EAST BAY MUNICIPAL UTILITY DISTRICT

Long-Term Infrastructure Investment Workshop

Board of Directors

November 26, 2019

Agenda

	Duration (minutes)
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

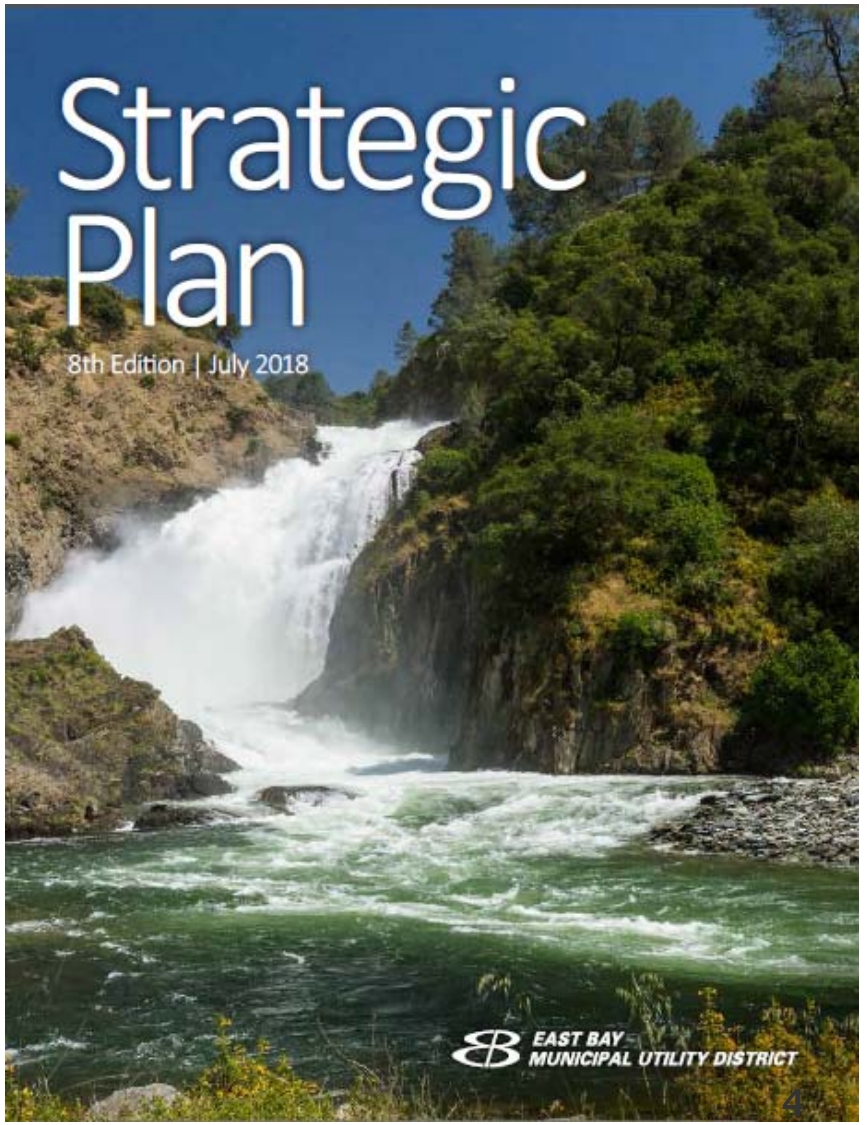
Workshop Purpose

- 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.

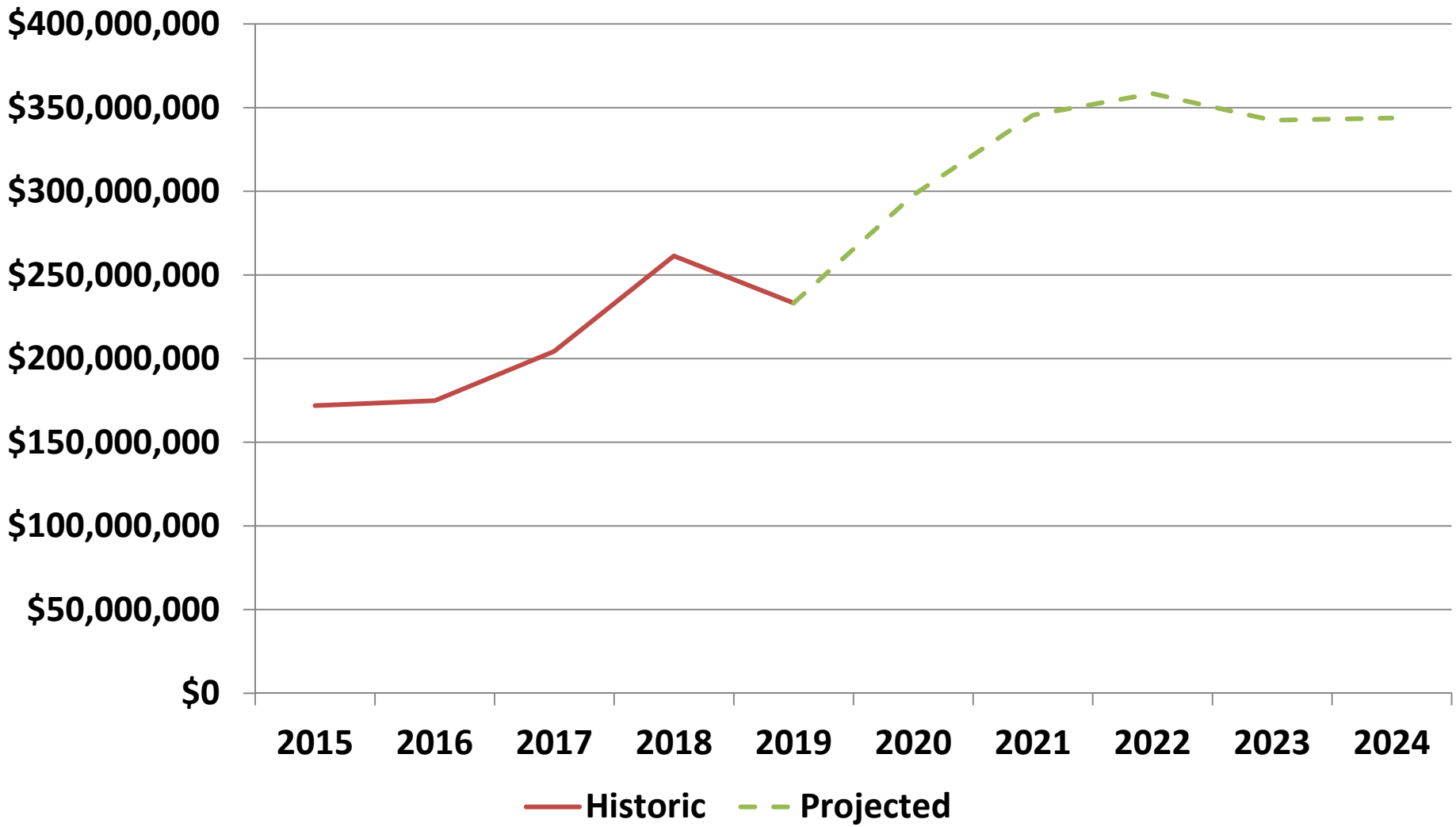


Long Term Infrastructure Investment

Strategies and Drivers

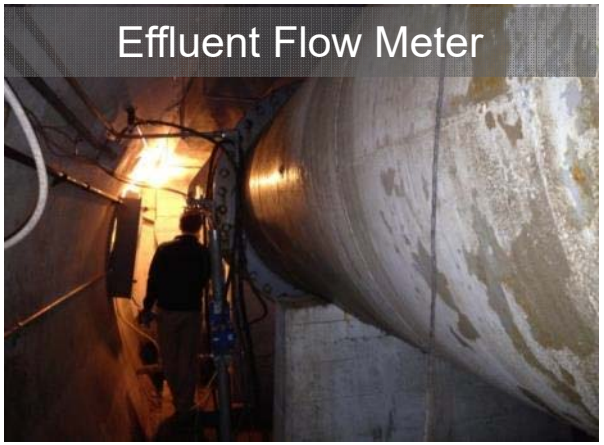
Capital Improvement Program

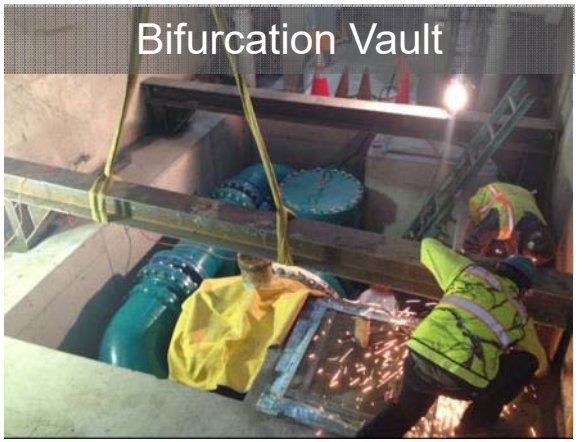
Historic and Projected Spending



Capital Improvement Program

FY15-19 Accomplishments – Water Treatment Plants





Orinda WTP Maintenance and Reliability Improvements Project

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)


South


Summit


San Pablo Clearwell

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	
Pearl	Richmond	3
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	


Acorn

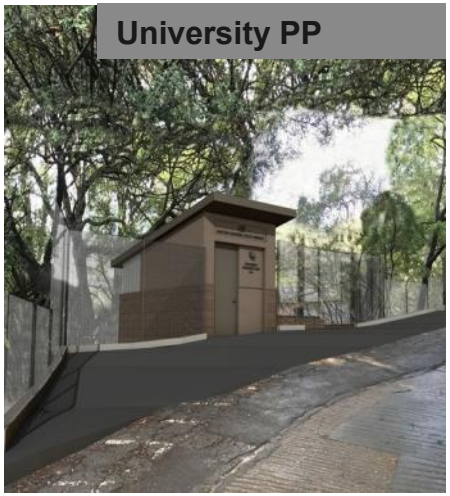

Round Hill


Eden

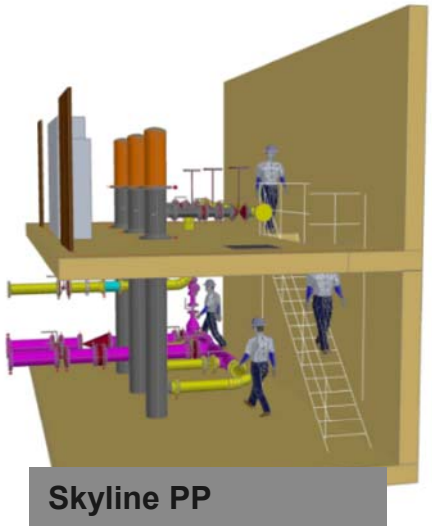
Capital Improvement Program

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	3
Skyline	Oakland	
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	



University PP



Skyline PP

Diablo PP

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

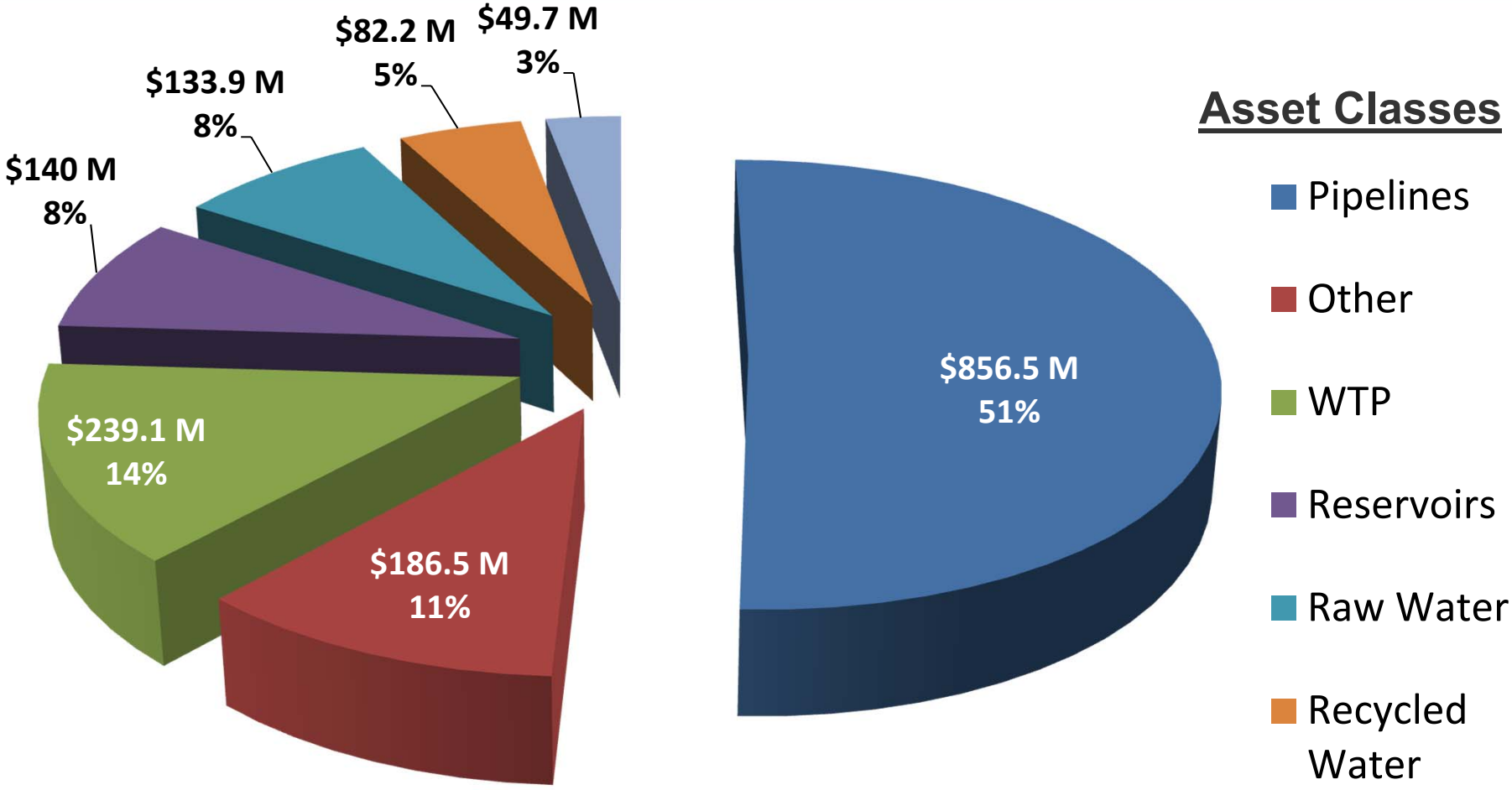
Renew. Reinvest. Ready.

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

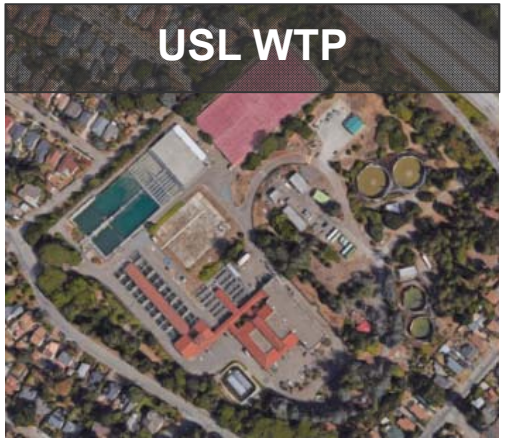
Budget by Asset Class

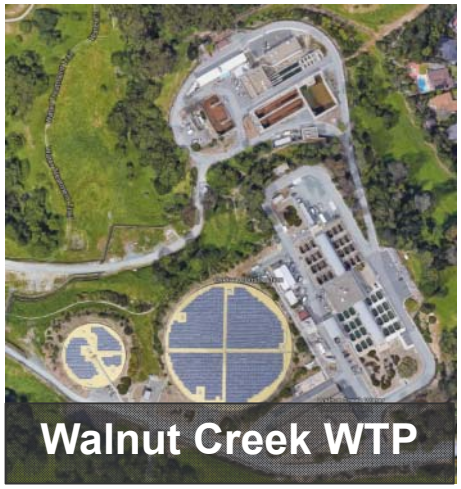


Total FY20-24 Cash Flow = $1.69B

FY20-24 Capital Improvement Program

Water Treatment Plants





- 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


Leland Reservoir


Seneca Reservoir


Central Reservoir

FY20-24 Capital Improvement Program

Steel Reservoirs

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


Scenic


Castenada No. 2

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

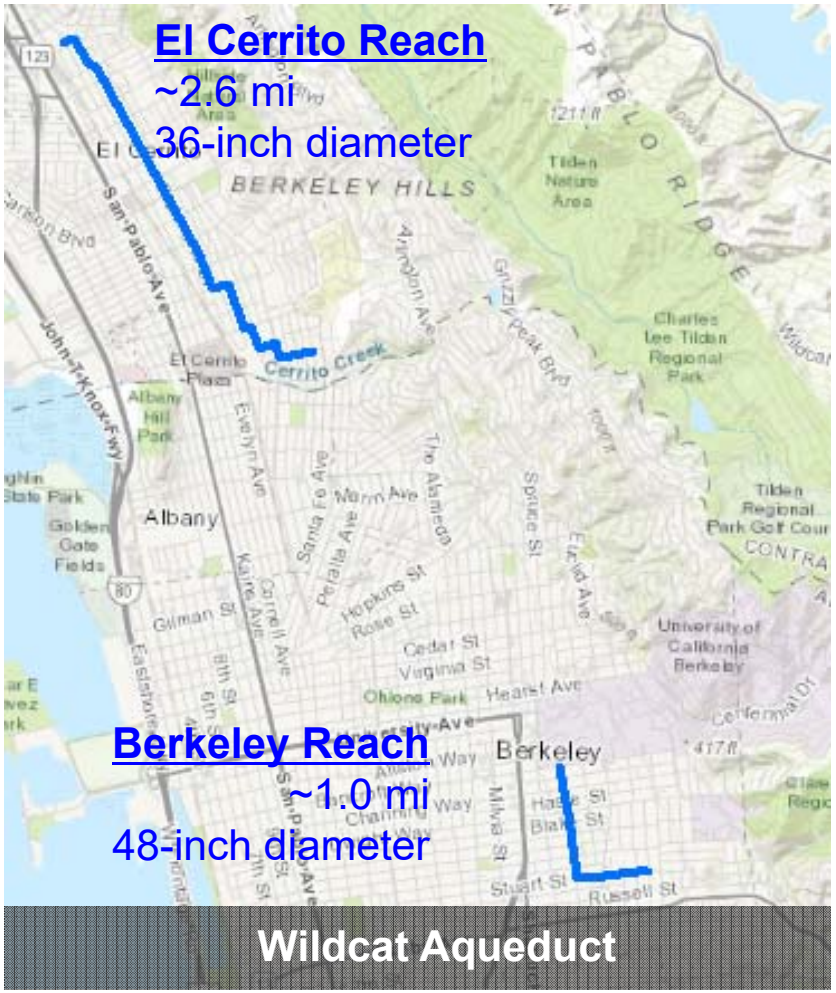
Encinal

FY20-24 Capital Improvement Program

Large Diameter Pipelines

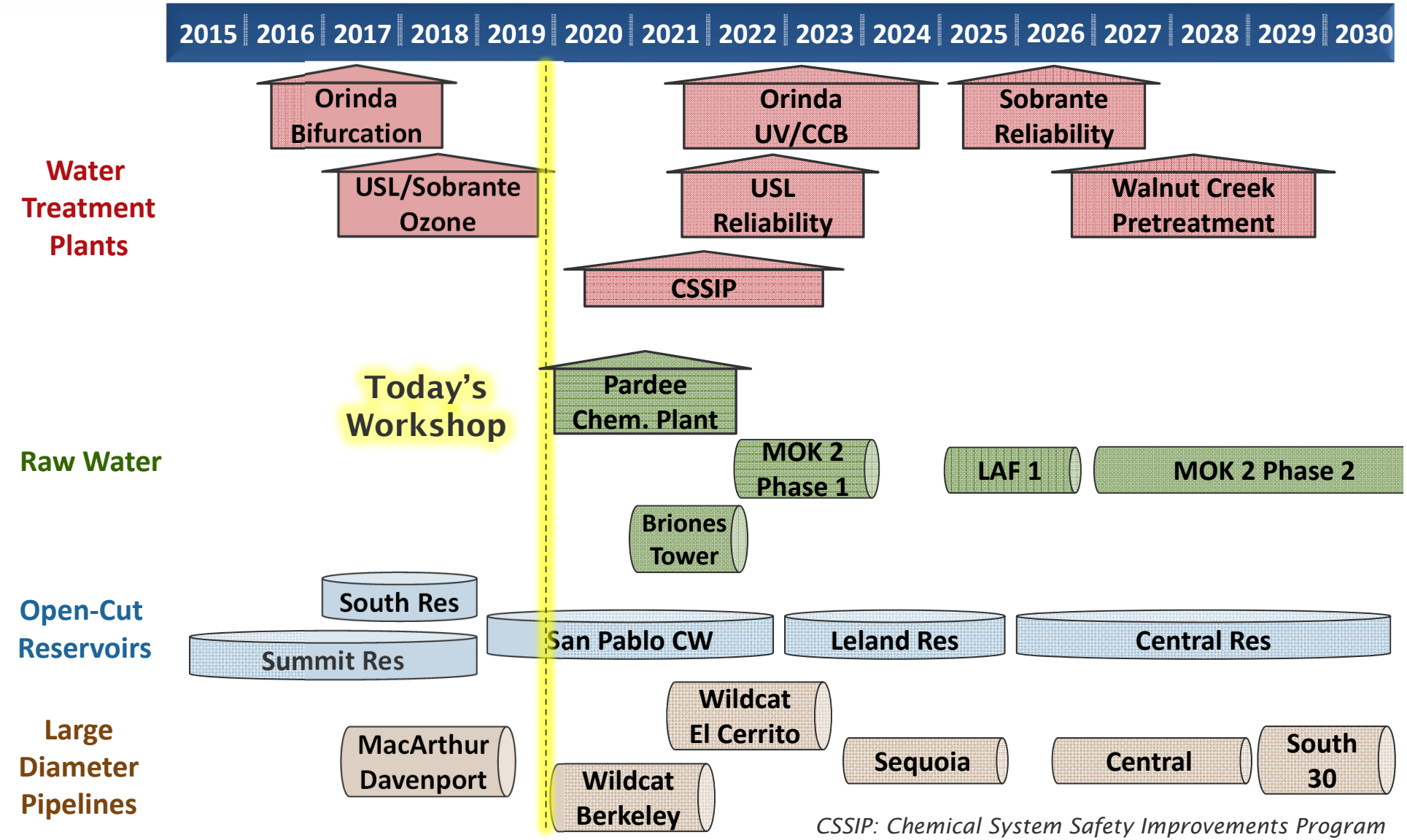
- Capacity Studies
- Outage Plans

Wildcat Aqueduct Tee



Wildcat Aqueduct

Treatment & Transmission
Construction Sequencing



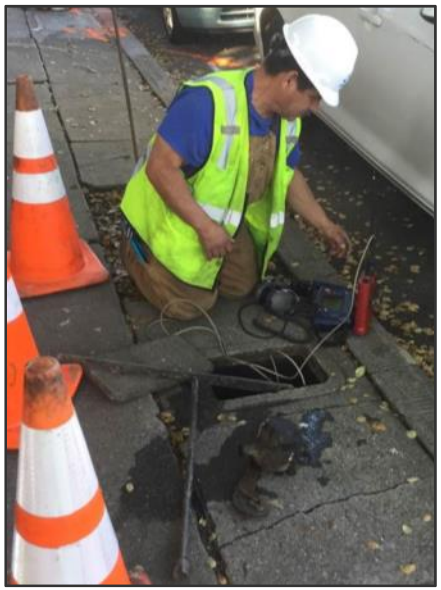
CSSIP: Chemical System Safety Improvements Program

FY20-24 Capital Improvement Program

Pipeline Rebuild

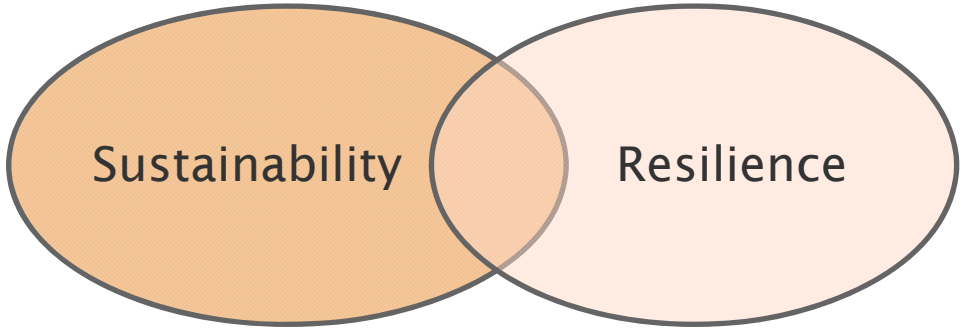
Where Are We Headed

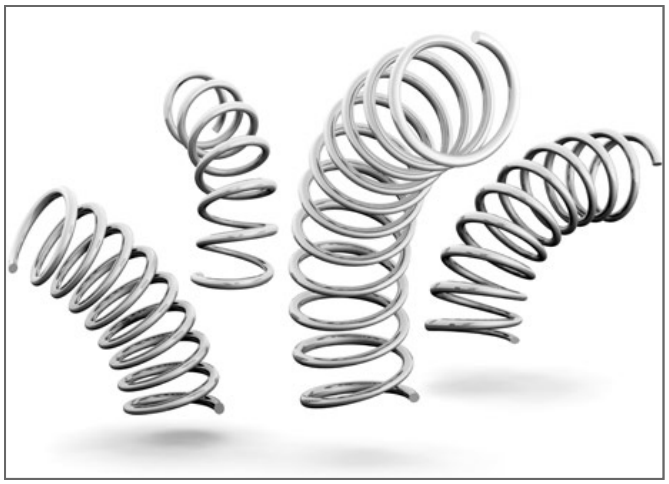
- 17.5 mi/year → 25 mi/year by FY25
- New materials
- Implementing recommendations
- Continue to innovate



