



Port of Los Angeles Resiliency in Capital Improvement Projects

Presented by:

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Port of Los Angeles

THE PORT OF LOS ANGELES



7,500 acres

- 4,300 land and 3,200 water

43 miles of Waterfront

- Water depth of -53 ft

Market Share

- 43% West Coast, 18% Nationally

Jobs

- 1.6 Million jobs Nationwide,
 - 500,000 regionally
 - 150,000 locally

270 berths

- Includes 30 berths with Alternative Maritime Power

10.7 Million TEUs in 2021!

27 Terminals

- Auto (1)
- Breakbulk (4)
- Container (8)
- Dry Bulk (3)
- Liquid Bulk (7)
- Multi-Use (2)
- Passenger (2)

Public Amenities And Attractions

**Neighbor to San Pedro
and Wilmington
Communities**

SEA LEVEL RISE STUDY OVERVIEW

Port of Los Angeles Sea Level Rise Study Completed in Fall 2018 - (Updating in 2023)

- Task 1 ● Asset Inventory
- Task 2 ● Sea Level Rise Inundation Maps
- Task 3 ● Vulnerability Assessment
- Task 4 ● Development of SLR Resiliency Strategies
- Task 5 ● Prioritized Strategies & Finalize Study
- Task 6 ● Implement Resiliency Strategies

ASSET INVENTORY

1. Terminals

*Container, Liquid/Dry Bulk,
Passenger, Miscellaneous Operations*

2. Critical Facilities

*Fire Stations, electrical substations,
pump stations, life/safety*

3. Transportation (Rail/Road)

4. Community Assets

5. Natural Habitats



SEA LEVEL RISE PROJECTIONS

Year	Range	POLA SLR Study
2030	2–12 in	12"
2050	5–24 in	24"
2100	17–66 in	37" 66"

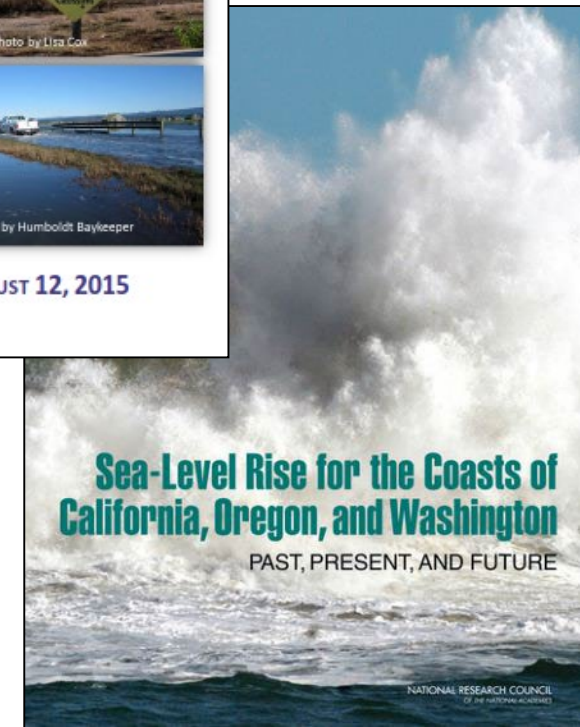
Regional Sea Level Rise projections at Los Angeles relative to year 2000, based on National Research Council projections:

