

# SP-152 Climate Resiliency Study

Orange County Sanitation District

Nasrin Nasrollahi, Senior Engineer  
Operations Committee  
November 6, 2019



# Reducing Greenhouse Gas Emissions



## Achieving Greenhouse Gas (GHG) Emission Goals at OCSD

### CALIFORNIA GOAL

Reduce GHG emissions 40%  
below 1990 levels by 2030

Senate Bill 32



### We have reduced GHG emissions using several different means



**Water recycling**  
Avoid emissions from pumping  
imported water



**Renewable energy sources**  
Solar panels designed for new  
headquarters building



**Low-emissions transportation**  
Fuel-efficient and electric vehicles,  
compressed natural gas fueling



**Energy and resource recovery**  
Methane produced during wastewater  
treatment used as an energy source



**High-efficiency assets**  
Variable frequency drives on motors;  
occupancy sensors for lighting and HVAC



**Battery storage system**  
Offset power demand during critical times

# Regulatory Drivers



**Nov 2008**

## **EO-S-13-08**

*State agencies to plan for sea level rise and climate impacts through coordination of the state Climate Adaptation Strategy.*

**Sep 2016**

## **Assembly Bill 2800**

*State agencies shall consider impacts of climate change when planning, designing, building state infrastructure.  
(July 2020)*

**2019**

## **OCSD Strategic Plan**

### **NPDES Permit**

*It is anticipated that a “Climate Change Effects Vulnerability Assessment and Mitigation Plan” is required as part of the NPDES Permit*

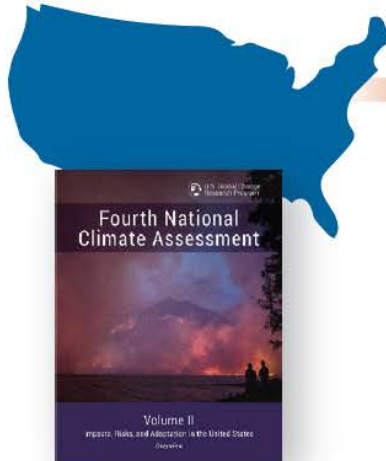
# Recent Climate Science References



International



National



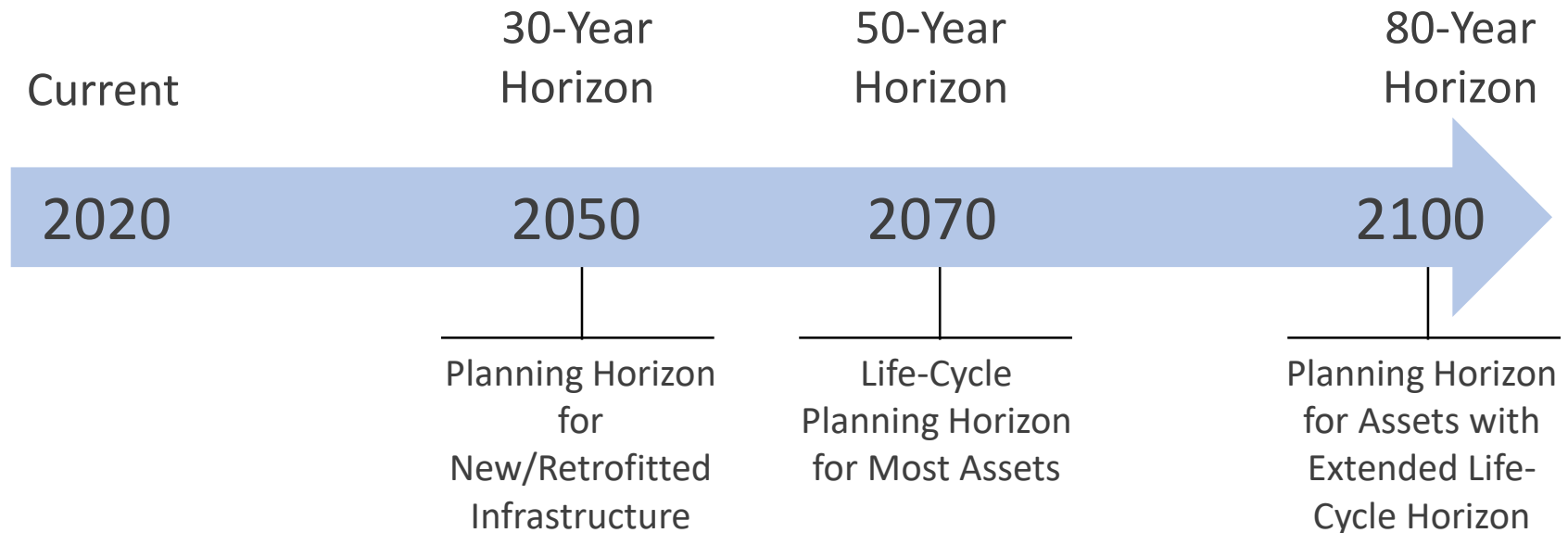
Statewide



Regional



# Planning Horizons for Vulnerability Assessment

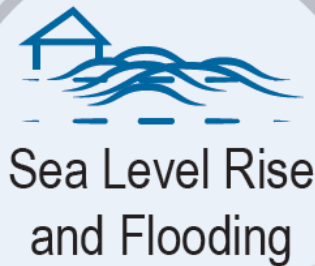


***There is time to adapt, and time to course-correct through successive update cycles of the Resiliency Plan***

# Climate Forces



Flooding threatens Plant No. 2 and pump stations near the coast and major channels.



Sea Level Rise  
and Flooding

Coastal infrastructure is vulnerable to tsunamis.



Tsunami

Fire and flying embers are a risk to buildings near heavy vegetation.

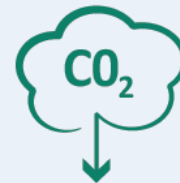


Wildfires

Inland areas are subject to higher temperatures and longer heat waves.