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

Sustainability & Resilience

Envision Rating System

QUALITY OF LIFE

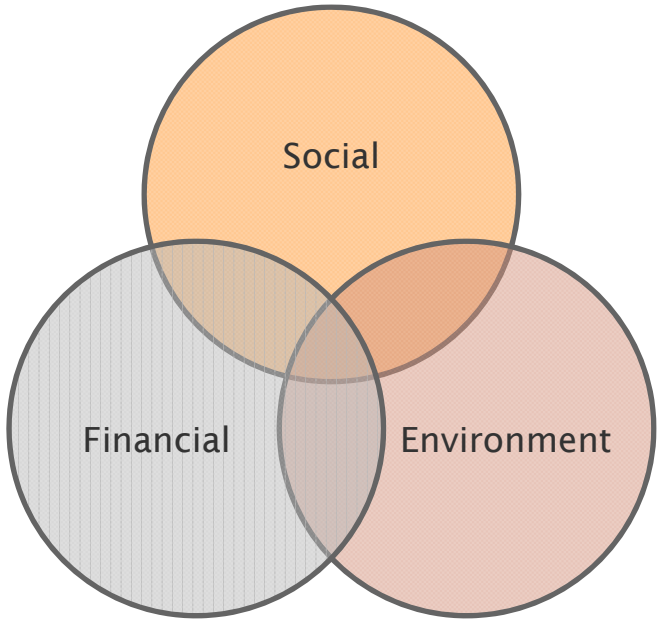
LEADERSHIP

RESOURCE ALLOCATION

NATURAL WORLD

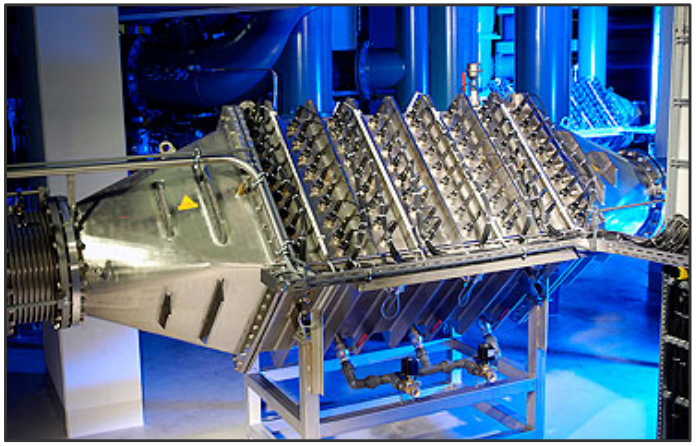
CLIMATE AND RISK

- 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



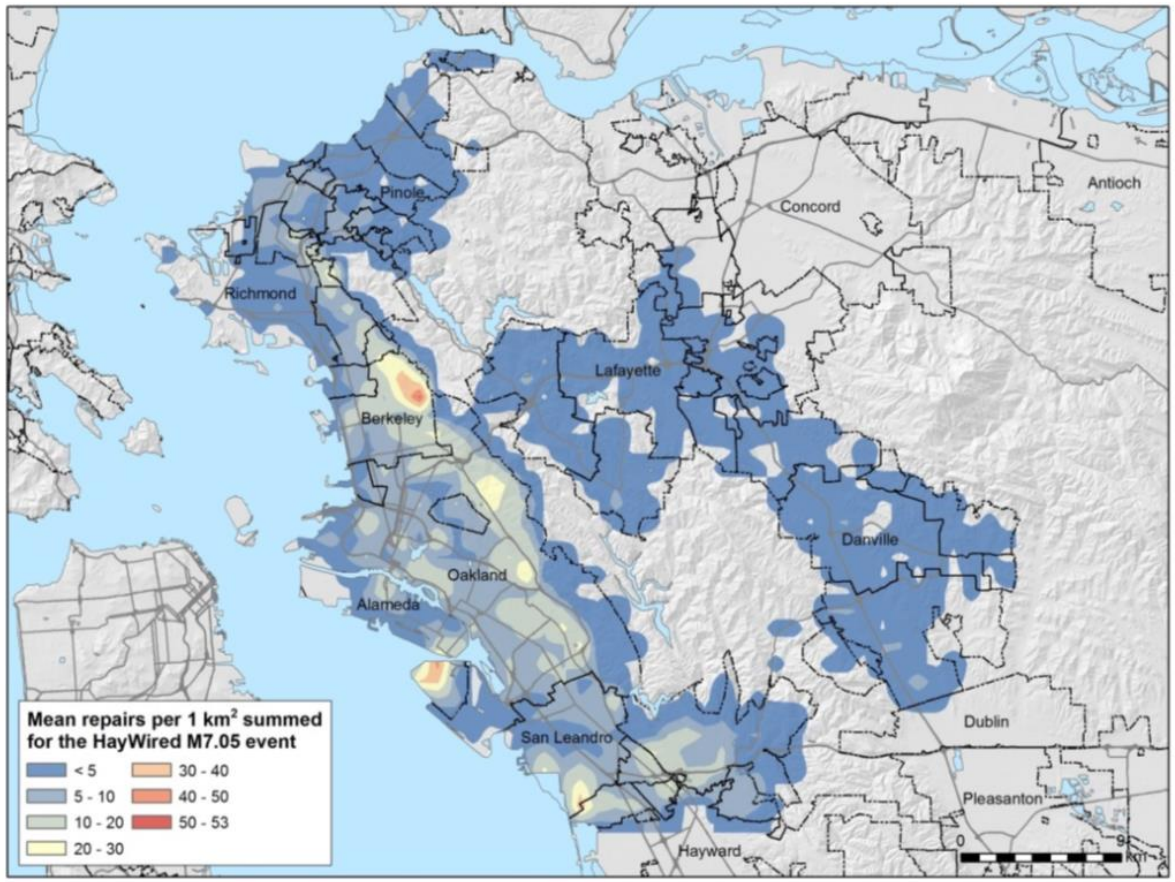
Pipeline Rebuild

Sustainability

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

Pipeline Rebuild

Resilience

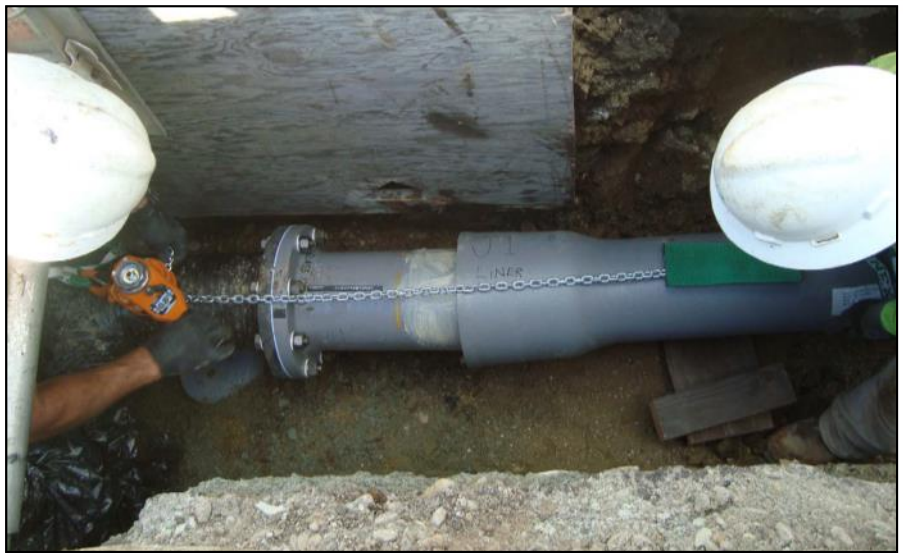


Significant number of breaks in the western service area

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

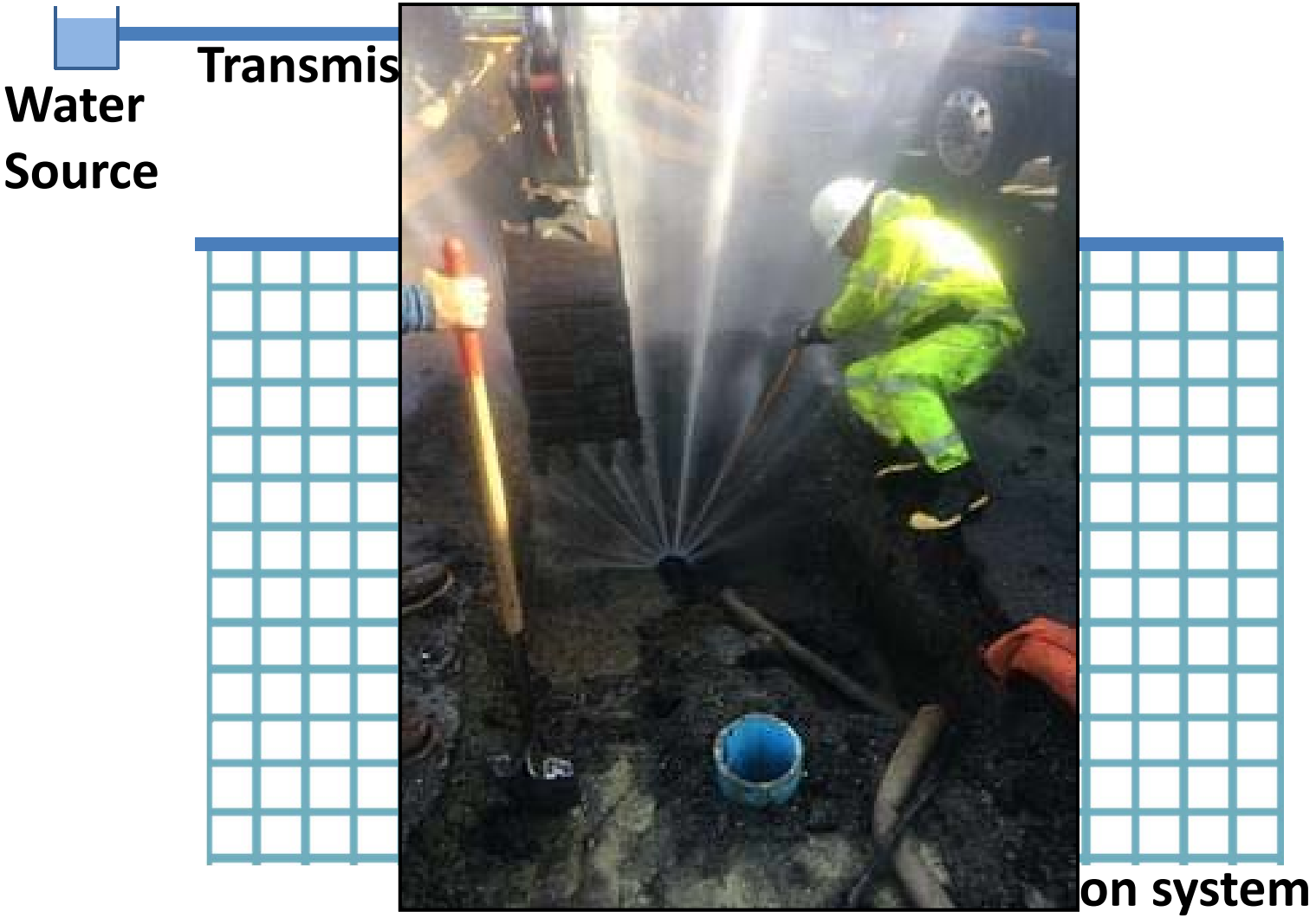
Pipeline Rebuild
Resilience

- 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



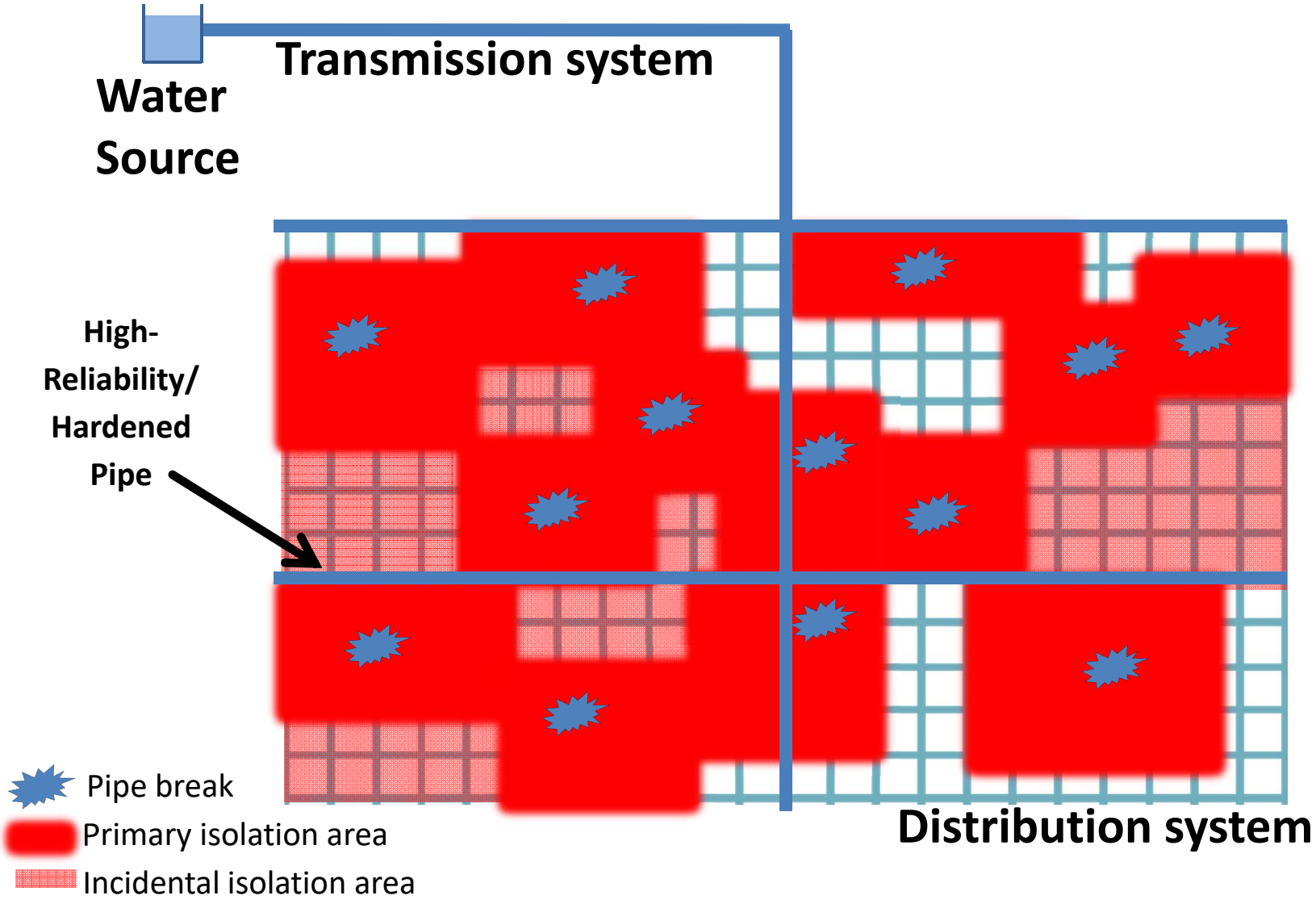
Pipeline Rebuild

Resilience: Strategic Hardening



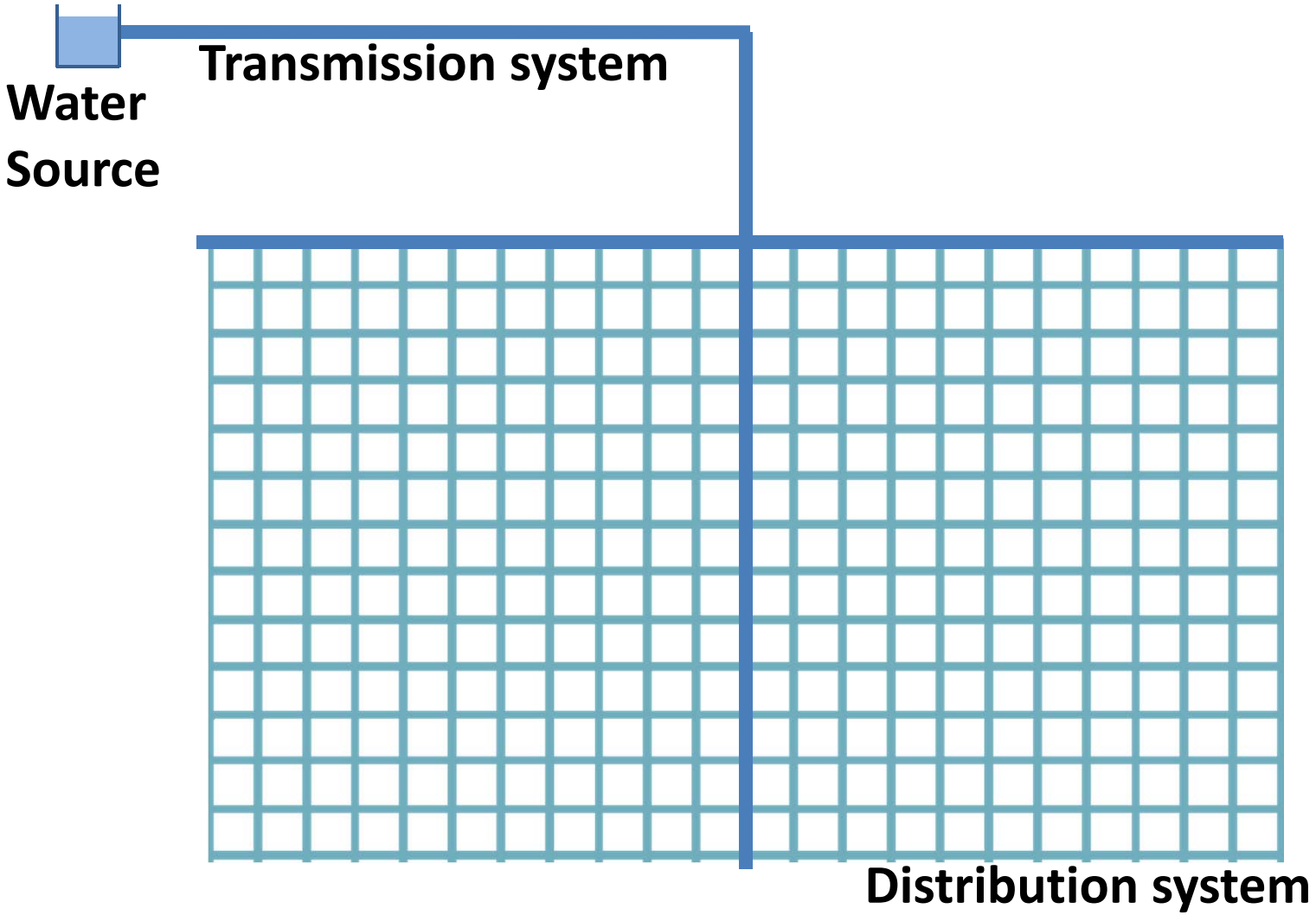
Pipeline Rebuild

Resilience: Strategic Hardening



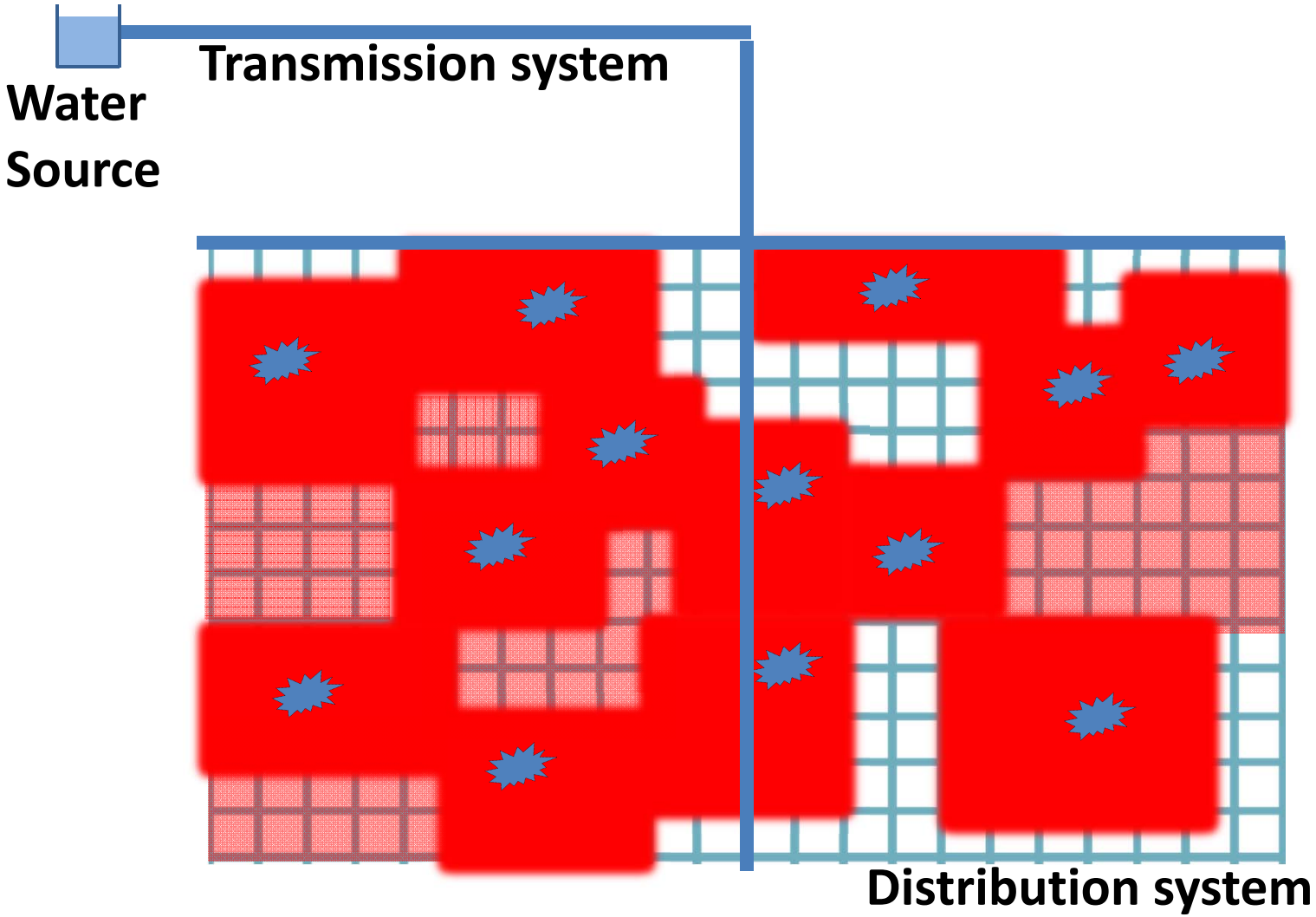
Pipeline Rebuild

Resilience: Valve Configuration

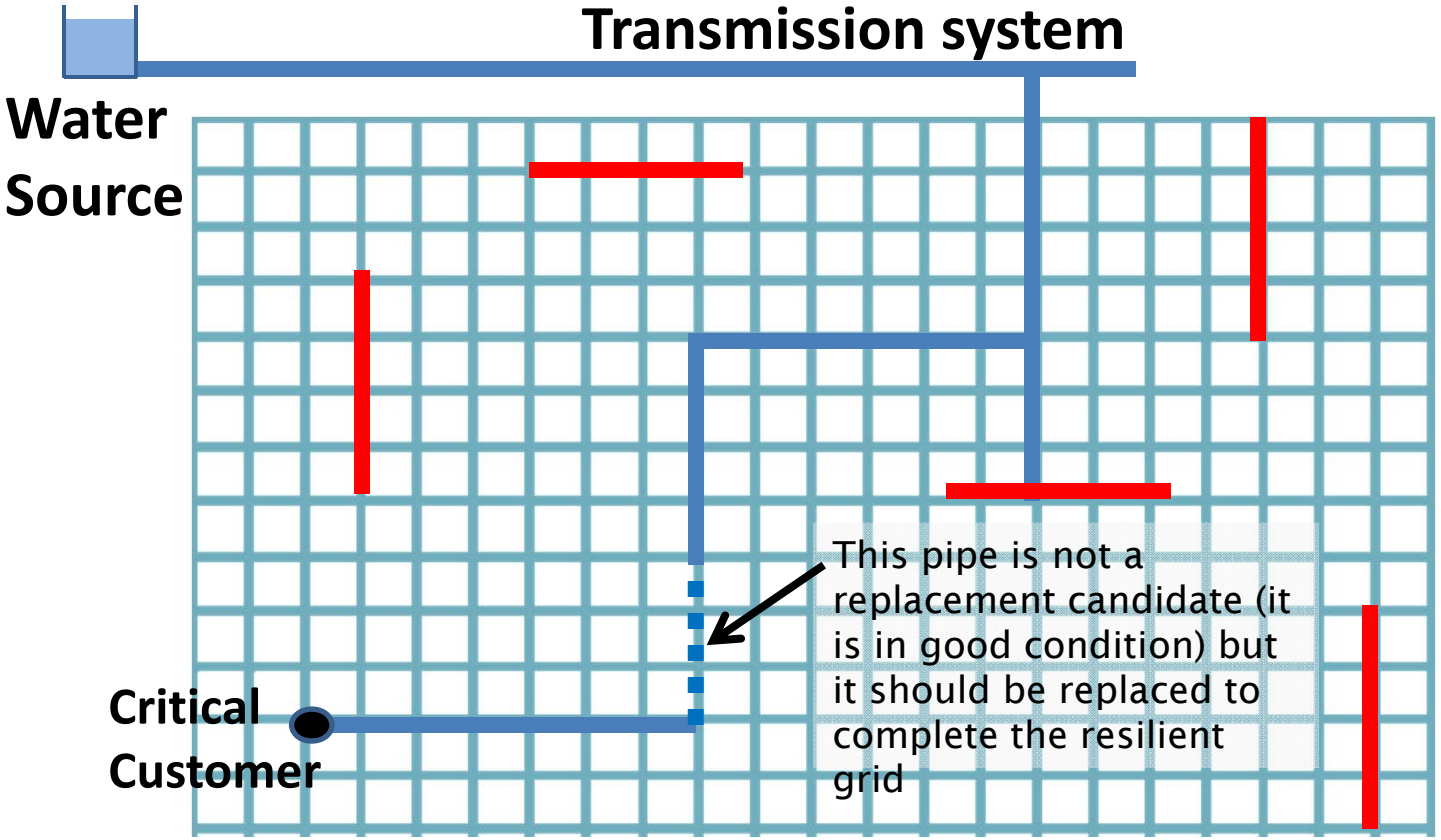


Pipeline Rebuild

Resilience: Valve Configuration

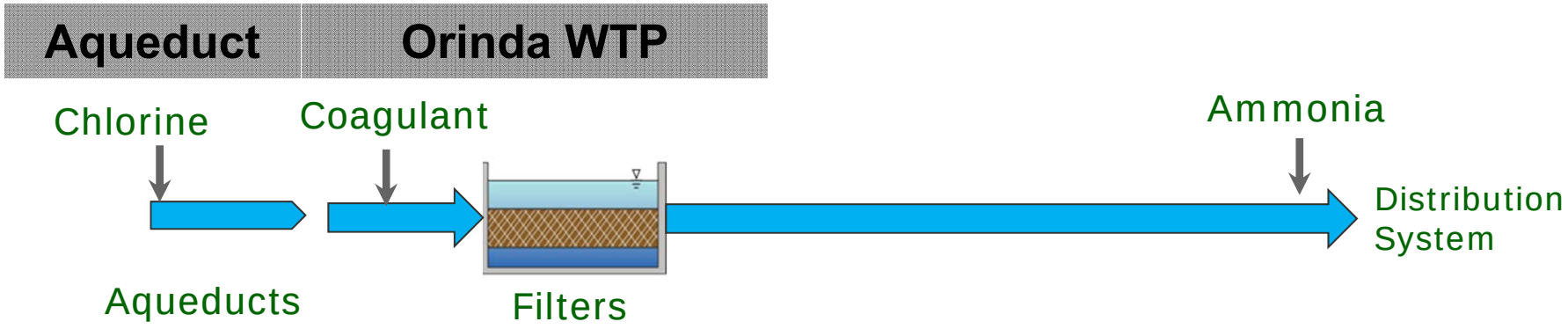


Pipeline Rebuild
Resilience: Critical Customers



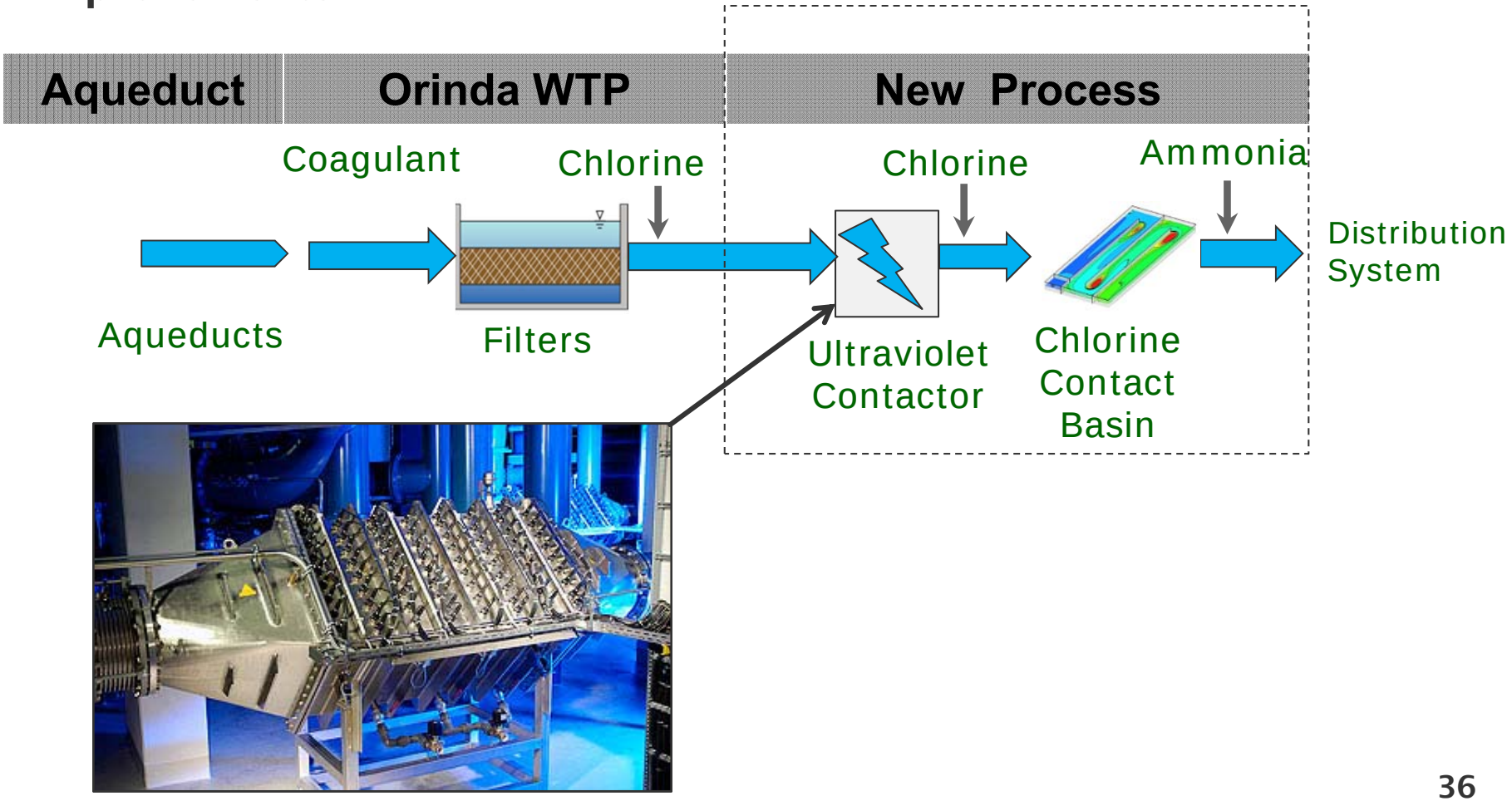
Orinda WTP
Disinfection Improvements Project

Existing Treatment Process at Orinda WTP



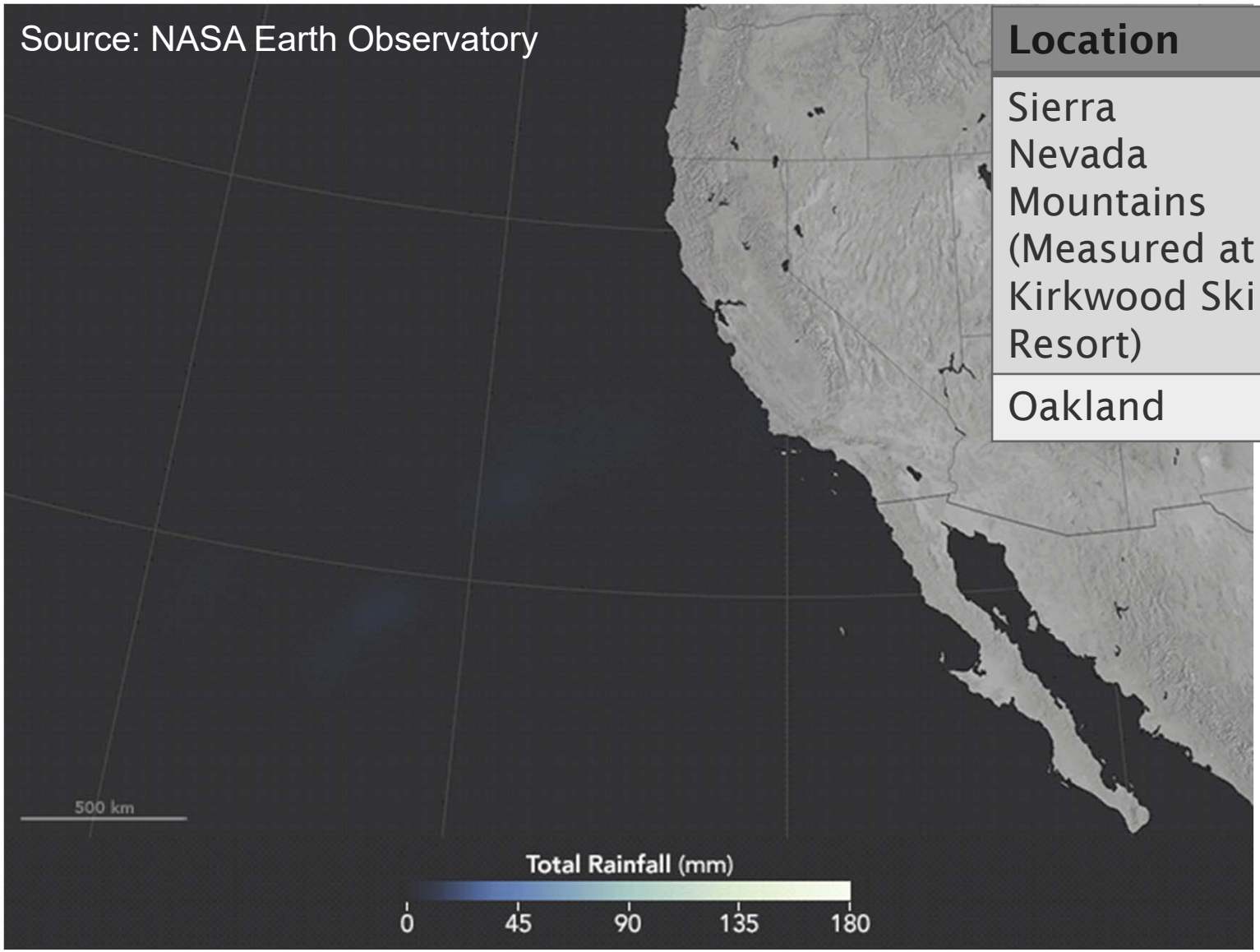
Orinda WTP
Disinfection Improvements Project

