



**BOARD OF DIRECTORS  
EAST BAY MUNICIPAL UTILITY DISTRICT**

375 - 11th Street, Oakland, CA 94607

Office of the Secretary: (510) 287-0440

**Notice of Special Meeting**

**Long-Term Infrastructure Investment Workshop  
Tuesday, November 26, 2019  
8:45 a.m.  
Training Resource Center  
375 Eleventh Street  
Oakland, California**

At the call of President Marguerite Young, the Board of Directors has scheduled a Long-Term Infrastructure Investment Workshop for 8:45 a.m. on Tuesday, November 26, 2019. The workshop will be held in the Training Resource Center of the Administration Building, 375 - 11th Street, Oakland, California.

The Board will meet in workshop session to receive information on current and planned activities to maintain and improve the District's infrastructure.

Dated: November 21, 2019

A handwritten signature in cursive script that reads 'Rischa S. Cole'.

Rischa S. Cole  
Secretary of the District





**BOARD OF DIRECTORS  
EAST BAY MUNICIPAL UTILITY DISTRICT**

375 - 11th Street, Oakland, CA 94607

Office of the Secretary: (510) 287-0440

**AGENDA**  
**Special Meeting**

**Long-Term Infrastructure Investment Workshop**  
**Tuesday, November 26, 2019**  
**8:45 a.m.**  
**Training Resource Center**  
**375 Eleventh Street**  
**Oakland, California**

**ROLL CALL:**

**PUBLIC COMMENT:** The Board of Directors is limited by State law to providing a brief response, asking questions for clarification, or referring a matter to staff when responding to items that are not listed on the agenda.

**DISCUSSION:**

1. Long-Term Infrastructure Investment Update (Yoloye)

**ADJOURNMENT:**

**Disability Notice**

*If you require a disability-related modification or accommodation to participate in an EBMUD public meeting please call the Office of the Secretary (510) 287-0404. We will make reasonable arrangements to ensure accessibility. Some special equipment arrangements may require 48 hours advance notice.*

**Document Availability**

*Materials related to an item on this Agenda that have been submitted to the EBMUD Board of Directors within 72 hours prior to this meeting are available for public inspection in EBMUD's Office of the Secretary at 375 11th Street, Oakland, California, during normal business hours, and can be viewed on our website at [www.ebmud.com](http://www.ebmud.com).*

W:\Board of Directors - Meeting Related Docs\Agendas\Agendas 2018\2018\_Cite\_Agendas\Workshop\1126319\_Infrastructure Workshop\_agenda.doc



## EAST BAY MUNICIPAL UTILITY DISTRICT

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DATE: November 21, 2019

MEMO TO: Board of Directors

FROM: Alexander R. Coate, General Manager *ARC*

SUBJECT: Long-Term Infrastructure Investment Workshop

A workshop on the District's long-term infrastructure investment will be held on November 26, 2019. The staff presentation, which is attached, will provide an update on the District's current and planned activities to maintain and improve the District's infrastructure in support of providing safe, high-quality water and wastewater services now and in the future.

Staff will highlight efforts on master plans, sustainability, resilience, effective maintenance and water loss prevention, and resource considerations.

ARC:OOY;jmj

Attachment: Long-Term Infrastructure Investment Workshop Presentation

I:\SEC\2019 Board Related Items\112619 LT Infrastructure Investment Workshop\OGM – Long-Term Infrastructure Investment Workshop.doc



# **Long-Term Infrastructure Investment Workshop**

**Board of Directors**

November 26, 2019

# Agenda

	<b>Duration (minutes)</b>
Introduction	5
Capital Improvement Program	20
Sustainability and Resiliency	15
Water Loss Control Strategy	30
Break	10
Resource Considerations	15
Yard Development	10
Wastewater	15
Board Input & Discussion	15

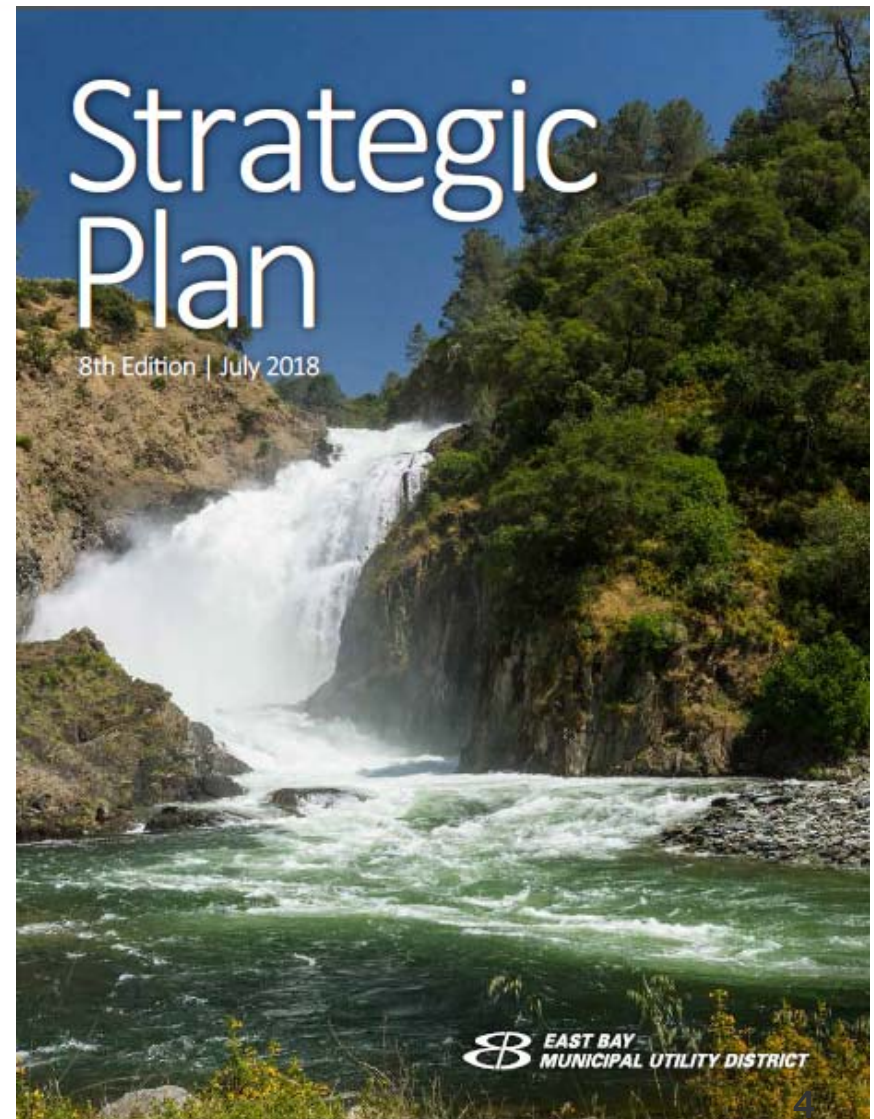
# Workshop Purpose

- Review Water Capital Improvement Program (CIP) accomplishments, highlights, and priorities
- Highlight sustainability and resilience activities
- Describe water loss control strategy
- Discuss resource considerations
- Review Wastewater CIP accomplishments and MWWTP Master Plan

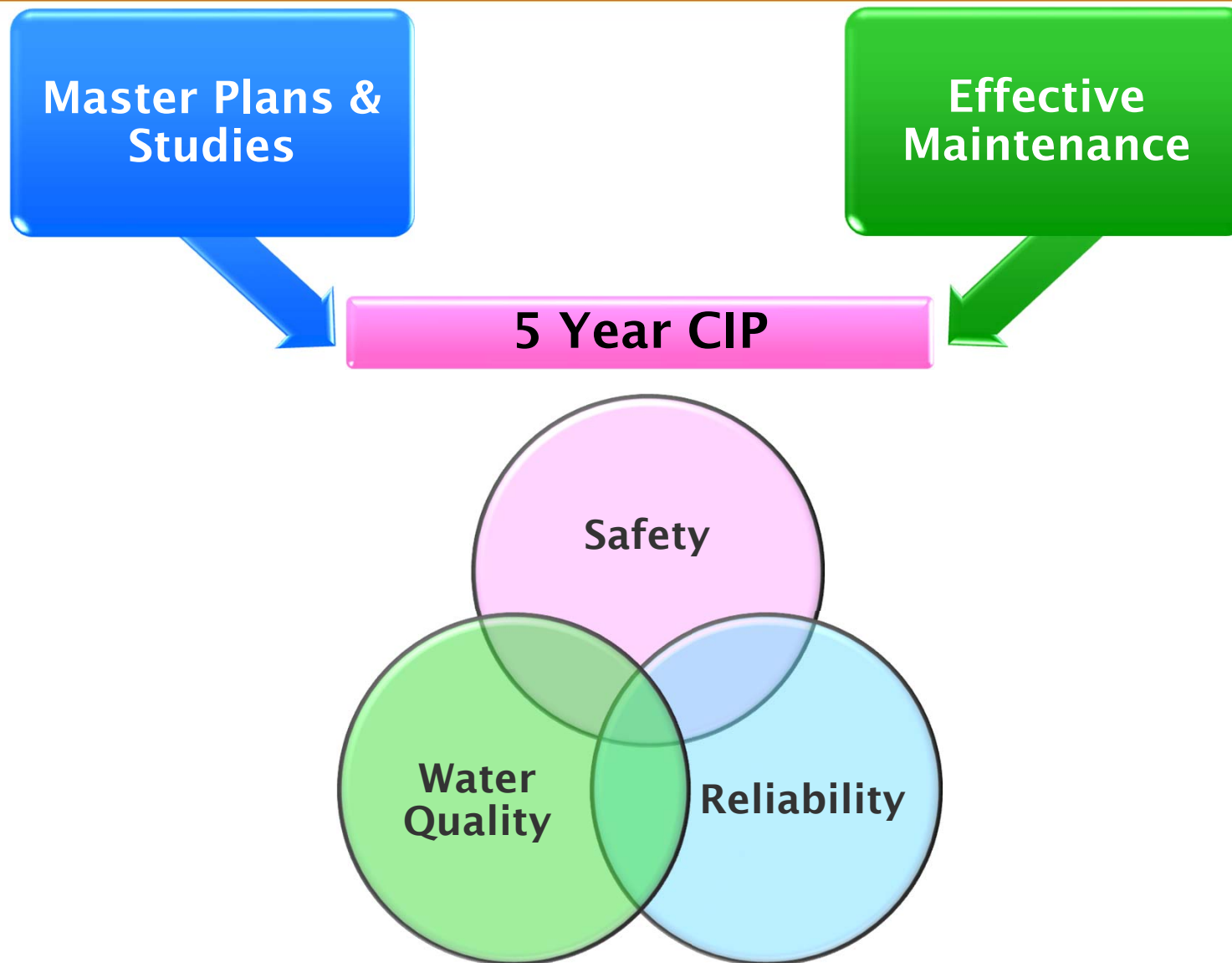
# Strategic Plan Goal

## Long-Term Infrastructure Investment

We maintain and improve the District's infrastructure in a cost-effective manner to ensure sustainable delivery of reliable, high quality service now and in the future, addressing economic, environmental, and social concerns.

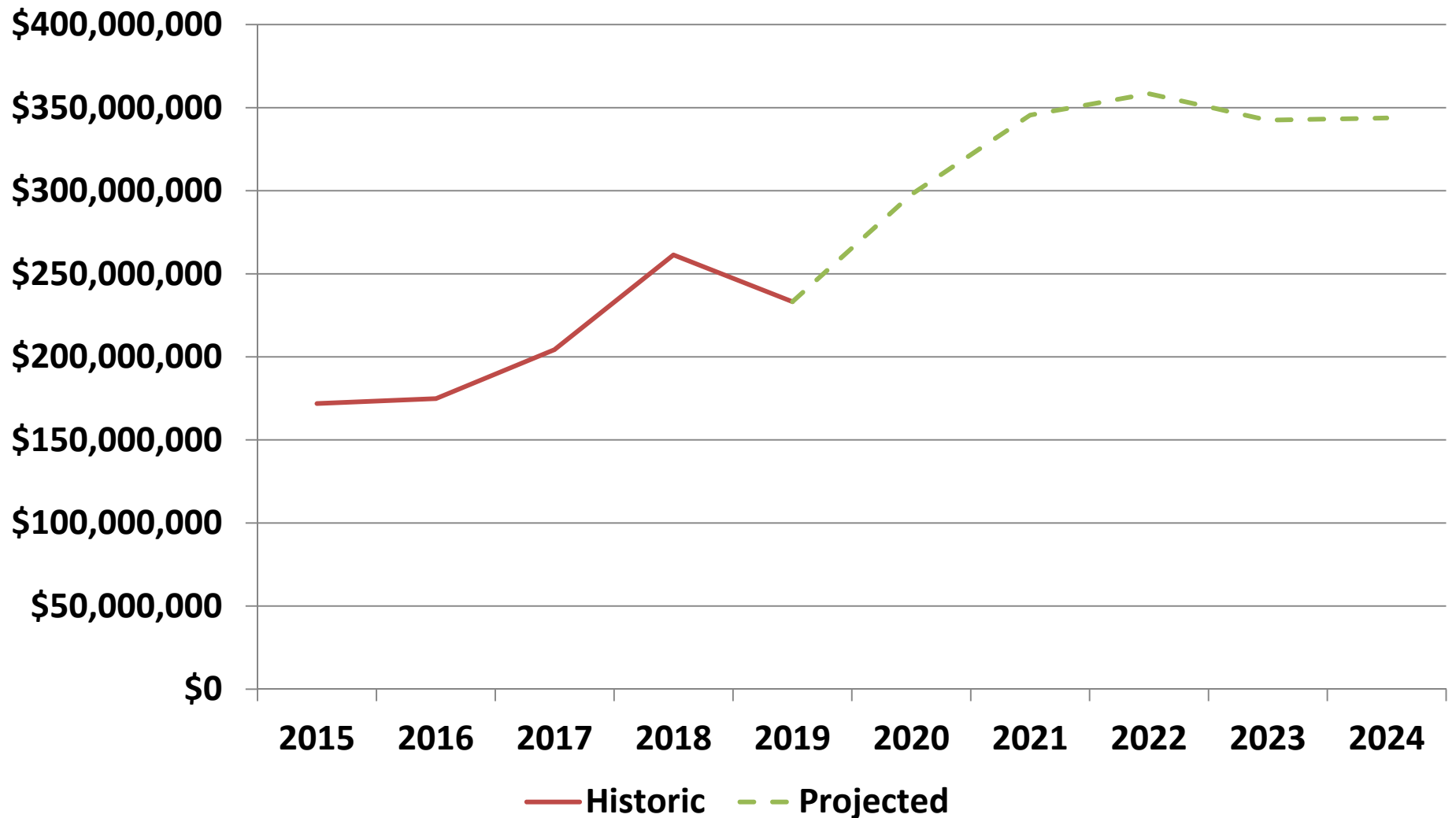


# Long Term Infrastructure Investment Strategies and Drivers



# Capital Improvement Program

## Historic and Projected Spending



# Capital Improvement Program

## FY15-19 Accomplishments – Water Treatment Plants

Effluent Flow Meter



Chemical Feed Systems



Bifurcation Vault



### Orinda WTP Maintenance and Reliability Improvements Project

Updated Controls



Efficient & Reliable Generators



Better T&O Control



### USL and Sobrante WTPs Ozone Improvements

# Capital Improvement Program

## FY15-19 Accomplishments – Open-Cut Reservoirs

- South Reservoir, Castro Valley (Ward 7)
- Summit Reservoir, Berkeley (Ward 4)
- San Pablo Clearwell, Kensington (Ward 4)



# Capital Improvement Program

## FY15-19 Accomplishments - Steel Reservoirs

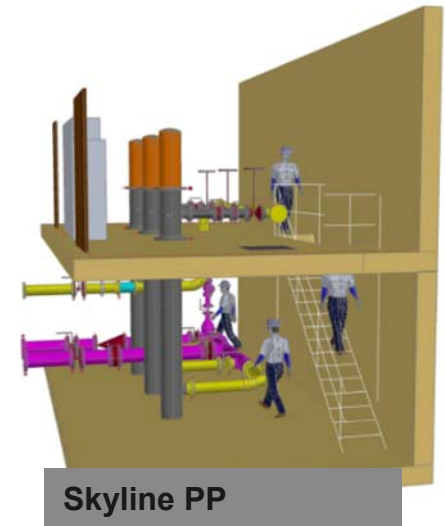
Reservoir	City	Ward
Mendocino	Hercules	1
Birch	Rodeo	
Potrero	Richmond	
Larkey	Walnut Creek	2
Acorn No. 1	Blackhawk	
Bacon	Lafayette	
Rheem	Lafayette	
Round Hill	Alamo	
Muir	Danville	3
Pearl	Richmond	
Sherwick	Oakland	
University	Oakland	4
Stonewall	Oakland	
Berkeley View No. 2	Oakland	
Eden	Castro Valley	7
Arcadian	Castro Valley	
Cull Creek	Castro Valley	
Faria No. 1 & 2	San Ramon	



# Capital Improvement Program

## FY15-19 Accomplishments – Pumping Plants

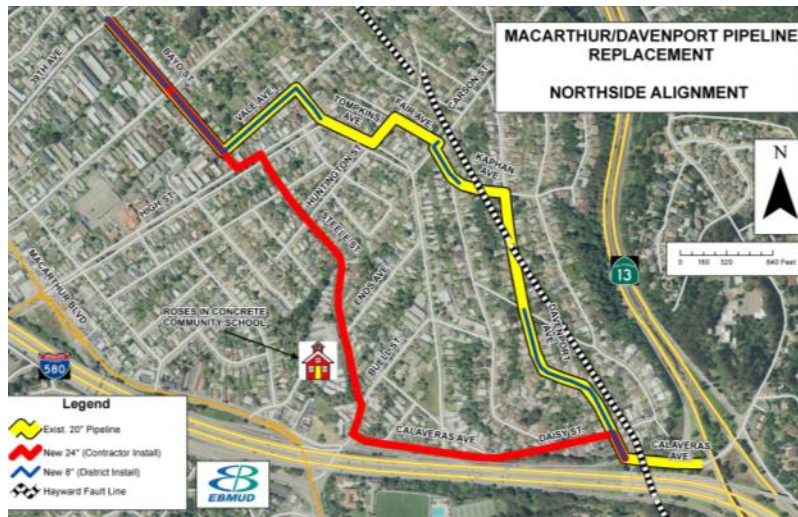
Pumping Plant	City	Ward
Moyers	Richmond	1
Road 24 No. 1	San Pablo	
Road 24 No. 2	Richmond	
Schapiro	San Pablo	
Diablo Vista	Lafayette	2
Diablo	Danville	
Laguna	Orinda	
Gwin	Oakland	
Skyline	Oakland	3
Country Club	Oakland	
Maloney	El Sobrante	
Greenridge	El Sobrante	
Shasta	Berkeley	4
Woods	Berkeley	
Berryman North	El Cerrito	
University No. 1	Berkeley	
Bayfair	Oakland	6
Peralta	Oakland	
May	Oakland	
Fire Trail	Castro Valley	7
Jensen	Castro Valley	



# Capital Improvement Program

## FY15-19 Accomplishments - Large Diameter Pipeline

### MacArthur-Davenport (Wards 4 and 6)



### Grand Avenue (Ward 4)



# Capital Improvement Program

## FY15-19 Accomplishments – Pipeline Rebuild

*Pipeline*  
**REBUILD**

Renew. Reinvest. Ready.

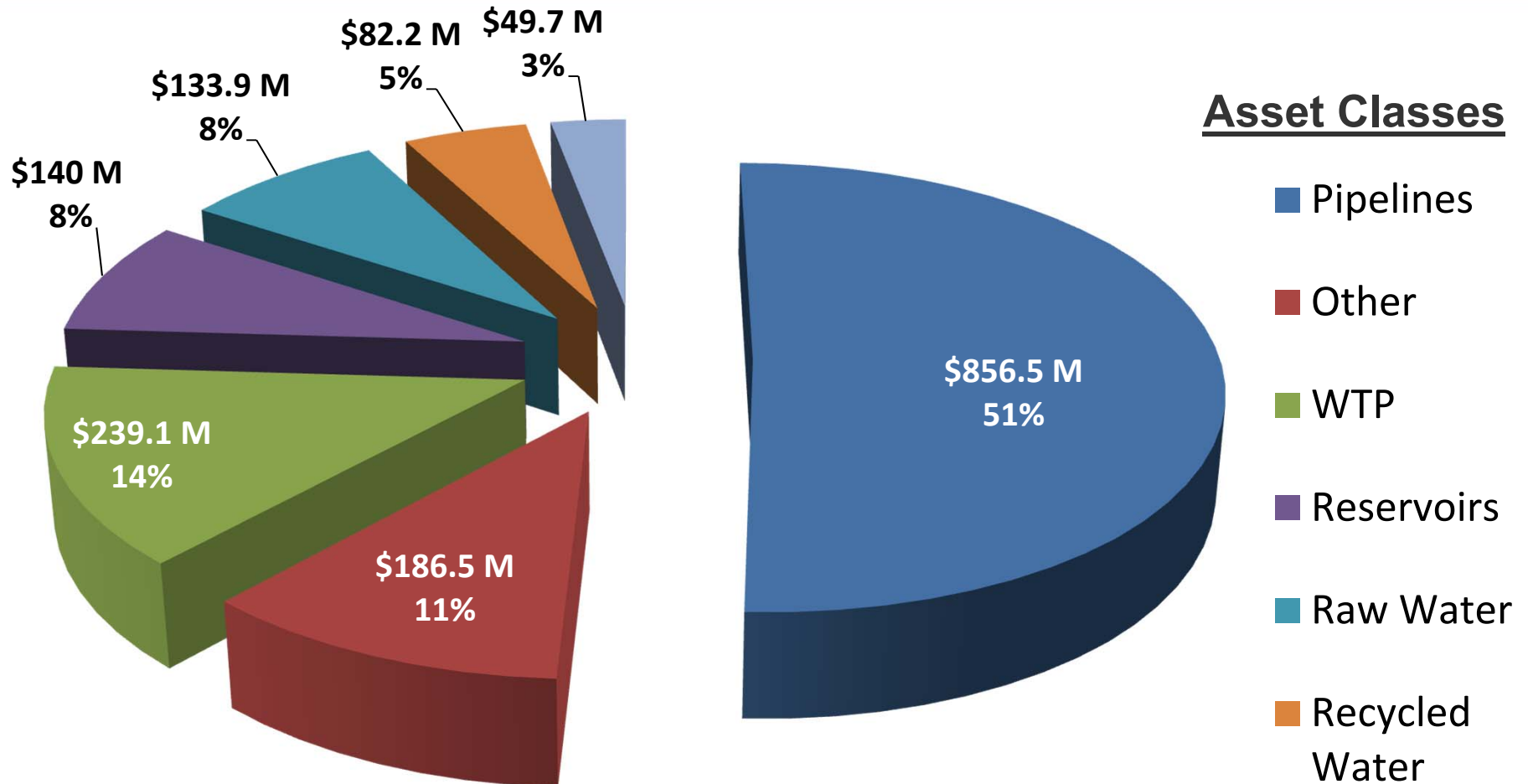
### Accomplishments

- Added 2 new pipeline crews and support staff
- Increased replacement from 10 to 15 mi/year
- Completed pilot program



# FY20-24 Capital Improvement Program

## Budget by Asset Class



Total FY20-24 Cash Flow = \$1.69B

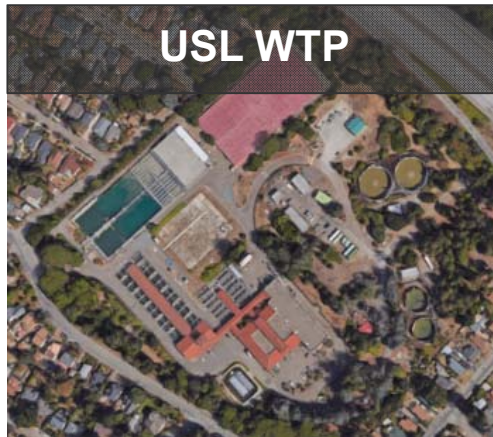
# FY20-24 Capital Improvement Program

## Water Treatment Plants

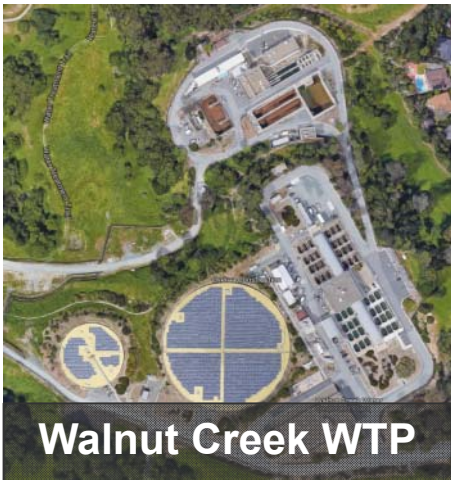
Orinda WTP



USL WTP



Walnut Creek WTP



Sobrante WTP



- Treatment Studies
  - Pretreatment
  - Fouling
- Chemical Safety Study
- Condition Assessments
- Complete WTP road map

# FY20-24 Capital Improvement Program

## Orinda Water Treatment Plant



# FY20-24 Capital Improvement Program

## Raw Water System

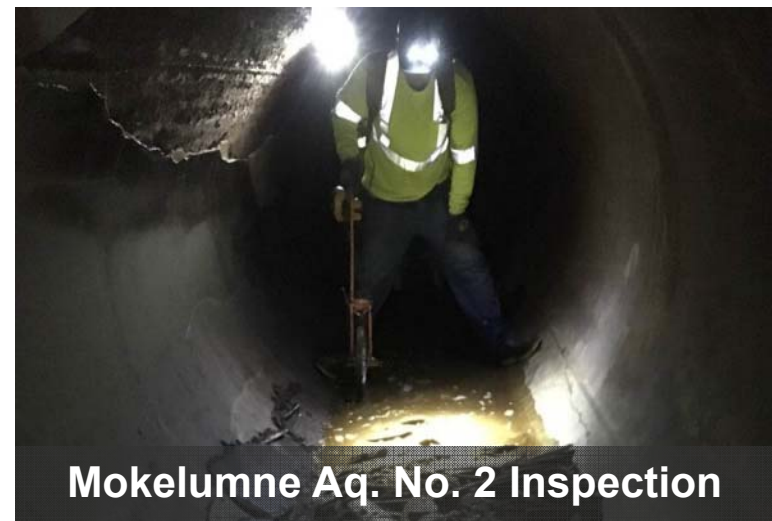
- Chemical Improvements
- Aqueduct Relining



Pardee Chemical Plant



Mokelumne Aqueducts



Mokelumne Aq. No. 2 Inspection

# FY20-24 Capital Improvement Program

## Open-Cut Reservoirs

- Replacement Plans
- Demolition
- Outage Plans



# FY20-24 Capital Improvement Program

## Steel Reservoirs

- Rehabilitate or replace 3 reservoirs per year
- Continue to meet or exceed established KPI



# FY20-24 Capital Improvement Program

## Pumping Plants

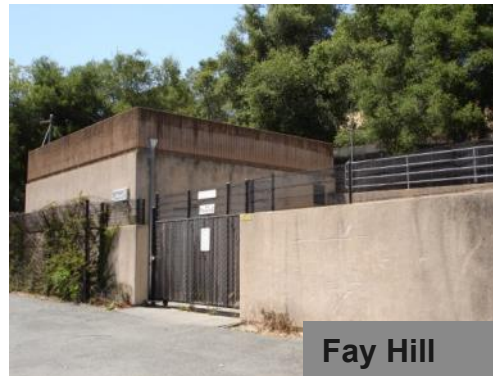
- Rehabilitate or replace 3 pumping plants per year
- Continue to meet or exceed established KPI



Madrone / Palo Seco



Hill Mutual



Fay Hill

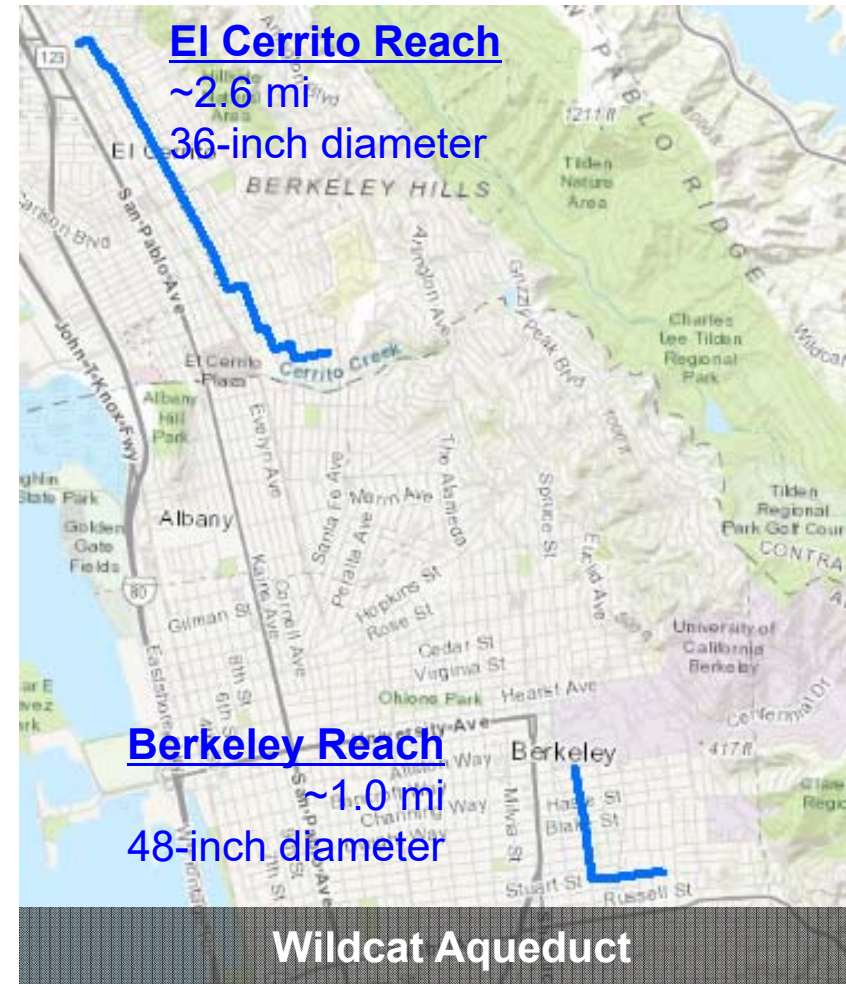


Encinal

# FY20-24 Capital Improvement Program

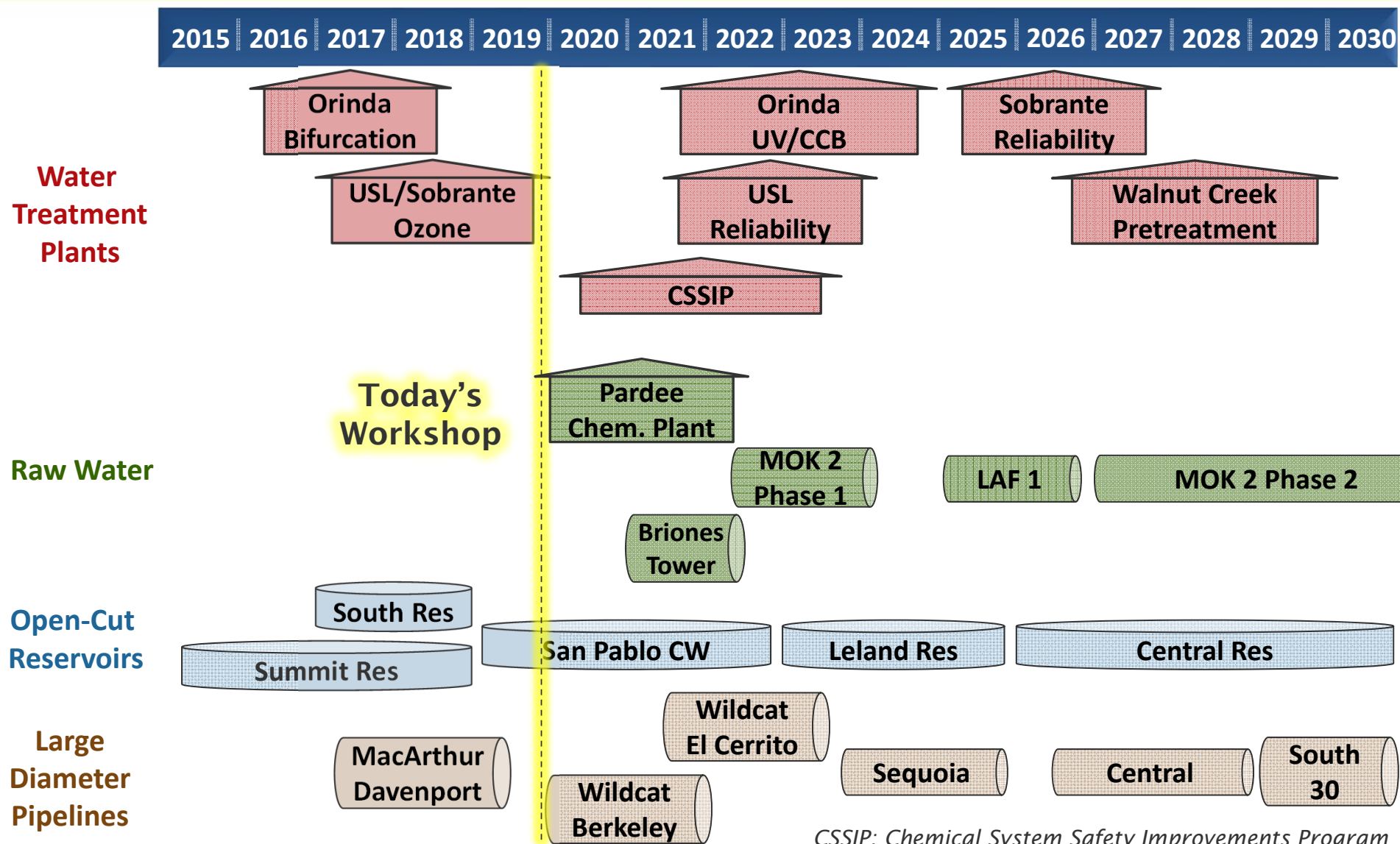
## Large Diameter Pipelines

- Capacity Studies
- Outage Plans



# Treatment & Transmission

## Construction Sequencing



CSSIP: Chemical System Safety Improvements Program

# FY20-24 Capital Improvement Program

## Pipeline Rebuild

### Where Are We Headed

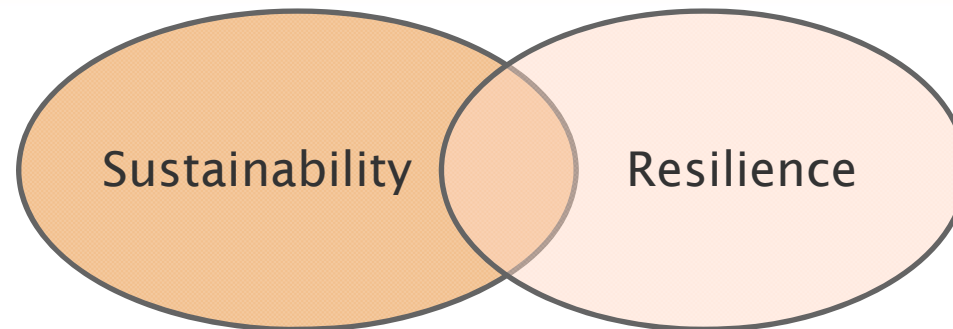
- 17.5 mi/year → 25 mi/year by FY25
- New materials
- Implementing recommendations
- Continue to innovate