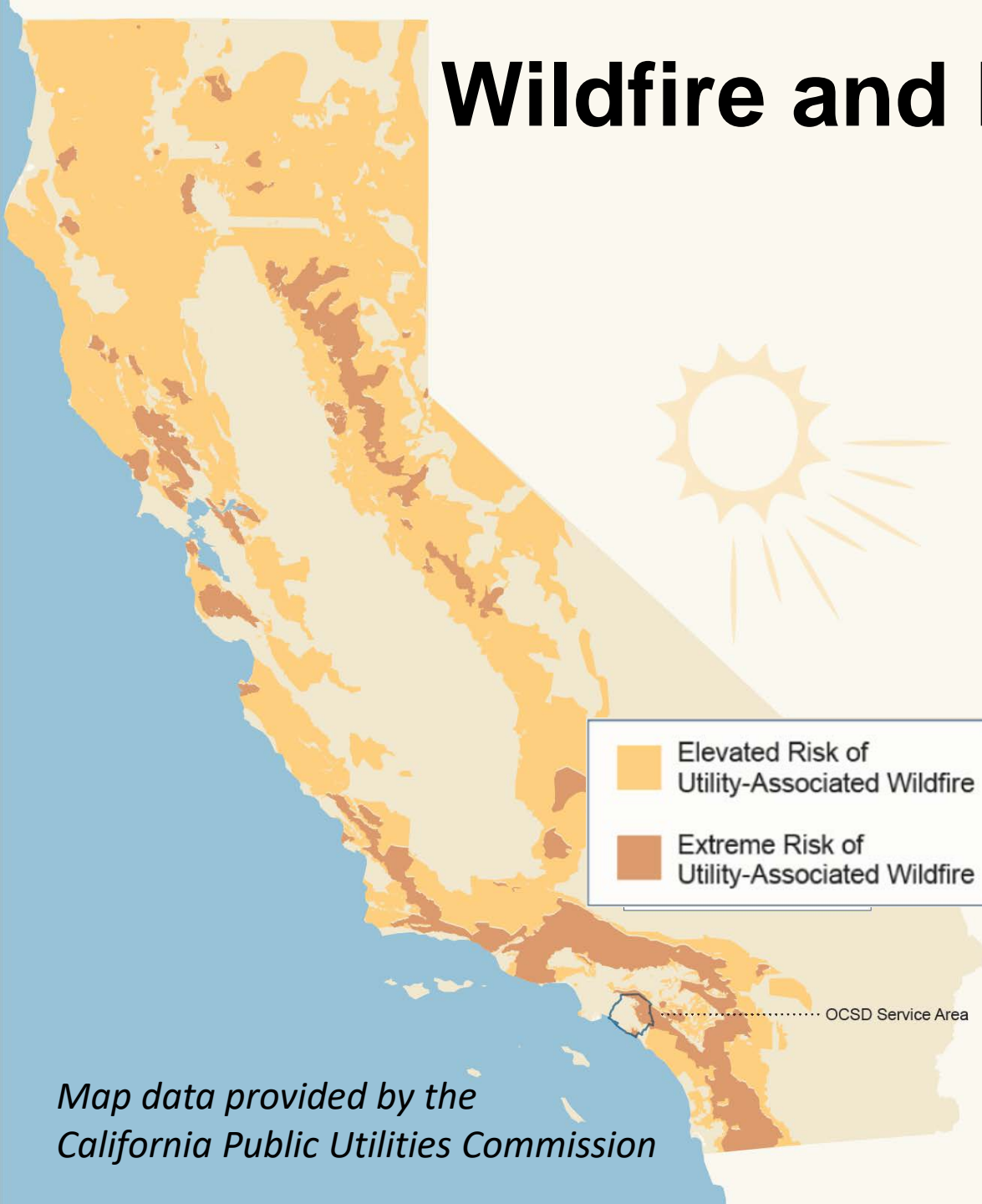
Extreme Heat



CO<sub>2</sub> Reduction

Greenhouse gases, such as carbon dioxide, impact the earth's atmosphere and climate.

# Wildfire and Extreme Heat



*Map data provided by the  
California Public Utilities Commission*

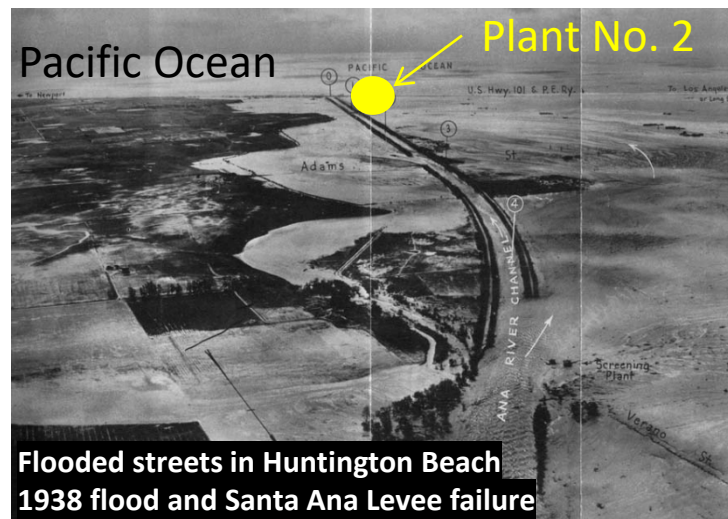


The Cocos Fire burns in San Marcos, California, in 2014. (theatlantic.com)



Ventura Fire, California, Dec 2017. (@aghakouchak)