CALIFORNIA COASTAL COMMISSION
SEA LEVEL RISE POLICY GUIDANCE

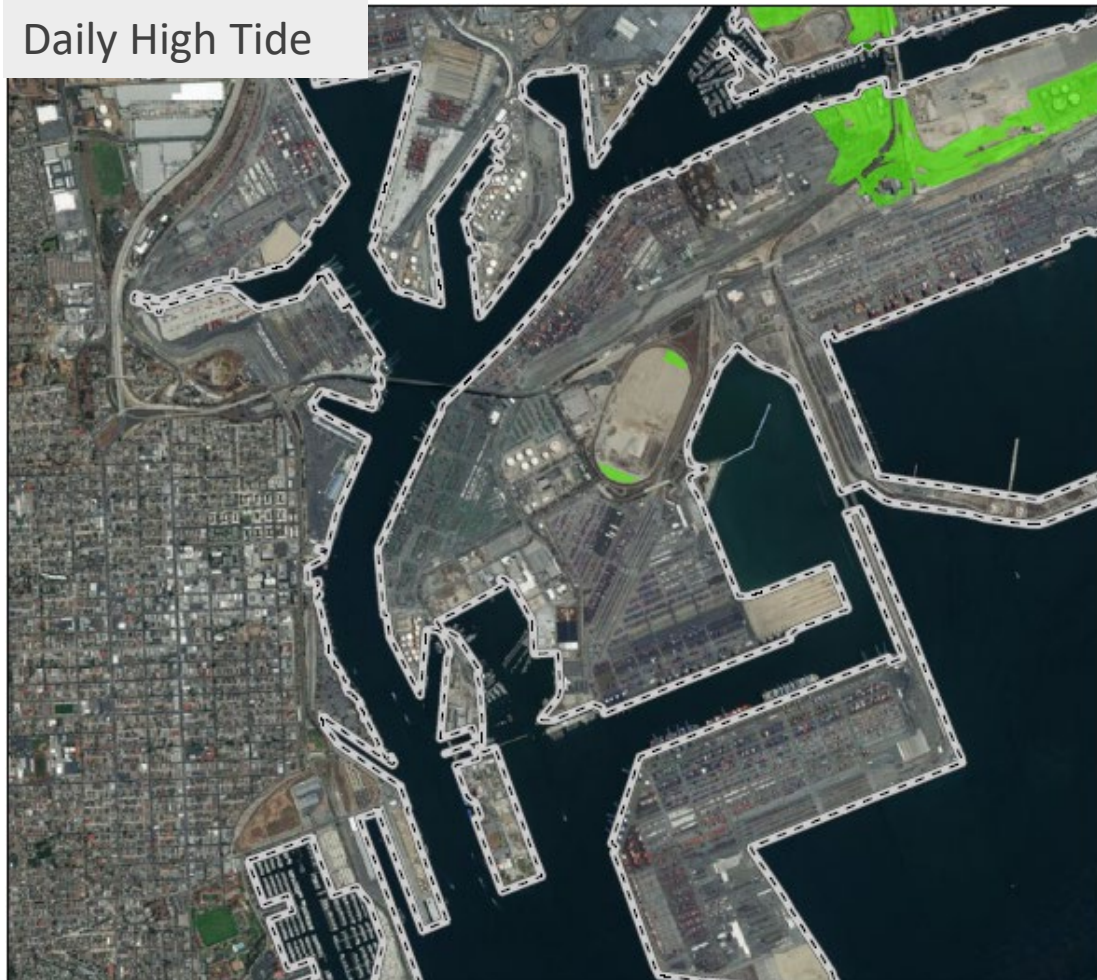
*Interpretive Guidelines for Addressing
Sea Level Rise in Local Coastal Programs
and Coastal Development Permits*

Sunset Beach, Photo by Mario Fernandez
Chula Vista, Photo by Lisa Cox
San Francisco, Photo by Mike Baird
Arcata, Photo by Humboldt Baykeeper

UNANIMOUSLY ADOPTED – AUGUST 12, 2015



Daily High Tide



100-year Storm Tide

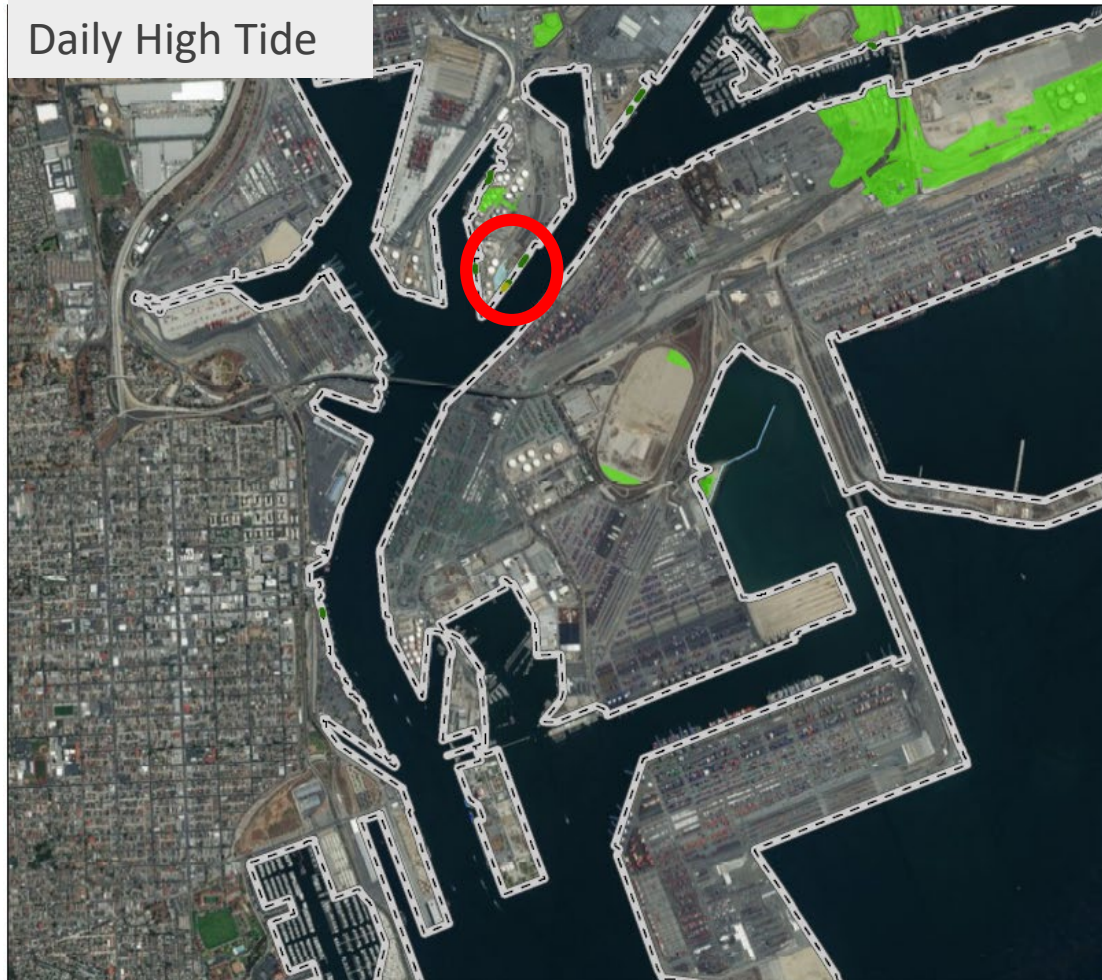


SEA LEVEL RISE MAPS – 12" (2030)