# **Sustainability & Resilience**

# Sustainability & Resilience



*Sustainability practices manage resources and impacts equitably across generations*



*Resilience is the ability to prepare and plan for, absorb, recover from, and adapt to adverse events* 24

# Sustainability & Resilience

## Envision Rating System



QUALITY  
OF LIFE



LEADERSHIP



RESOURCE  
ALLOCATION

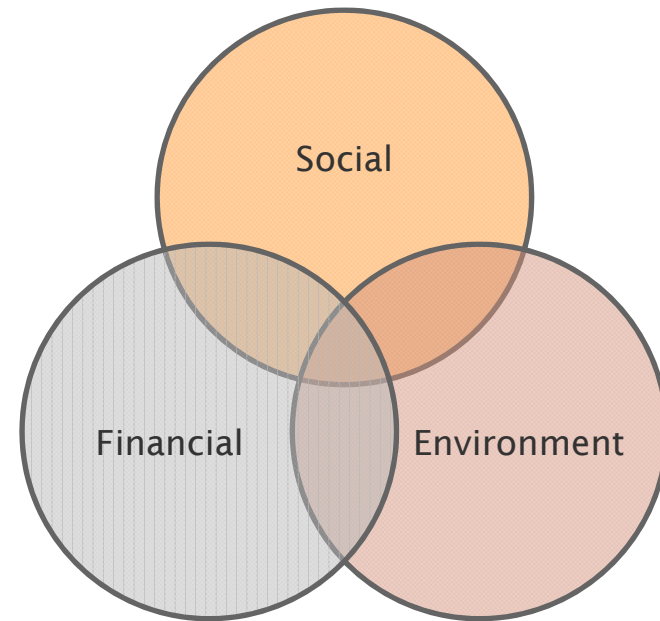


NATURAL  
WORLD



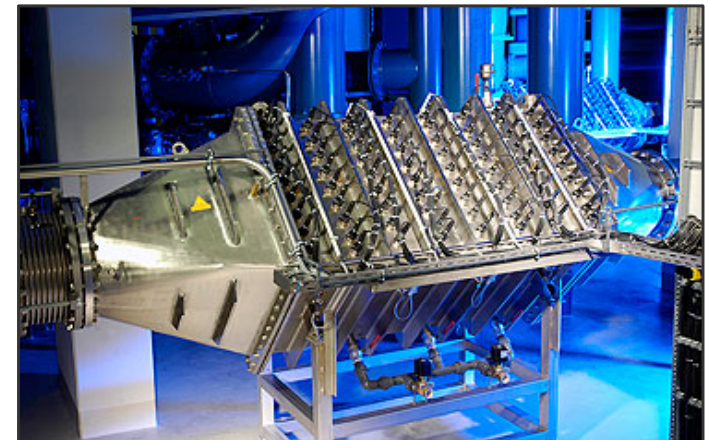
CLIMATE  
AND RISK

- Planning and design tool
- Industry-wide sustainability metrics for infrastructure
- Focus on Triple Bottom Line



# Sustainability & Resilience

- Three example projects
  1. Pipeline Rebuild
  2. Orinda WTP Disinfection Improvements Project
  3. Central Reservoir Replacement Project



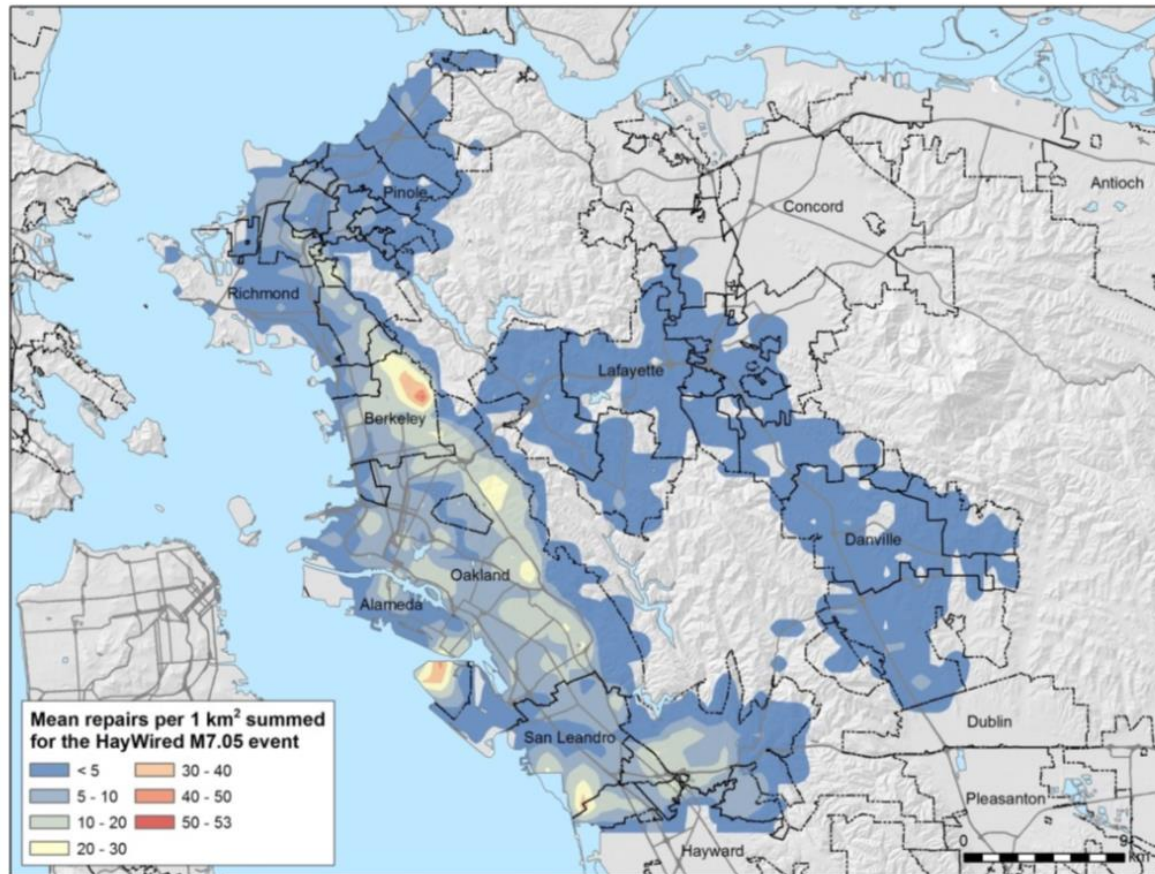
# Pipeline Rebuild

## Sustainability



- Move to a sustainable replacement rate
- Select materials to reduce installation time & impacts to customers
- Lining as alternative to trenching

# Pipeline Rebuild Resilience



- HayWired Model
- 5,500 pipeline breaks (main & aftershocks)
- Customer outages
  - 6 weeks average
  - Up to 6 months

Significant number of breaks in the western service area

# Pipeline Rebuild


## Resilience

- Long-term goal:  
Complete replacement
- Short term goal:  
Maximize resilience with  
every pipeline project
- Resilient grid
  - Tolerate damage and still  
be mostly functional
  - Strategic hardening
  - Valve configuration



# Pipeline Rebuild

## Resilience: Strategic Hardening

 **Water Source**

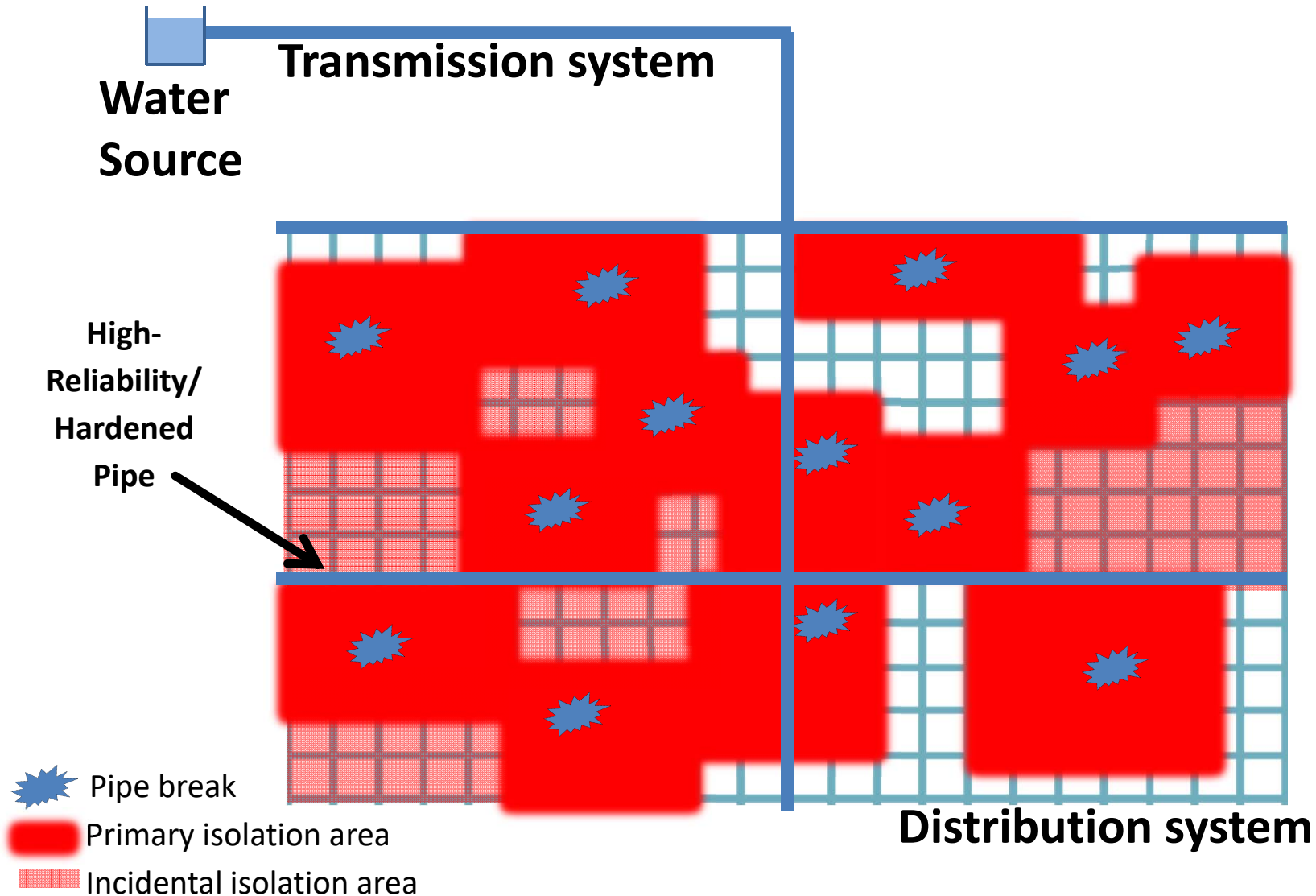
**Transmis**



**on system**

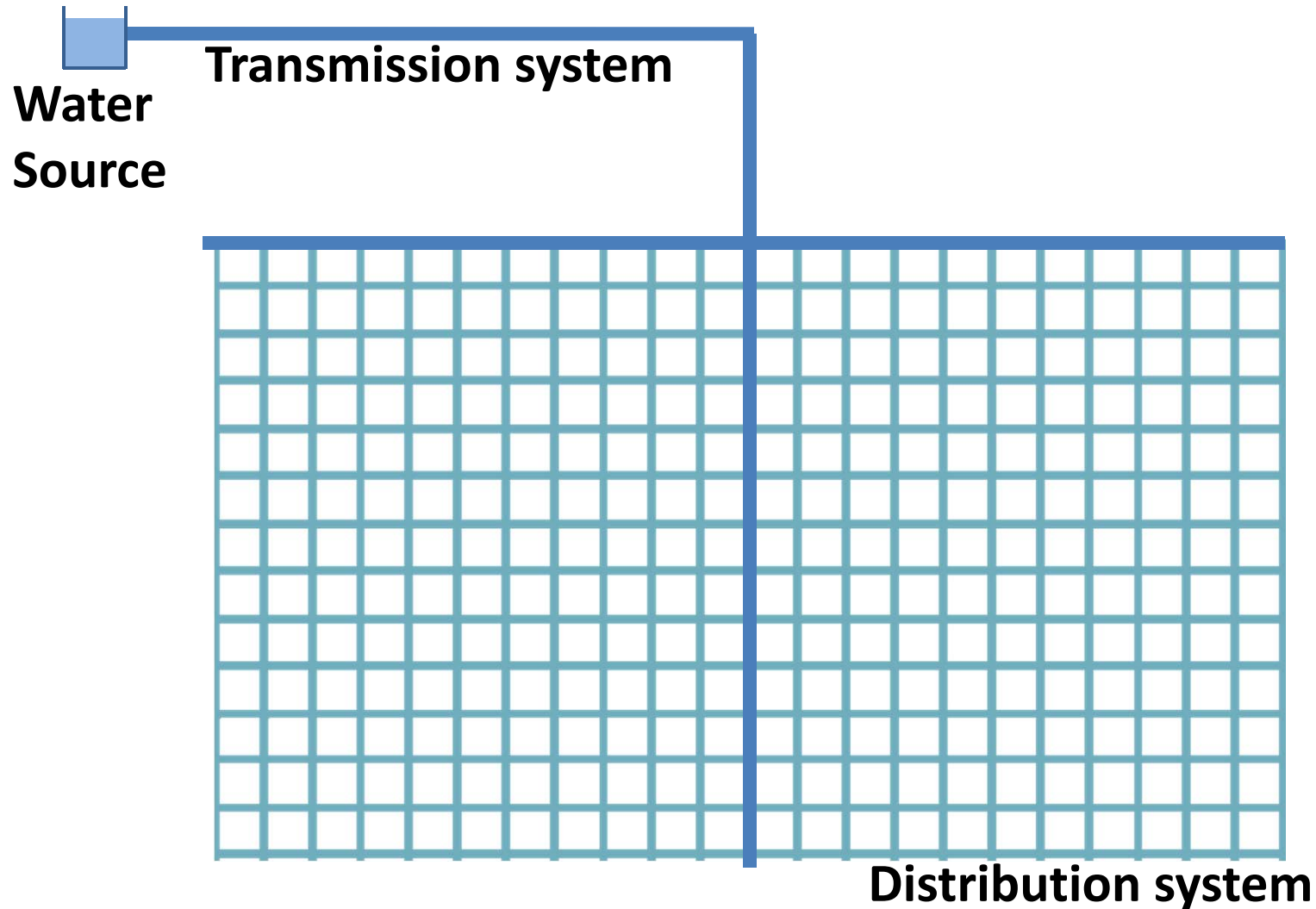
# Pipeline Rebuild

## Resilience: Strategic Hardening



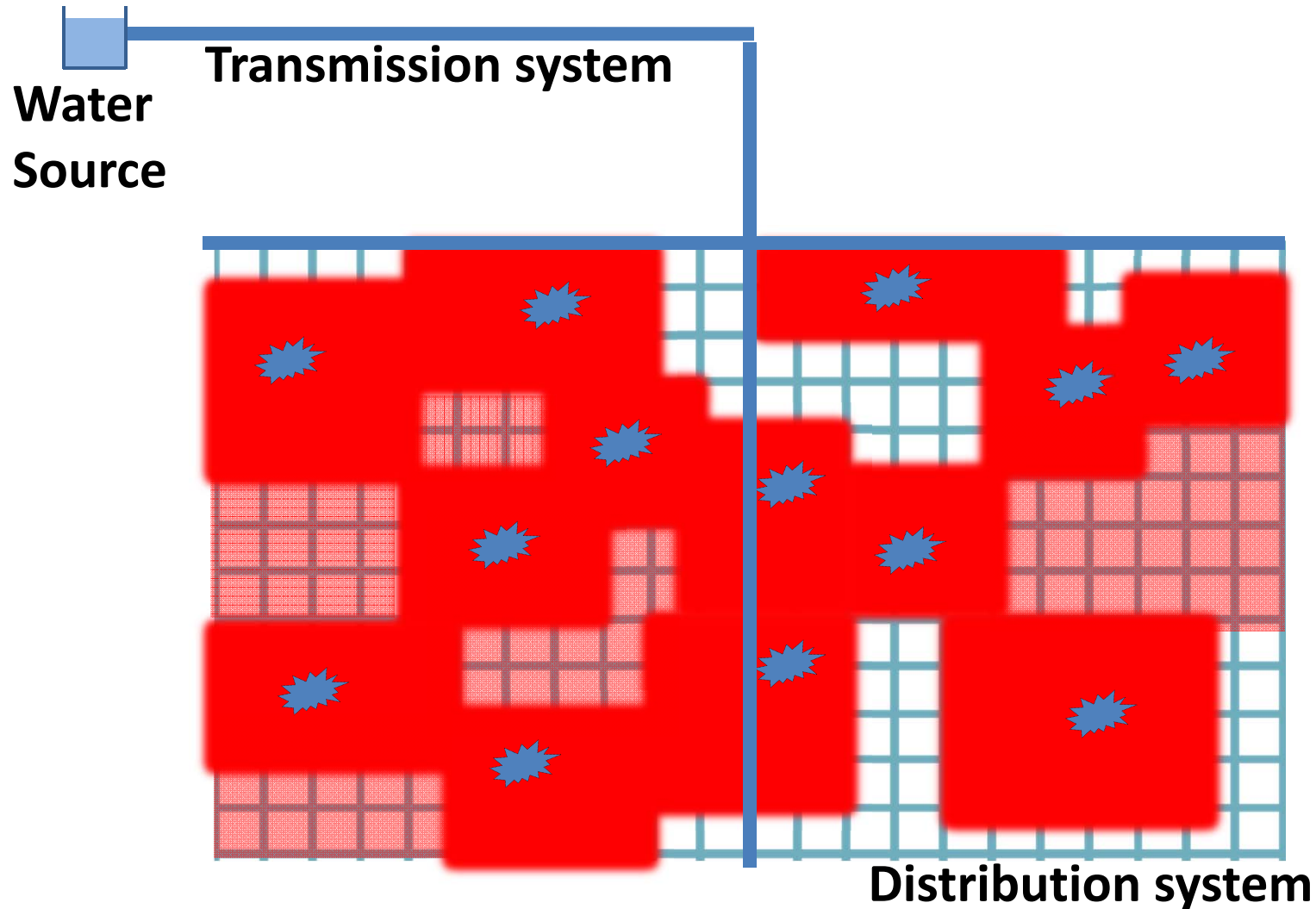
# Pipeline Rebuild

## Resilience: Valve Configuration



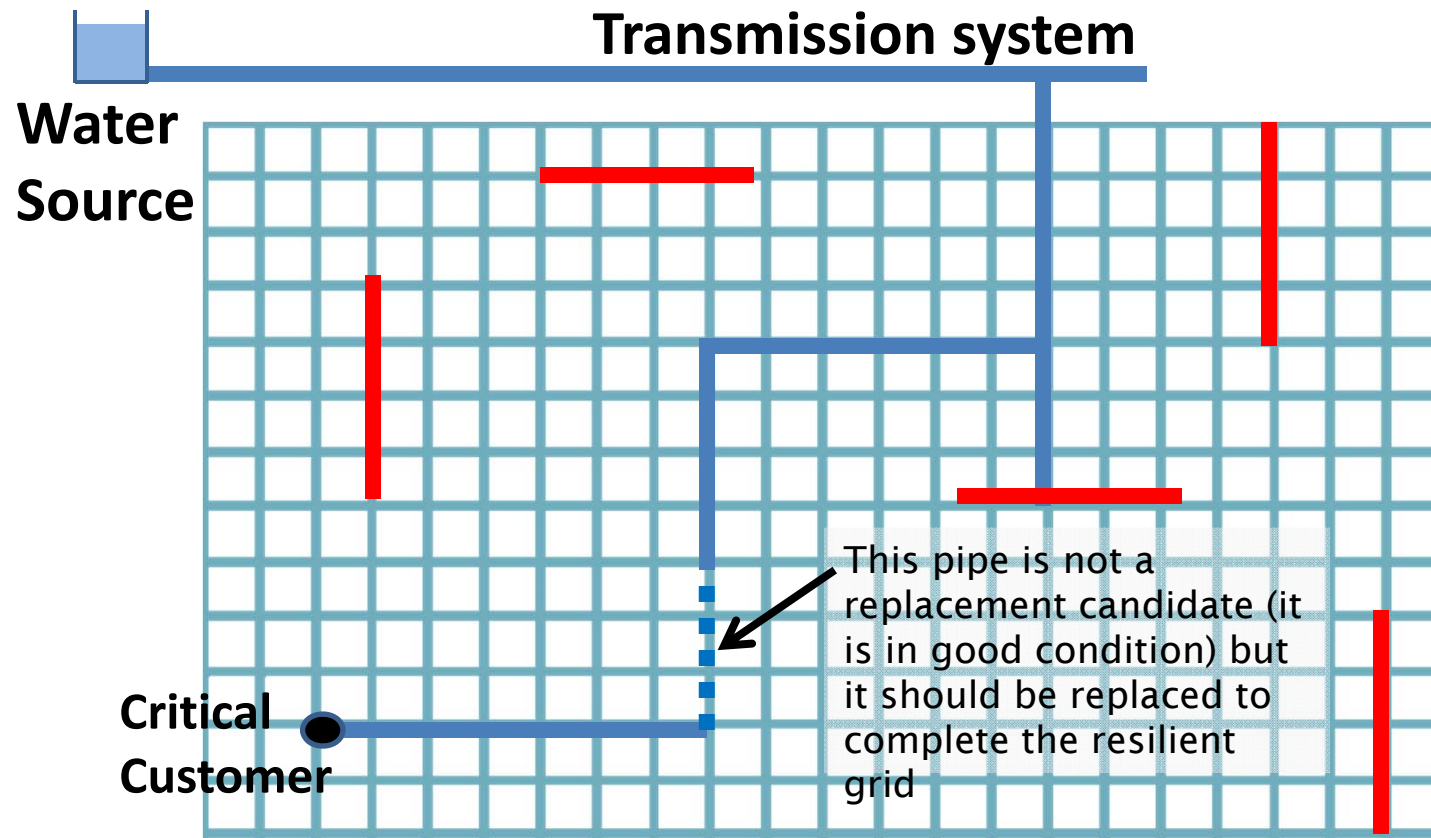
# Pipeline Rebuild

## Resilience: Valve Configuration



# Pipeline Rebuild

## Resilience: Critical Customers

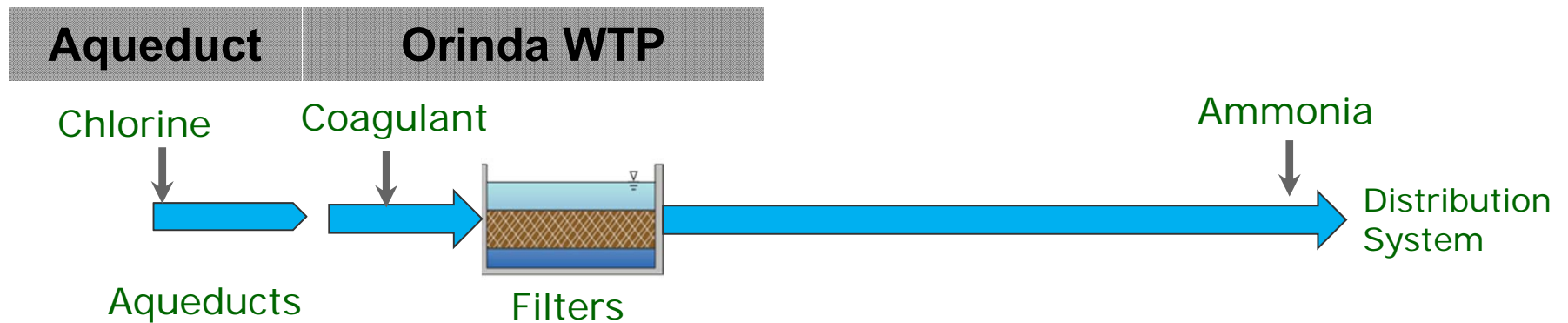


— High-reliability pipeline    — High-risk pipeline

# Orinda WTP

## Disinfection Improvements Project

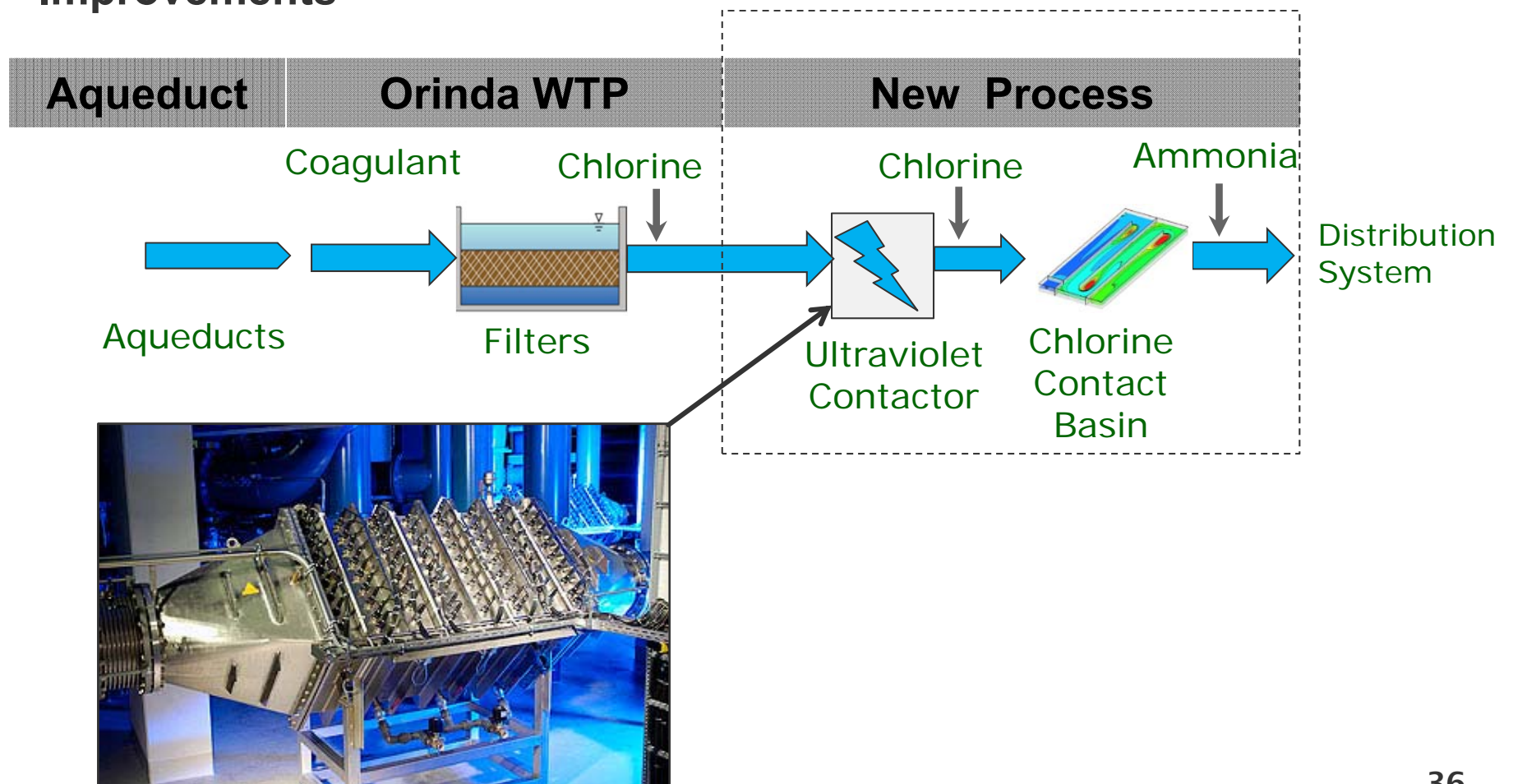
### Existing Treatment Process at Orinda WTP