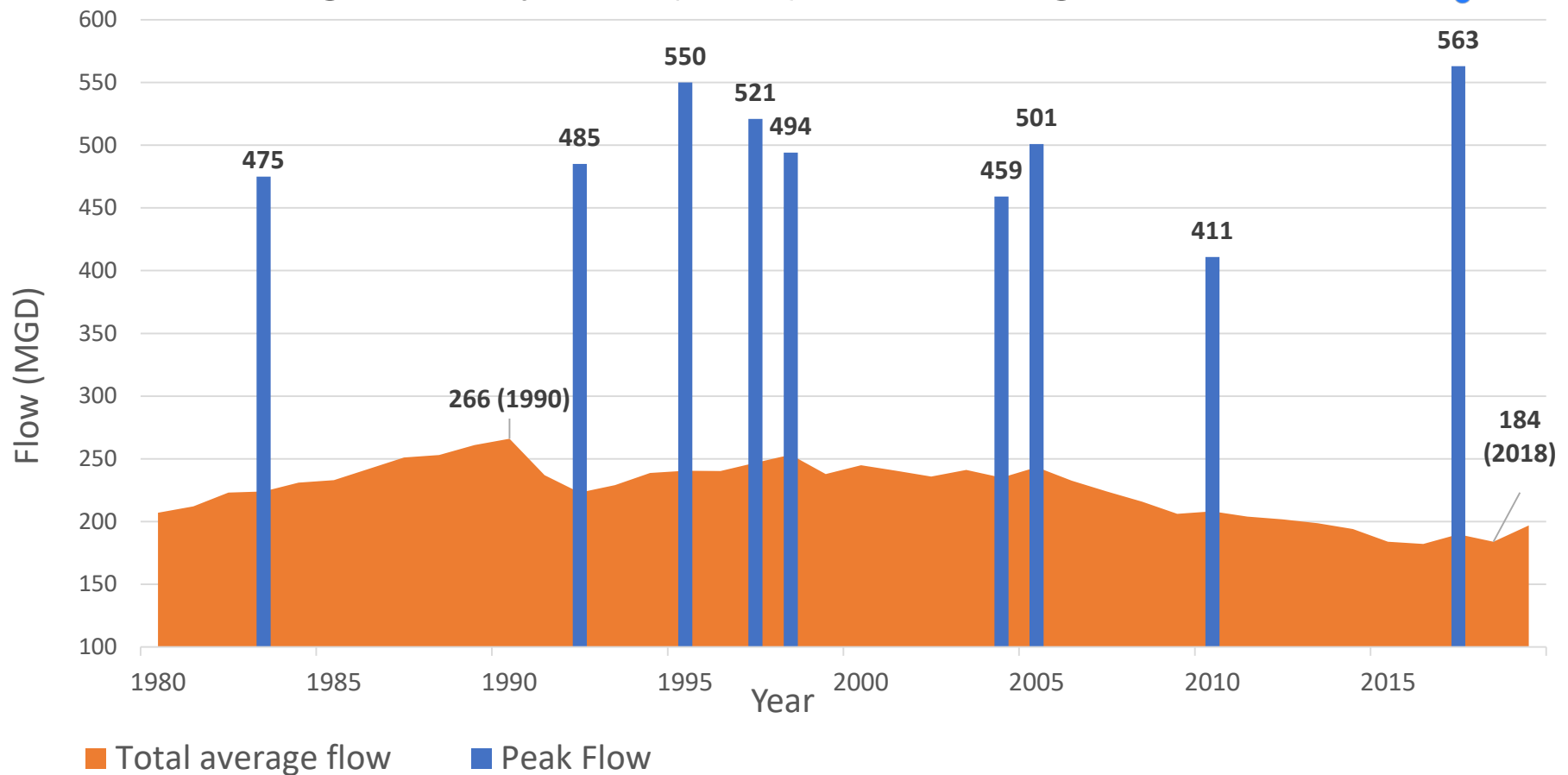
# Flooding in Orange County



# Extreme Flow Events



Average Monthly Flow (MGD) vs. Peak High Flow Events



# Flooding



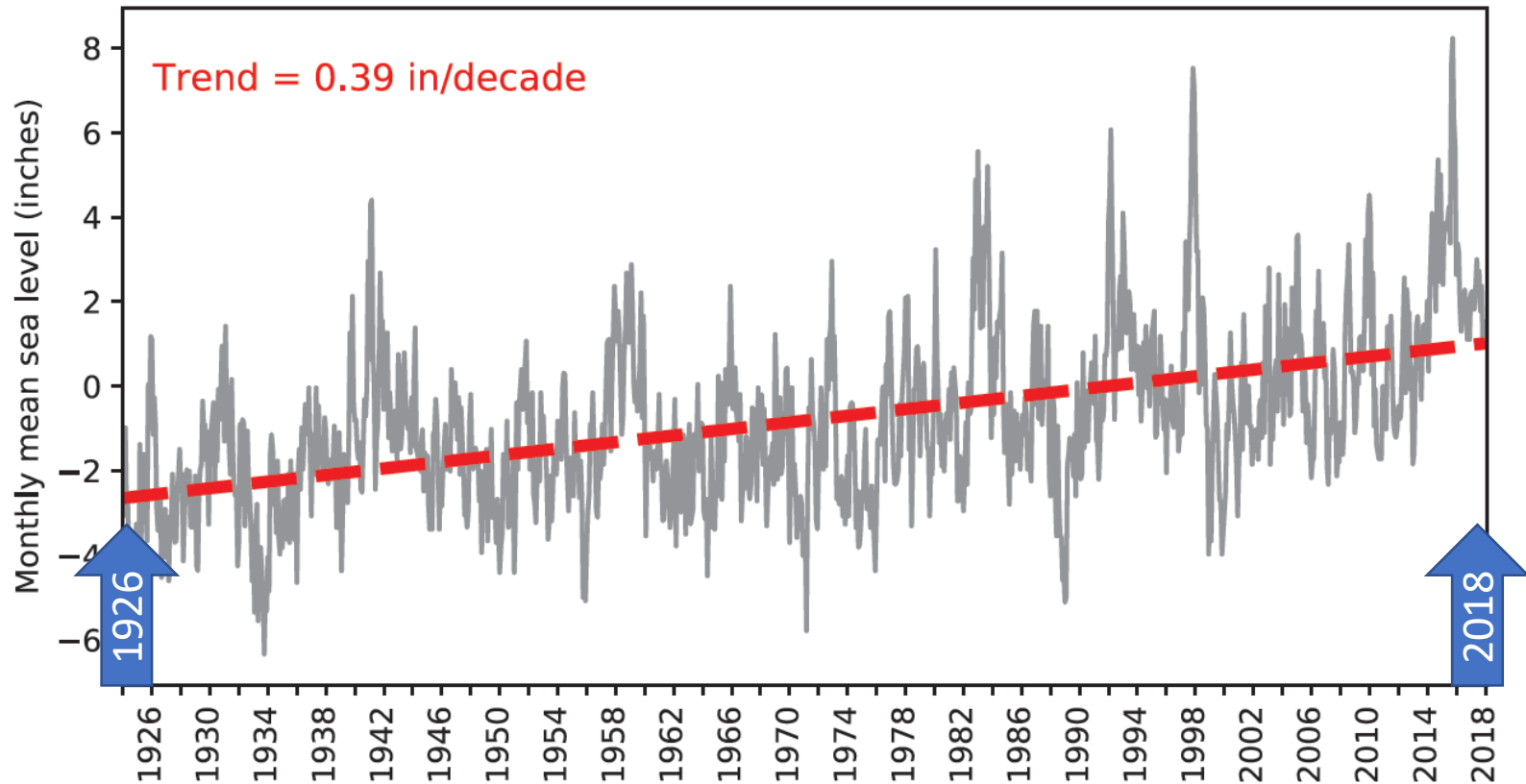
100-year FEMA Flood Maps (2019)