0 0.2 0.4 0.6 0.8 1 Miles

<p>THE PORT OF LOS ANGELES Inundation Mapping MHHW + 12" SLR</p>	<p>Sea Level Rise Inundation</p> <table border="1"> <tr><td>0 - 2</td><td>Lightest Blue</td><td rowspan="10">Depth in Feet</td></tr> <tr><td>2 - 4</td><td>Light Blue</td></tr> <tr><td>4 - 6</td><td>Medium-Light Blue</td></tr> <tr><td>6 - 8</td><td>Medium Blue</td></tr> <tr><td>8 - 10</td><td>Dark Blue</td></tr> <tr><td>10 - 12</td><td>Very Dark Blue</td></tr> <tr><td>12 - 14</td><td>Dark Purple</td></tr> <tr><td>14 - 16</td><td>Black</td></tr> <tr><td>16+</td><td>Black</td></tr> <tr><td colspan="2">Low-lying Area > 1 Mile</td></tr> </table>	0 - 2	Lightest Blue	Depth in Feet	2 - 4	Light Blue	4 - 6	Medium-Light Blue	6 - 8	Medium Blue	8 - 10	Dark Blue	10 - 12	Very Dark Blue	12 - 14	Dark Purple	14 - 16	Black	16+	Black	Low-lying Area > 1 Mile		<p>Shoreline Overtopping Potential</p> <table border="1"> <tr><td>0 - 1</td><td>Green</td><td rowspan="6">Depth in Feet</td></tr> <tr><td>1 - 2</td><td>Light Green</td></tr> <tr><td>2 - 3</td><td>Yellow-Green</td></tr> <tr><td>3 - 4</td><td>Yellow</td></tr> <tr><td>4 - 5</td><td>Orange</td></tr> <tr><td>>5</td><td>Red</td></tr> <tr><td colspan="2">No Overtopping</td></tr> </table>	0 - 1	Green	Depth in Feet	1 - 2	Light Green	2 - 3	Yellow-Green	3 - 4	Yellow	4 - 5	Orange	>5	Red	No Overtopping		<p>Los Angeles County</p>	<p>THE PORT OF LOS ANGELES Inundation Mapping 100-yr Tide + 12" SLR</p>	<p>Sea Level Rise Inundation</p> <table border="1"> <tr><td>0 - 2</td><td>Lightest Blue</td><td rowspan="10">Depth in Feet</td></tr> <tr><td>2 - 4</td><td>Light Blue</td></tr> <tr><td>4 - 6</td><td>Medium-Light Blue</td></tr> <tr><td>6 - 8</td><td>Medium Blue</td></tr> <tr><td>8 - 10</td><td>Dark Blue</td></tr> <tr><td>10 - 12</td><td>Very Dark Blue</td></tr> <tr><td>12 - 14</td><td>Dark Purple</td></tr> <tr><td>14 - 16</td><td>Black</td></tr> <tr><td>16+</td><td>Black</td></tr> <tr><td colspan="2">Low-lying Area > 1 Mile</td></tr> </table>	0 - 2	Lightest Blue	Depth in Feet	2 - 4	Light Blue	4 - 6	Medium-Light Blue	6 - 8	Medium Blue	8 - 10	Dark Blue	10 - 12	Very Dark Blue	12 - 14	Dark Purple	14 - 16	Black	16+	Black	Low-lying Area > 1 Mile		<p>Shoreline Overtopping Potential</p> <table border="1"> <tr><td>0 - 1</td><td>Green</td><td rowspan="6">Depth in Feet</td></tr> <tr><td>1 - 2</td><td>Light Green</td></tr> <tr><td>2 - 3</td><td>Yellow-Green</td></tr> <tr><td>3 - 4</td><td>Yellow</td></tr> <tr><td>4 - 5</td><td>Orange</td></tr> <tr><td>>5</td><td>Red</td></tr> <tr><td colspan="2">No Overtopping</td></tr> </table>	0 - 1	Green	Depth in Feet	1 - 2	Light Green	2 - 3	Yellow-Green	3 - 4	Yellow	4 - 5	Orange	>5	Red	No Overtopping		<p>Los Angeles County</p>
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Daily High Tide



100-year Storm Tide



SEA LEVEL RISE MAPS – 24" (2050)