Treatment Process at Orinda WTP after Orinda Disinfection Improvements



Orinda WTP

Resilience: Intense Atmospheric Rivers



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

Orinda WTP

Resilience: Drought

Orinda WTP

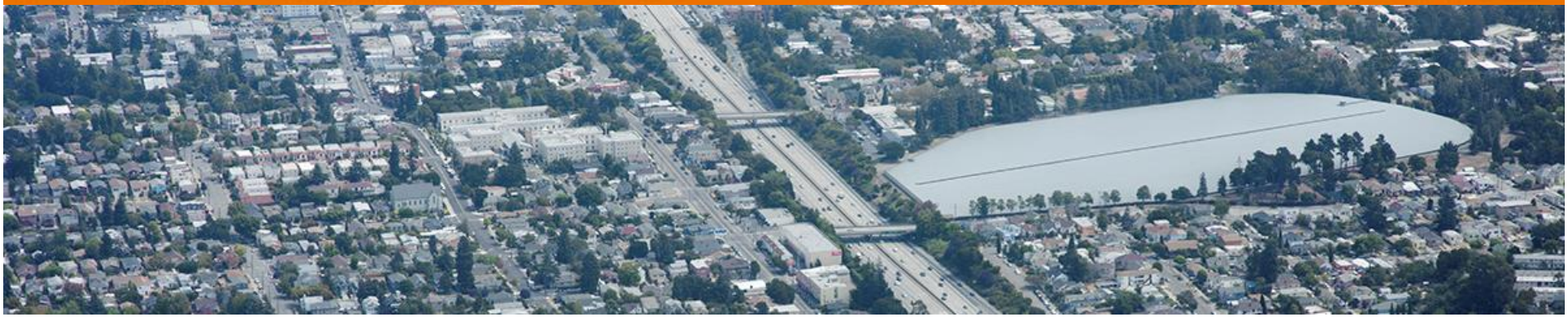
Resilience: Water Quality

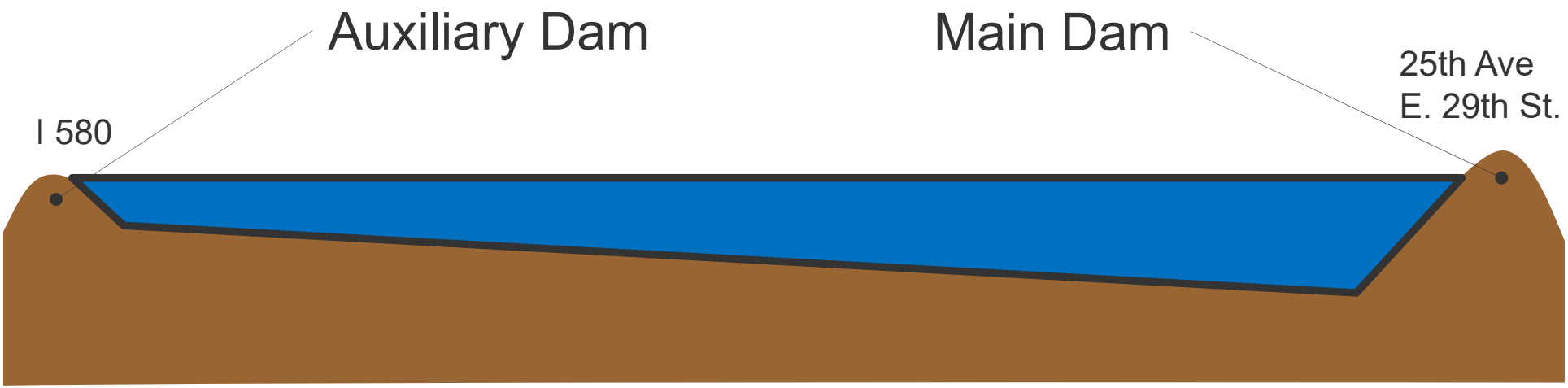
Orinda WTP

Resilience: Water Quality

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

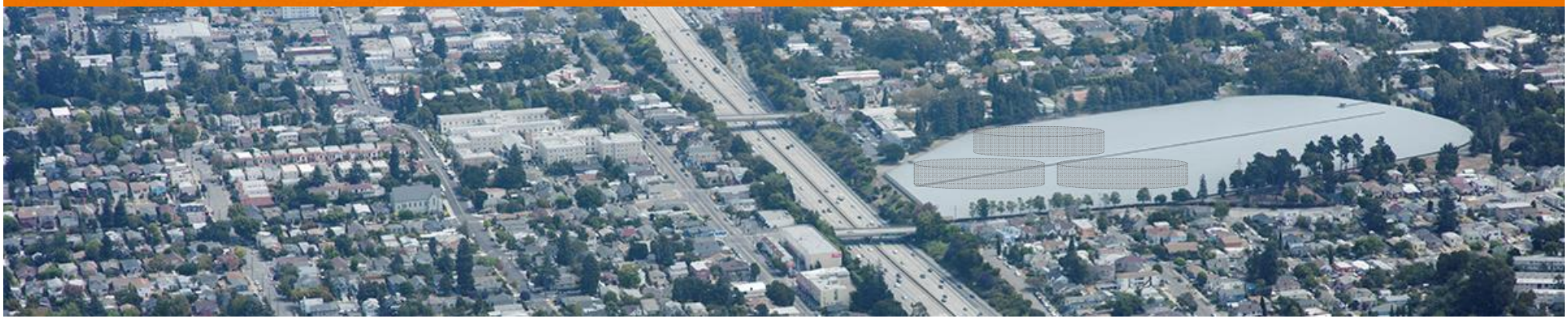
Central Reservoir Replacement Project



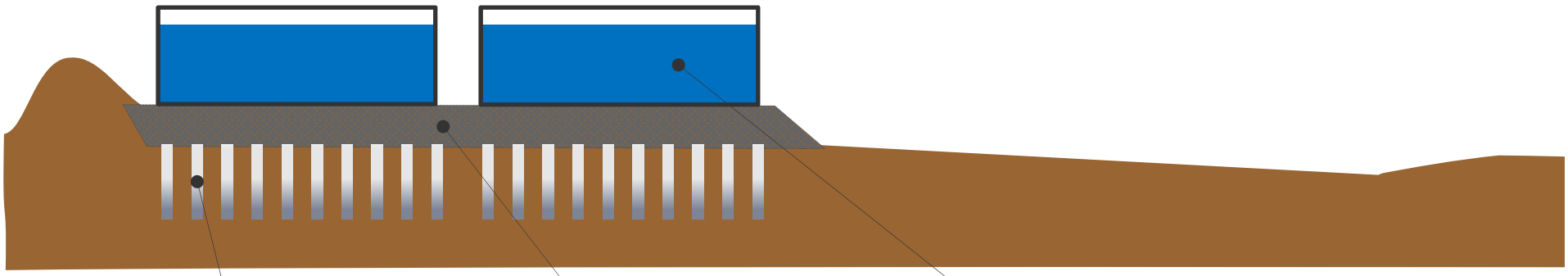


Central Reservoir

Resilience

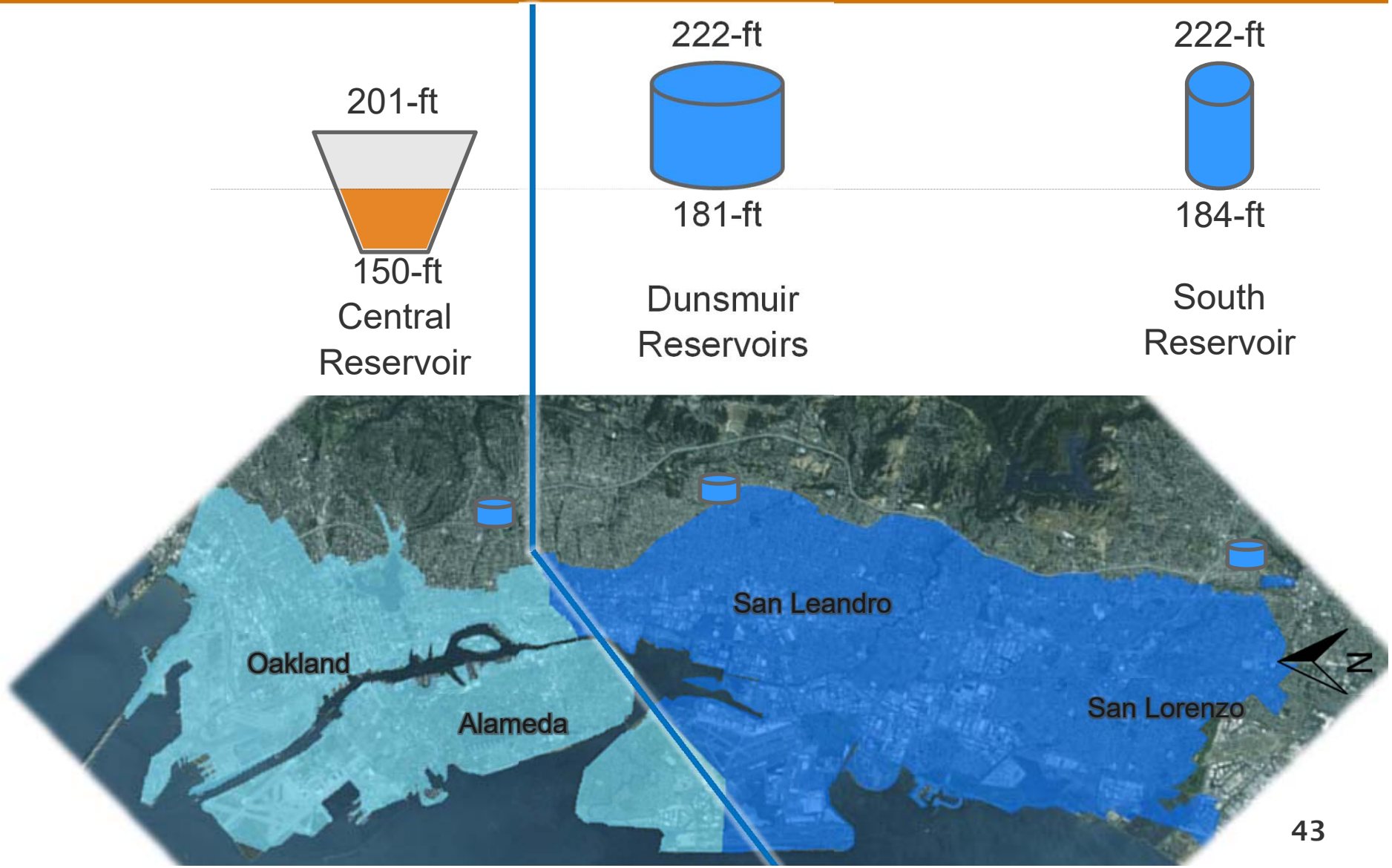


- Raise reservoir to significantly improve operational flexibility



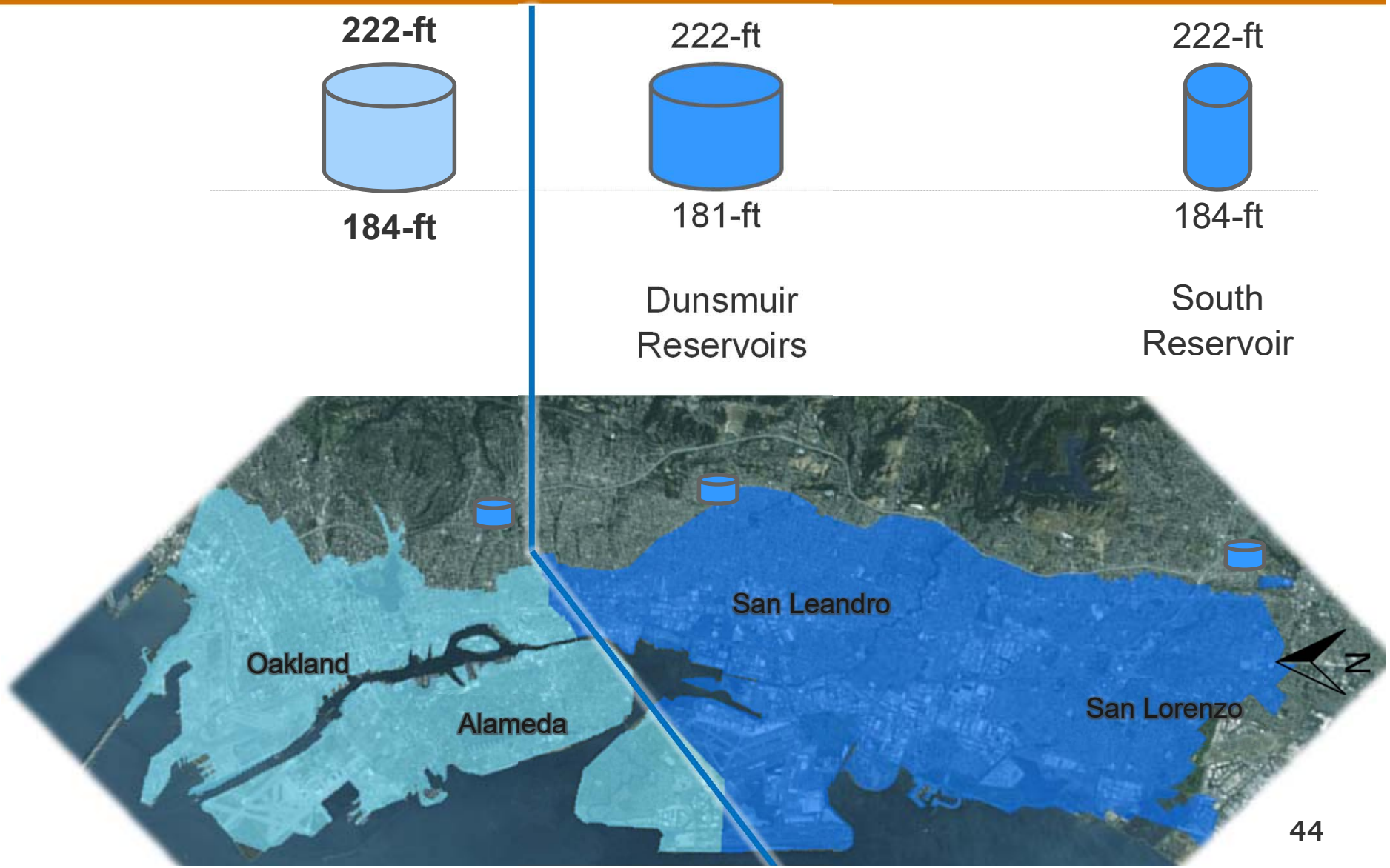
Central Reservoir

Resilience



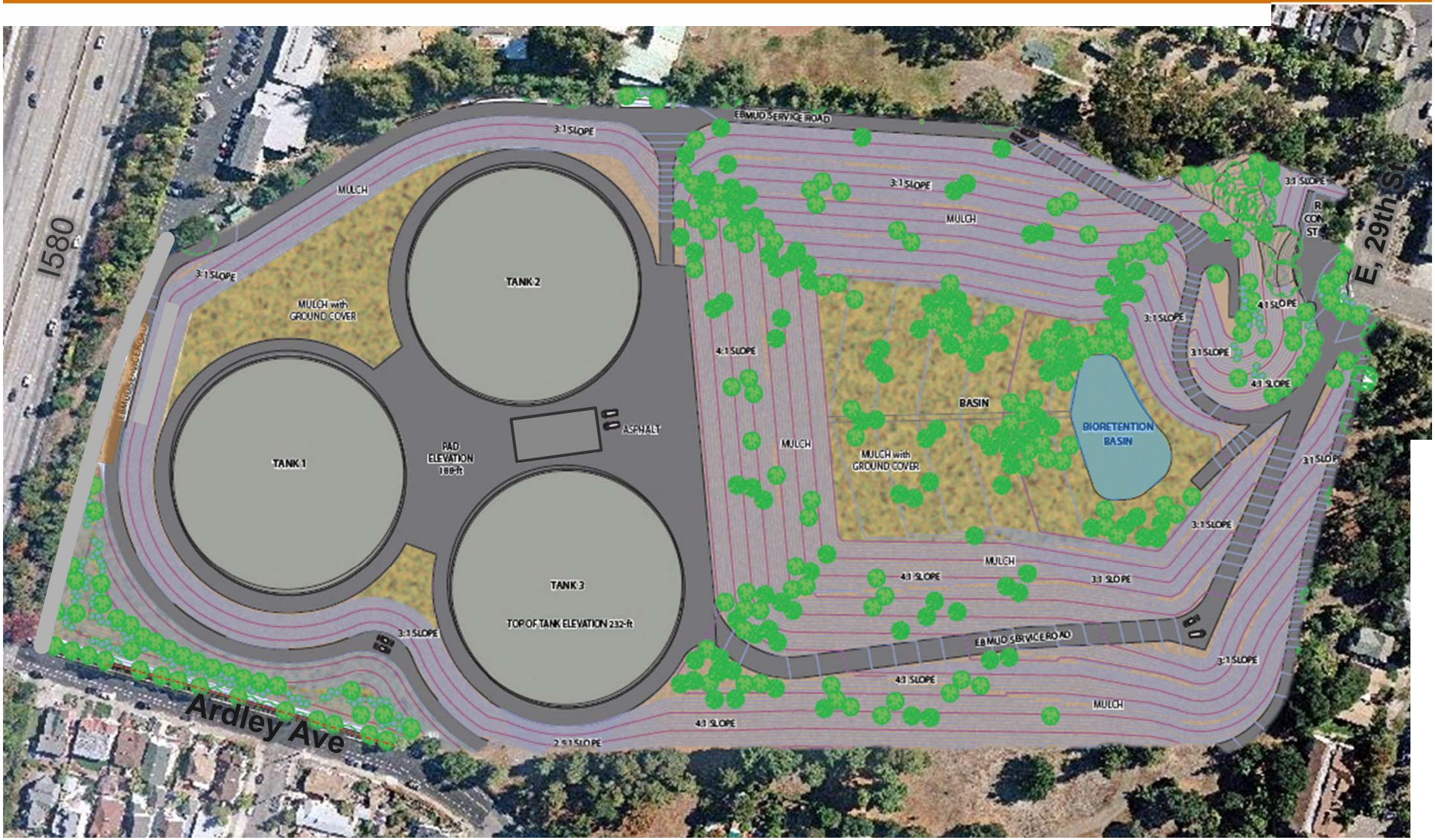
Central Reservoir

Resilience



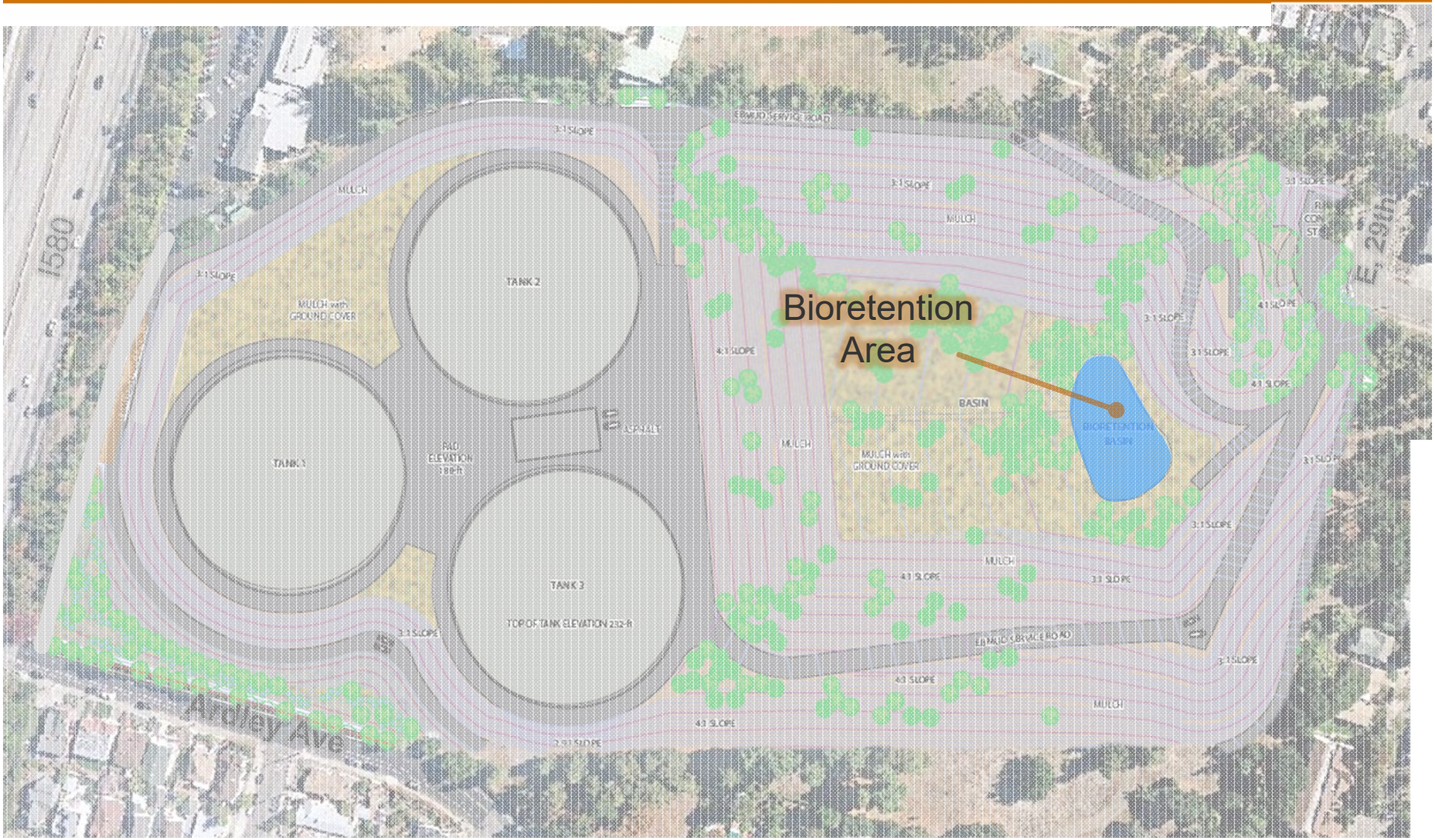
Central Reservoir

Sustainability



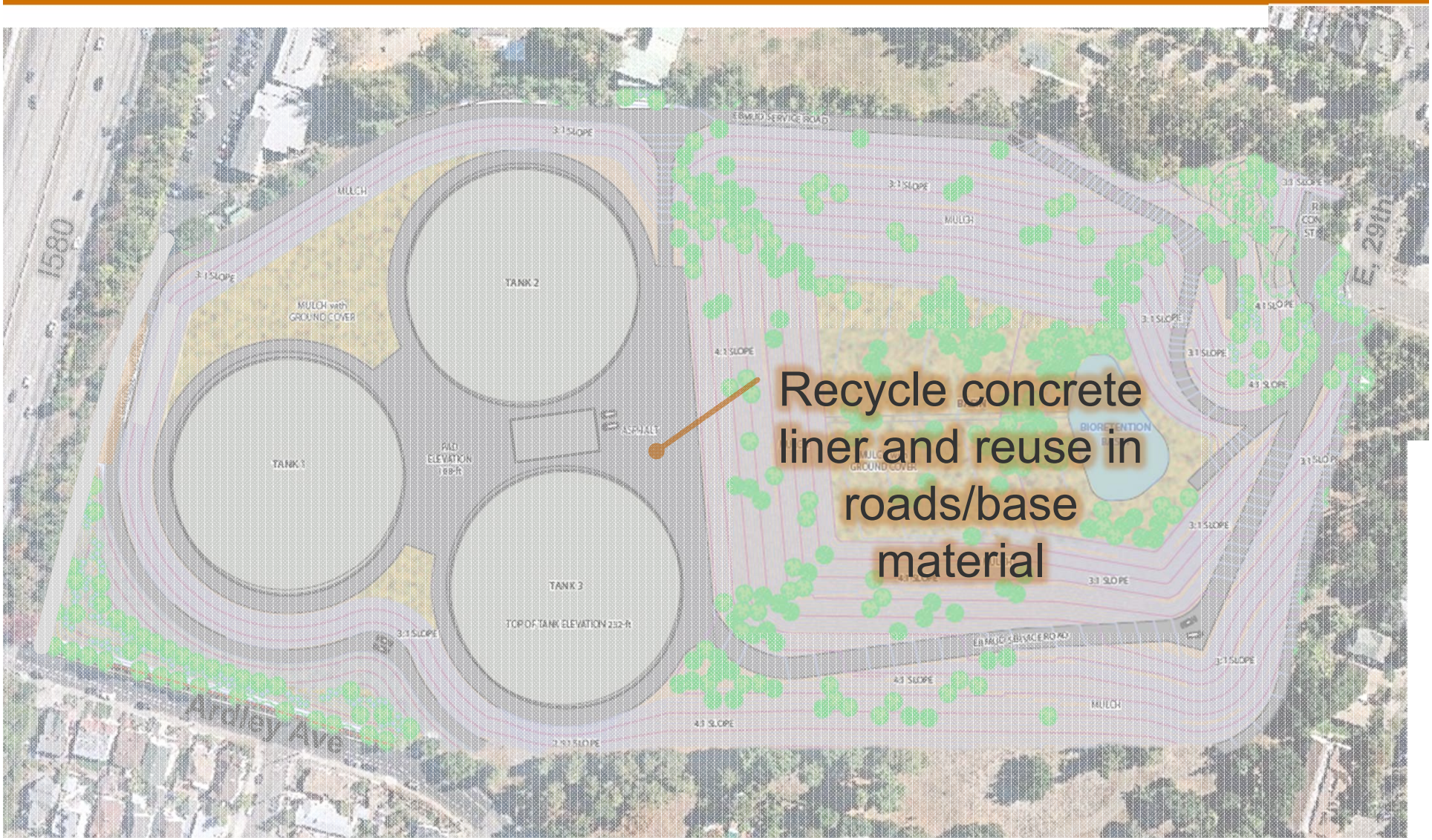
Central Reservoir

Sustainability



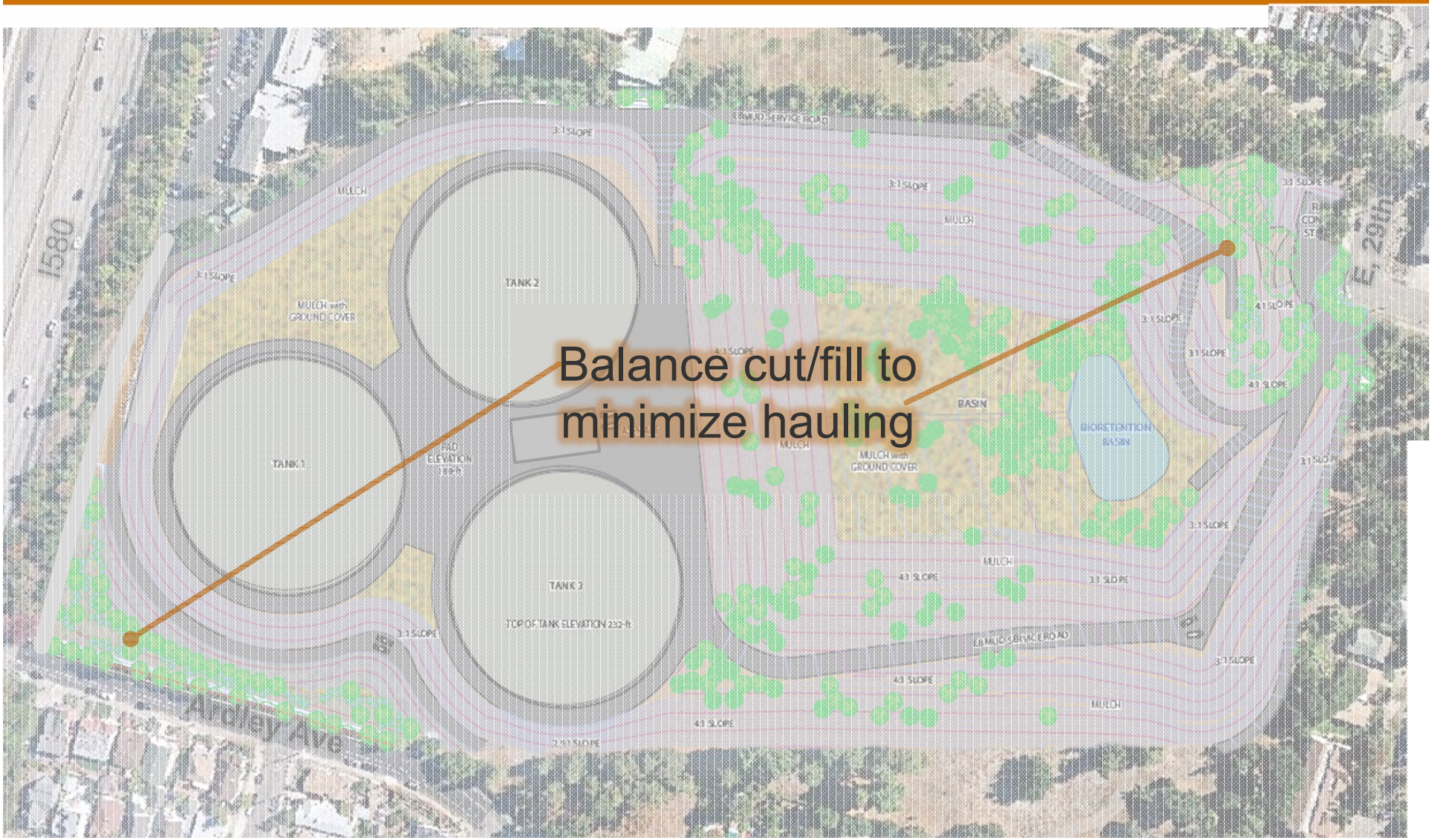
Central Reservoir

Sustainability



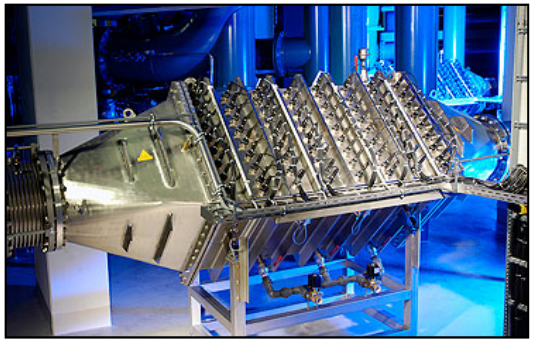
Central Reservoir

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

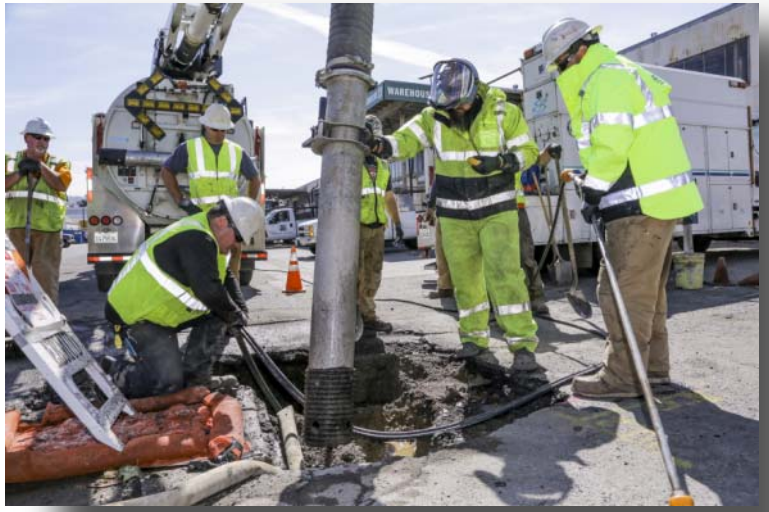
- Meter inaccuracy

Real Losses

- Leaks on mains and services

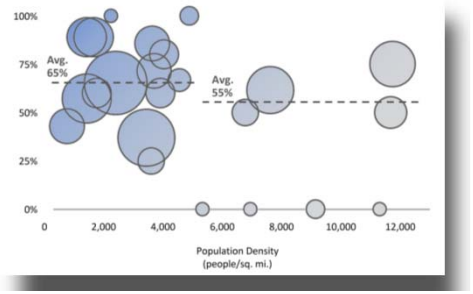
Water Loss Control Strategy Goals

- 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

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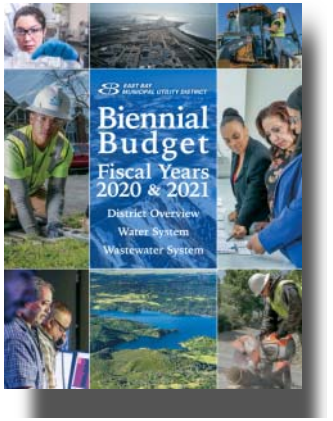
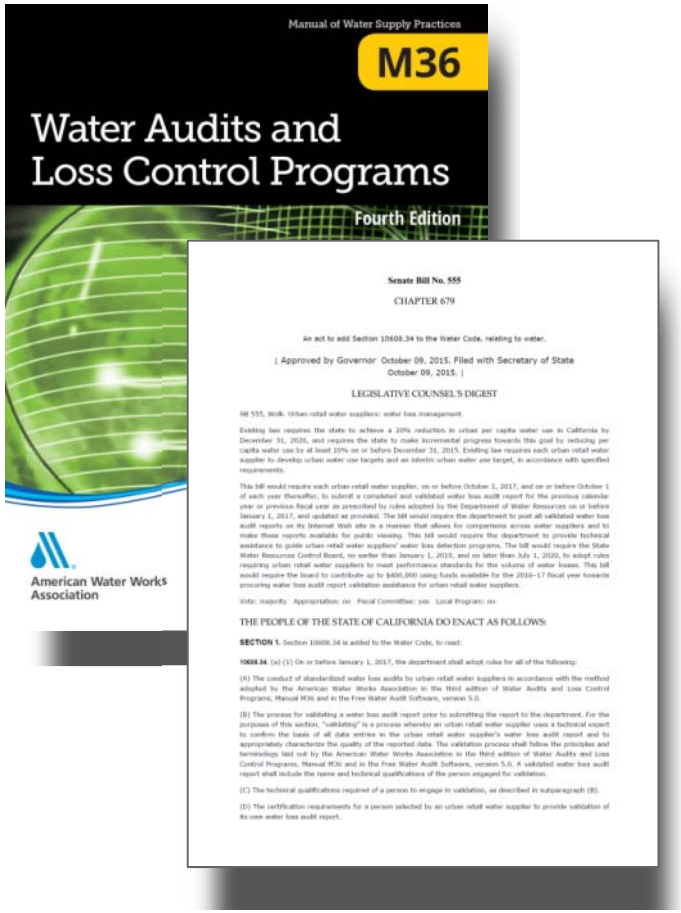