# Sea Level Rise

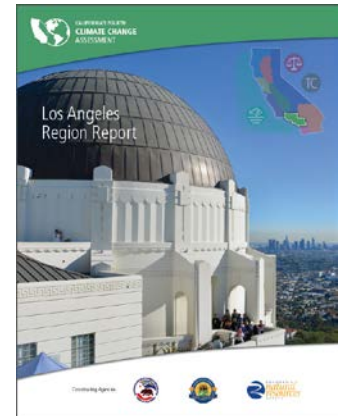
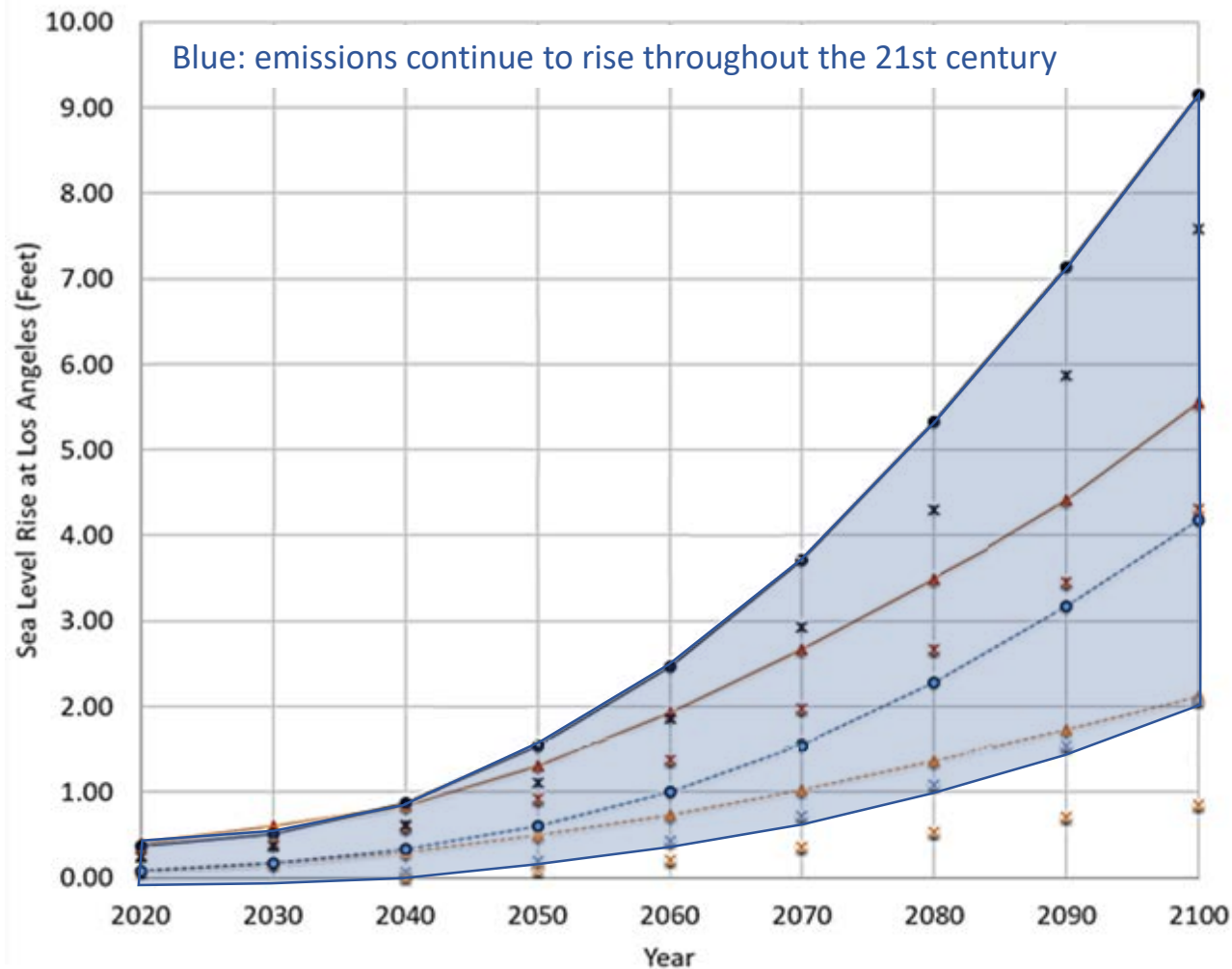


Relative Sea Level at NOAA Los Angeles Tide Gauge [ID:9410660]

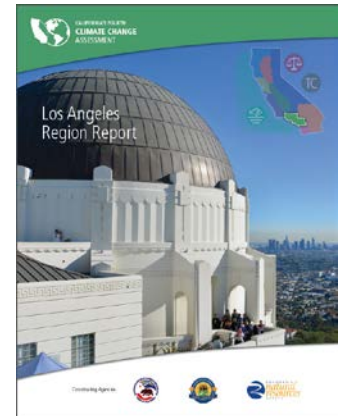
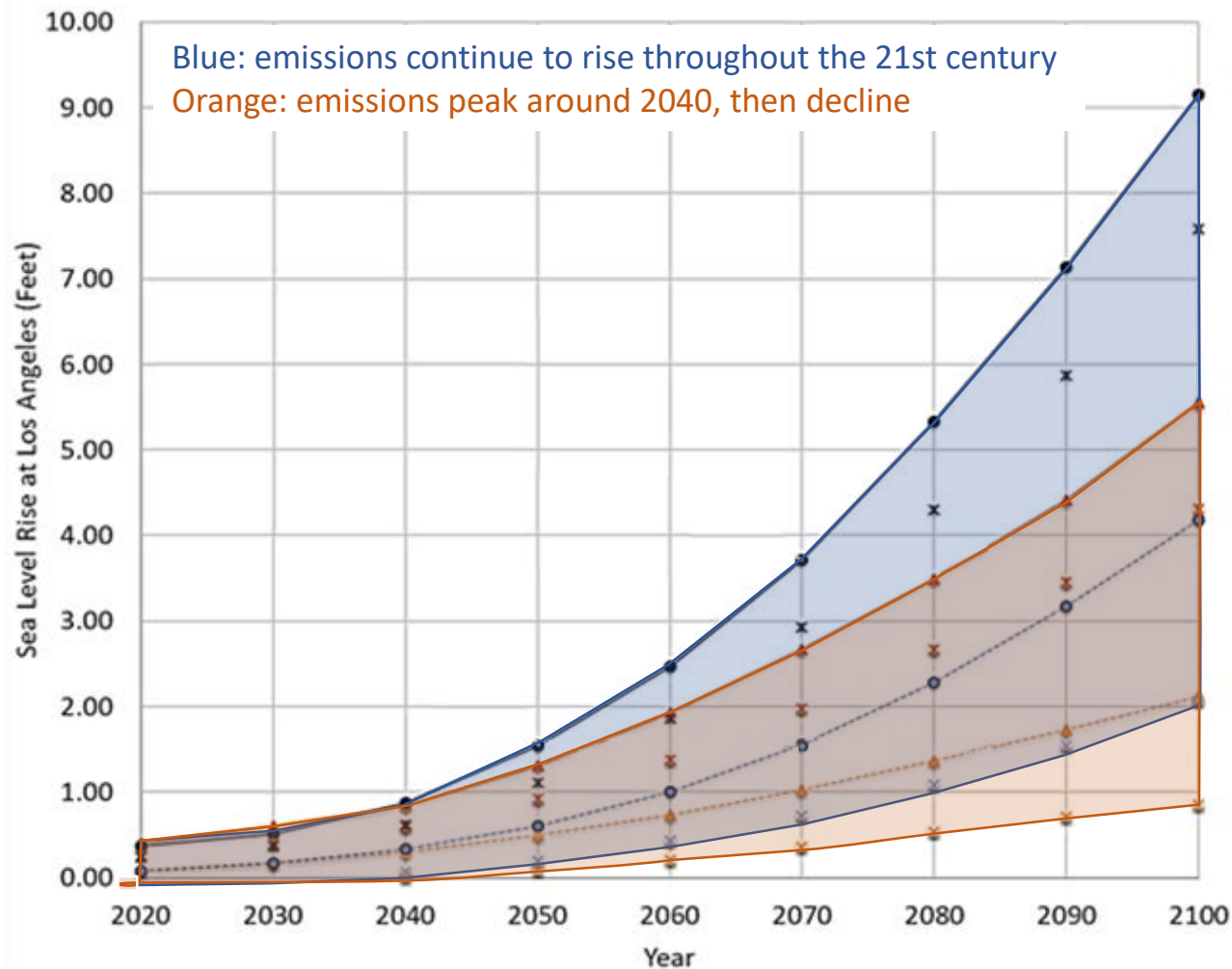


