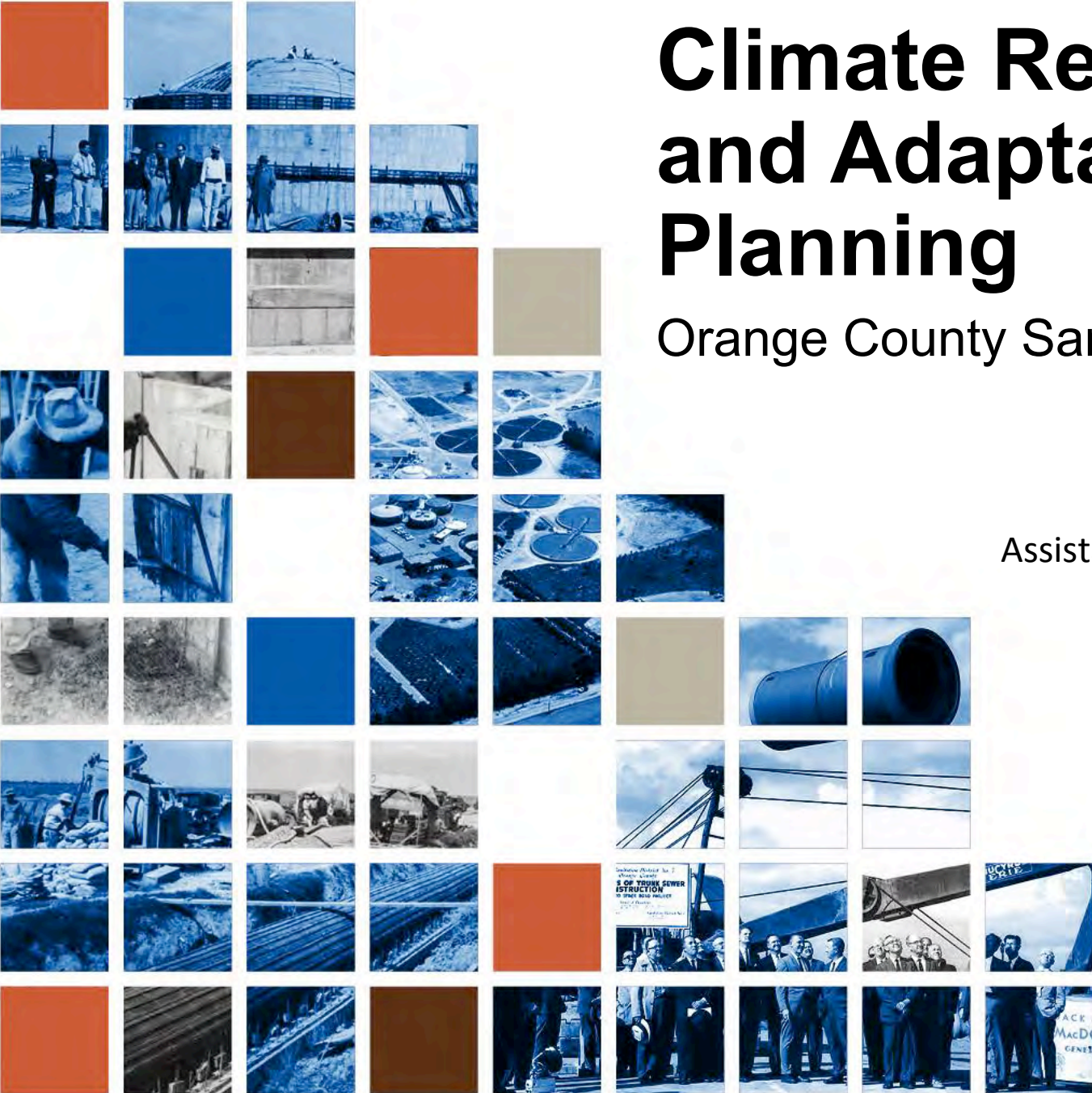


Climate Resiliency and Adaptation Planning

Orange County Sanitation District

Rob Thompson
Assistant General Manager
October 17, 2019



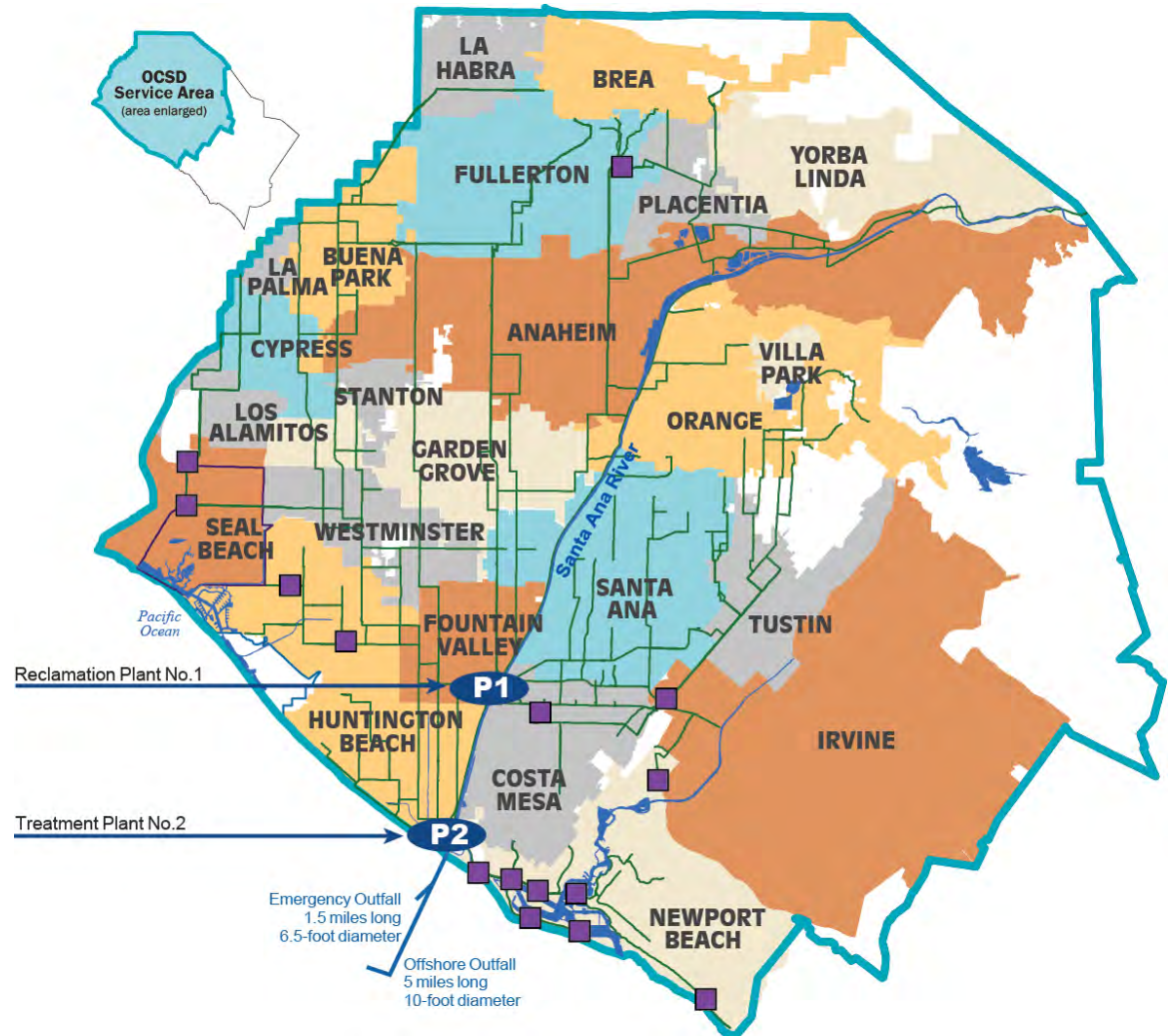
Who is OCSD?



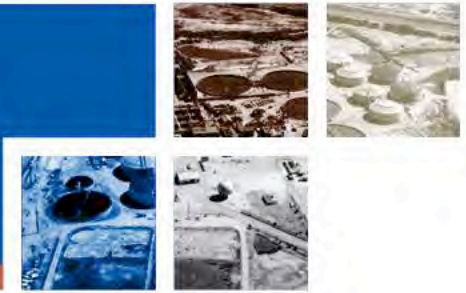
389 regional
trunk sewer
MILES

15 pump
stations

479 service
