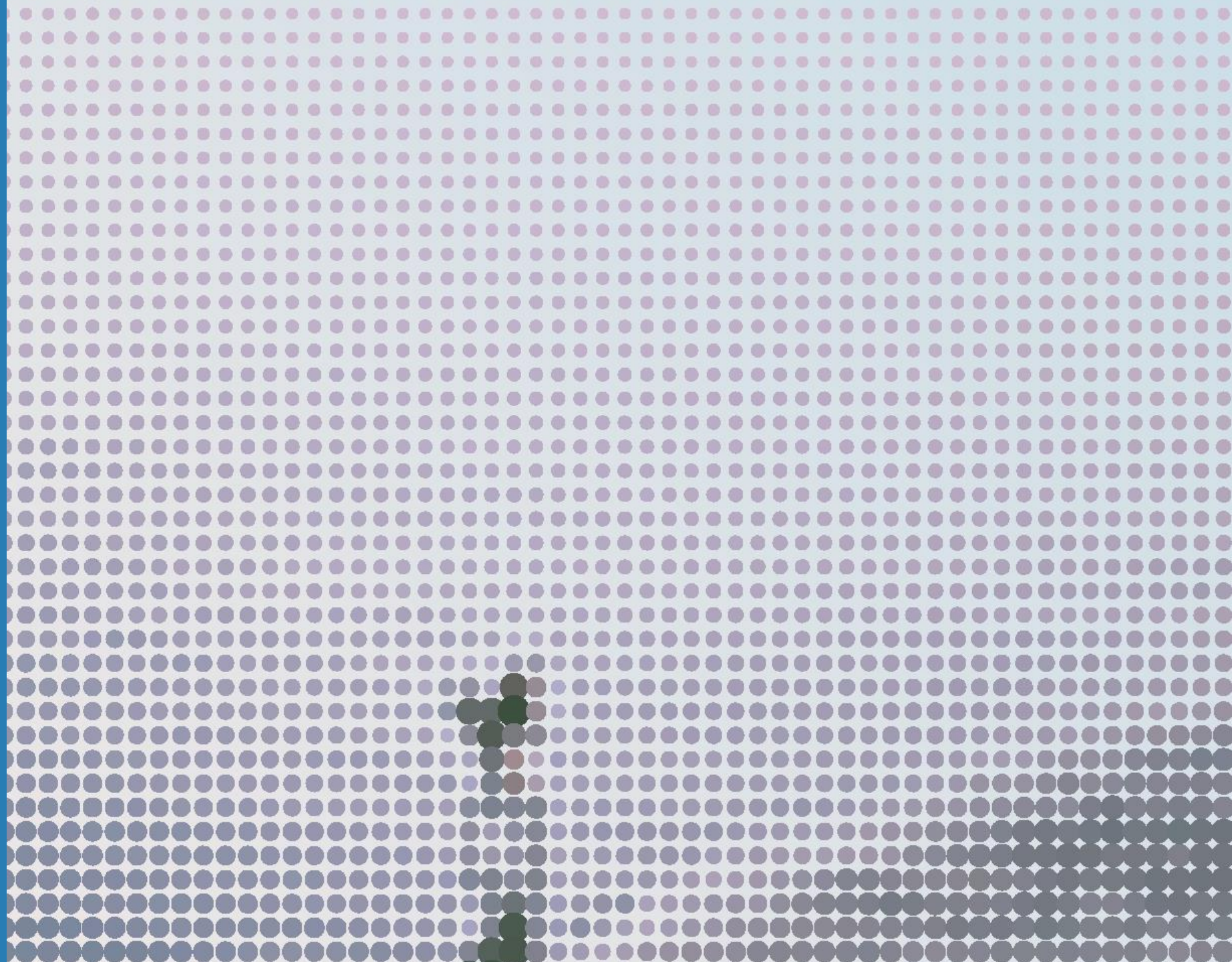
- May reduce cost
- May provides better tie-in to high ground
- May reduce need for Bay fill
- May promote a more nature-based / hybrid solution

Bay Farm Island Shoreline and Flood Protection Elevations



- Flood Protection Elevations do not consider wave runup yet;
- Wave exposed reaches may require higher levels of protection

Summary / Conclusions



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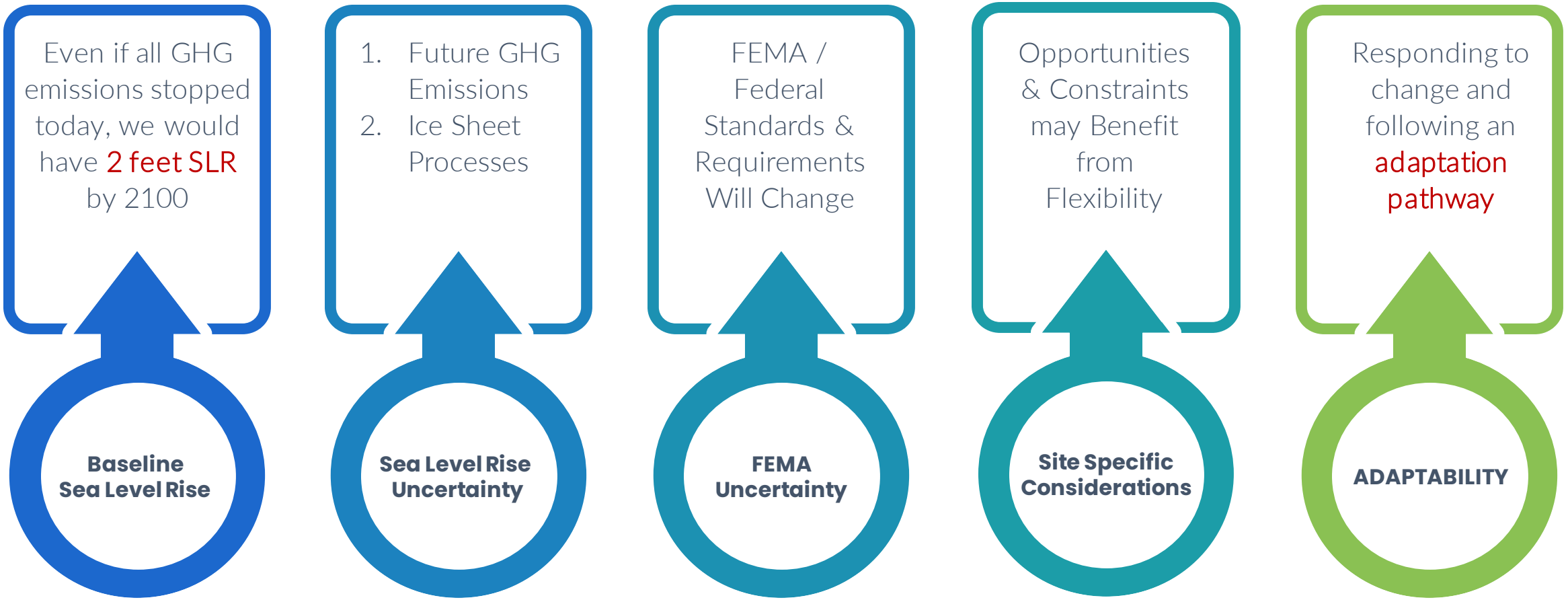
Sea Level Rise Criteria – It's a Goal, not a Standard



Thank You