# Orinda WTP

## Disinfection Improvements Project

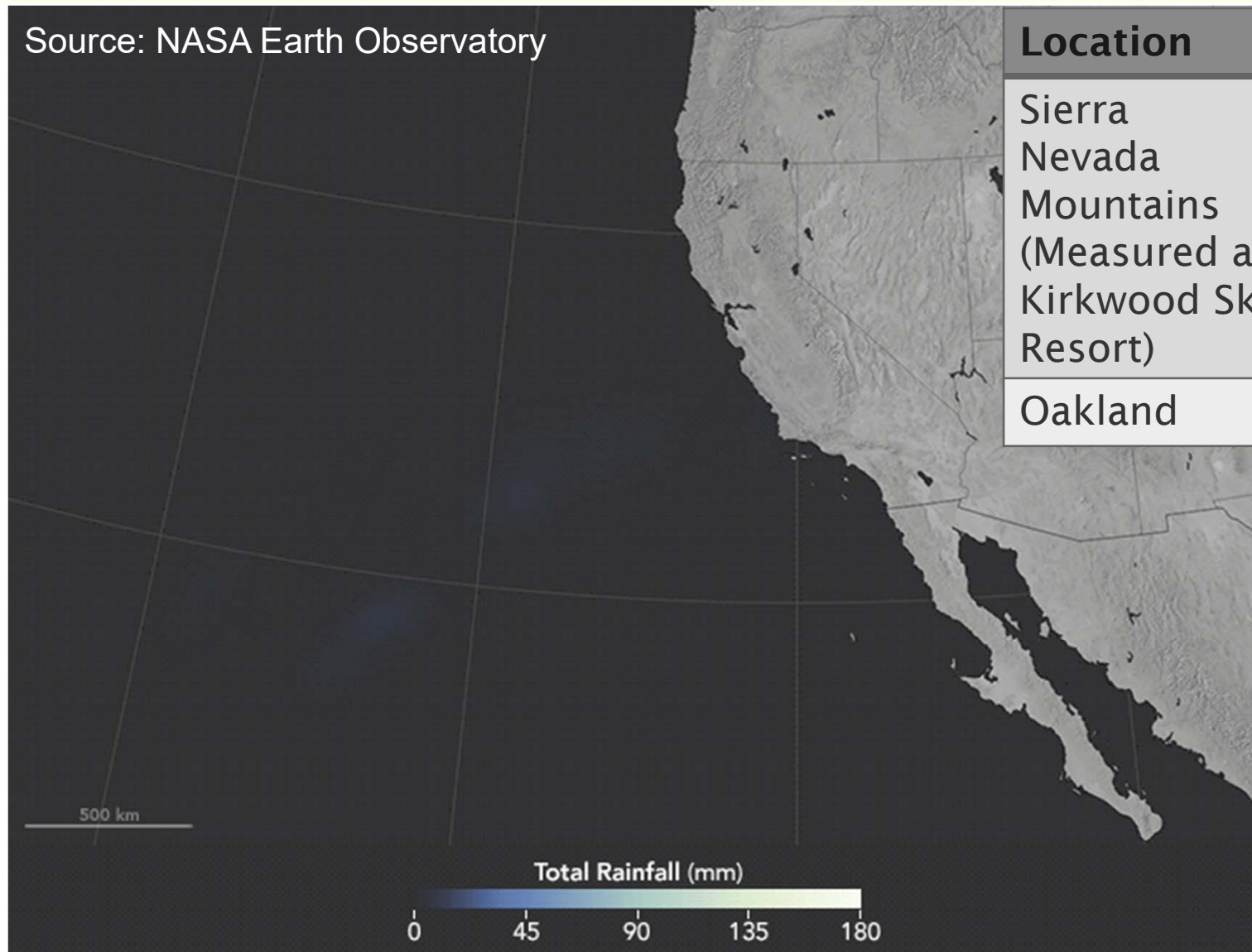
### Treatment Process at Orinda WTP after Orinda Disinfection Improvements



# Orinda WTP

## Resilience: Intense Atmospheric Rivers

Source: NASA Earth Observatory



Location	Amount
Sierra Nevada Mountains (Measured at Kirkwood Ski Resort)	133- inches (Snow)
Oakland	3.36 inches

# Orinda WTP

## Resilience: Drought



# Orinda WTP

## Resilience: Water Quality



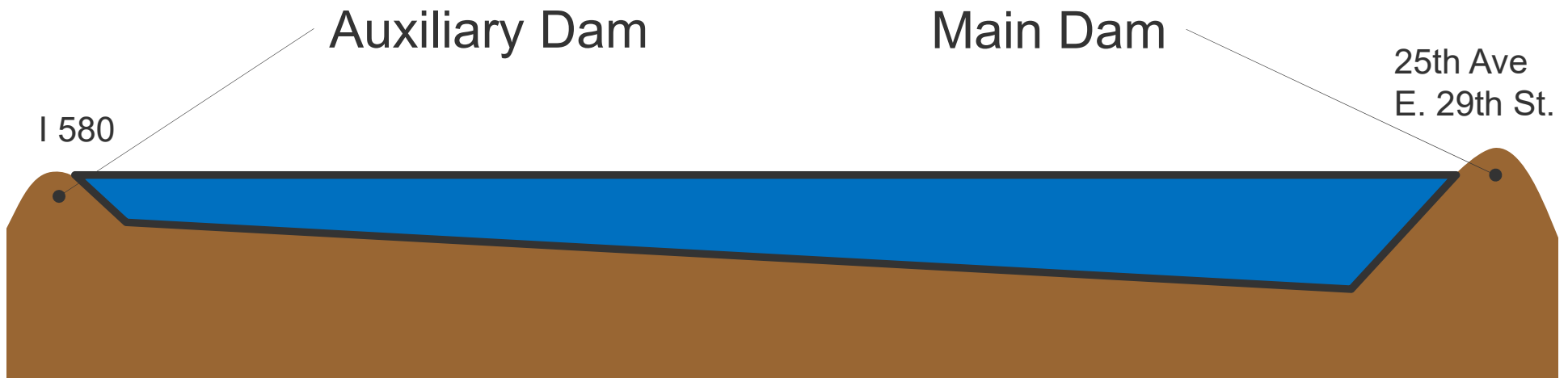
# Orinda WTP

## Resilience: Water Quality



Orinda WTP Disinfection Improvements Project is one project that increases our resilience to upsets in raw water quality

# Central Reservoir Replacement Project

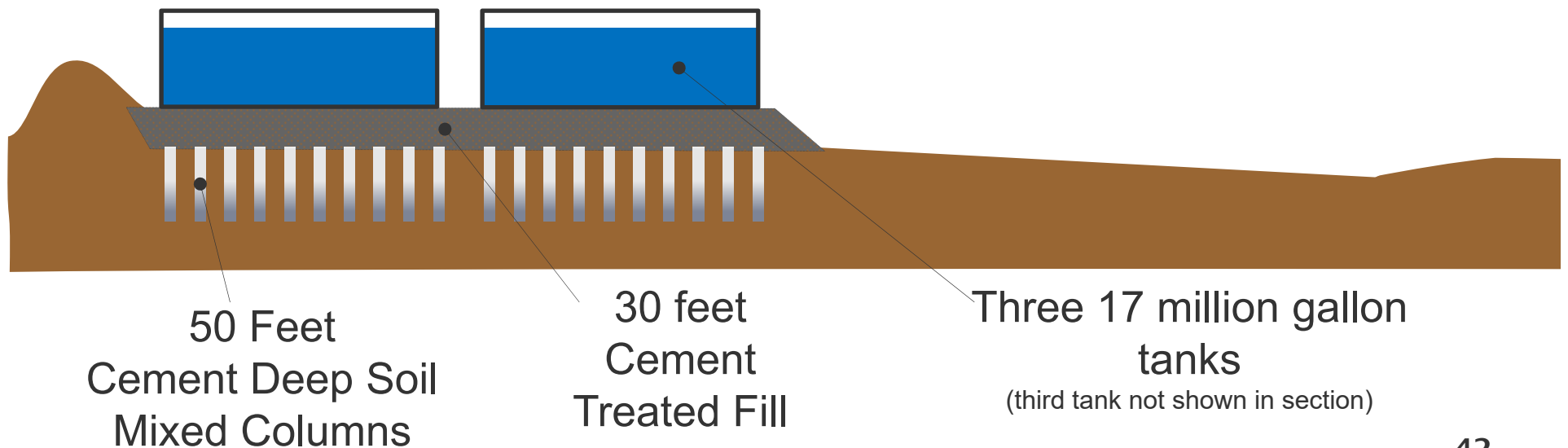


# Central Reservoir

## Resilience

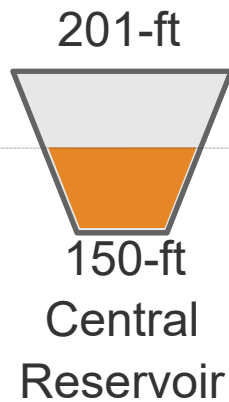


- Raise reservoir to significantly improve operational flexibility



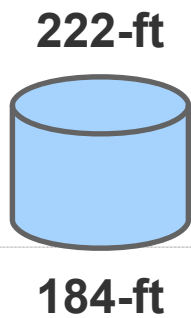
# Central Reservoir

## Resilience



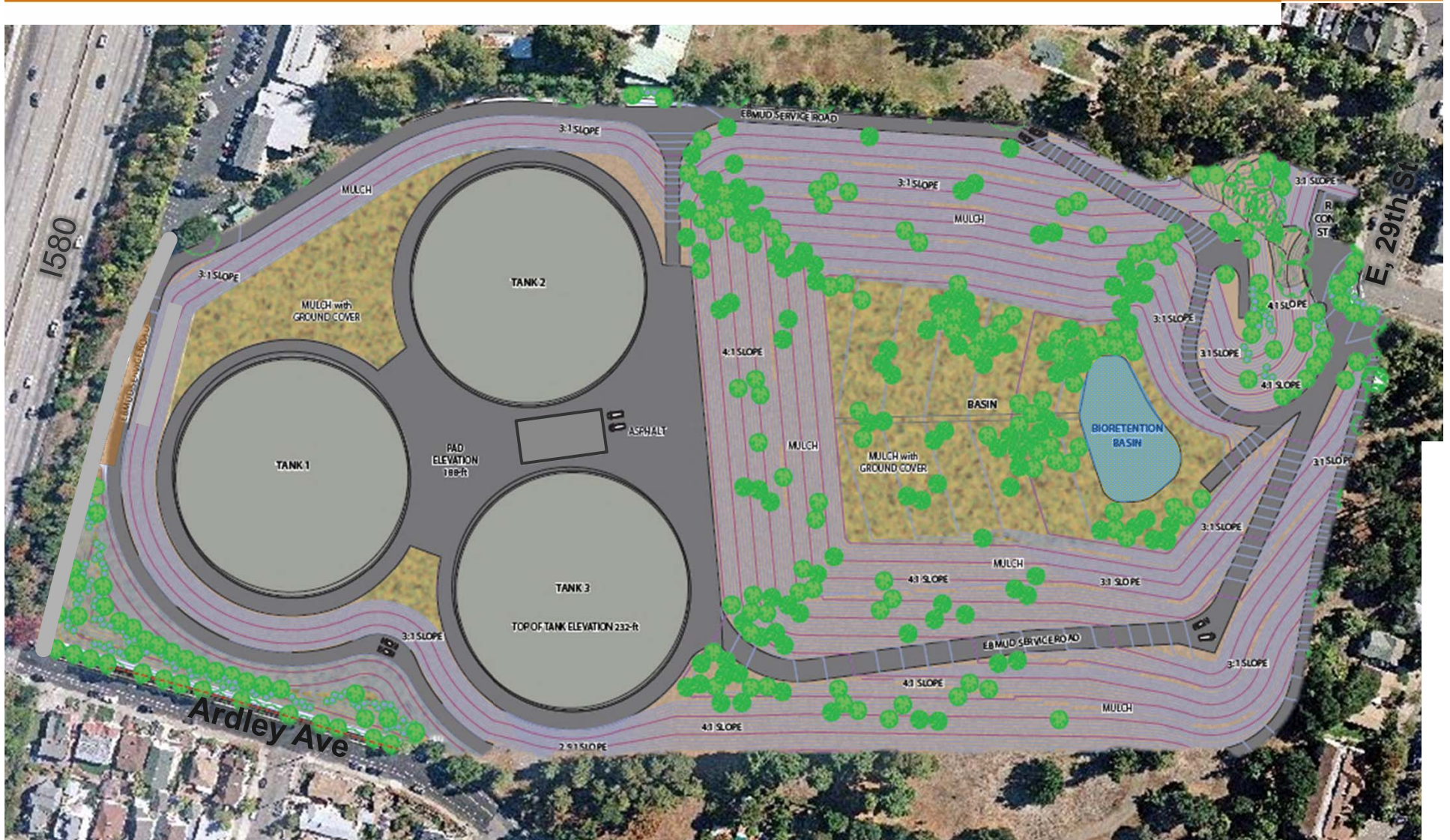
# Central Reservoir

## Resilience



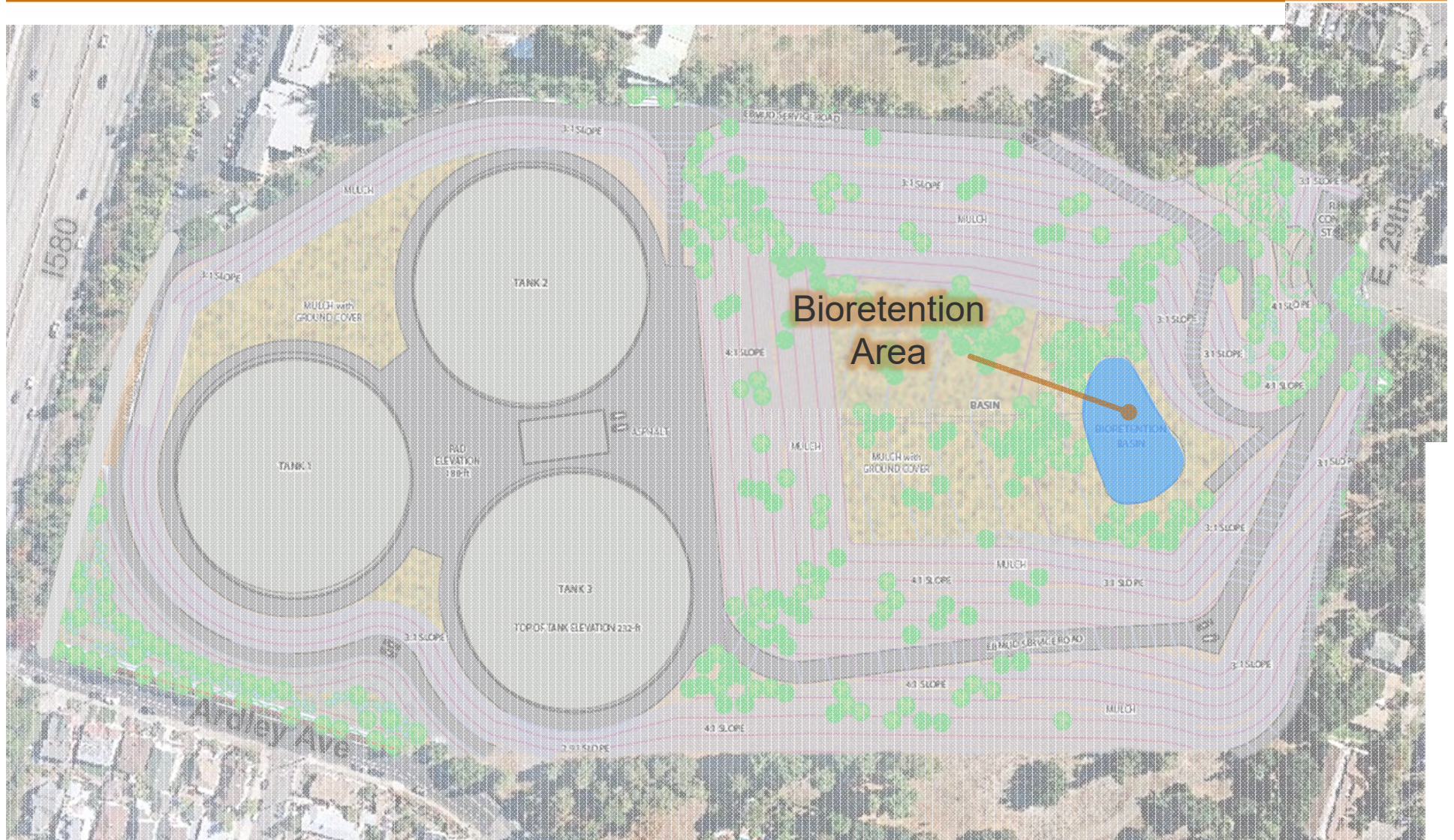
# Central Reservoir

## Sustainability



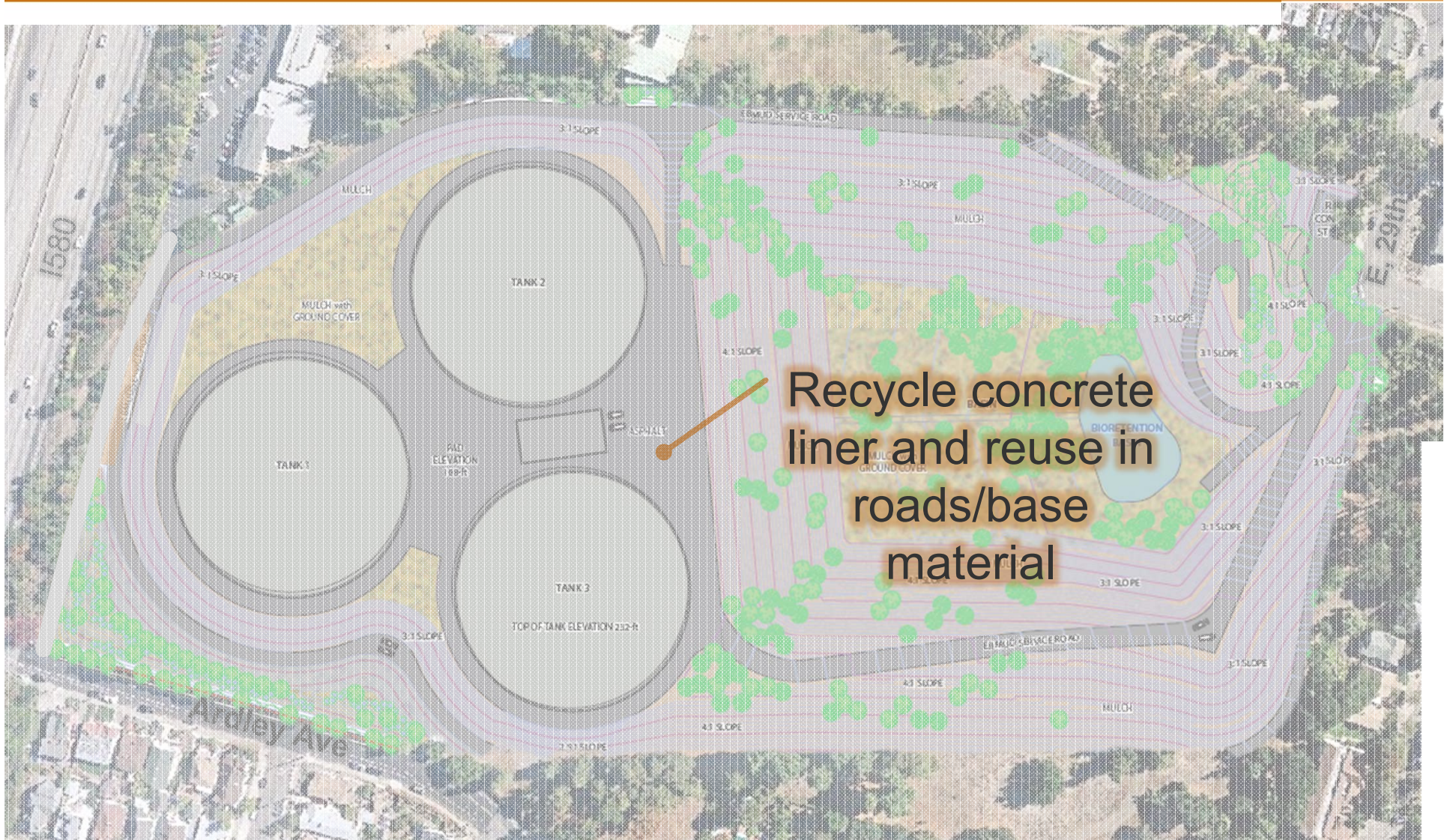
# Central Reservoir

## Sustainability



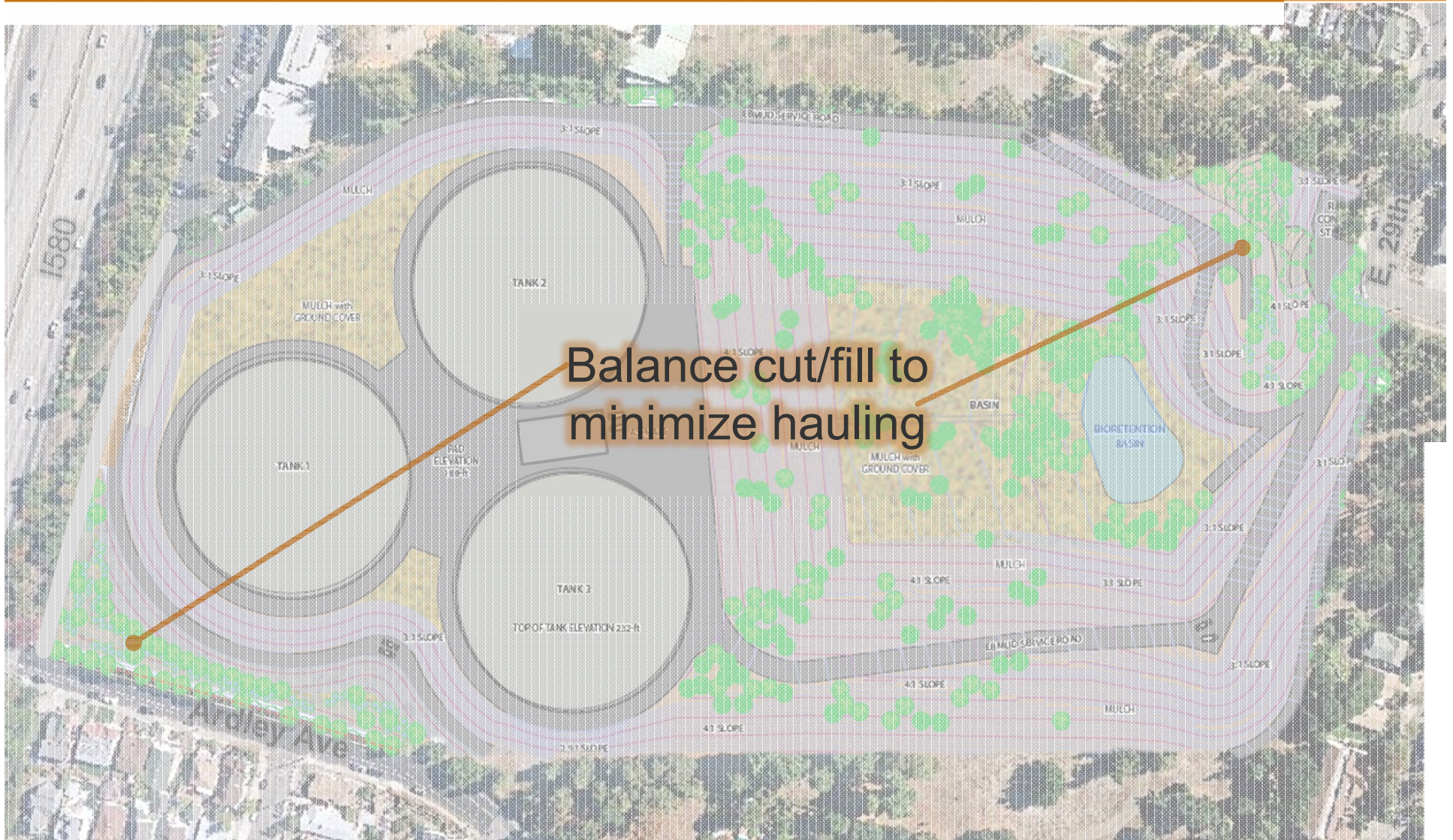
# Central Reservoir

## Sustainability



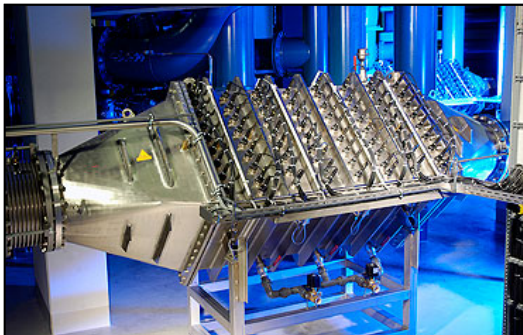
# Central Reservoir

## Sustainability



# Sustainability & Resilience Summary

- Sustainability and resilience is part of every project
- Financial, social and environmental considered
- Continuous attention to areas of improvement

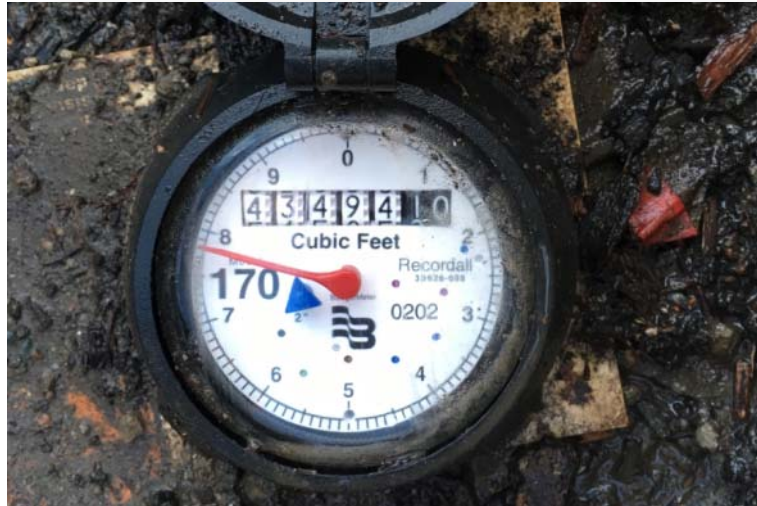




# **Water Loss Control Strategy**

# Types of Water Loss

## Apparent Losses



- Meter inaccuracy

## Real Losses



- Leaks on mains and services

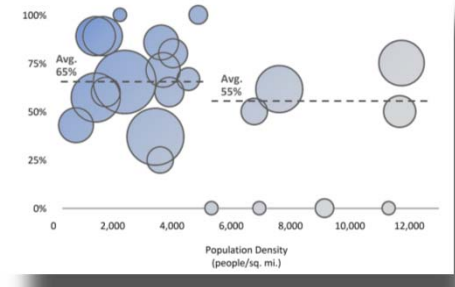
# Water Loss Control Strategy Goals

- Reduce water loss
- Reduce main breaks

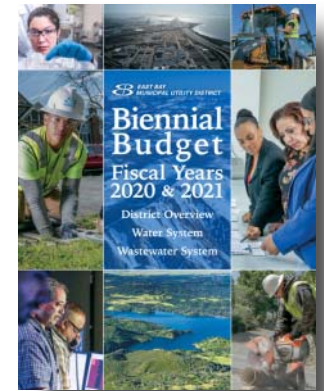


# Data-Driven Decisions

- New methods are being developed and tested at the District
- Analyze data to
  - Prioritize spending
  - Lead to new strategies



Data

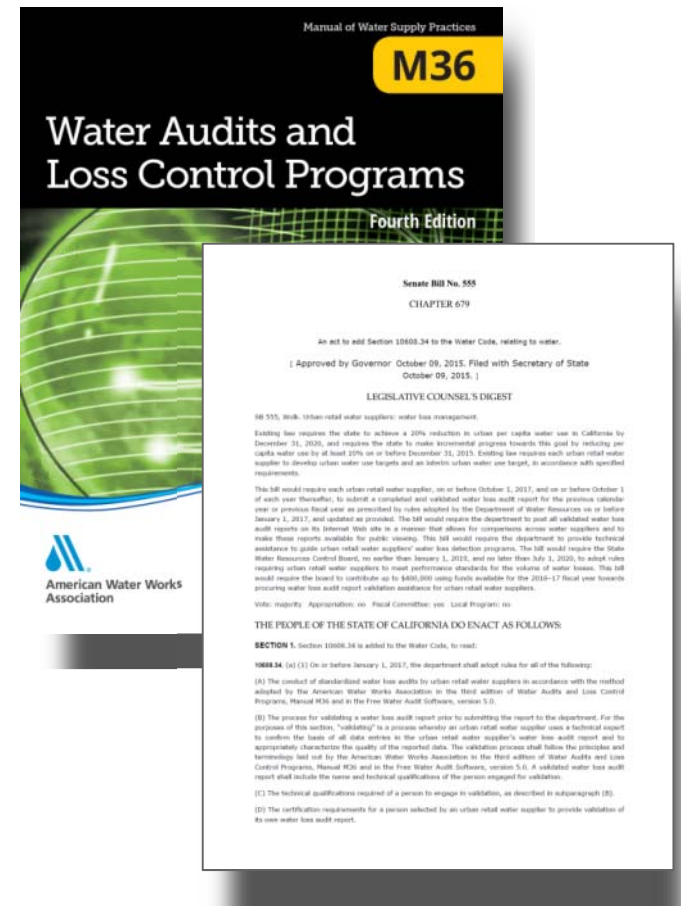


Strategies

# California Senate Bill 555

## What does SB 555 require?

1. Annual water audits
2. Validated water audits
3. Post audits online
4. Establish water loss standards



# SB 555 Rulemaking Period



- Water loss standard adopted July 2020
- Interim and final targets
- District comments

# Calculating Real Losses

WTP  
Production  
Volume



–

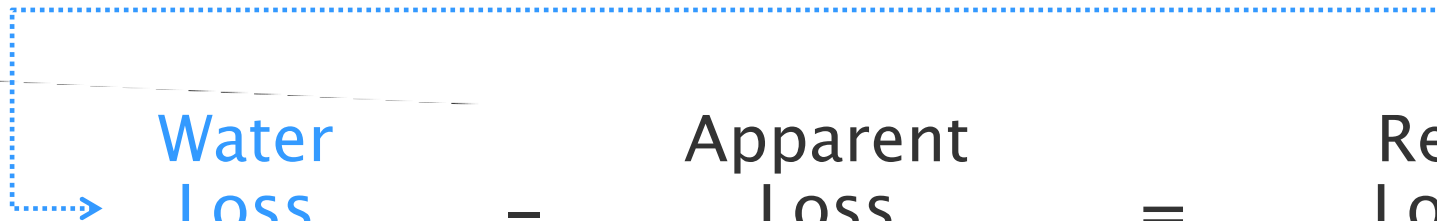
Customer  
Consumption  
Volume



=

Water  
Loss  
Volume

Water  
Loss  
Volume



–

Apparent  
Loss  
Volume



=

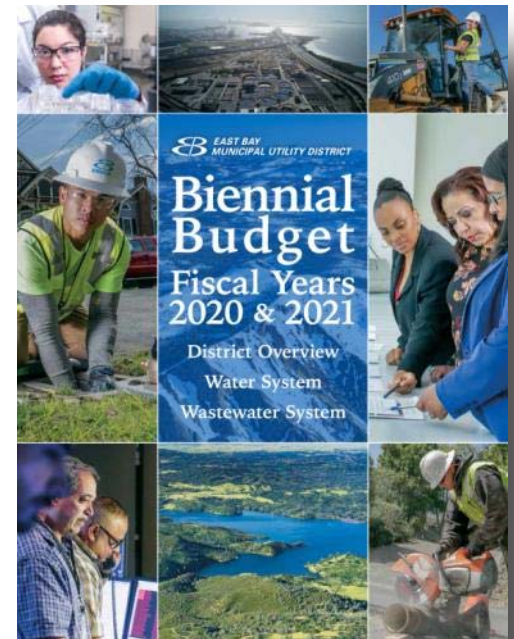
Real  
Loss  
Volume



# Capital Improvement Program

## CIP Budget for Water Loss Control

- Meter replacement
- Leak detection
- Pressure management
- Water loss control master plan



# Apparent Losses

## Large Meters

- Large meters for customers and water treatment plants
- More accurate water loss auditing
- Annual testing of flow meters



# Apparent Losses

## Meter Replacement & Testing

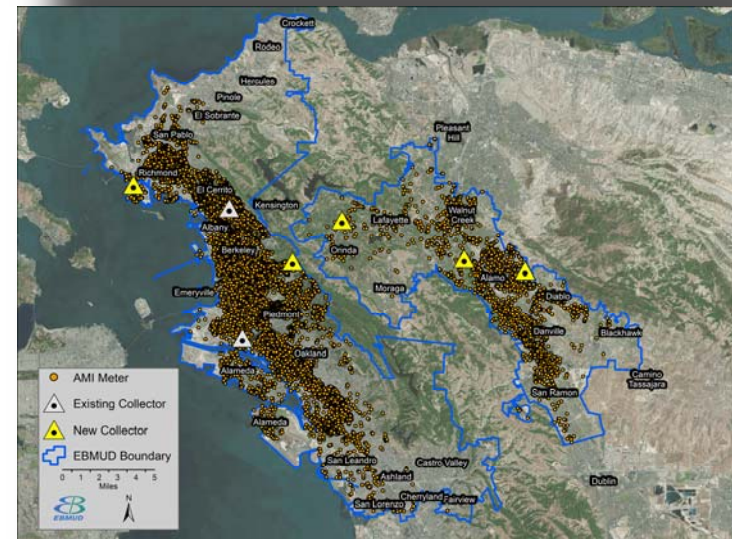
- Meter testing provides the basis for future replacement rates
- Increased meter replacement in FY20-24