0 0.2 0.4 0.6 0.8 1 Miles

THE PORT OF LOS ANGELES
Inundation Mapping
MHHW + 24" SLR

Sea Level Rise Inundation	Shoreline Overtopping Potential
0 - 2	0 - 1
2 - 4	1 - 2
4 - 6	2 - 3
6 - 8	3 - 4
8 - 10	4 - 5
10 - 12	> 5
12 - 14	No Overtopping
14 - 16	
16+	

Depth in Feet

Low-lying Area > 1 Acre

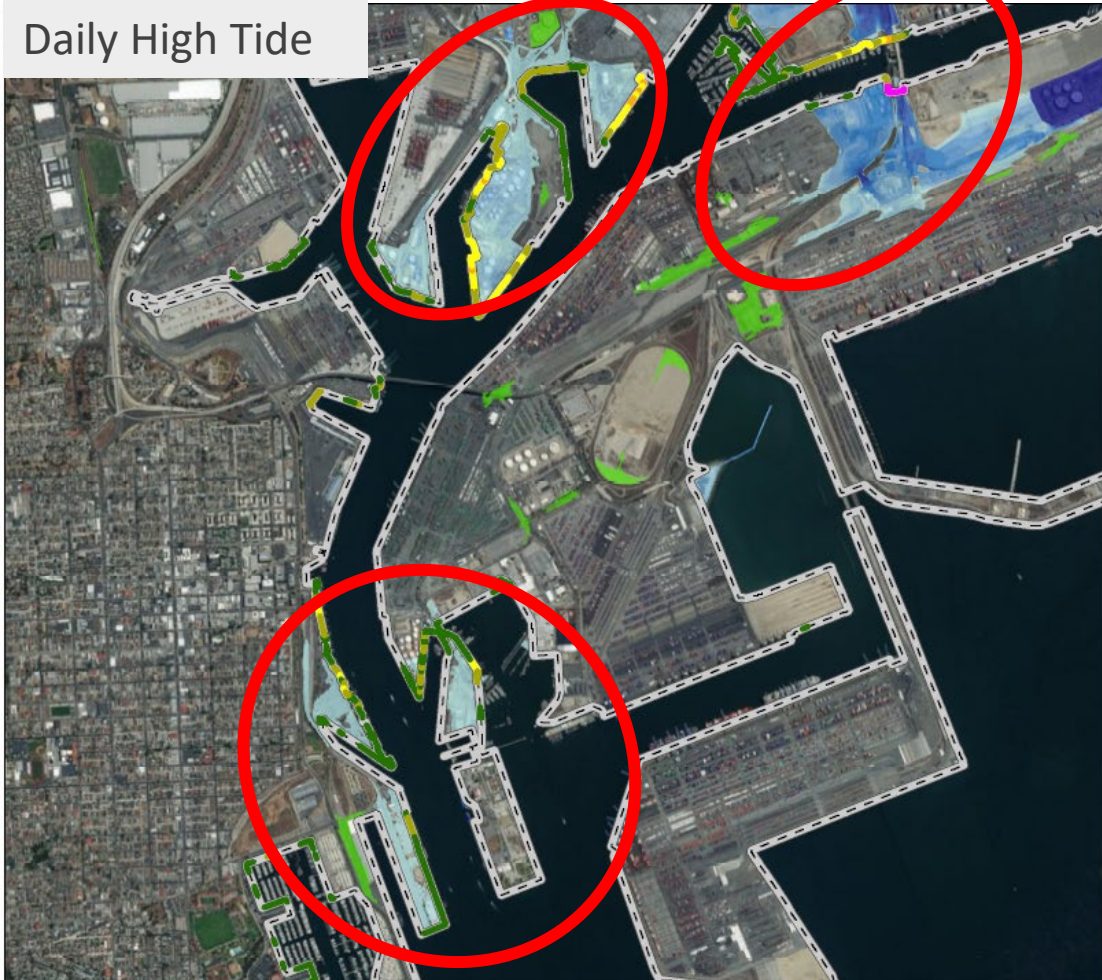
THE PORT OF LOS ANGELES
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100-yr Tide + 24" SLR

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2 - 4	1 - 2
4 - 6	2 - 3
6 - 8	3 - 4
8 - 10	4 - 5
10 - 12	> 5
12 - 14	No Overtopping
14 - 16	
16+	