Strategies

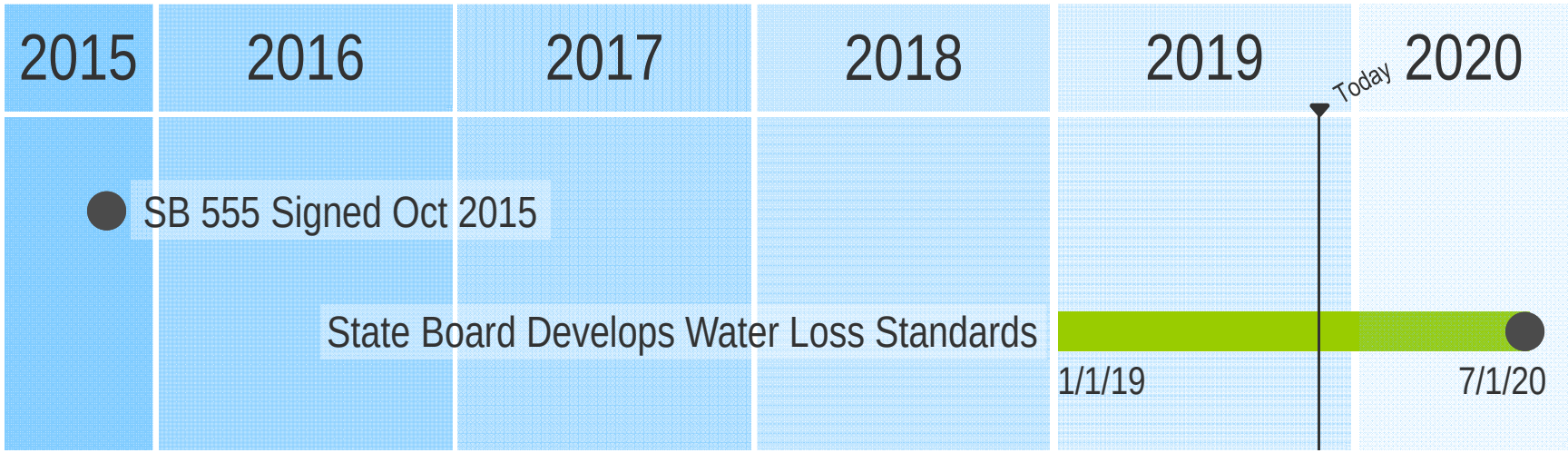
California Senate Bill 555

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

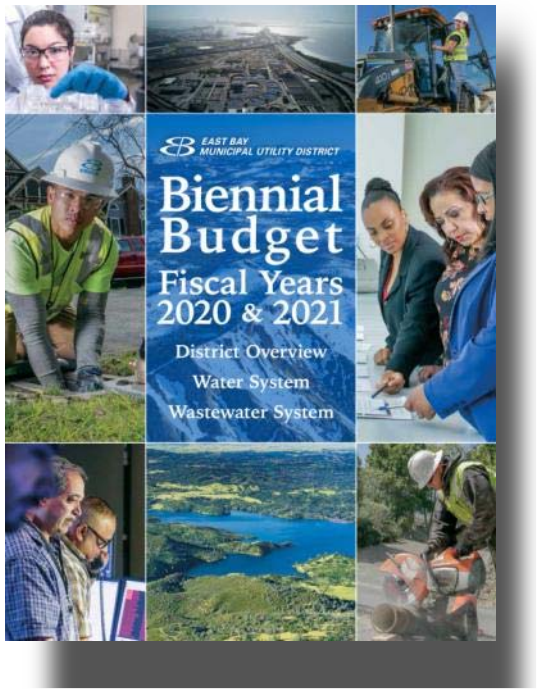
WTP Production Volume – Customer Consumption Volume = Water Loss Volume

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

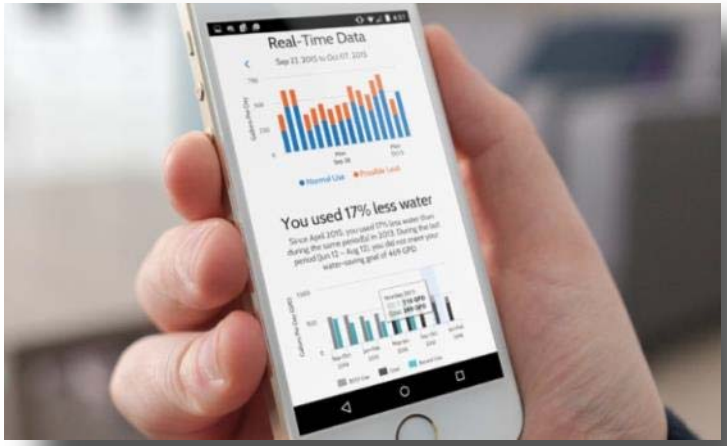
- Large meters for customers and water treatment plants
- More accurate water loss auditing
- Annual testing of flow meters

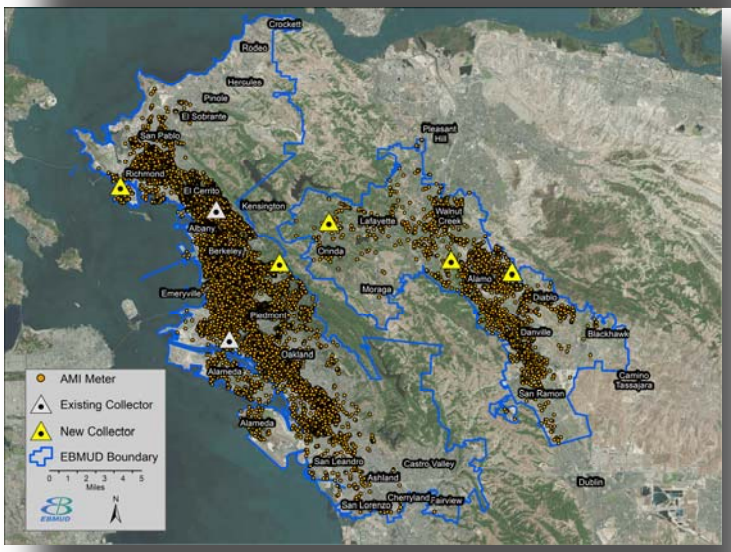
Apparent Losses
Meter Replacement & Testing

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

Apparent Losses
Advanced Metering Infrastructure (AMI)

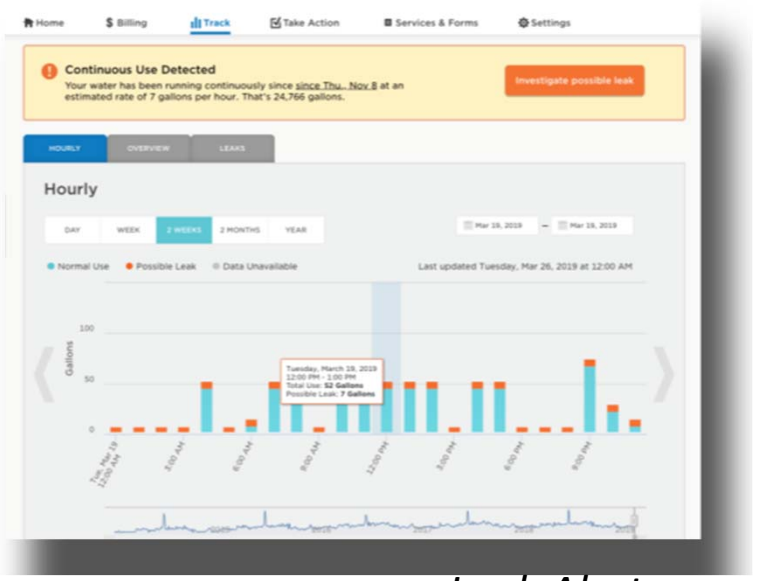
- AMI pilot includes 13,000 accounts
- Purpose: Provide AMI data to quantify water and energy savings
- $1.25M in grant funding for two studies





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

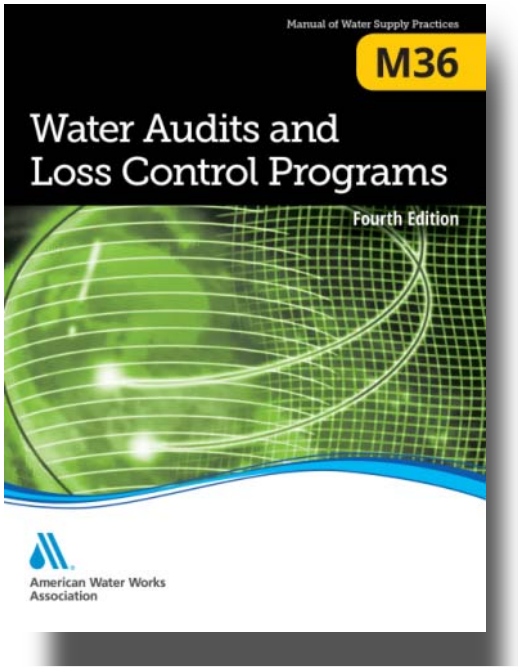
Leak Alert Text Message

Real Losses

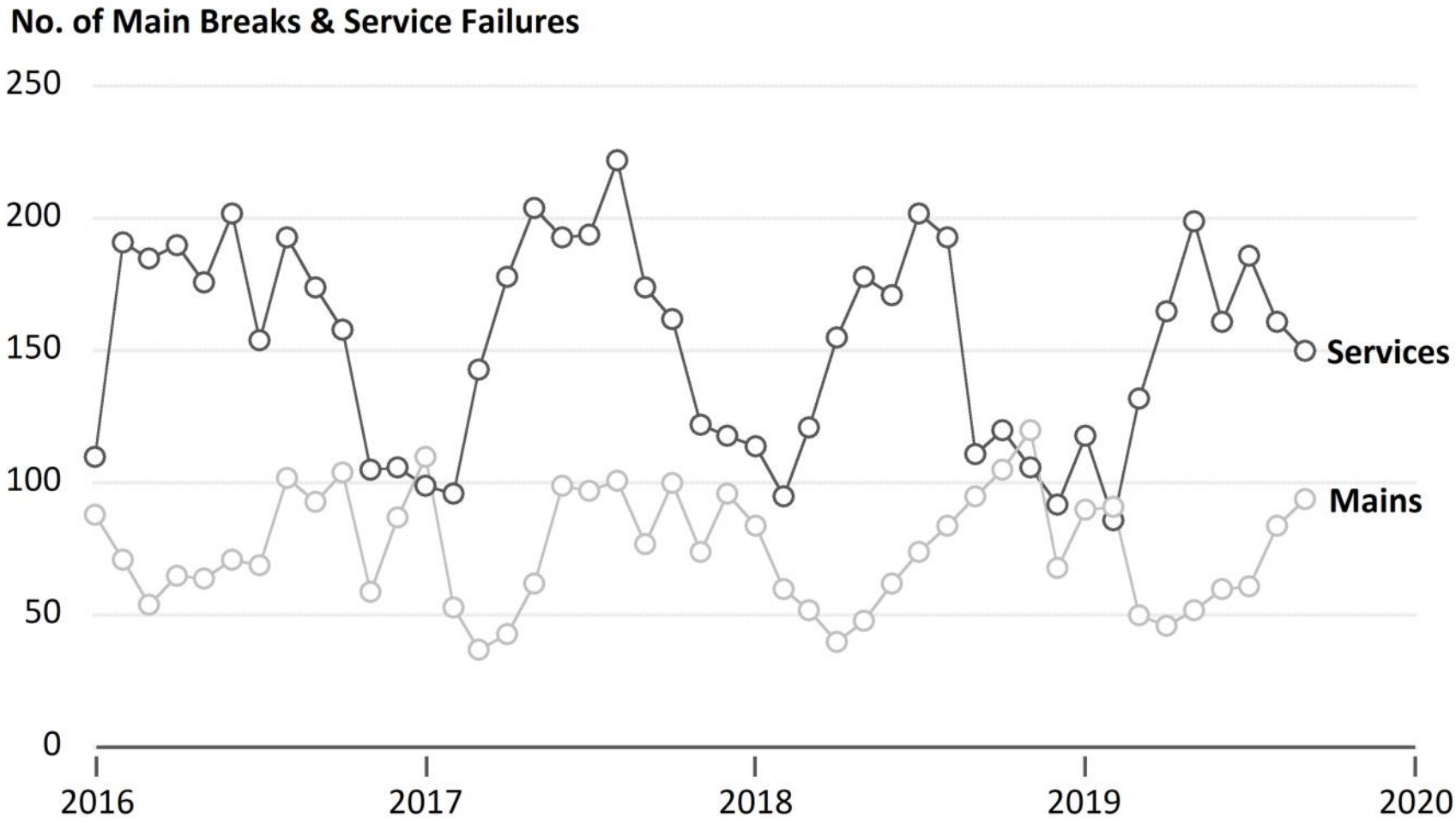
Real Losses

Strategies to Address Real Losses

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



Real Losses
Reported Leaks



Active Leak Detection

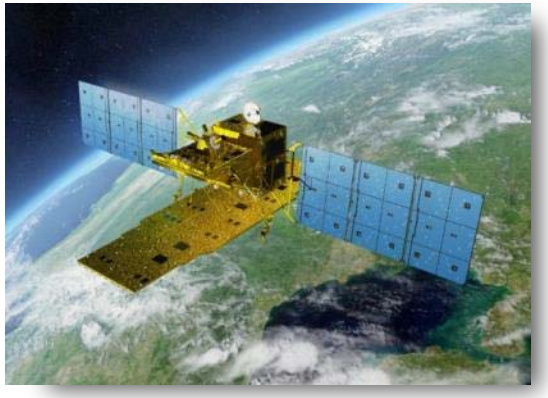
Automated Acoustic Leak Detection

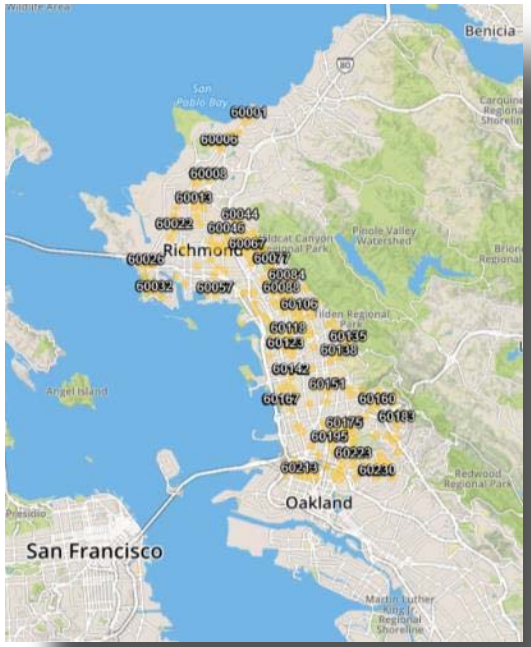
- Finds leaks before they surface
- Reduces water loss
- Protects the environment and property
- Found over 200 leaks
- Quick payback

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



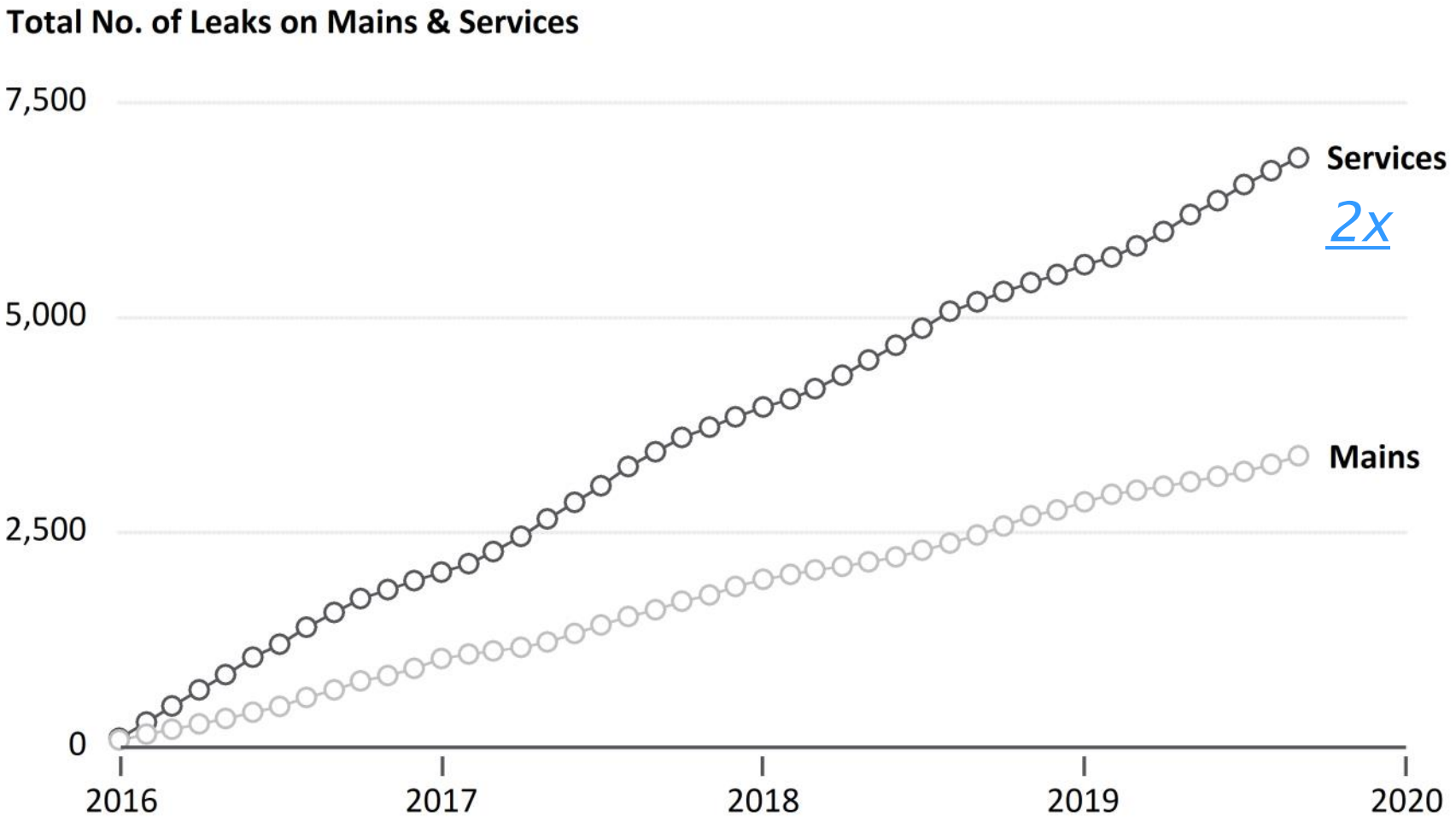


Active Leak Detection

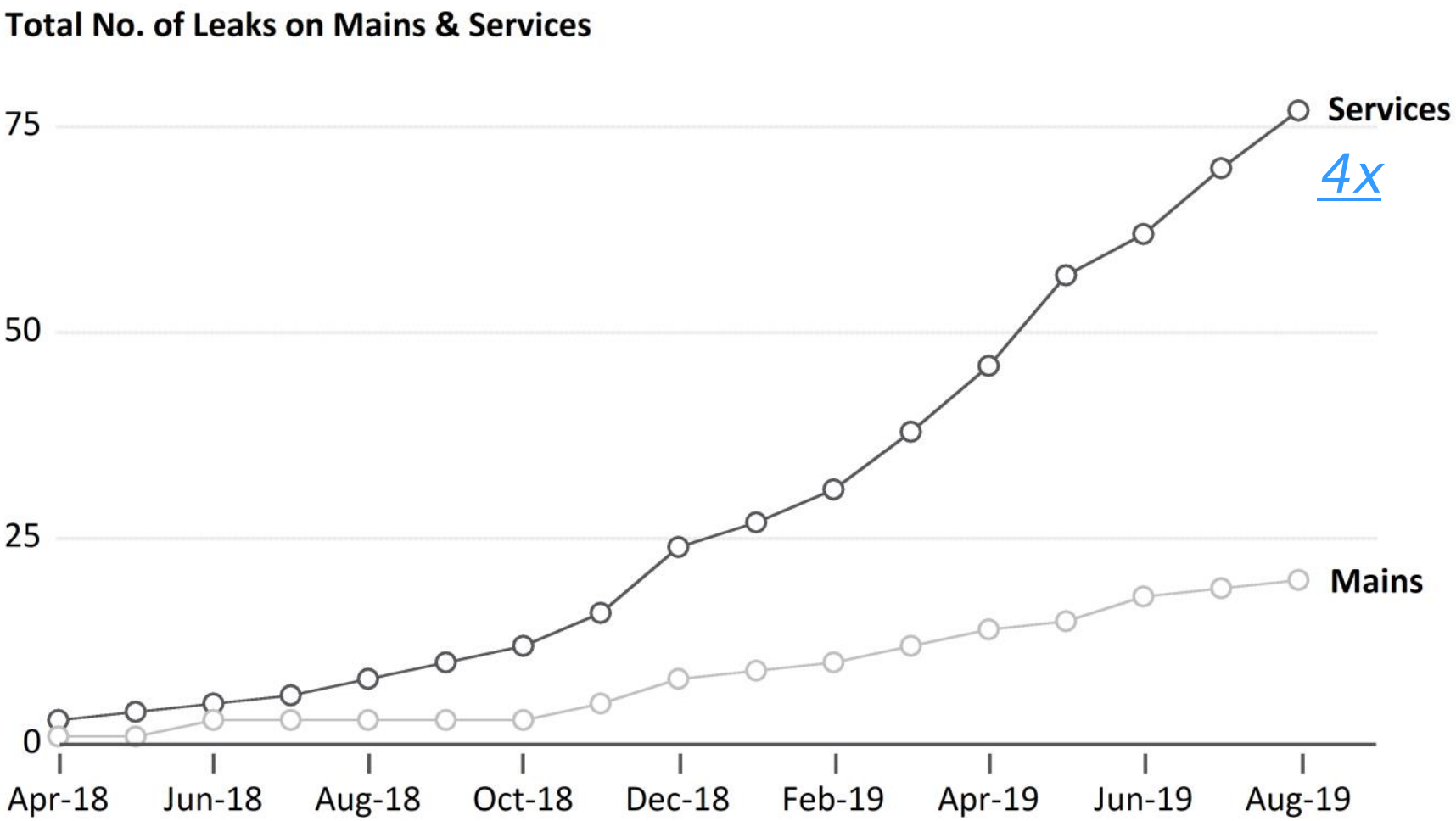
Manual Acoustic Leak Detection

- 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



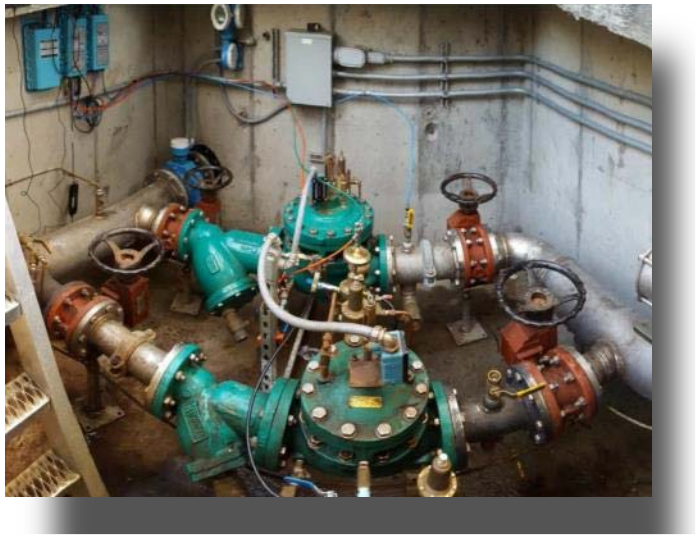
Real Losses
Unreported Leaks



Pressure Management

Pressure Stabilization and Reduction

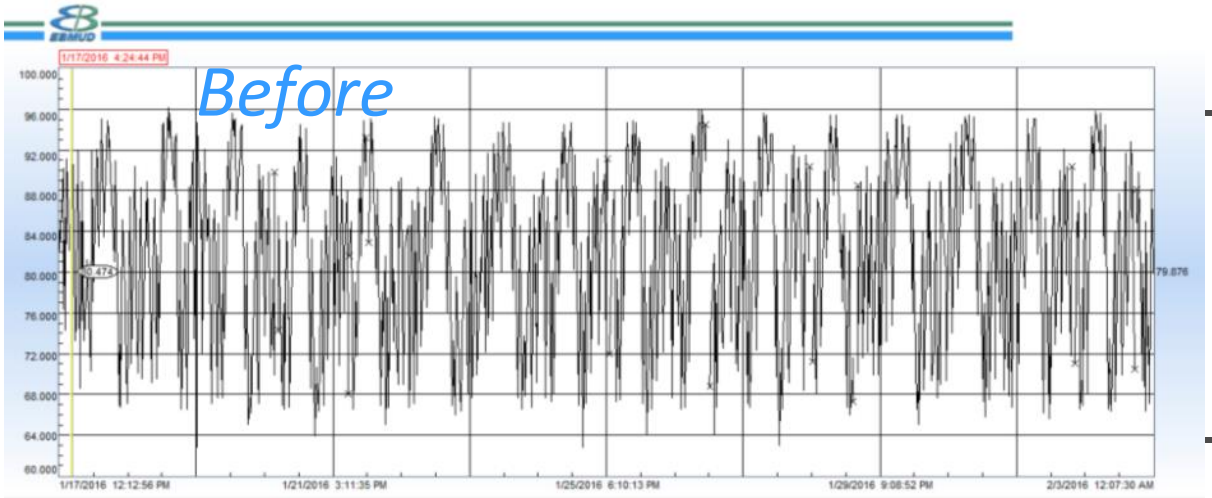
- Concept
  - Reduce pressure
  - Minimize pressure swings
- Benefits
  - Extends the life of pipelines
  - Reduces leakage
  - Reduces main breaks
  - Improves customer service



Dwight Regulator
& FCS Pegasus+

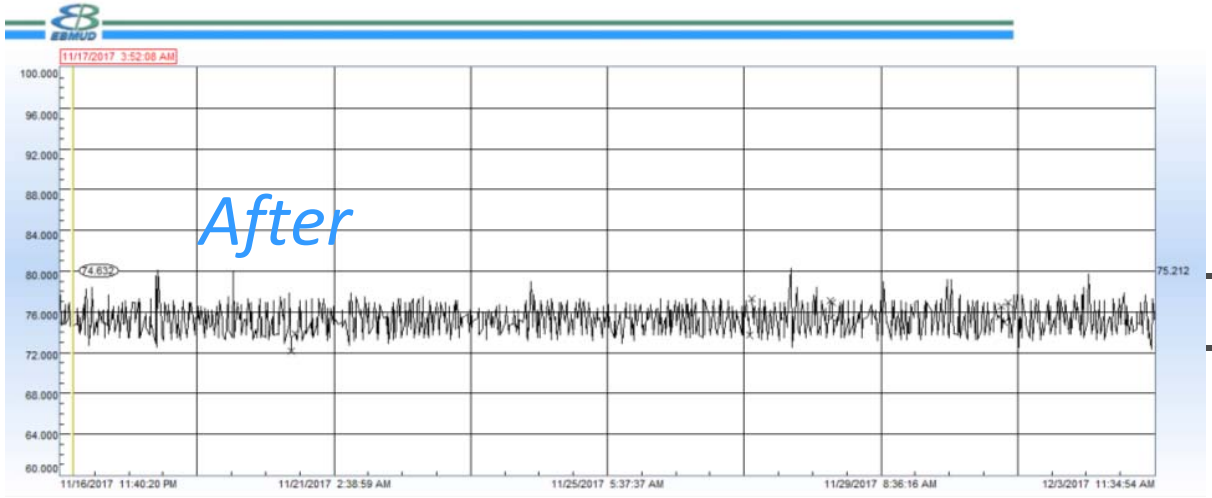
Pressure Management

Pressure Stabilization and Reduction



33 psi

Max. Pressure
96 psi



5 psi

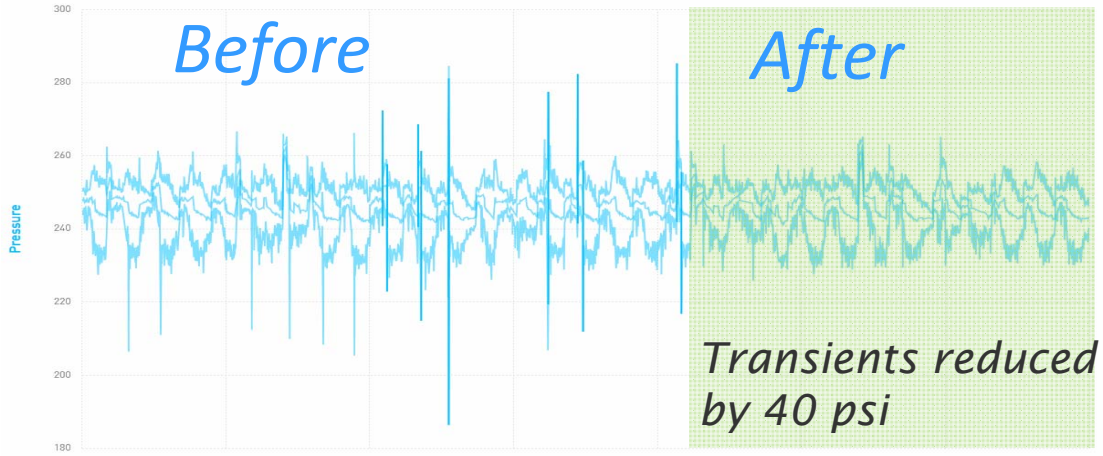
Max. Pressure
80 psi
Δ = 16 psi

Pressure Management

Pressure Transients

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

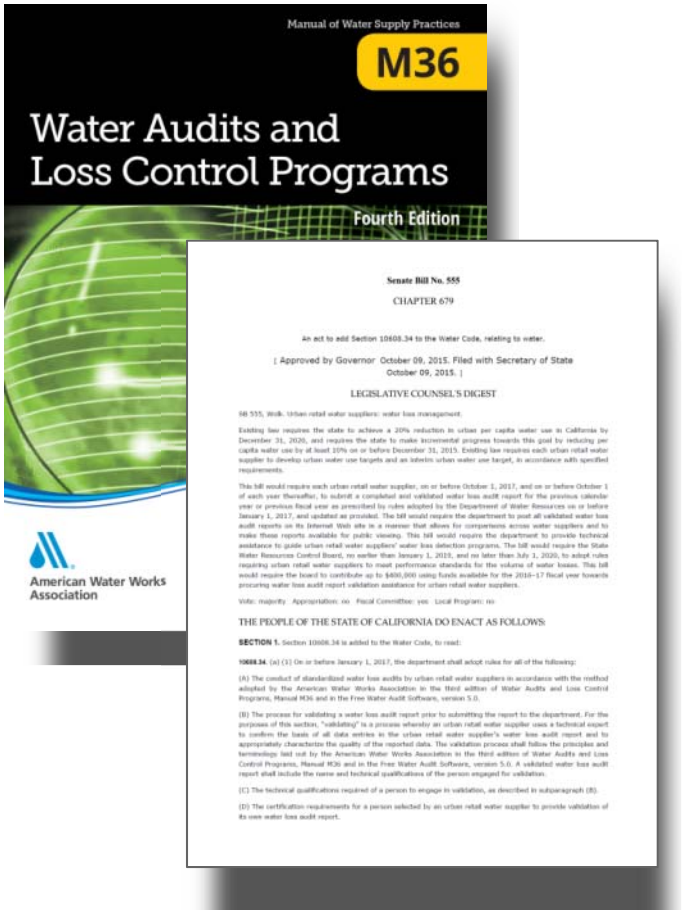
Pressure Monitor



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

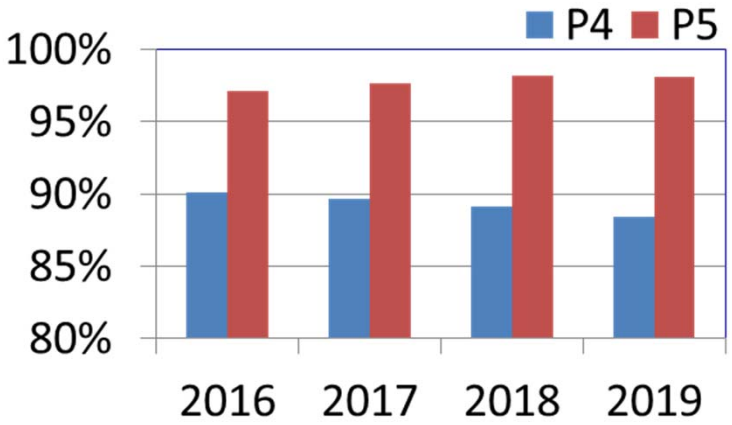
- Response time
  - Points of interest within 2 hours
  - Respond to main breaks within 1 hour
  - Timely completion of repairs
- Training
- Equipment and tools