# Apparent Losses

## Advanced Metering Infrastructure (AMI)

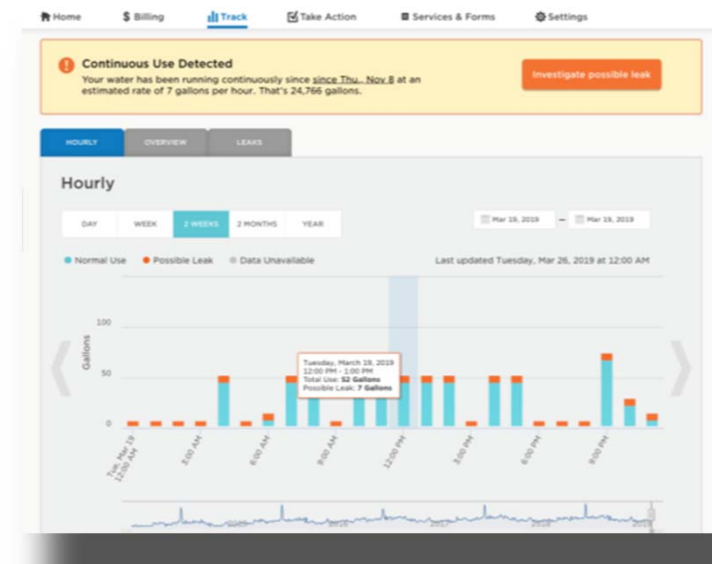
- AMI pilot includes 13,000 accounts
- Purpose: Provide AMI data to quantify water and energy savings
- \$1.25M in grant funding for two studies



# Apparent Losses

## Next Steps for AMI

- One year AMI pilot
- Quantify water and energy savings
- Evaluate the business case for a District-wide AMI project



*Leak Alert  
on Website*



*Leak Alert  
Text Message*

# Real Losses

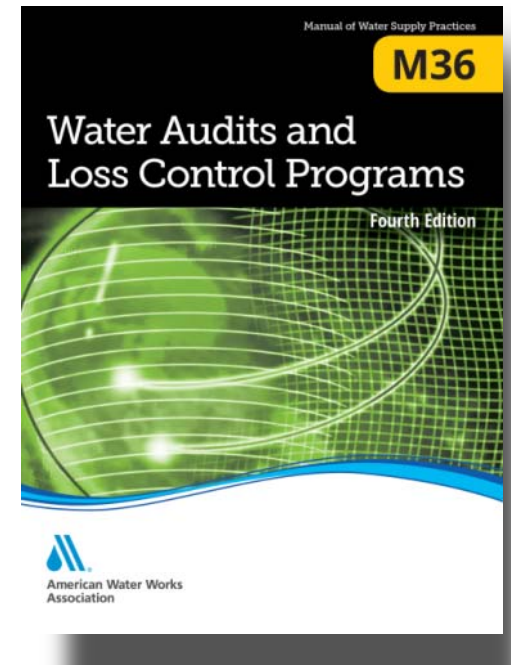


# Real Losses



# Strategies to Address Real Losses

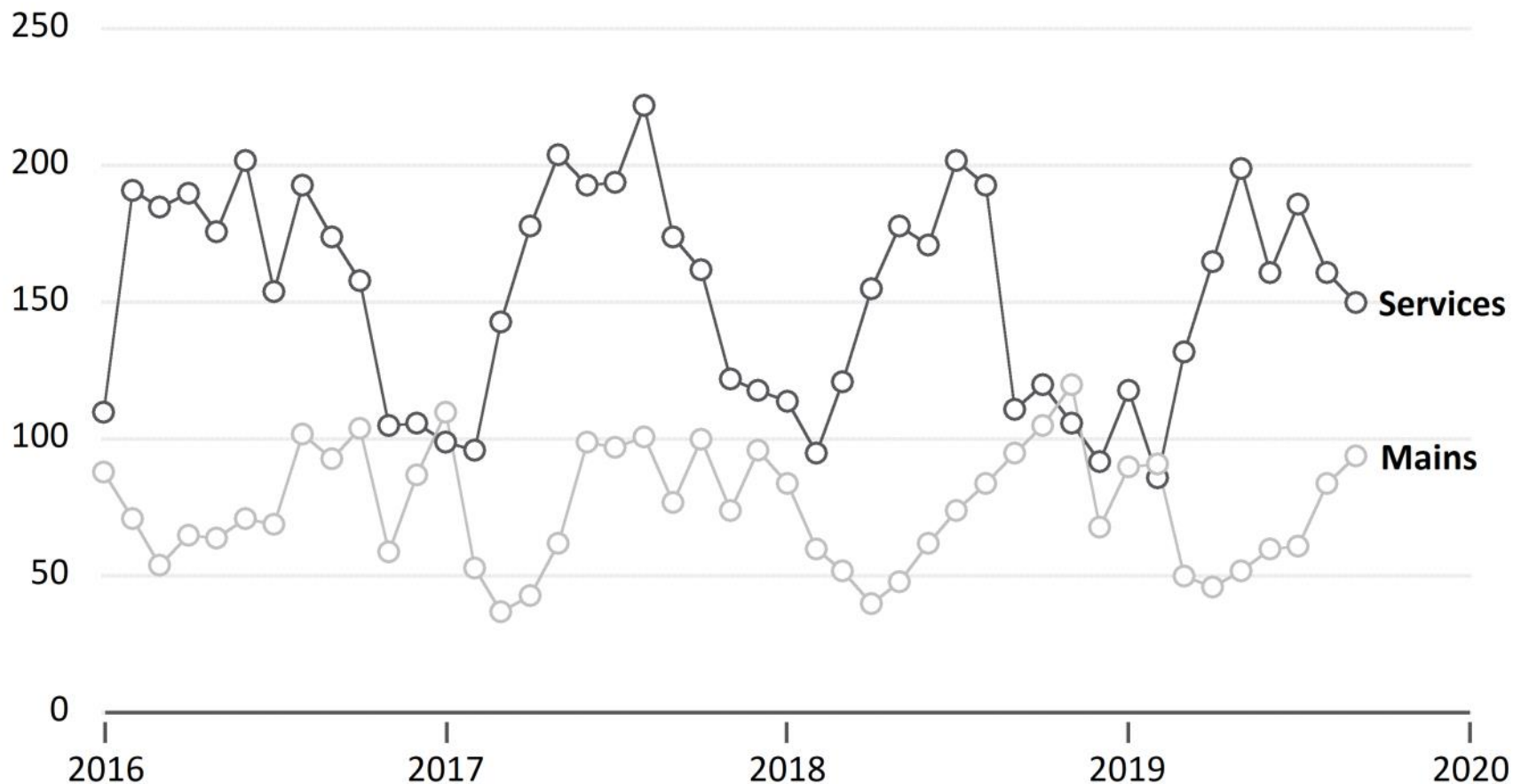
- Active leak detection
- Pressure management
- Speed & quality of repairs
- Infrastructure management



# Real Losses

## Reported Leaks

No. of Main Breaks & Service Failures



# Active Leak Detection

## Automated Acoustic Leak Detection

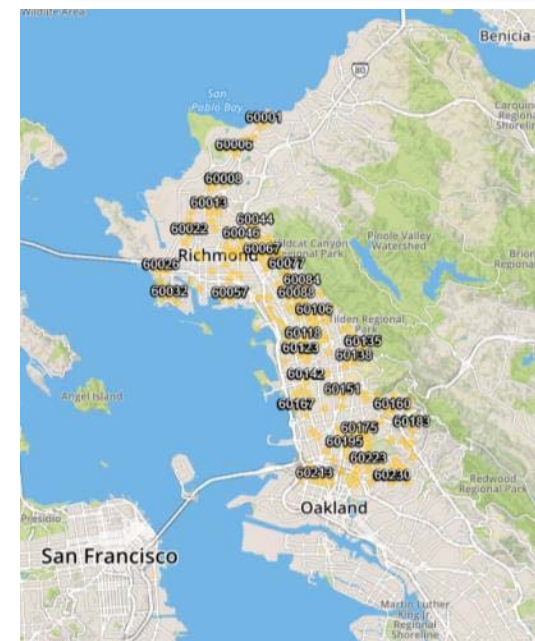
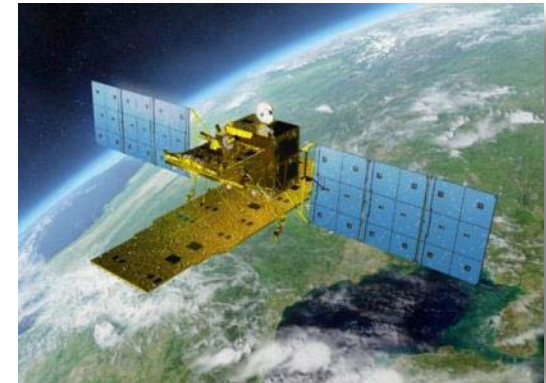
- Finds leaks before they surface
- Reduces water loss
- Protects the environment and property
- Found over 200 leaks
- Quick payback



# Active Leak Detection

## Satellite Leak Detection

- Uses satellite imagery
- Quickly survey distribution system
- Not affected by pipe diameter
- District was the first utility in North America to use the technology
- Not a substitute for acoustic leak detection but it is a complementary method



# Active Leak Detection

## Manual Acoustic Leak Detection

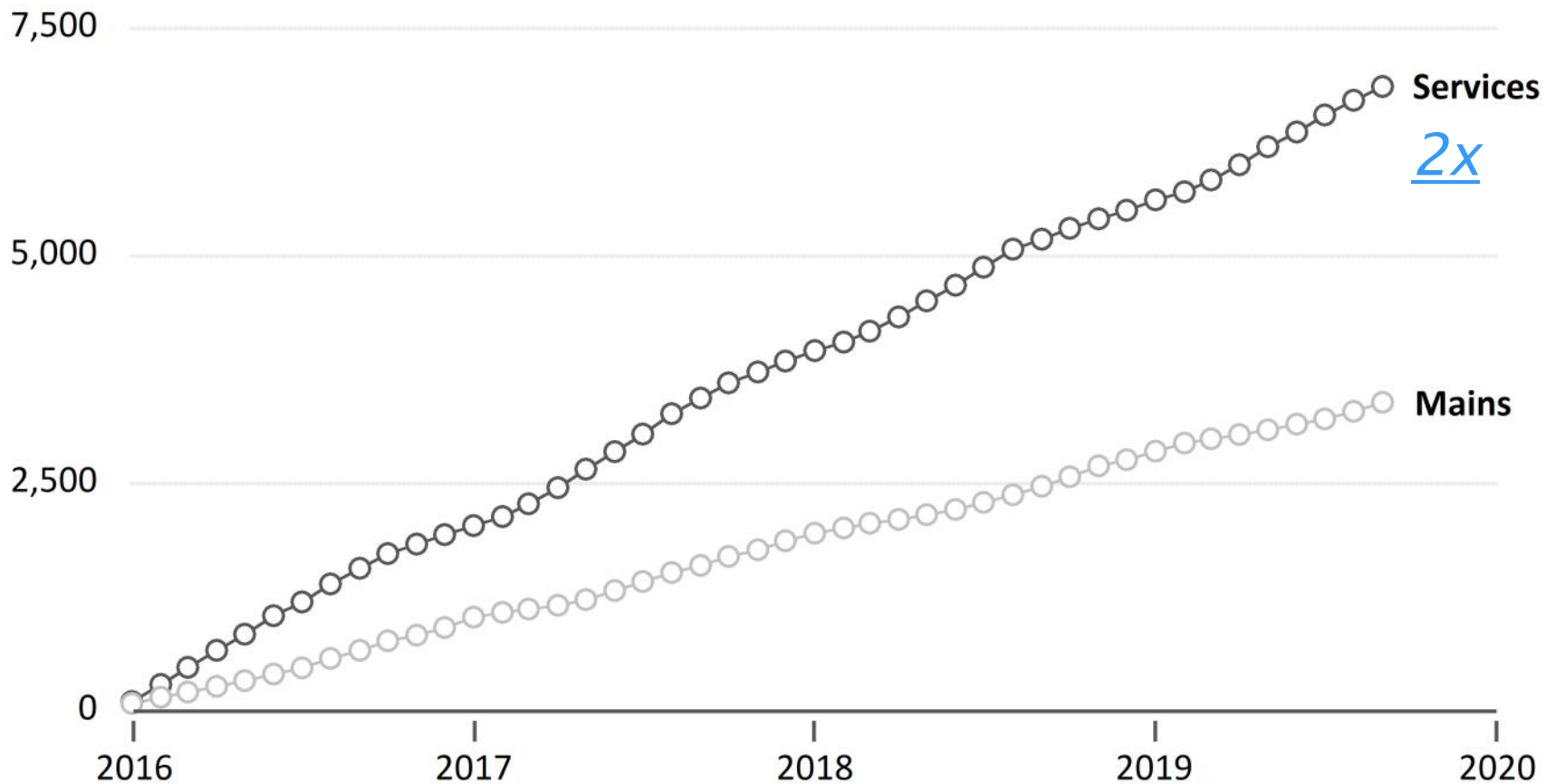
- Manual acoustic leak detection used as last step
- State-of-the-art leak detection equipment
- Staff is experienced at pinpointing leaks before leaks surface



# Real Losses

## Reported Leaks

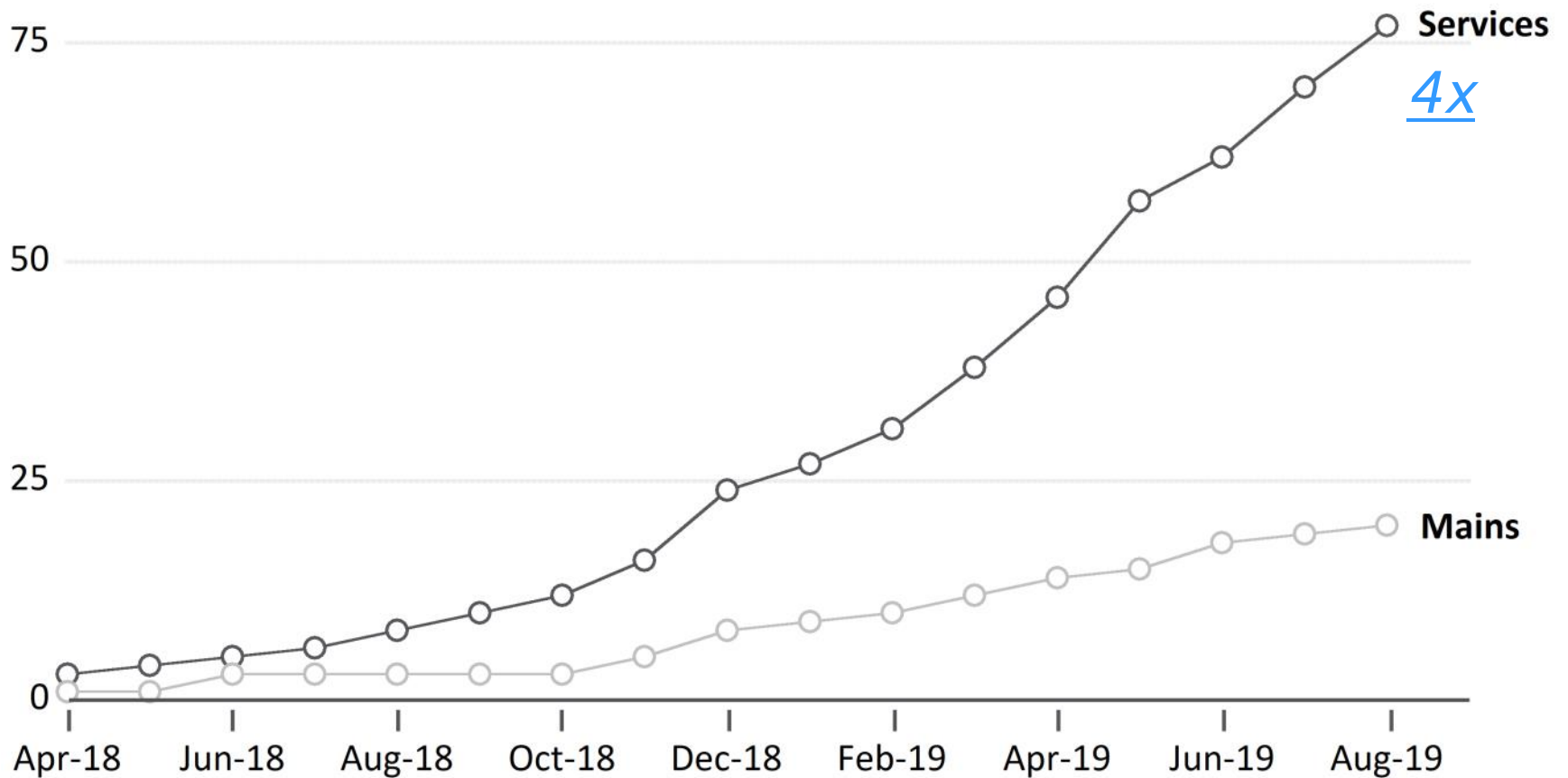
Total No. of Leaks on Mains & Services



# Real Losses

## Unreported Leaks

Total No. of Leaks on Mains & Services



# Pressure Management

## Pressure Stabilization and Reduction

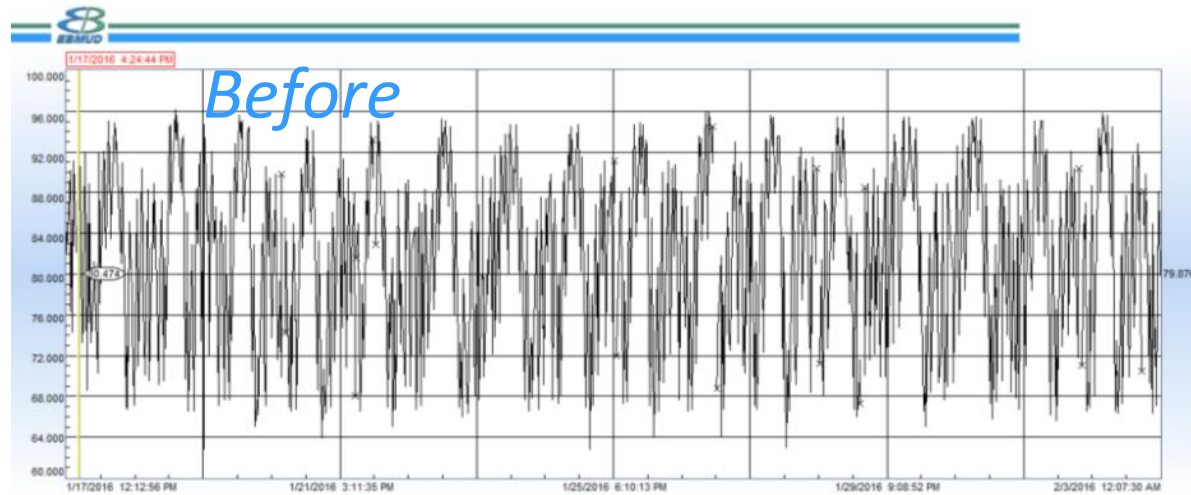
- Concept
  - Reduce pressure
  - Minimize pressure swings
- Benefits
  - Extends the life of pipelines
  - Reduces leakage
  - Reduces main breaks
  - Improves customer service



Dwight Regulator  
& FCS Pegasus+

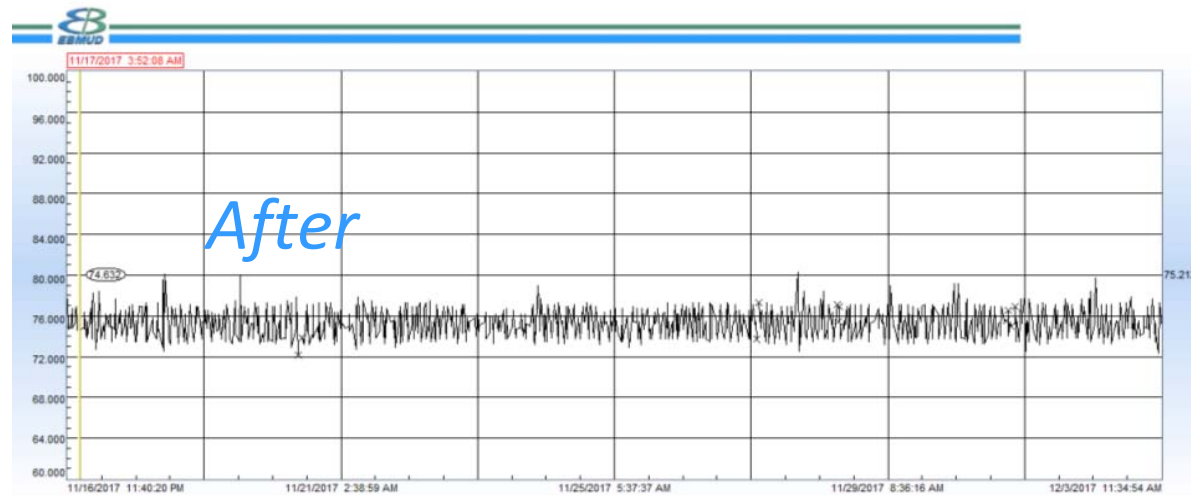
# Pressure Management

## Pressure Stabilization and Reduction



Max.  
Pressure  
96 psi

33 psi



Max.  
Pressure  
80 psi

5 psi

$\Delta = 16 \text{ psi}$

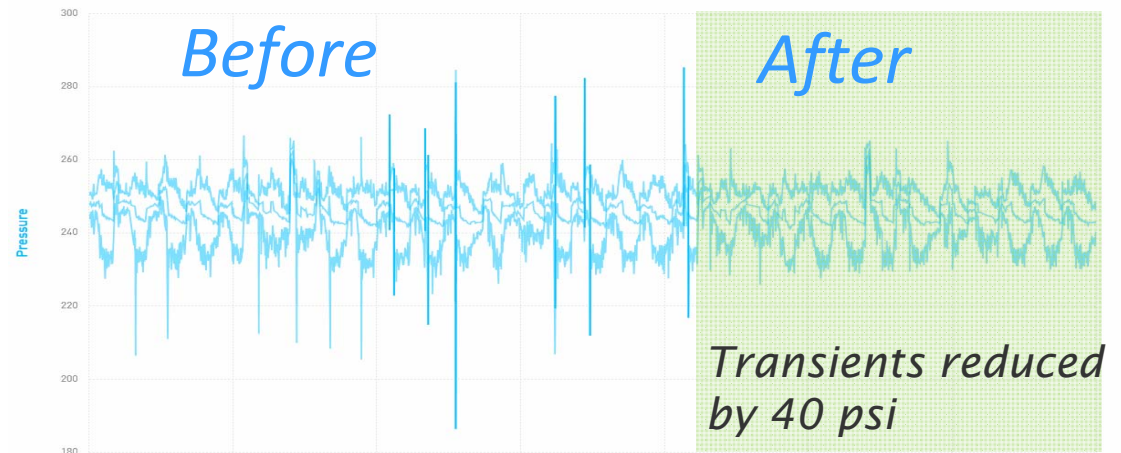
# Pressure Management

## Pressure Transients

- Monitors pressure swings to identify sources
- Over 100 units installed
- Avoids main breaks with little cost

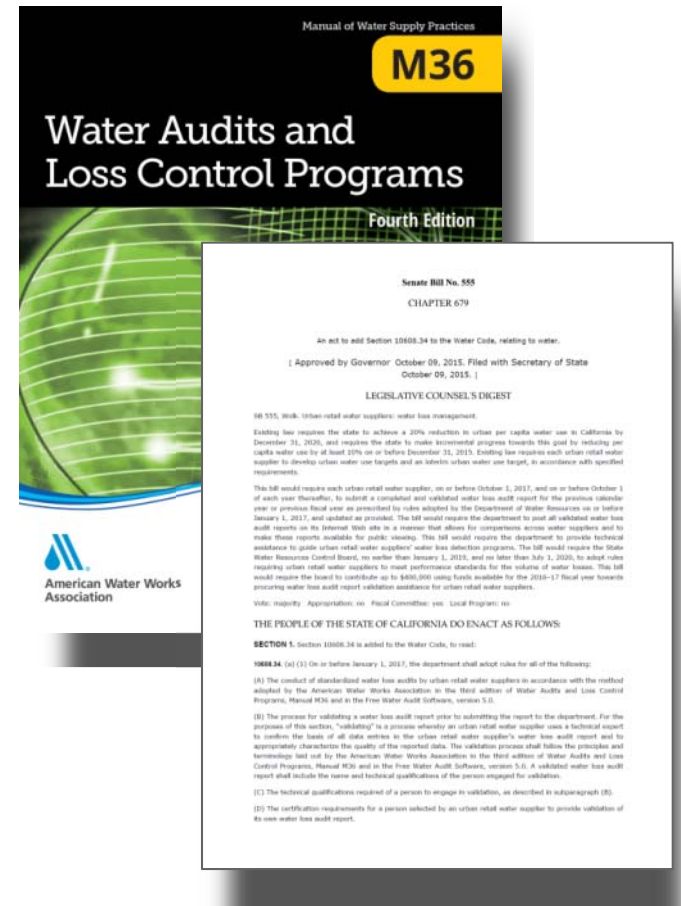


Pressure Monitor



# Water Loss Control Next Steps

- Prepare Water Loss Control Master Plan
- Contract for award at February 11 Board meeting
- Complete master plan September 2020



# Speed and Quality of Repairs

## Overview

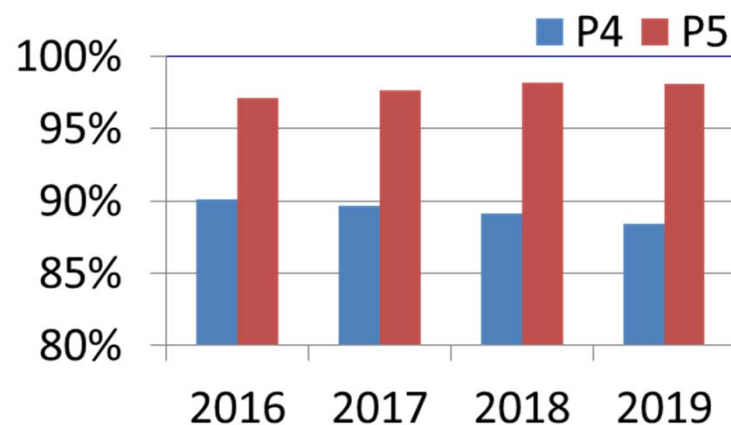
- Response time
  - Points of interest within 2 hours
  - Respond to main breaks within 1 hour
  - Timely completion of repairs
- Training
- Equipment and tools

# Speed and Quality of Repairs

## Main Break Response

### Main break response KPI

- P5: Repair 90% within 1 day
- P4: Repair 90% within 7 days
- Decline in P4 & P5 response time