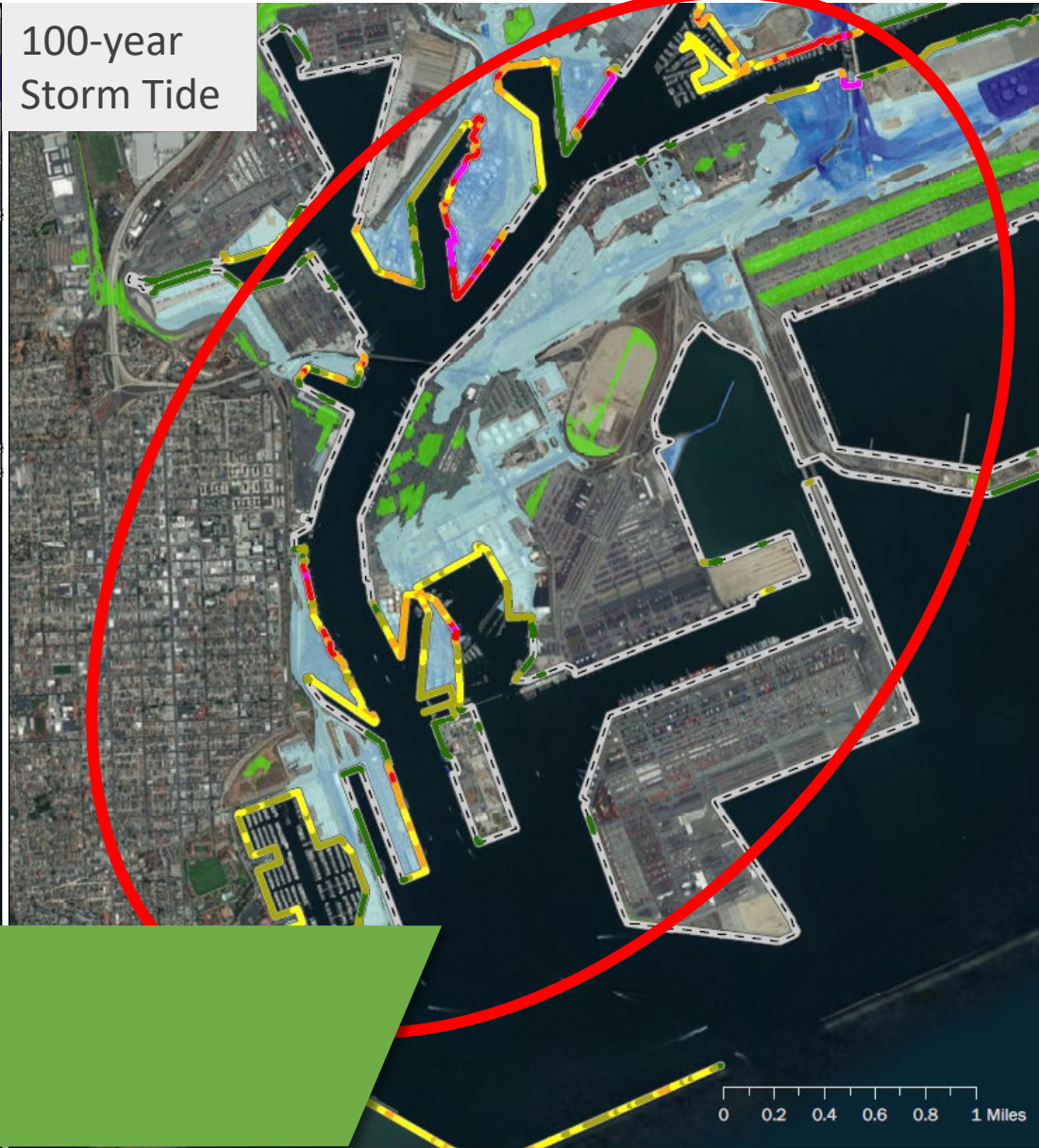
Depth in Feet

Low-lying Area > 1 Acre

Daily High Tide



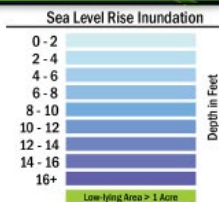
100-year Storm Tide



SEA LEVEL RISE – 66" (2100)

0 0.2 0.4 0.6 0.8 1 Miles

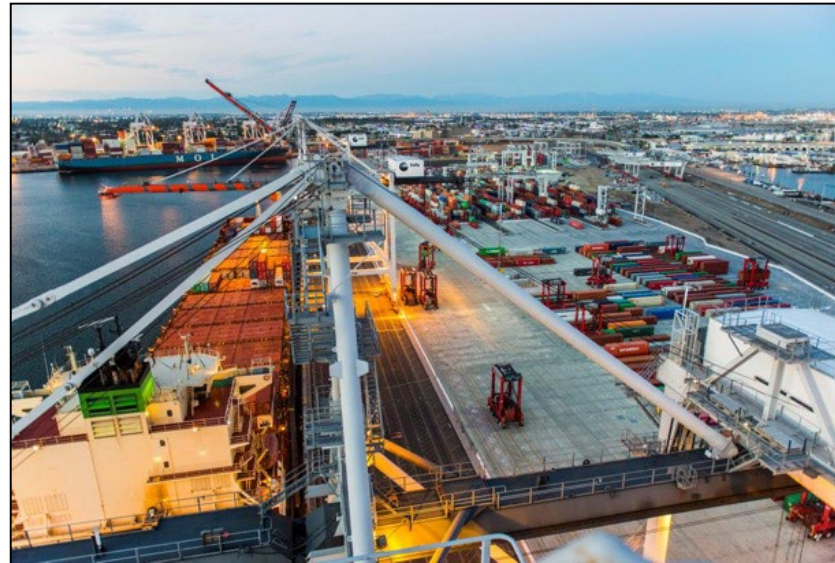
LA
THE PORT
OF LOS ANGELES
Inundation Mapping
MHHW + 66" SLR



