Strategic Plan Development

Tonight's Policy Discussions

- Budget Control & Fiscal Discipline
- Energy Independence
- Chemical Sustainability
- Asset Management
- Climate and Catastrophic Event Resiliency

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Budget Control & Fiscal Discipline

Presented by Lorenzo Tyner
Assistant General Manager and
Director of Administrative Services

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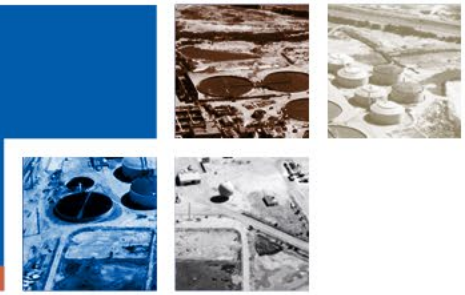
Governing Principles



1. Stable
2. Conservative
3. Responsible
4. Generational Equity

Stability = Rates

Ten Year Cash Flow Projection

1. **Consistent Revenue**
   Broad-based – Single Family Residential = 75% of revenue
   No one business or industry can impact

2. **Low Rates**
   Consistently in the lower third of our comparison agencies
   They meet various metrics indicating our rates are low

2. **Moderate (and low) Increases**
   Increase between 1%-2% over the next 10 years
   Avoids rate spikes or additional debt

Conservative = Portfolio Management

1. **Safety**

   The safety and preservation of principal is the **foremost** objective of the investment program.

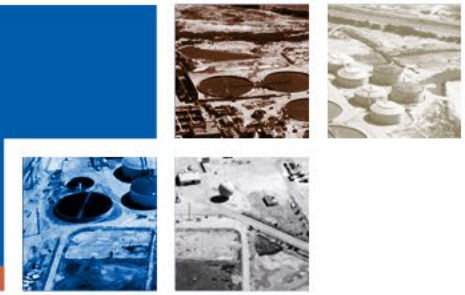
2. **Liquidity**

   The program will ensure that sufficient funds are **always** available to meet our capital and operational needs.

3. **Return on Investment**

   The investment portfolio will achieve a rate of return **commensurate** with legal, safety, and liquidity considerations.

Responsible = Debt Management



1. **Capital Focus**

   Debt initiatives and proceeds will be used **only** to support our Capital Improvement Program (CIP).

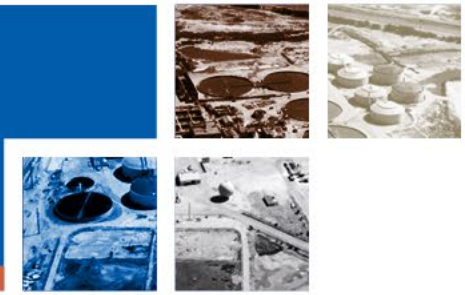
2. **Established Time Horizons**

   All debt in the portfolio will be issued with the consideration of a set **payoff date.**

3. **Debt Restructuring**

   Debt restructuring will be used to reduce interest rates and/or term with the specific goal **principal reduction.**

Generational Equity



Financing and Pay As You Go – Finding the Balance

Major Elements

a) Rates

b) Portfolio Management

c) Debt Management

Proposed Policy Statement

The Sanitation District will prudently manage the public funds that it collects. It will take a long-term planning approach to its facilities and rate setting that provides a stable setting program, prudent reserves and pay as you go philosophy for operating and replacement of capital expenses.

Initiatives

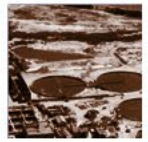
- **Initiative:** Maintain a stable and fiscally responsible financial plan that is based on long-term planning which supports stable rate setting and a **"pay as you go"** philosophy for operating and replacement capital expenses.

- **Initiative:** Maintain the current investment policy that prioritizes **safety, liquidity and return on investment**, in that order.

- **Initiative:** Maintain a long-term debt program that will pay off all existing debt issuances by **2044**, and avoid new debt to support existing facilities.

- **Initiative:** Maintain all Post Employment Benefit funding levels between **95% and 105%** while minimizing and/or eliminating and Unfunded Actuarially Accrued Liabilities.

- **Cost Containment Initiatives**
  Energy Independence, Asset Management, Chemical Sustainability




Questions?

OCSD Energy Policy Update

Presented by Rob Thompson
Assistant General Manager and
Director of Operations and Maintenance

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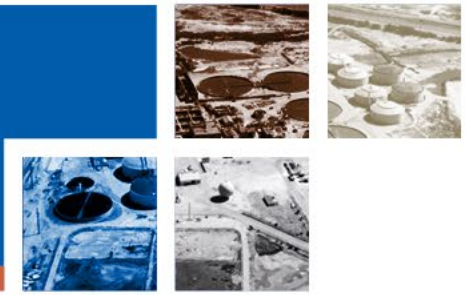
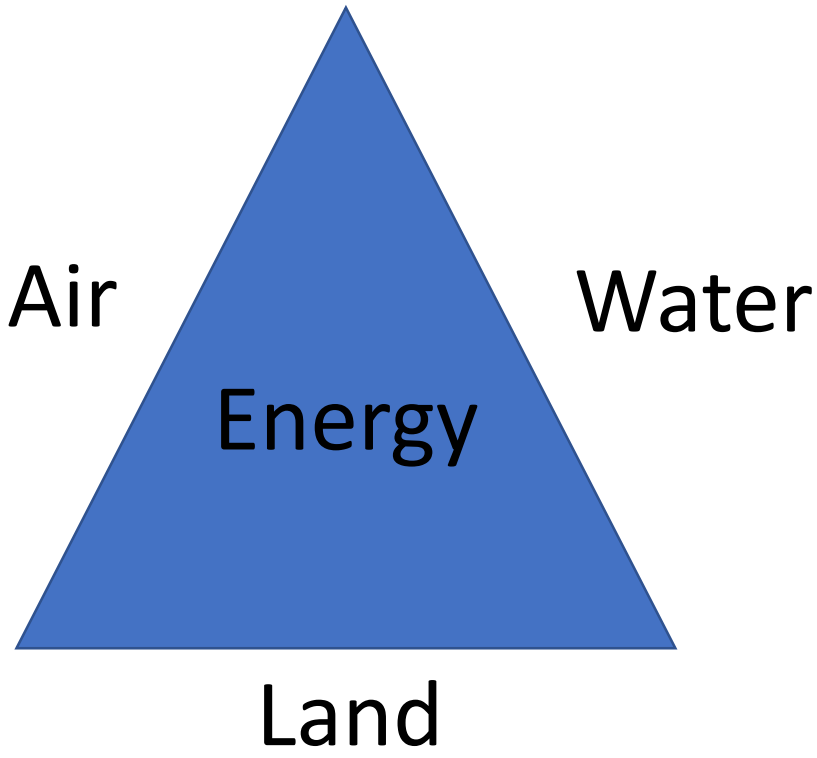
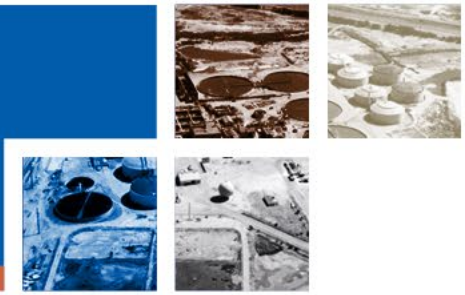
Why is Energy a Core Function?





Energy is integral to the treatment process that converts impurities to benign components that must go somewhere. For example, solids from water are converted to gas and biosolids.

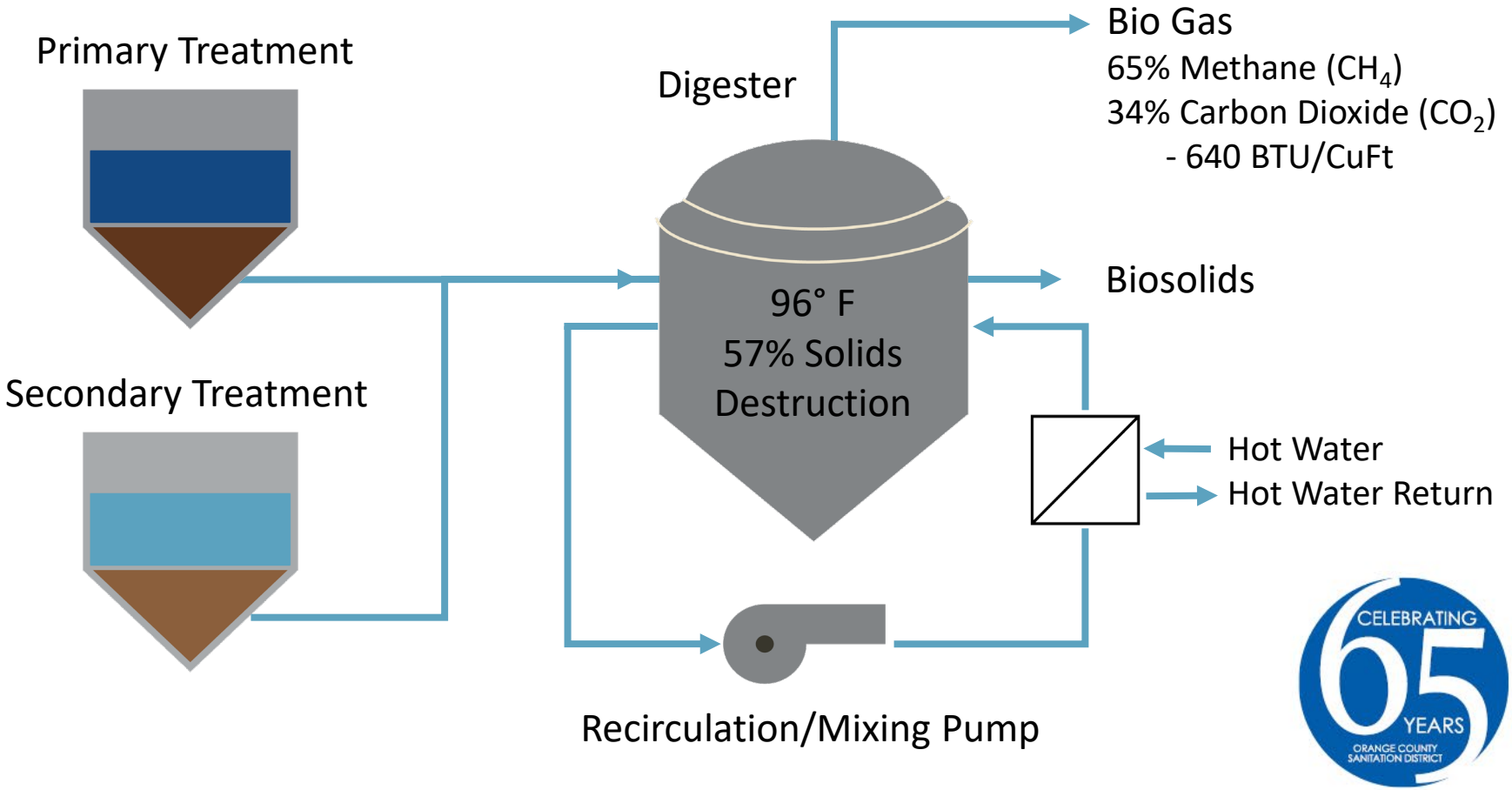
Energy Demand



- OCSD is very efficient in its utilization
  - Premium efficiency motors
  - Variable speed pumping systems
  - Turbo air blowers
  - Fine bubble diffusers
  - Lighting Systems
- Energy Audits

Energy Recovery—
Bio Gas Creation



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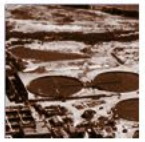
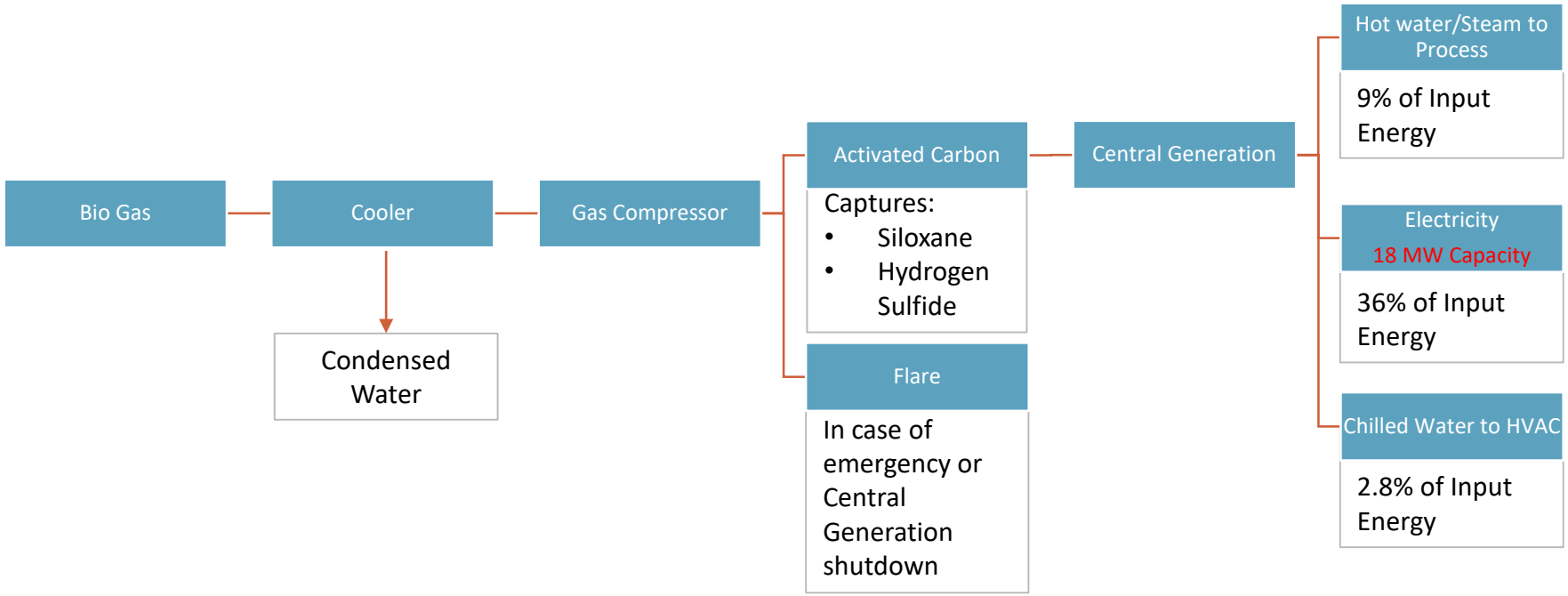
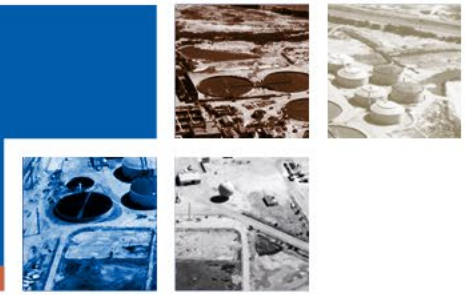
Energy Recovery—
Bio Gas to Electricity and Heat



OCSD Energy Picture

(Average month: July 2018 – June 2019)



Supply

- **What we make**
  - **Bio Gas** **24,618,600 kWhr**
    - **Electrical Gen.** **8,175,225 kWhr**
    - **Thermal** **2,952,750 kWhr**
- **What we import**
  - **Natural Gas** **2,328,900 kWhr**
  - ***SCE Electricity** **3,962,500 kWhr**
  - **Diesel** **Emergency Power**

Demand

- **Electricity** **12,137,725 kWhr**
- **Thermal** **3,245,200 kWhr**
  - **Process** **2,700,100 kWhr**
  - **HVAC** **545,000 kWhr**

* OCSD needs to produce 50% more bio gas to be energy independent.