(<http://tidesandcurrents.noaa.gov/sltrends/sltrends.shtml>)

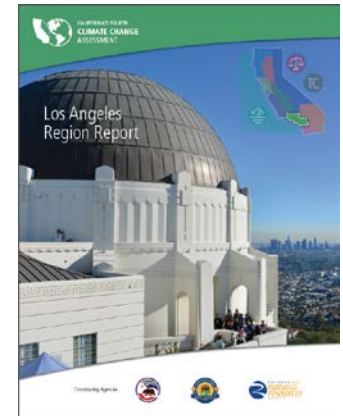
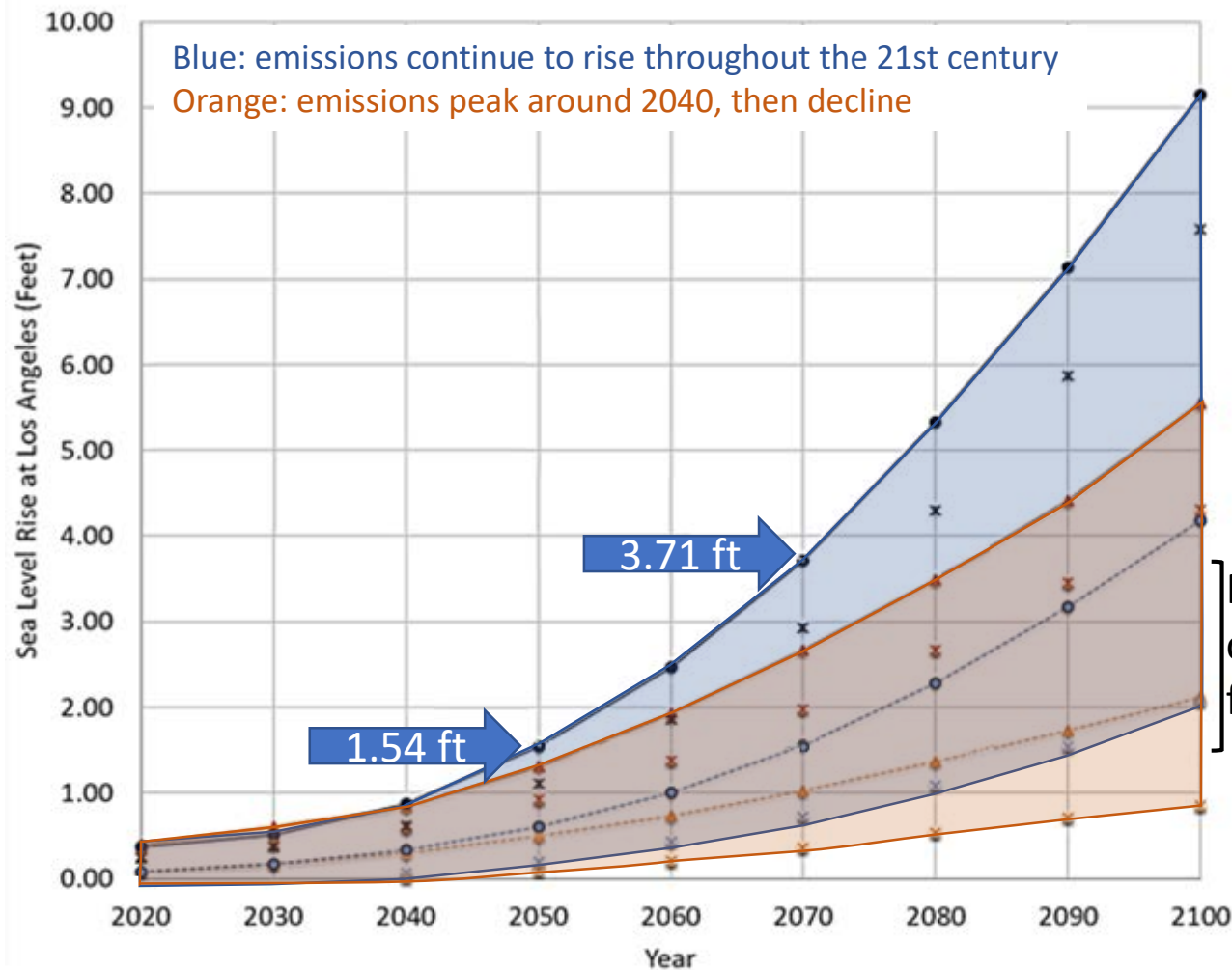
# Sea Level Rise (SLR) Projections