area
square
MILES

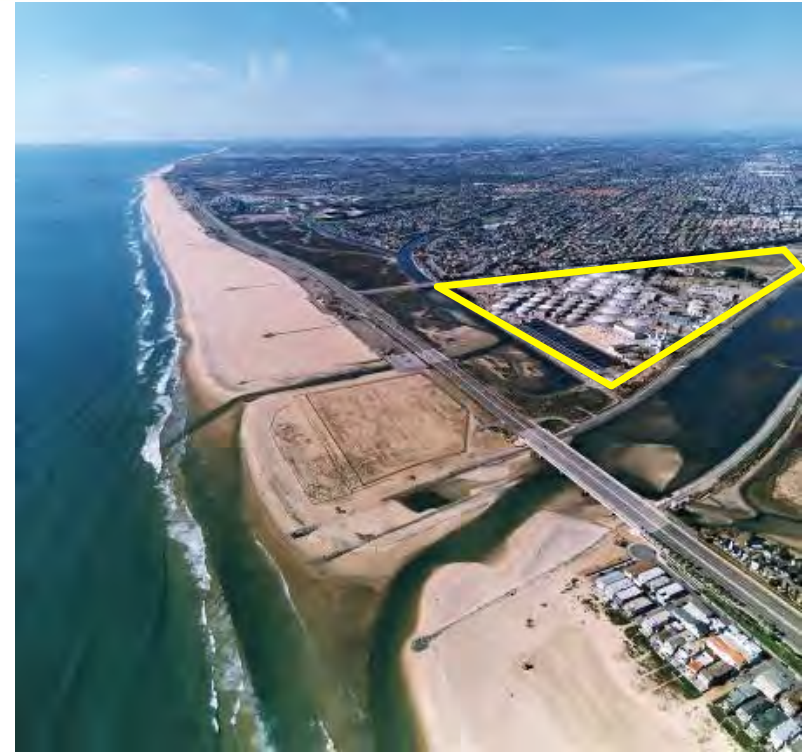


Treatment Plants



Reclamation Plant No. 1
Fountain Valley

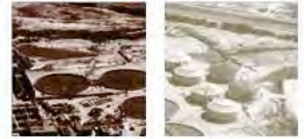
Average Influent flow: 120 MGD



Treatment Plant No. 2
Huntington Beach

Average Influent flow: 65 MGD

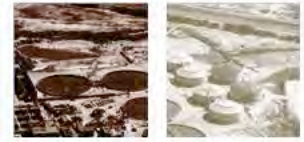
What is Resiliency?