Proposed Policy Statement

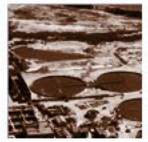
The Sanitation District will strive to be a net energy exporter. Electrical, thermal, and methane gas generation will be maximized. Energy utilization will be minimized using sound engineering and financial principals.

Initiatives

- **Initiative:** Maximize the anaerobic digestion conversion of organics to methane through receipt of food waste and operational techniques.

- **Initiative:** Investigate and install energy storage and photovoltaic systems where practical to achieve energy independence/resilience.

- **Initiative:** Continue to support the conversion of biomethane into electricity and heat for process use. Improve systems as necessary to comply with air regulations.




Questions?

Chemical Sustainability

Presented by Rob Thompson
Assistant General Manager and
Director of Operations and Maintenance

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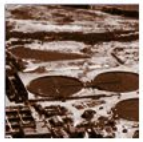
Need for Chemicals at the Sanitation District

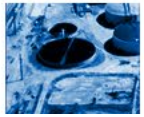
Chemicals are used to speed up or inhibit natural processes to make facilities smaller or less energy intensive.

- Prevent formation of odorants
- Coagulation of organic compounds
- Disinfection or biocide

The Sanitation District spends more than $13 million on chemicals.

Regional Odor Control






- 36 Caustic Slug Dosed Manholes

9 Chemical Dosing Stations

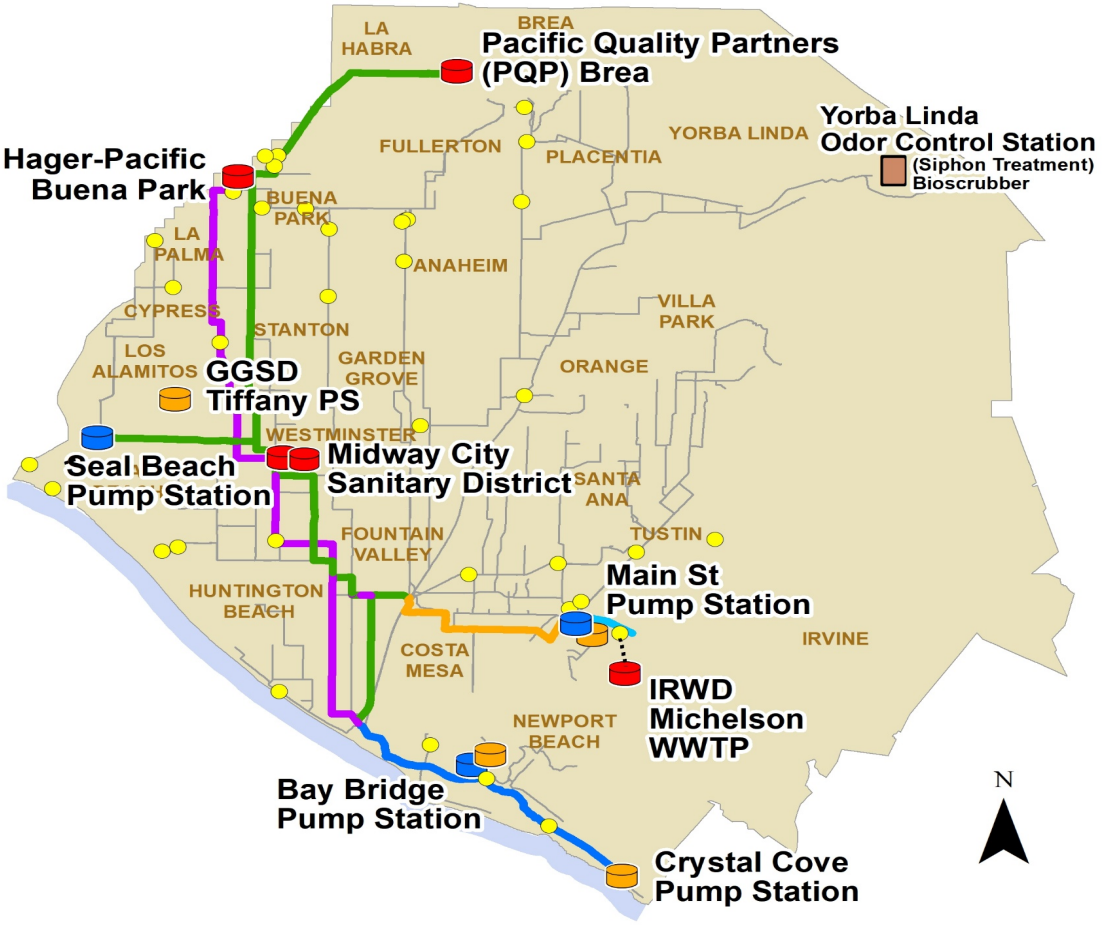
Chemical Tanks:

- Ferrous Chloride (6)
- Calcium Nitrate (4)
- Magnesium Hydroxide (3)

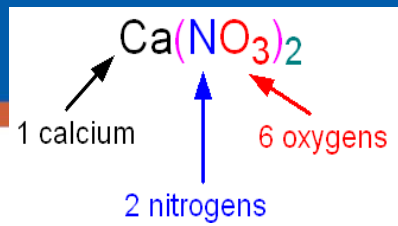
Continuously-Dosed Sewer Segments:

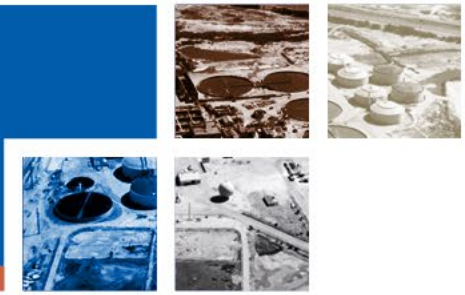
- Sunflower
- Baker-Main (Airbase)
- Knott Interceptor
- Miller-Holder
- Newport

- *Non-Dosed OCSD Sewer*

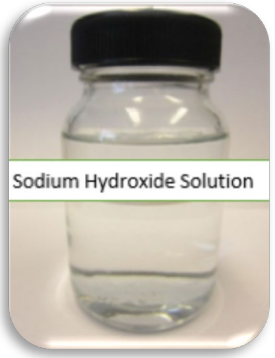


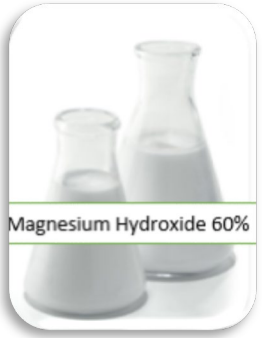
Collection Liquid - Phase





- Ferrous chloride – oxidize and/or precipitate dissolved sulfide.
- Calcium nitrate – prevent the formation of sulfides
- Magnesium hydroxide – adjustment of pH, suppress odors
- Sodium hydroxide – deactivating/inhibiting the slime layer.





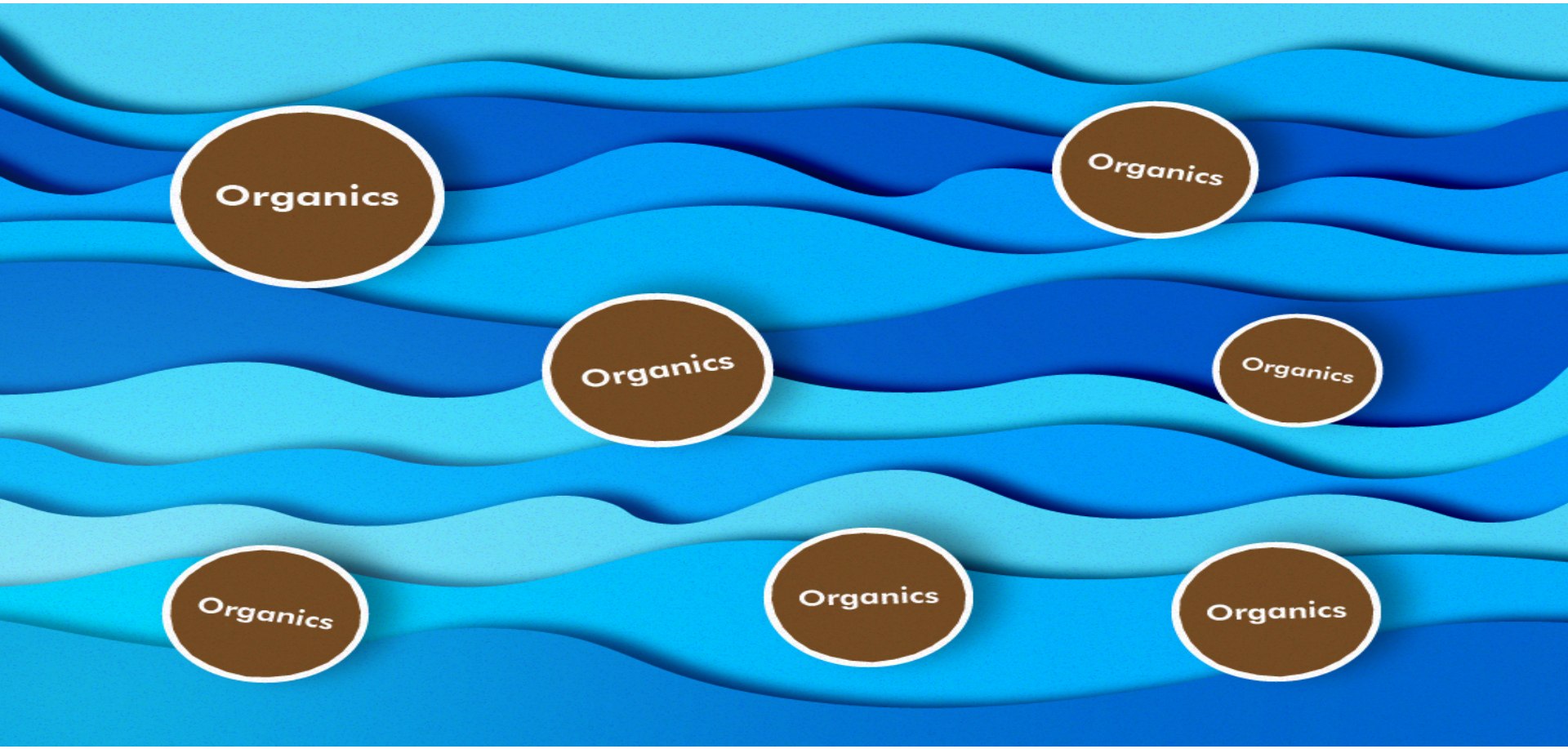
Coagulant Chemicals

Coagulant chemicals are designed to bind organic compounds together to form clumps or flocculant.

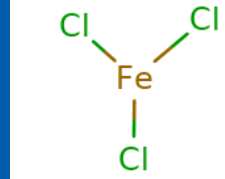
- In water treatment: Ferric Chloride/Anionic Polymer
- In solids treatment: Cationic Polymer

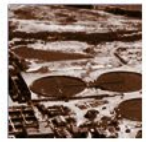
These chemicals are specialty chemicals for the water/wastewater industry and are most subject to pricing and availability volatility.

