City of Seal Beach
Local Coastal Program

Vulnerability Assessment

Workshop 2

July 17, 2019

Michael Baker INTERNATIONAL

moffatt & nichol

CITY OF SEAL BEACH CALIFORNIA

What is a Local Coastal Program?

- Consists of Land Use Plan (LUP) and Local Implementation Plan (LIP)
- Guides development in Coastal Zone once LCP is certified by the Coastal Commission
- City was awarded grant funding by the Coastal Commission to address

LCP History in Seal Beach

- 2003: Initiated LCP Preparation
- 2008: Re-initiated LCP Preparation
- 2017: Coastal Commission provided grant funding to prepare and certify an LCP
- 2018: Initiated LCP Preparation in

Benefits of a Certified LCP

- Development applications and permit issuance within the Coastal Zone is delegated to the City
- Coastal Development Permit processing is streamlined through the City instead of Coastal Commission
- City controls local decision making
- A Certified LCP does not

LCP Process and Scope

PHASE I (Current Scope)

- Project Kick-Off
- Consultation with Coastal Commission
- Community Outreach
- Sea Level Rise Vulnerability Assessment
- Prepare Administrative Draft Land Use Plan and Maps

PHASE II (Future Efforts)

- Final Land Use Program
- Administrative Draft and Final Local Implementation Plan
- Study Session with Planning Commission and City Council
- Local Adoption
- Coastal Commission Application and Certification

Components of an LCP

- **Land Use Plan (LUP)**
  - Similar to General Plan
  - Goal: A general statement describing a desired future condition
  - Policy: A statement of commitment designated to guide future decisions in such a way that the LCP goals can be achieved
- **Local Implementation Plan (LIP)**
  - Incorporated as part of the Zoning Ordinance
  - Implementation Program: A program to identify systems, procedures, or techniques that implement

Community Outreach Efforts

- Pop-Up Booth Workshop: Vision, Issues and Opportunities
  - May 27th at the Seal Beach Car Show
- SLR Vulnerability Assessment and Adaptation
  - July 17th at the Marina Center
- LCP Policy Development
  - August 21st at the

Stakeholder Meeting Summary

Stakeholder	Date
Lions Club	April 10
Friends of Seal Beach Naval Wildlife Refuge	April 10
Boeing	April 17
Surfside Colony Board	April 17
Chamber of Commerce	April 17
Naval Weapons Station Seal Beach	April 18
Gold Coast Architectural Committee	April 18
Save our Beach	April 18
City Council – District 1 and 3 Representatives	April 25

Key Stakeholder Comments

Vision/Aspirations

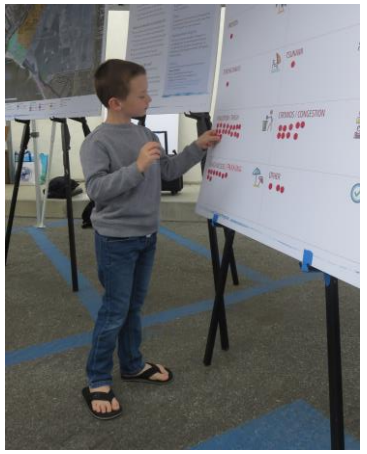
- Small-town feel, with connection to the past
- Service, volunteerism and community involvement

Concerns

- Coastal flooding and wave run ups
- Trash brought to the beach during heavy storms
- Protection of critical facilities
- Local control of the Coastal Zone

Pop-Up Workshop 1 Meeting Summary

- Approximately 200 participants
- Primary modes of transportation:
  - Walking, Driving, Biking
- Concerns about:
  - Pollution/Trash
  - Crowds/Congestion
  - Beach



How Will Input be Used?

- Participants will be informed about the process of developing an LCP consistent with Coastal Commission regulations
- City is gathering information and public feedback that will help inform LCP policy development

City of Seal Beach Sea Level Rise Vulnerability Assessment

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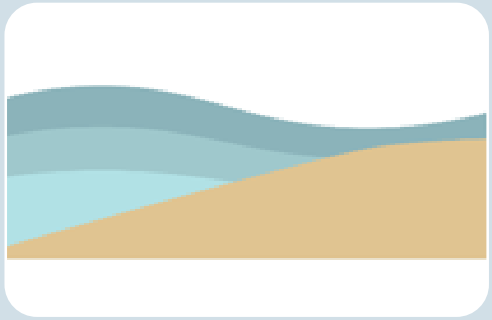
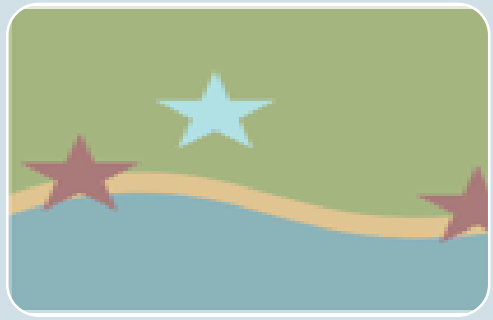
moffatt & nichol

Key Questions

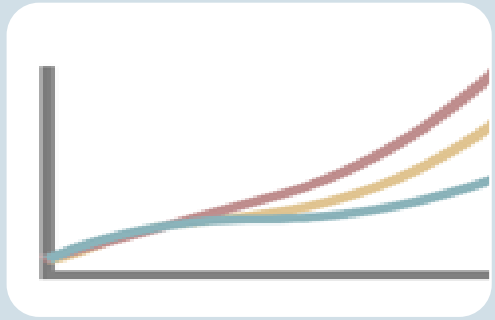
What are the hazards associated with sea level rise for Seal Beach?



What magnitudes of sea level rise matter for Seal Beach?



What resources are at risk?

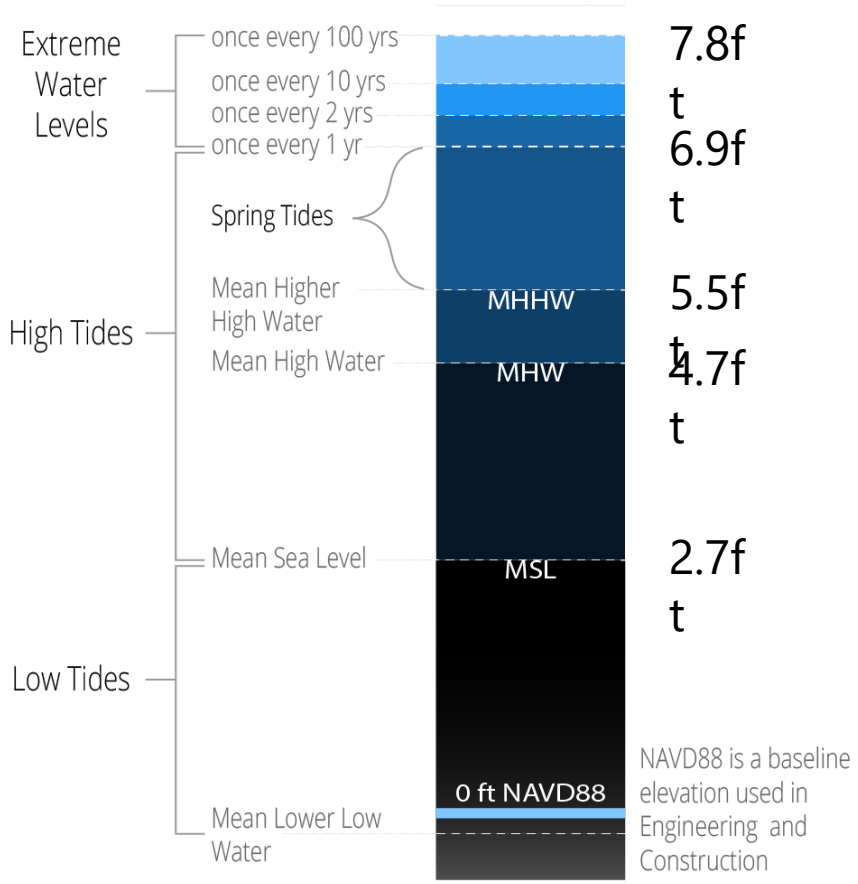


When could these scenarios happen and how do we plan for them?

Coastal Setting

Water Levels

- Typical tidal range of MLLW to MHHW
- Spring tides 2x a month
- King tides
  - Largest spring tides of the year
  - Can cause dry-weather flooding
- Sea level anomalies
  - El Nino
  - Storm surge

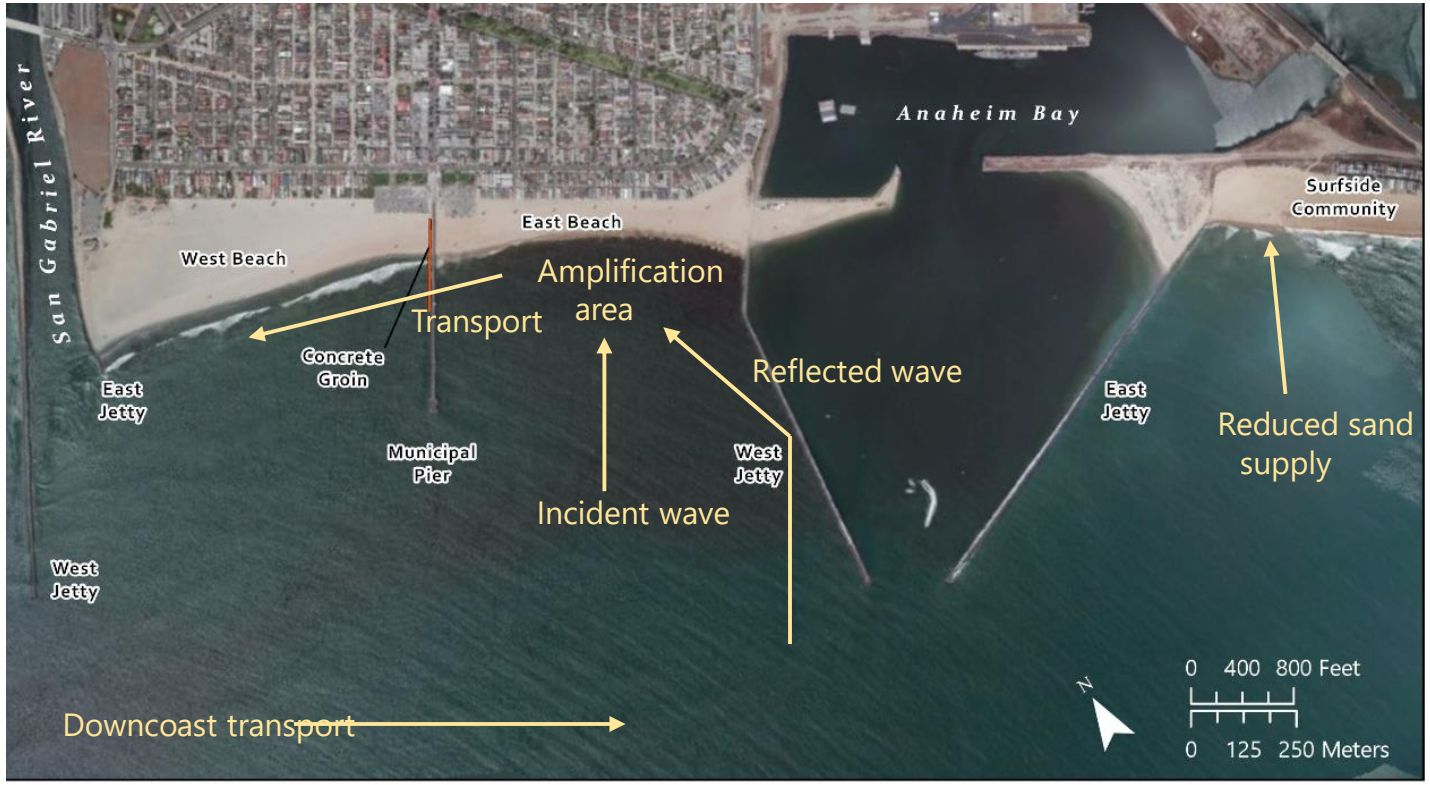


Wave Climate

- Wave exposure typical of region
  - South swells in summer
  - West swells in winter
- Unique winter wave hazard
  - Swell reflected off of Anaheim Bay west jetty
  - Wave energy amplified
  - Increased wave heights along east beach