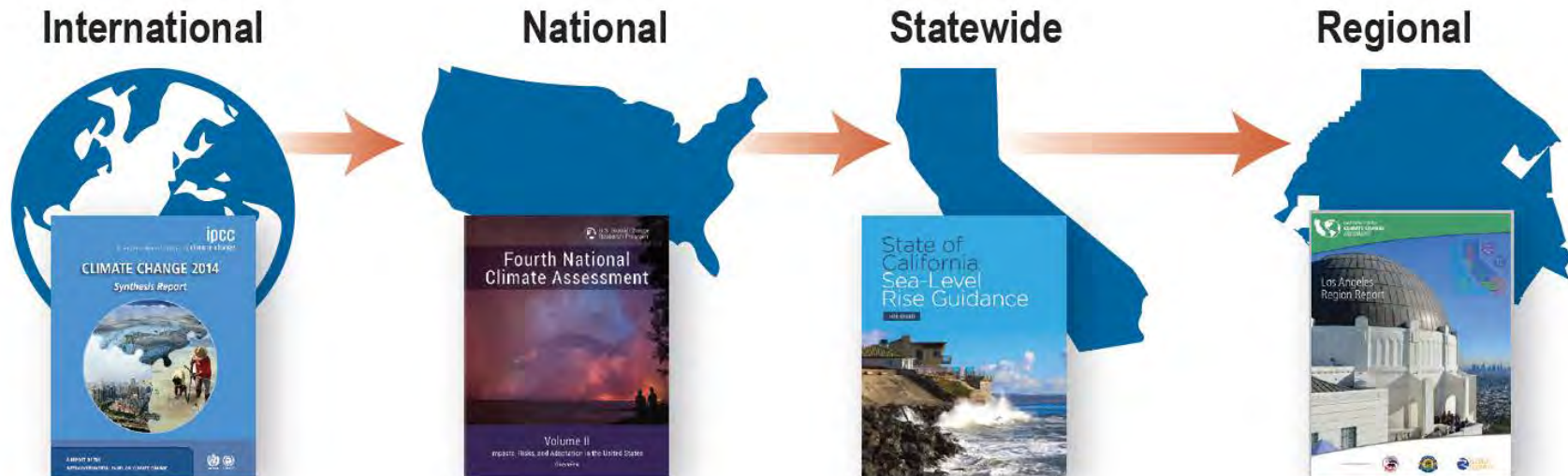
Resiliency is the ability to accomplish your mission as circumstances and conditions change



Drivers - Climate Science References

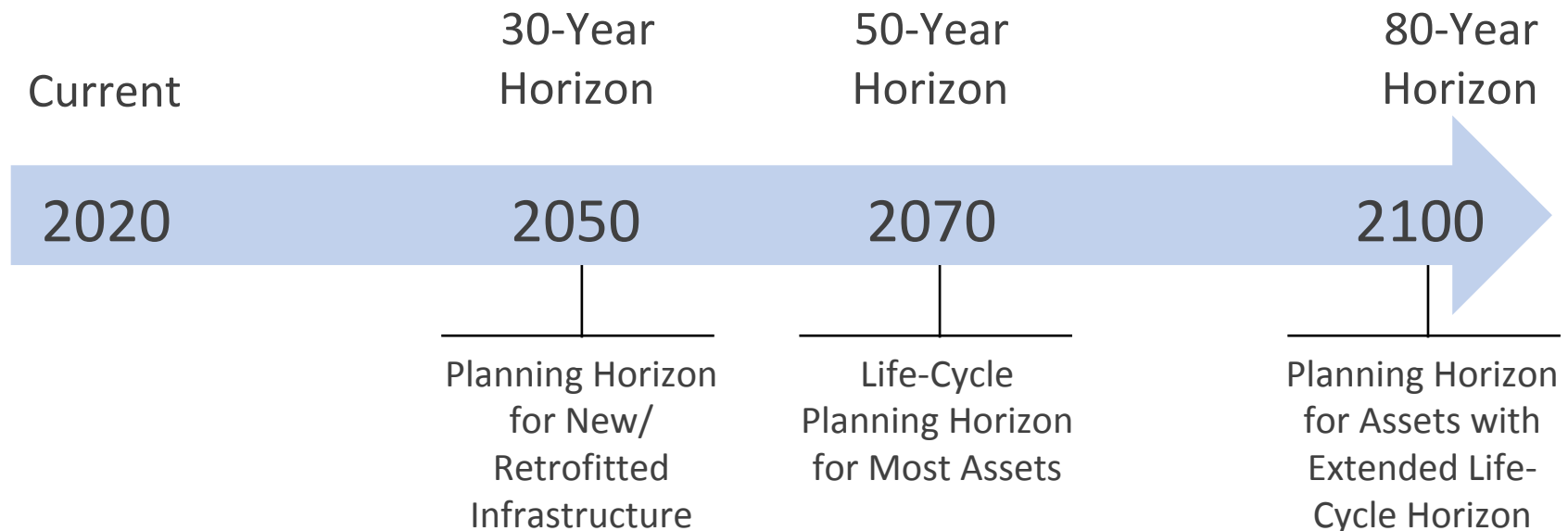


2014-2018



Climate change research is extensive and widely discussed, and as a pertinent topic to future planning, investigation and exploration is ongoing. The climate projections, including sea level rise, are based on the work of the Rising Seas Report and California's Fourth Climate Change Assessment as representing the "state of the science" for the Orange County area.

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 Pump Stations and Plant 2 near the coast and major channels.



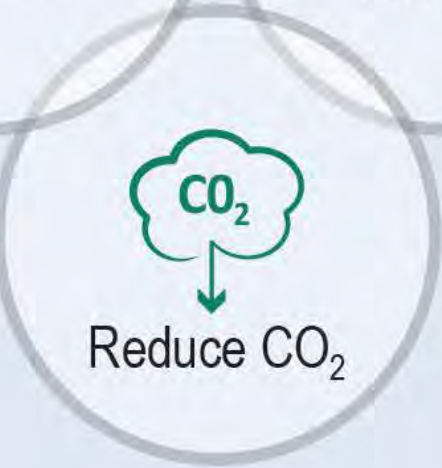
Coastal infrastructure is vulnerable to tsunamis.



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



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



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

Wildfire and Extreme Heat



Extreme heat and increased temperatures can cause physical stress to materials, such as common pipe materials, and operational stress on equipment, such as electronics, electrical equipment, motors, and chemical handling facilities. The location of OCSD facilities are low risk for wildfire impacts.