LA
THE PORT
OF LOS ANGELES
Inundation Mapping
100-yr Tide + 66" SLR



DEVELOPMENT OF STRATEGIES



Governance:

Include Sea Level Rise considerations in policy planning

Initiatives:

Feasibility Studies and Collaboration

Physical Infrastructure:

Temporary/Permanent Protection around impacted areas

GOVERNANCE

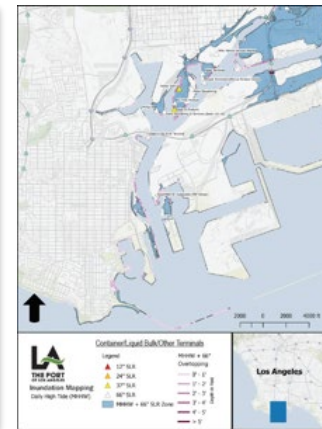
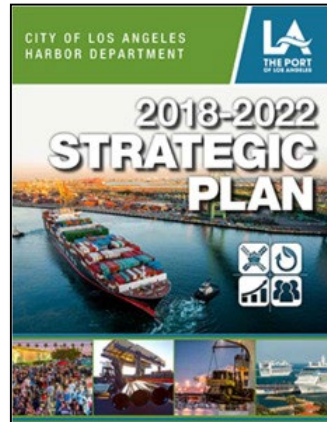
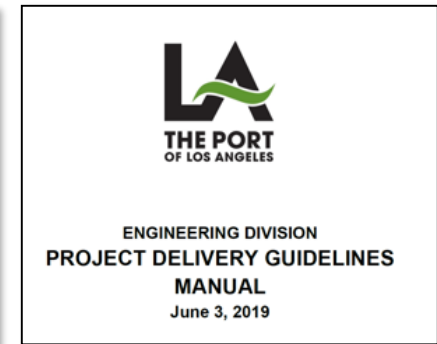
1. Add language regarding SLR to the following guiding policy, planning, and design guidelines:

- Port Master Plan
- Engineering Design Guidelines
- LA Waterfront Design Guidelines

2. Develop a one-page vulnerability zone map

3. Consider SLR in Capital funded projects

4. Monitor SLR science and continually update the plan



INITIATIVE



1. Regional Collaboration (POLB, City of LA)
2. Participate in CAPA Sea Level Rise Committee
3. Discuss breakwater vulnerabilities with ACOE
4. Funding opportunities
 - Public Access Investment Plan
 - Community Grants
 - Caltrans Infrastructure Investment Jobs Act – Resilience and Climate Adaptation Working Group

5. Tenant Collaboration
6. International Association of Ports and Harbors – Risk and Resiliency Committee
7. PIANC Tsunami Working Group
8. Climate Resilience – Advancements in Zero Emission technology