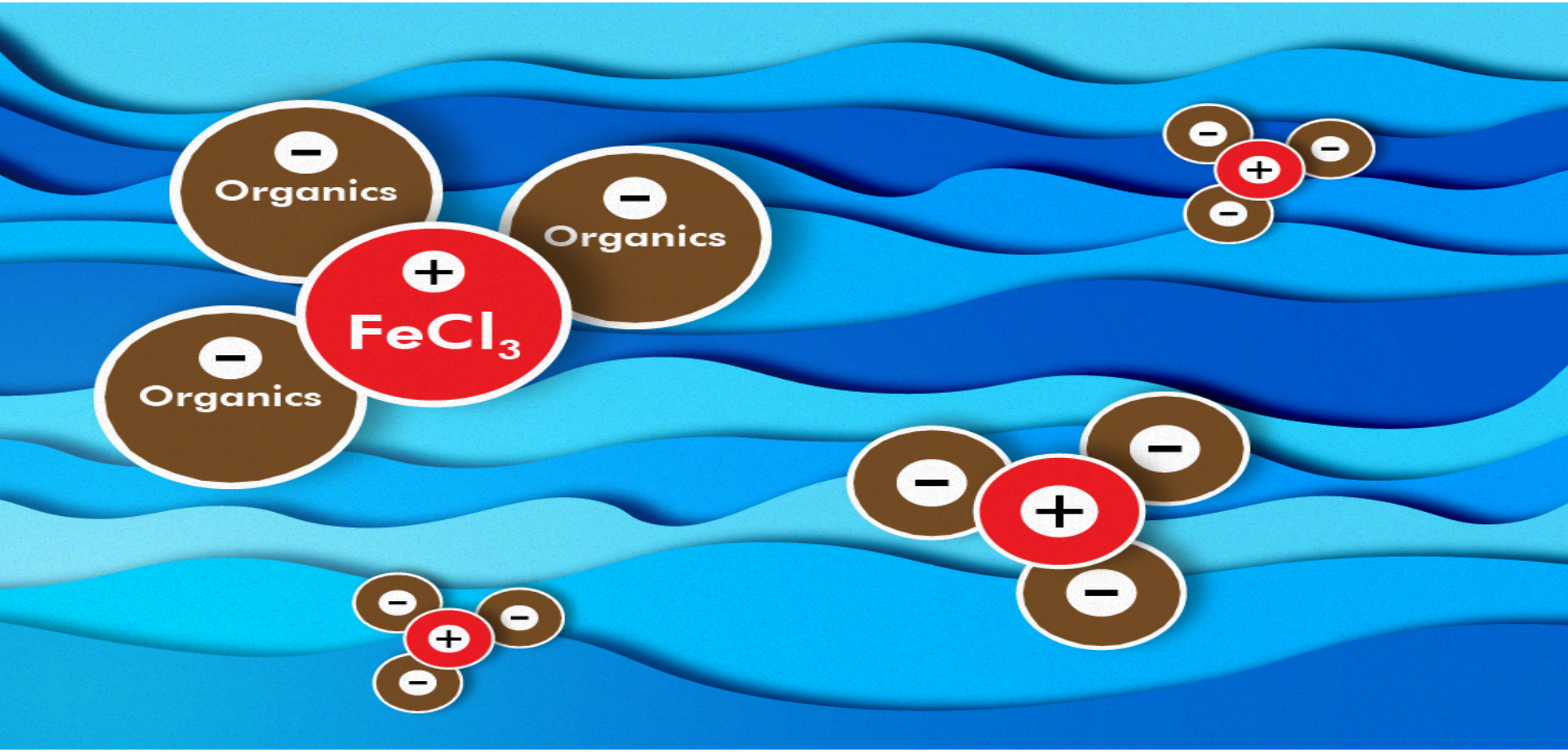
Wastewater to Primary Treatment



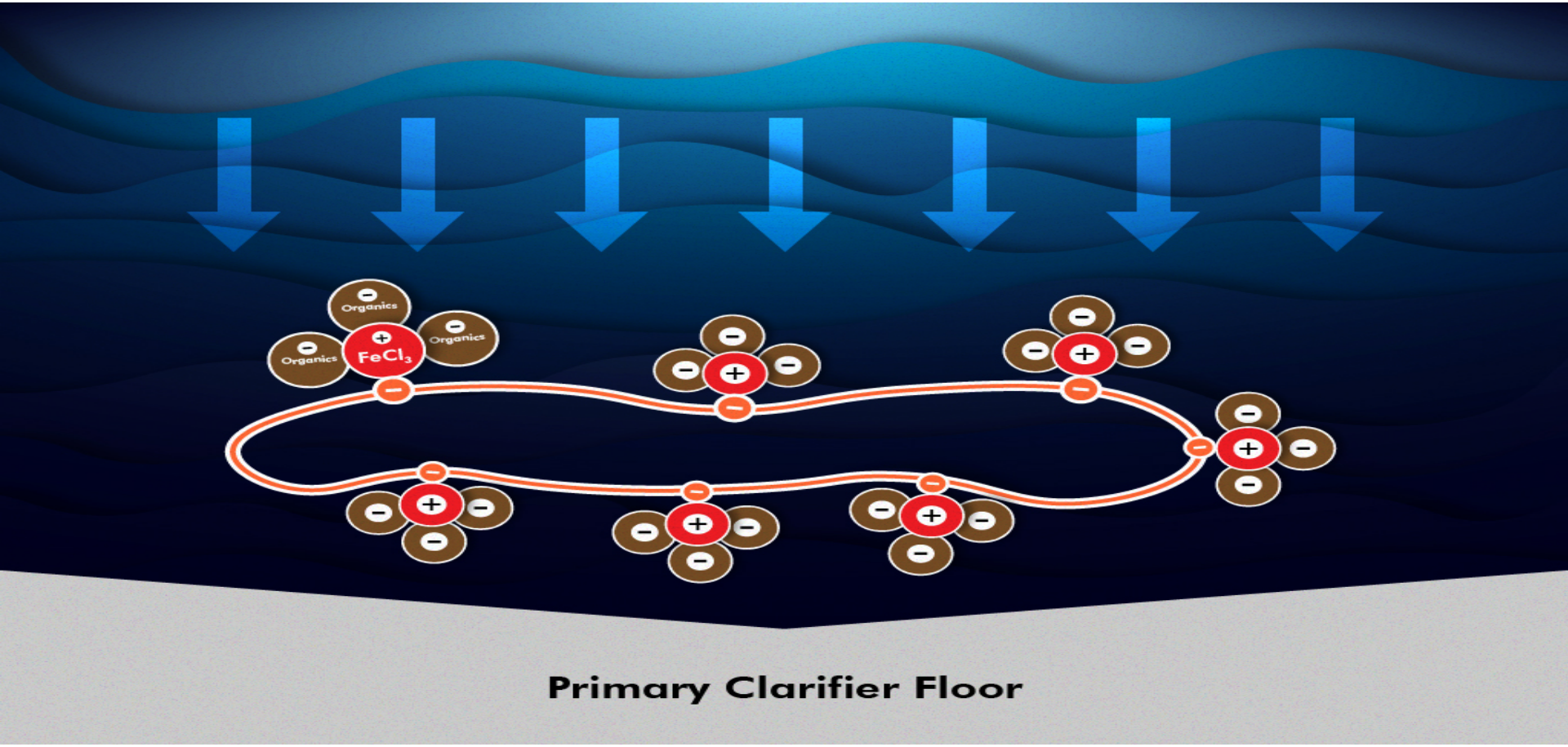
Ferric Chloride



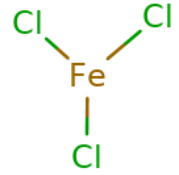


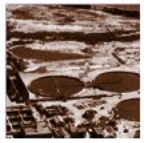


Ferric Chloride and Polymer



Ferric Chloride



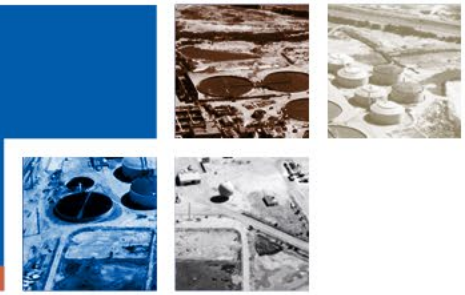


- Coagulant of choice for wastewater treatment applications due to its high efficiency and effectiveness in clarifying and reducing suspended solids
- Reacts with sulfates to prevent the formation hydrogen sulfide odors
- 78,000 gallons of storage at each plant.
  - Plant No. 1 uses 5,280 gallons/day or about 14 days of storage
  - Plant No. 2 uses 2,100 gallons/day or about 37 days of storage

Alternatives – None as effective, some create additional sludge

- Aluminum Sulfate, Aluminum Chloride and Sodium Aluminate
- Ferrous Chloride, Ferric/Ferrous Sulfate

Ferric Chloride Commercial Considerations



- Ferric is a specialty chemical with a limited number of suppliers
- In the past there have been industry consolidations (single supplier) and price spikes.
- Vendors require a significant supply chain/infrastructure to make/purchase and transport the product. This is also why the Sanitation District doesn't make the product in house.
- The Sanitation District has adopted a policy to support multiple vendors to maintain competition in the market. This is the basis for recommending two contracts to supply the same chemical.

Anionic Polymer

- Synthetic coagulant, in conjunction with Ferric Chloride, helps bridge, bind, and strengthen the floc, add weight, and increase settling rate, forming macroflocs. Once floc has reached it optimum size and strength, solids drop out readily.

- Many proprietary choices in the market. Decisions are based on best cost performance in trials and $/pound bidding.

Alternatives – Only effective at very high dosages, more expensive

- Natural polysaccharides such as starch, guar gum, alginate, glycogen or dextran

Cationic Polymer

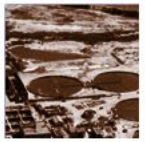
- Cationic Polymers are necessary for proper operations of Centrifuges, Belt Presses and Dissolved Air Floatation Thickeners.

- Many proprietary choices in the market. Decisions are based on best cost performance in trials and $/pound bidding.

Alternatives – Only effective at very high dosages, more expensive

- Natural cationic flocculants such as starch, chitosan or tannin

Sodium hypochlorite (Bleach)




- Bleach is a commodity chemical used in many industries.
- Bleach is used for odor control and water disinfection.
- 60,000 gallons of storage at Plant No.1
  - Plant No. 1 uses 1,500 gallons/day or about 40 days of storage
- 121,000 gallons of storage at Plant No. 2
  - Plant No. 2 uses 1,400 gallons/day or about 86 days of storage

- Alternatives:
  - Hydrogen Peroxide can be used for odor control but is less effective and more costly.
  - Water disinfection: Ozone and UV light can be utilized for disinfection process; however require expensive capital expenditures, more energy and are subject to re-growth of bacteria.

High Purity Liquid Oxygen (LOX)

- LOX is a commodity chemical used in many industries.
- LOX helps the biological secondary treatment process by removing organic matter and suspended solids to increase solids settling in the secondary clarifiers.
- Alternatives: No alternatives since P2 secondary system was designed for using pure oxygen only.
- 400 tons of storage
  - 13 tons/day average use or 30 days storage

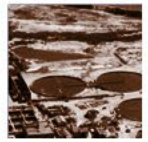
Proposed Policy Statement

The Sanitation District has a need to use chemicals in its treatment process to improve plant performance, reduce odor potential, and meet its regulatory requirements. These commodity chemicals are provided by outside vendors through the purchasing process. Some of these chemicals are subject to price swings due to market condition changes such as energy cost impacts, raw material cost changes, commercial competition changes, and transportation cost changes. The Sanitation District will identify chemicals key to its operation, investigate the market risks for those chemicals and devise strategies to mitigate identified risks to availability and pricing.

Initiatives

- **Initiative**: Reduce reliance on any particular chemical or vendor and establish flexibility to utilize other chemicals/processes to accomplish the same operational objectives.

- **Initiative:** Update the Sanitation District's Chemical Sustainability Study and incorporate the results in future procurement recommendations.




Questions?

Asset Management

Presented by Kathy Millea
Director of Engineering

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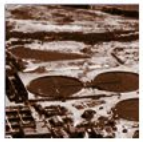
What is Asset Management?




- **What is Asset Management?**
- Asset management involves the balancing of costs, opportunities and risks against the desired performance of assets to achieve an organization's objectives.
- Asset management also enables an organization to examine the need for and performance of assets and asset systems at different levels. Additionally, it enables the application of analytical approaches towards managing an asset over the different stages of its life cycle (which can start with the conception of the need for the asset, through to its disposal, and includes the managing of any potential post disposal liabilities).
- Asset management is the art and science of making the right decisions and optimizing the delivery of value. A common objective is to minimize the whole life cost of assets but there may be other critical factors such as risk or business continuity to be considered objectively in this decision making.

What is Asset Management?

Public sector managers have been managing assets for decades.

However, it is becoming clear that what we have been doing in the past will not be sufficient to address the growing and increasingly complex challenges that lie ahead.

Practical, advanced techniques for better managing physical assets have been developed and refined over the past several decades around the world.

These techniques - a blend of processes and practices - have been slowly integrated into a holistic management framework over the past two decades.

The question "what is asset management?" is really comprised of five interrelated questions as shown below:

What is the "AM Framework"?	Why do AM?	What "Deliverables" do I get?	How to do AM?	How do I move forward?

What is Asset Management?