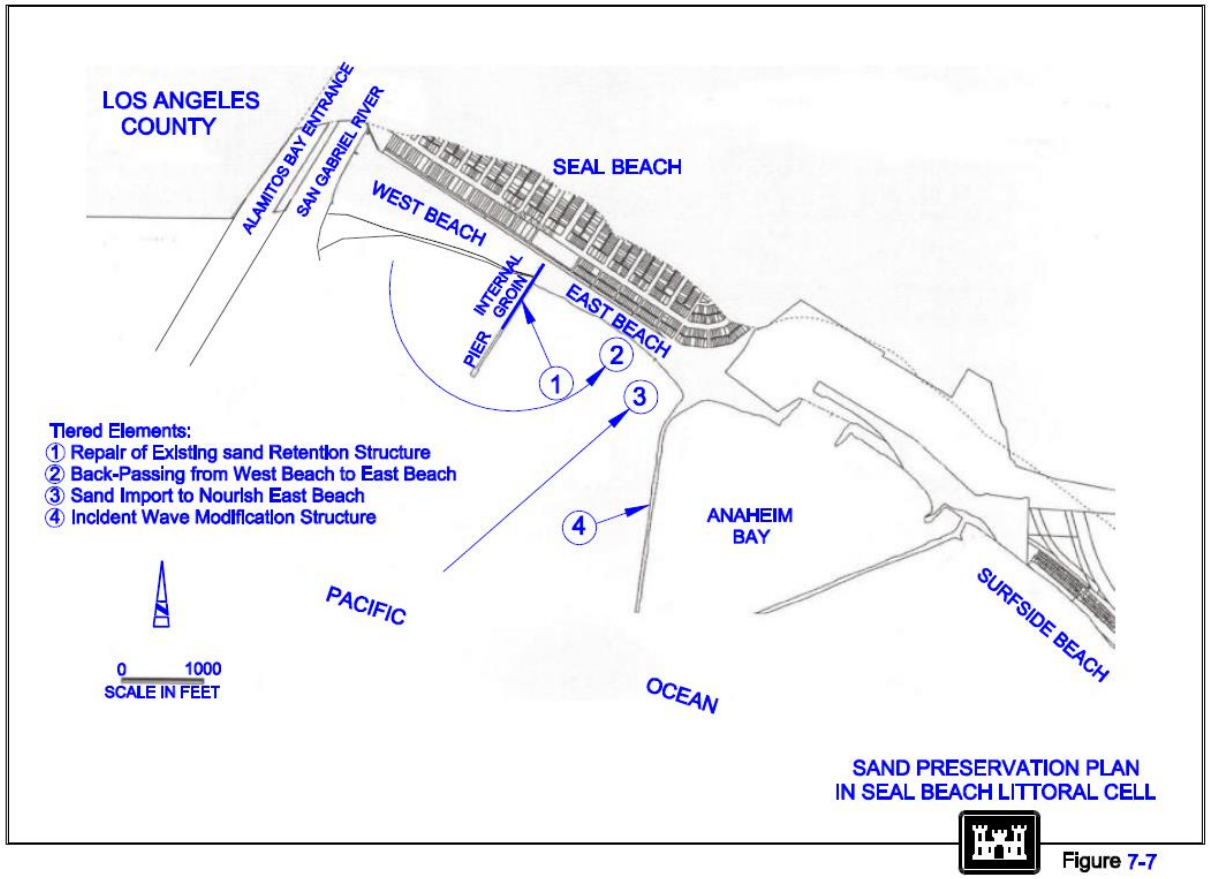
Littoral Processes

- Influenced by jetties, pier, concrete groin
- Jetties create a pocket beach
  - Isolated from regional sand transport
  - Shoreline impacts at Surfside
- Reflected waves transport sand upcoast
  - Localized erosion ~13th St
  - Pier groin constructed to offset



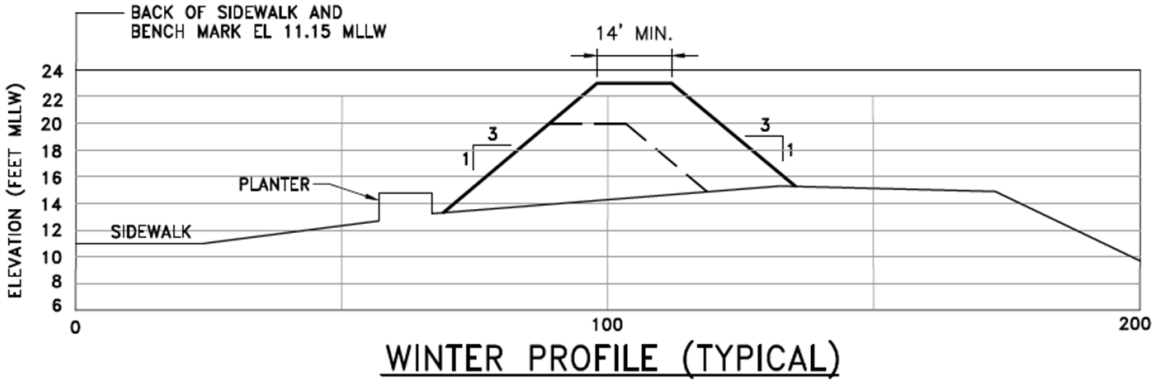
City Sediment Management

- Sand backpassing
  - West to east beach
  - Offset sand transport
- Winter dike
  - Wave/flood protection
- Nourishment
  - Opportunistic at east beach
  - Cycle of nourishment at Surfside



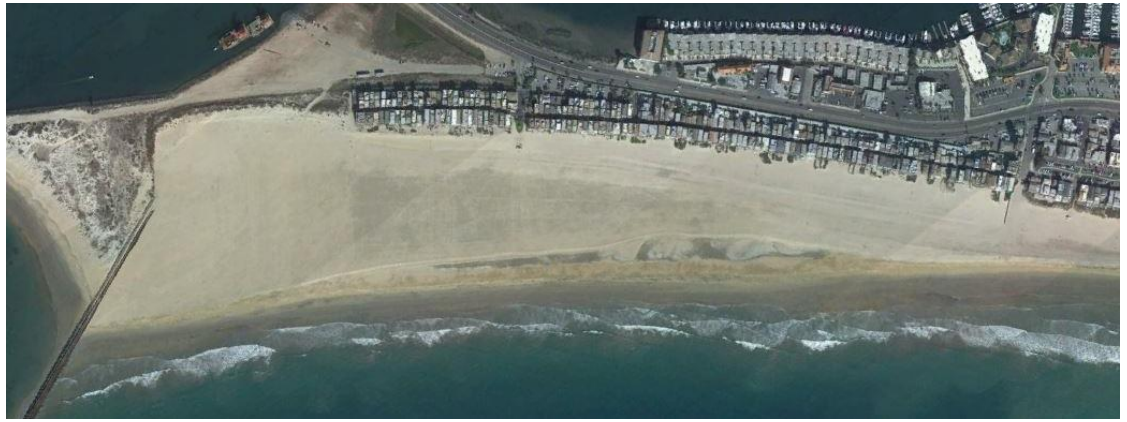
Sediment Management

Berm construction

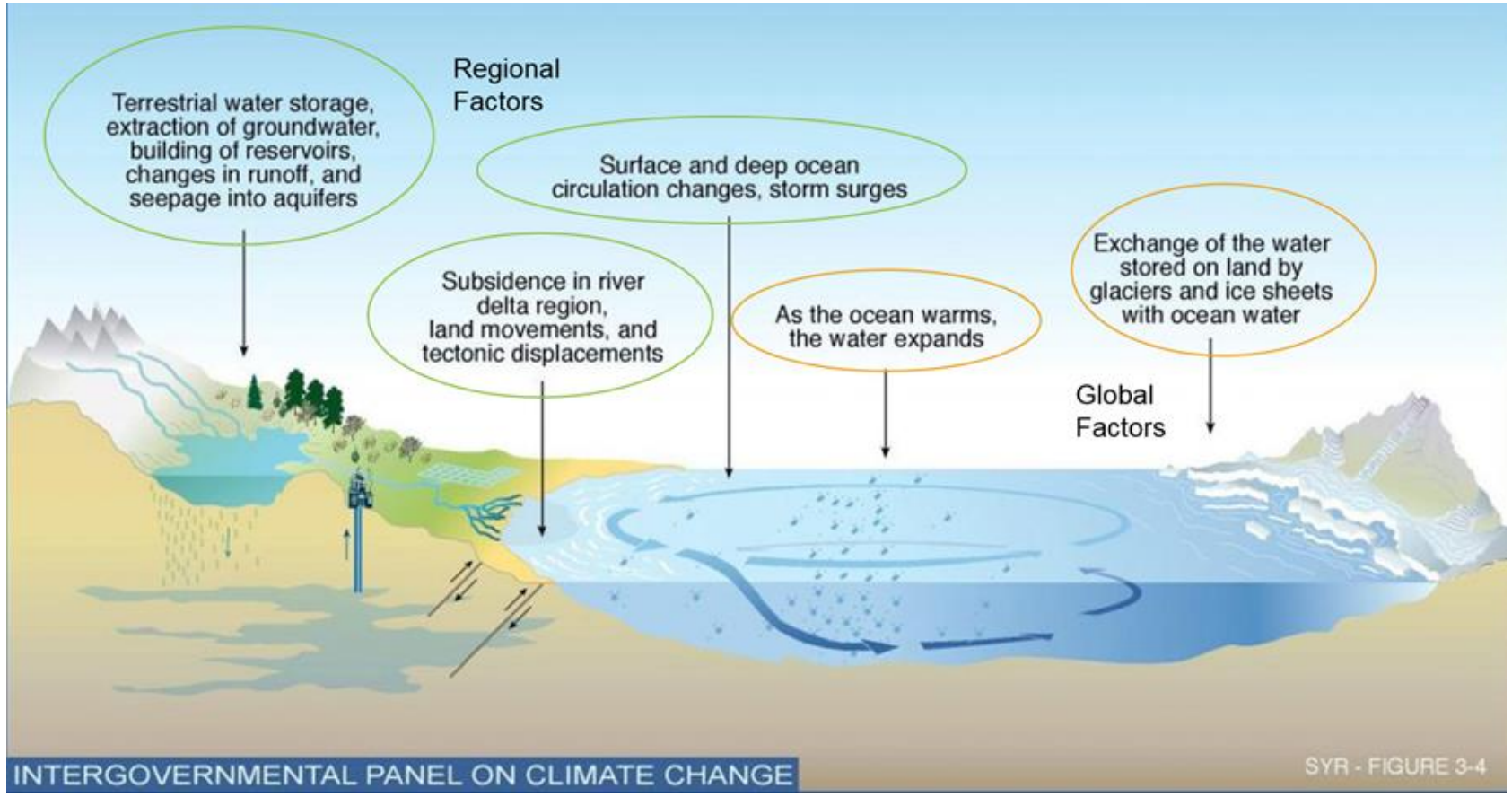


WINTER PROFILE (TYPICAL)

Surfside nourishment

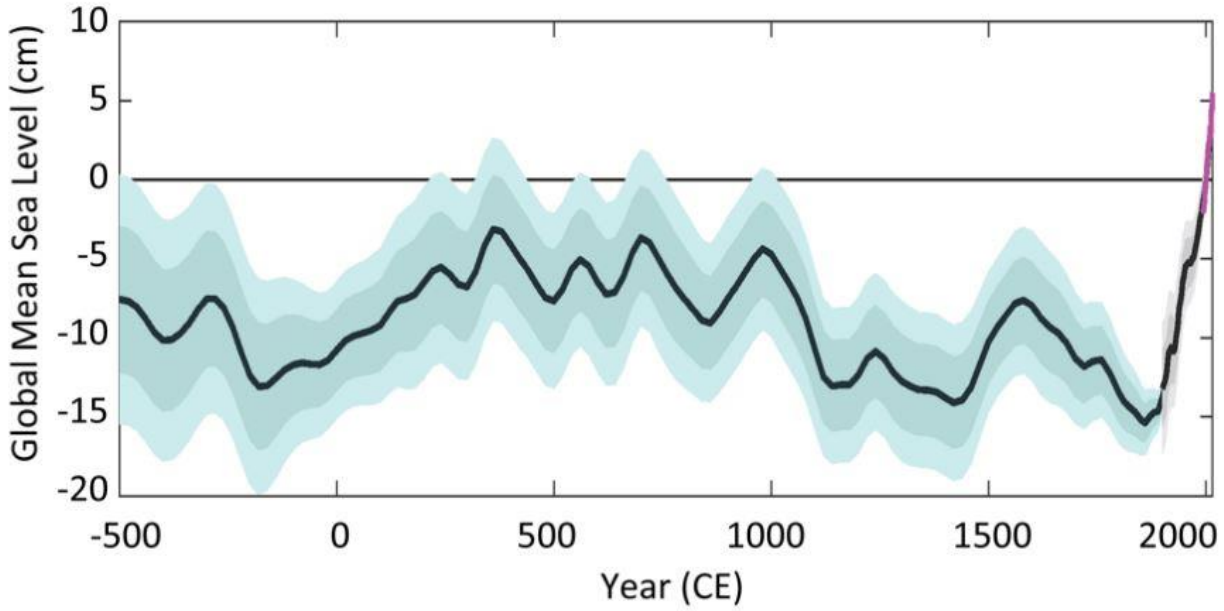


What is Sea Level Rise?