# Speed and Quality of Repairs

## Pipeline Training Academy



Classroom  
Training

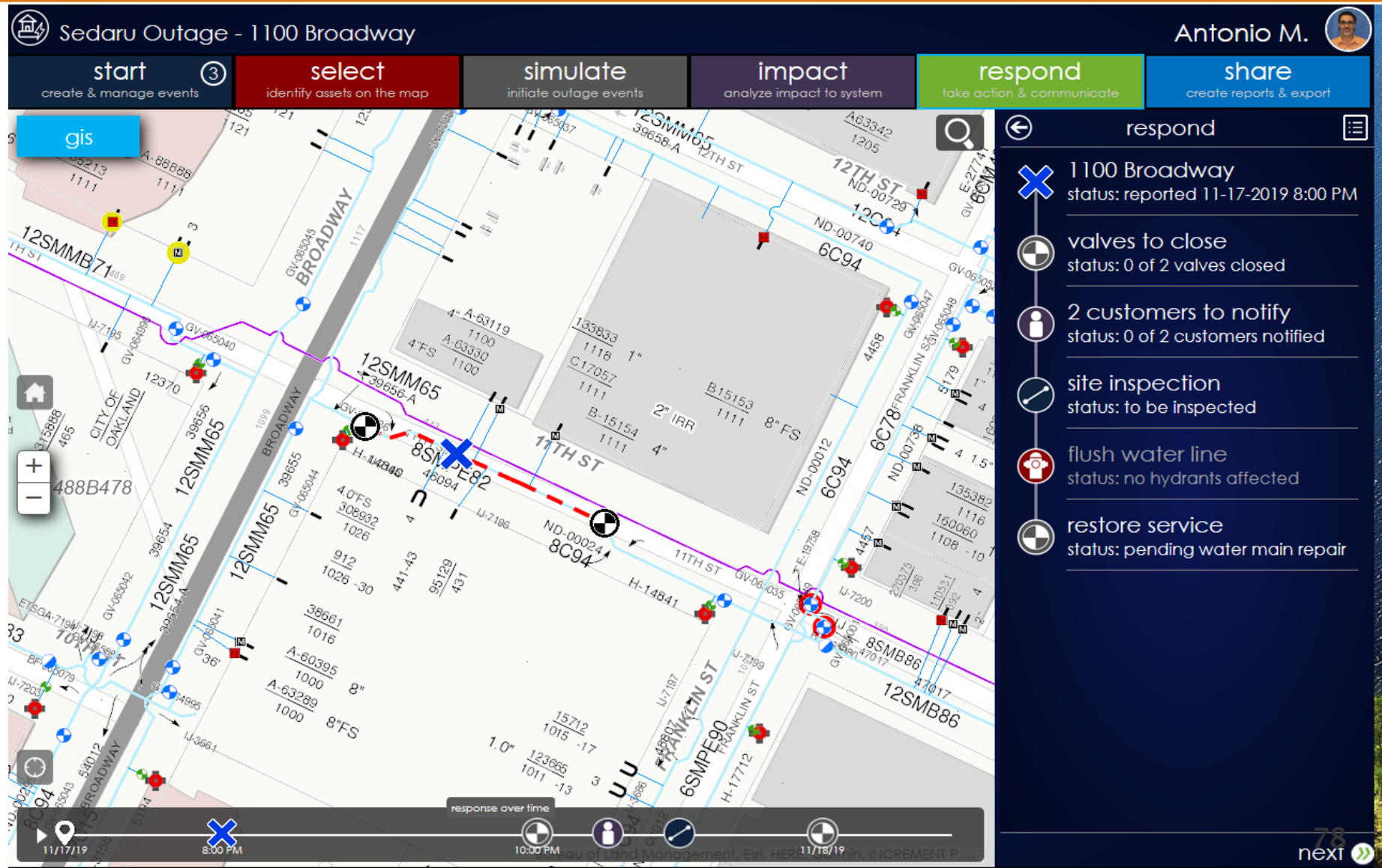


Field training



# Speed and Quality of Repairs

## Mobile Computing Tools



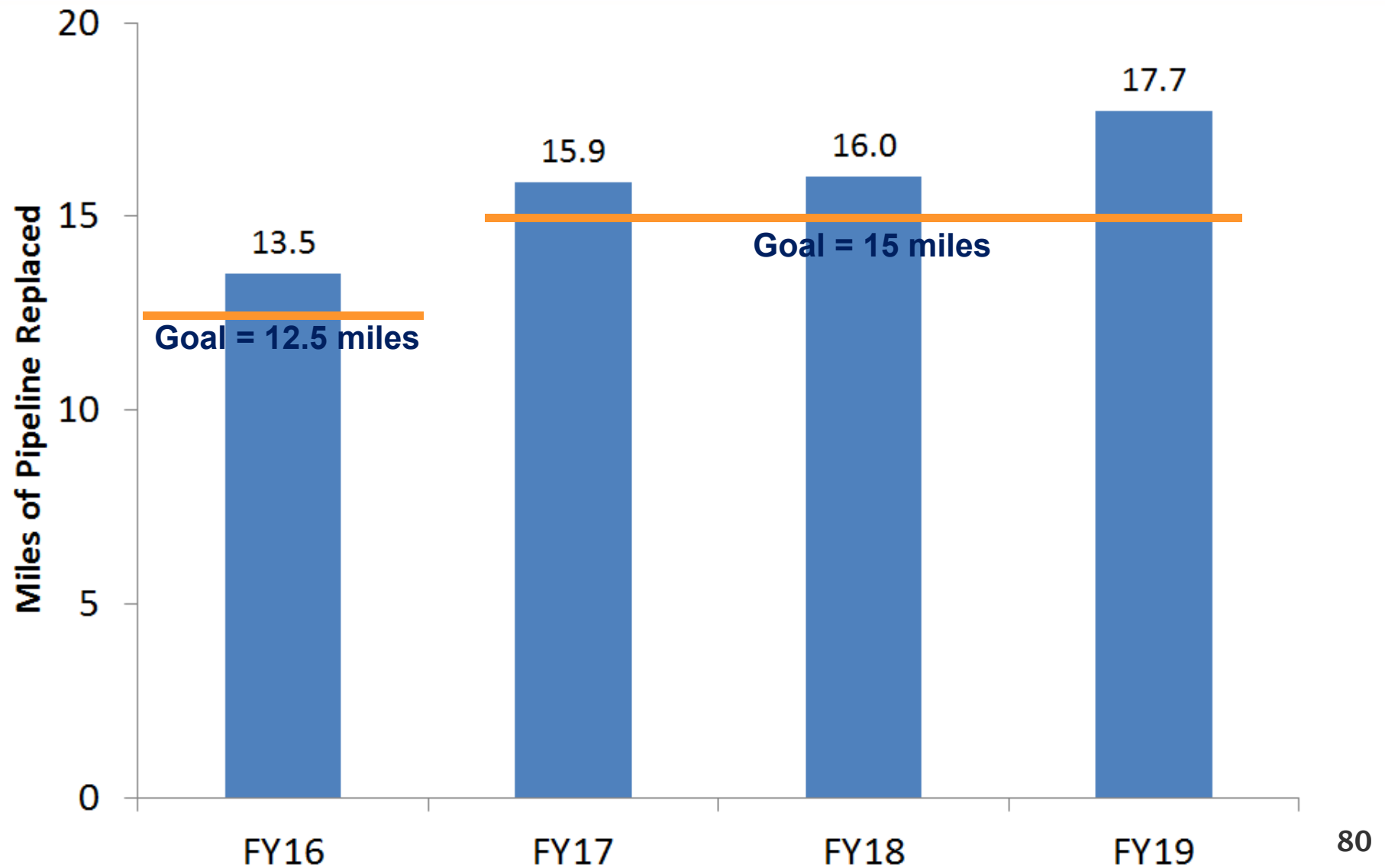
# Speed and Quality of Repairs

## Tools & Equipment



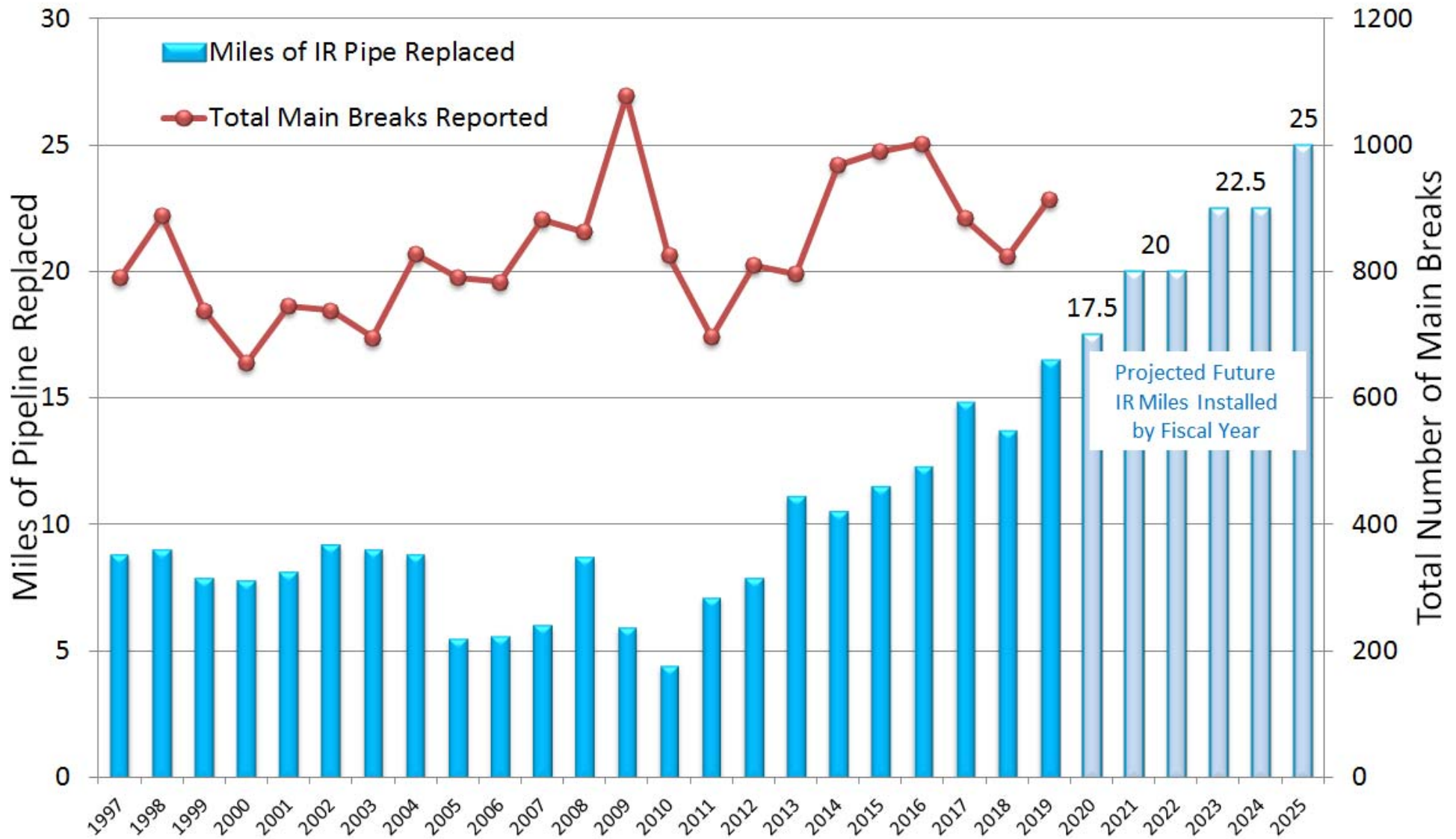
# Infrastructure Management

## Pipeline Rebuild Program



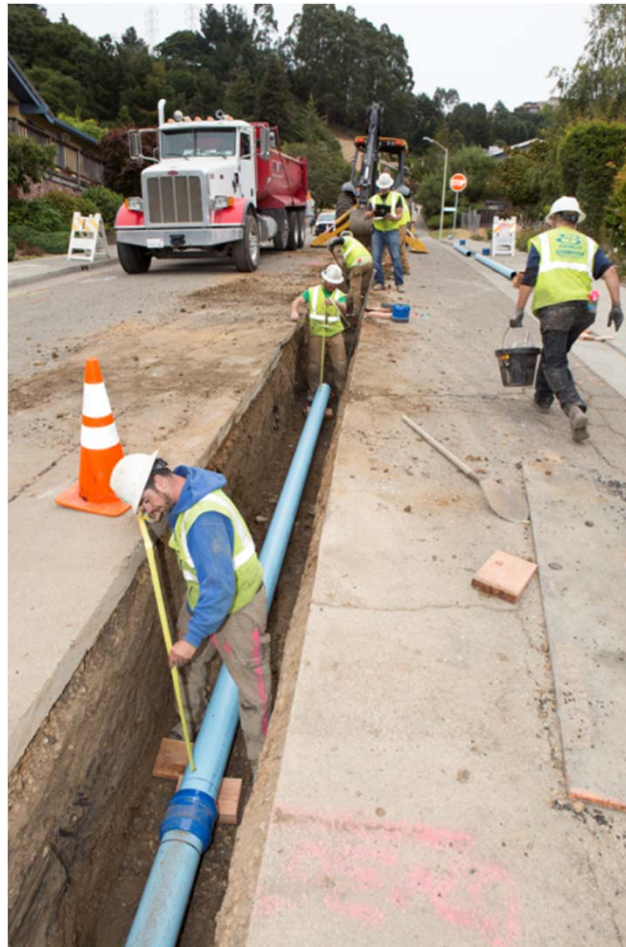
# Infrastructure Management

## Pipeline Rebuild: Progress and Plan



# Infrastructure Management

## Pipeline Rebuild: Maximize Efficiency/Performance

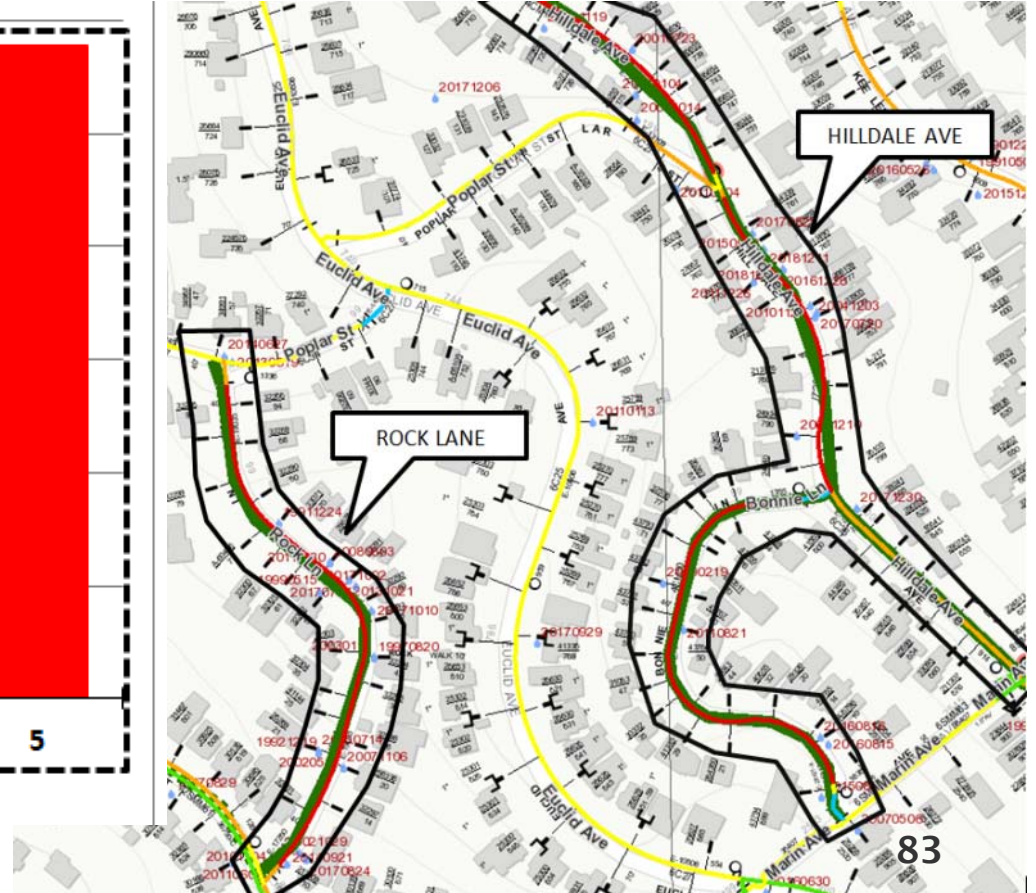
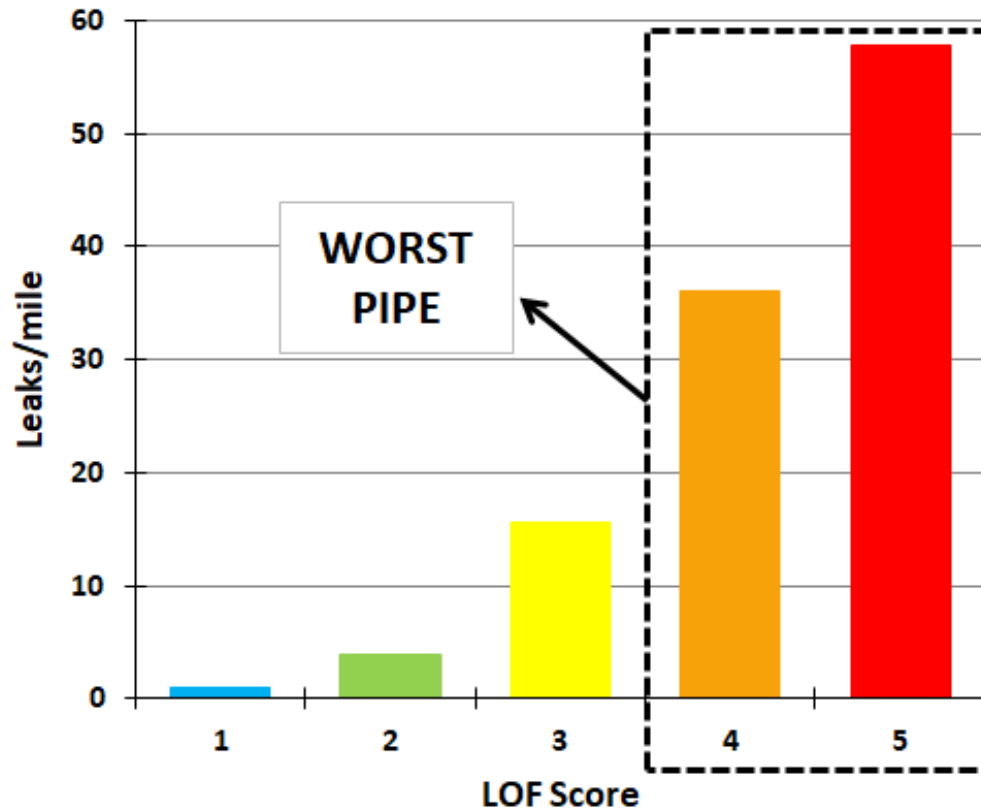


- Maintain focus on efficiencies
- Implement lessons learned
- Metrics

# Infrastructure Management

## Pipeline Rebuild: Select the Right Pipes

- Maximize replacement of bad pipe
- Prioritize high Likelihood of Failure (LOF) pipe
- Consider Consequence of Failure in finalizing project



# Infrastructure Management

## Pipeline Rebuild: Select Pipeline Materials



### Long-Term Pipeline Replacement Program

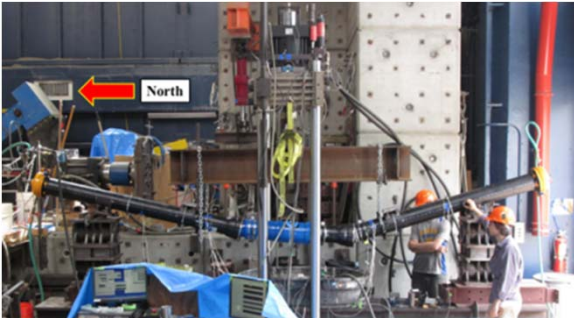


- Design
- Construction
- Maintenance



# Infrastructure Management

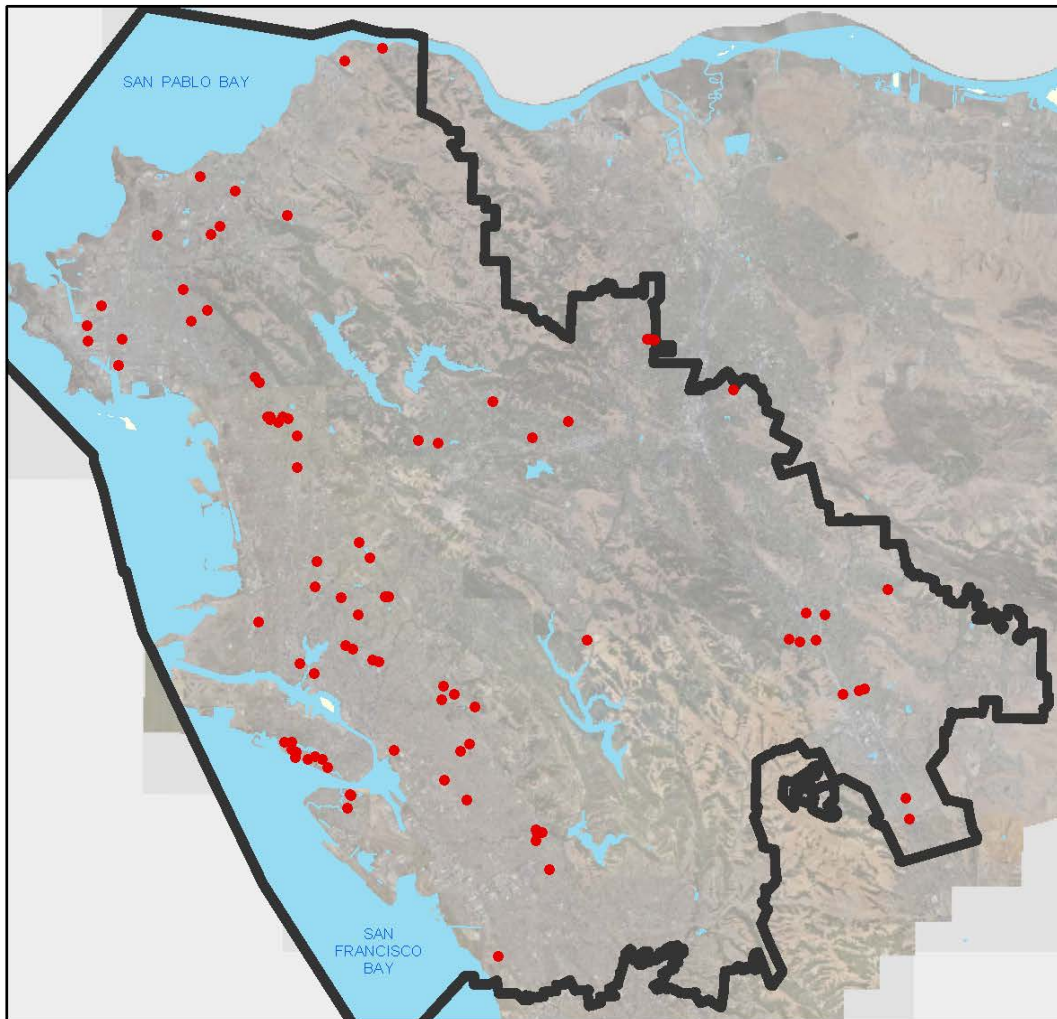
## Pipeline Rebuild: Designing for Resiliency



- Seismic design
- Collaboration with Cornell University
- Testing at UC Boulder

# Infrastructure Management

## Corrosion Control – Metallic Water Mains

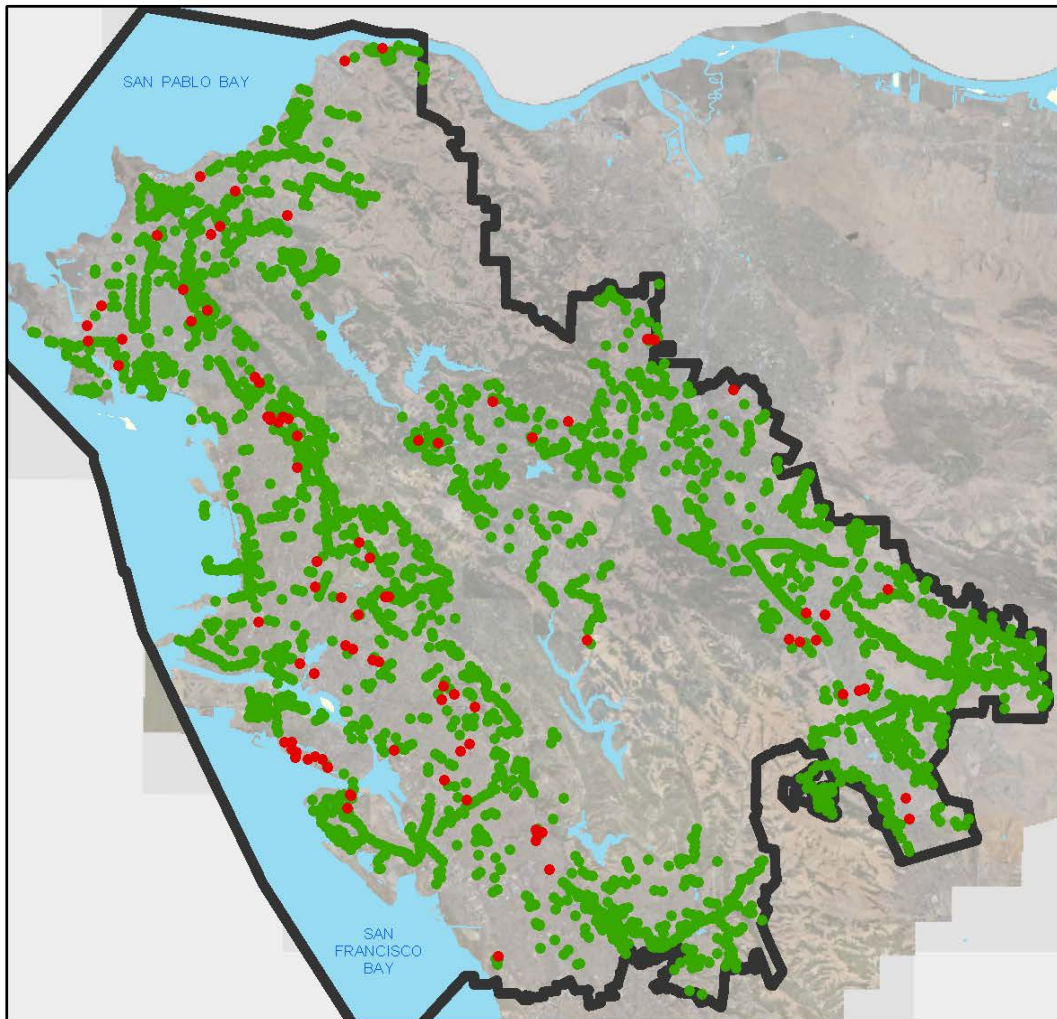


- Impressed Current Cathodic Protection
  - Over 100 Systems in Service Area
  - Protect Steel Mains (Transmission)

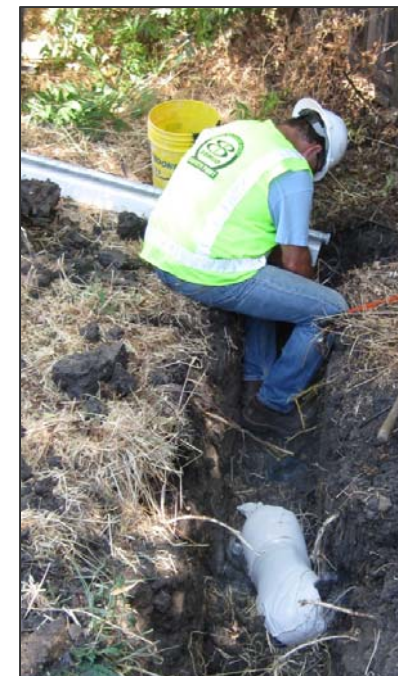


# Infrastructure Management

## Corrosion Control – Metallic Water Mains

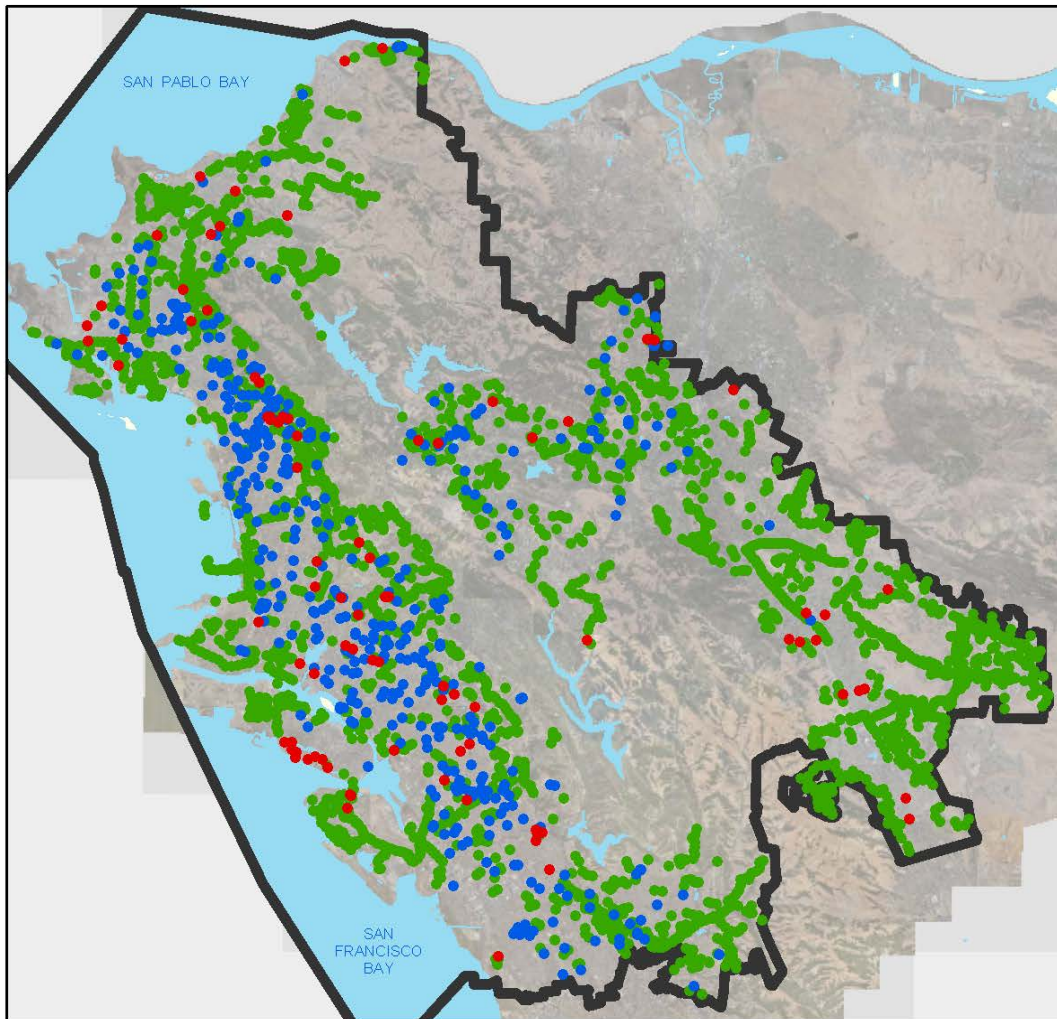


- Impressed Current Cathodic Protection
  - Over 100 Systems in Service Area
  - Protect Steel Mains (Transmission)
- Galvanic Cathodic Protection
  - Over 3,000 Test Stations
  - Protect Steel Mains (Distribution)



# Infrastructure Management

## Corrosion Control – Metallic Water Mains

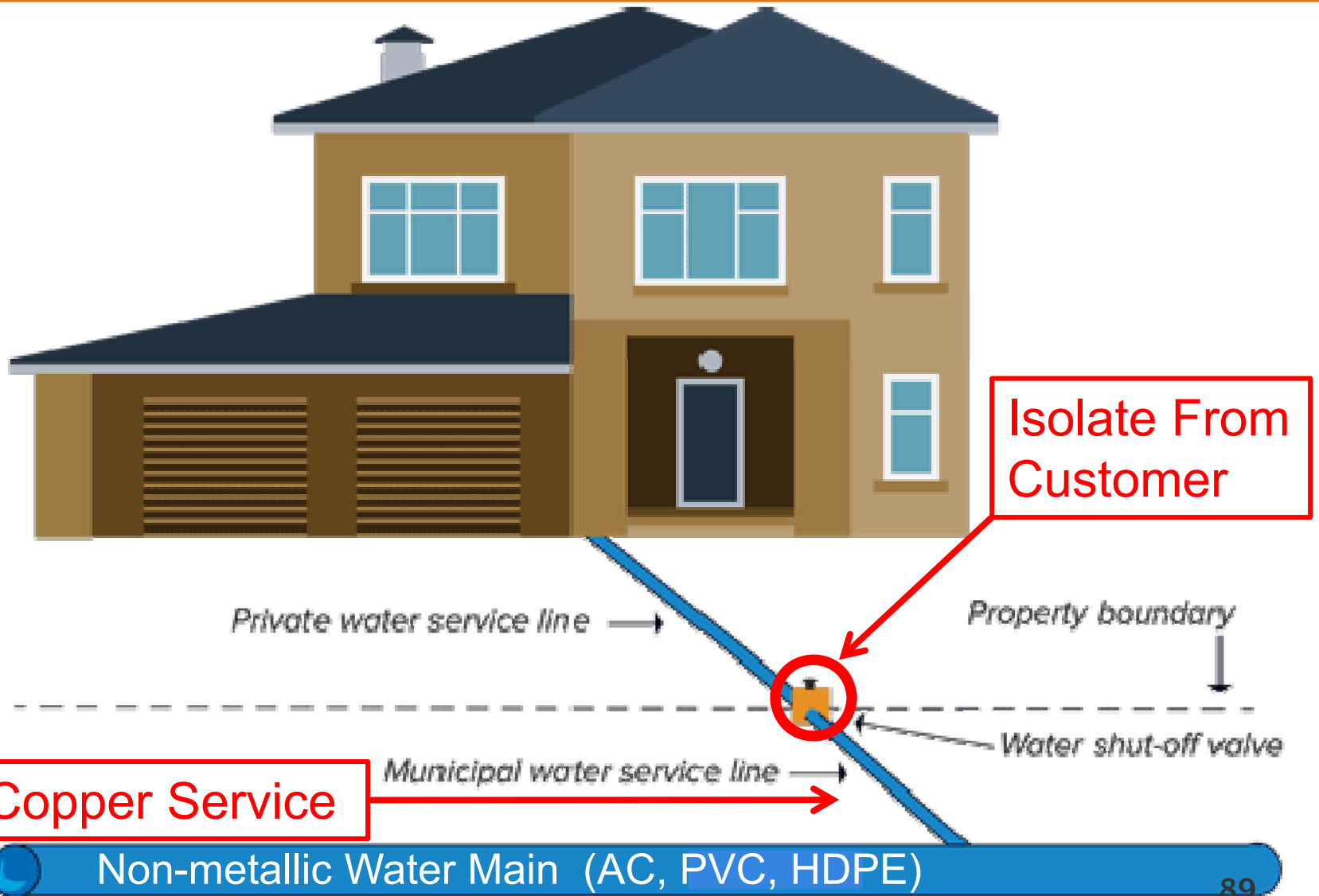


- Impressed Current Cathodic Protection
  - Over 100 Systems in Service Area
  - Protect Steel Mains (Transmission)
- Galvanic Cathodic Protection
  - Over 3,000 Test Stations
  - Protect Steel Mains (Distribution)
- Metallic Main Break Anode Installs
  - Over 400 Cast Iron Main Breaks
  - Protects Steel and Cast Iron Mains



# Infrastructure Management

## Corrosion Control – Copper Services

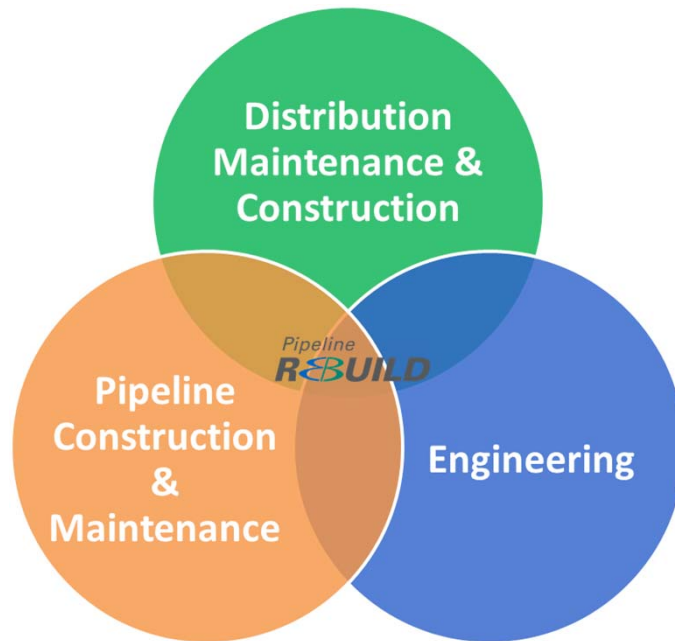


# Infrastructure Management

## Moving Forward



- Common goal
- Reduce main breaks, minimize water loss
- Replace the right pipe





# **Resource Considerations**

# Infrastructure Staffing (FY18-21)



## Infrastructure

Field and Operations Staff	38
Engineering Design/Support	19
<b>Total</b>	<b>57</b>