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

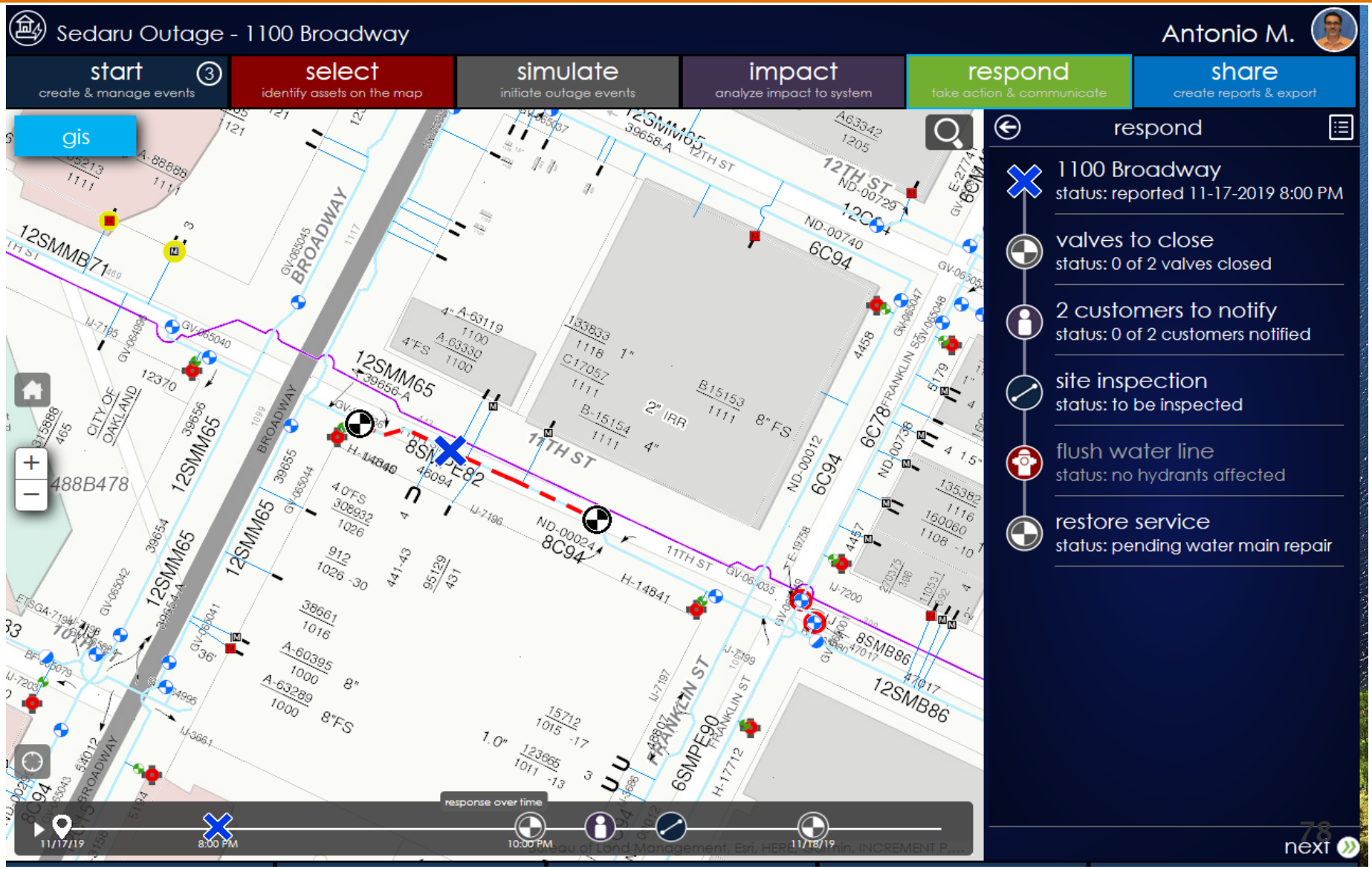
Pipeline Training Academy

Classroom Training

Field training

Speed and Quality of Repairs

Mobile Computing Tools

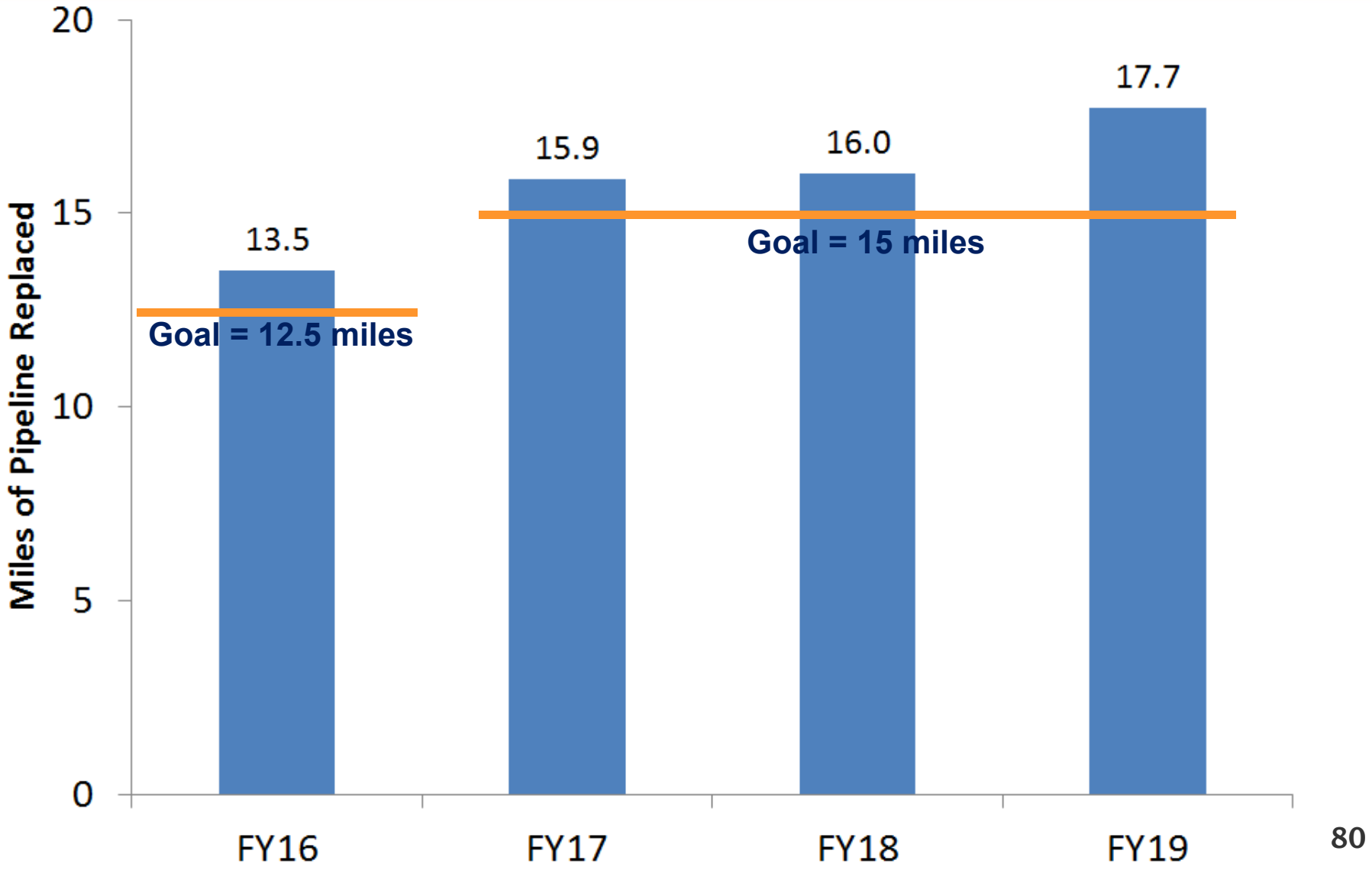


Speed and Quality of Repairs

Tools & Equipment

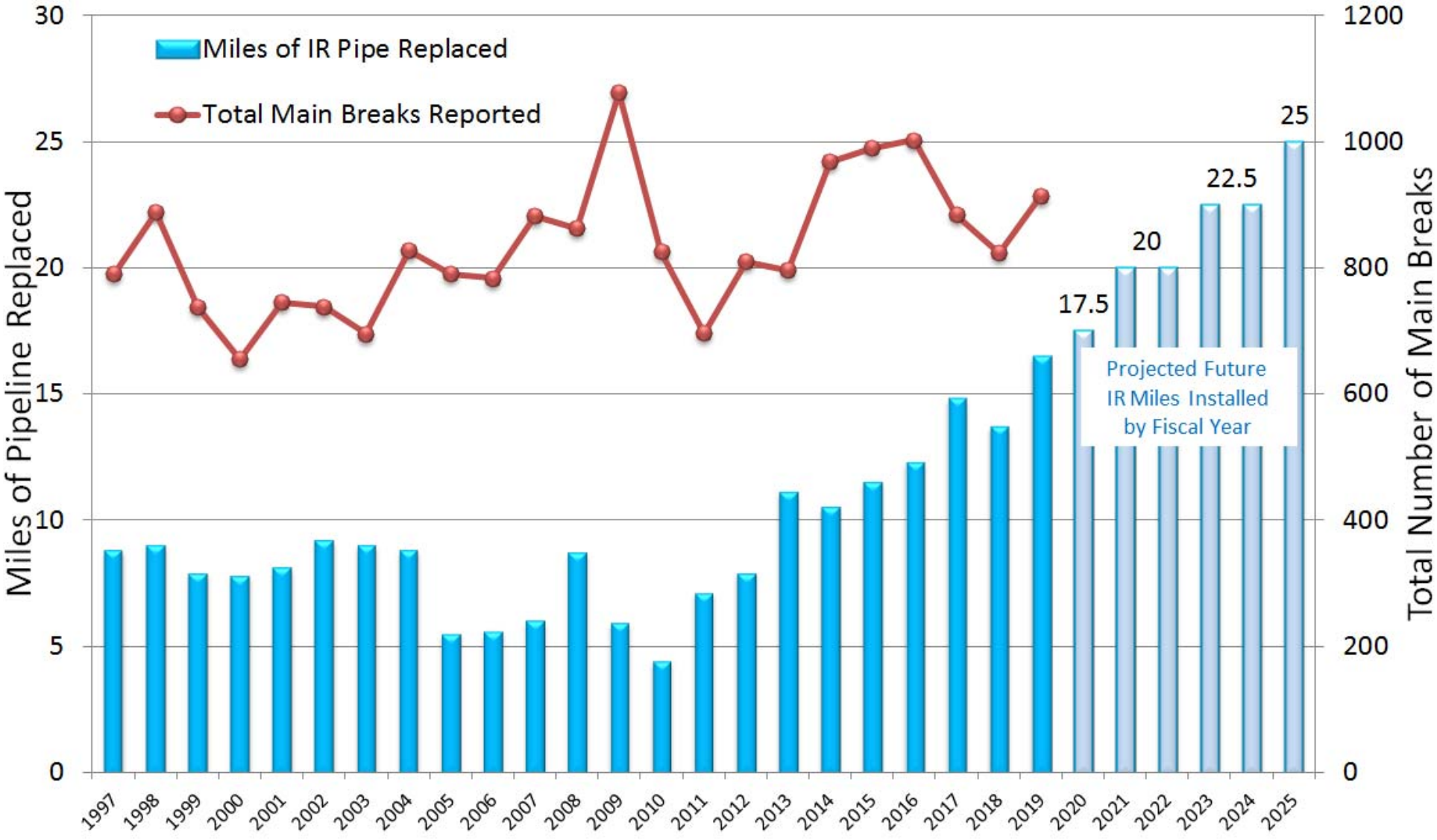
Infrastructure Management

Pipeline Rebuild Program



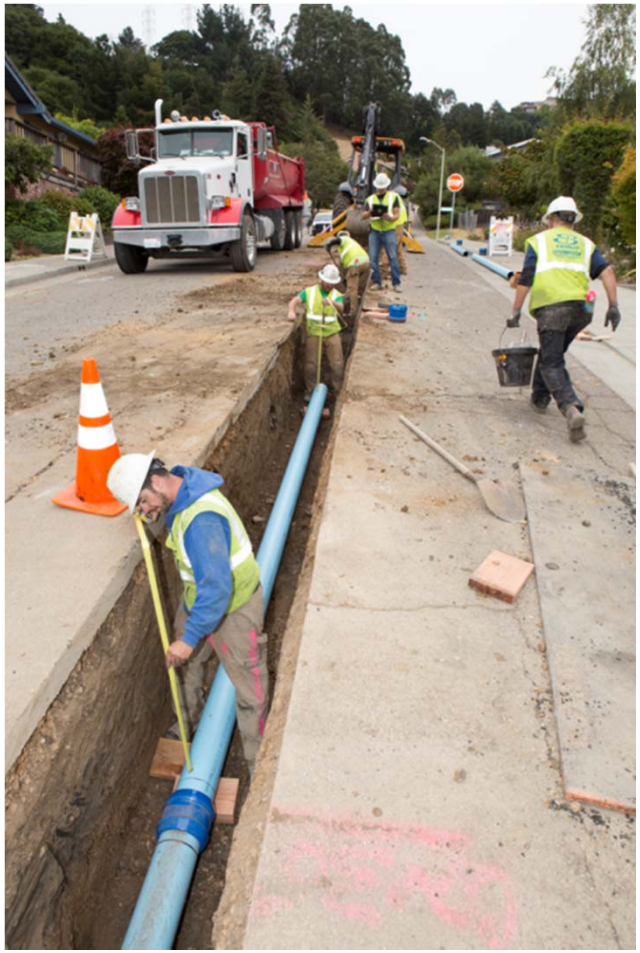
Infrastructure Management

Pipeline Rebuild: Progress and Plan



Infrastructure Management

Pipeline Rebuild: Maximize Efficiency/Performance

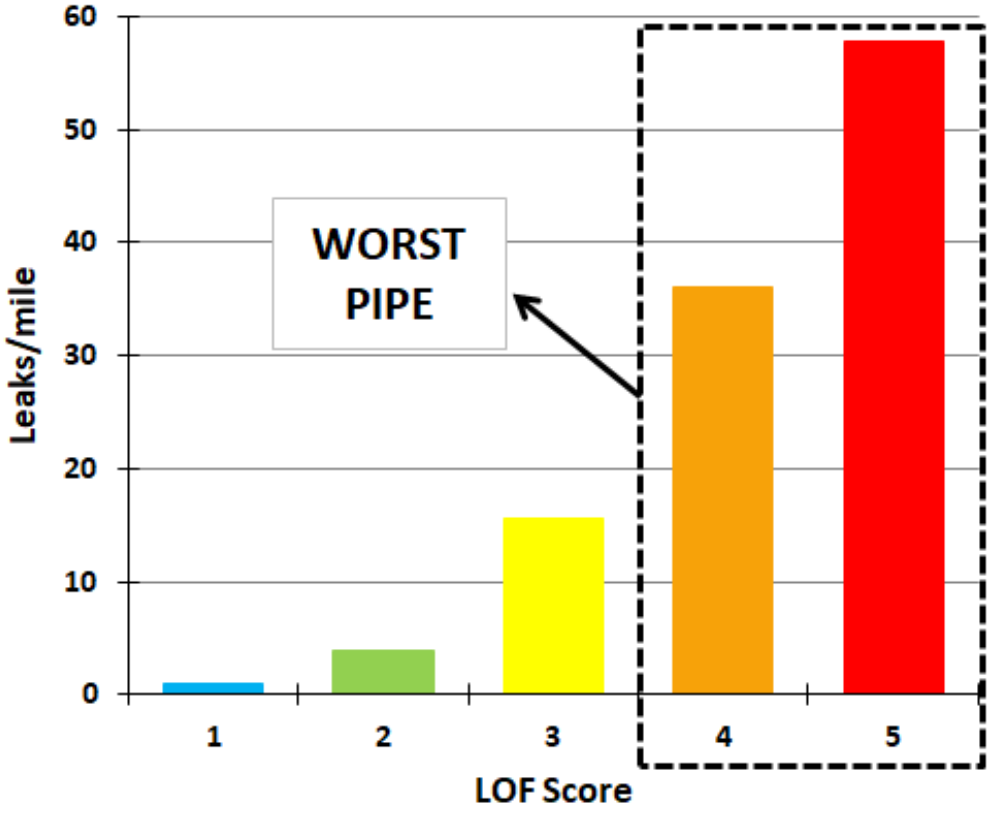


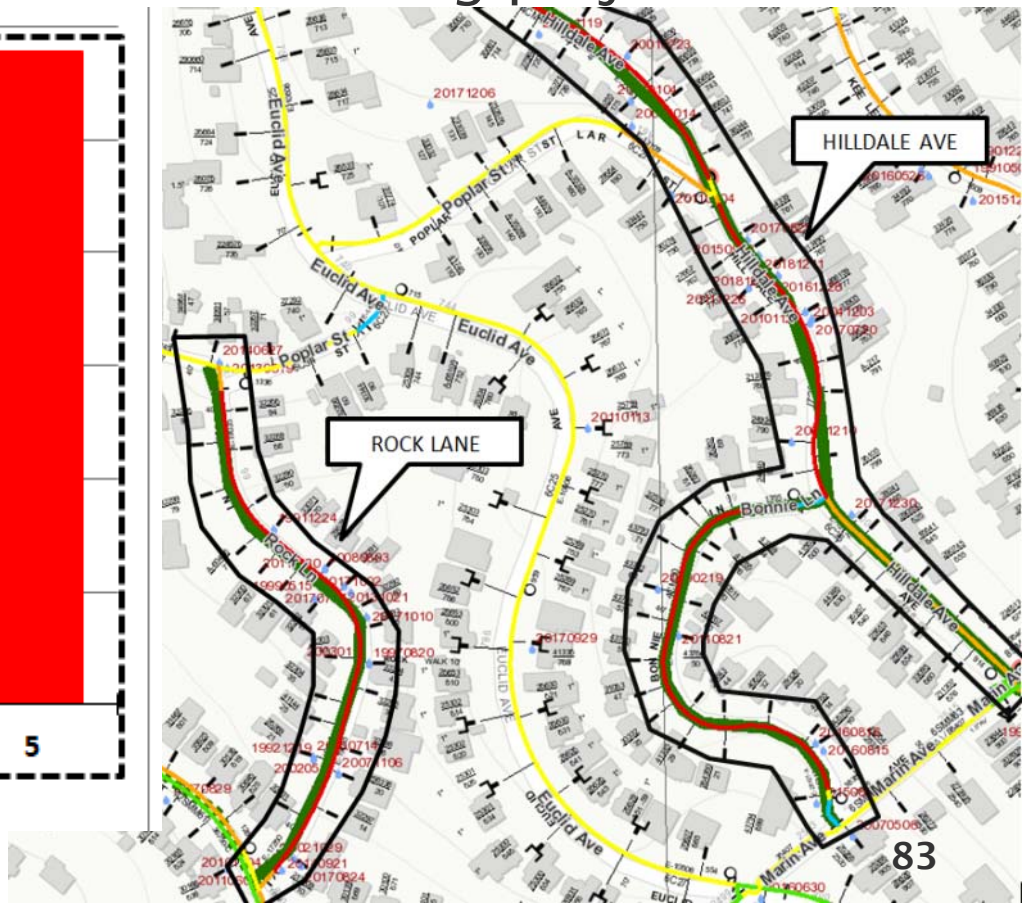
- Maintain focus on efficiencies
- Implement lessons learned
- Metrics

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

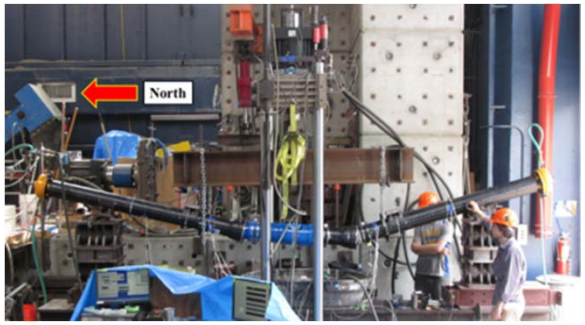
Pipeline Rebuild: Select Pipeline Materials

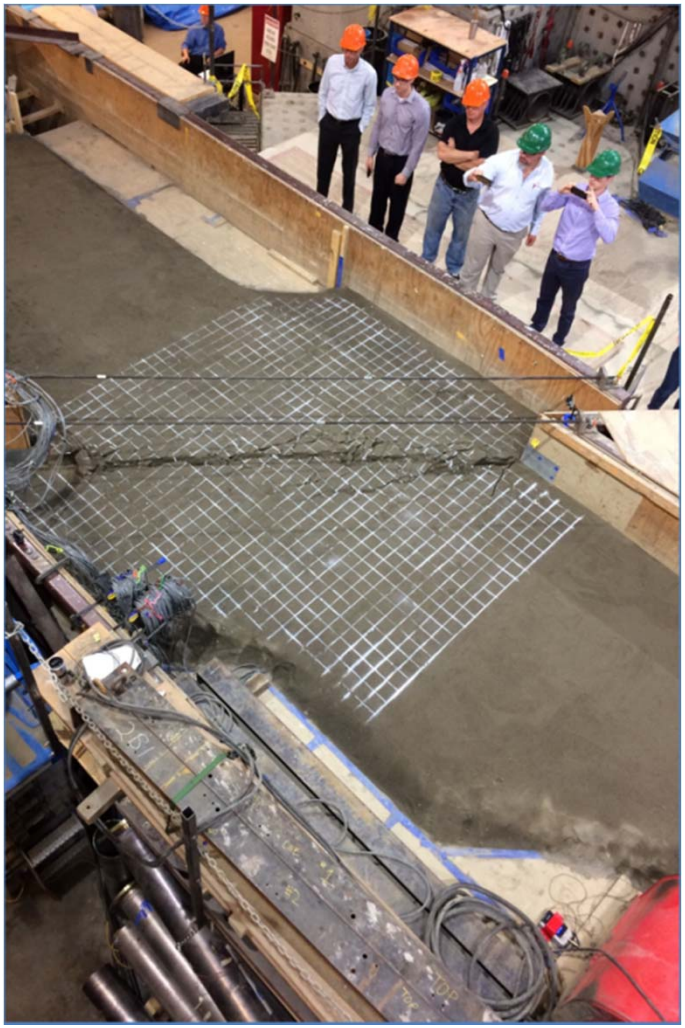
Long-Term Pipeline Replacement Program

- Design
- Construction
- Maintenance

Infrastructure Management

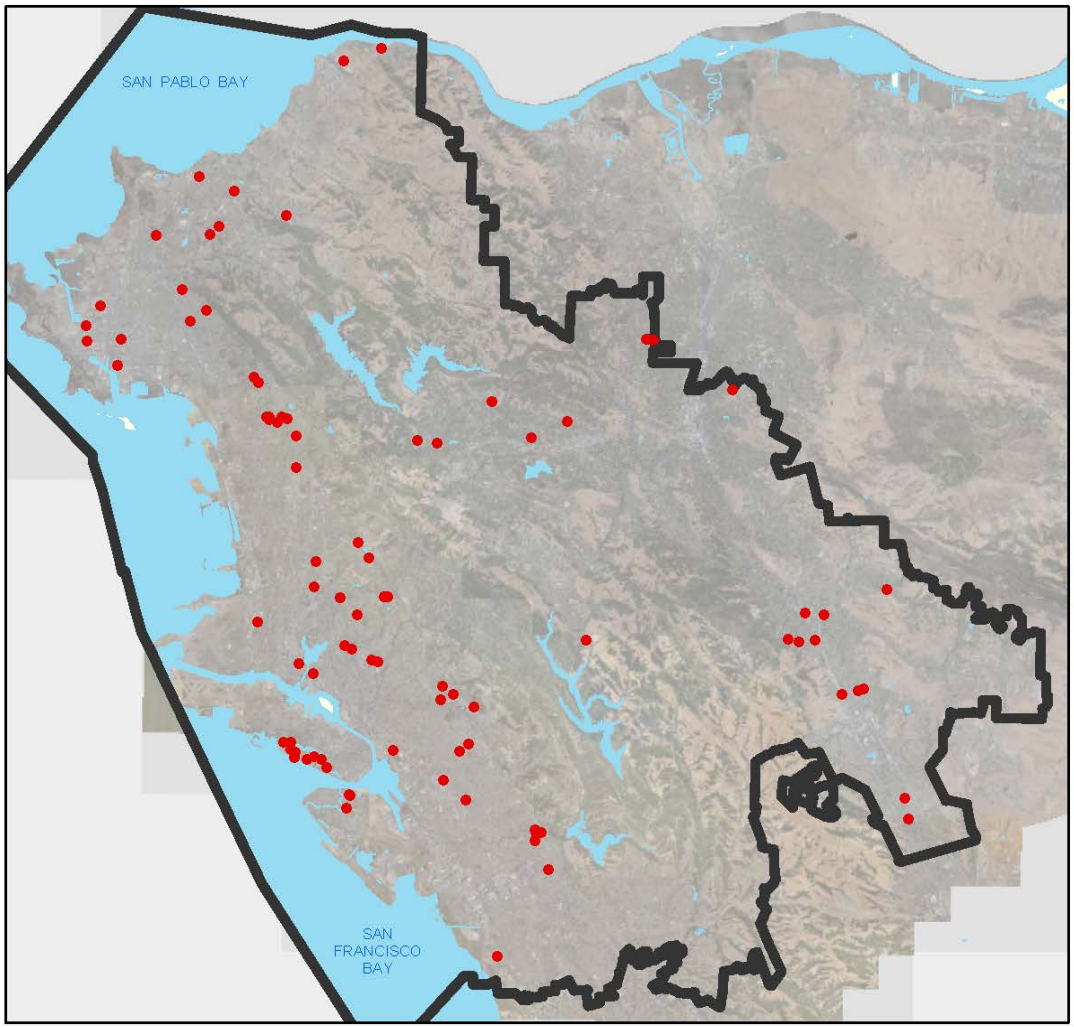
Pipeline Rebuild: Designing for Resiliency





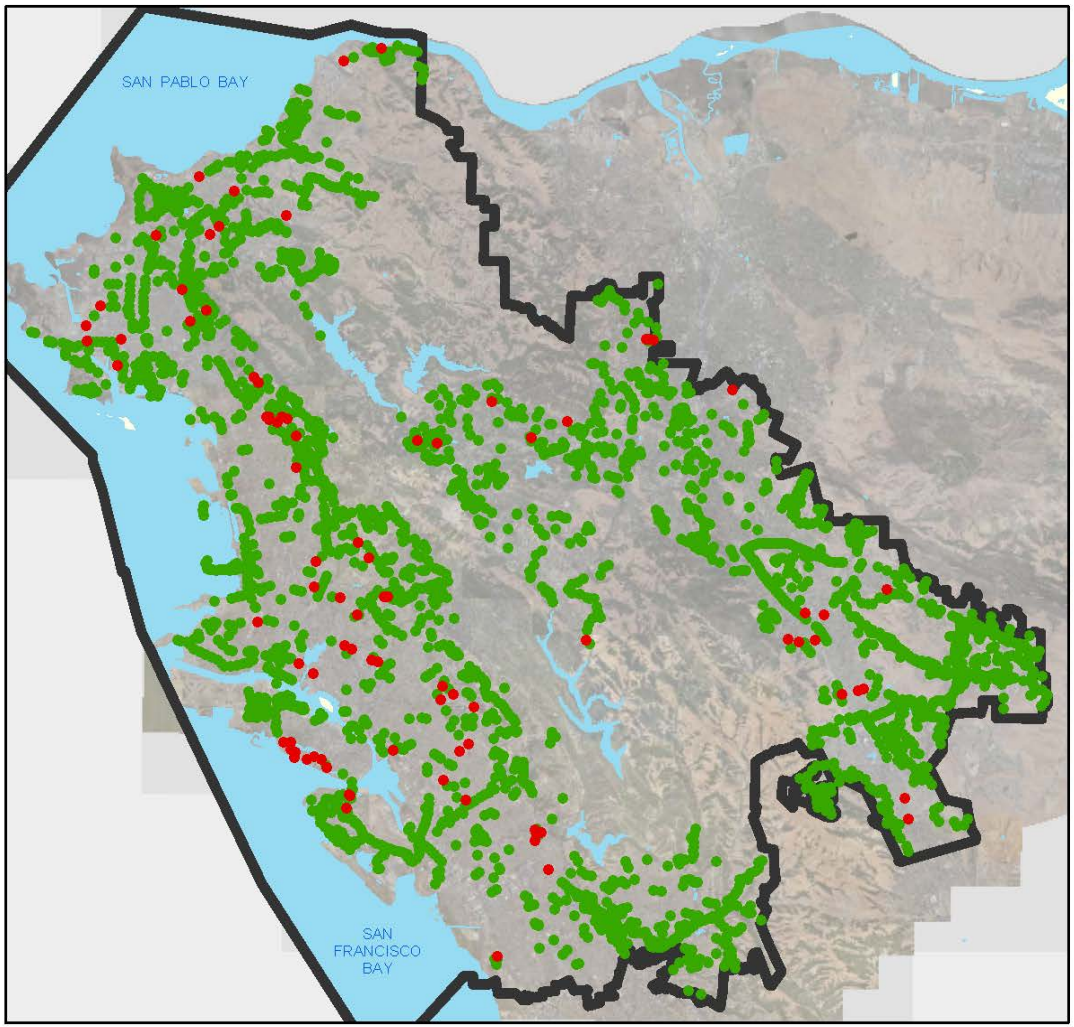
- Seismic design
- Collaboration with Cornell University
- Testing at UC Boulder

Infrastructure Management
Corrosion Control – Metallic Water Mains



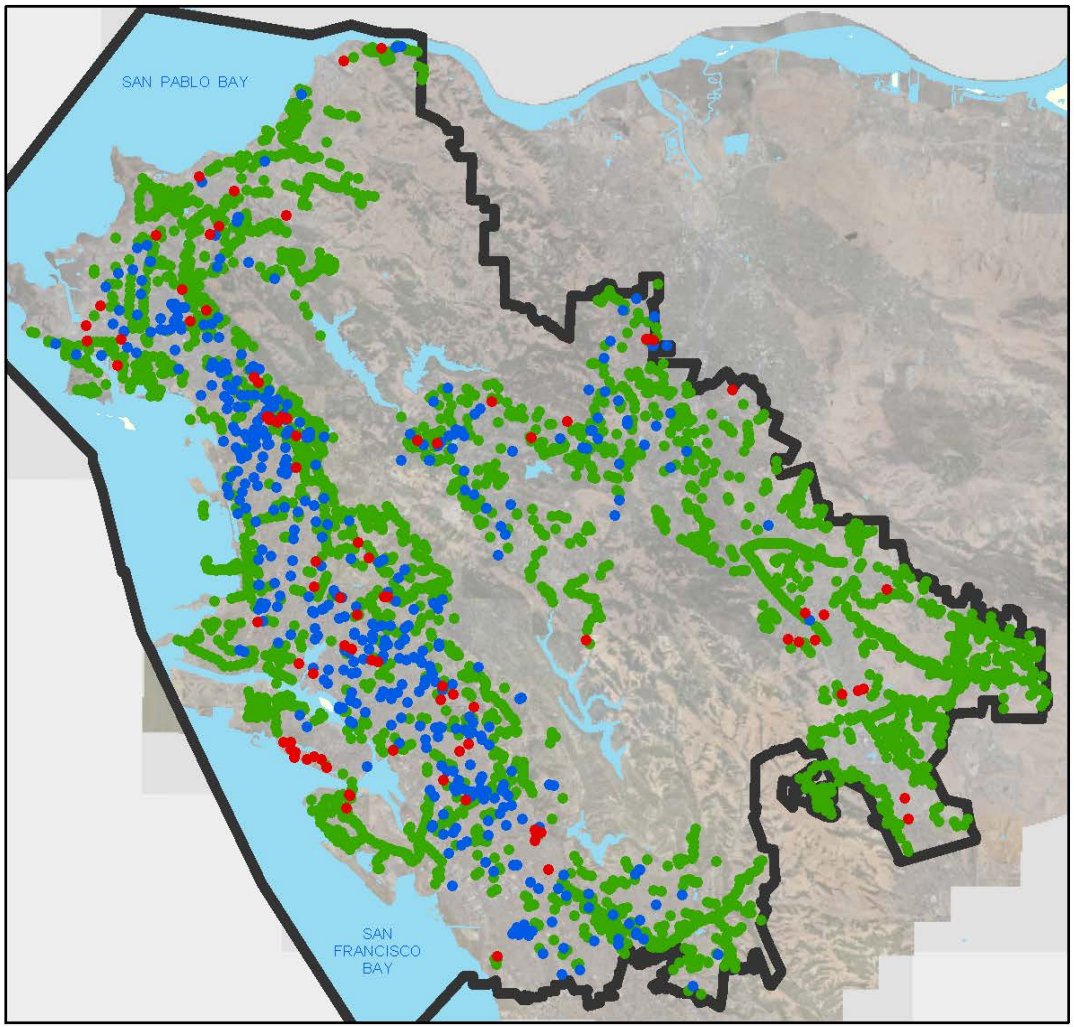
- Impressed Current Cathodic Protection
  - Over 100 Systems in Service Area
  - Protect Steel Mains (Transmission)