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



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

Causes of Flooding in Orange County



 King Tides

 Storm Events

 Tsunamis

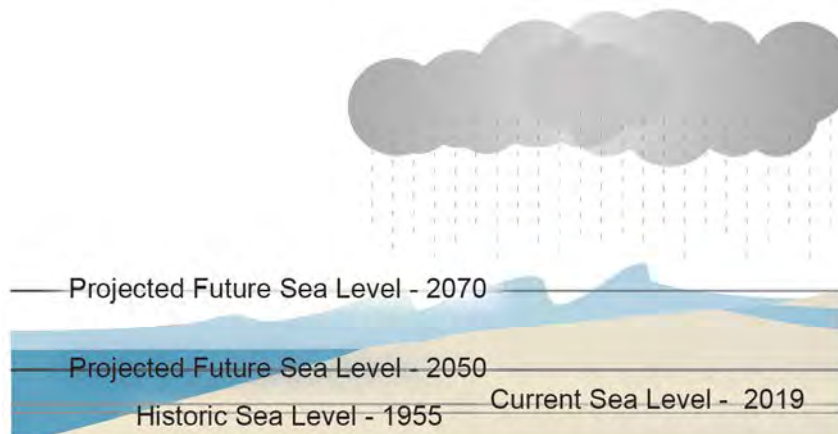
 Sea Level Rise



Storm Event, Dec 2010
Balboa Island (www.sopr.org)

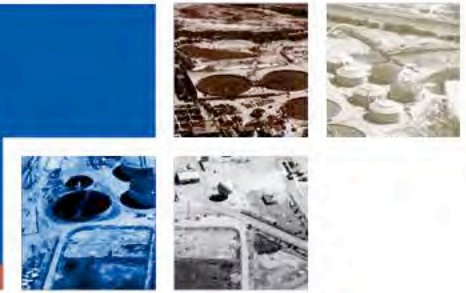


King Tide 2012
8th St and Coast Hwy, Newport Beach
(OCREGISTER)

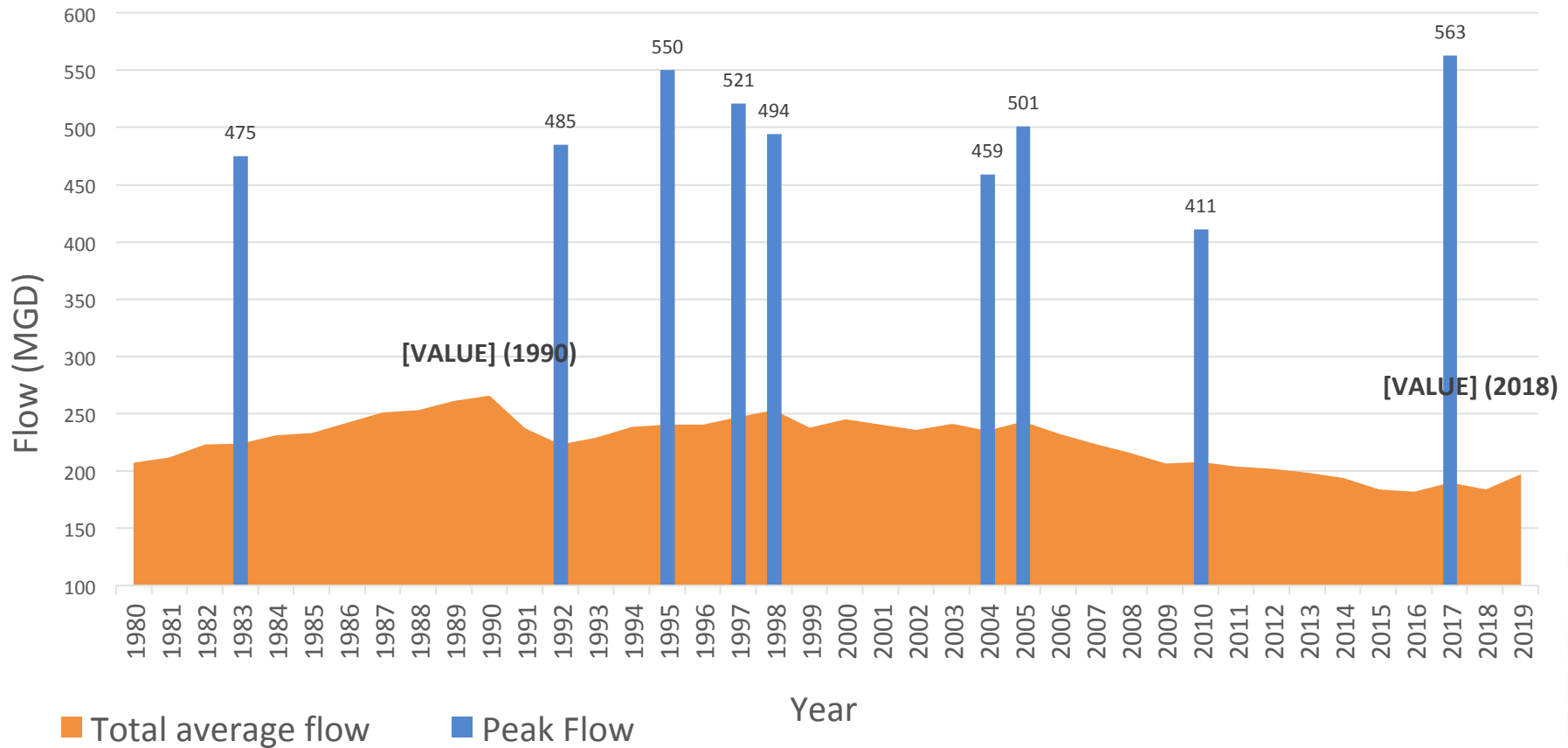


Flooded streets in Newport Beach
1983, (OCREGISTER)