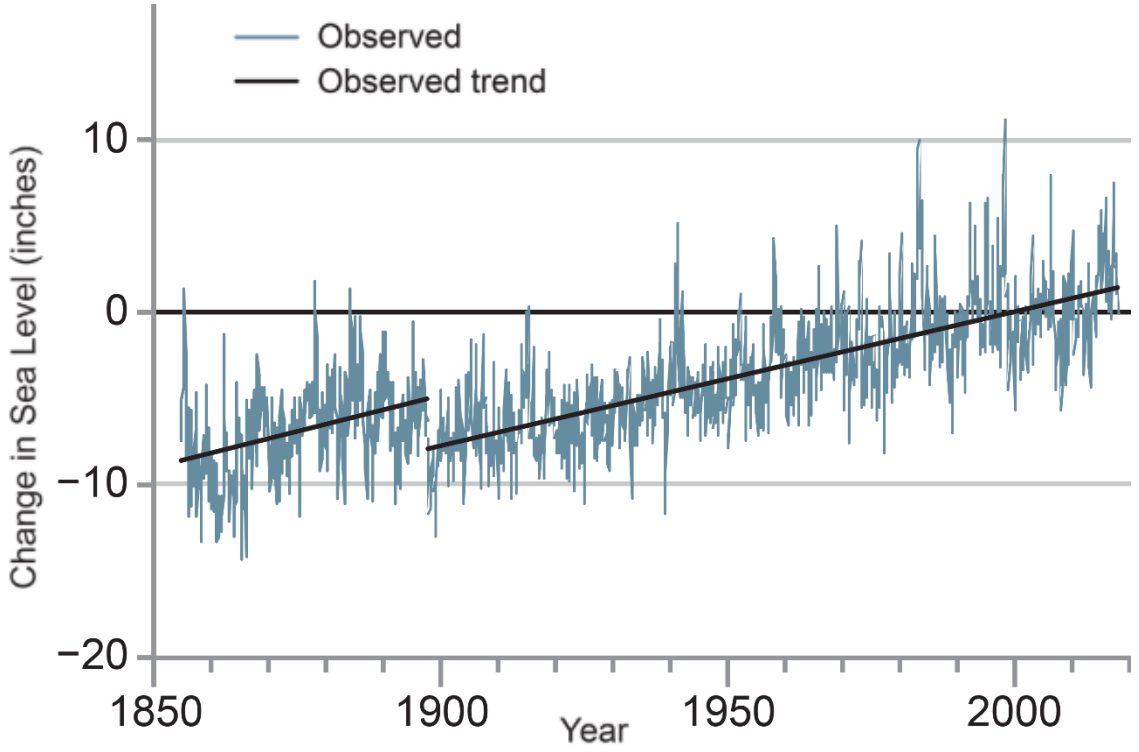


Historic Trends

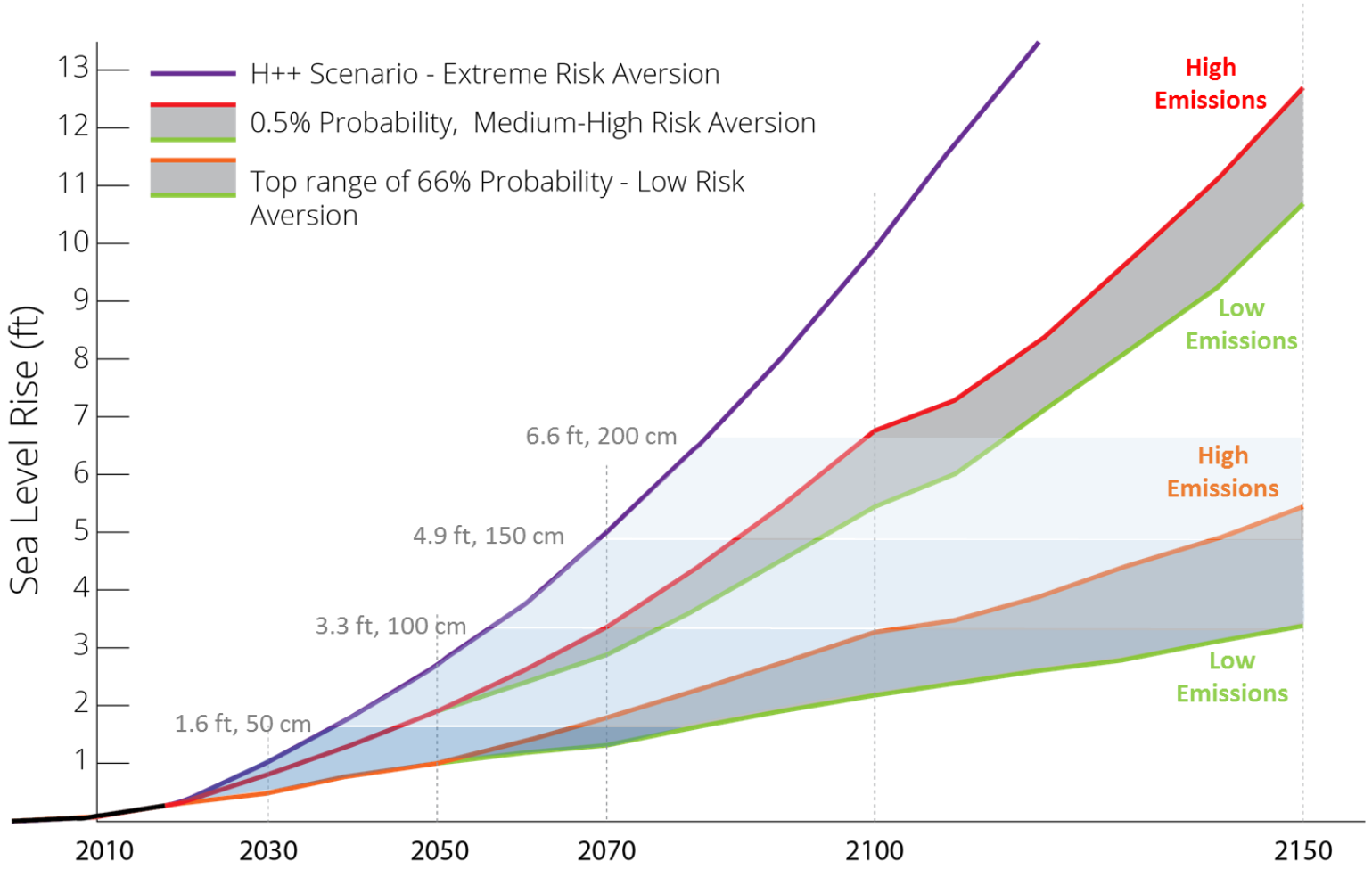
Variation over geologic time scales



Observations in CA show increase over last ce

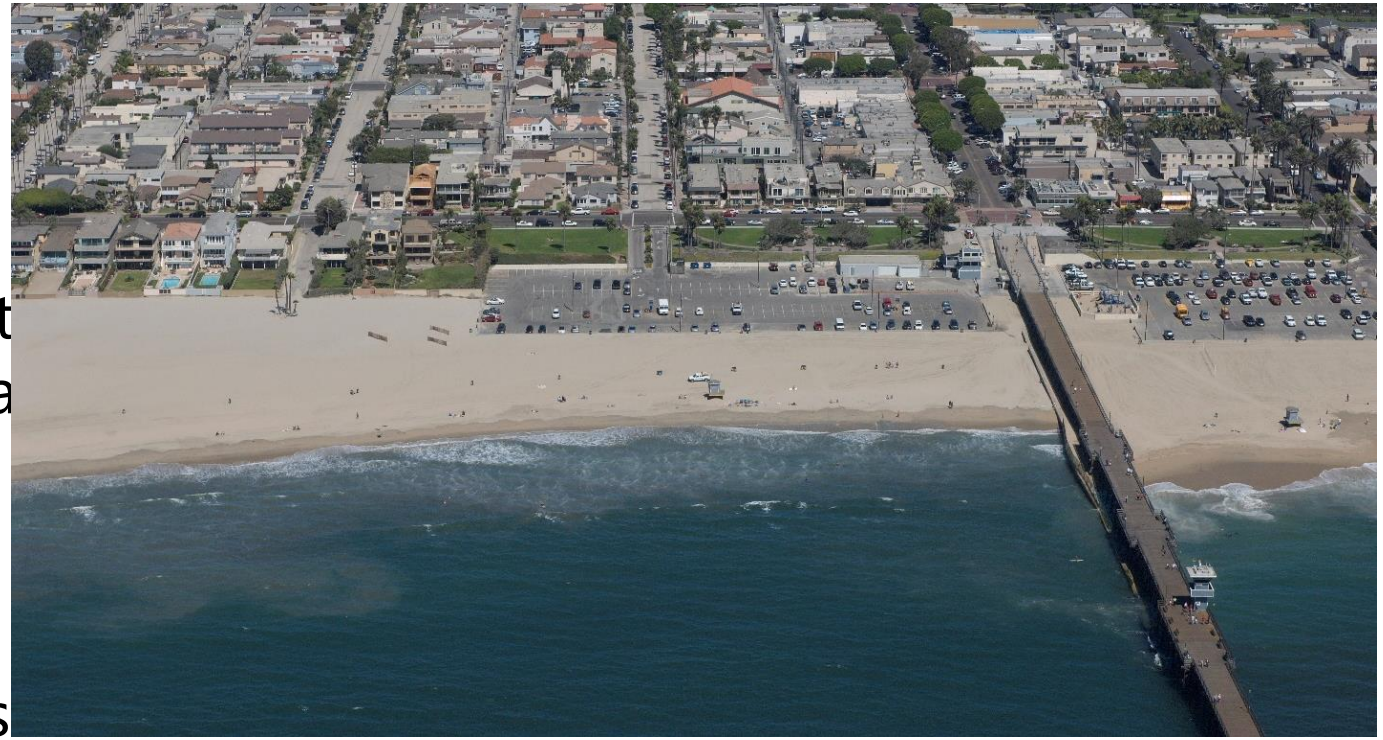


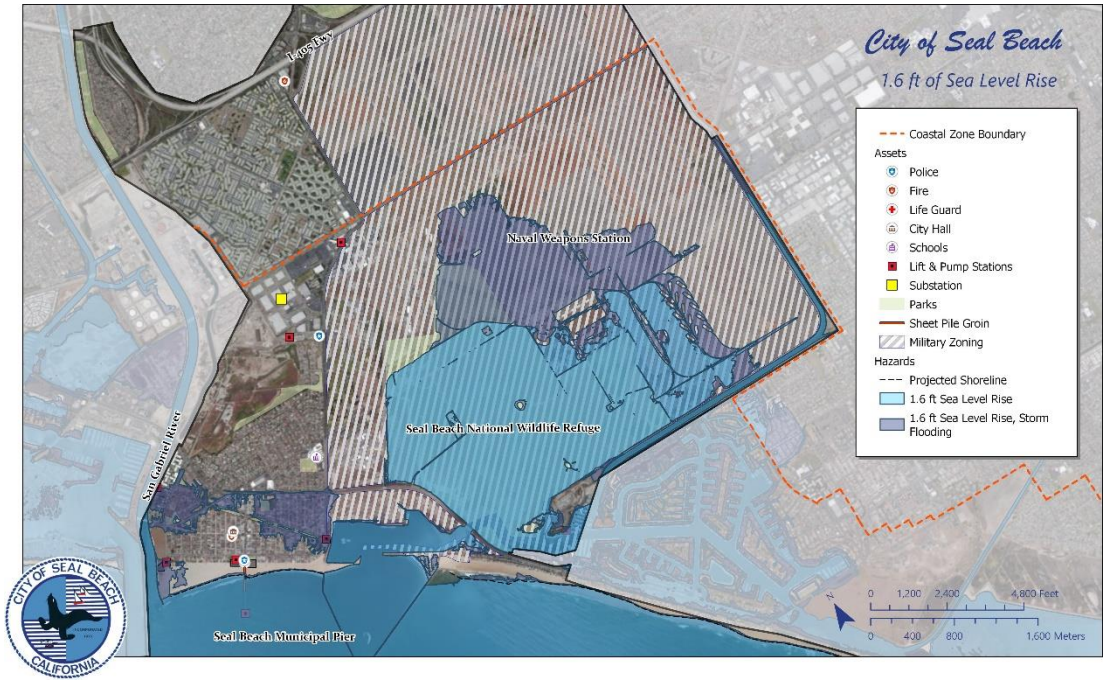
Projections and Probability

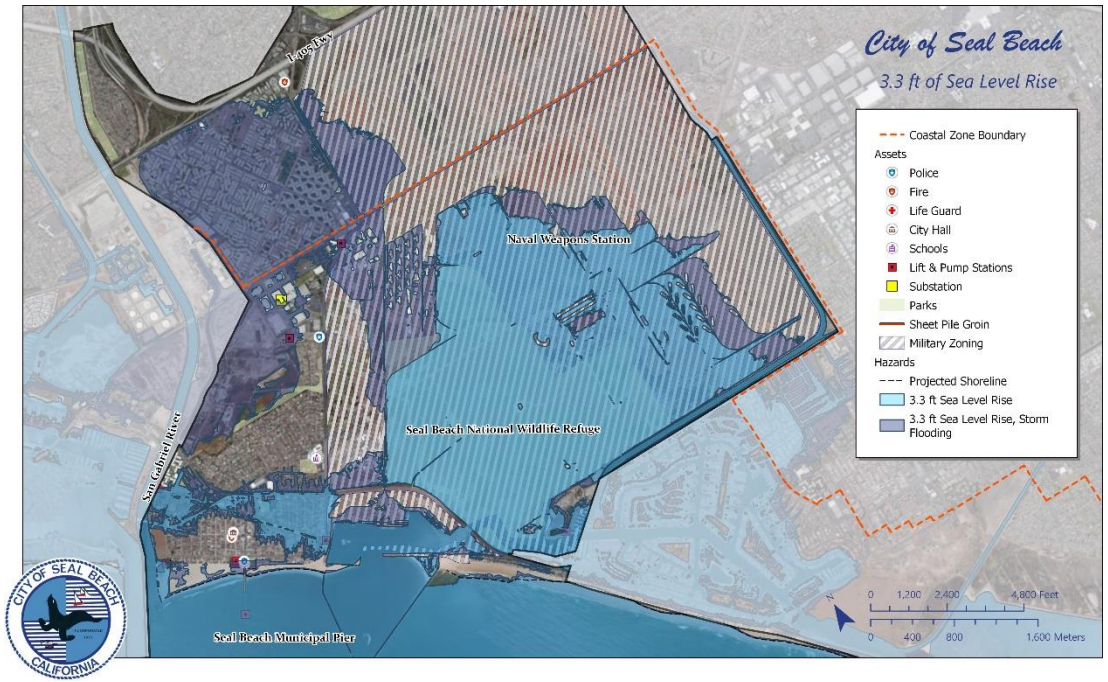


Vulnerability Assessment

- Resources
  - Coastal development
  - Utilities infrastructure
  - Public safety facilities
  - Transportation infrastruct
  - Coastal access and recrea
  - Municipal pier
  - Environmental resources
- Hazard analysis
  - Spring tide flood hazards
  - 100-year storm flood hazards