# Sea Level Rise (SLR) Projections



# Sea Level Rise (SLR) Projections

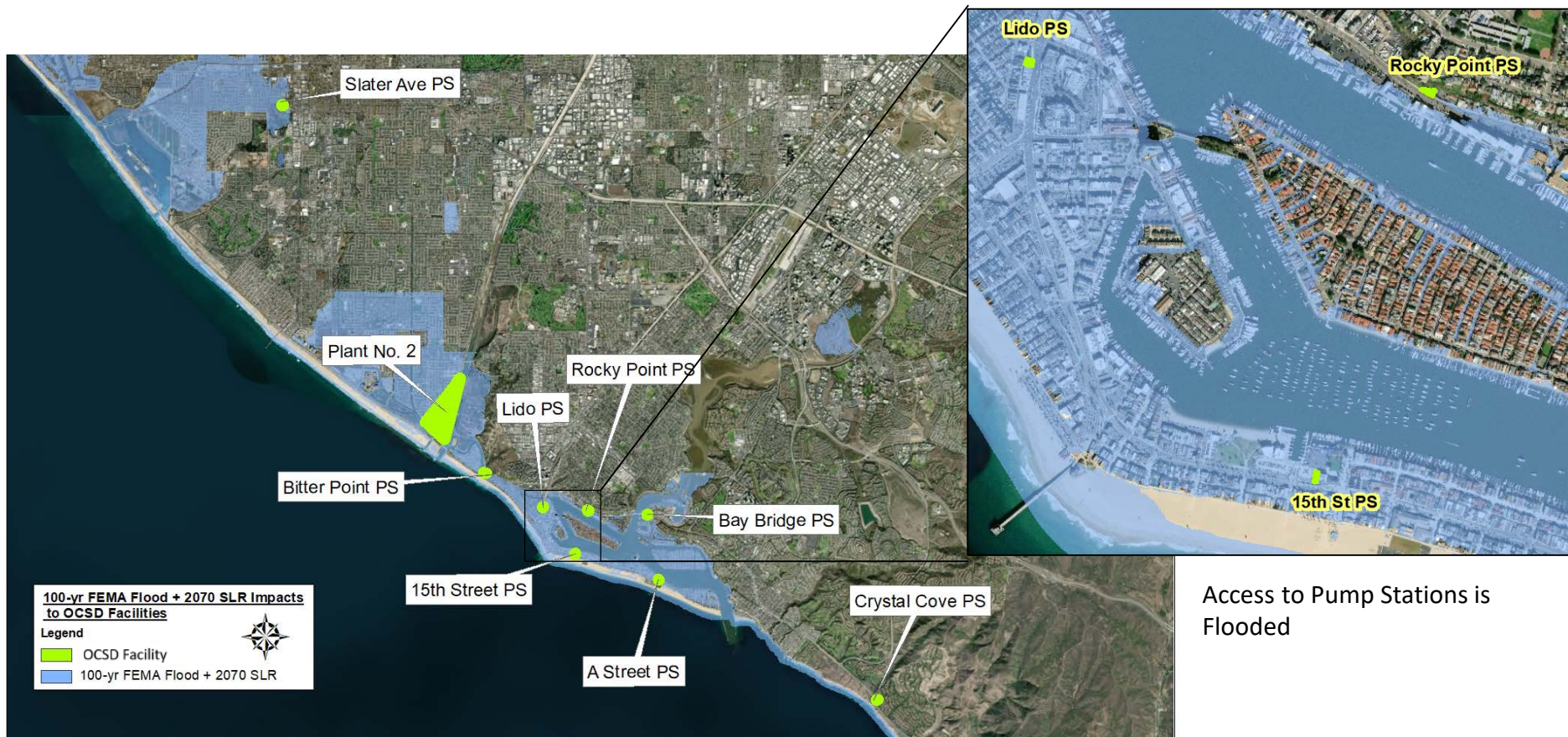


Recommended range  
of sea level rise for  
future CIP projects

# Flooding and Sea Level Rise



100-year Flood + 2070 SLR



Access to Pump Stations is Flooded

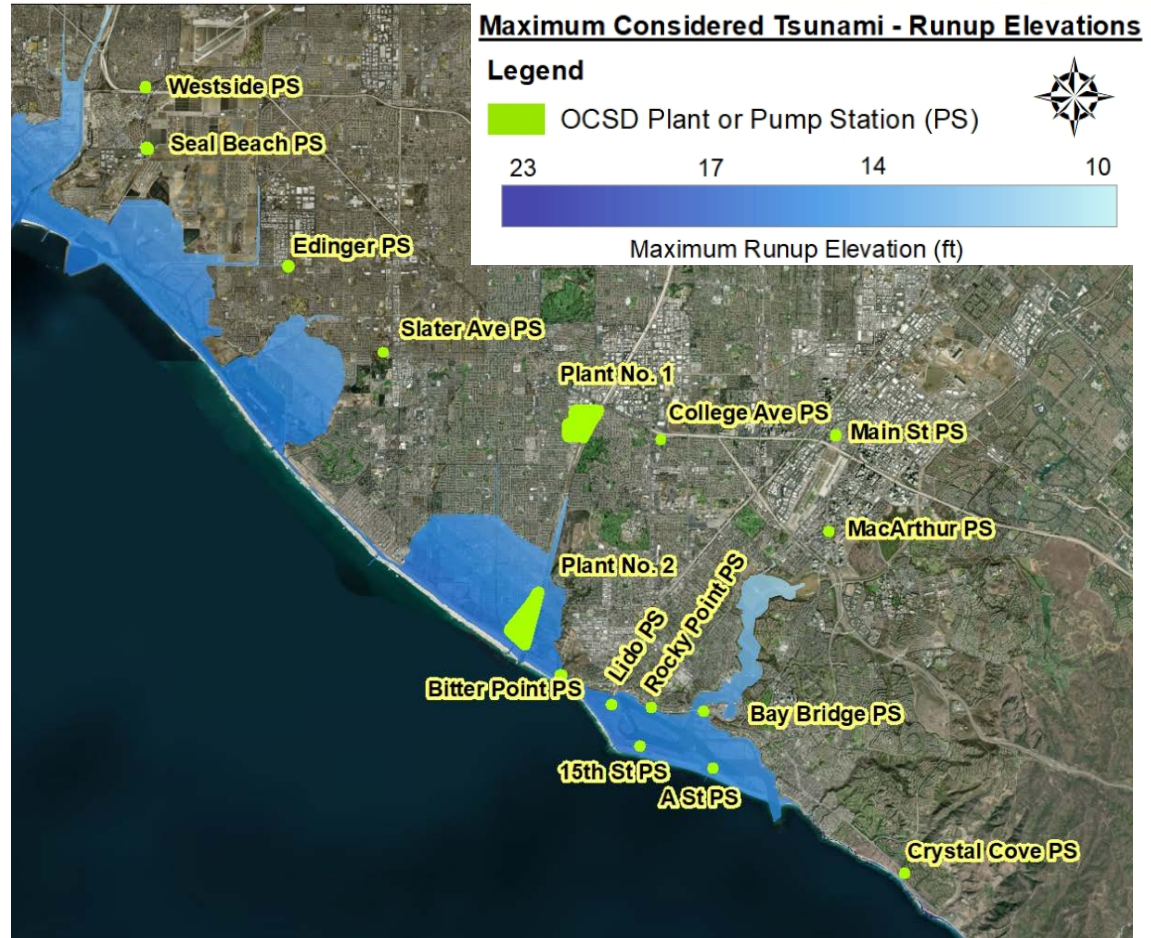
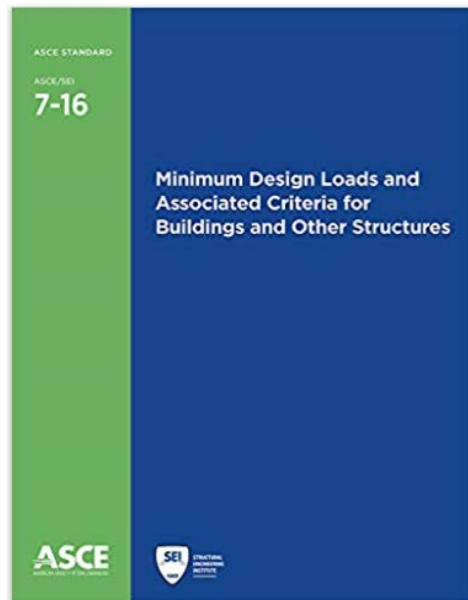
Sea Level Rise Projection of 3.71 ft is assumed in 2070