Infrastructure Management
Corrosion Control – Metallic Water Mains



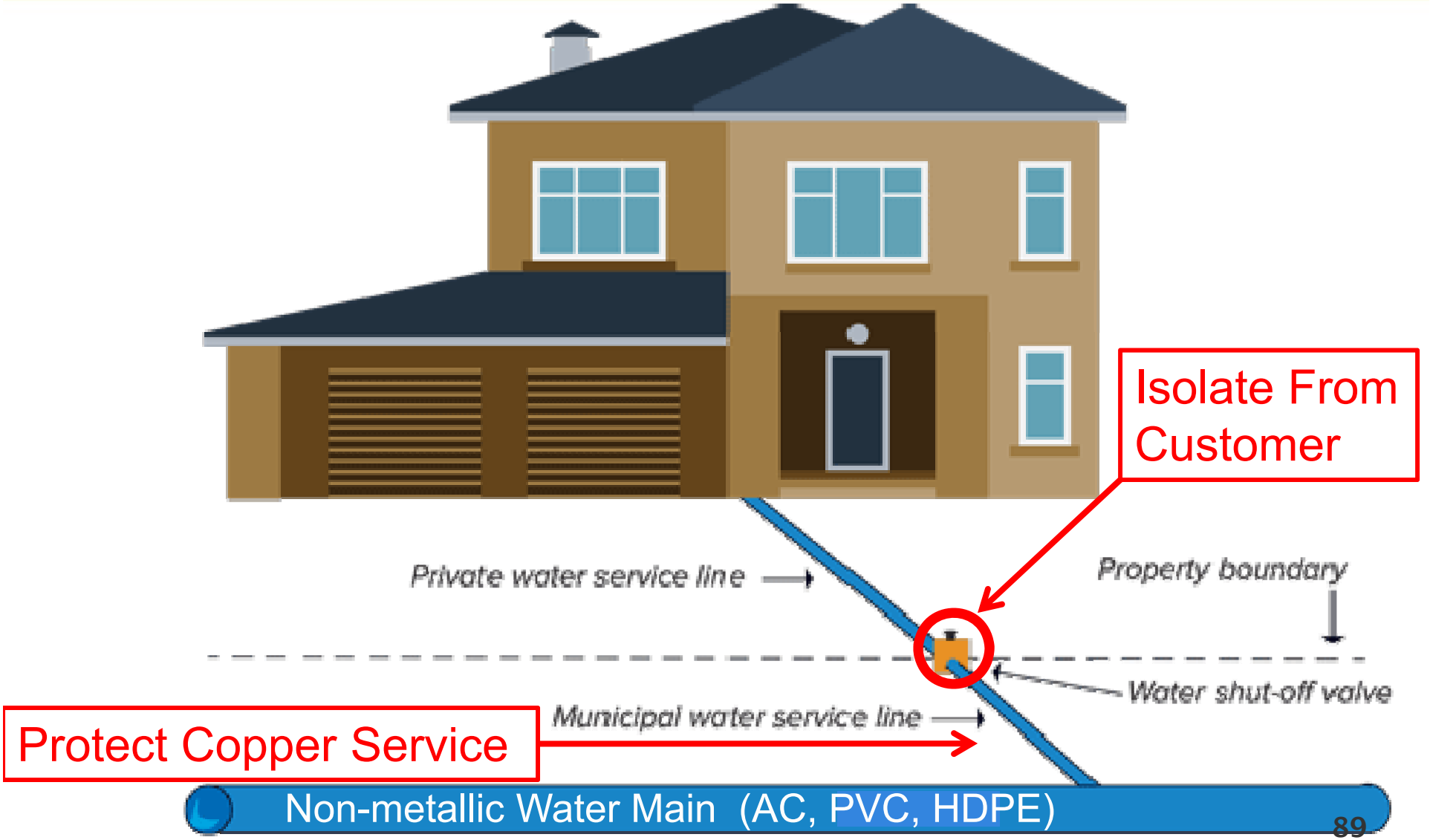
- Impressed Current Cathodic Protection
  - Over 100 Systems in Service Area
  - Protect Steel Mains (Transmission)
- Galvanic Cathodic Protection
  - Over 3,000 Test Stations
  - Protect Steel Mains (Distribution)

Infrastructure Management
Corrosion Control – Metallic Water Mains

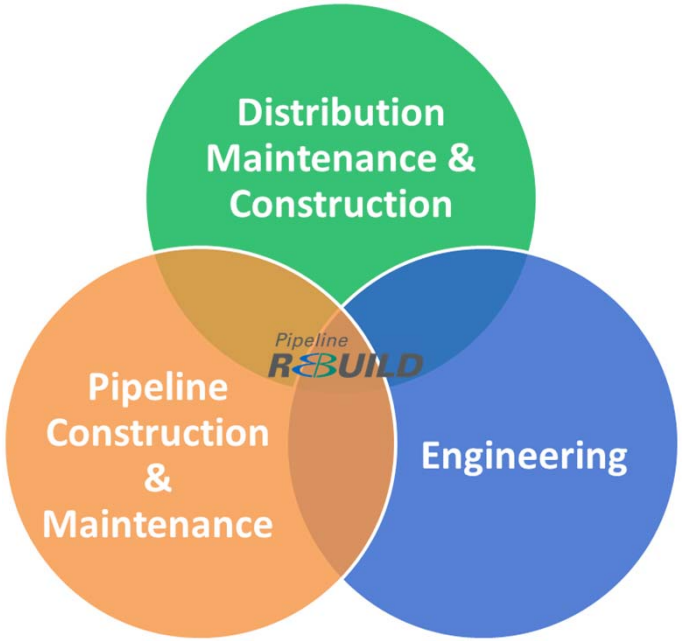


- Impressed Current Cathodic Protection
  - Over 100 Systems in Service Area
  - Protect Steel Mains (Transmission)
- Galvanic Cathodic Protection
  - Over 3,000 Test Stations
  - Protect Steel Mains (Distribution)
- Metallic Main Break Anode Installs
  - Over 400 Cast Iron Main Breaks
  - Protects Steel 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
Total	**57**

FM&O

Heavy Transport Operator	11
Heavy Equipment Operator	2
Truck Driver II	1
LT Positions	6
TOTAL	**20**

- 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
Total	**63**	**$8,137,000**

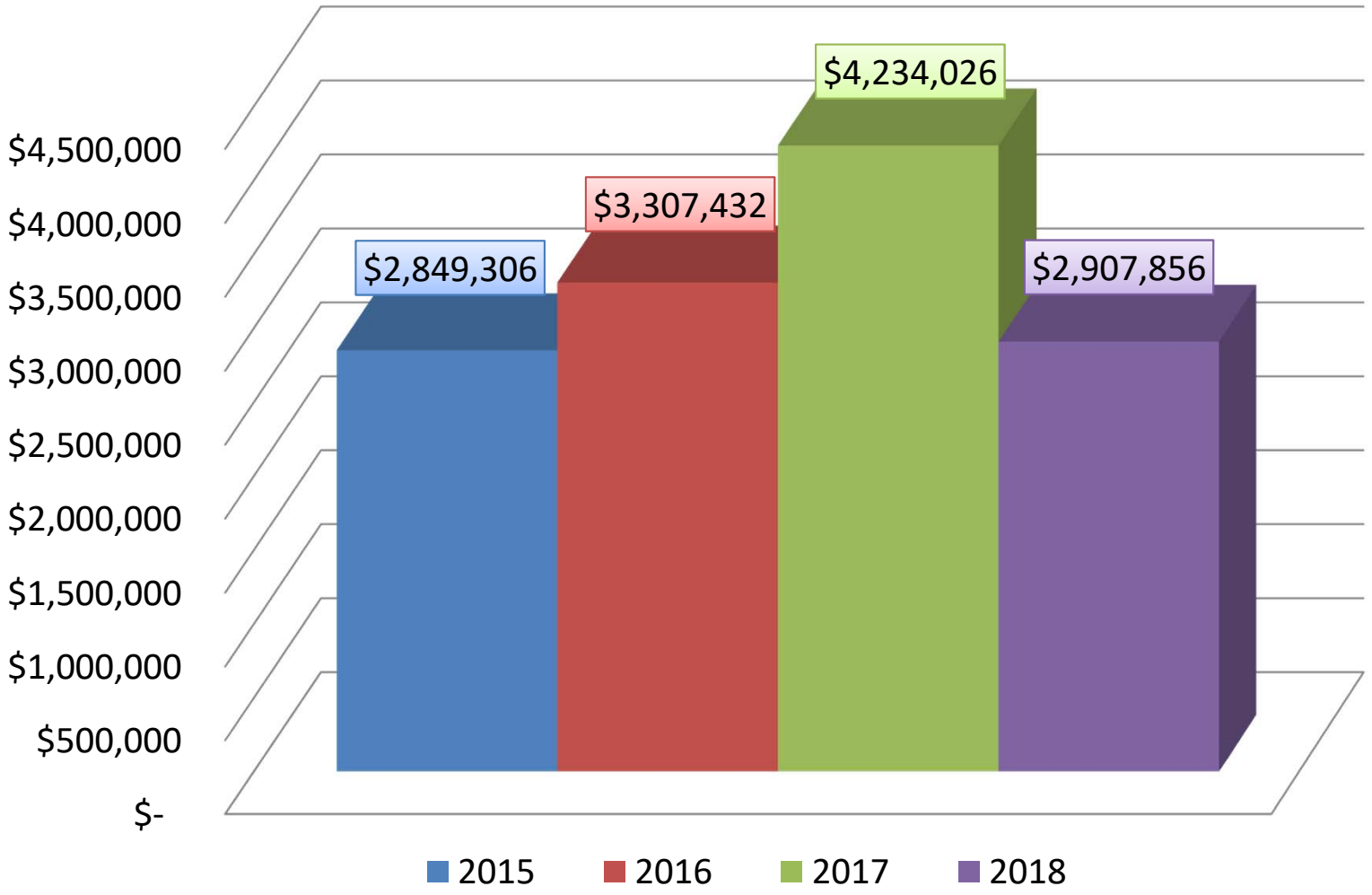
What is FM&O?

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

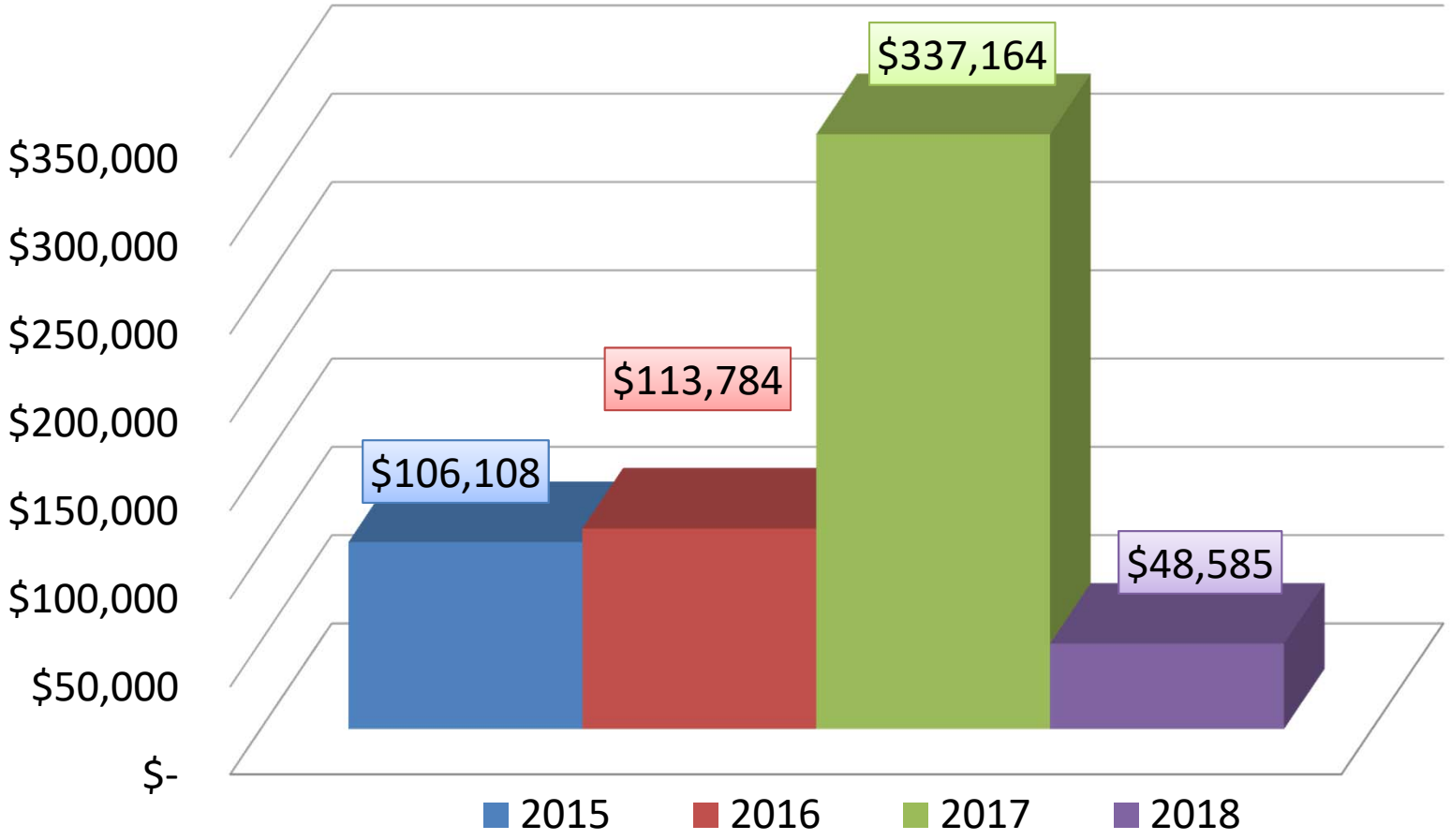
Use of FM&O Resources

- 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

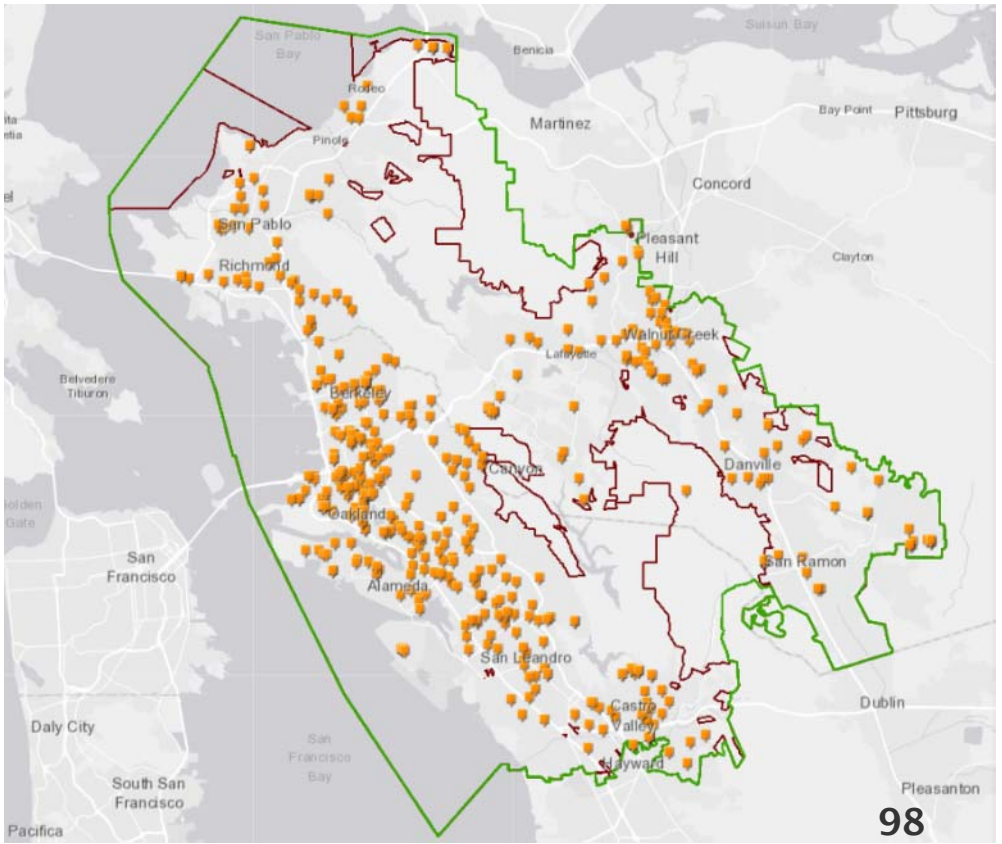

$4,500,000
$4,000,000
$3,500,000
$3,000,000
$2,500,000
$2,000,000
$1,500,000
$1,000,000
$500,000
$-
$2,849,306
$3,307,432
$4,234,026
$2,907,856
2015
2016
2017
2018

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

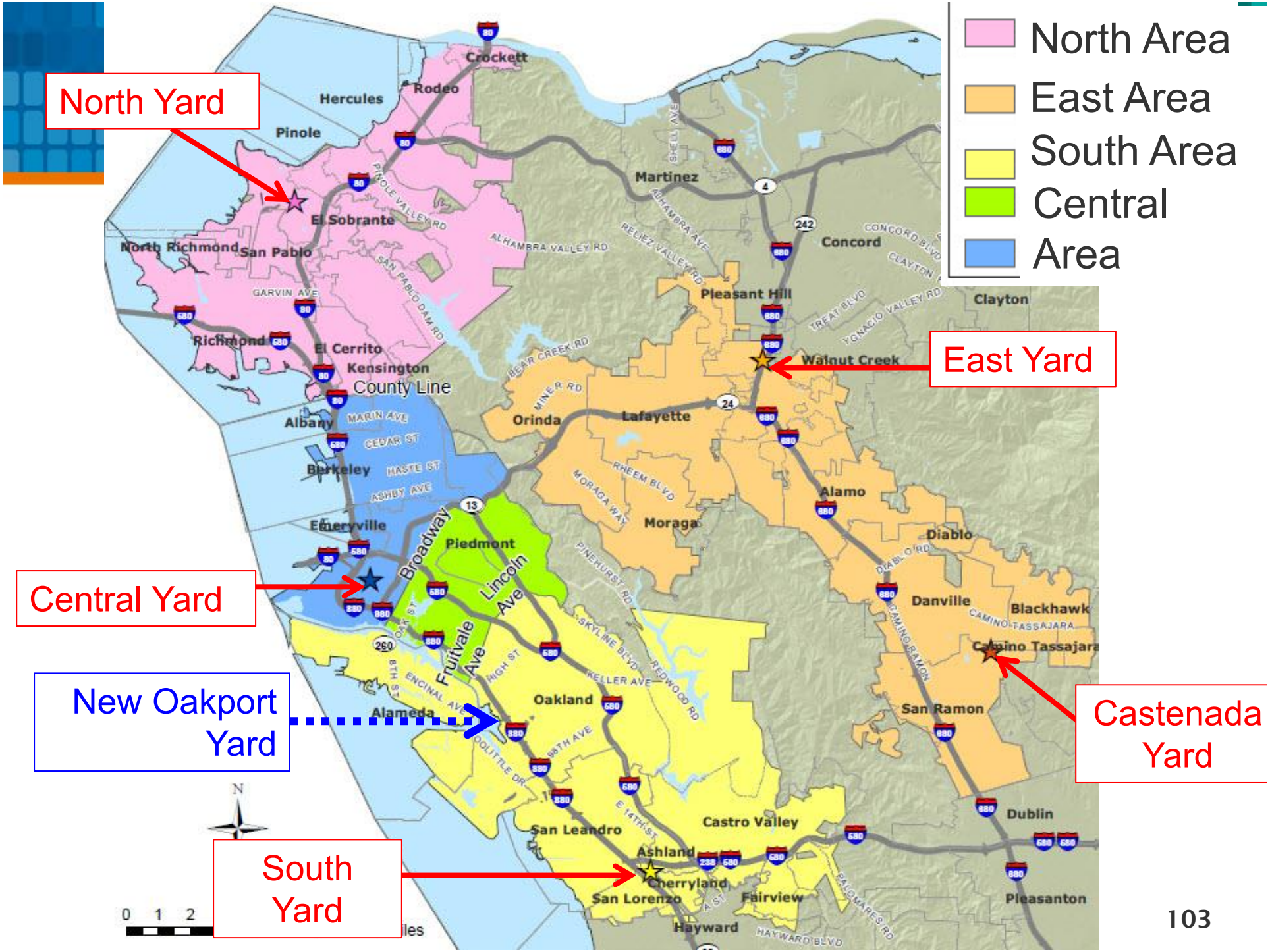
Existing & Proposed Oakport

- Warehouse Storage
- Outdoor Storage
- Warehouse Offices
- Weld Shop

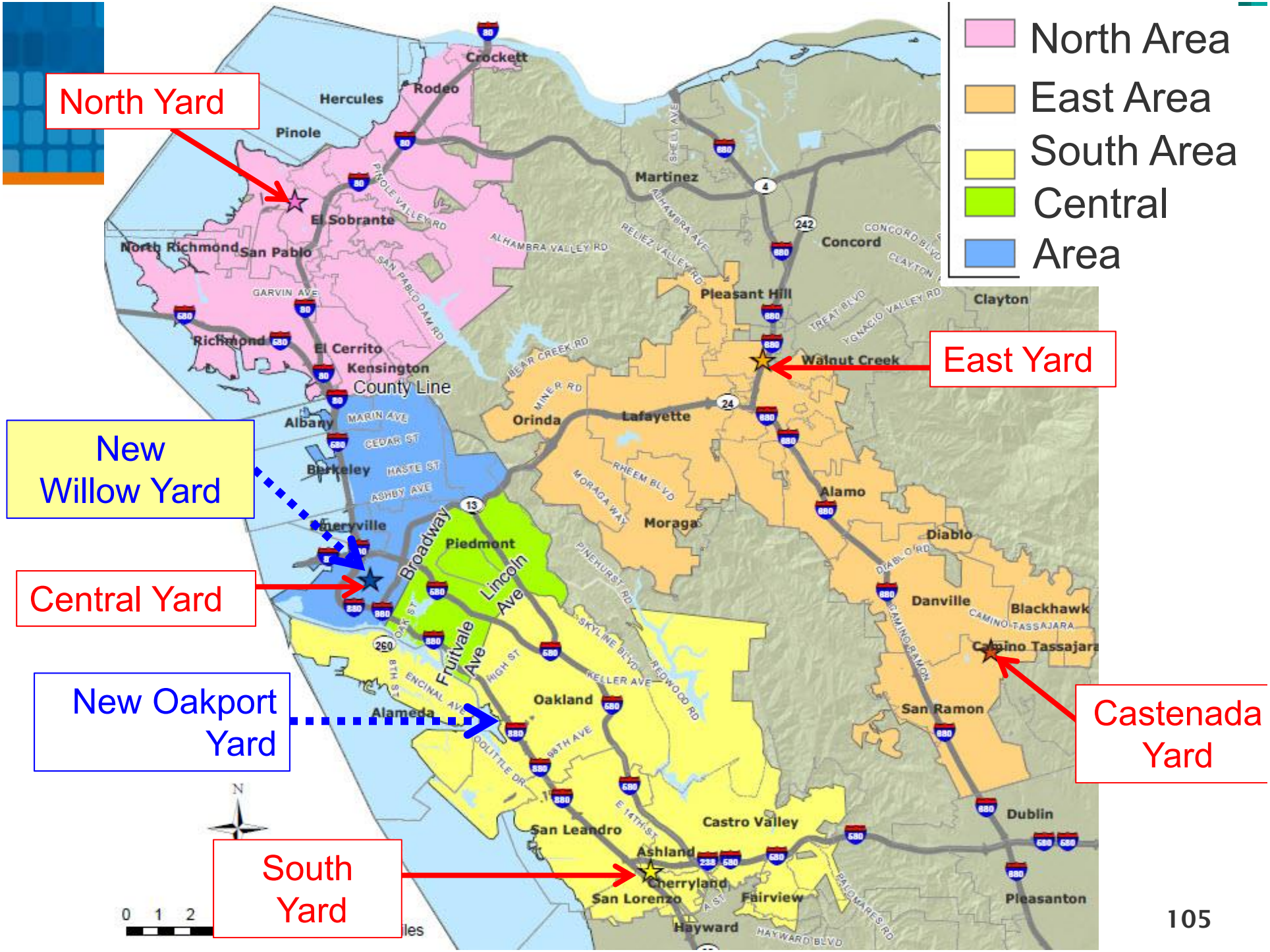
+ Pipeline Training Academy

+ New Service Yard

will increase space to accommodate Pipeline Rebuild


North Area
East Area
South Area
Central
Area
North Yard
East Yard
Central Yard
New Oakport Yard
South Yard
Castenada Yard
Crockett
Rodeo
Hercules
Pinole
El Sobrante
North Richmond
San Pablo
Richmond
El Cerrito
Kensington
County Line
Albany
Berkeley
Emeryville
Piedmont
Oakland
Alameda
Martinez
Concord
Pleasant Hill
Clayton
Walnut Creek
Orinda
Lafayette
Moraga
Alamo
Diablo
Danville
Blackhawk
Camino Tassajara
San Ramon
Dublin
Pleasanton
Castro Valley
San Leandro
Ashland
Cherryland
San Lorenzo
Fairview
Hayward
Broadway
Lincoln Ave
Fruitvale Ave
0 1 2

Oakport Redevelopment


North Area
East Area
South Area
Central
Area
North Yard
East Yard
New
Willow Yard
Central Yard
New Oakport
Yard
Castenada
Yard
South
Yard
Crockett
Rodeo
Hercules
Pinole
El Sobrante
North Richmond
San Pablo
Richmond
El Cerrito
Kensington
County Line
Albany
Berkeley
Emeryville
Piedmont
Oakland
Alameda
Martinez
Concord
Pleasant Hill
Clayton
Walnut Creek
Orinda
Lafayette
Moraga
Alamo
Diablo
Danville
Blackhawk
Camino Tassajara
San Ramon
Dublin
Pleasanton
Castro Valley
San Leandro
Ashland
Cherryland
San Lorenzo
Fairview
Hayward
Broadway
Lincoln Ave
Fruitvale Ave
0 1 2

Willow Street Yard Development

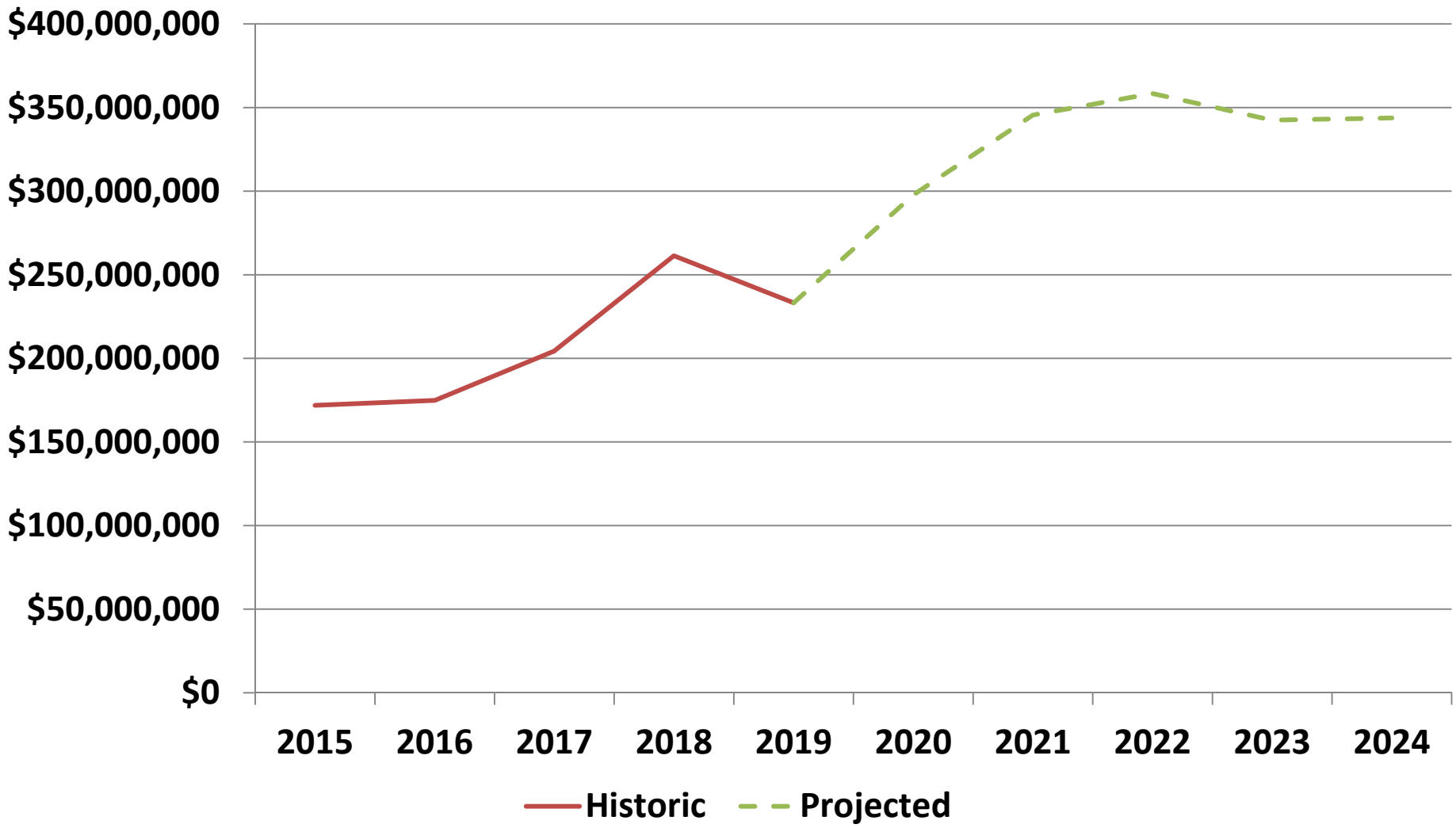
Willow Street Yard Development

- 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

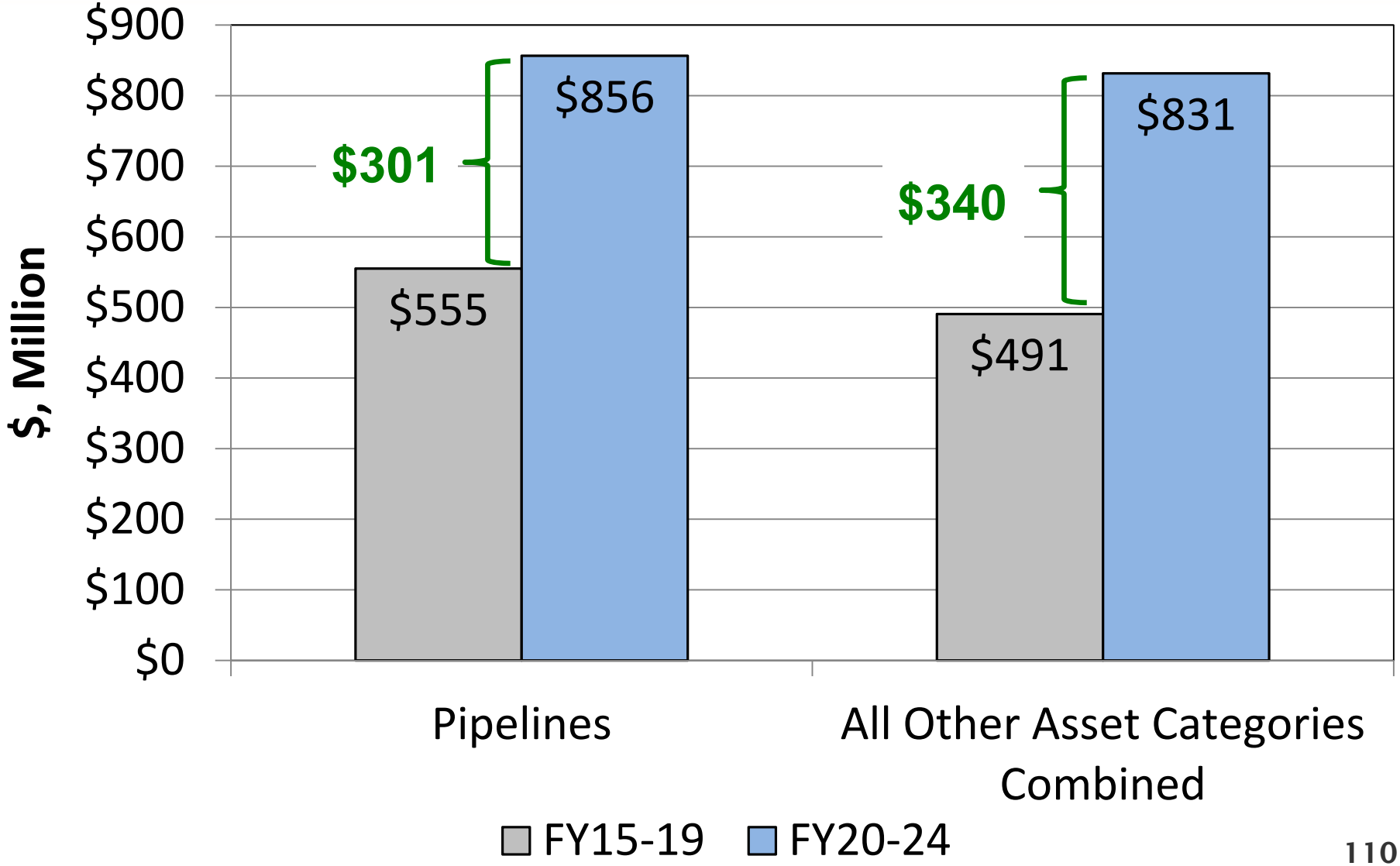
Capital Improvement Program

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

- FY19 Accomplishments
- Review Drivers
- Master Plan Overview
- In-House Work
- Next Steps