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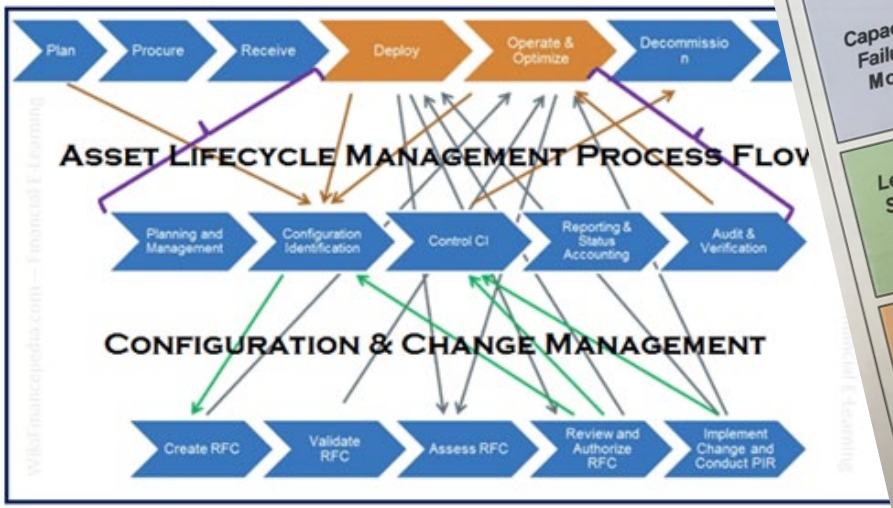
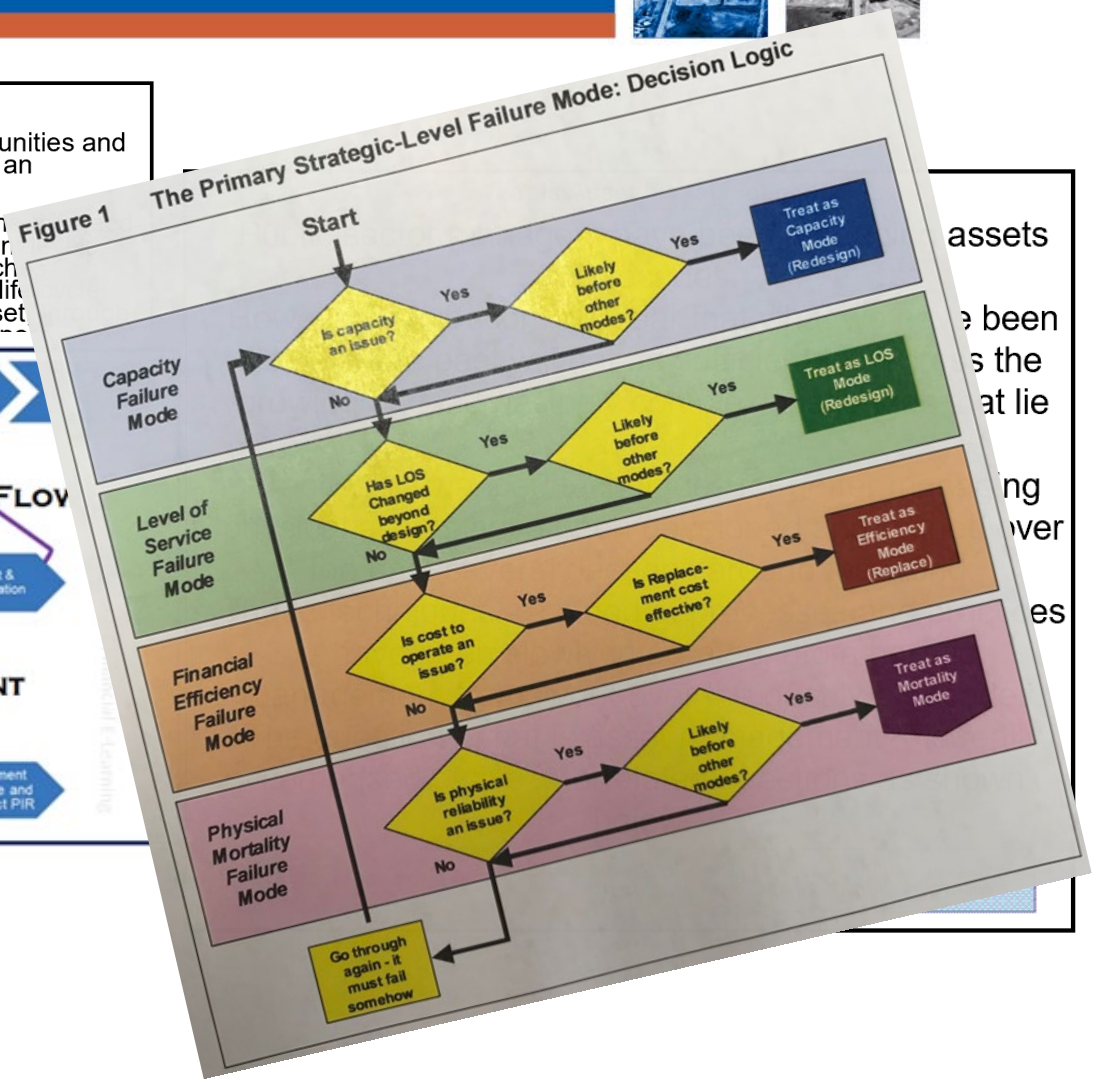
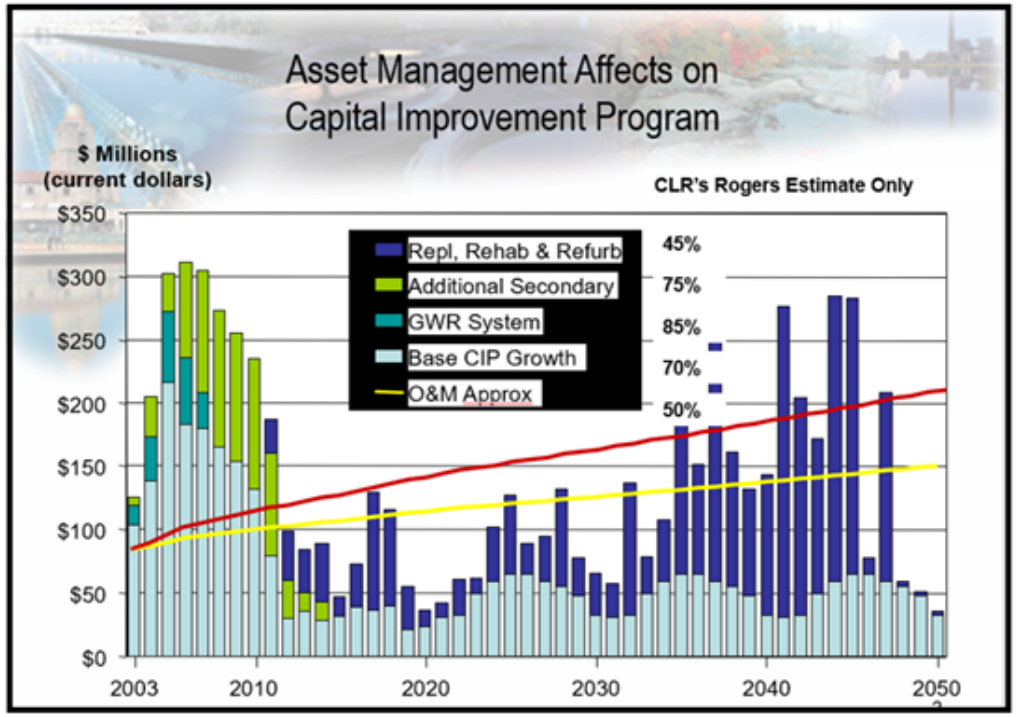
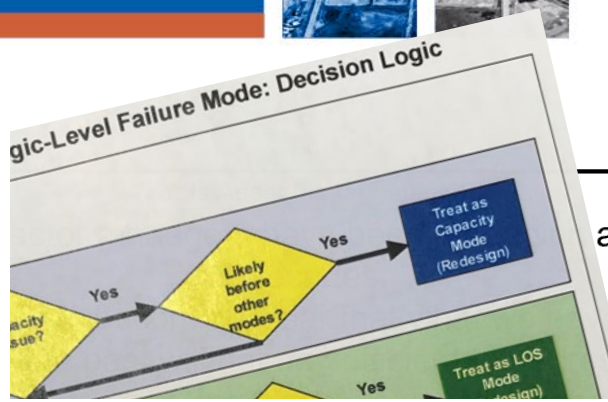




What is Asset Management?





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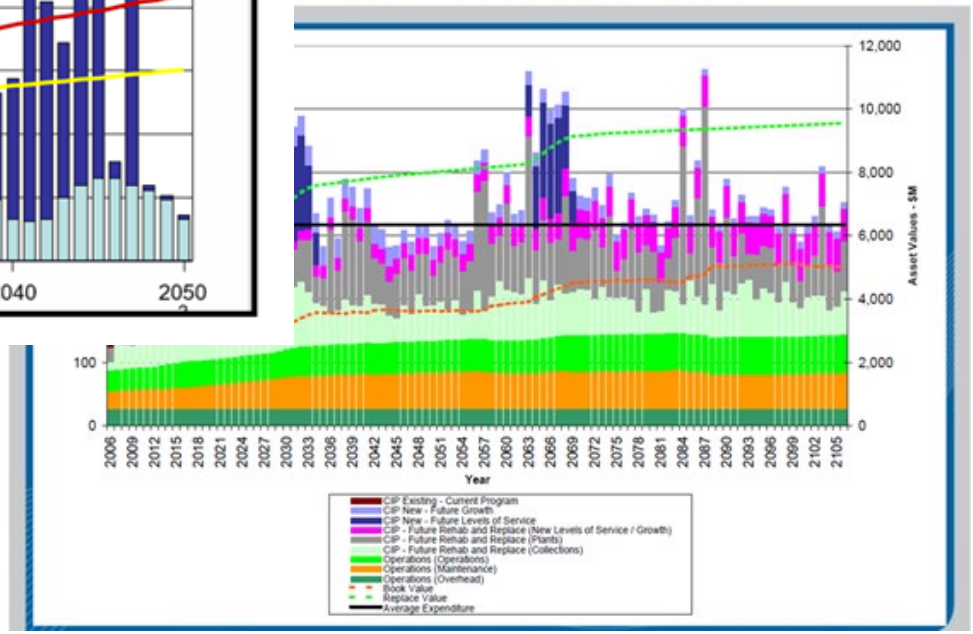
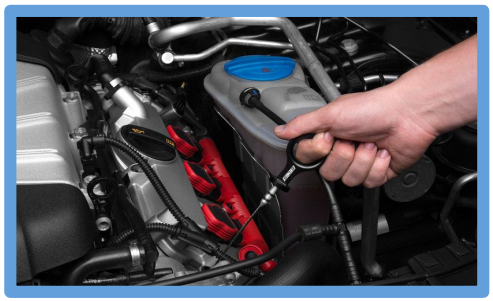
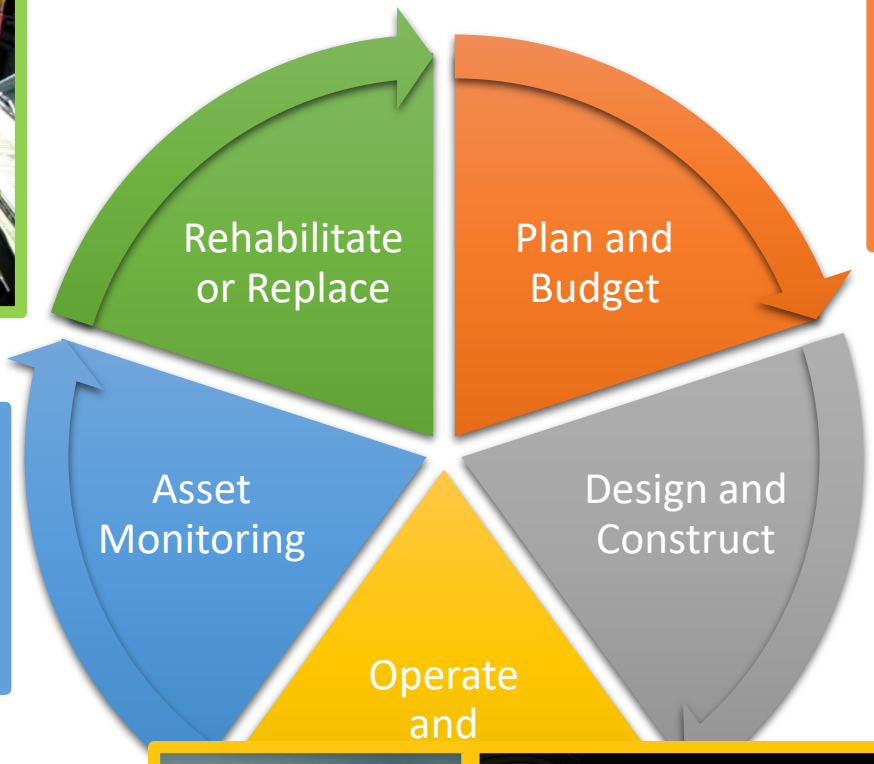
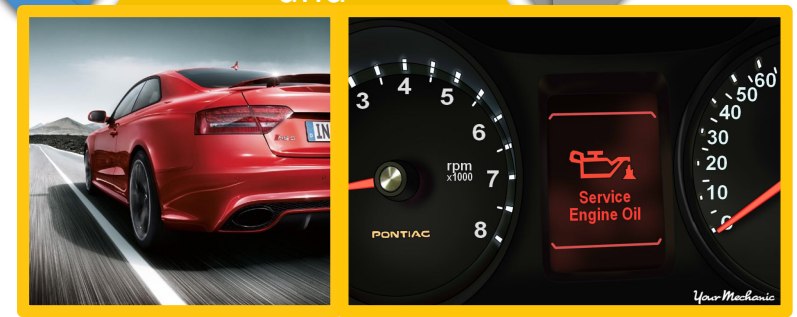


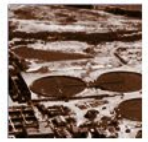
Asset Life Cycle



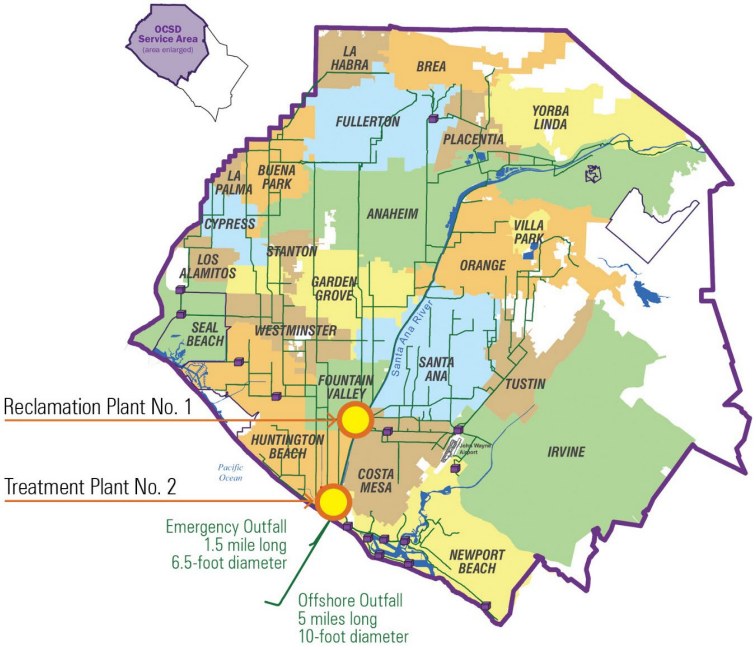




OCSD Assets Valued at $10.8 Billion




$30,000



$10,800,000,000

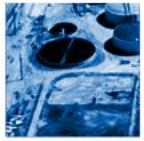
OCSD's Vision for Asset Management

OCSD will know **what we own**, **what condition** our assets are in, and will **have a plan** to operate and maintain those assets to deliver the required level of service at the lowest lifecycle cost with an acceptable level of risk.

Efforts from all departments and divisions will be **well planned**, **clearly communicated** and **closely coordinated**.