# Tsunami Runup Elevation

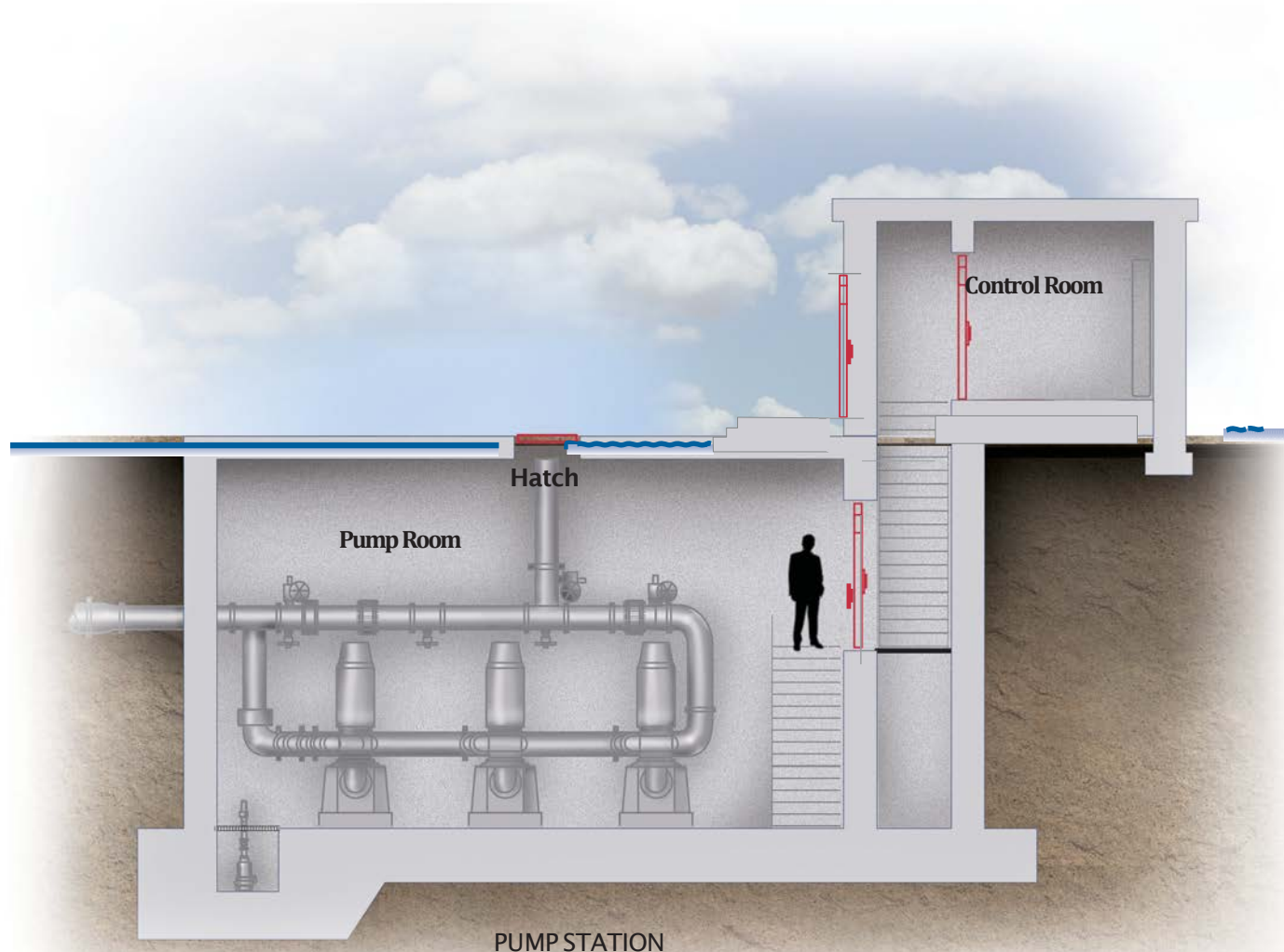
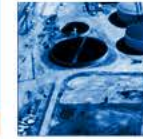


American Society of Civil Engineers (ASCE) 7-16

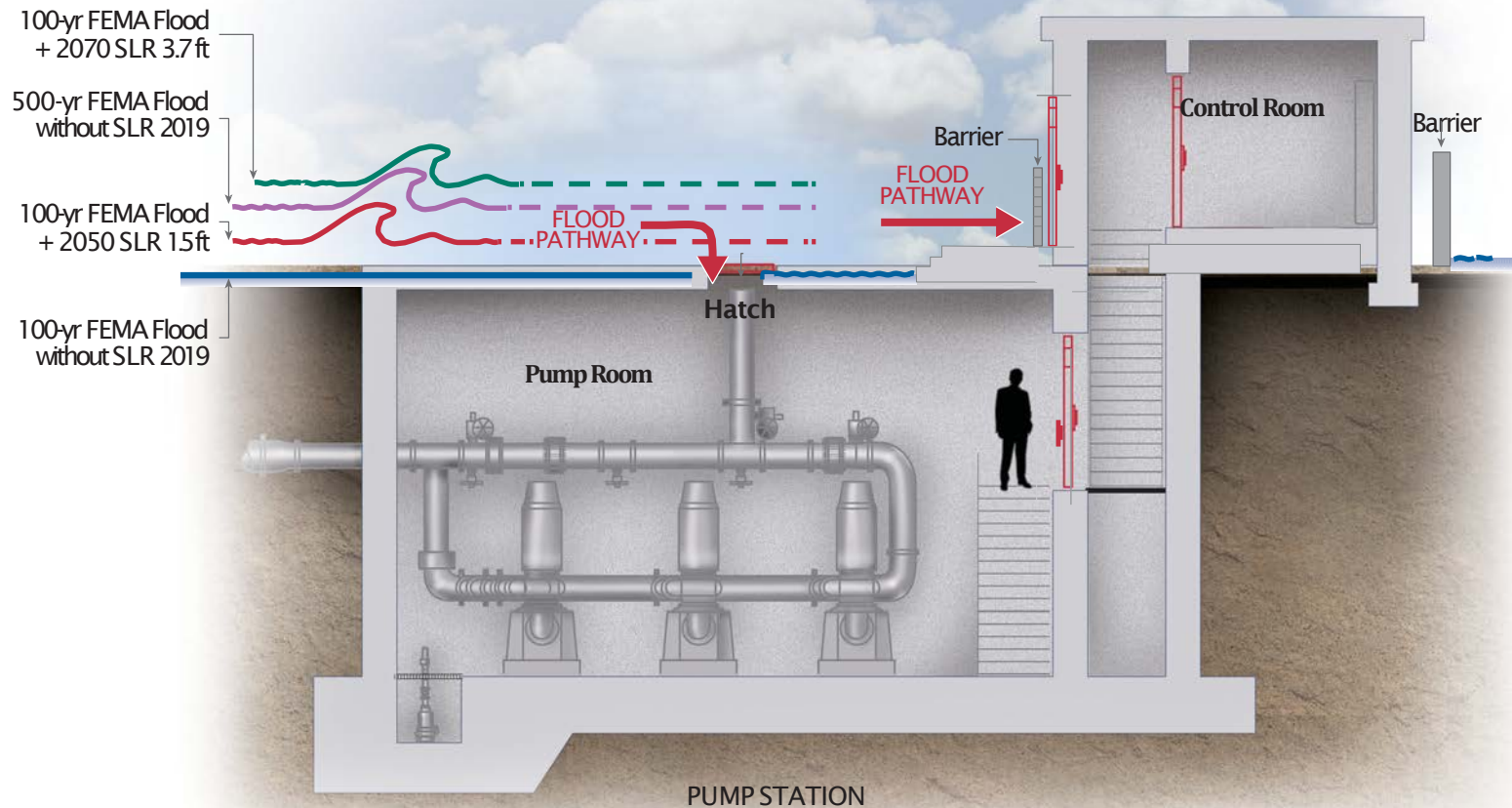
Current maximum extent inundation zones.