## FM&O

Heavy Transport Operator	12
Heavy Equipment Operator	1
Truck Driver II	1
LT Positions	6
<b>TOTAL</b>	<b>20</b>

- Additional staffing or funding to support
  - Pipeline Rebuild
  - Pipeline Maintenance
  - Other infrastructure construction support
- Additional staffing or funding to reduce FM&O costs

# Equipment Additions (FY18-21)



Function	Quantity	Cost
Maintenance	5	\$198,000
Operations	1	\$30,000
Pipeline Rebuild	35	\$3,800,000
FM&O	22	\$4,109,000
<b>Total</b>	<b>63</b>	<b>\$8,137,000</b>

# What is FM&O?



- Includes equipment and personnel
- FM&O services
  - Paving and concrete
  - Dump trucks
  - Backhoes
  - Vacuum excavation
  - Sweeping/Grinding
  - Traffic control
  - Welding
  - Saw cutting

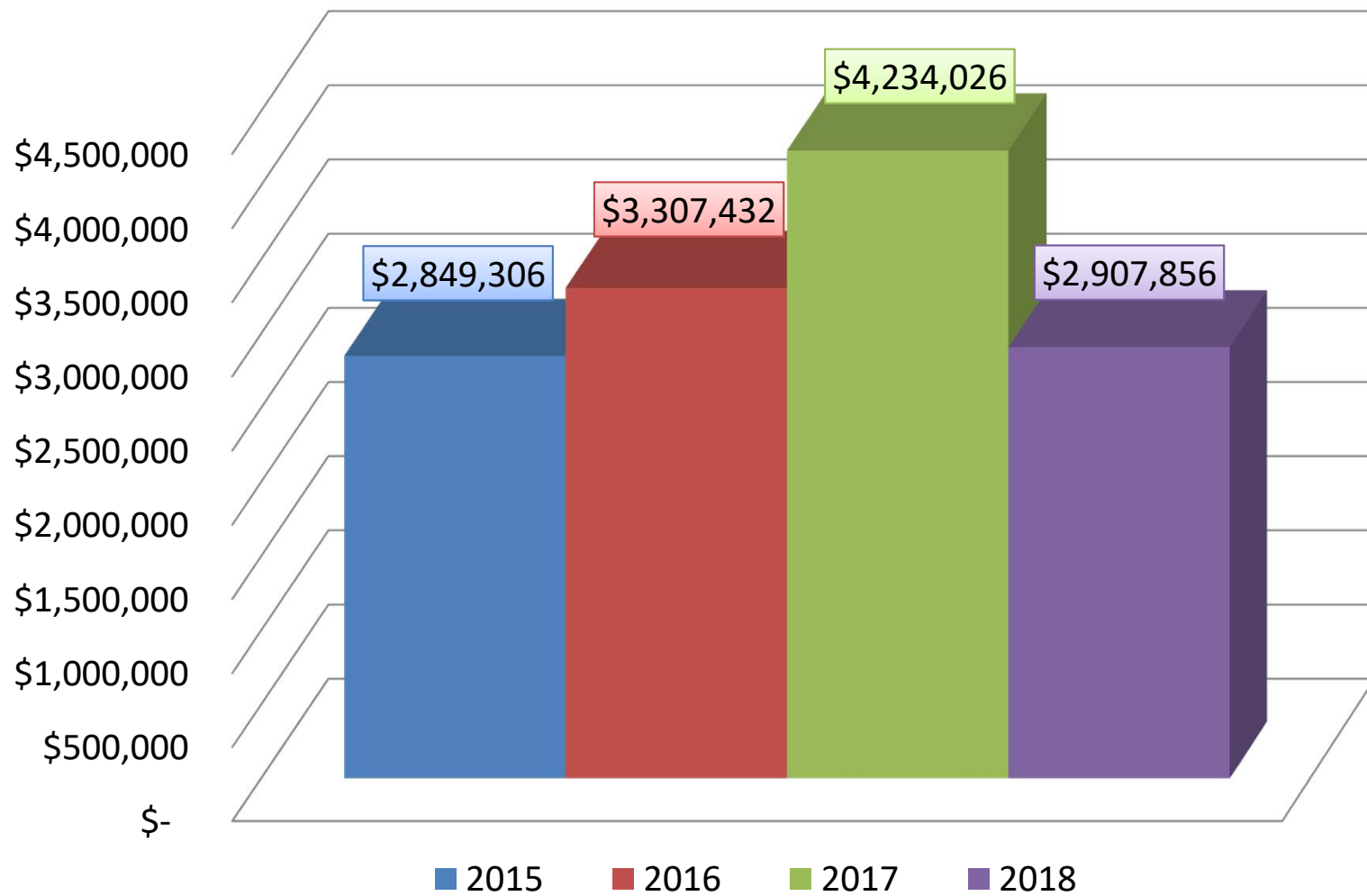


# Use of FM&O Resources

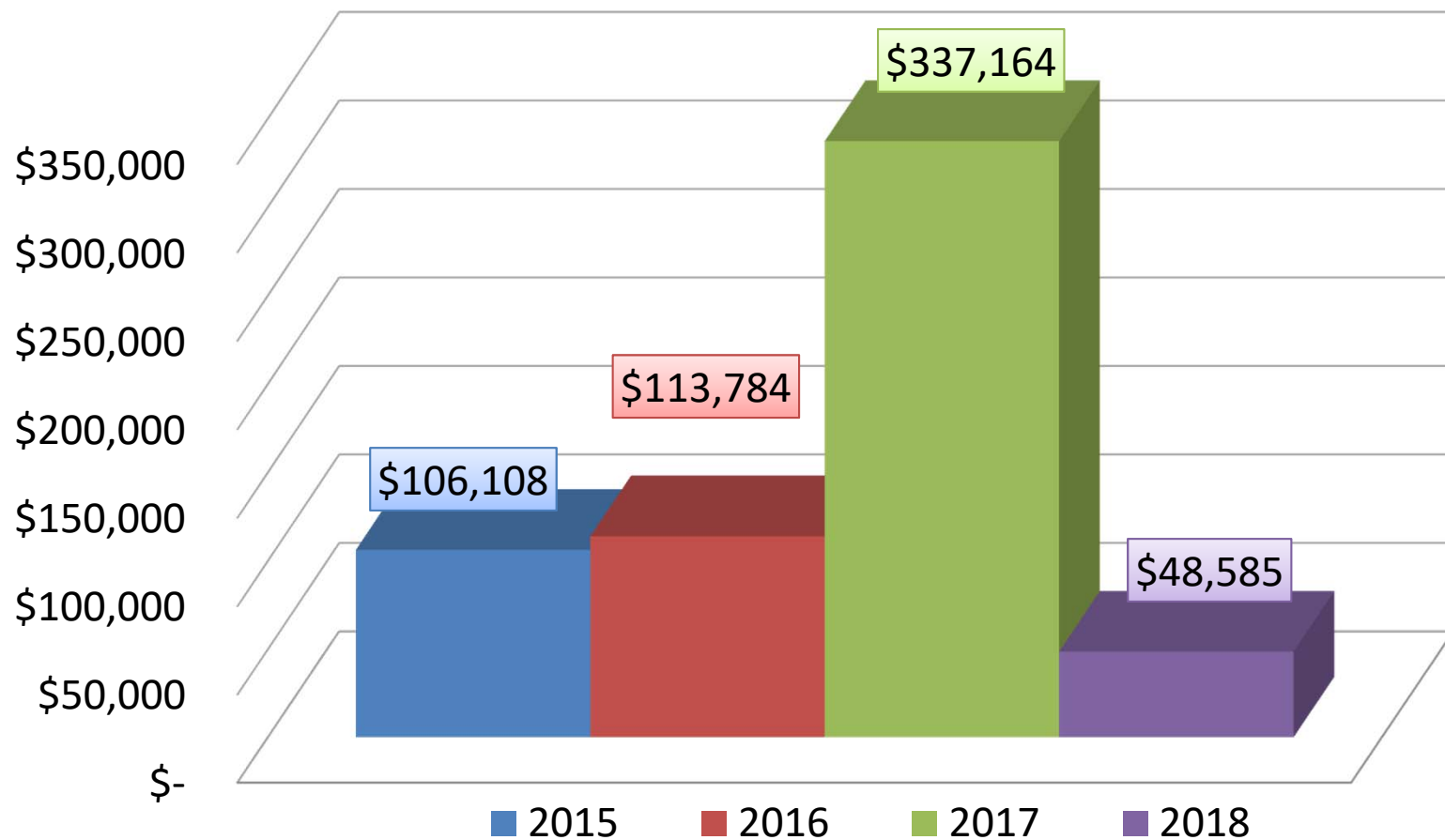


- Peak workloads
- Specific/specialized service
- Employee absences (e.g., injuries, fatigue, vacations)
- Joint paving projects with cities
- Backlog reduction (e.g., paving delays due to inclement weather)

# Dump Trucks



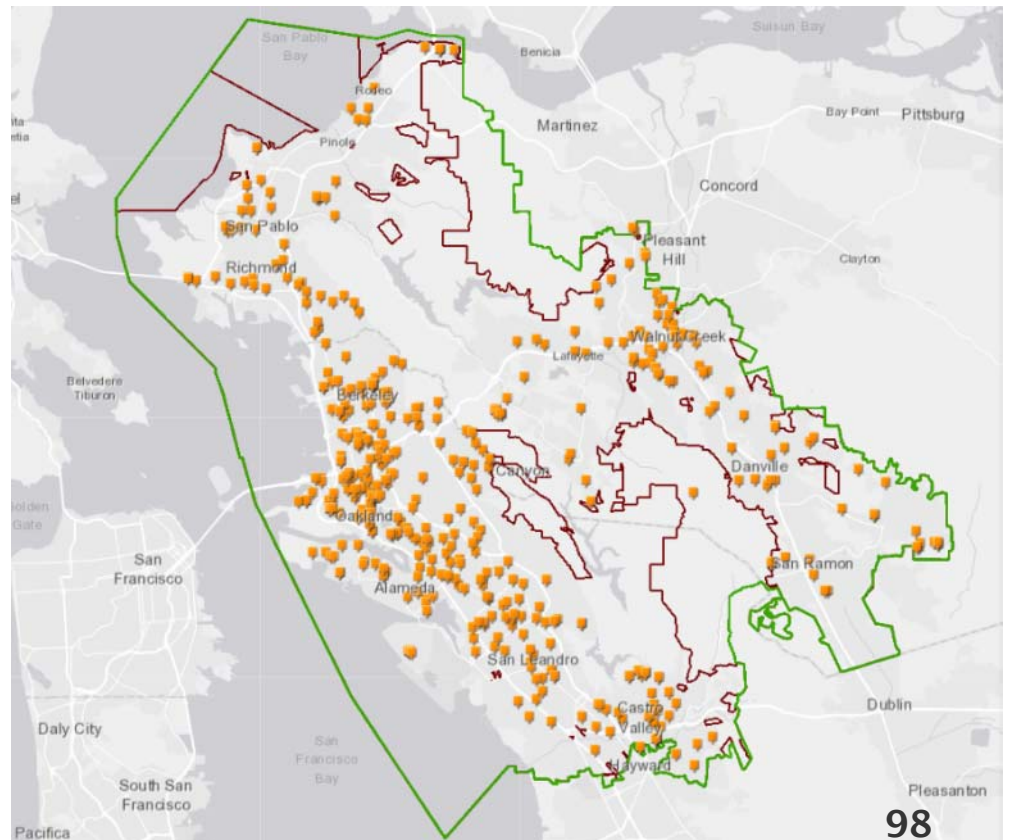
# Backhoe Services



# Applications in Process



- Water Service Applications
  - 3-5 new applications submitted online per day
  - Push for ADU and smaller infill projects
- Online Water Service Application
  - Improves timeliness
  - Better communication
- Resource Balance
  - Maintain infrastructure
  - Meet customer commitments



# Going Forward



- Finish hiring and equipment purchases
- Complete pilot studies
- Implement tracking software
- Provide recommendations in FY22/23 budget



# **Yard Development**

# Yard Developments

- More storage & office space needed for growth of Pipeline Rebuild
- Choosing strategic locations to reduce drive time



# Existing & Proposed Oakport

- Warehouse Storage
- Outdoor Storage
- Warehouse Offices
- Weld Shop
- + Pipeline Training Academy
- + New Service Yard

will increase space  
to accommodate  
Pipeline Rebuild





North Yard

- North Area
- East Area
- South Area
- Central
- Area

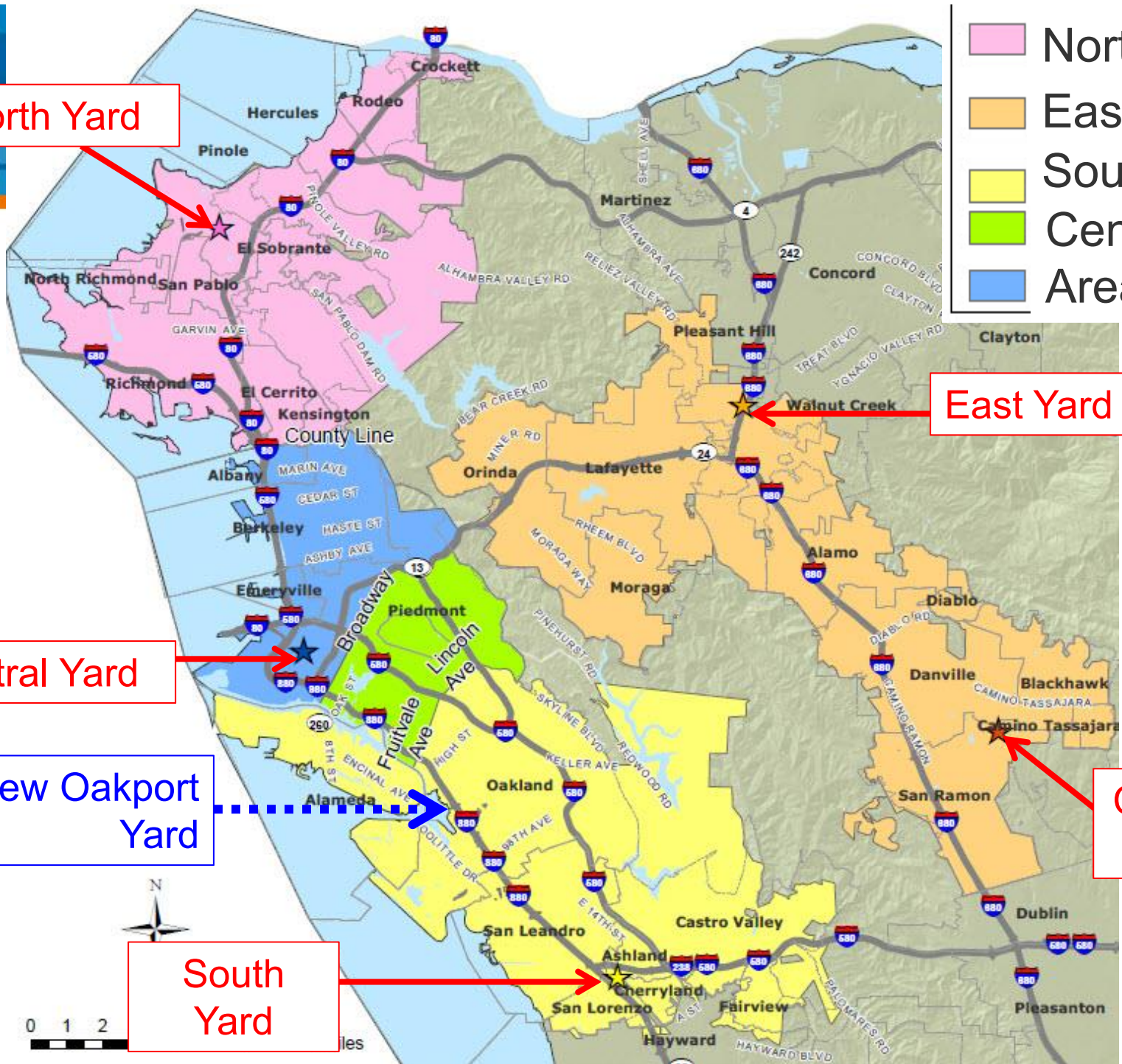
East Yard

Central Yard

New Oakport Yard

Castenada Yard

South Yard

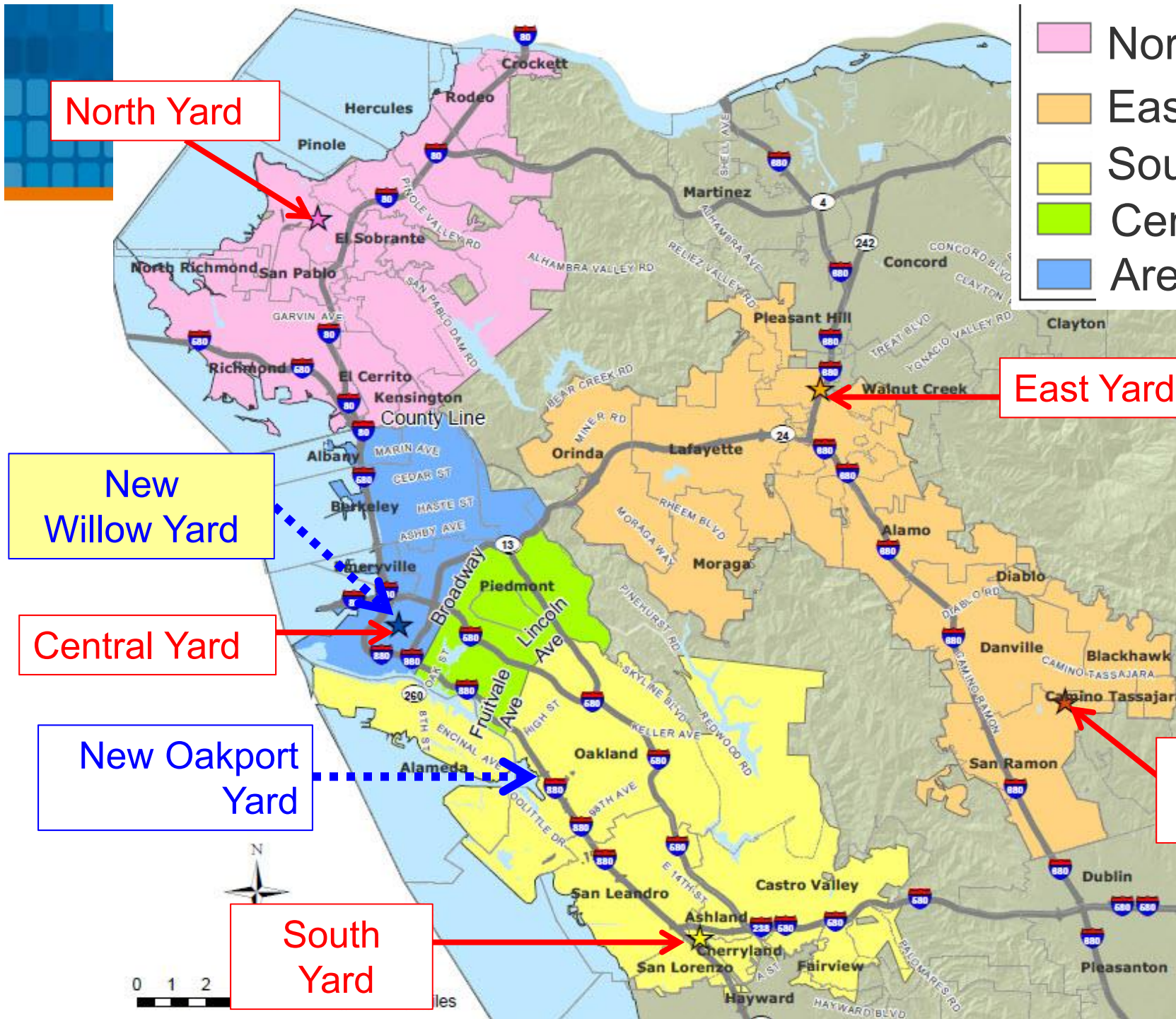


# Oakport Redevelopment





- North Area
- East Area
- South Area
- Central
- Area



# Willow Street Yard Development



**Willow St  
Property**

0.2 miles from current  
CMS Facility

- 2 minute drive
- 12 minute walk

**Adeline  
Facilities**

**Existing  
Central Yard**

# Willow Street Yard Development

- 1.8 acre site with 22' tall concrete perimeter wall
- Relocate Central Yard to rehabilitate and repurpose site
- Working with West Oakland Indicators Project

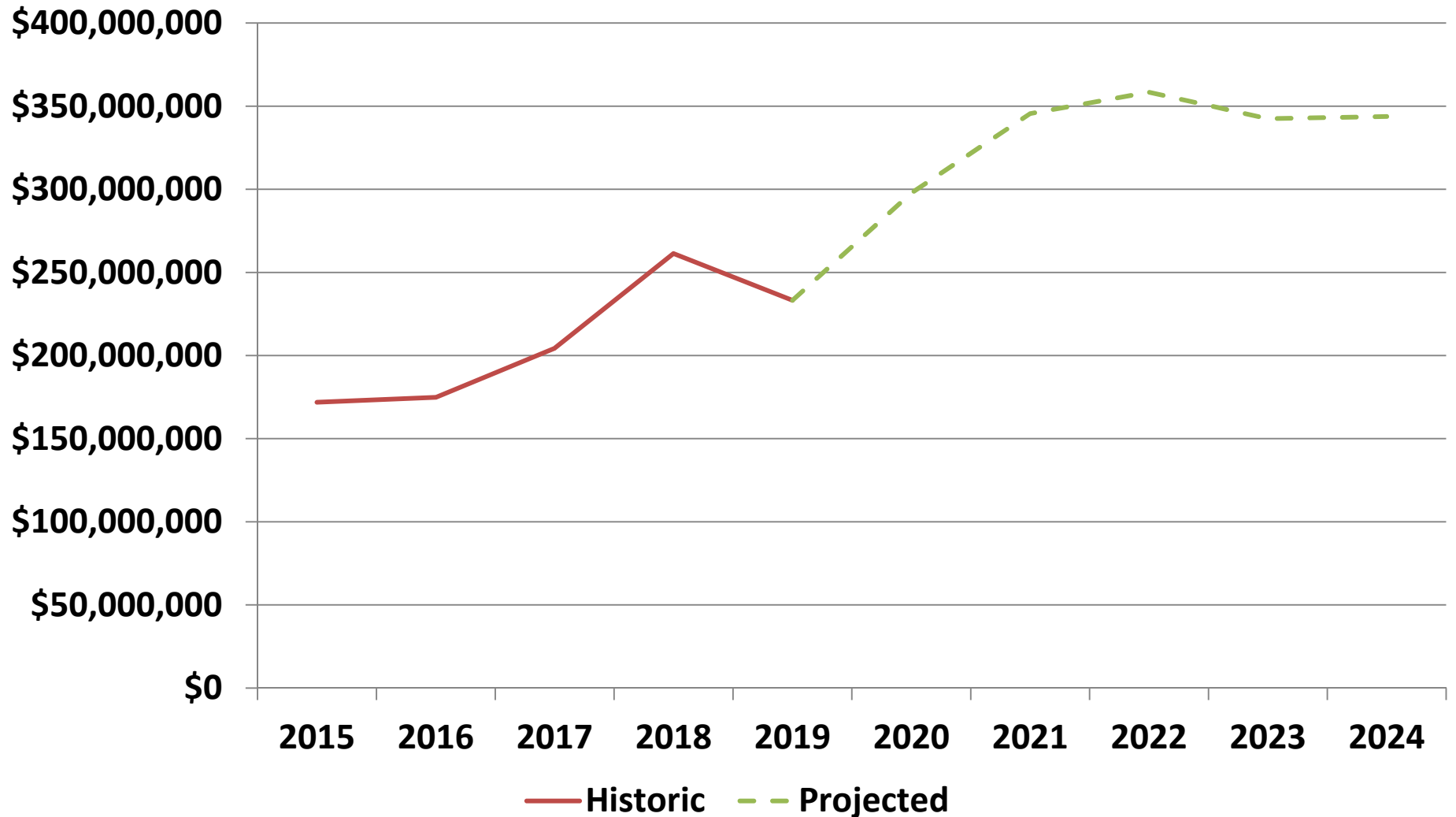




# **Design and Construction Management and Inspection**

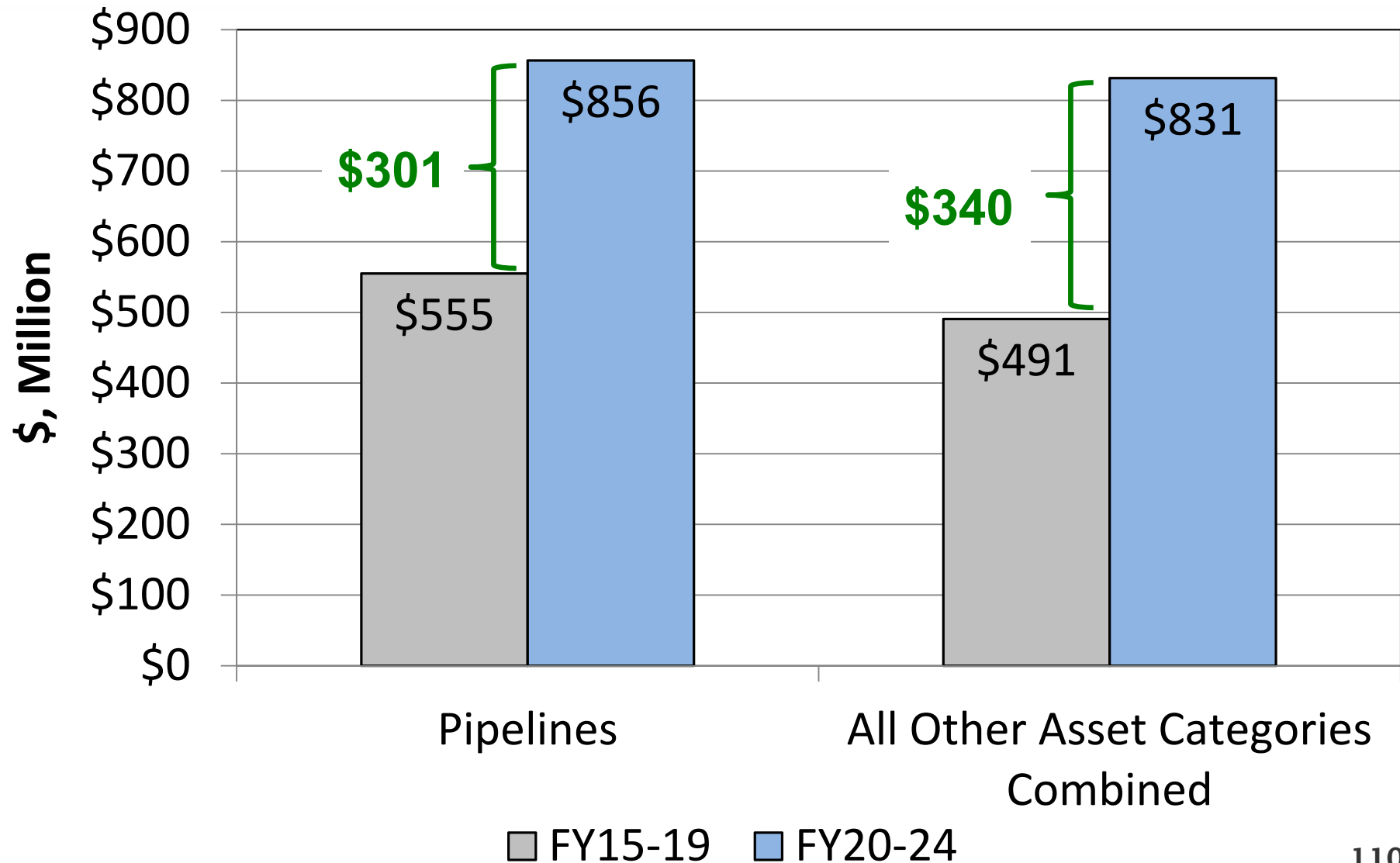
# Capital Improvement Program

## Historic and Projected Spending



# Capital Improvement Program

## Projected spending by asset class



# Capital Improvement Program

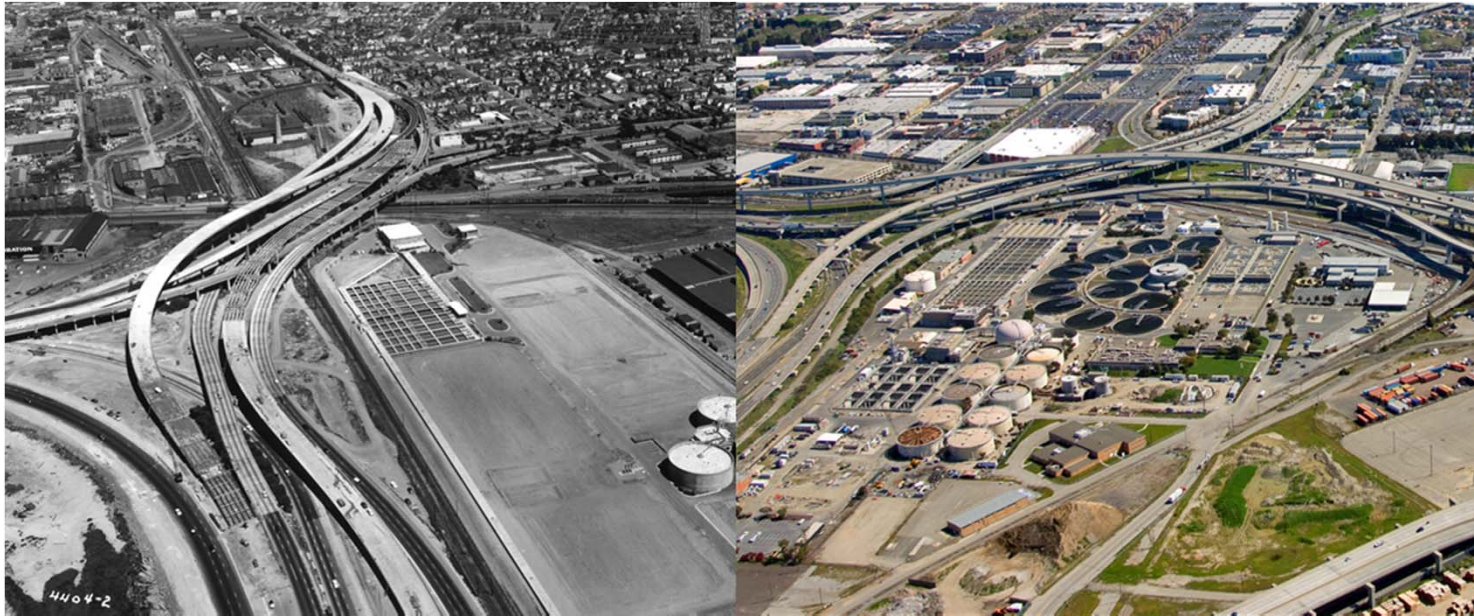
## Design, CM & Inspection Resources

- Pipeline Infrastructure addressed in FY20/21 budget
- Need to address other asset classes
- Driven by necessary sequencing of treatment plant and raw water facility projects
- Develop overall plan for consideration in conjunction with major project construction but no later than FY22/23 budget

# Water System Infrastructure Summary

- Executing plan to renew infrastructure
- Promoting sustainability and resilience
- Reducing water loss
- Continuing to address resource considerations

# Wastewater Infrastructure Overview



# Integrated MWWTP Master Plan Development



- 
- An aerial photograph of a wastewater treatment plant, showing several large circular aeration tanks and various industrial buildings, serving as a background for the slide.
- FY19 Accomplishments**
  - Review Drivers**
  - Master Plan Overview**
  - In-House Work**
  - Next Steps**