Condition Assessment Identifies Maintenance, Rehabilitation and Replacement Needs

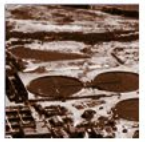


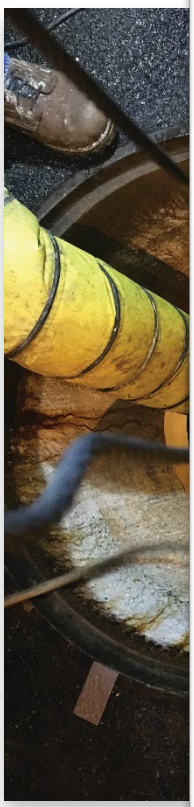



Condition of Assets

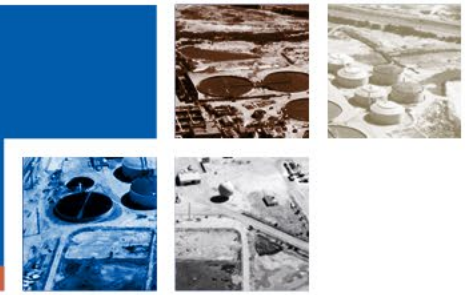
	A-Side				B-Side					C-Side				
	PC-D	PC-E	PC-F	PC-G	PC-H	PC-I	PC-J	PC-K	PC-L	PC-M	PC-N	PC-O	PC-P	PC-Q
Structural – Clarifier Wall	4	3	4	3	4	3	3	3	3	3	2	2	2	2
Structural – Dome	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Structural – Building	2		2		2		2		2		2		2	
Mechanical - Internal Mechanicals	4	5	3	3	5	3	3	3	3	4	5	3	4	4
Mechanical - Sludge/scum pumping system	3		3		3		3		3		3		3	
HVAC & Ventilation	2		2		2		2		2		2		2	
Influent piping	2	2	1	3	3	3	2	3	3	2	2	3	2	2
Effluent piping	3	3	3	2	2	3	3	3	3	3	3	3	3	3
Electrical MCC & VFD	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Electrical Distribution – Switchgear	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Instrumentation – PLC, Flow Meters	3	3	3	3	3	3	3	3	3	3	3	3	3	3

Sewer System is Evaluated by CCTV & Inspection



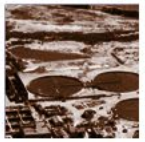
Adaptive Operations



Be clear on how to operate for full benefit and to extend equipment life

- Using systems incorrectly can reduce equipment life and limit availability
- Train operators with Standard Operating Procedures and Emergency Operating Procedures
- Process teams share information across Operations, Maintenance and Engineering

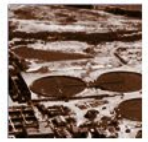
Proactive Maintenance




Maintain assets in a ready state

- Clearinghouse Committee coordinates decision making
- Individual repair/refurbish/replace decisions are made understanding the greater unit process life-cycle.
- Keep the assets working and available

Annual Asset Management Plan




2017

Asset Management Plan 2019

2019

Asset Management Plan 2020

2020

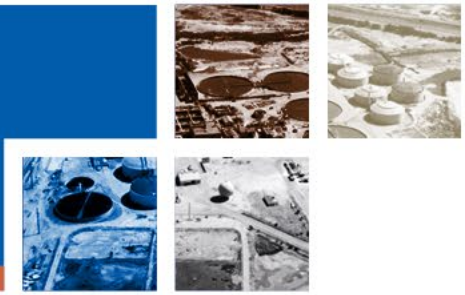
Asset Management Plan 2021

2021

Asset Management Plan 2022

2022

OCSD is a Leader in Asset Management



- Known replacement cost of assets ($10.8 B)
- 20-year CIP plan for all $10.8 B assets
- Rate structure that supports the 20-year CIP plan
- An aligned Operations, Maintenance and Engineering agency
- A designated Asset Management Team
- Comprehensive condition assessment
- Proactive maintenance of our assets
- Turn our strategic asset management plan into a work process (Boots on the ground)

OCSD is a Leader in Asset Management

- Known replacement cost of assets ($10.8 B)
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- Comprehensive condition assessment
- Proactive maintenance of our assets
- **Turn our strategic asset management plan into a work process (Boots on the ground)**

Utility of the Future

One group of structures, nothing to look at, houses an Orange County Sanitation District water-treatment facility. Each day some 185 million gallons of raw sewage flows in, and eventually the treated water flows out—not toxic, but not potable either. This wastewater used to be pumped through long pipes to disperse in the Pacific Ocean. But now more than half of the treated product goes next door, to nondescript facilities operated by the Orange County Water District. The OCWD strains the water through microscopic filters, then forces it by reverse osmosis through superfine membranes, and finally bombards it with high-intensity ultraviolet light.

What flows out of the facility, in volumes sufficient to meet the daily demands of roughly 850,000 people, is as pure as a sparkling glass of premium ice water. Pumping stations return it to the Orange County aquifer to percolate into wells for future drinking. The process costs less, and consumes less energy, than importing water from the Colorado River.

So the next Hoover Dam is no dam at all. It's technology, invention, efficiency. Take a look at Singapore—one of the world's infrastructure leaders, according to Germany's respected Kiel Institute for the World Economy. Using the technology pioneered in Orange County, the island nation has replaced 40% of its freshwater consumption with recycled NEWater, as they call it. Infrastructure is shrinking even as it grows more powerful.

Like DeWitt Clinton and Arthur Powell Davis, the leaders of Orange County had to let go of the past to reach for the future. In the mid-1990s, the sanitation district was faced with a need to upgrade existing infrastructure. But instead of doubling down on what they already had, they built something completely different.

"…the leaders of Orange County had to let go of the past to reach for the future."

"…the sanitation district was faced with a need to upgrade existing infrastructure. But instead of doubling down on what they already had, they built something completely different."

Proposed Policy Statement

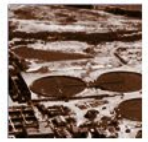
The Sanitation District will assess and manage the collection system and treatment plant systems and assets to improve resilience and reliability while lowering lifecycle costs. This will be accomplished through adaptive operation, coordinated maintenance and condition assessment, and planned capital investment. Staff will balance maintenance, refurbishment, and replacement strategies to maximize useful life, system availability and efficiency.

Initiatives

- **Initiative:** Create an annual Asset Management Plan documenting the condition of the collection system and treatment plants, and upcoming maintenance or capital projects

- **Initiative:** Coordinate the efforts of operations, collections, mechanical maintenance, electrical maintenance, instrument maintenance and engineering through process teams to assure the Sanitation District's resources are focused on the high priority work functions.

- **Initiative:** Maintain a 20-year forecast of all CIP projects needed to maintain or upgrade the Sanitation District's nearly $11 billion in assets on a prioritized risk basis to establish rate structures.



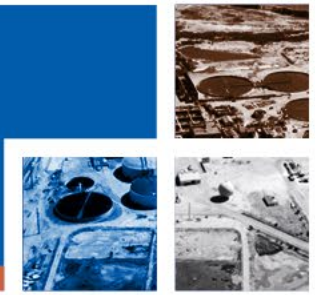

Questions?