# Adaptation Example



# Adaptation Example



# Adaptation Example



## Recommended Capital Improvements for Lido Pump Station



4 drywell hatches below flood level



Watertight replacement of drywell hatches



Flood pathway

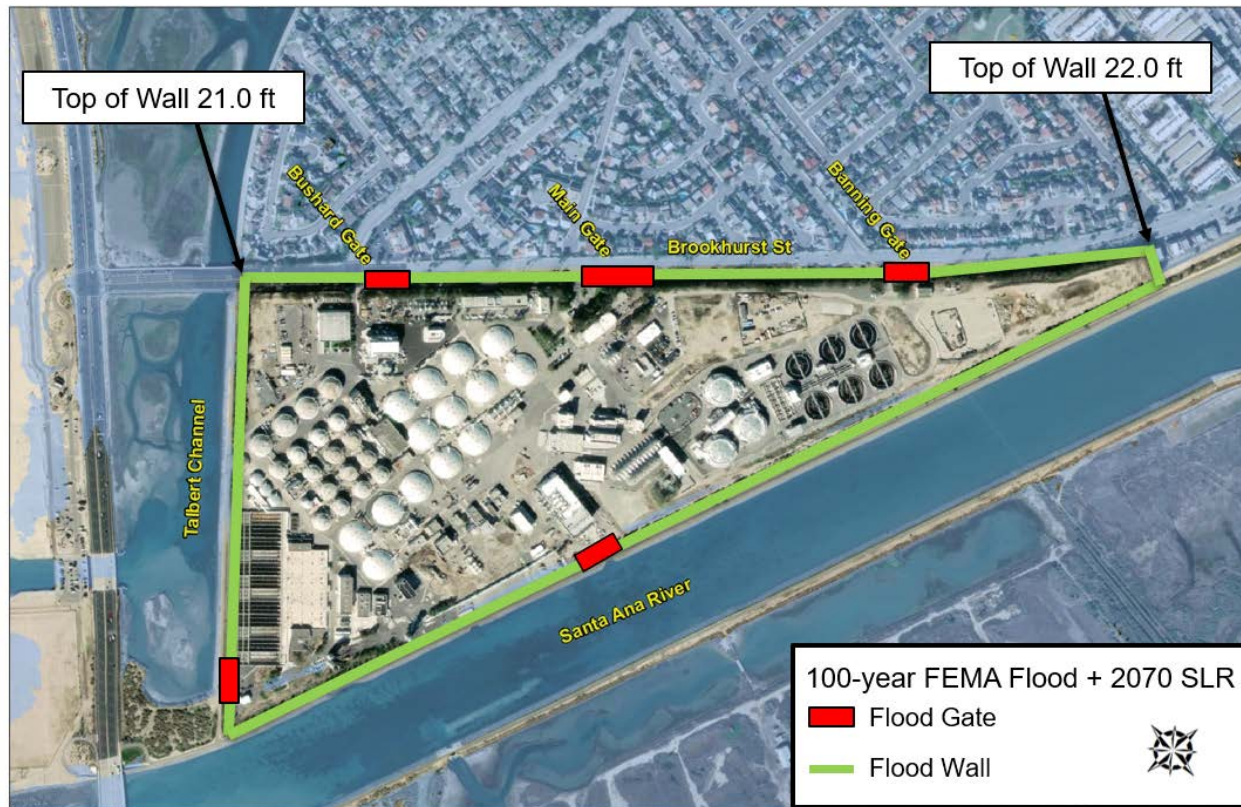


Stop logs over doors or sealed doors

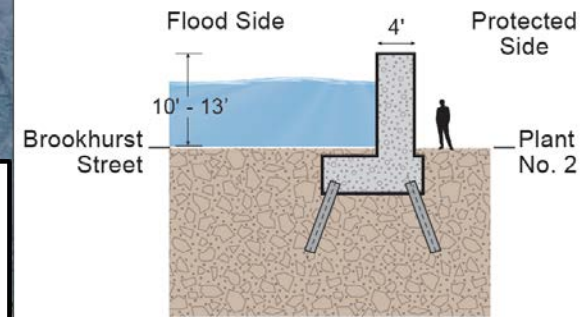
# Protecting the Treatment Plant



## Recommendation: Plant No. 2 Boundary Wall



T-WALL DETAIL DRAWING



# Summary of Impacted Facilities



# Study Recommendations



Facility	Construction Cost	Impacted Planning Horizon
Slater Pump Station	\$0.5 million	Current, 2050, 2070
Lido Pump Station	\$0.5 million	Current, 2050, 2070
15th Street Pump Station	\$0.1 million	2070
A Street Pump Station	\$0.4 million	2070
Plant No. 2	\$28 million	2050, 2070

# OCSD Policy



OCSD aims to design, maintain and operate valuable wastewater assets that withstand or adapt to adverse conditions in a reasonable manner that is both cost-effective and sustainable for present and future generations. These adverse conditions include heavy rains, flooding, sea level rise, earthquakes, tsunamis, extreme heat, wildfires and electrical grid interruptions.





**Questions?**