Heavy Rains



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



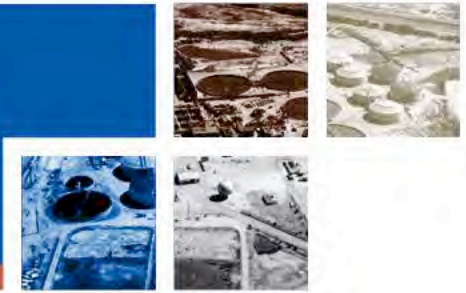
Flooding



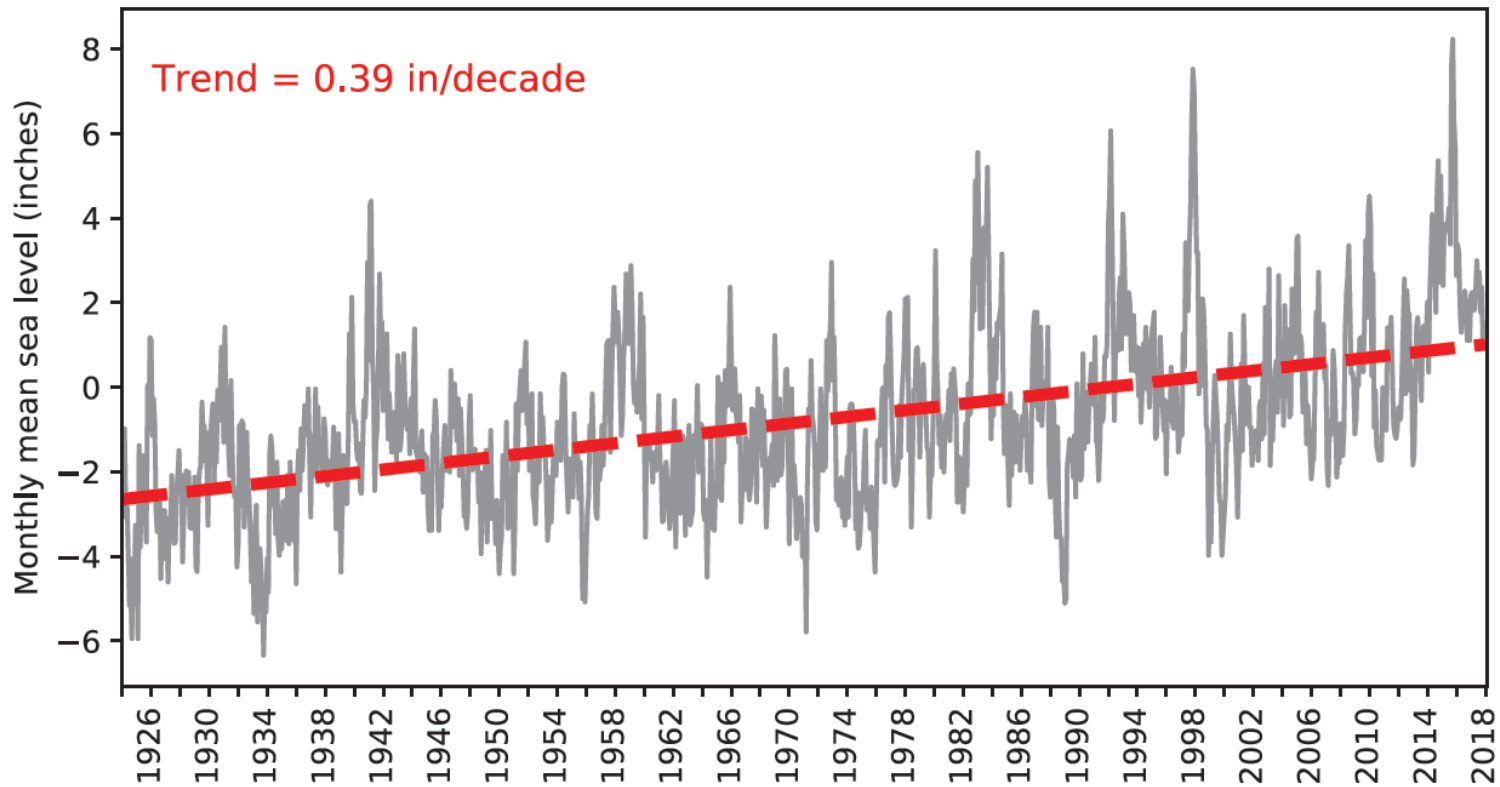
100-year FEMA Flood Maps (2019)



Sea Level Rise



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



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

Flooding and Sea Level Rise



100-year Flood + 2070 SLR



Sea Level Rise Projection of 3.71 ft is assumed in 2070

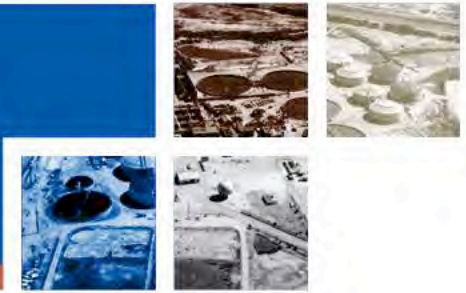
Tsunami Runup Elevation



- American Society of Civil Engineers (ASCE) 7-16
 - Current maximum extent inundation zones.
 - SLR will increase the extent of inland flooding that could be caused by tsunami
 - California Building Code Part 2 Chapter 16 Appendix M
- Tsunami inundation zones included in hazard plans