OCSD Climate and Catastrophic Event Resilience Policy

Presented by Kathy Millea
Director of Engineering

CELEBRATING 65 YEARS
ORANGE COUNTY SANITATION DISTRICT

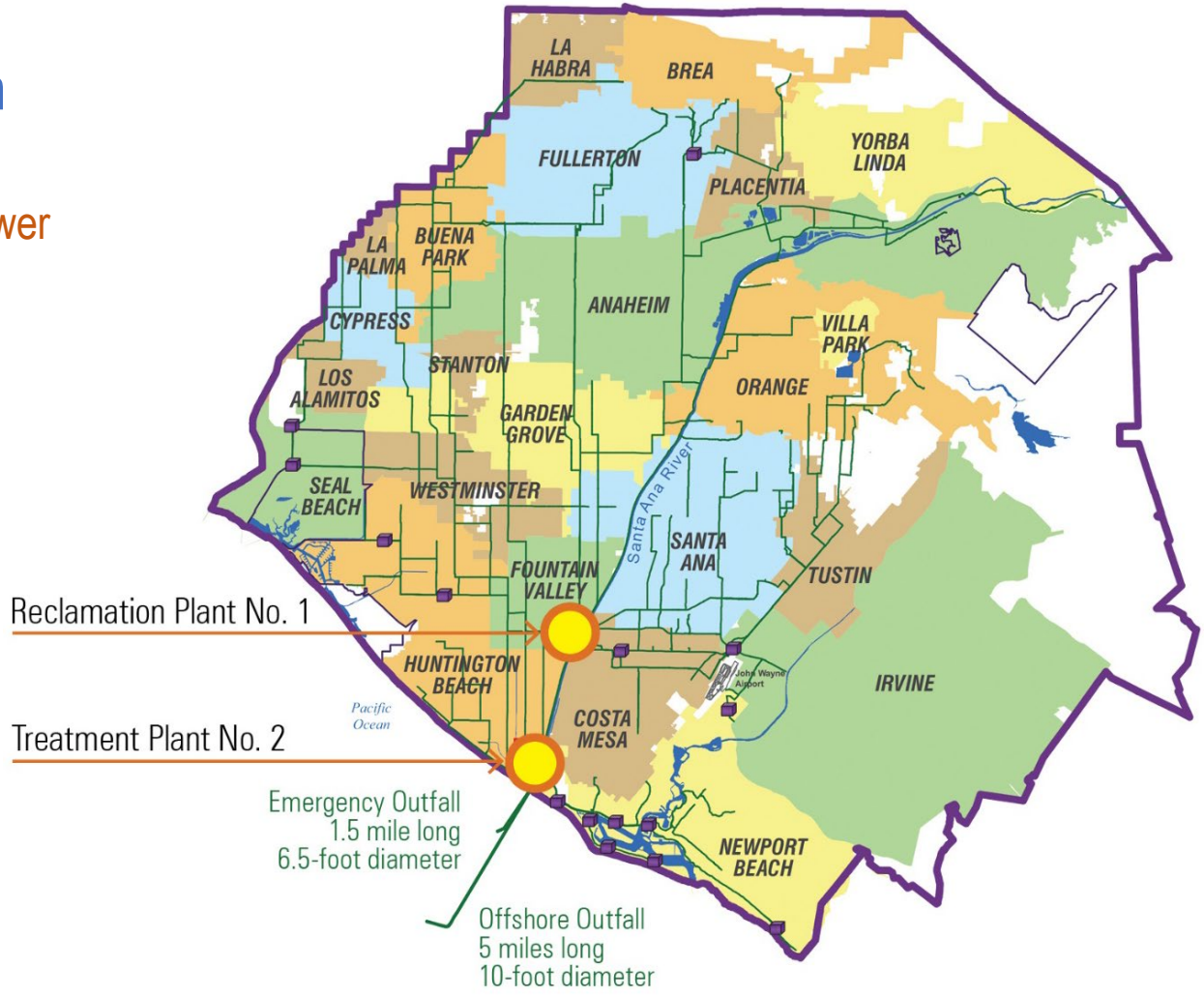
OCSD Assets Valued at $10.8 Billion



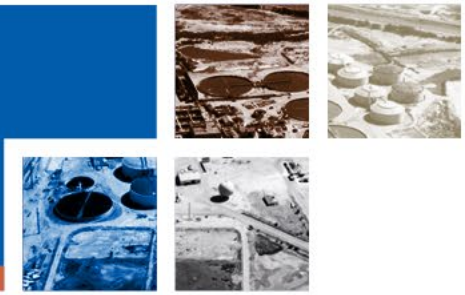
Collections System

389 MILES regional trunk sewer

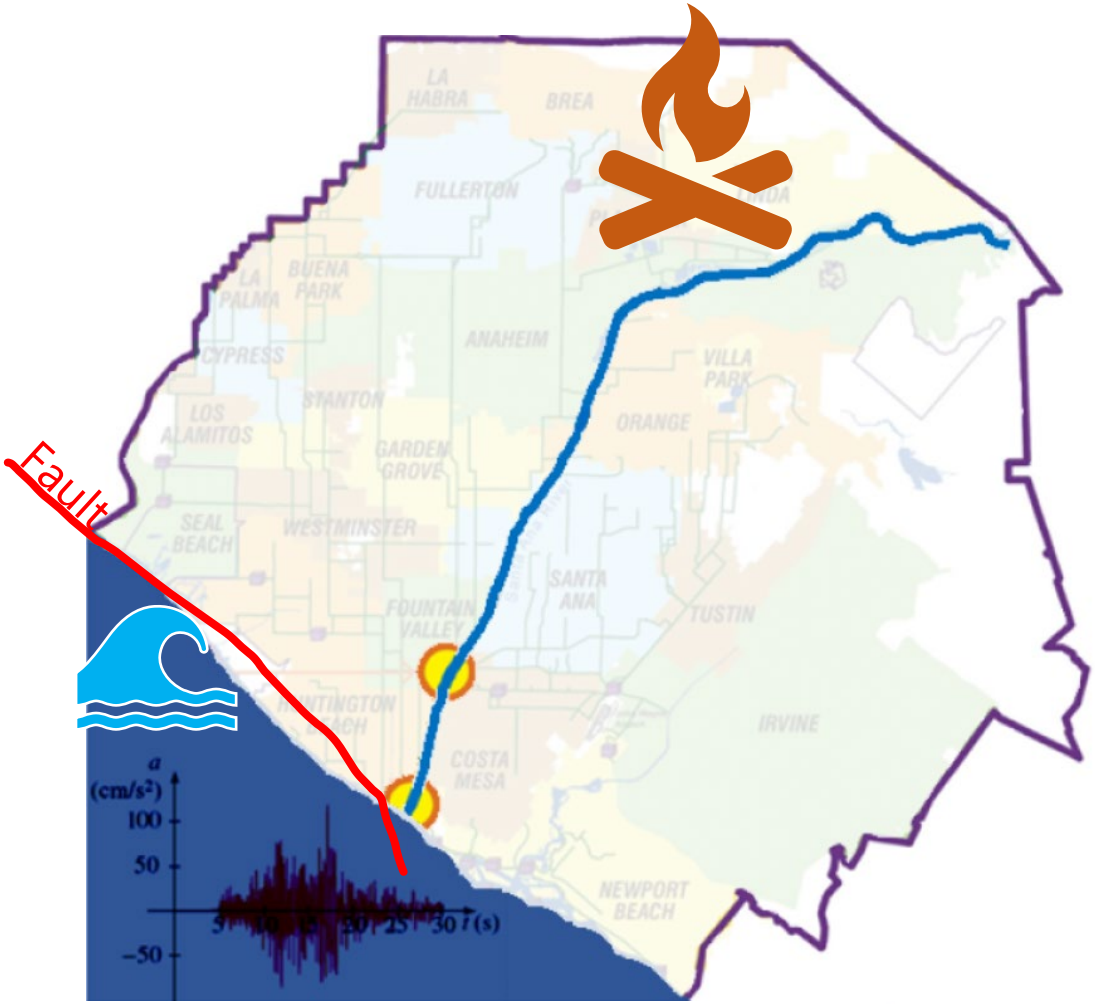
15 pump stations



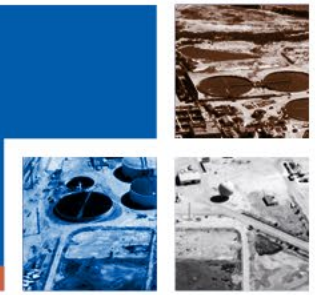
OCSD Risk Events

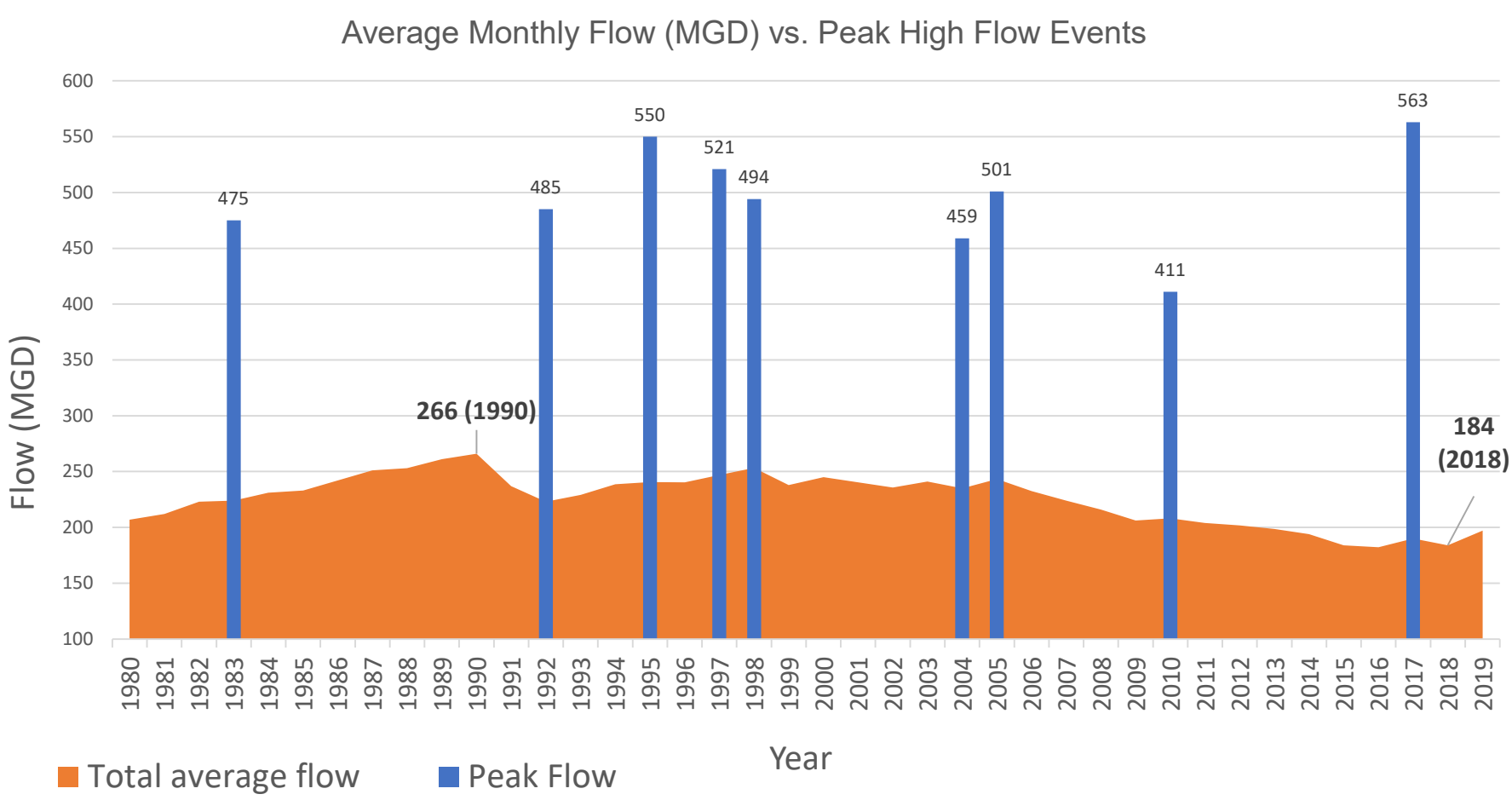


- Heavy Rains
- King Tides
- Floods
- Sea Level Rise
- Wildfires
- Earthquakes
- Tsunamis



Heavy Rains




Average Monthly Flow (MGD) vs. Peak High Flow Events
Flow (MGD)
600
550
500
450
400
350
300
250
200
150
100
475
485
550
521
494
459
501
411
563
266 (1990)
184 (2018)
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
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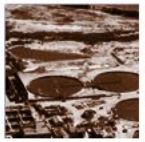
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
Year
Total average flow
Peak Flow

King Tides



Huntington Beach, King Tide 2014

A Street Pump Station

8th St, Newport Beach, King Tide 2012

Newport Beach Pump Stations

Floods

- **7 feet** of storm surge + high tide (January 2005)
- **8 feet** of storm surge + high tide (December 2012)

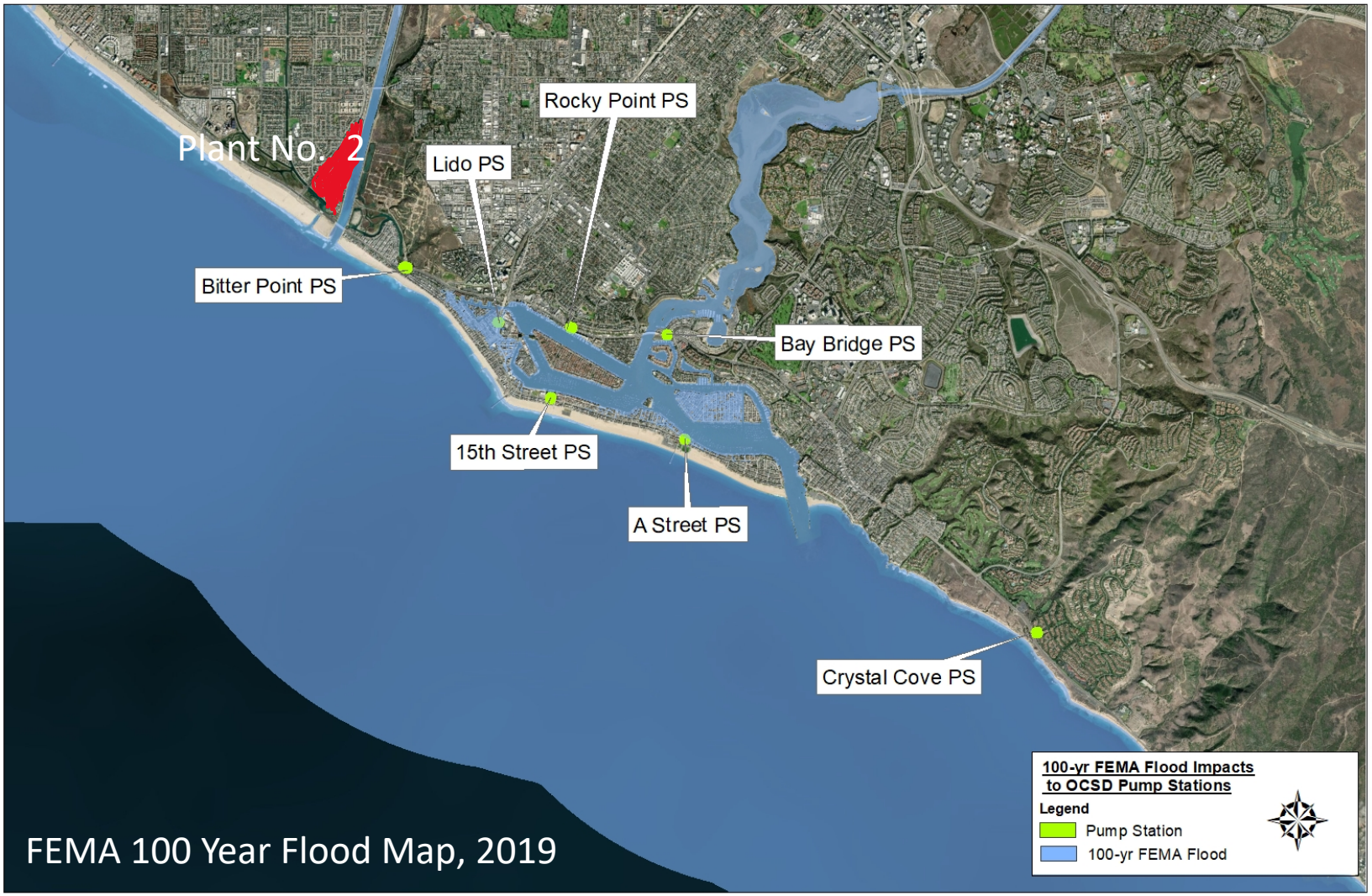
(Natural Hazards Mitigation, City of Newport Beach)