# Wastewater Accomplishments in FY19

**3<sup>rd</sup> Street Interceptor  
Rehab Phase 2**



**Pump Station Q  
Dual Flow Project  
(for Consent Decree)**



**North Richmond Equalization  
Tank Rehabilitation**



**Primary Sedimentation Tanks  
Rehab Phase 5**



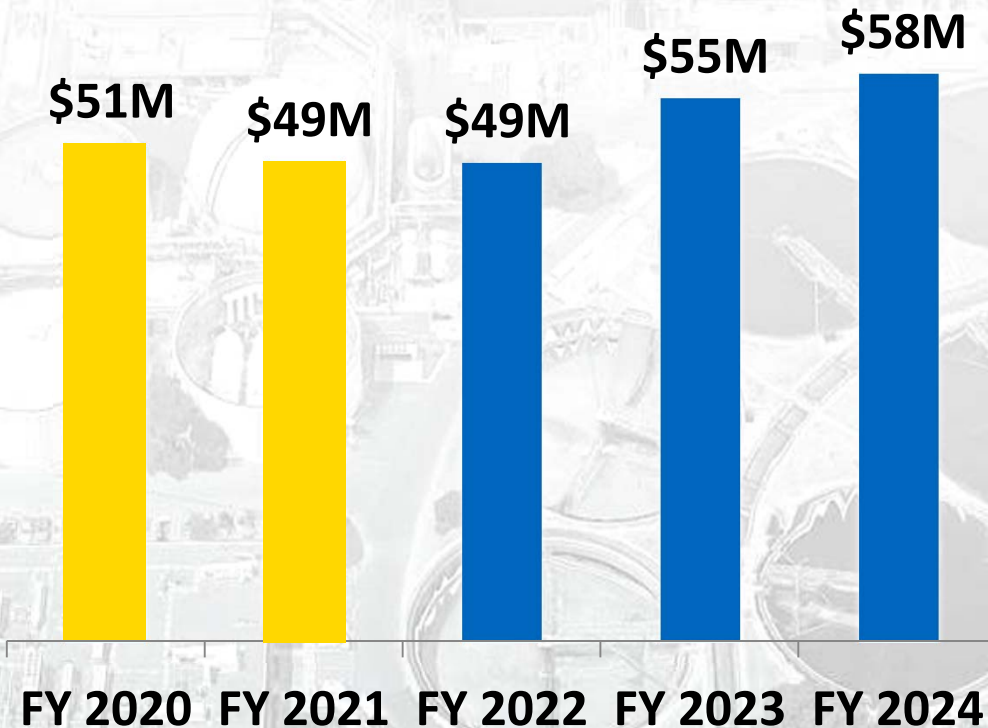
**Aerated Grit Tank Conveyors  
Replacement Phase 1**



**Digester Upgrades Phase 3**

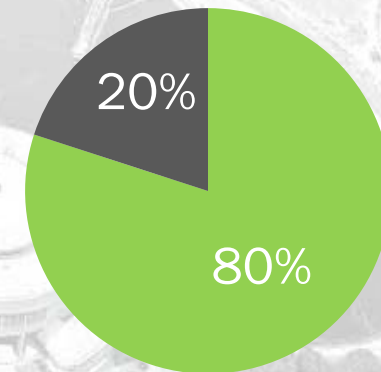


# FY20–24 Wastewater CIP



## BY THE NUMBERS

**\$262M** 5-Year CIP



- Main Wastewater Treatment Plant
- Interceptor System

# Previous Focus Plans



# New Drivers

**Aging  
Infrastructure**

**More Stringent  
Regulations**

**Land Use  
(1996 & 2011)**

**Recycled Water  
(2019)**

**Energy System  
(2012)**

**Odor Control  
(1998 & 2009)**

**Biosolids  
(2004)**

**Sludge  
Management  
(1990)**

**Climate  
Change**

**Plant Property  
(1990)**

**Capacity**

# More Stringent Regulations

## COLOR LEGEND

Nutrient Watershed

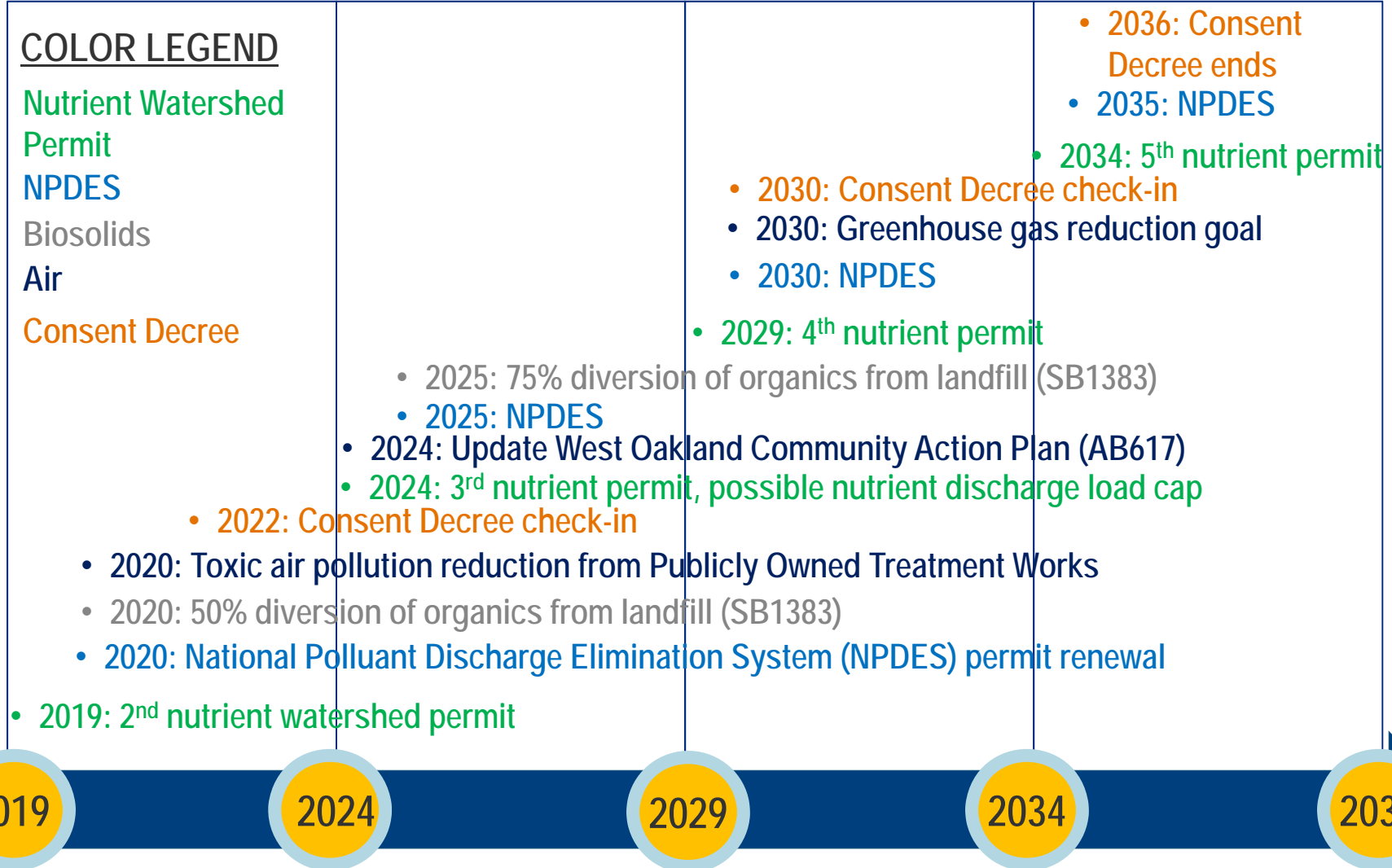
Permit

NPDES

Biosolids

Air

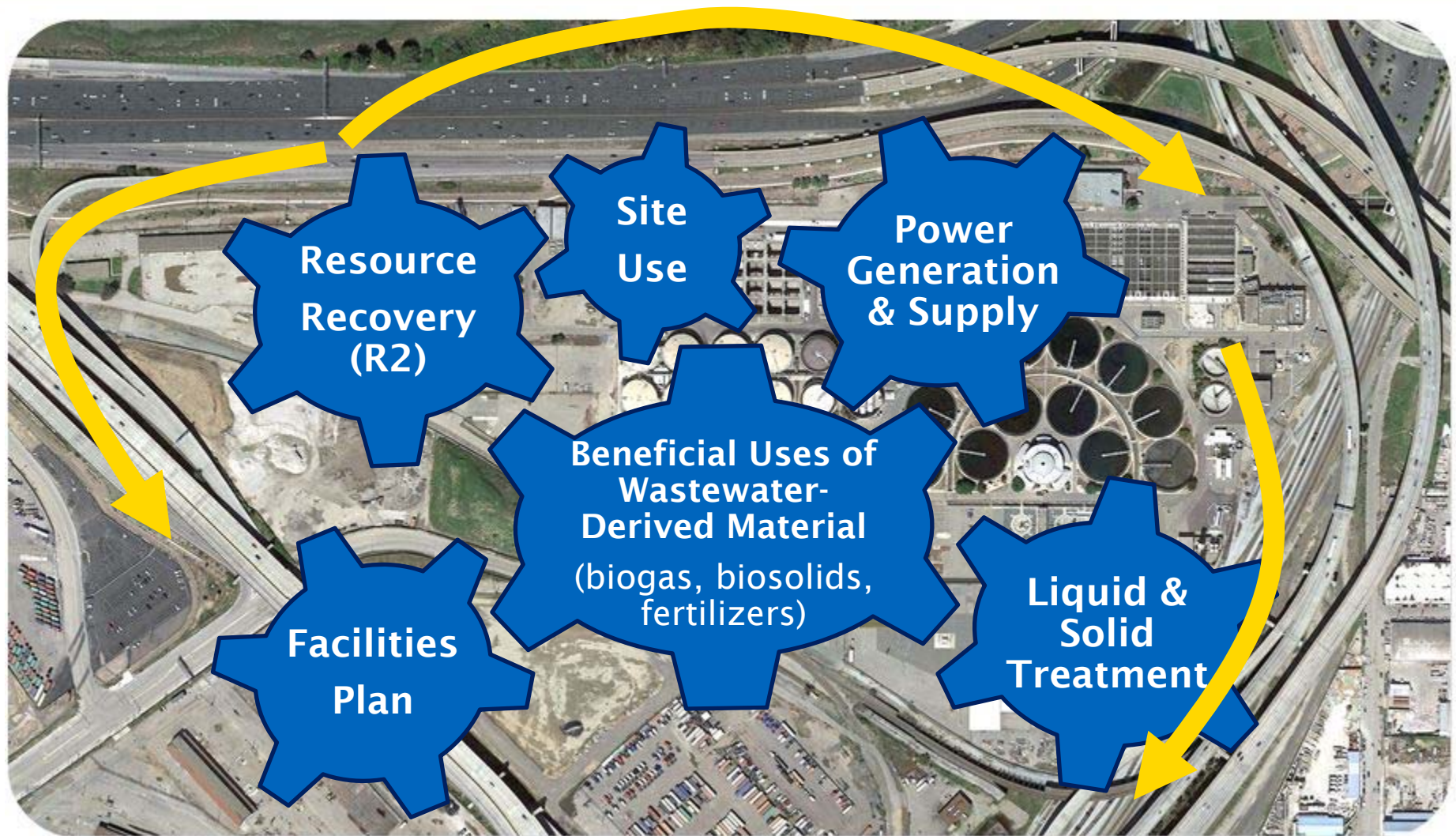
Consent Decree



# The Master Plan will integrate...



# The Master Plan will integrate...



# Teamed Approach



Board



Engineers



Lab



Steering  
Committee



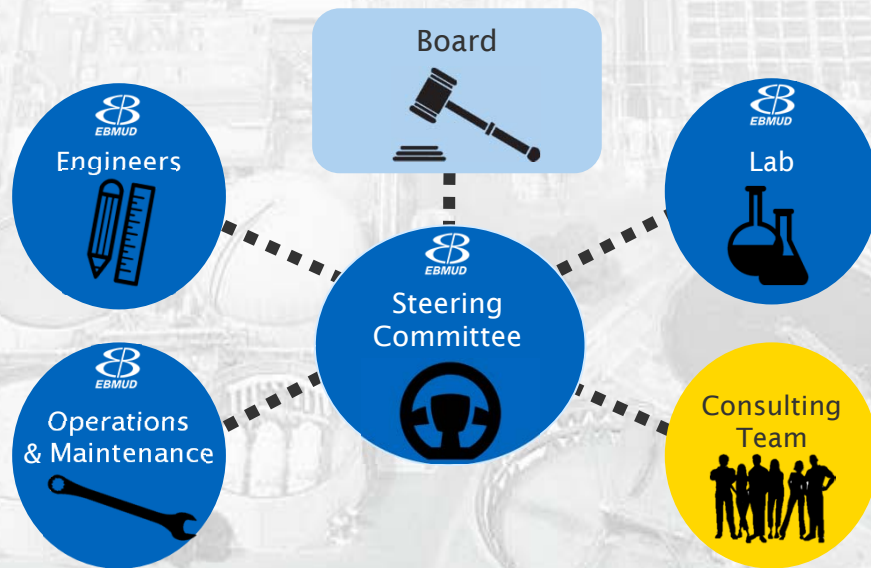
Operations  
& Maintenance



Consulting  
Team



# Teamed Approach



## NO. OF MEETINGS

20 Steering Committee

6 Internal Workshops

5 Workshops with Consultant

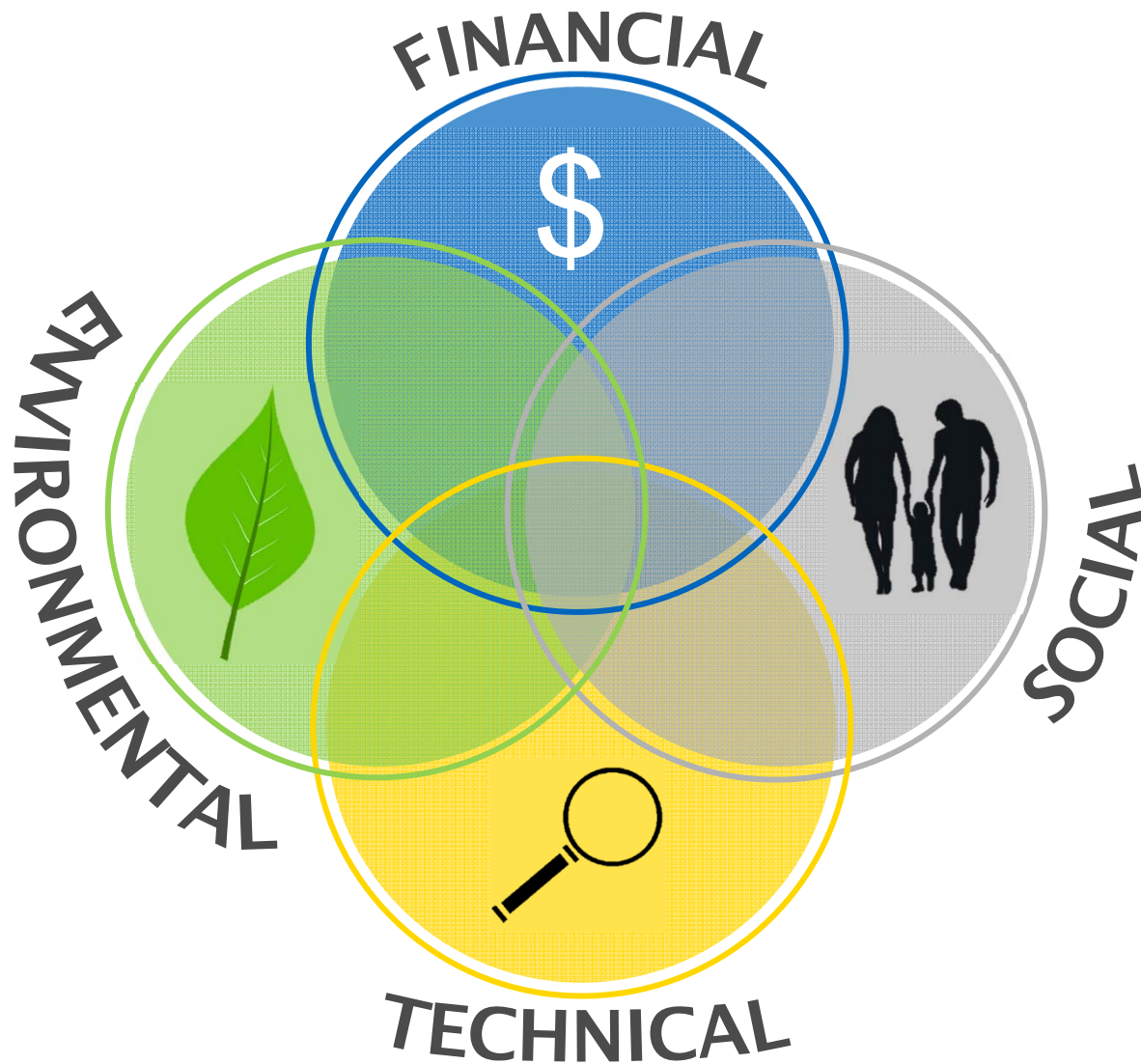
Internal Workshops



Workshops with Consultant



# Guiding Principles

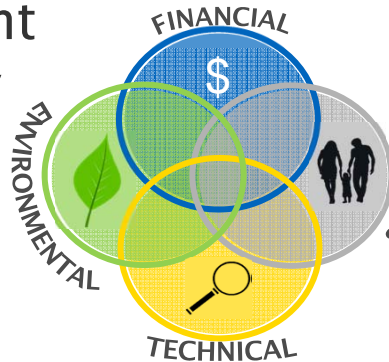


# Guiding Principles



1 Maintain fair rates through cost-effective & no-regrets infrastructure investments

2 Provide reliable wastewater treatment to meet increasingly stringent water quality & environmental regulations



5 Reduce visual, noise, & odor impacts to neighbors

3 Maximize sustainability

4 Develop a roadmap for critical infrastructure investments to meet future needs & strengthen resiliency

# In-House Work to Define Drivers & Future Needs



## Aging Infrastructure

Systematic Condition Assessment

Seismic Evaluation

## New Regulations

Active Engagement in  
Regulatory Development

Summary Report of  
Future Regulations

## Climate Change

Climate Change Monitoring Impact  
& Adaptation Plan

Market Assessment for R2 Waste &  
Potential Use of Excess Biogas

Collaborate with Recycled Water  
Team for Future Needs

## Capacity

Flows & Loads Projections

Existing Treatment  
Performance & Capacity  
Evaluation

# Condition Assessment: Overview



## Completed Work

**70** Years' Worth of  
Infrastructure

**950+** Assets >\$10k  
Evaluated

Documented  
In Database

Photo  
O&M History  
Desired improvements  
Anecdotal info  
Covered in CIP: yes/no

Electrical



Instrumentation



Concrete Structures



Mechanical



Tanks



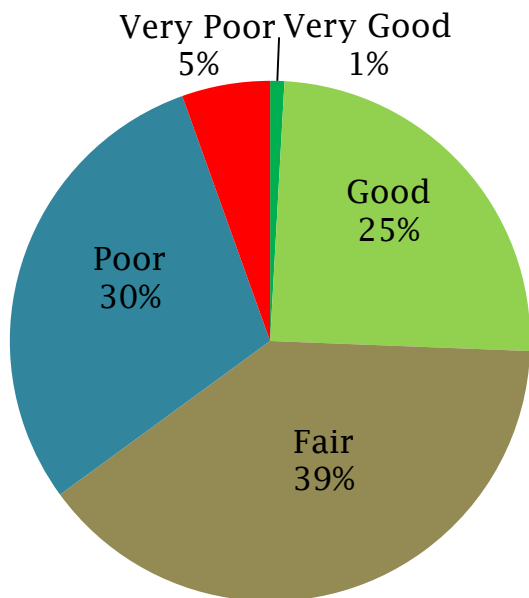
Facilities & Roofs



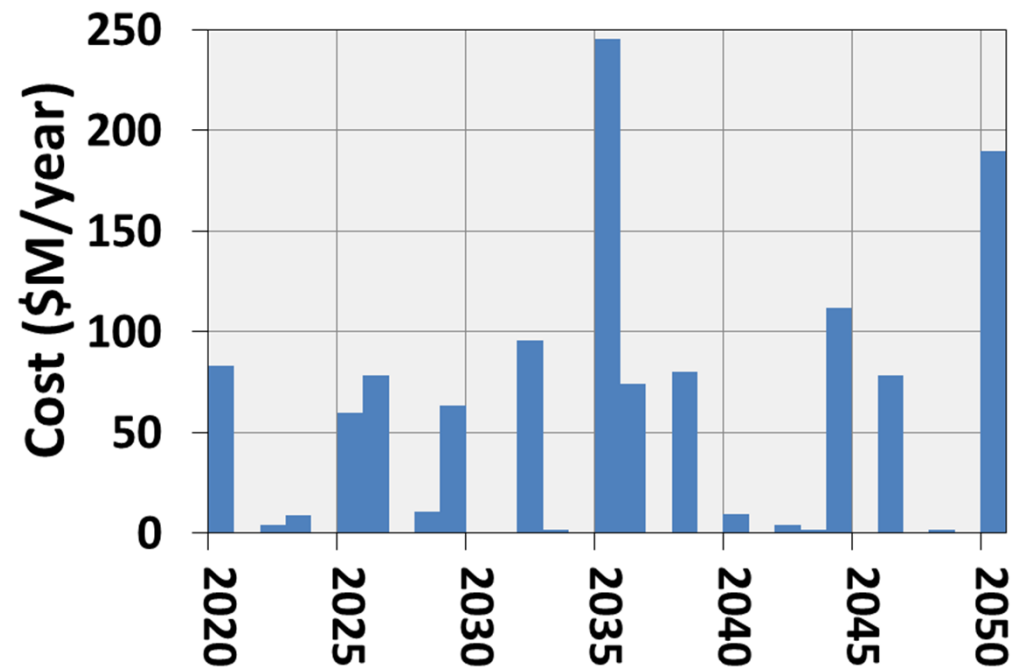
# Condition Assessment: Major Findings



## Condition Distribution by Replacement Value



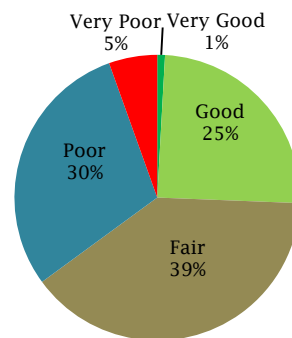
## Business As Usual Preliminary Infrastructure Renewal Forecast



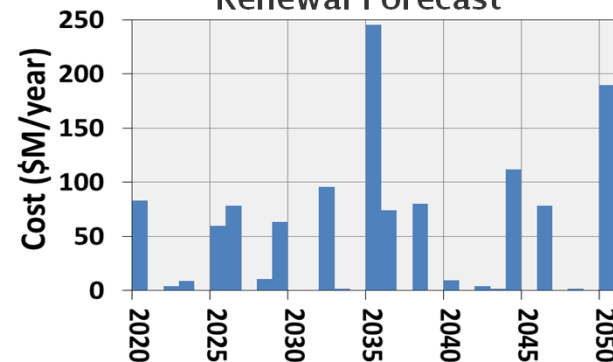
# Condition Assessment: Major Findings



Condition Distribution by  
Replacement Value



Business As Usual  
Preliminary Infrastructure  
Renewal Forecast



## KEY TAKEAWAYS

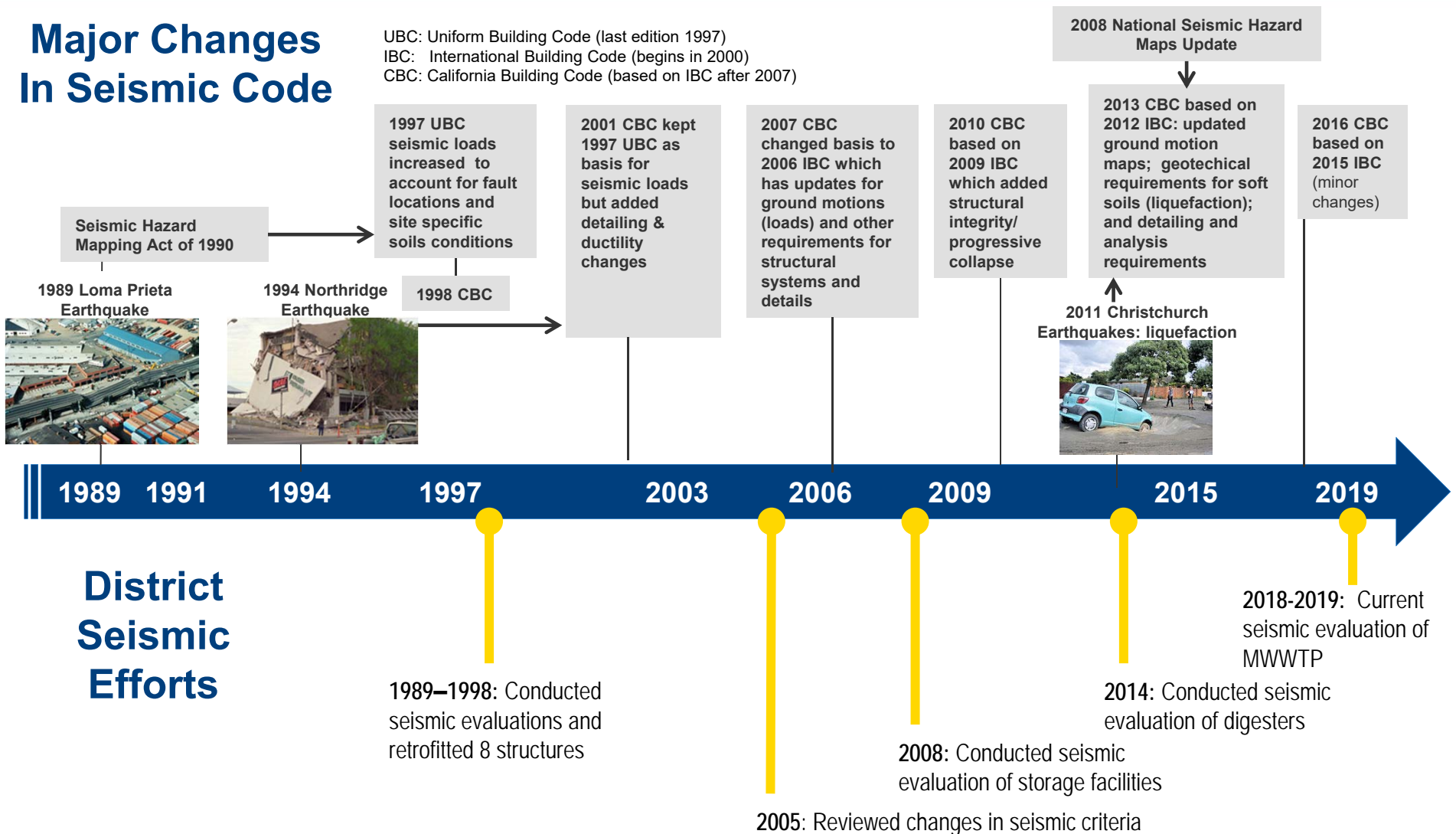
- 1 Renewal forecast shows big spending milestones for maintaining business as usual...
- 2 ... yet does not take into account extra investments to address the new drivers.
- 3 Spending decisions must be strategic and consider the long term to make “no regrets” infrastructure investments.

# Major Seismic Code Changes



## Major Changes In Seismic Code

UBC: Uniform Building Code (last edition 1997)  
IBC: International Building Code (begins in 2000)  
CBC: California Building Code (based on IBC after 2007)



# Current Seismic Evaluation



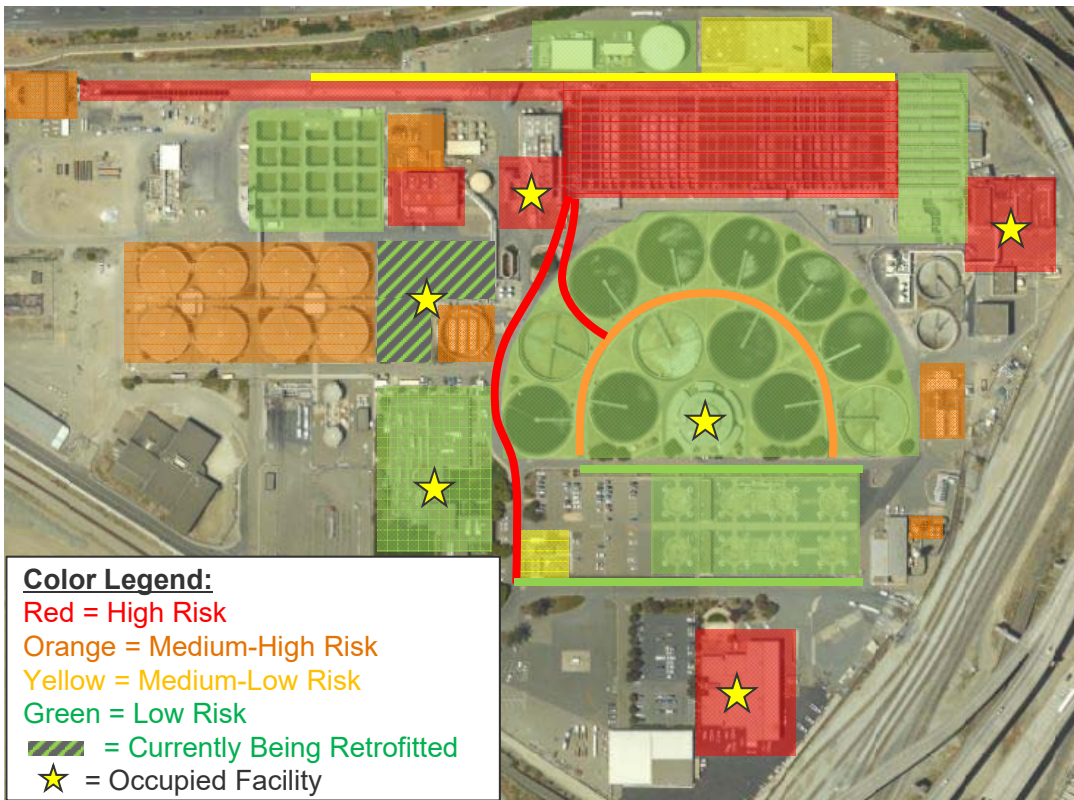
Evaluate 80+  
Facilities at MWWTP



Rank Facilities  
By Seismic Risk



Preliminary Structural Evaluation  
of Highest-Risk Facilities



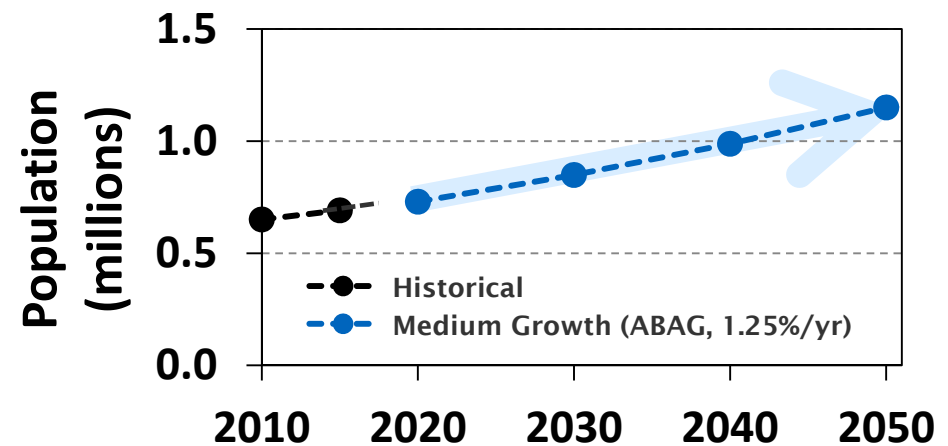
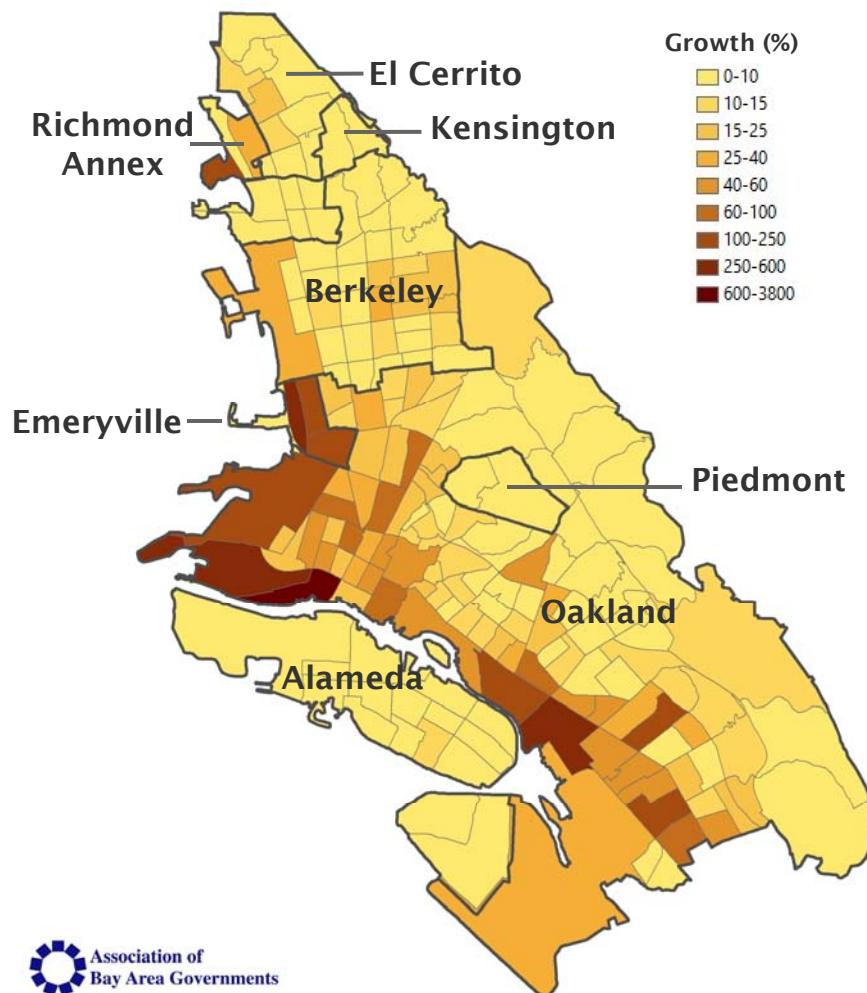
## KEY TAKEAWAYS