INFRASTRUCTURE ACCOMMODATION

Temporary Protection



Tiger Dam: Vinyl tubes filled with water or cement slurry

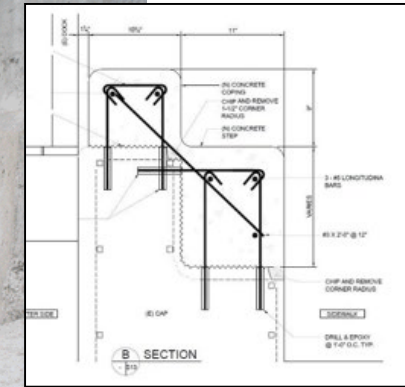


Sandbags



Aqua Fence: Deployable flood protection structure

Permanent Protection



Reinforced Concrete Wall



Sheet Pile Wall

Wilmington Waterfront Promenade



Wilmington Waterfront Promenade



West Harbor Development



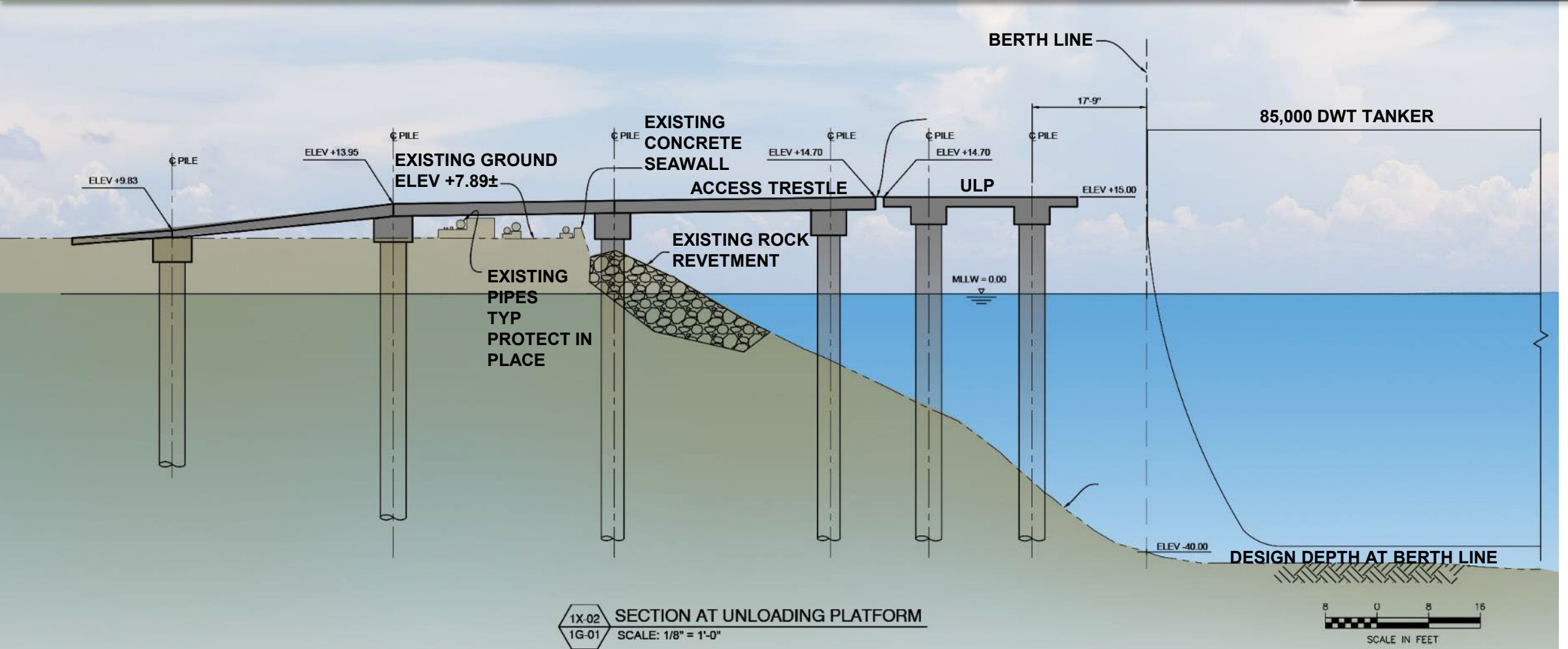
West Harbor Development



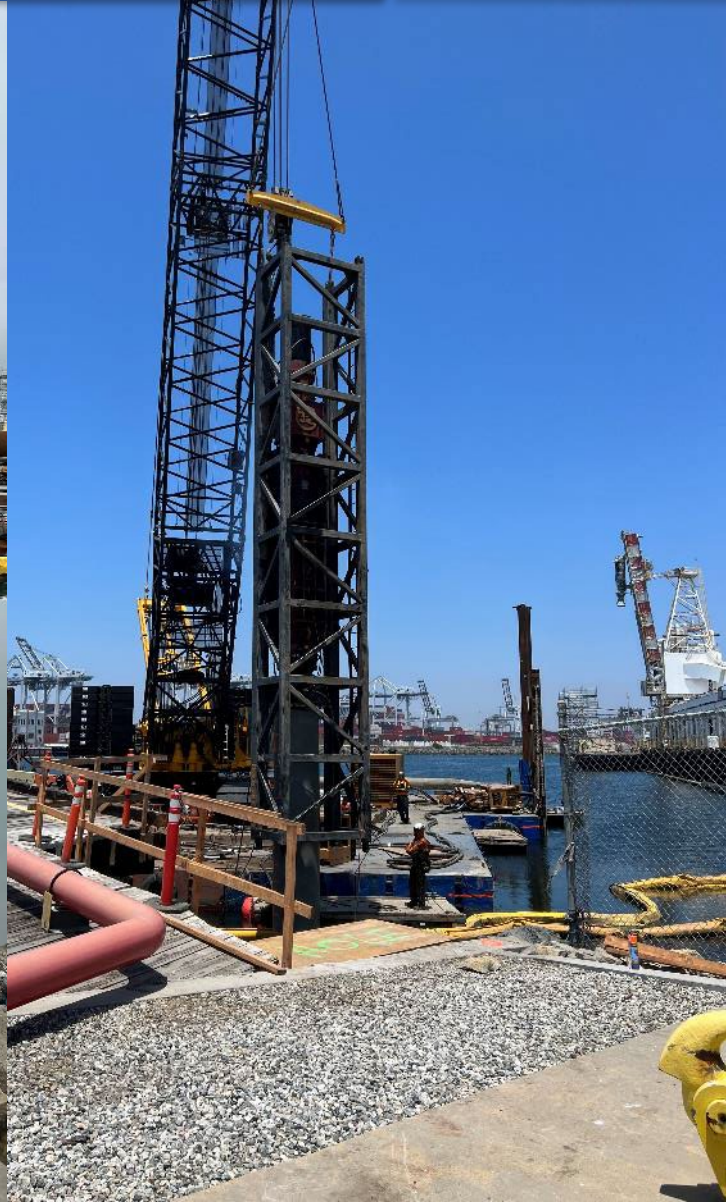
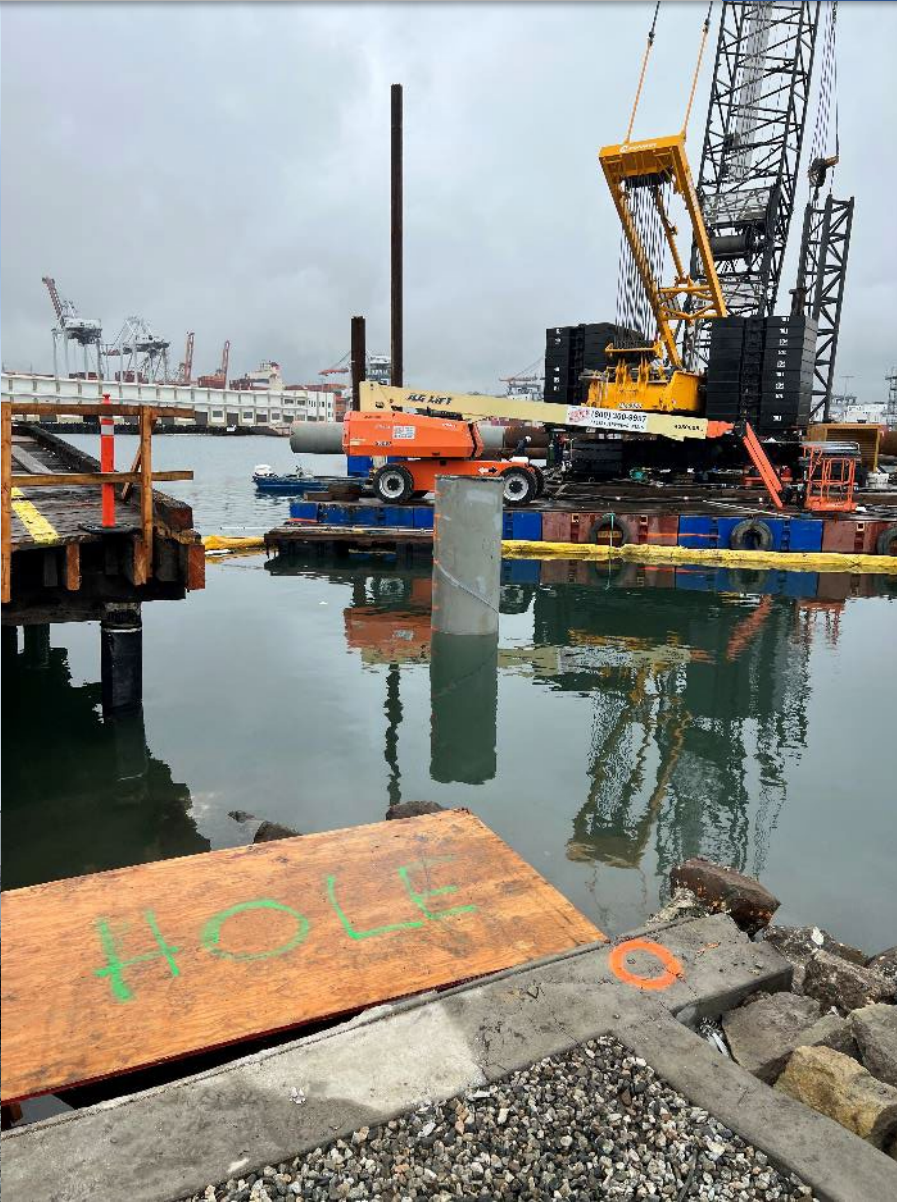
Shell OIL Mormon Island MOTEMS