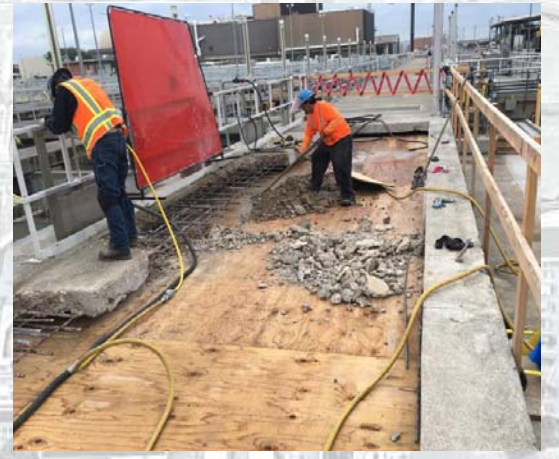
Wastewater Accomplishments in FY19

3rd Street Interceptor Rehab Phase 2

Pump Station Q Dual Flow Project (for Consent Decree)

North Richmond Equalization Tank Rehabilitation

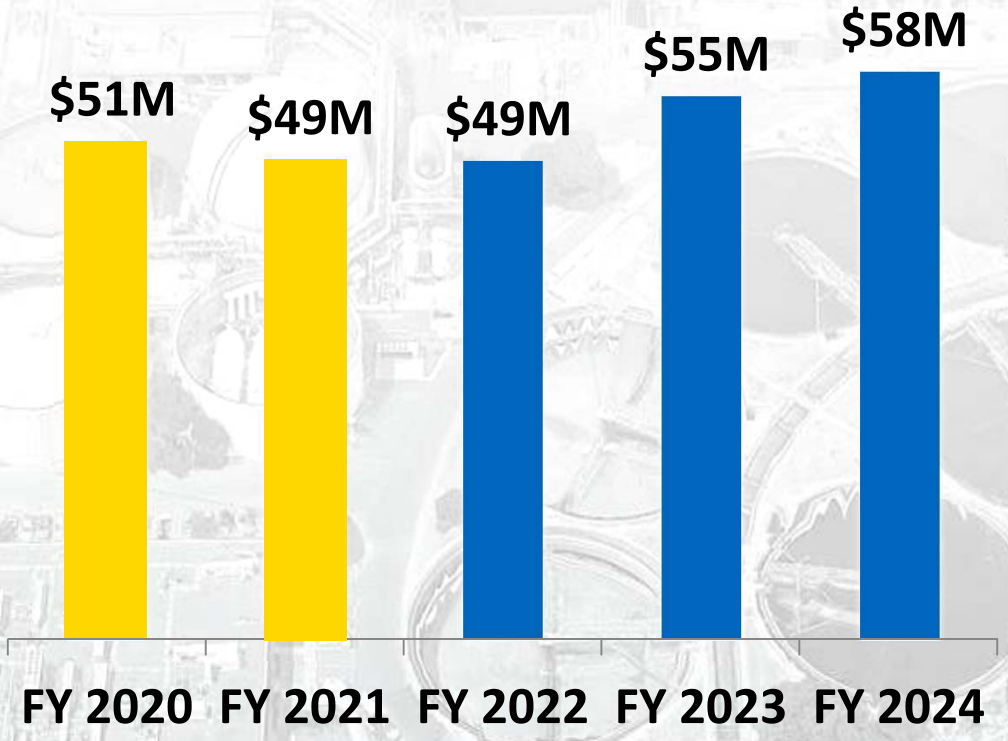
Primary Sedimentation Tanks Rehab Phase 5



Aerated Grit Tank Conveyors Replacement Phase 1

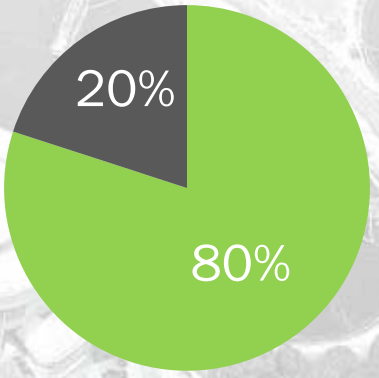
Digester Upgrades Phase 3

FY20–24 Wastewater CIP



BY THE NUMBERS

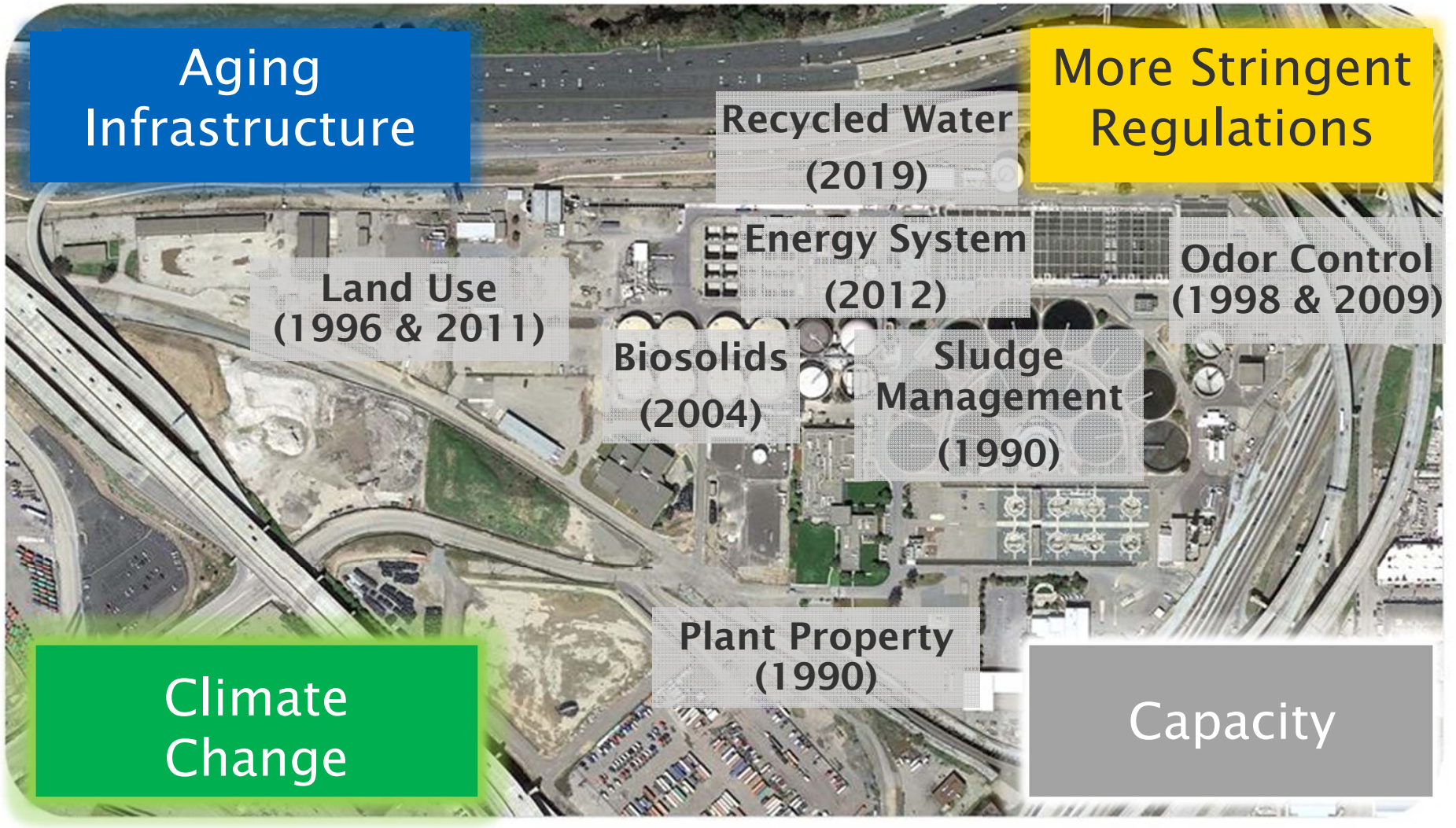
$262M 5-Year CIP



- Main Wastewater Treatment Plant
- Interceptor System

Previous Focus Plans

New Drivers


Aging Infrastructure
Recycled Water (2019)
More Stringent Regulations
Energy System (2012)
Odor Control (1998 & 2009)
Land Use (1996 & 2011)
Biosolids (2004)
Sludge Management (1990)
Plant Property (1990)
Climate Change
Capacity

More Stringent Regulations

COLOR LEGEND

Nutrient Watershed Permit

NPDES

Biosolids

Air

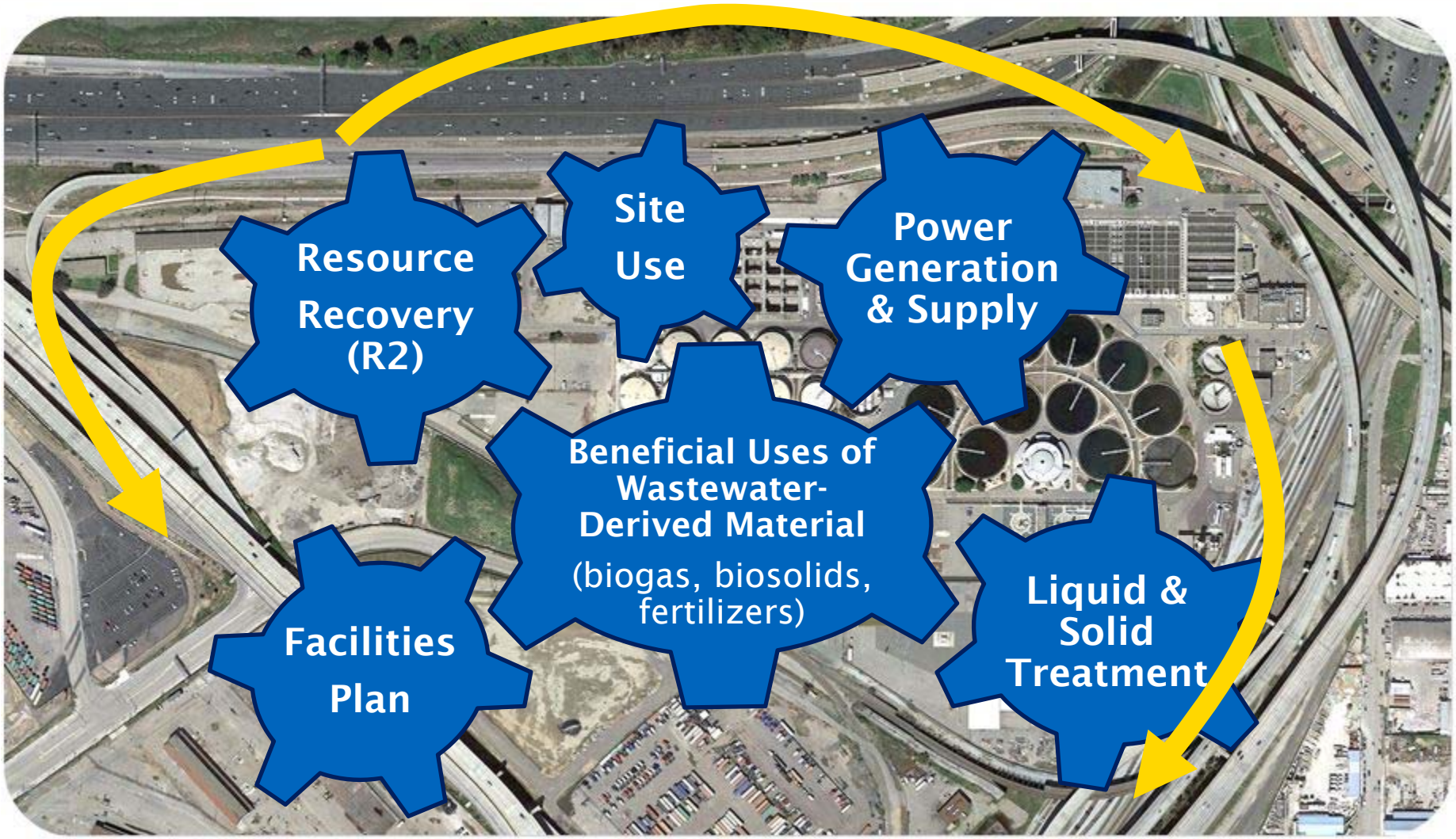
Consent Decree

- 2019: 2nd nutrient watershed permit
- 2020: National Polluant Discharge Elimination System (NPDES) permit renewal
- 2020: 50% diversion of organics from landfill (SB1383)
- 2020: Toxic air pollution reduction from Publicly Owned Treatment Works
- 2022: Consent Decree check-in
- 2024: 3rd nutrient permit, possible nutrient discharge load cap
- 2024: Update West Oakland Community Action Plan (AB617)
- 2025: NPDES
- 2025: 75% diversion of organics from landfill (SB1383)
- 2029: 4th nutrient permit
- 2030: NPDES
- 2030: Greenhouse gas reduction goal
- 2030: Consent Decree check-in
- 2034: 5th nutrient permit
- 2035: NPDES
- 2036: Consent Decree ends

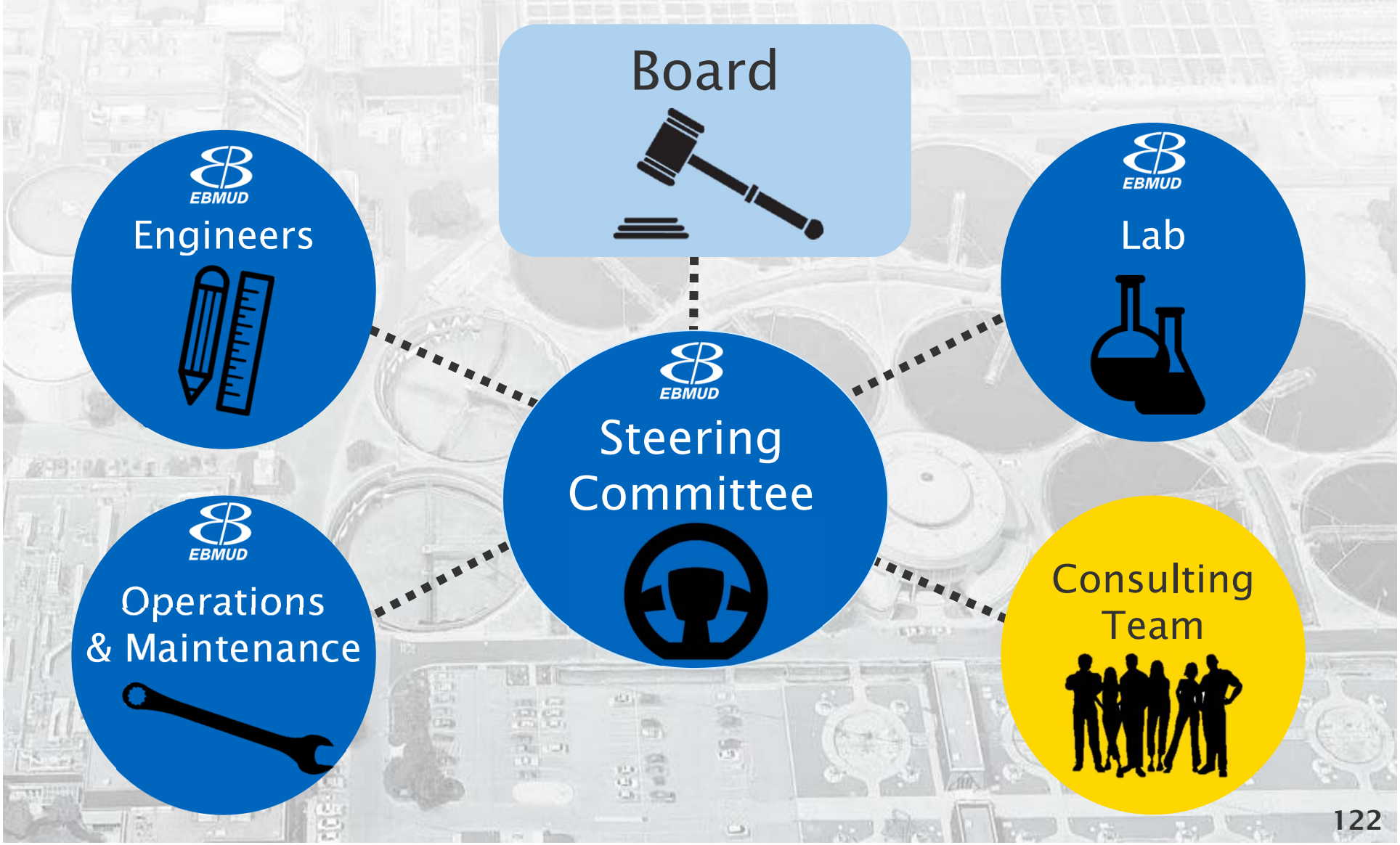
2019 2024 2029 2034 2039

The Master Plan will integrate…

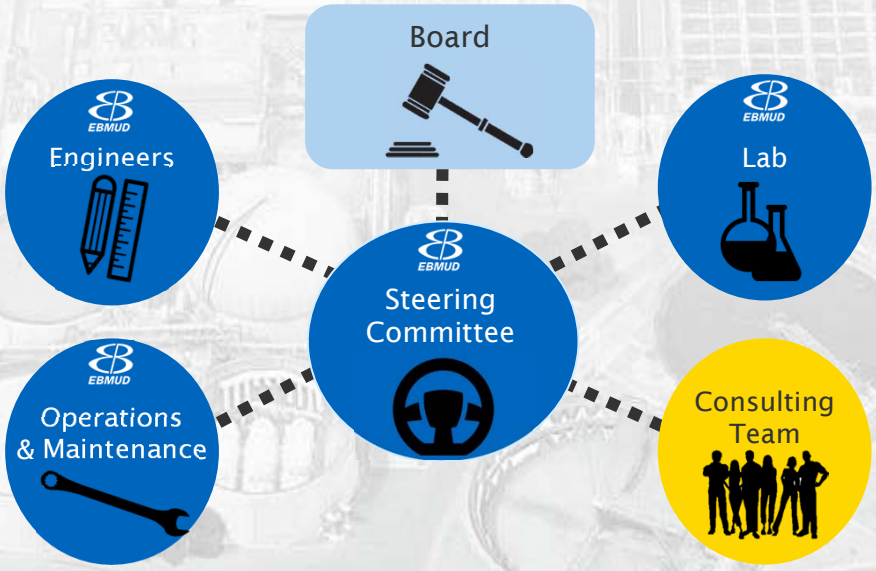
The Master Plan will integrate…



Teamed Approach



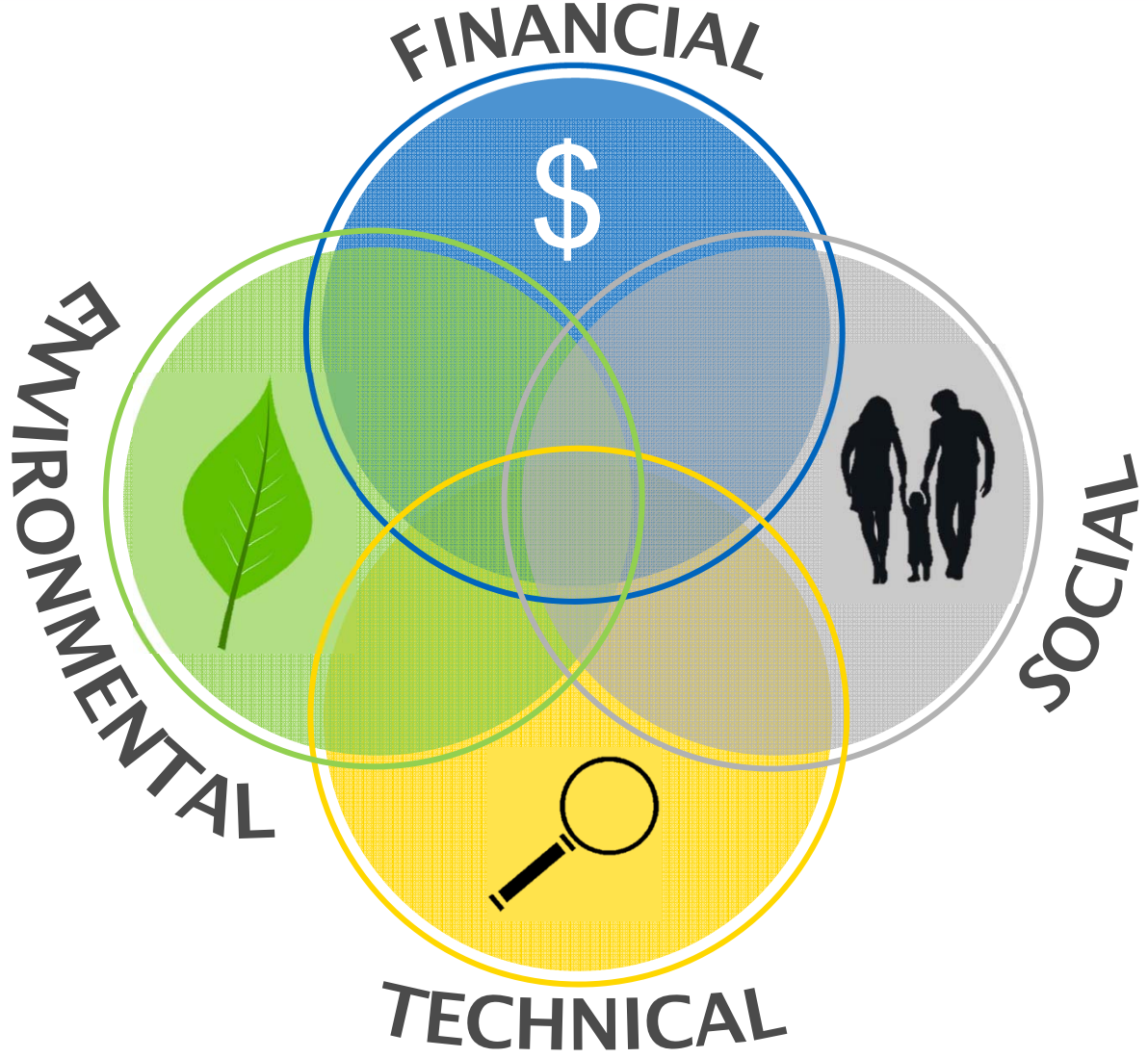
Teamed Approach



NO. OF MEETINGS

20	Steering Committee
6	Internal Workshops
5	Workshops with Consultant

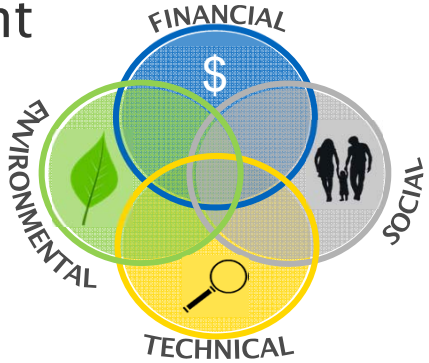
Guiding Principles



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

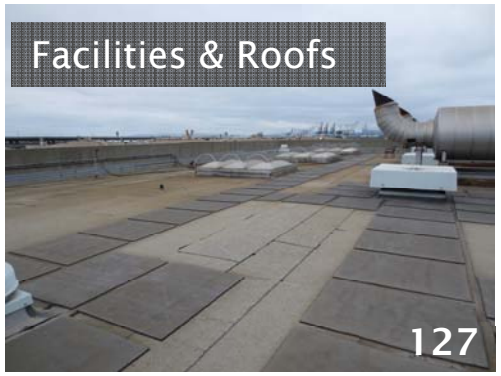
Condition Assessment: Overview

Completed Work

70 Years' Worth of Infrastructure

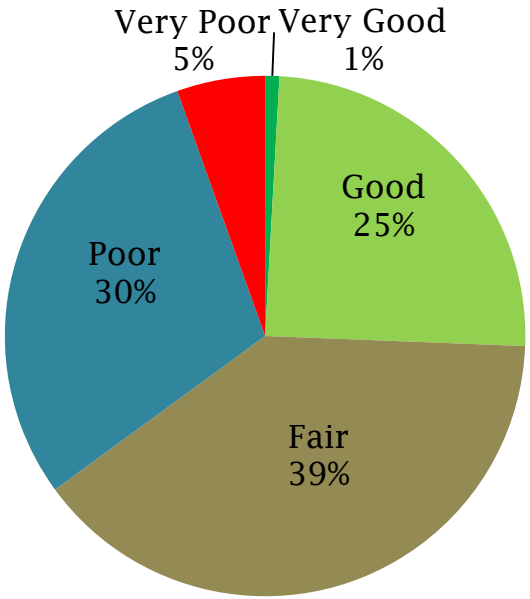
950+ Assets >$10k Evaluated

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

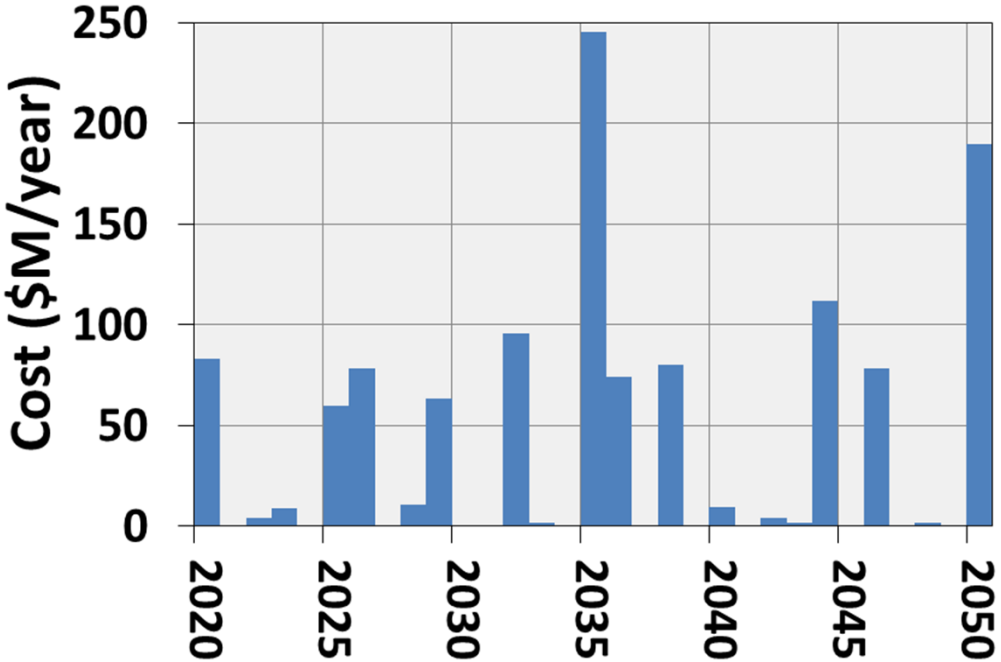


Condition Assessment: Major Findings

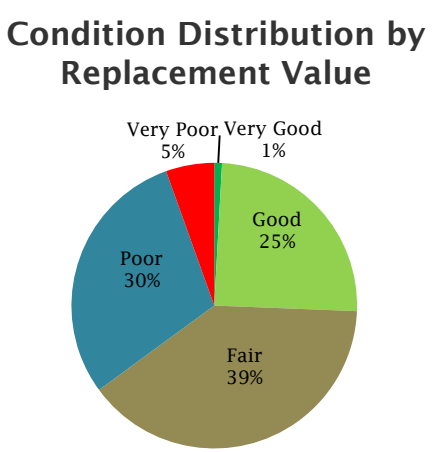
Condition Distribution by Replacement Value

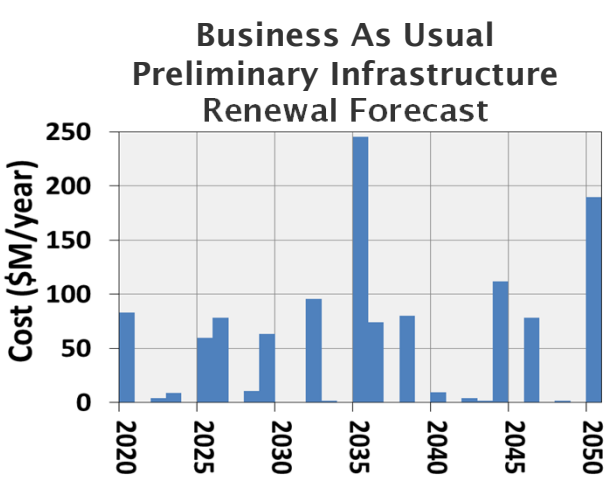


Business As Usual Preliminary Infrastructure Renewal Forecast



Condition Assessment: Major Findings





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)

Seismic Hazard Mapping Act of 1990

1989 Loma Prieta Earthquake

1994 Northridge Earthquake

1997 UBC seismic loads increased to account for fault locations and site specific soils conditions

1998 CBC

2001 CBC kept 1997 UBC as basis for seismic loads but added detailing & ductility changes

2007 CBC changed basis to 2006 IBC which has updates for ground motions (loads) and other requirements for structural systems and details

2010 CBC based on 2009 IBC which added structural integrity/ progressive collapse

2011 Christchurch Earthquakes: liquefaction

2008 National Seismic Hazard Maps Update

2013 CBC based on 2012 IBC: updated ground motion maps; geotechical requirements for soft soils (liquefaction); and detailing and analysis requirements