Dec 2010, Balboa Island

January 2010, Flooding at Plant No. 2

1983, Flooded streets in Newport Beach

FEMA Flood Map

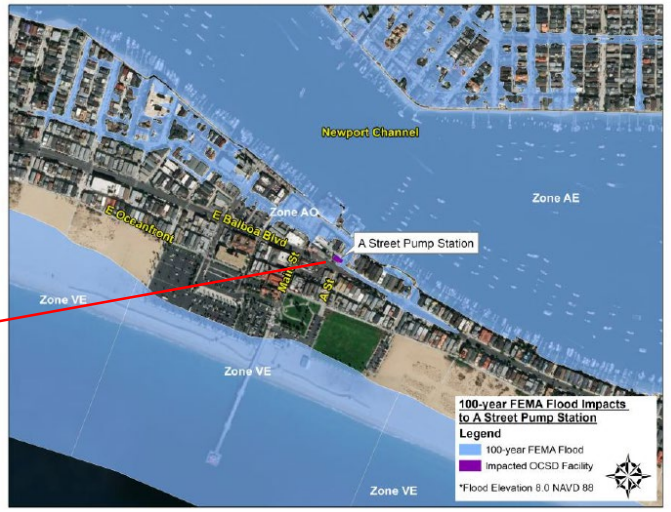


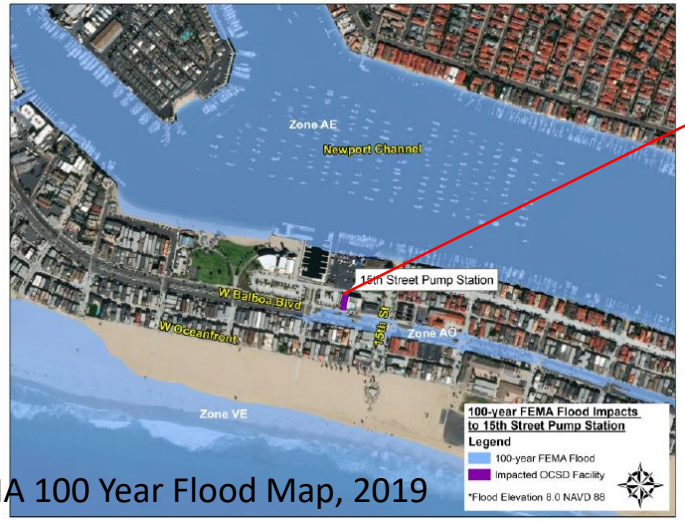
FEMA 100 Year Flood Map, 2019

FEMA Flood Map

Lido Pump Station

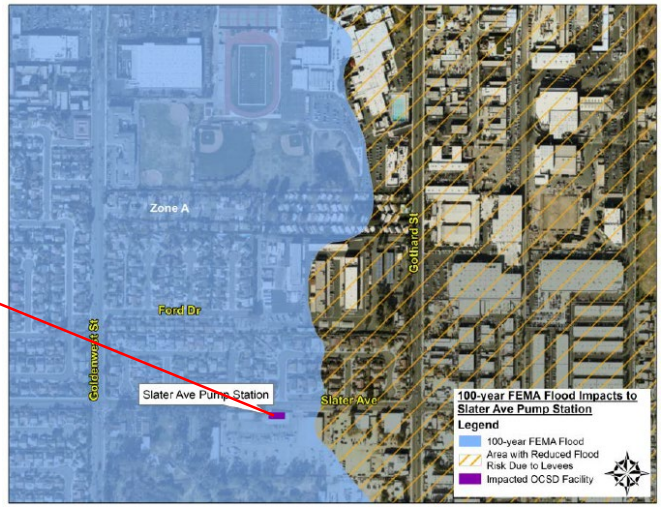
A St Pump Station





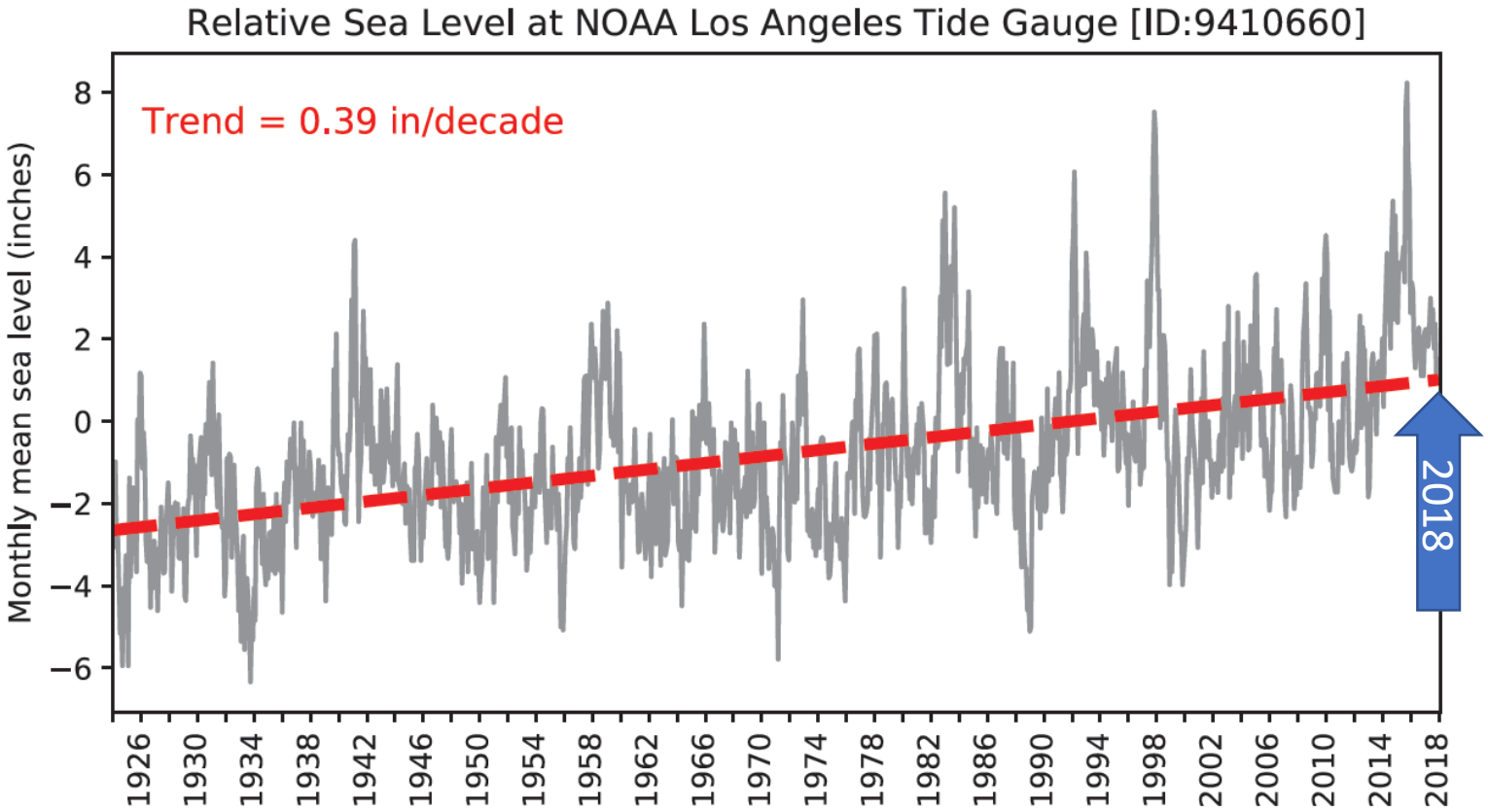
15 St Pump Station

Slater Ave Pump Station



FEMA 100 Year Flood Map, 2019

Sea Level Rise

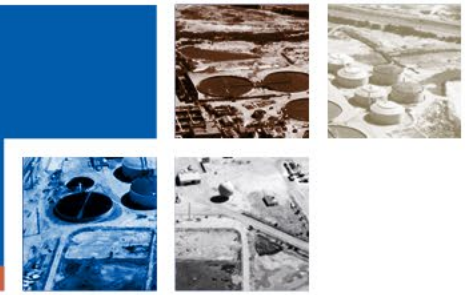


Observation: 1mm/year

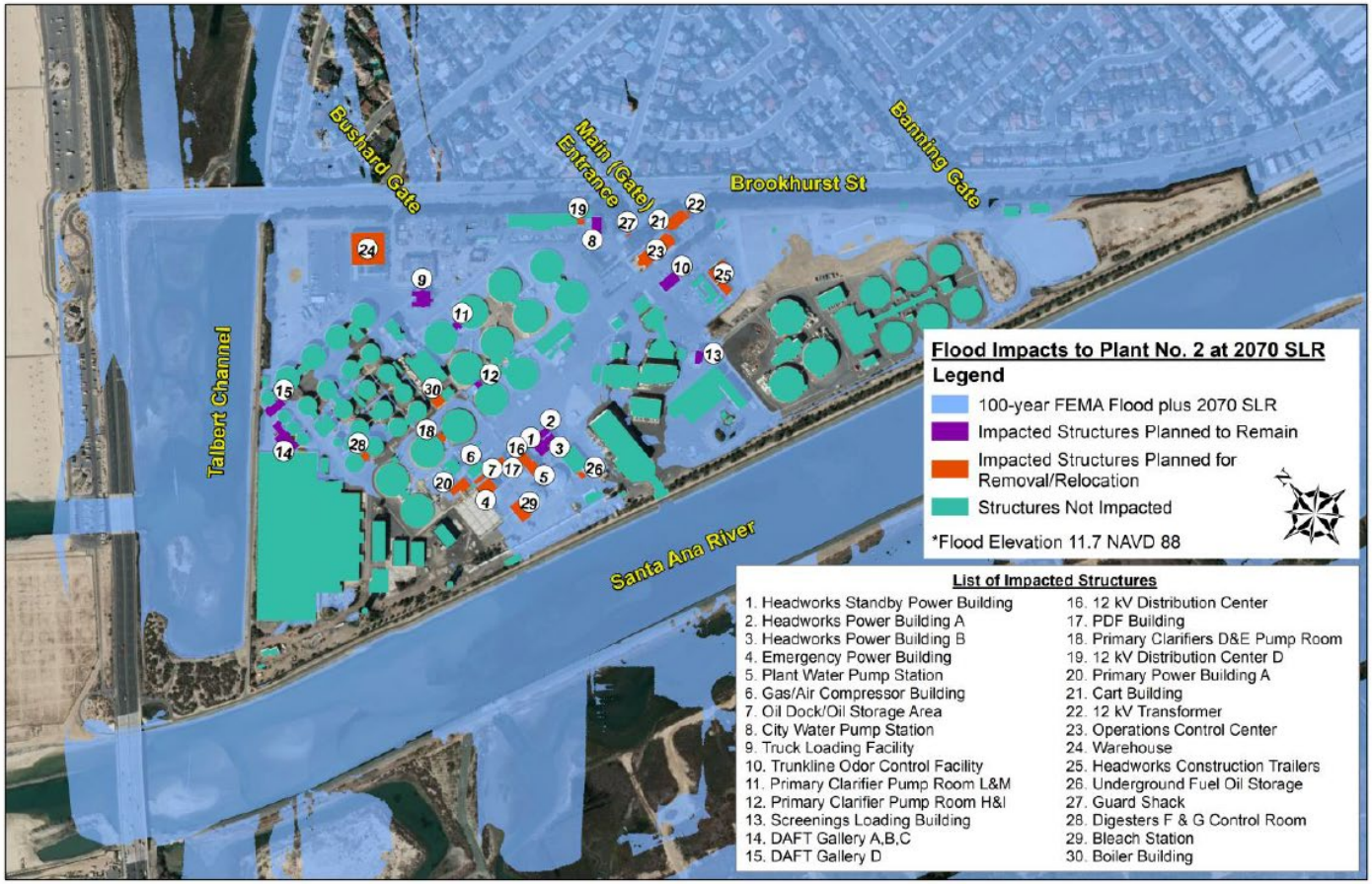
Current projections for Newport Beach: 2.2 mm per year

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

100 year Flood and Sea Level Rise Projection for 2070



2070 SLR + 100-yr FEMA Flood Map

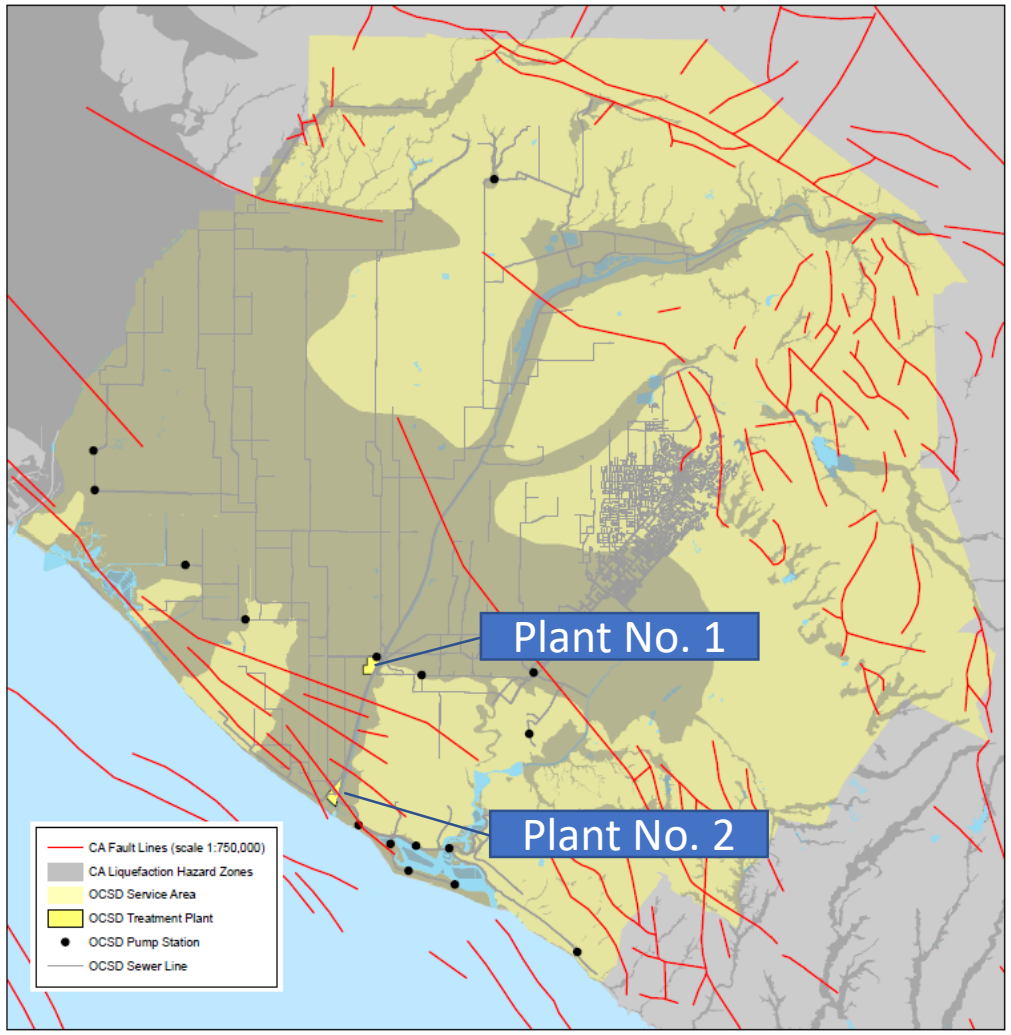


Wildfire

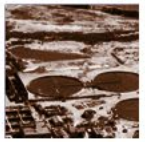
The Cocos Fire burns in San Marcos, California, in 2014.
(theatlantic.com)

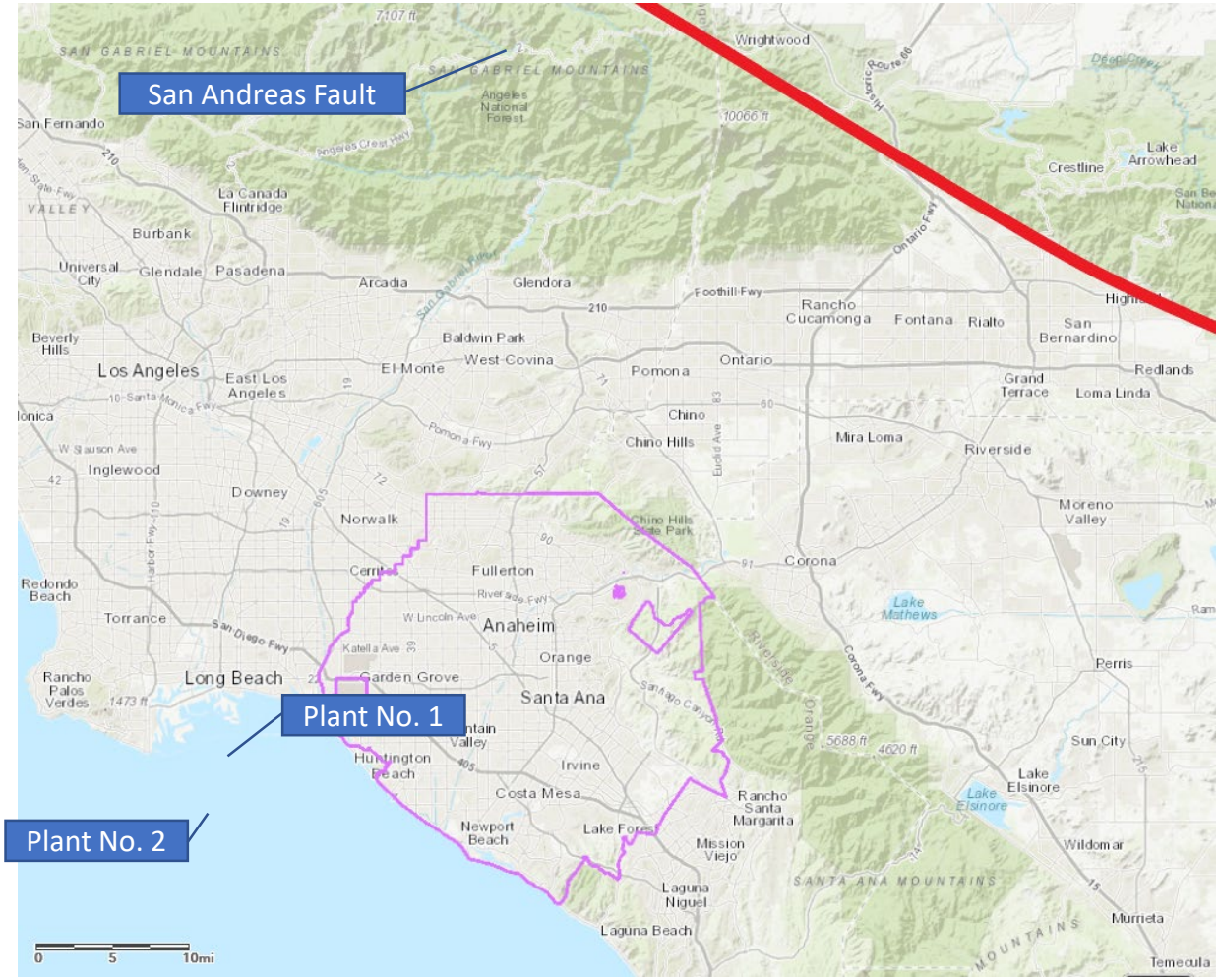
Ventura Fire, California, Dec 2017. (@aghakouchak)