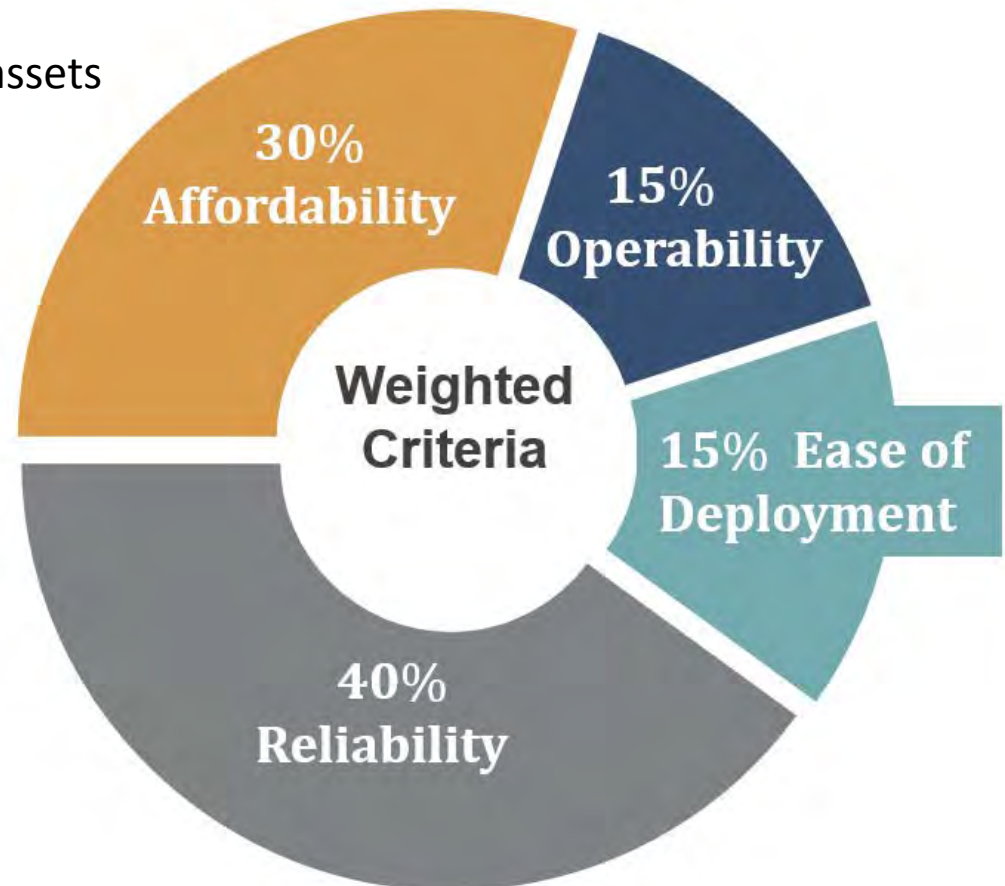
Criteria for Adaptation Selection



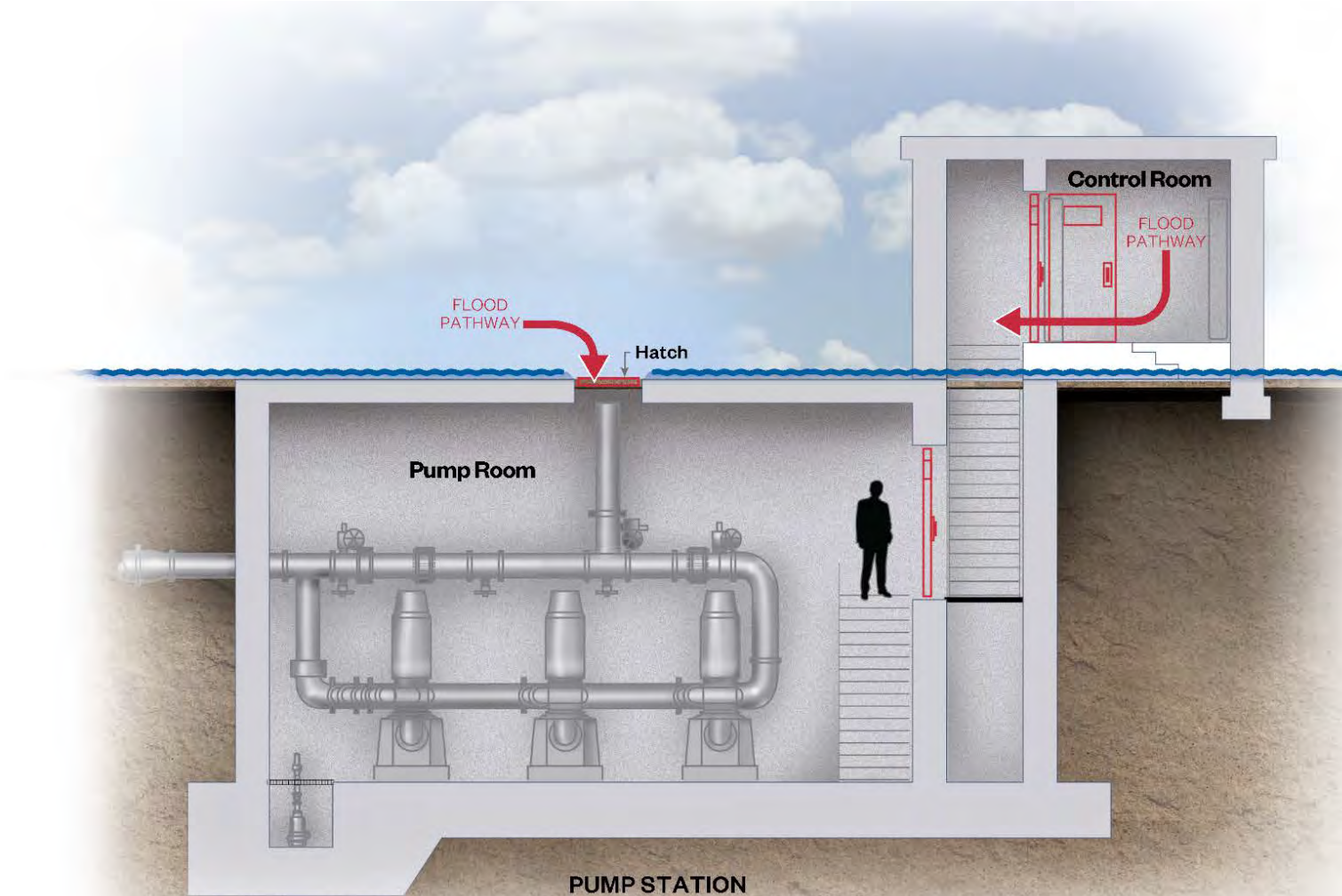
For every at-risk facility two different adaptation scenarios were considered:

- 1- Elevation and floodproofing of major assets
- 2- Facility Level Adaptation

Based on the weighted criteria considering 4 different options (reliability, affordability, operability and ease of deployment) facility level adaptation was selected as the best adaptation plan for OCSD facilities.