City of Seal Beach
1.6 ft of Sea Level Rise
Coastal Zone Boundary
Assets
Police
Fire
Life Guard
City Hall
Schools
Lift & Pump Stations
Substation
Parks
Sheet Pile Groin
Military Zoning
Hazards
Projected Shoreline
1.6 ft Sea Level Rise
1.6 ft Sea Level Rise, Storm Flooding
Naval Weapons Station
Seal Beach National Wildlife Refuge
Seal Beach Municipal Pier
San Gabriel River
Lgos Hwy
0 1,200 2,400 4,800 Feet
0 400 800 1,600 Meters
CITY OF SEAL BEACH CALIFORNIA


City of Seal Beach
3.3 ft of Sea Level Rise
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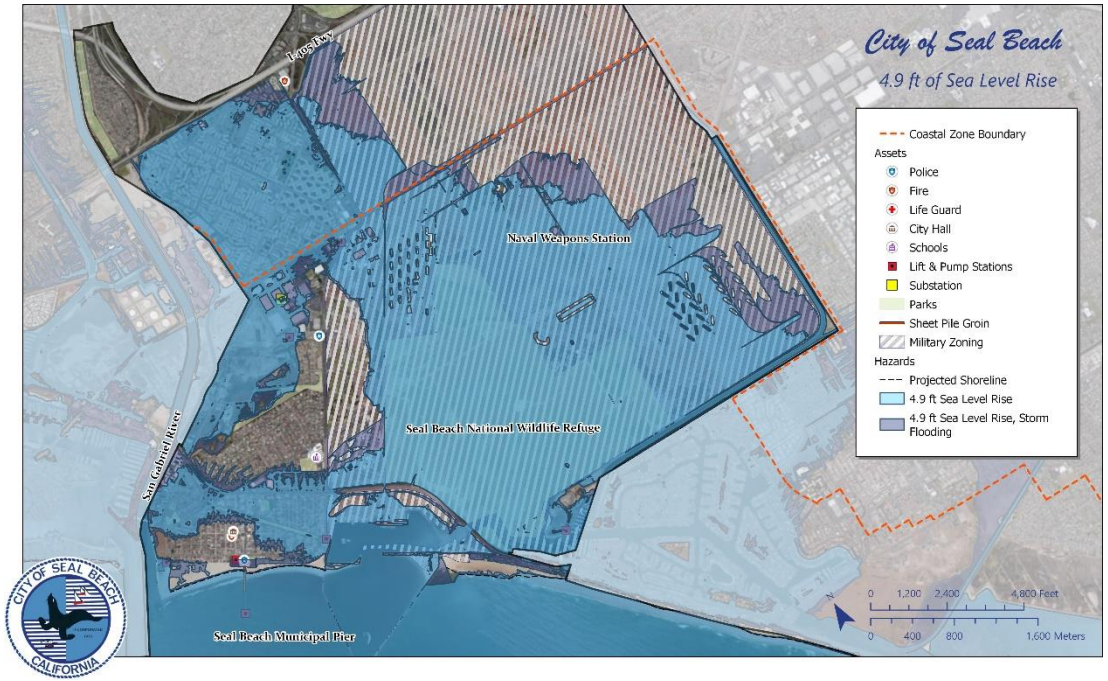
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4.9 ft of Sea Level Rise