Shell OIL Mormon Island MOTEMS



Shell OIL Mormon Island MOTEMS



KEY TAKEAWAYS

- POLA is committed to staying resilient to climate change
- Sea Level Rise is a component of our general plan
- Continue to Monitor Sea Level Rise



QUESTIONS?



Backup Slides

CCC SLR POLICY GUIDANCE

(adopted 11/2018)



	Probabilistic Projections (in feet) (based on Kopp et al. 2014)		H++ Scenario (Sweet et al. 2017)
	Low Risk Aversion	Medium-High Risk Aversion	Extreme Risk Aversion
	<i>Upper limit of "likely range" (~17% probability SLR exceeds...)</i>	<i>1-in-200 chance (0.5% probability SLR exceeds...)</i>	<i>Single scenario (no associated probability)</i>
2030	0.5	0.7	1.0
2040	0.7	1.2	1.7
2050	1.0	1.8	2.6
2060	1.3	2.5	3.7
2070	1.7	3.3	5.0
2080	2.2	4.3	6.4
2090	2.7	5.3	8.0
2100	3.2	5.5	9.9
2110*	3.3	7.1	11.5
2120	3.8	8.3	13.8
2130	4.3	9.7	16.1
2140	4.9	11.1	18.7
2150	5.4	12.7	21.5



²¹ Probabilistic projections for the height of sea level rise and the H++ scenario are presented. The H++ projection is a single scenario and does not have an associated likelihood of occurrence. Projections are with respect to a baseline year of 2000 (or more specifically, the average relative sea level over 1991-2009). Table is adapted from the 2018 OPC SLR Guidance to present only the three scenarios OPC recommends evaluating. Additionally, while the OPC tables include low emissions scenarios, only high emissions scenarios, which represent RCP 8.5, are included here because global greenhouse gas emissions are currently tracking along this trajectory. The Coastal Commission will continue to update best available science as necessary, including if emissions trajectories change.