Site Specific Risk Assessment



Collection System Recommendations



Recommended Capital Improvements for Lido Pump Station



4 drywell hatches below flood level



Watertight replacement for all 4 drywell hatches



Flood pathway



- Stop logs over both doors
- Can use sealed door instead

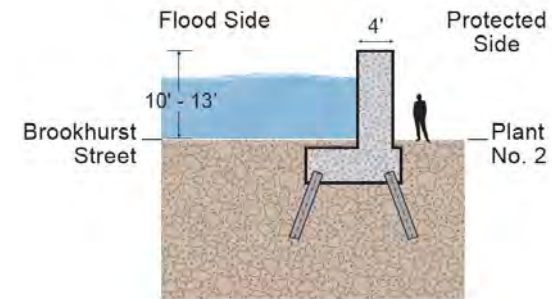
Protecting the Treatment Plant



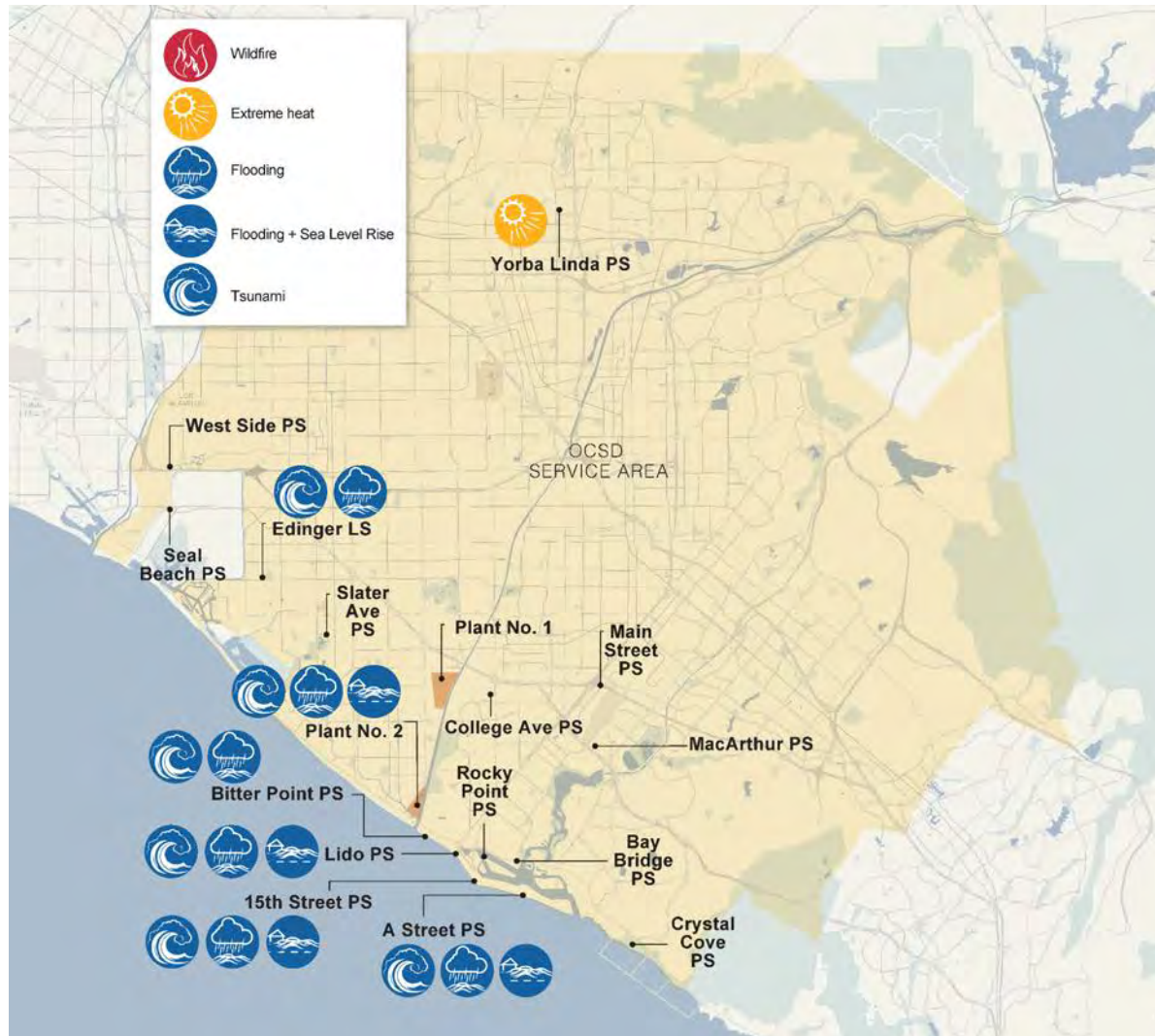
Plant No. 2 Boundary Wall Recommendation: Brookhurst Street, Talbert and Santa Ana Berms



T-WALL DETAIL DRAWING



Summary of Impacted Facilities



Reducing Greenhouse Gas Emissions



Achieving Greenhouse Gas (GHG) Emission Goals at OCSD

CALIFORNIA GOAL

Reduce GHG emissions



below 1990 levels by 2030

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



Water recycling

Emissions associated with imported water avoided



Renewable energy sources

Solar panels placed on some buildings



Low-Emissions Transportation

Fuel efficient and electric vehicles, compressed natural gas fueling



Energy and resource recovery

Methane production during WWT and then use as an energy source



High efficiency assets

Variable frequency drives on motors, occupancy, sensors for lighting and HVAC



“As Orange County continues to grow and evolve to a more urban environment, OCSD must grow with it to provide resilient service and enhanced resource recovery.”

- Rob Thompson, Assistant General Manager
rthompson@ocsd.com

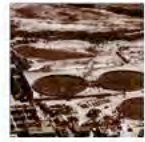
Thank you

Be Social Connect with Us!