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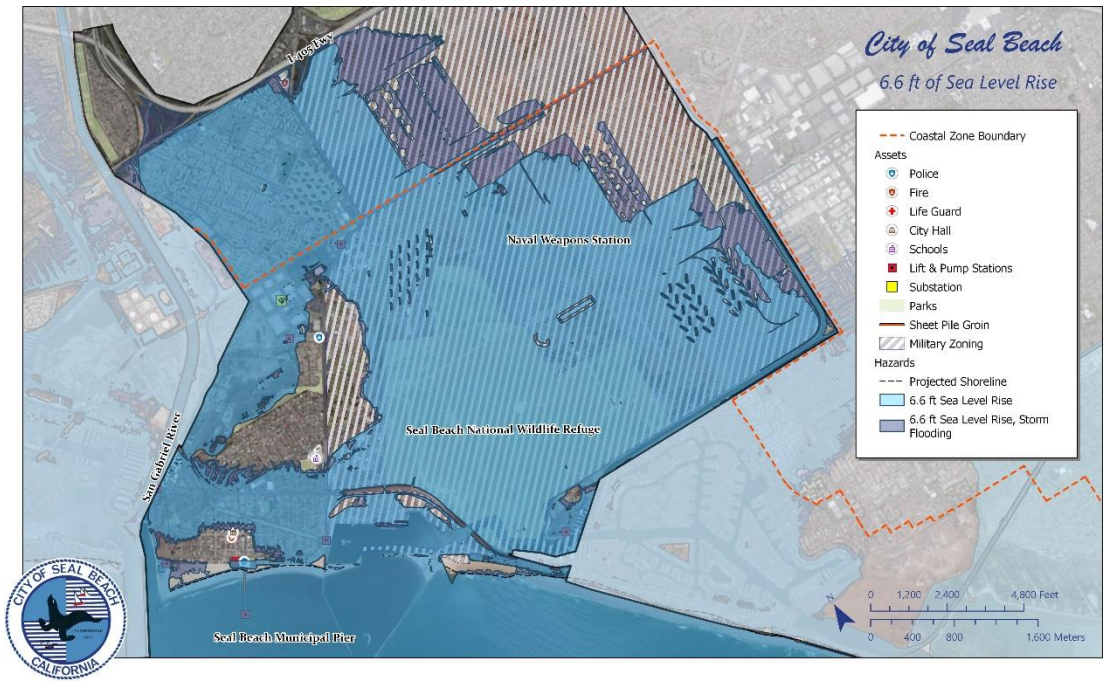
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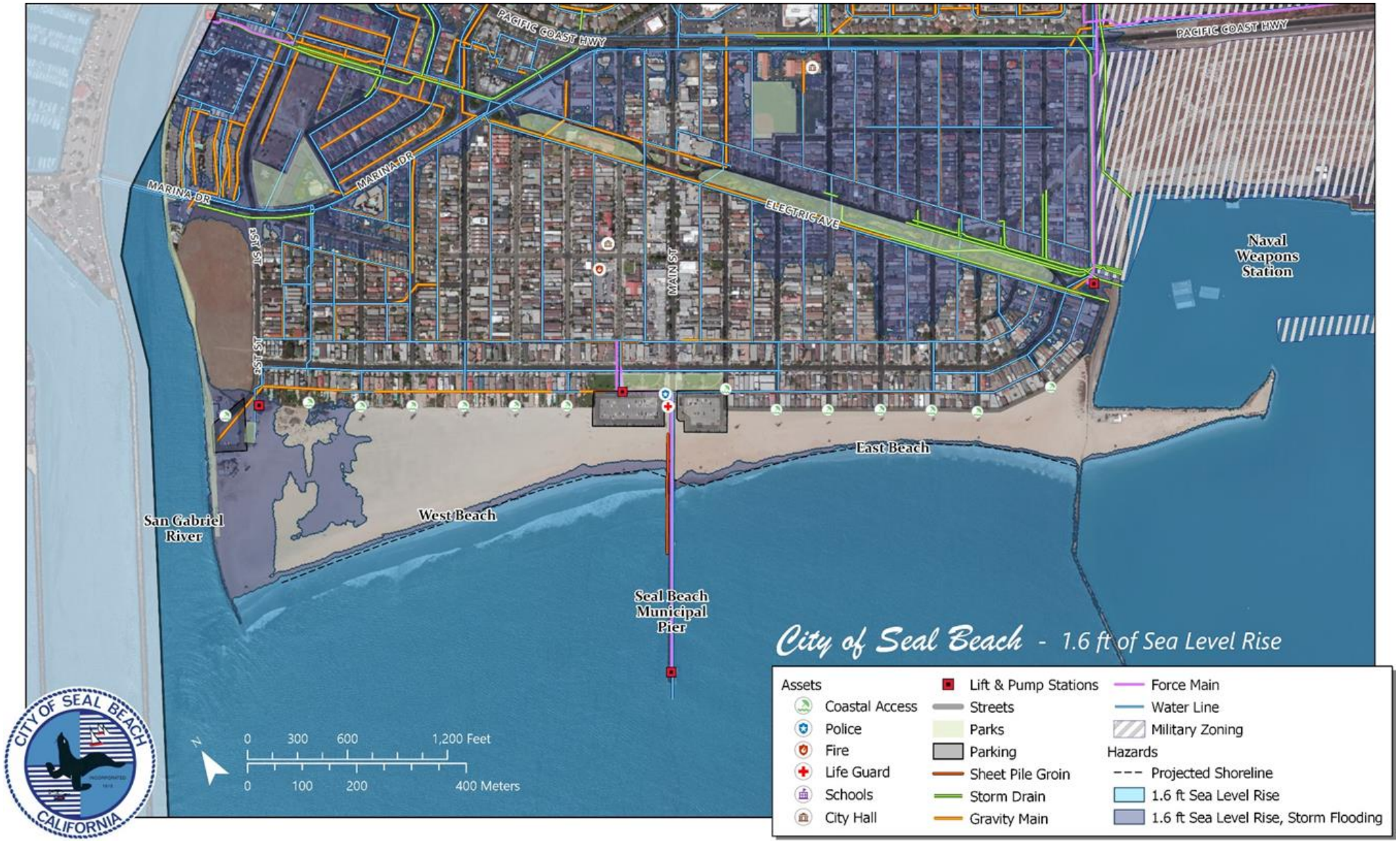
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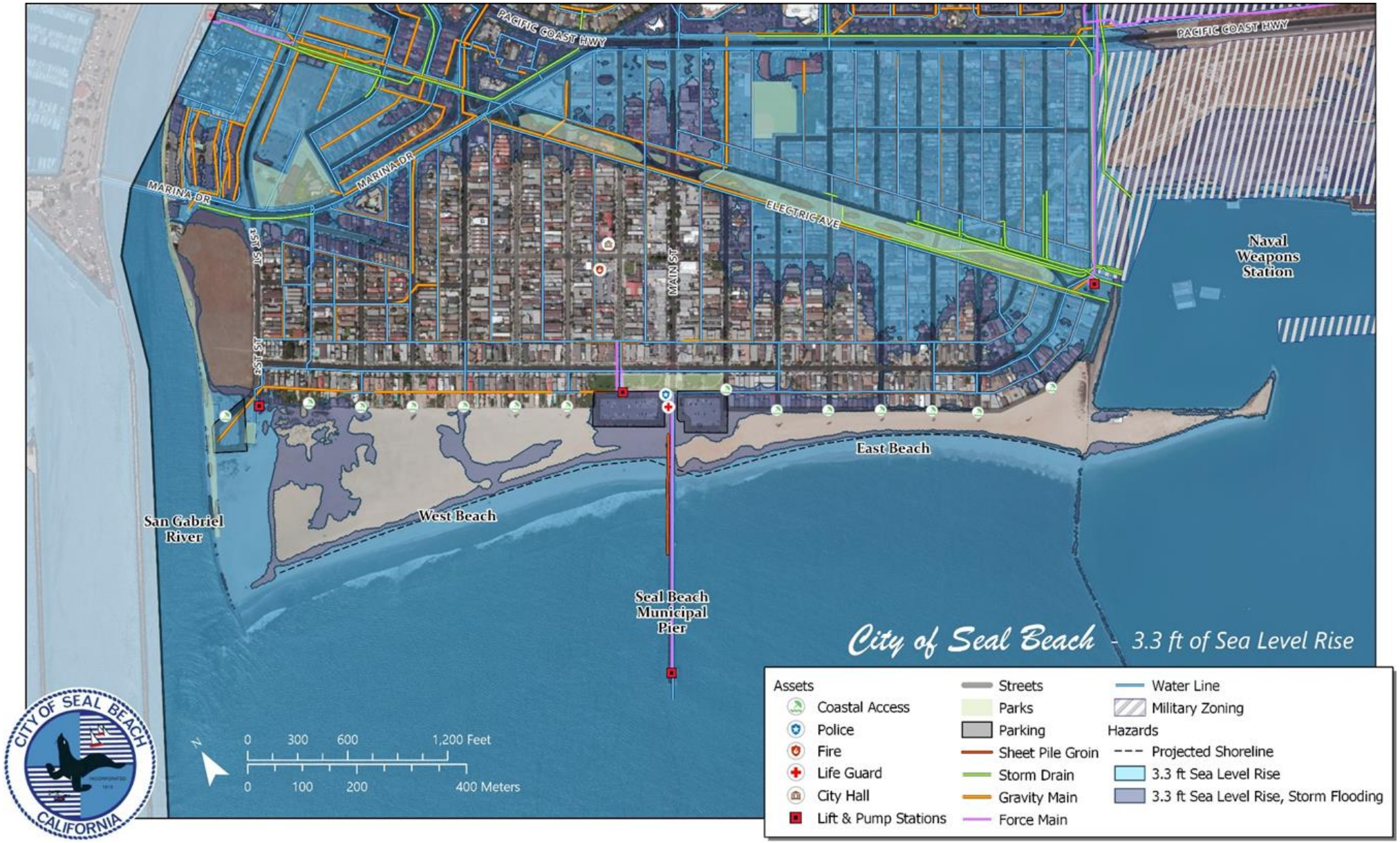
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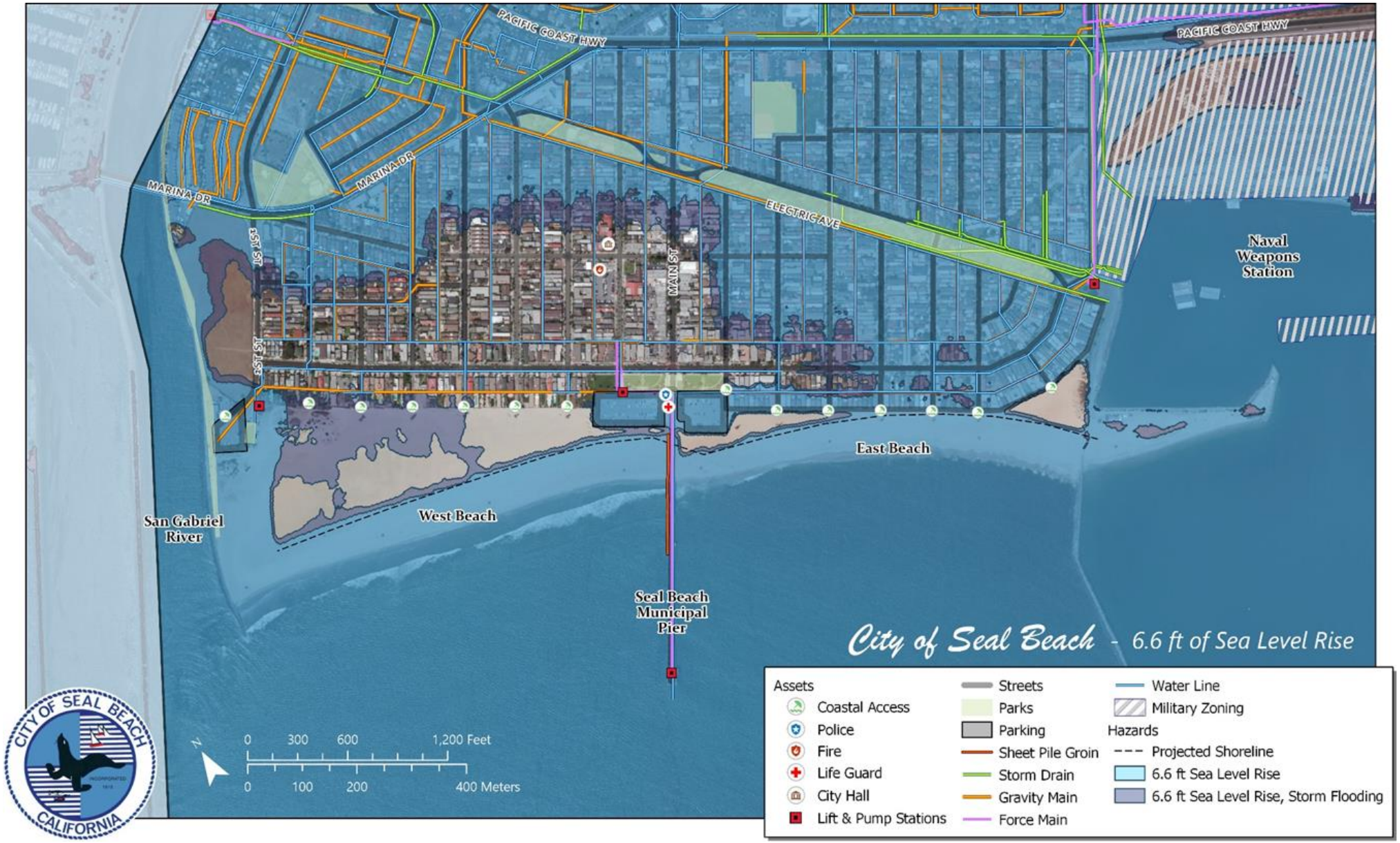
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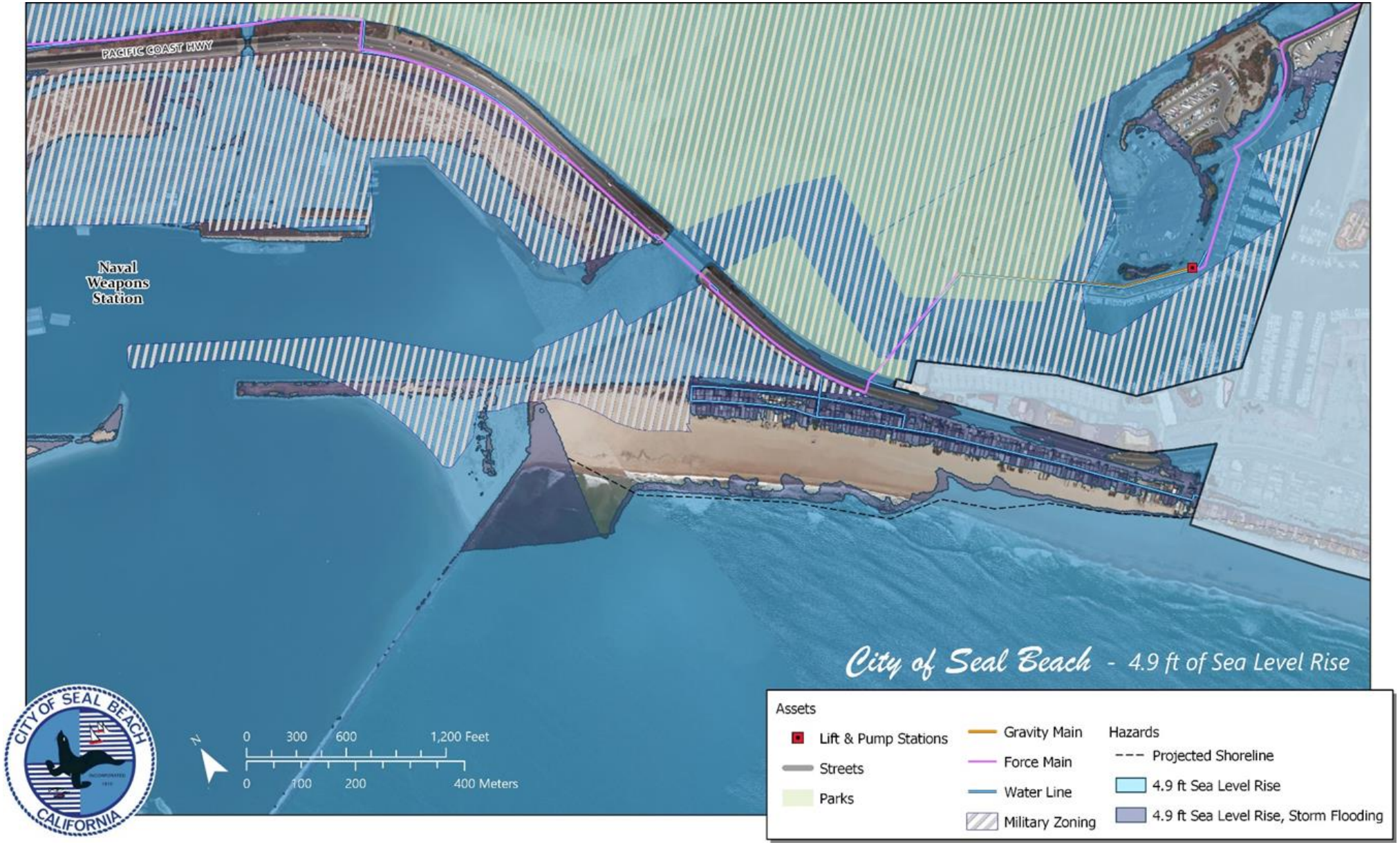
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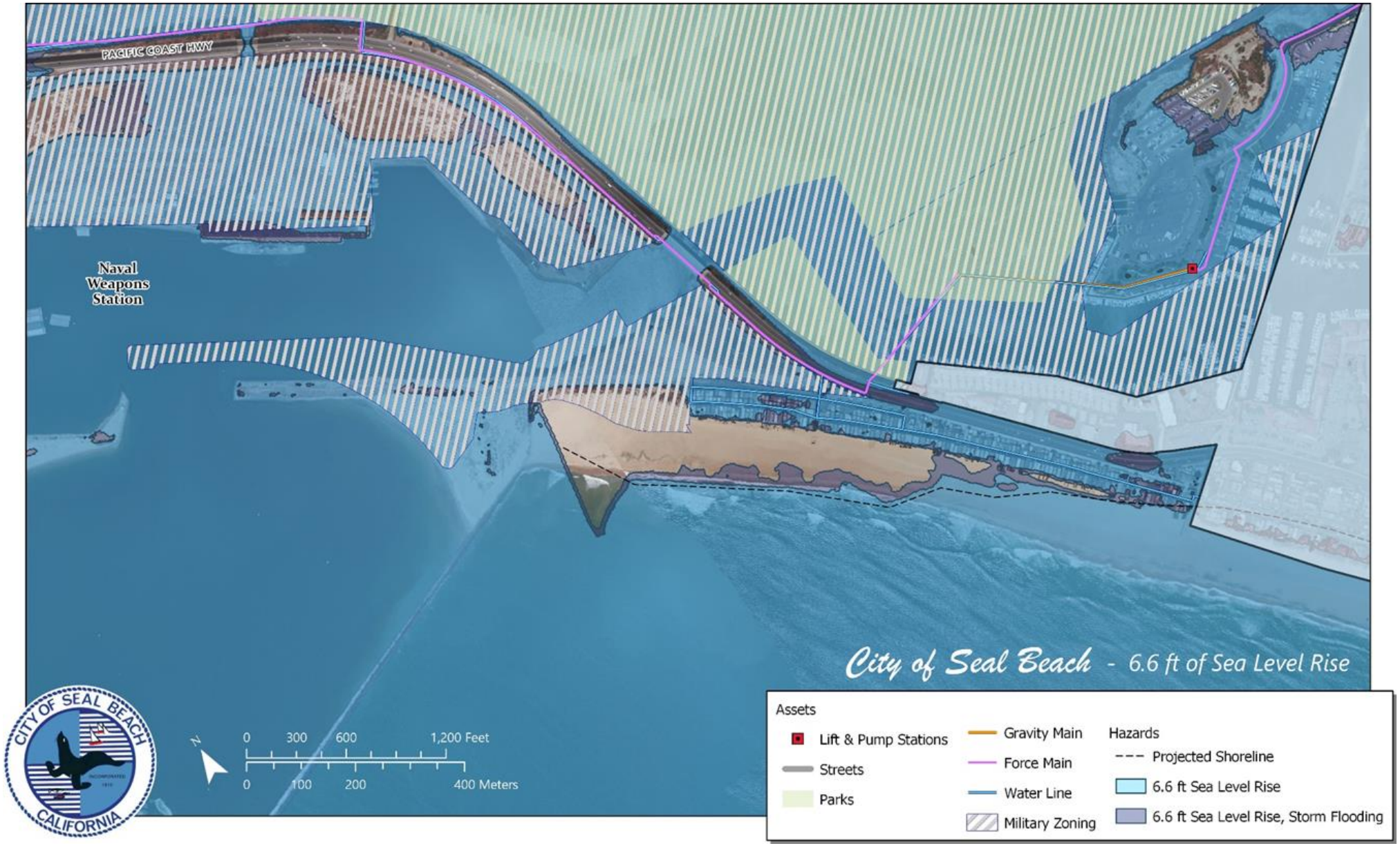
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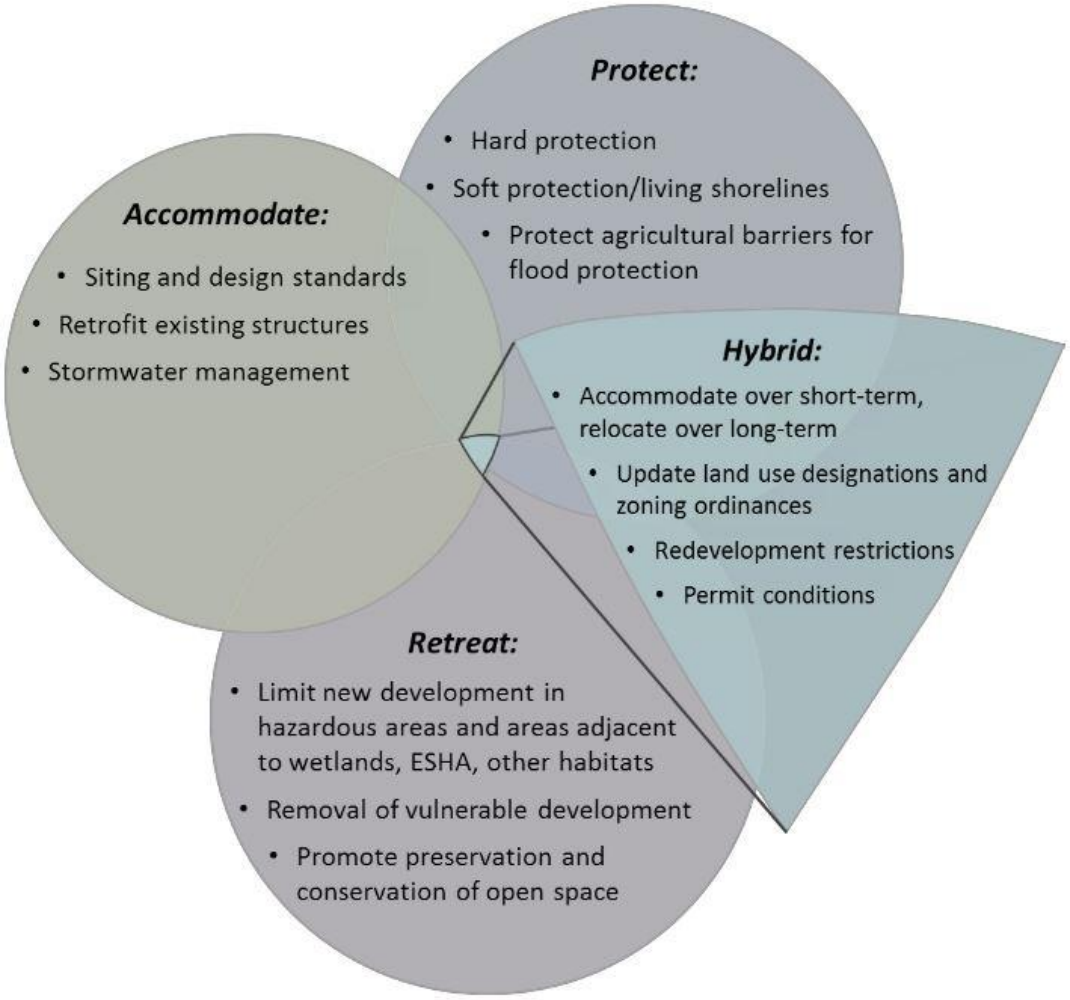
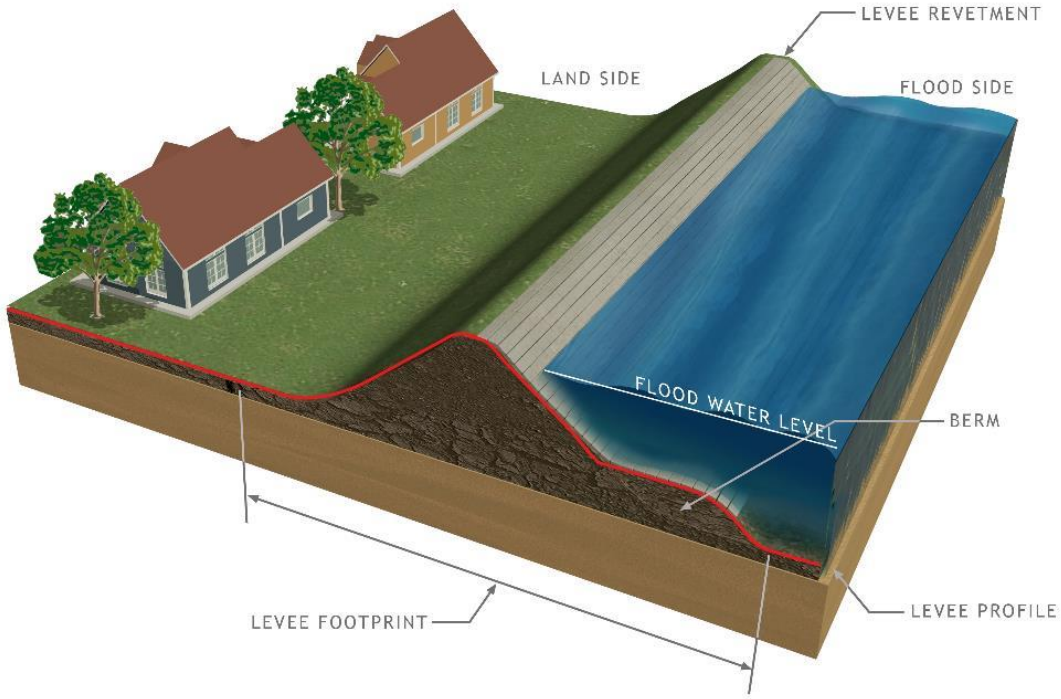
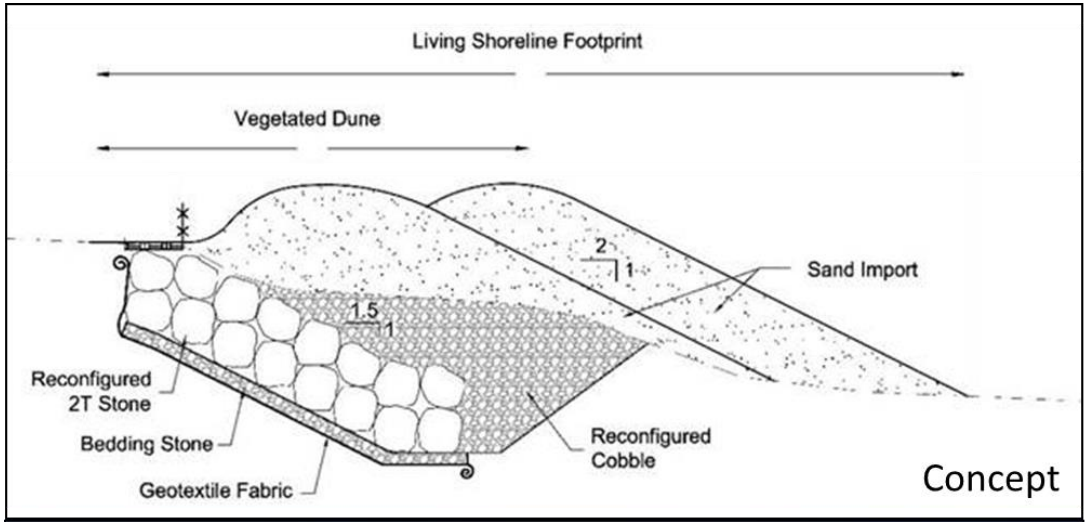
Sea Level Rise Adaptation