Seismic/Earthquakes

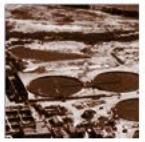


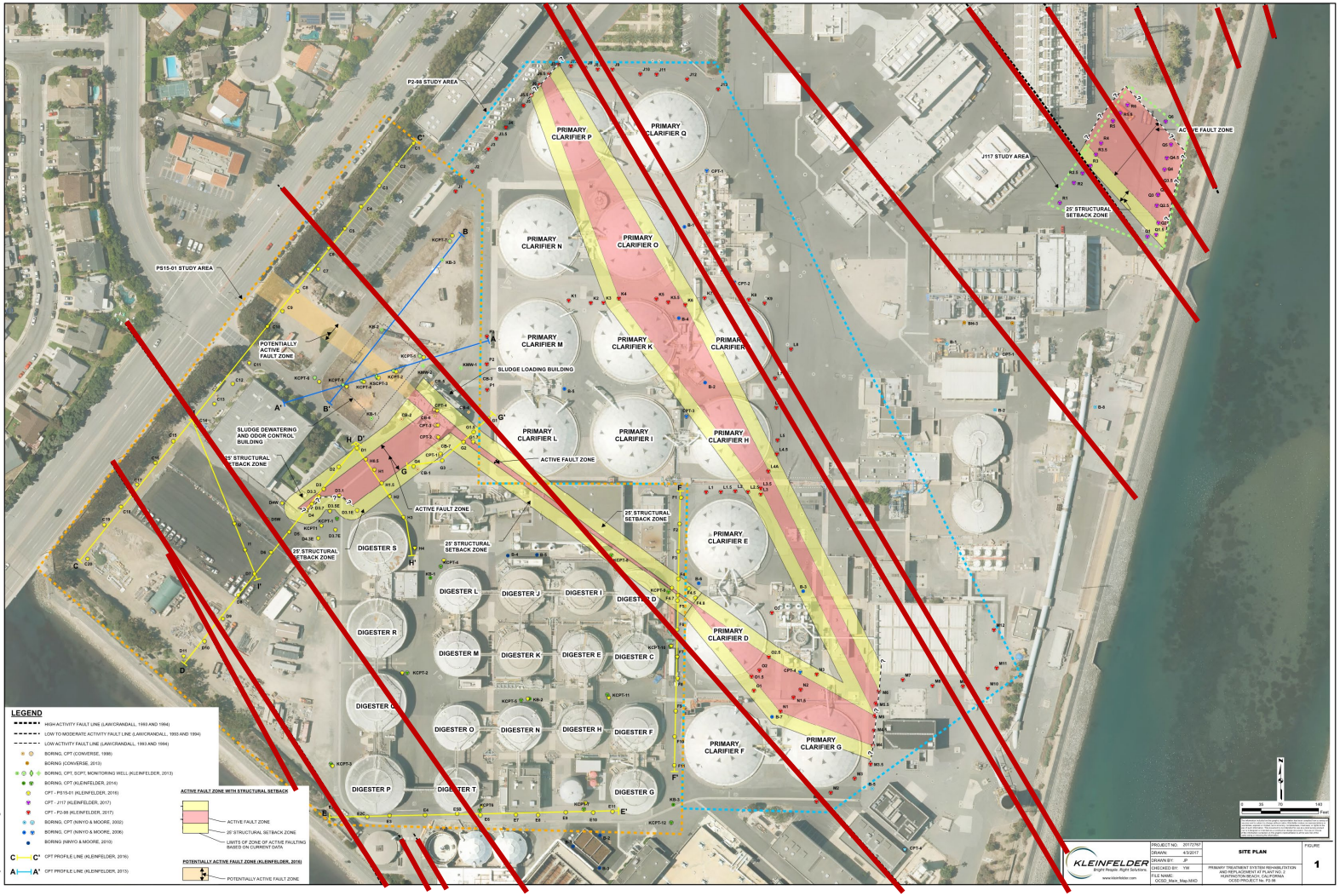
Seismic/Earthquakes



Plant No. 2 Fault Zones



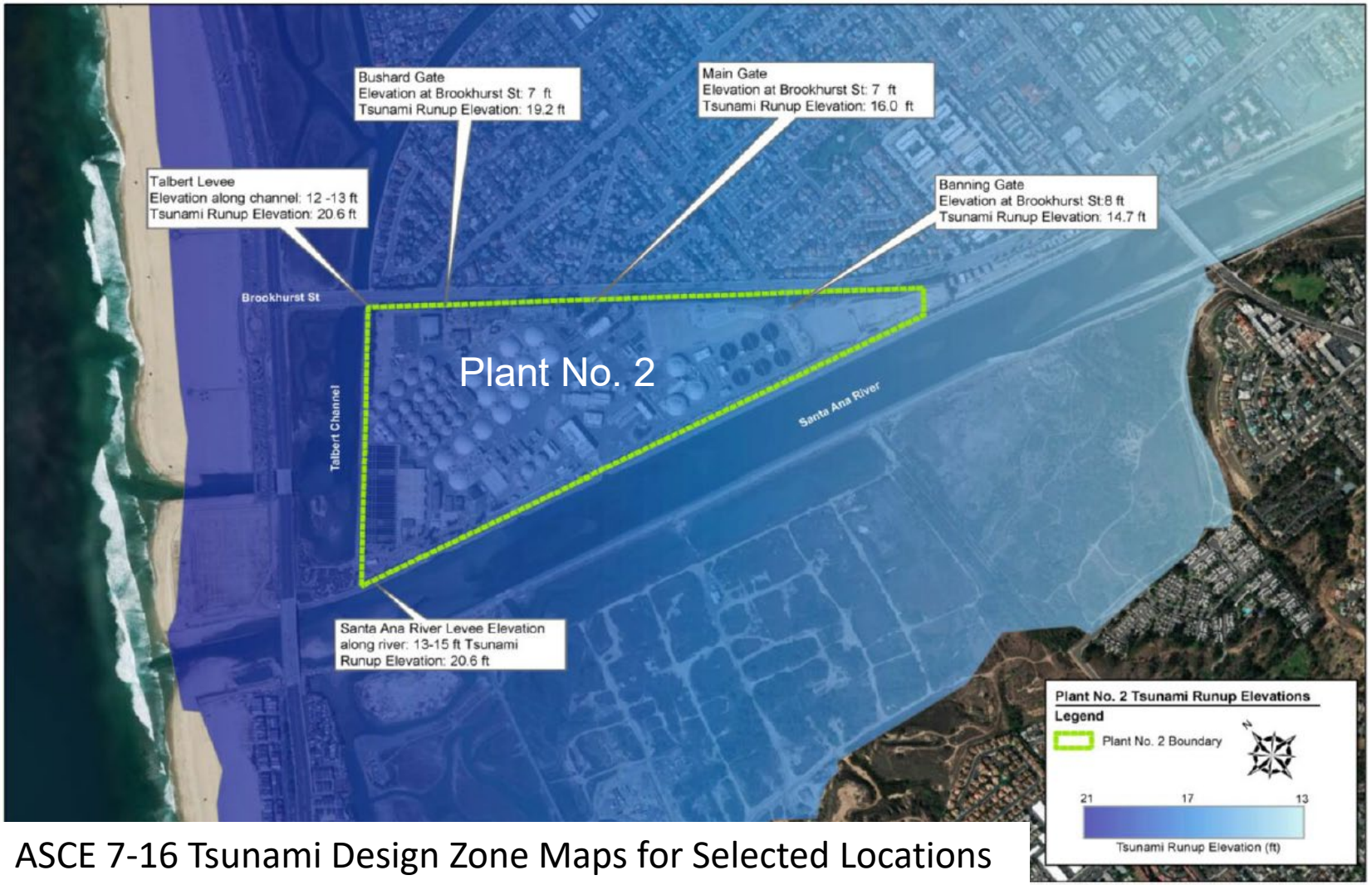
Example of Lateral Spreading

East Tomokomai Port near a coal plant, lateral spread extends 200 ft. inland
Hokkaido, Japan, Mag. 6.6, 2018

ASCE Tsunami Design Zones

ASCE 7-16 Tsunami Design Zone Maps for Selected Locations

ASCE Tsunami Design Zone for Plant No. 2



ASCE 7-16 Tsunami Design Zone Maps for Selected Locations

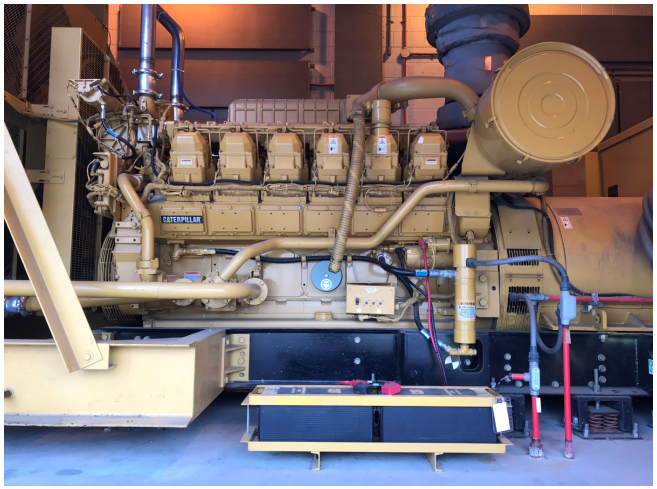
Example of Tsunami

2011 Quake Tsunami in Tohoku, Japan

Energy Supply Resiliency

Southern California Edison

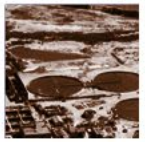
Digester Gas Powered Generators

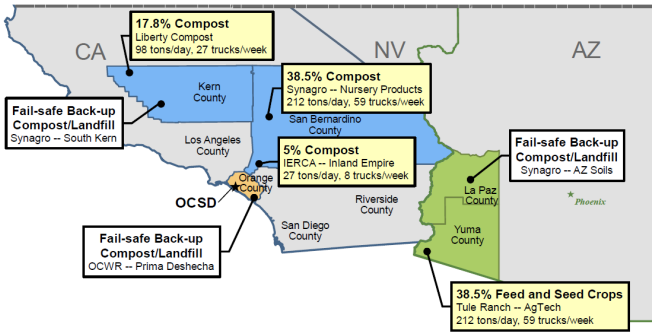


Diesel Powered Backup Generators

Tesla Batteries

High Flows/Flooding Planning



Biosolids portfolio diversified

Storm Preparation Task List

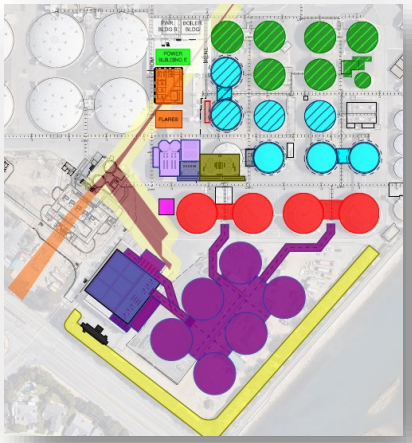
Task	Responsible Division	Completed By
1. Ensure all influent pumps are operational. Provide a detailed plan on the repair of out of service equipment.	830, 850 & 860	
2. Check all emergency generators for proper operation.	850 & 860	
3. Ensure all Cen-Gen generators are available for service.	830 & 860	
4. Ensure that Edison power is available (running connected).	830 & 860	
5. Have emergency operational staff available for call in if needed.	830	
6. Ensure that all four barscreens and five grit chambers are available for operation.	830 & 850	
7. Have emergency Storm Watch Staff callout list setup (after calling Code Blue).	230, 420, 431, 850 & 860	
8. Check all gate operating equipment for proper operation (pneumatic, hydraulic, electric and gas powered).	830	
9. Check SARI gate operation.	420 & 830	
10. Verify plant sump pumps are operational and clear of debris.	830	
11. Verify storm water collection drains and all tunnels are clear and free of debris	830	
12. Drain two or more of PSBs 6 through 31 for standby use. Select basins that are on opposite sides. *(Potential storage: 0.583 million gallons per basin)*	830	
13. At EJB #1, ensure 120-inch line is OPEN, then close 66-inch and 84-inch interplant lines. *(Potential storage: 2.5 million gallons)*	830	
14. Verify all CRISP alarm functionality related to levels, etc.	830 & 860	

High flow and bypass exercises

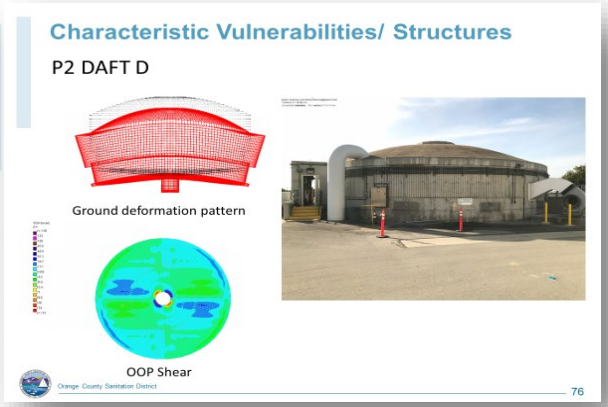
Plant 2 Storm Retention Pond

Flow Monitoring Storm Events

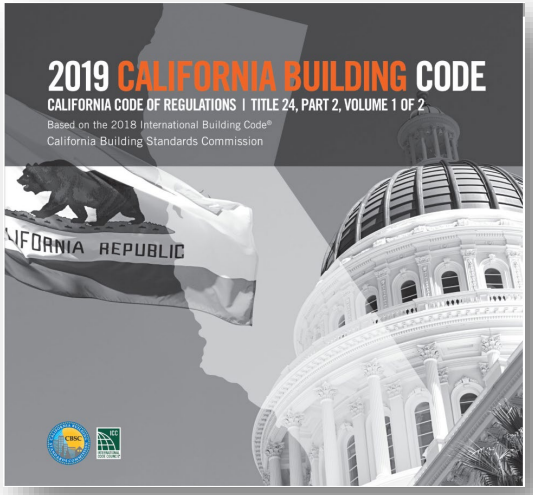
Seismic Preparedness



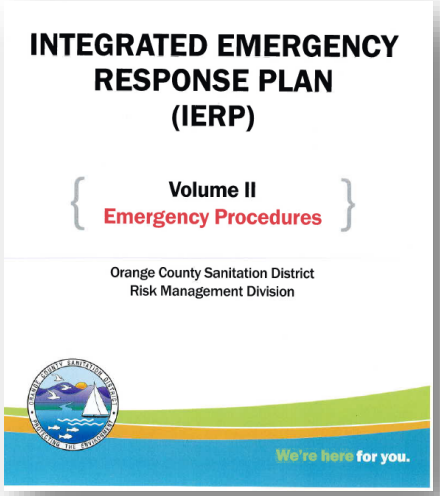
Locating New Facilities Off Fault Zones



Seismic Hazard Evaluation



Construct to latest building codes



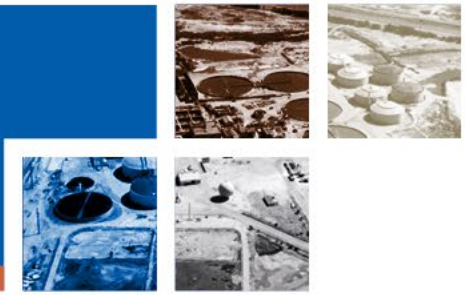
Integrated Emergency Response Plan

Proposed Policy Statement

The Sanitation District will design systems and operations to withstand or adapt to adverse conditions that can reasonably be expected.

These adverse events include heavy rains, sea level rise, flooding, earthquakes, wildfires, tsunamis or electrical grid collapse.

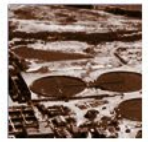
Initiatives



- **Initiative:** Complete an engineering study of the seismic vulnerabilities of the treatment plants. Incorporate necessary upgrades into future capital improvement projects.

- **Initiative:** Complete the biannual high flow exercise to assure readiness for a high flow event. Maintain a higher level of readiness October 15 through March 15 and in advance of predicted significant rain events.

- **Initiative:** Study the potential impact of tsunami and changing climate conditions, including flooding due to high tides and heavy rain events.




Questions?