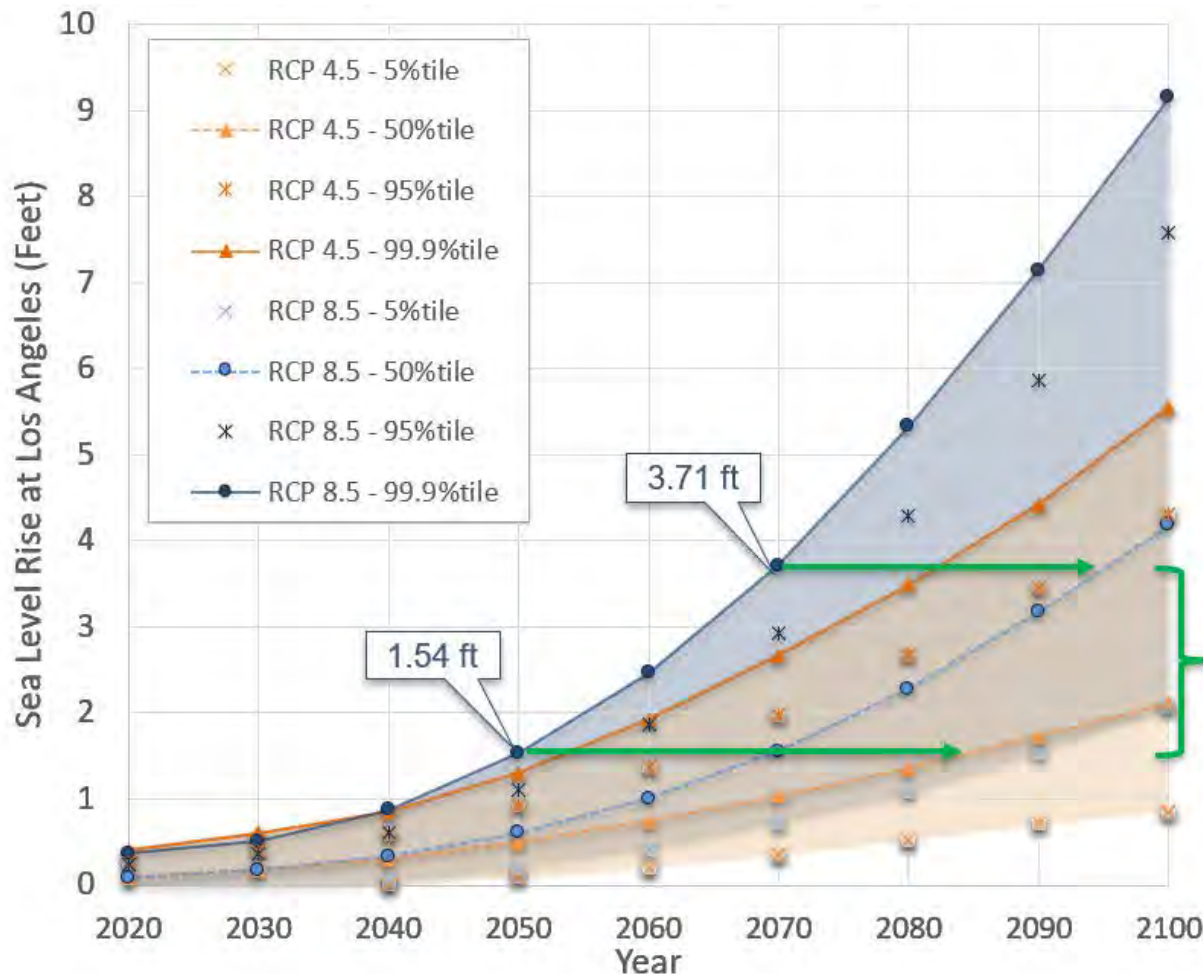


@ocsewers

Please visit our website at www.ocsd.com



Sea Level Rise (SLR) Projections



Percentile	Likelihood of SLR Level
5 %tile	Very likely
50 %tile	
95 %tile	
99.9 %tile	

The recommended SLR levels provide some safety against the wide range of late century projections, and extreme tides. **This enables time to adapt in the future.**

(data provided by Dr. Julie Kalansky, University of California, San Diego)

Plant No. 1 Projects

Project Start Year

- Current
- 2019 - 2021
- 2022 - 2026
- 2027 - 2031
- 2032 - 2037

P1-115
Buildings Title 24
Access
Compliance

P1-128
HEADQUARTERS
COMPLEX

X-044 (2033)
SALS REHAB

P1-105
HEADWORKS REHAB
AND EXPANSION

P1-133
PRIMARY SEDIMENTATION
BASINS NO. 6-31

X-017 (2025)
PRIMARY CLARIFIERS
6-37 REHABILITATION

P1-126 (2021)
PRIMARY
CLARIFIERS
REPLACEMENTS
AND
IMPROVEMENTS

3
4
5

METERING

PUMPING

SCREENINGS
HANDLING

ELECTRICAL
ROOM

ODOR
CONTROL
FACILITY

X-038 (2028)
CITY WATER
PUMP STATION

GRIT
HANDLING

GRIT
HEAD
BOX

PRI CLAR
1&2

POWER
BLDG

STANDBY
GENERATOR
BUILDING

**P1-127
(2027)**

CENGEN
REHAB

GAS
HANDLING

J-124
DIGESTER GAS
FACILITIES REHAB

POWER
BLDG 7

PB8

PS

**X-015
(2030)**

TRICKLING
FILTERS

PUMP
STATION

PEPS

AS1 AERATION
BASINS/BLOWERS
REHABILITATION
X-048 (2023)

P1-101
SLUDGE
DEWATERING AND
ODOR CONTROL

AS2 AERATION
REHABILITATION
X-018 (2033)

P1-129
RAS PIPING
REPLACEMENT

AS1
CLARIFIER
REHABILITATION
X-049 (2029)

DAFT DEMO
X-043 (2029)

PLANT WATER PS
X-039 (2033)

SOUTH PERIMETER SECURITY
P1-134

Plant No. 2 Projects



Project Start Year	
■	Current
■	2019 - 2021
■	2022 - 2026
■	2027 - 2031
■	2032 - 2037

Regional Sewer Projects