- Wide variety of adaptation measures
- 3 main categories
  - Protection
  - Accommodation
  - Retreat
- Adaptation often takes hybrid approach
  - Combine elements of multiple categories
  - Account for different vulnerabilities over space and time

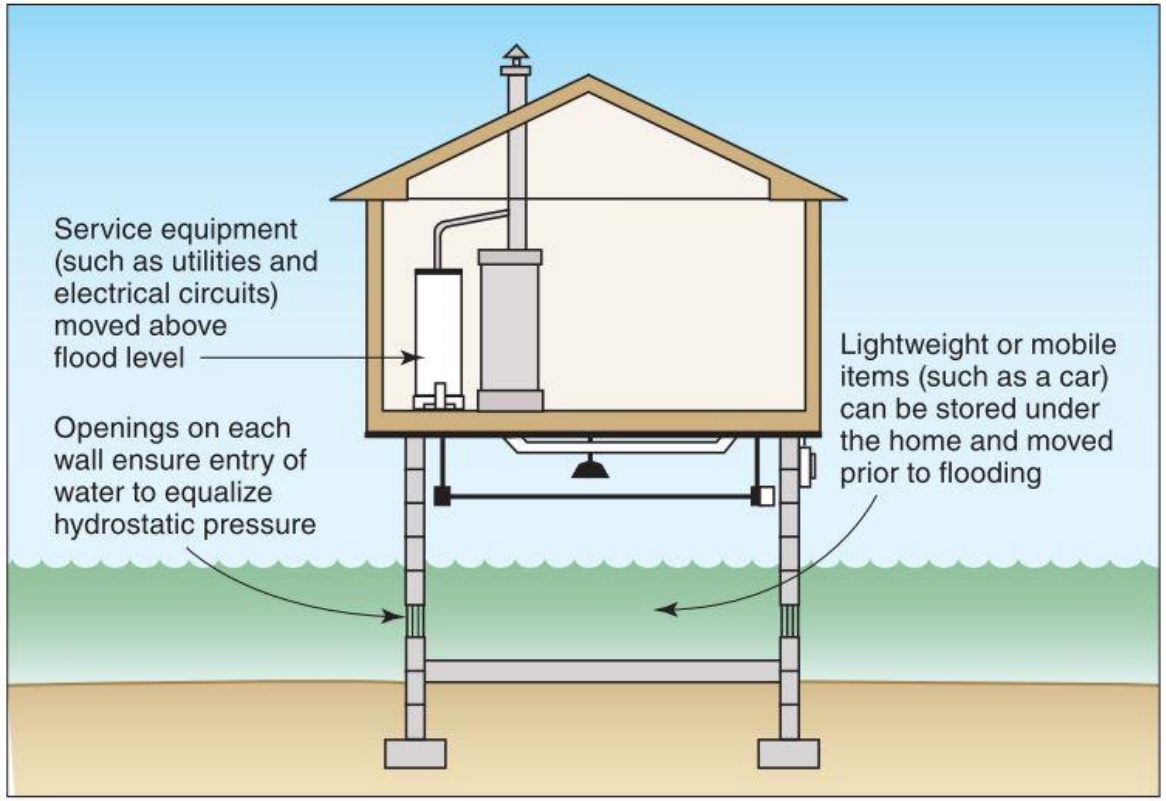


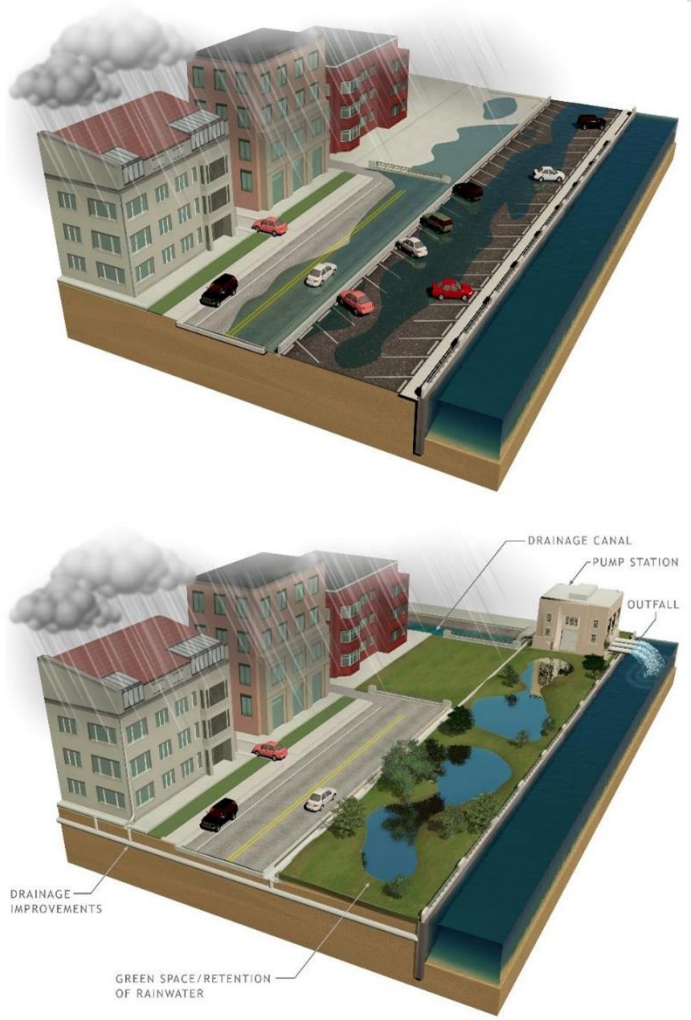
Conceptual Examples: Protection



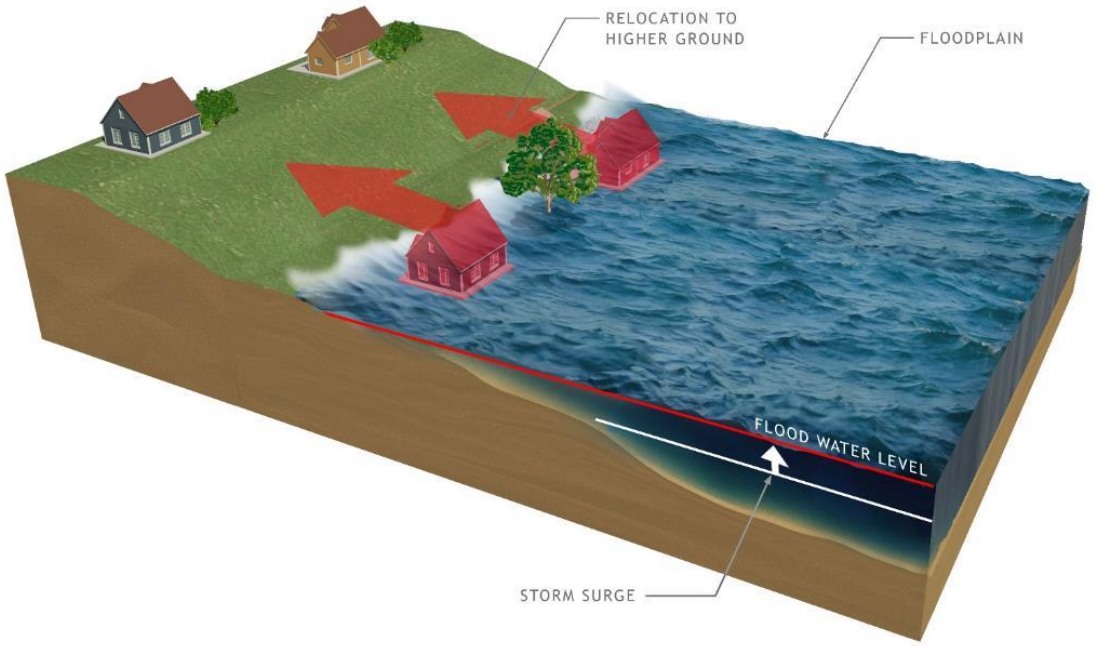


Conceptual Examples: Accommodation





Conceptual Examples: Retreat

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Selected Sea Level Rise Scenarios