- 1 Life safety is the #1 priority.
- 2 Current focus includes
  - i Geotechnical investigation
  - ii Structural evaluations
  - iii Retrofit cost estimates

# Wastewater Population Projections



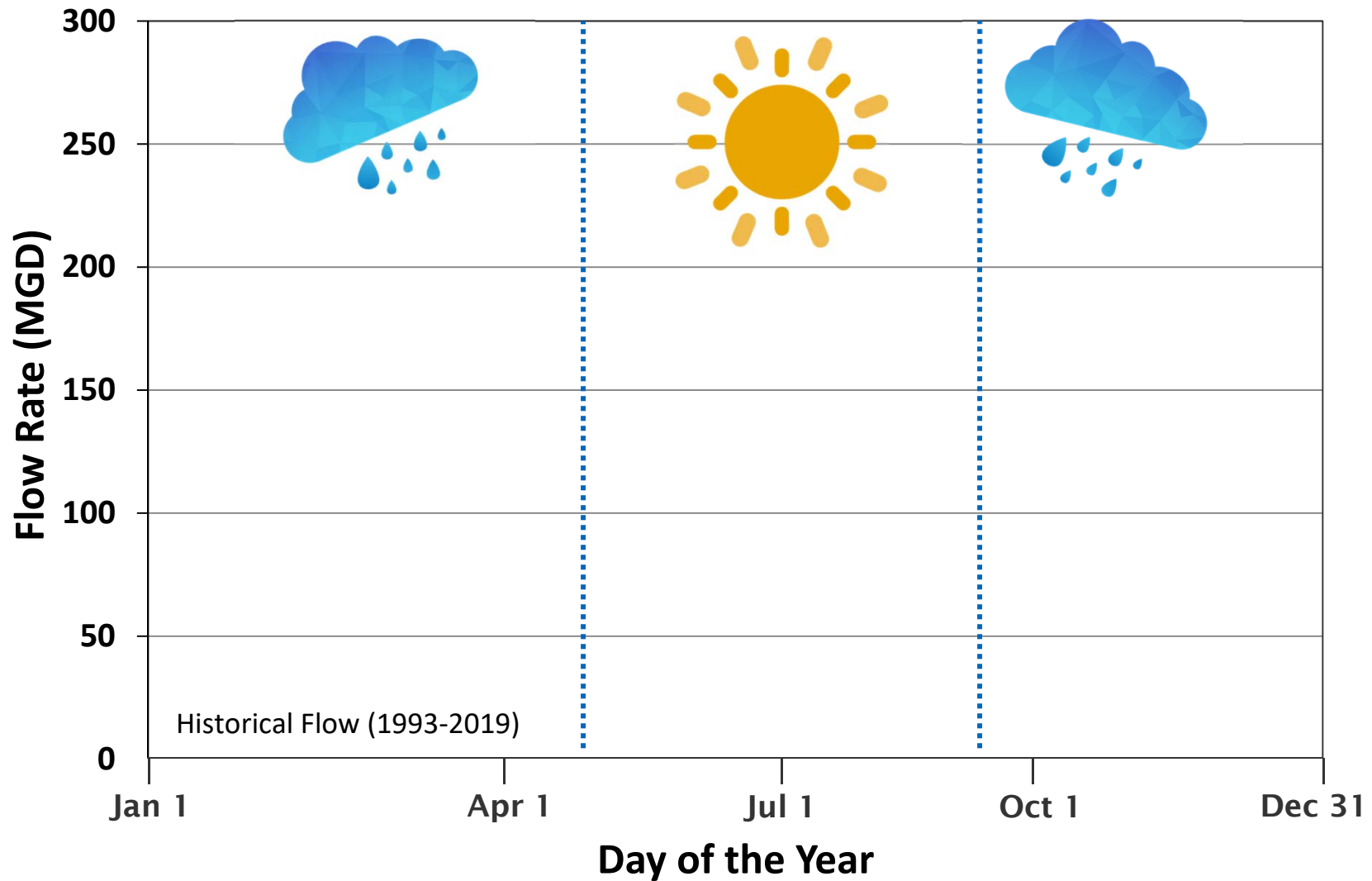
## Estimated Population Growth From 2020 to 2040



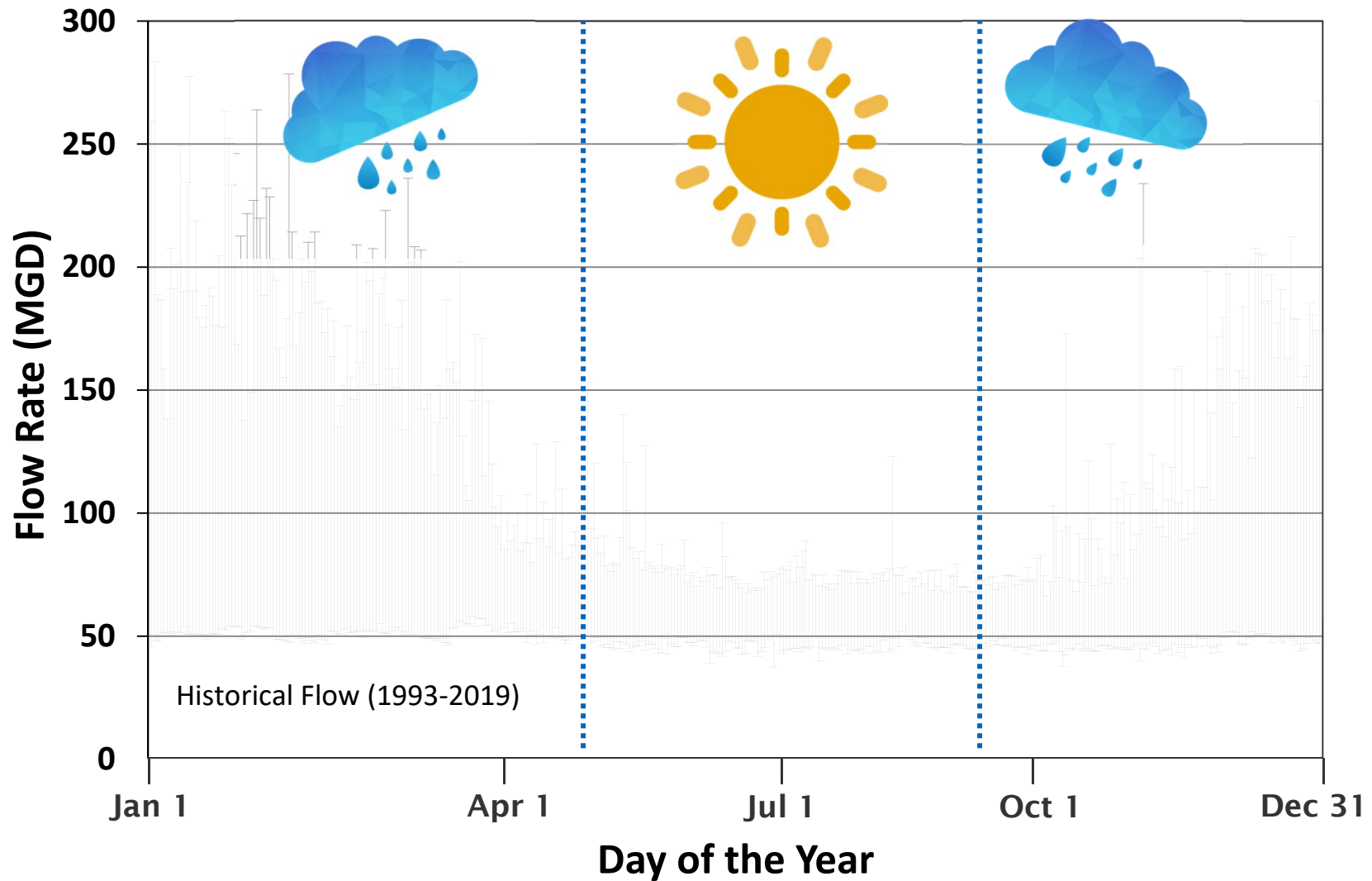
## KEY TAKEAWAYS

- 1 Wastewater service area boundaries are unlikely to change.
- 2 Considered local development and coordinated with Water Demand study.
- 3 Projections include additional low & high growth scenarios to capture uncertainties.

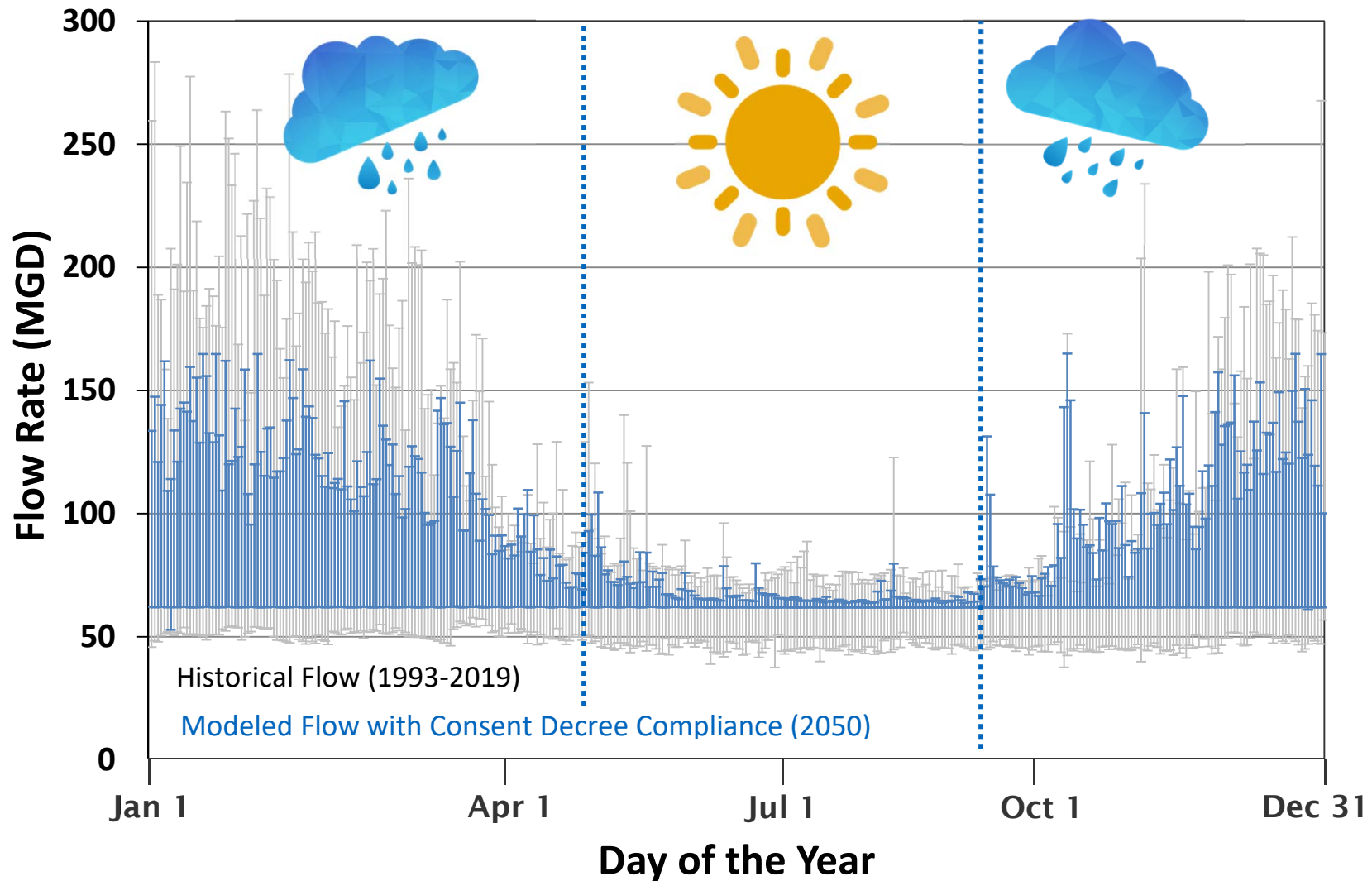
# MWWTP Influent Flows



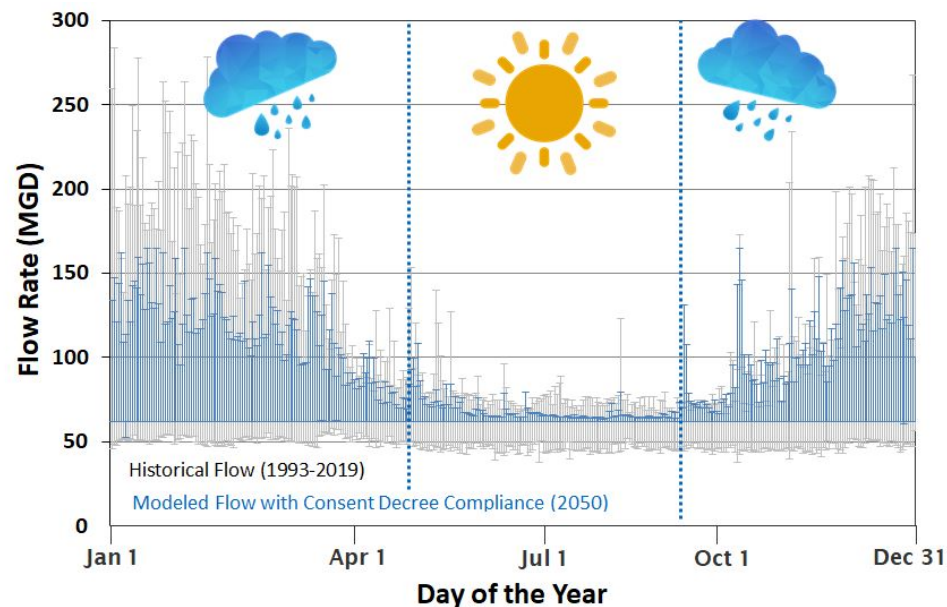
# MWWTP Influent Flows



# Future MWWTP Influent Flows with Consent Decree



# Future MWWTP Influent Flows with Consent Decree



## KEY TAKEAWAYS

- 1 There will still be a distinct wet weather season with peaks.
- 2 Consent Decree is expected to significantly reduce wet weather flows.

# Climate Change & Its Impacts



Drought



Lower Per-Capita Water Consumption



Changes in Influent Wastewater Flow and Characteristics



Potential Biological Upsets



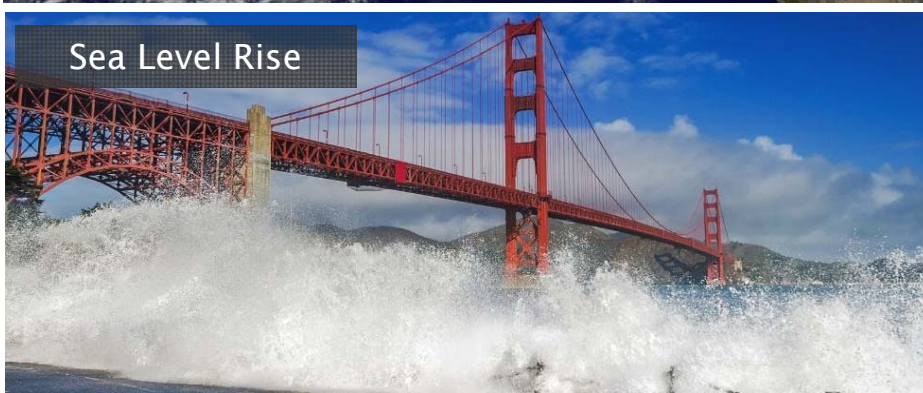
Atmospheric Rivers & Flooding



Increase in Inflow & Infiltration



Sea Level Rise



Vulnerable Infrastructure



# Resource Recovery Market Assessment



## Low-Strength R2



**Growth:** Brines (salty wastes)

## High-Strength R2



**Growth:** Food Waste

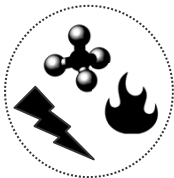
# Food Waste Resource Recovery



## PROS



Revenues



Renewable &  
Resilient Energy  
*(Will Benefit Potential Onsite Nutrient  
Removal & Biosolids Processing)*



Global Environmental  
Benefits

## CONS



Capital and  
O&M Costs

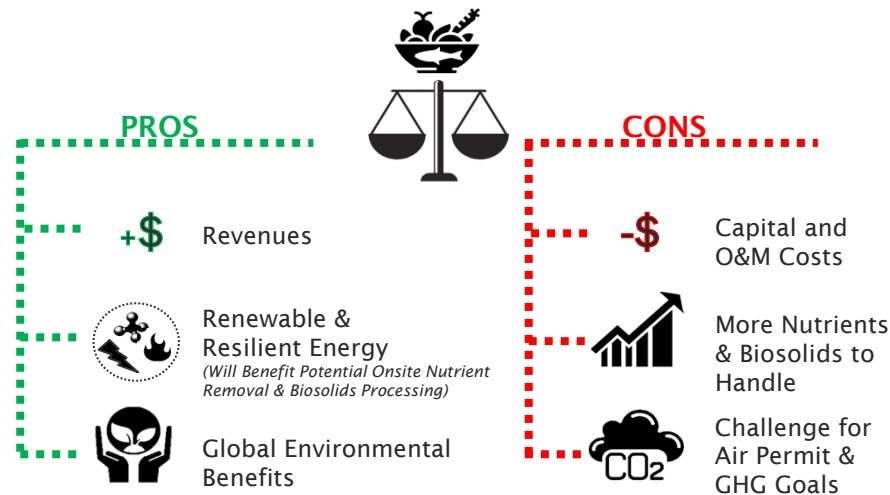


More Nutrients  
& Biosolids to  
Handle



Challenge for  
Air Permit &  
GHG Goals

# Food Waste Resource Recovery



## KEY TAKEAWAYS

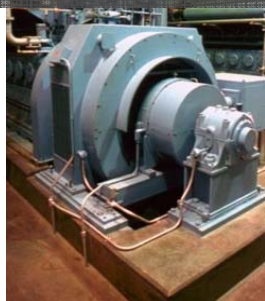
- 1 Food Waste R2 has many benefits, but comes at a cost and with challenges.
- 2 Master Plan will evaluate the balance of pros and cons to align with the Guiding Principles and other District goals.
  - i R2 must be financially independent (not subsidized by ratepayers).
  - ii Maintaining energy self-sufficiency is critical for MWWTP operations.

# MWWTP as a Resource Recovery Center

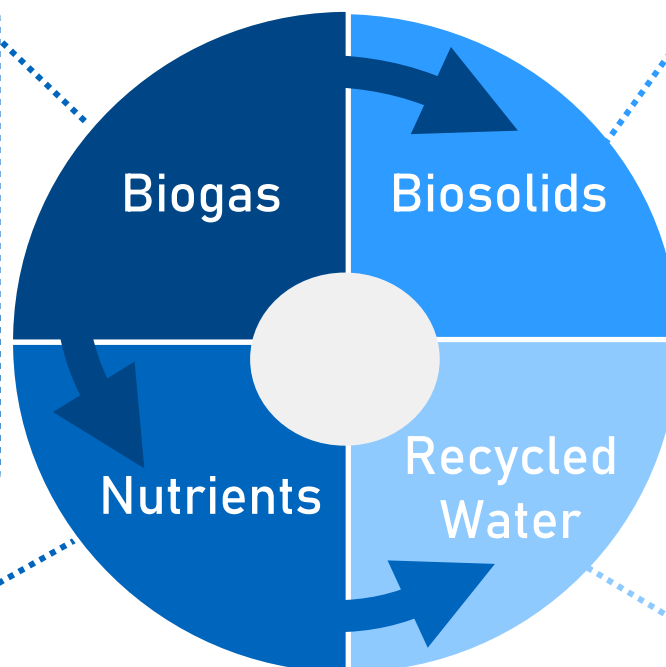


## Resilient & Sustainable Energy

Consider utilization options



Minimize GHGs



## Pair Technology with End Use

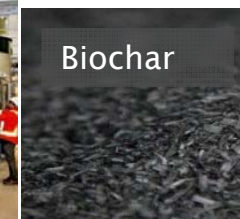
New Technologies



Compost

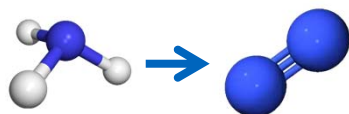


Biochar



## Removal vs. Recovery?

Ammonium converted to nitrogen gas



Fertilizer

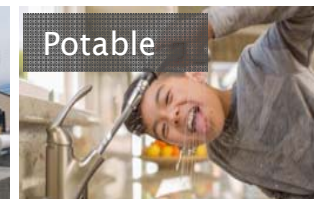


## Consider Future Needs

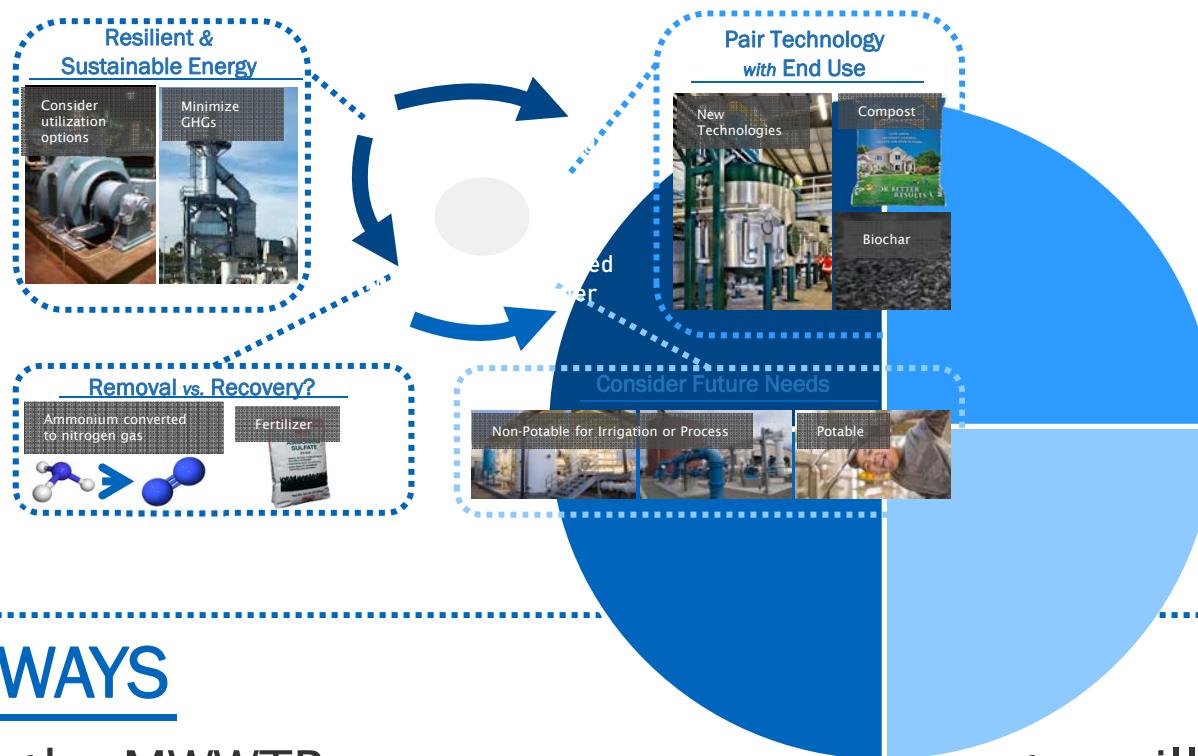
Non-Potable for Irrigation or Process



Potable



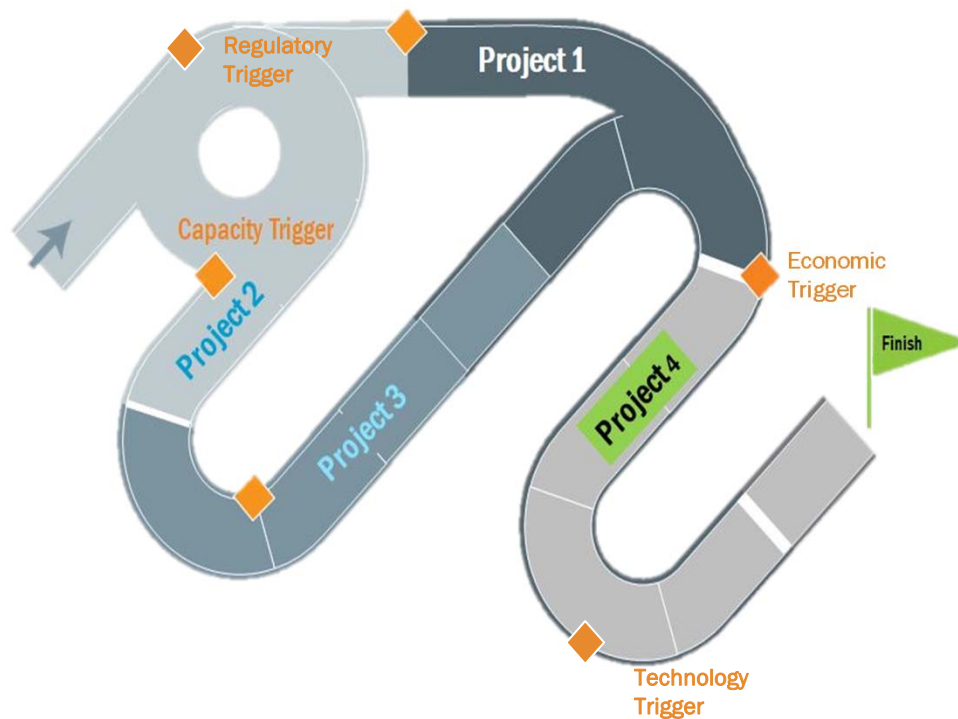
# MWWTP as a Resource Recovery Center



## KEY TAKEAWAYS

- 1 Leveraging the MWWTP as a resource recovery center will remain a long-term goal.
- 2 Master Plan will balance resource recovery goals with other competing factors.

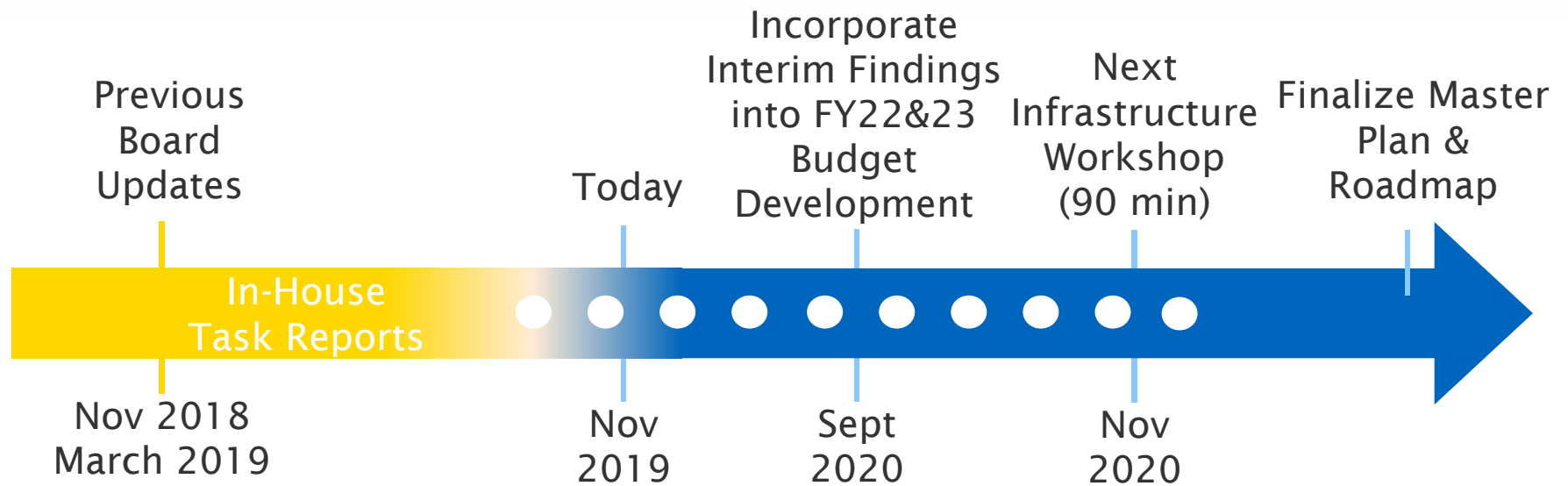
# Roadmap



## KEY TAKEAWAYS

- 1 Non-linear
- 2 Phased based on triggers
- 3 Adaptable for uncertainties
- 4 Informs CIP & site use

# Next Steps



## NEXT STEPS

- 1 Provide ongoing updates to Board.
- 2 Engage with regulators at appropriate time.
- 3 Stay in communication with community & neighbors, e.g. West Oakland Liaison meeting.

# Next Infrastructure Workshop



Nutrients



Resource Recovery



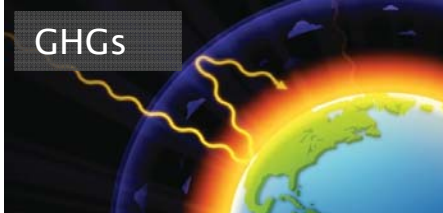
Biosolids



Fiscal Planning



GHGs



Power Supply & Demand



Life Cycle Cost



Beneficial Reuse



Construction Phasing



Impact To O&M



Climate Change Adaptation



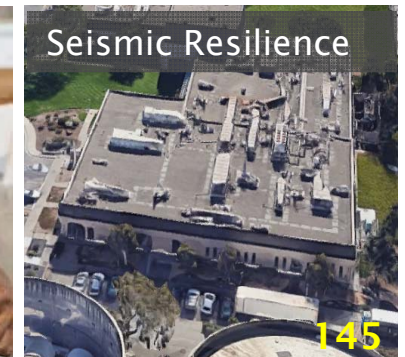
Site Use



Community Impact



Seismic Resilience



# Workshop Summary

- District is on track with infrastructure rehabilitation and replacement
- Data collected and pilots will inform future budgets including staffing resource needs
- Main Wastewater Treatment Plant Master Plan findings presented next year in a workshop and tour



# **Director Comments**