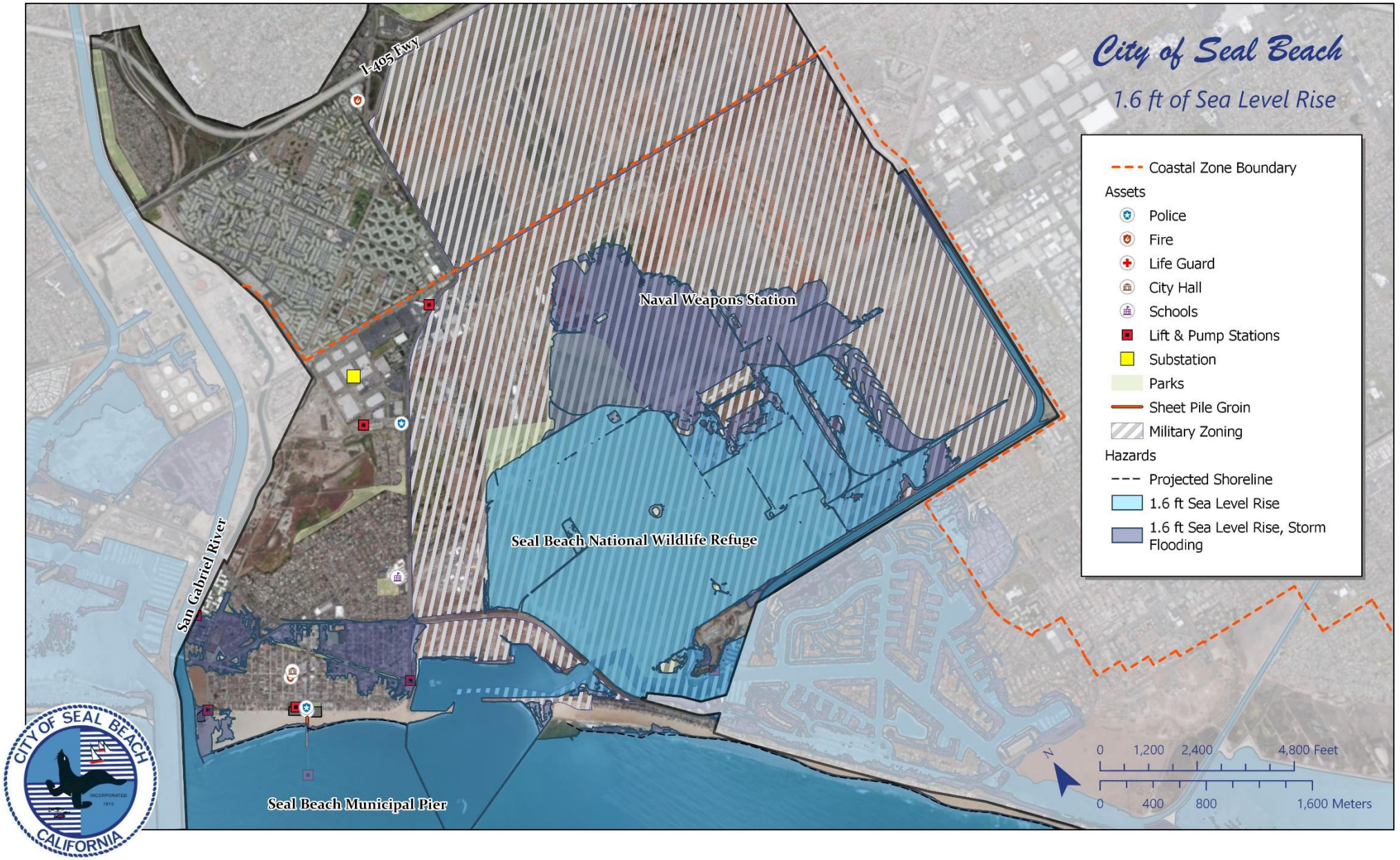
- 1.6ft
  - Extreme: 2040
  - Medium-high (0.5%): 2050
  - Low (17%): 2070
- 3.3ft
  - Extreme: 2060
  - Medium-high (0.5%): 2070
  - Low (17%): 2100
- 4.9ft
  - Extreme: 2070
  - Medium-high (0.5%): 2080-2090
- 6.6ft
  - Extreme: 2080-2090
  - Medium-high (0.5%): 2100

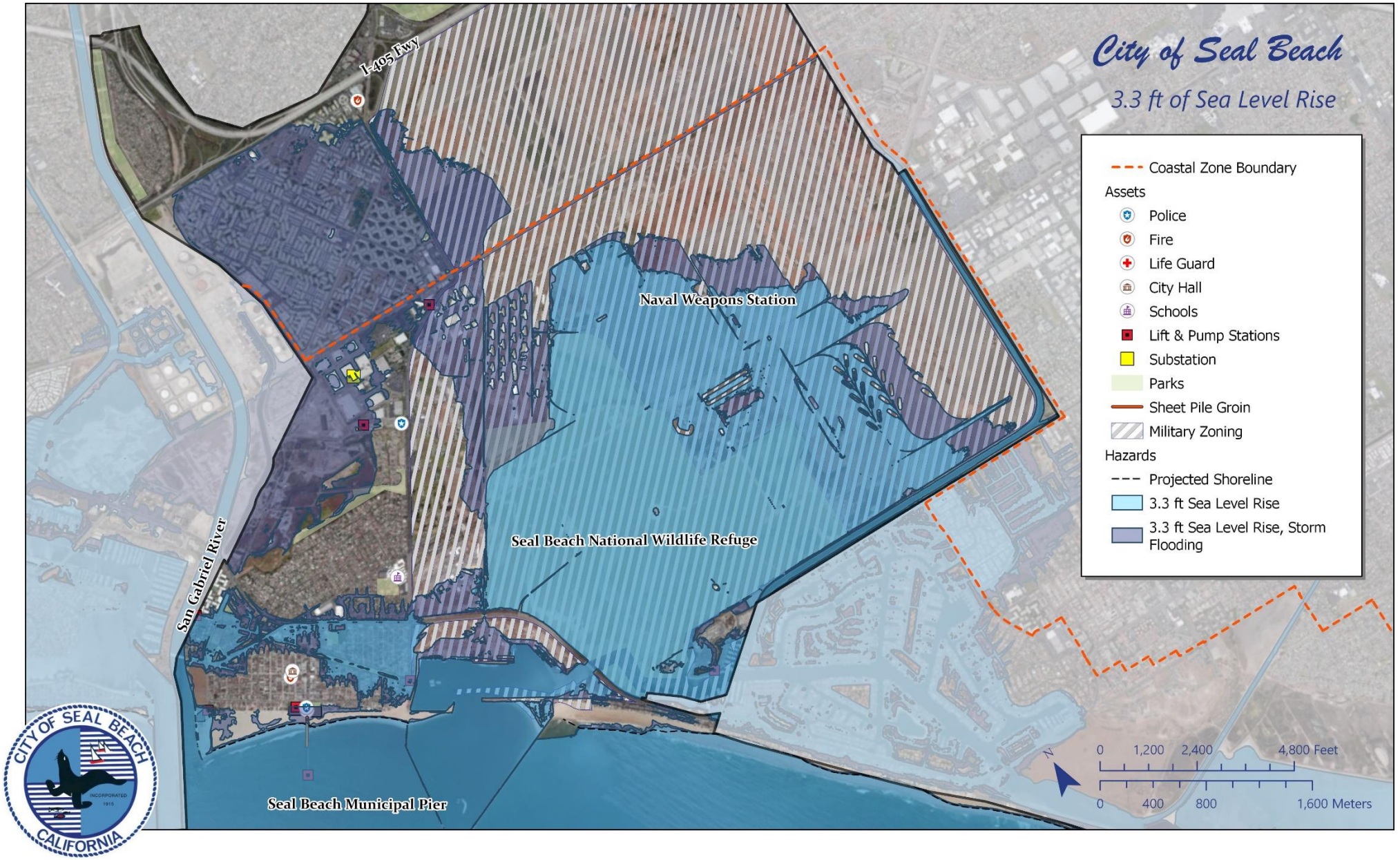
LOS ANGELES - High emissions (RCP 8.5)

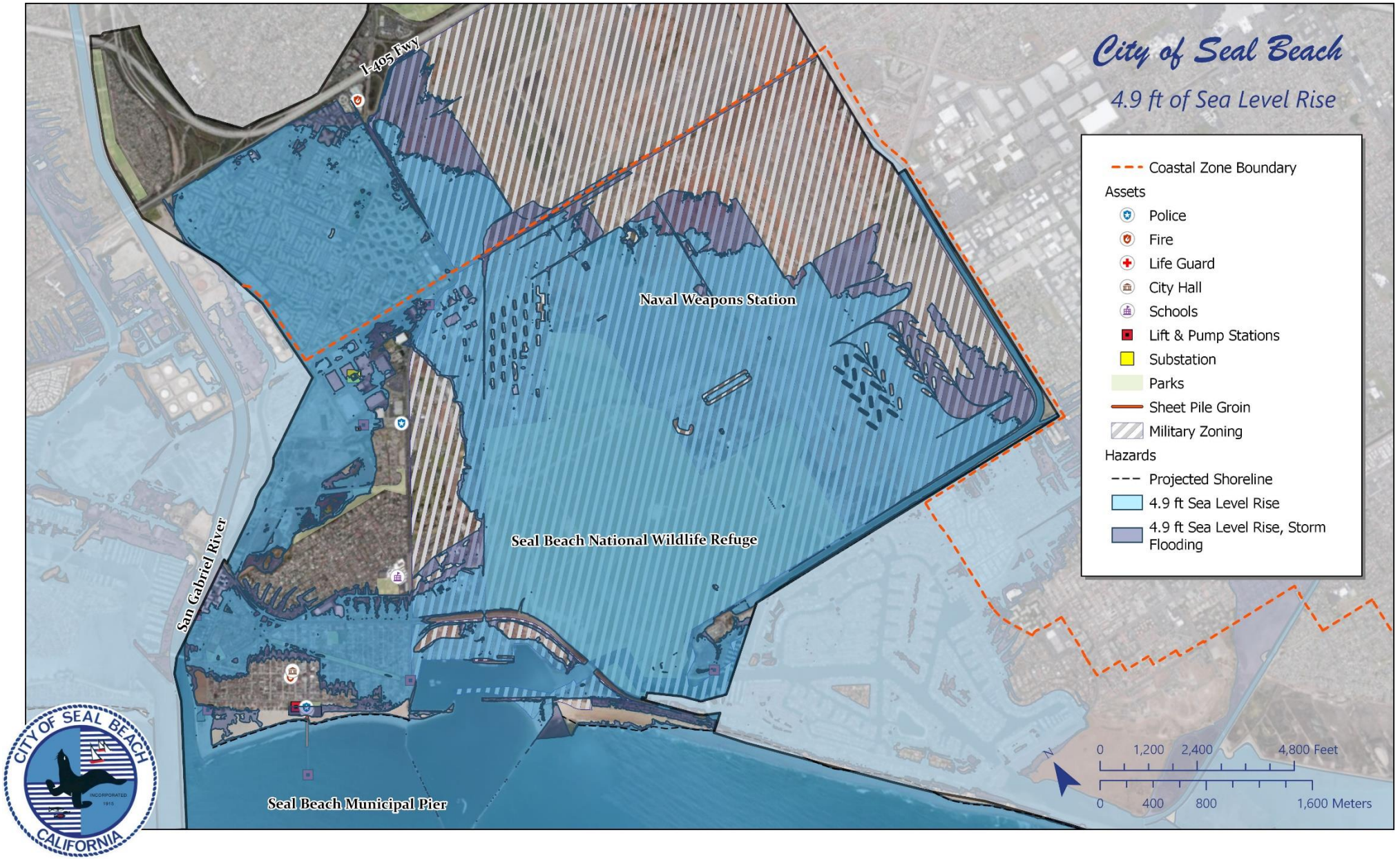
	Probability that sea-level rise will meet or exceed... (excludes H++)									
	1 FT.	2 FT.	3 FT.	4 FT.	5 FT.	6 FT.	7 FT.	8 FT.	9 FT.	10 FT.
2030										
2040	1.6%									
2050	17%	0.3%								
2060	47%	2%	0.2%							
2070	71%	8%	0.8%	0.2%	0.1%					
2080	84%	23%	3%	0.7%	0.2%	0.1%	0.1%			
2090	90%	42%	9%	2%	0.7%	0.3%	0.2%	0.1%	0.1%	
2100	92%	58%	21%	6%	2%	1%	0.4%	0.2%	0.1%	0.1%
2150	99%	90%	68%	42%	23%	12%	6%	4%	2%	1%

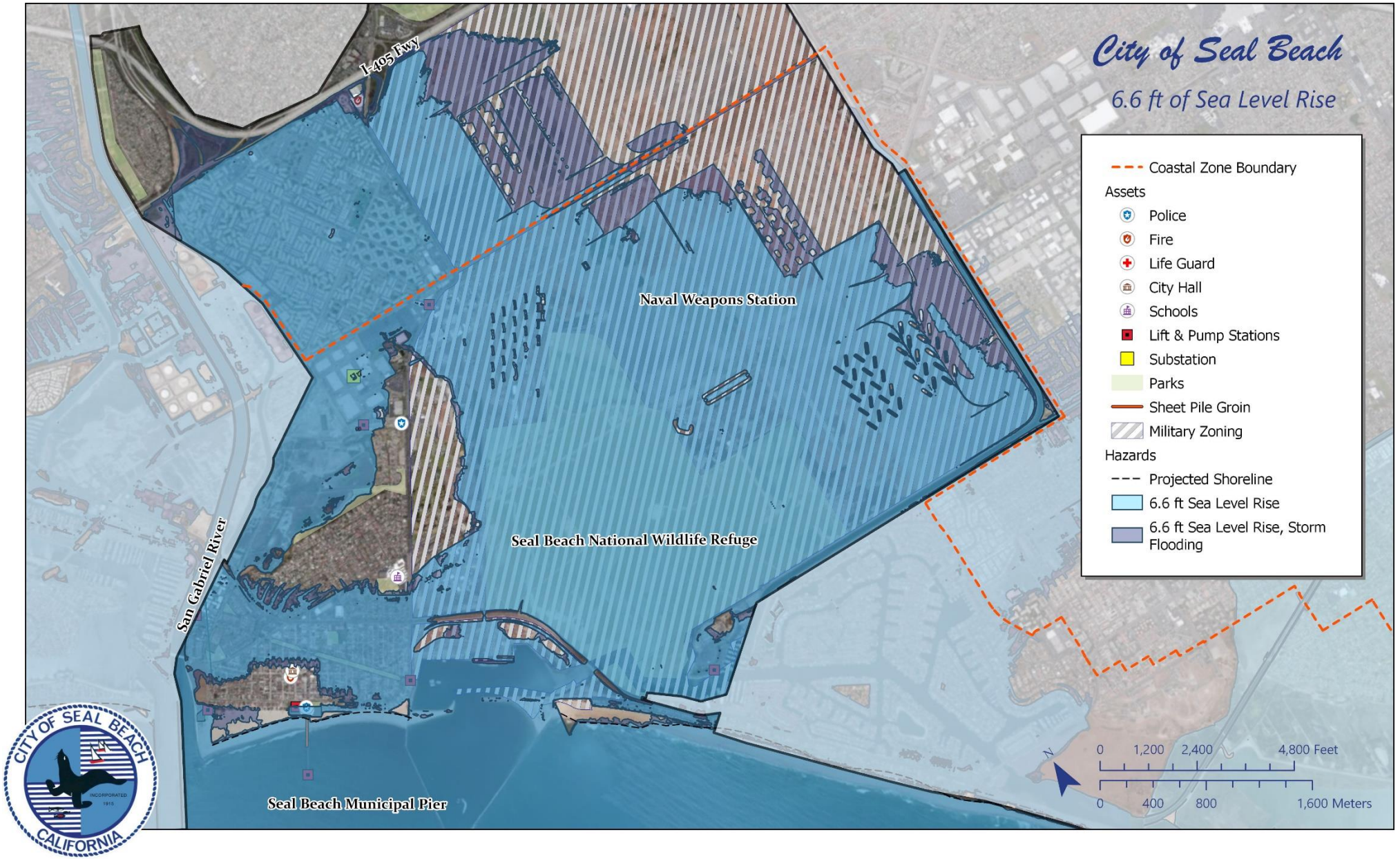
Selected Sea Level Rise Scenarios

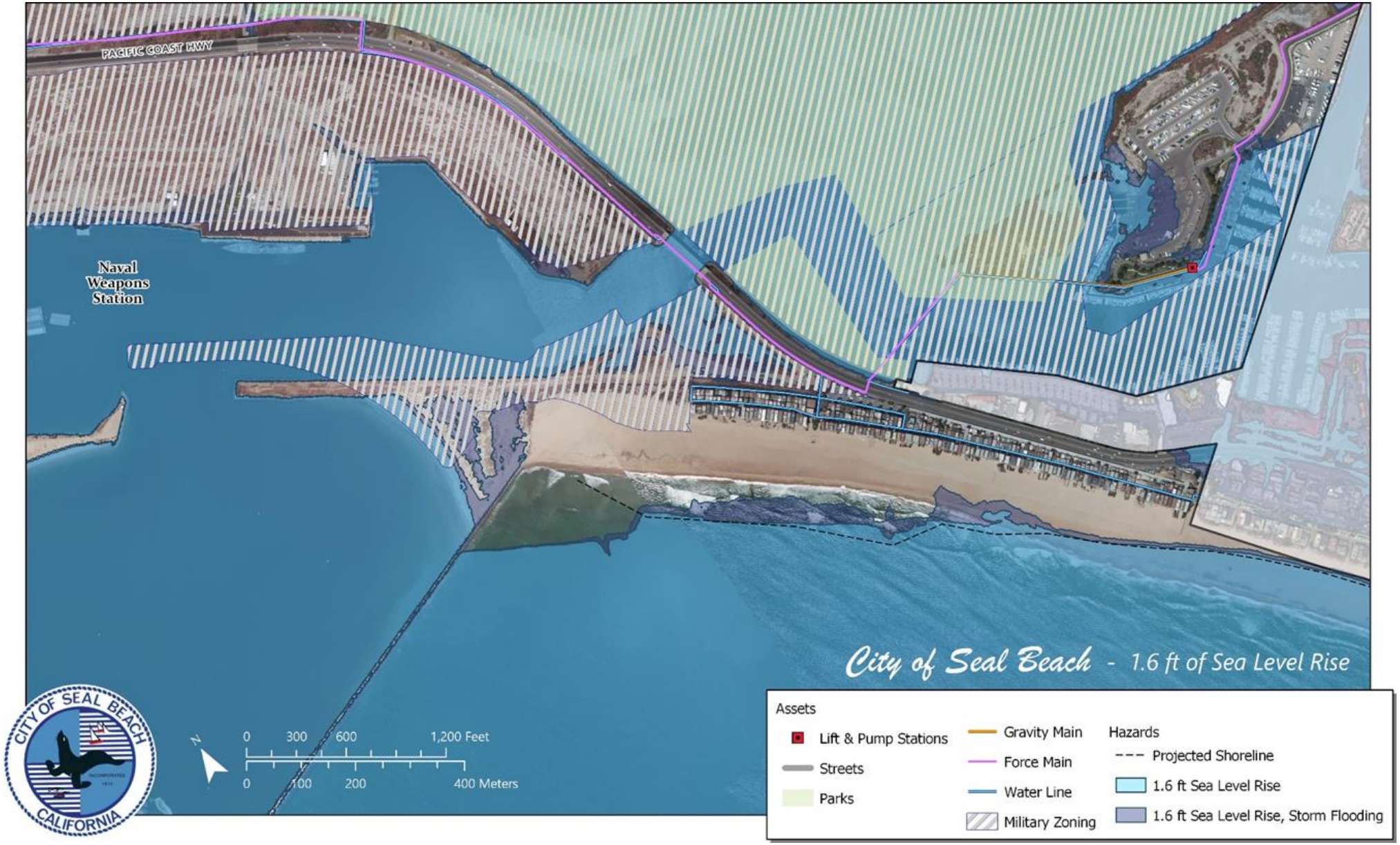
		Probabilistic Projections (in feet) (based on Kopp et al. 2014)					H++ scenario (Sweet et al. 2017) *Single scenario
		MEDIAN	LIKELY RANGE		1-IN-20 CHANCE	1-IN-200 CHANCE	
		50% probability sea-level rise meets or exceeds...	66% probability sea-level rise is between...		5% probability sea-level rise meets or exceeds...	0.5% probability sea-level rise meets or exceeds...	
				Low Risk Aversion		Medium - High Risk Aversion	Extreme Risk Aversion
High emissions	2030	0.3	0.2 -	0.5	0.6	0.7	1.0
	2040	0.5	0.4 -	0.7	0.9	1.2	1.7
	2050	0.7	0.5 -	1.0	1.2	1.8	2.6
Low emissions	2060	0.8	0.5 -	1.1	1.4	2.2	
High emissions	2060	1.0	0.7 -	1.3	1.7	2.5	3.7
Low emissions	2070	0.9	0.6 -	1.3	1.8	2.9	
High emissions	2070	1.2	0.8 -	1.7	2.2	3.3	5.0
Low emissions	2080	1.0	0.6 -	1.6	2.1	3.6	
High emissions	2080	1.5	1.0 -	2.2	2.8	4.3	6.4
Low emissions	2090	1.2	0.7 -	1.8	2.5	4.5	
High emissions	2090	1.8	1.2 -	2.7	3.4	5.3	8.0
Low emissions	2100	1.3	0.7 -	2.1	3.0	5.4	
High emissions	2100	2.2	1.3 -	3.2	4.1	6.7	9.9


City of Seal Beach
1.6 ft of Sea Level Rise
Coastal Zone Boundary
Assets
Police
Fire
Life Guard
City Hall
Schools
Lift & Pump Stations
Substation
Parks
Sheet Pile Groin
Military Zoning
Hazards
Projected Shoreline
1.6 ft Sea Level Rise
1.6 ft Sea Level Rise, Storm Flooding
I-405 Fwy
Naval Weapons Station
Seal Beach National Wildlife Refuge
San Gabriel River
Seal Beach Municipal Pier
N
0 1,200 2,400 4,800 Feet
0 400 800 1,600 Meters


City of Seal Beach
3.3 ft of Sea Level Rise
Coastal Zone Boundary
Assets
Police
Fire
Life Guard
City Hall
Schools
Lift & Pump Stations
Substation
Parks
Sheet Pile Groin
Military Zoning
Hazards
Projected Shoreline
3.3 ft Sea Level Rise
3.3 ft Sea Level Rise, Storm Flooding
I-405 Fwy
Naval Weapons Station
Seal Beach National Wildlife Refuge
San Gabriel River
Seal Beach Municipal Pier
N
0 1,200 2,400 4,800 Feet
0 400 800 1,600 Meters


City of Seal Beach
4.9 ft of Sea Level Rise
I-405 Fwy
Naval Weapons Station
Seal Beach National Wildlife Refuge
San Gabriel River
Seal Beach Municipal Pier
Coastal Zone Boundary
Assets
Police
Fire
Life Guard
City Hall
Schools
Lift & Pump Stations
Substation
Parks
Sheet Pile Groin
Military Zoning
Hazards
Projected Shoreline
4.9 ft Sea Level Rise
4.9 ft Sea Level Rise, Storm Flooding
N
0 1,200 2,400 4,800 Feet
0 400 800 1,600 Meters
CITY OF SEAL BEACH
CALIFORNIA


City of Seal Beach
6.6 ft of Sea Level Rise
I-405 Fwy
Naval Weapons Station
Seal Beach National Wildlife Refuge
San Gabriel River
Seal Beach Municipal Pier
Coastal Zone Boundary
Assets
Police
Fire
Life Guard
City Hall
Schools
Lift & Pump Stations
Substation
Parks
Sheet Pile Groin
Military Zoning
Hazards
Projected Shoreline
6.6 ft Sea Level Rise
6.6 ft Sea Level Rise, Storm Flooding
N
0 1,200 2,400 4,800 Feet
0 400 800 1,600 Meters


PACIFIC COAST HWY
Naval Weapons Station
City of Seal Beach - 1.6 ft of Sea Level Rise
CITY OF SEAL BEACH
CALIFORNIA
N
0 300 600 1,200 Feet
0 100 200 400 Meters
Assets
Lift & Pump Stations
Streets
Parks
Gravity Main
Force Main
Water Line
Military Zoning
Hazards
Projected Shoreline
1.6 ft Sea Level Rise
1.6 ft Sea Level Rise, Storm Flooding