2016 CBC based on 2015 IBC (minor changes)

1989 1991 1994 1997 2003 2006 2009 2015 2019

District Seismic Efforts

1989–1998: Conducted seismic evaluations and retrofitted 8 structures

2005: Reviewed changes in seismic criteria

2008: Conducted seismic evaluation of storage facilities

2014: Conducted seismic evaluation of digesters

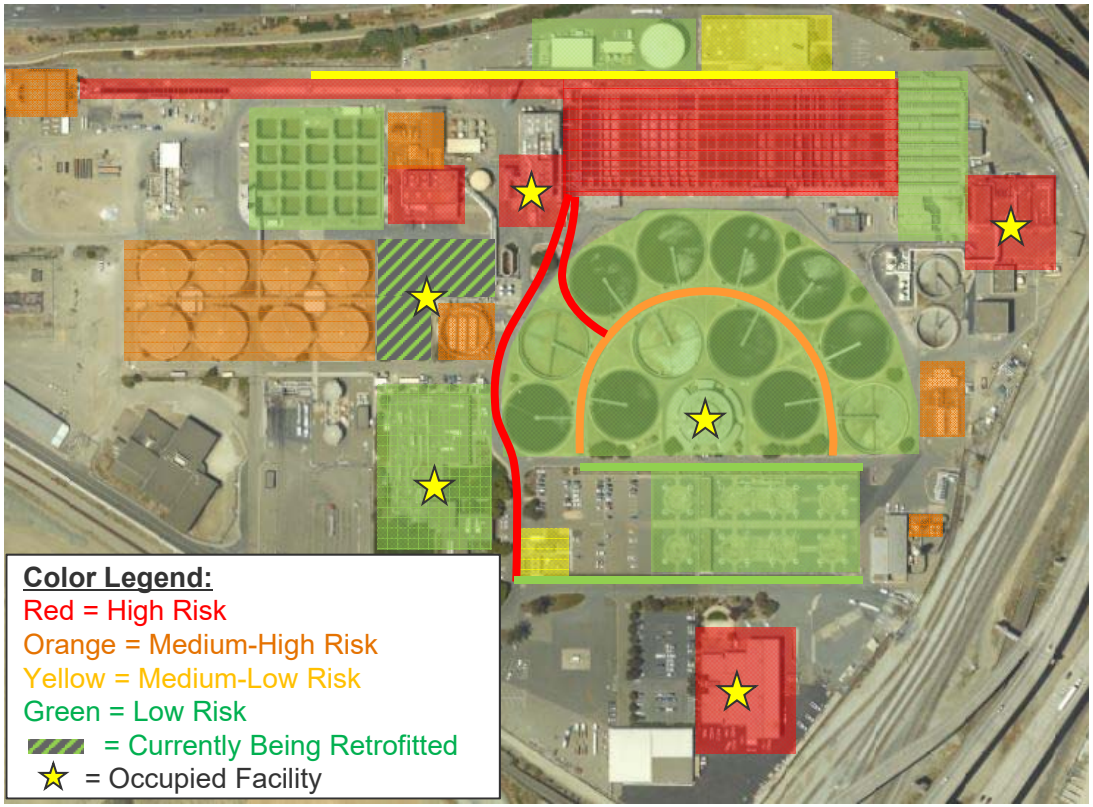
2018-2019: Current seismic evaluation of MWWTP

Current Seismic Evaluation

Evaluate 80+ Facilities at MWWTP

Rank Facilities By Seismic Risk

Preliminary Structural Evaluation of Highest-Risk Facilities

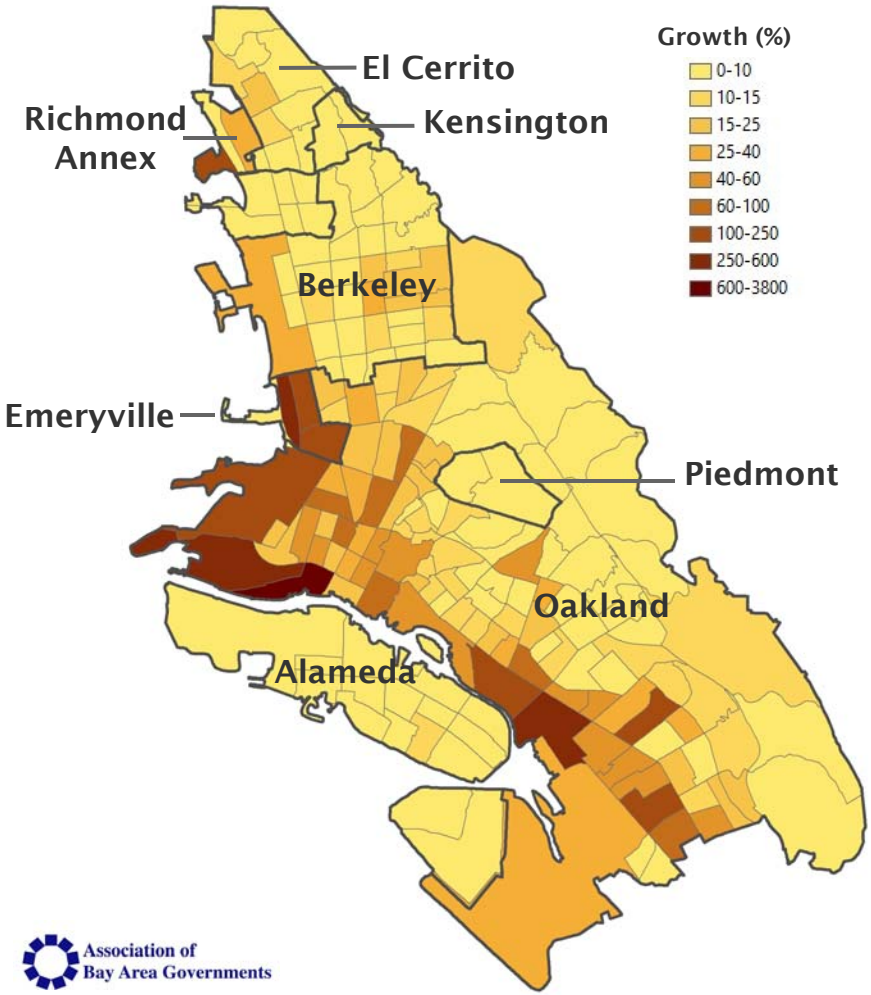


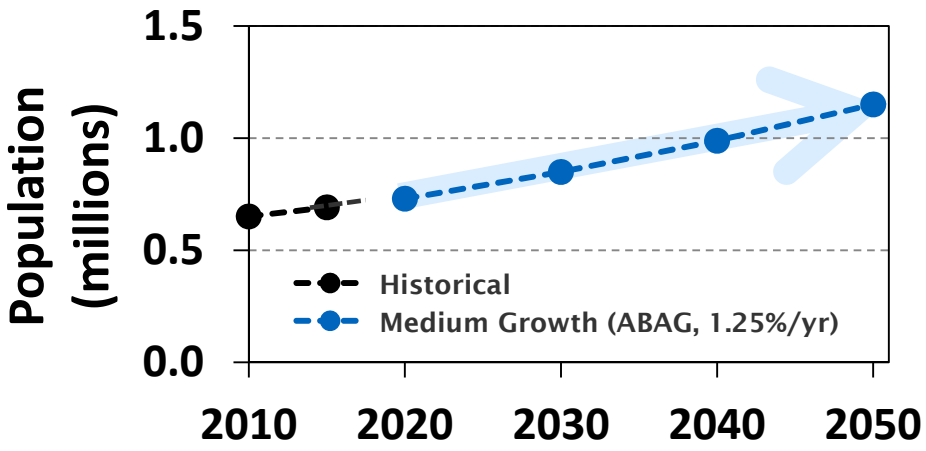
KEY TAKEAWAYS

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

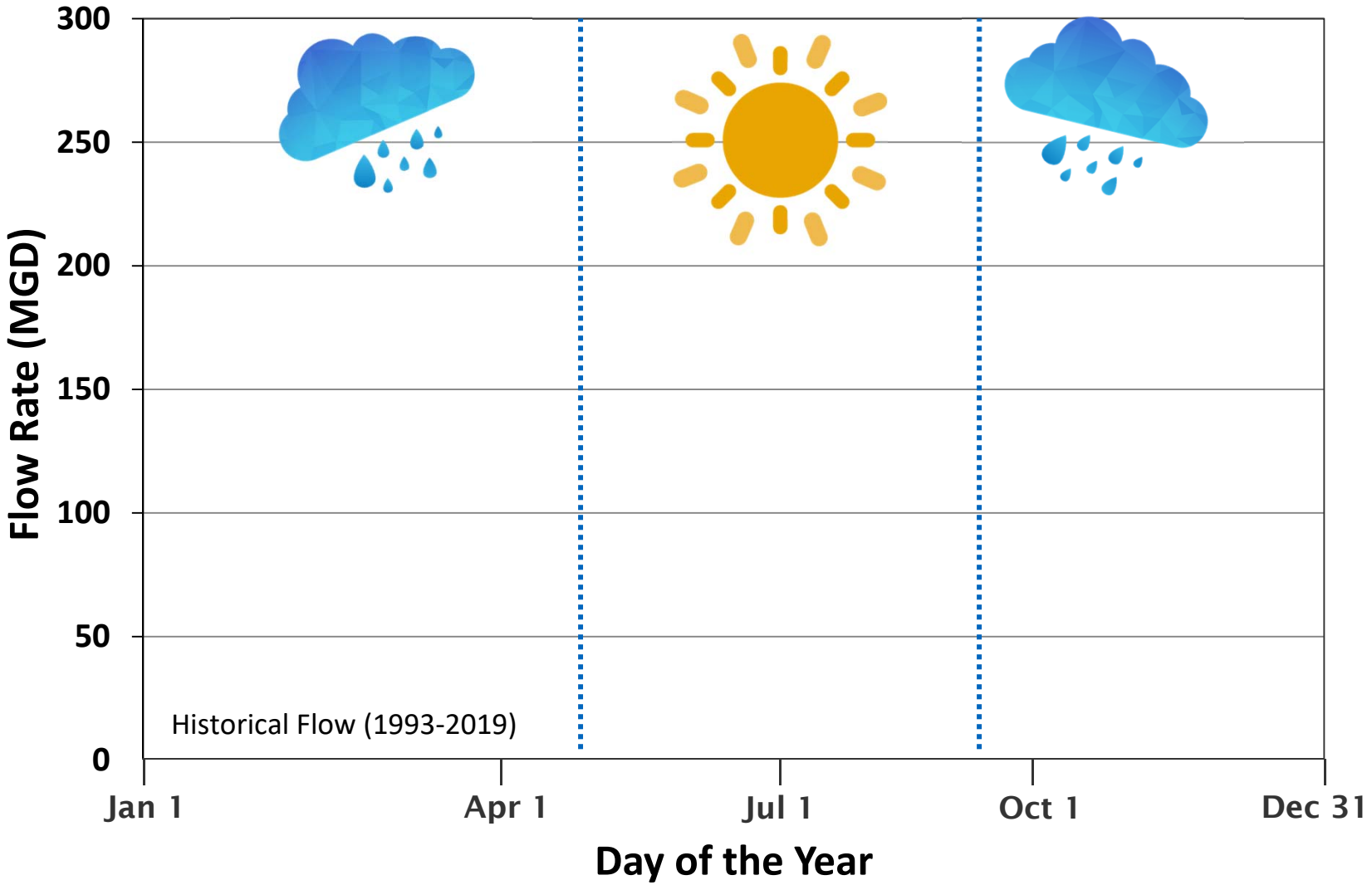




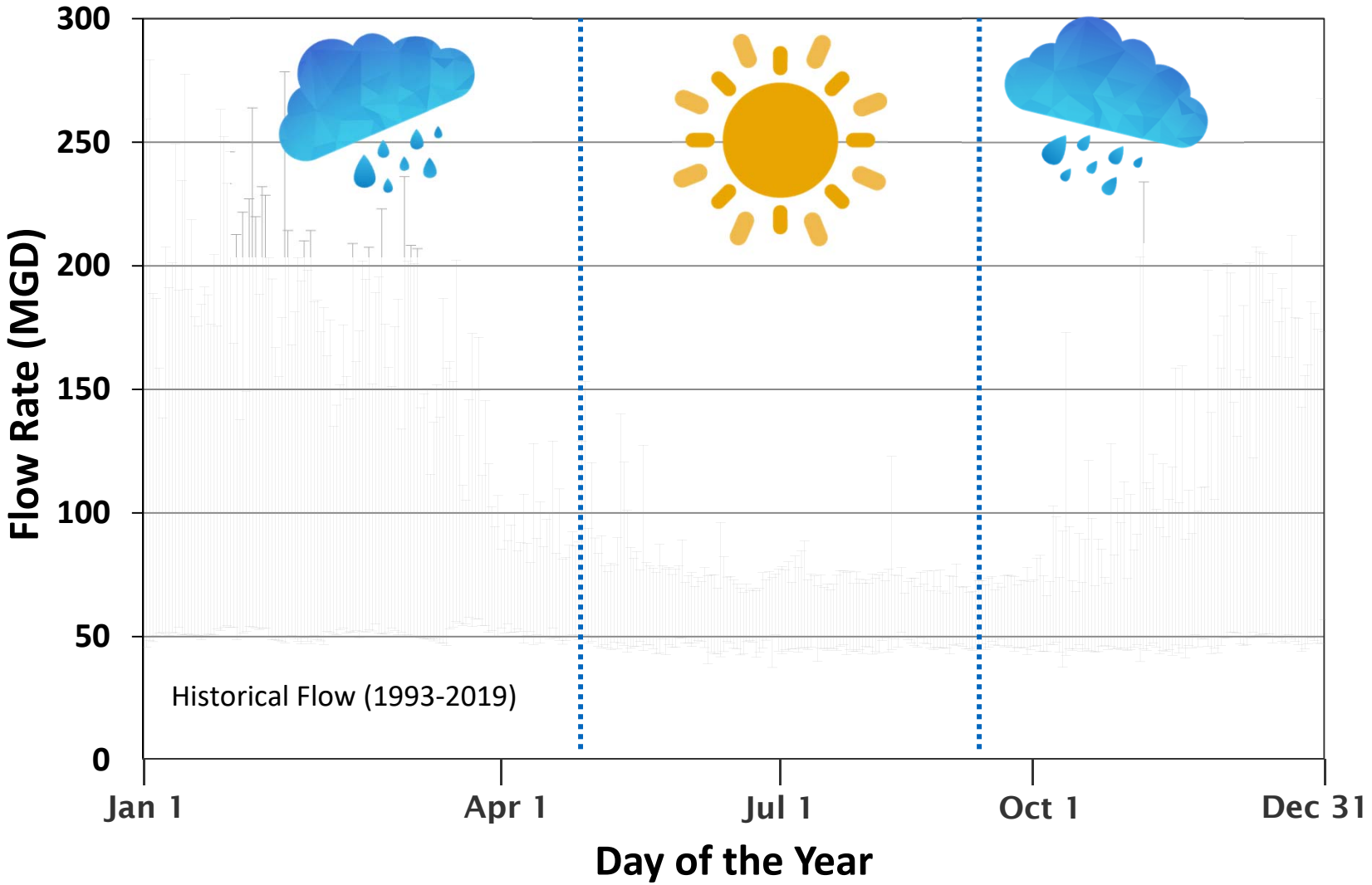
KEY TAKEAWAYS

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.

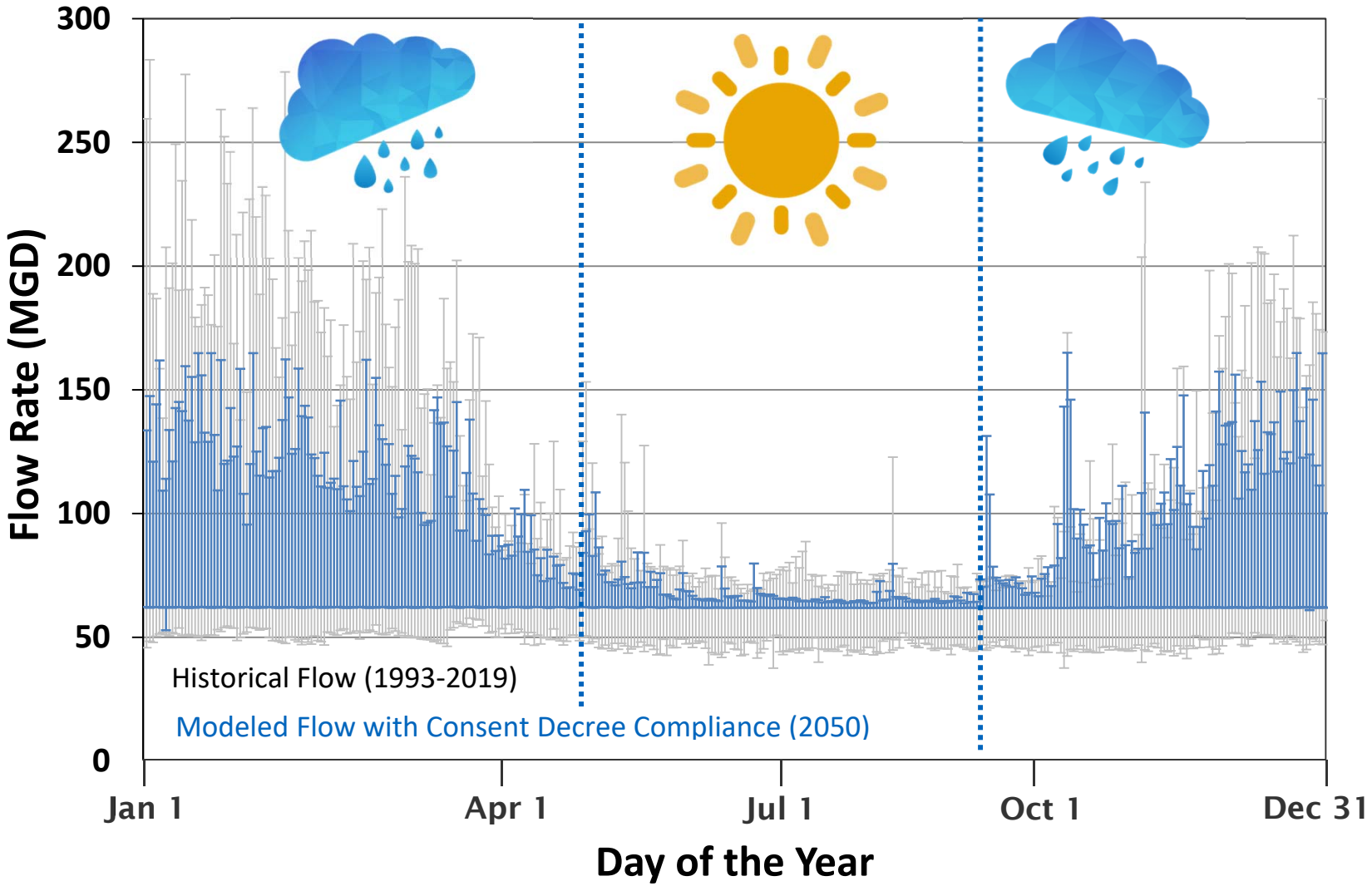
MWWTP Influent Flows



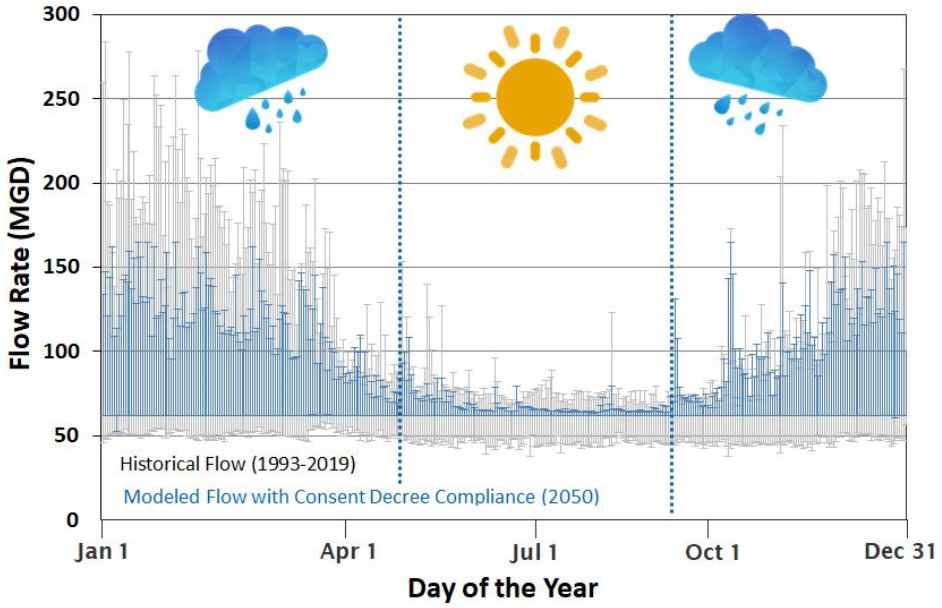
MWWTP Influent Flows



Future MWWTP Influent Flows with Consent Decree



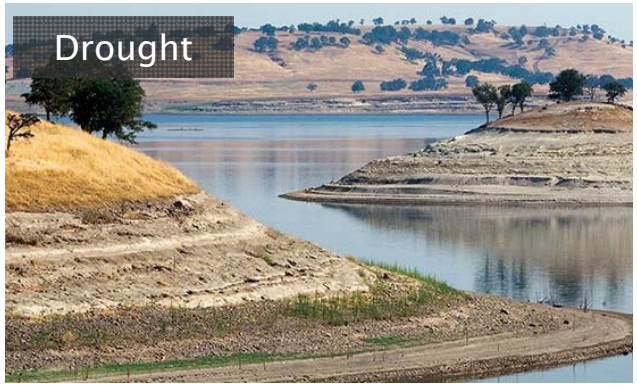
Future MWWTP Influent Flows with Consent Decree

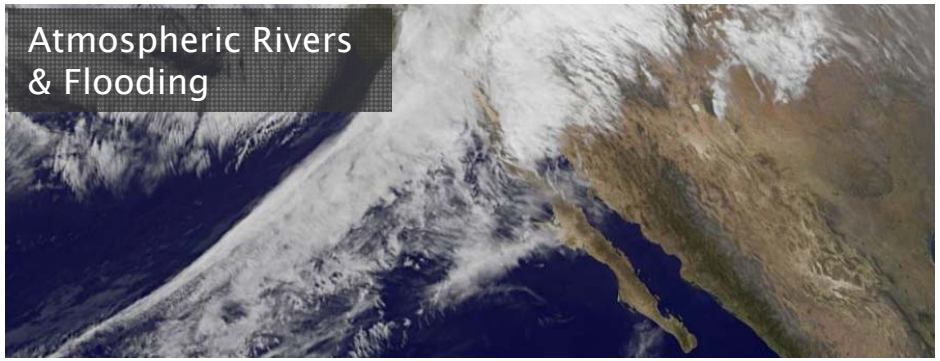


KEY TAKEAWAYS

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





Resource Recovery Market Assessment

Low-Strength R2

Growth: Brines (salty wastes)

High-Strength R2

Growth: Food Waste

Food Waste Resource Recovery

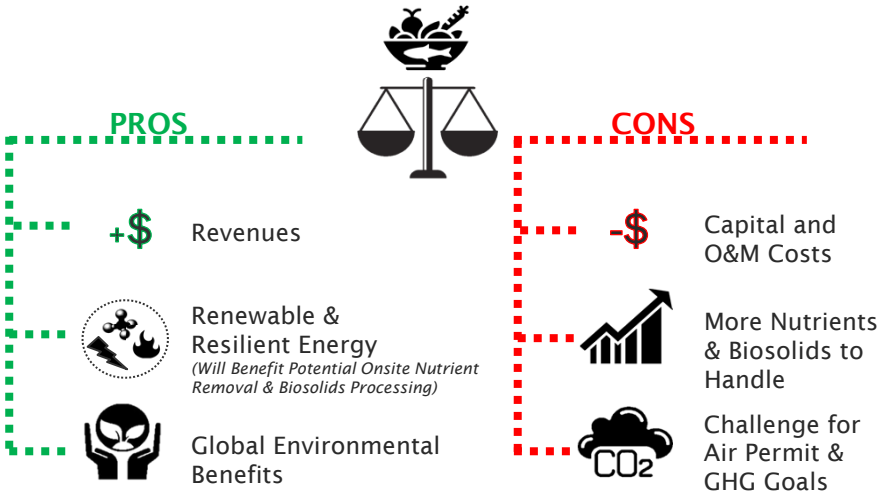
PROS

- +$ 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
- CO_2 Challenge for Air Permit & GHG Goals

Food Waste Resource Recovery



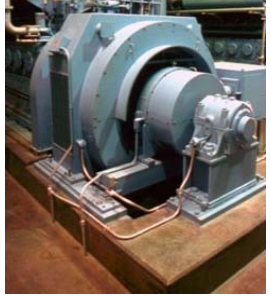
KEY TAKEAWAYS

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.

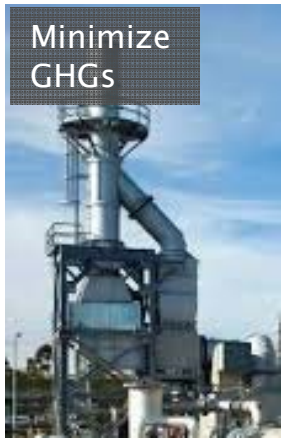
MWWTP as a Resource Recovery Center

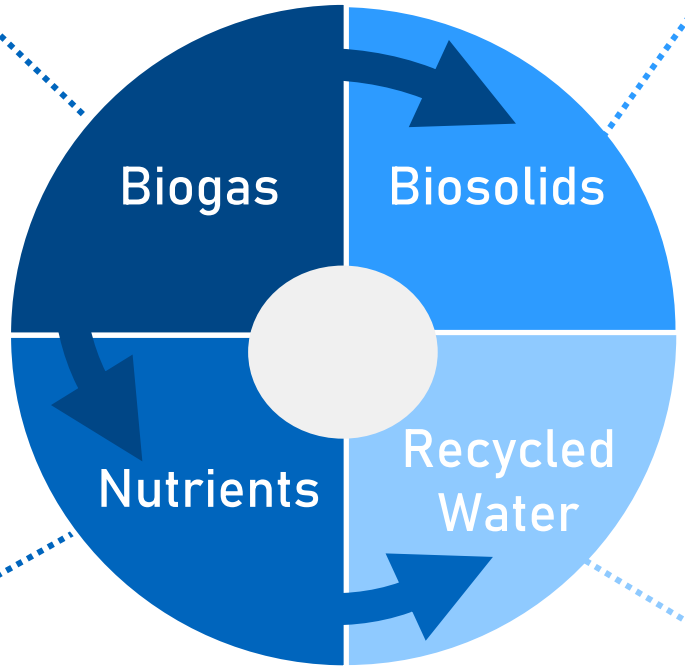
Resilient & Sustainable Energy

Consider utilization options



Minimize GHGs





Pair Technology *with* End Use

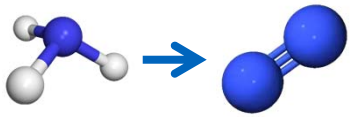
New Technologies

Compost

Biochar

Removal *vs.* Recovery?

Ammonium converted to nitrogen gas



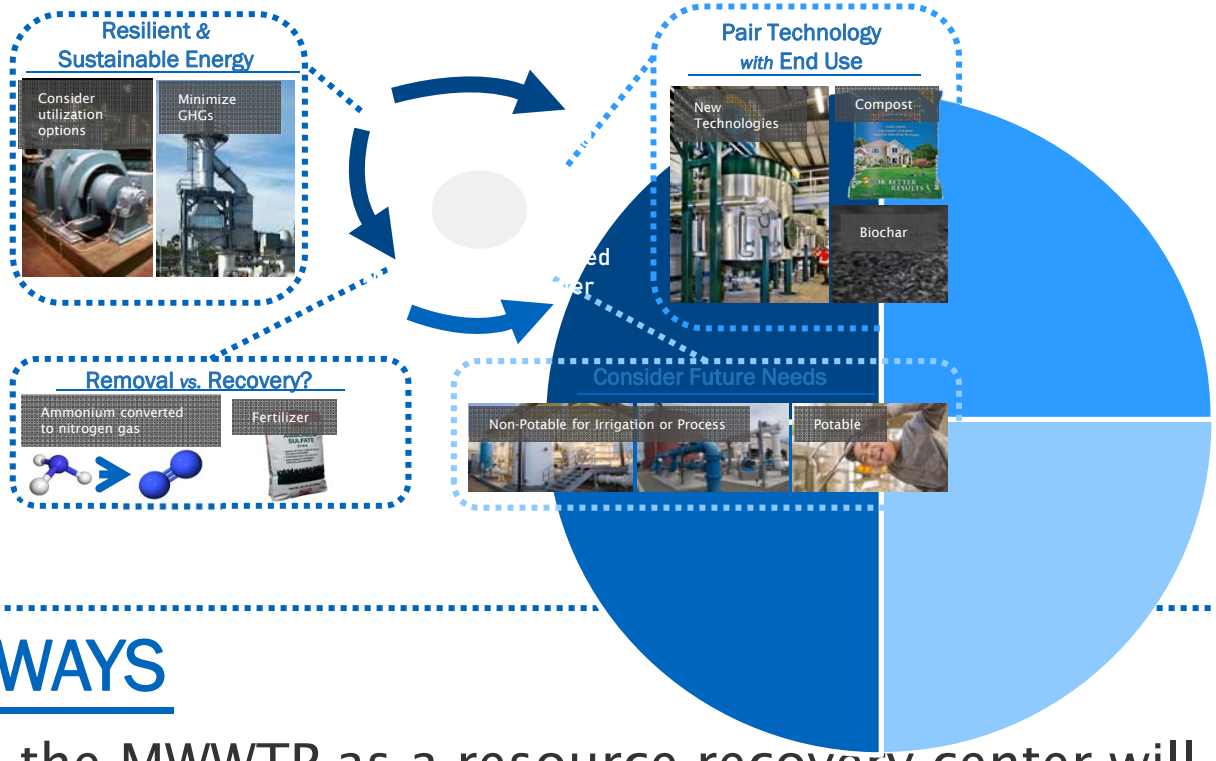
Fertilizer

Consider Future Needs

Non-Potable for Irrigation or Process

Potable

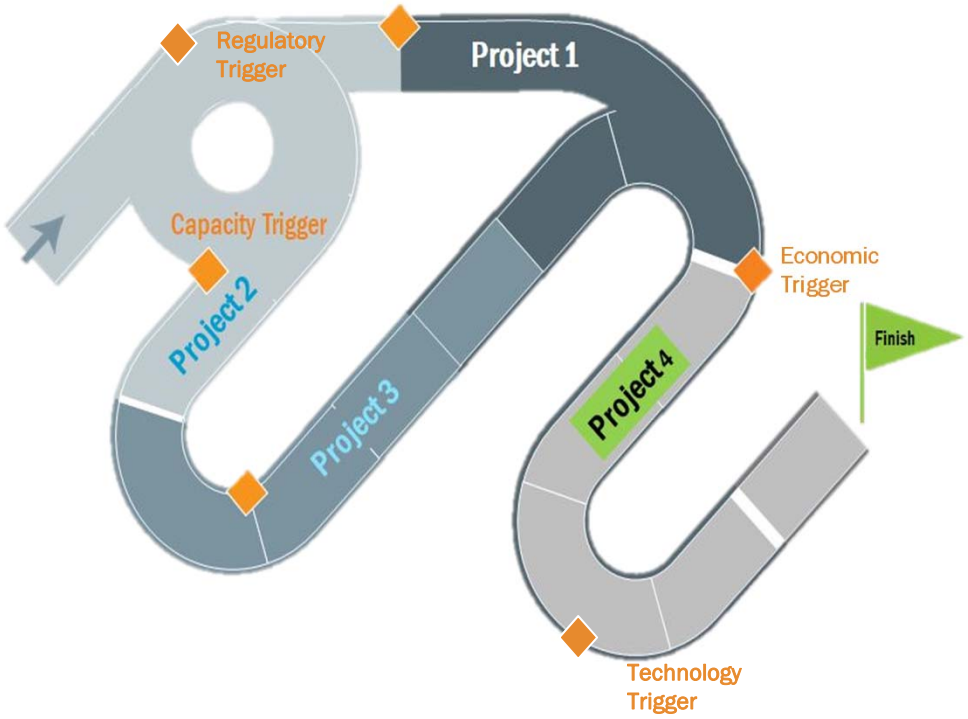
MWWTP as a Resource Recovery Center



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.

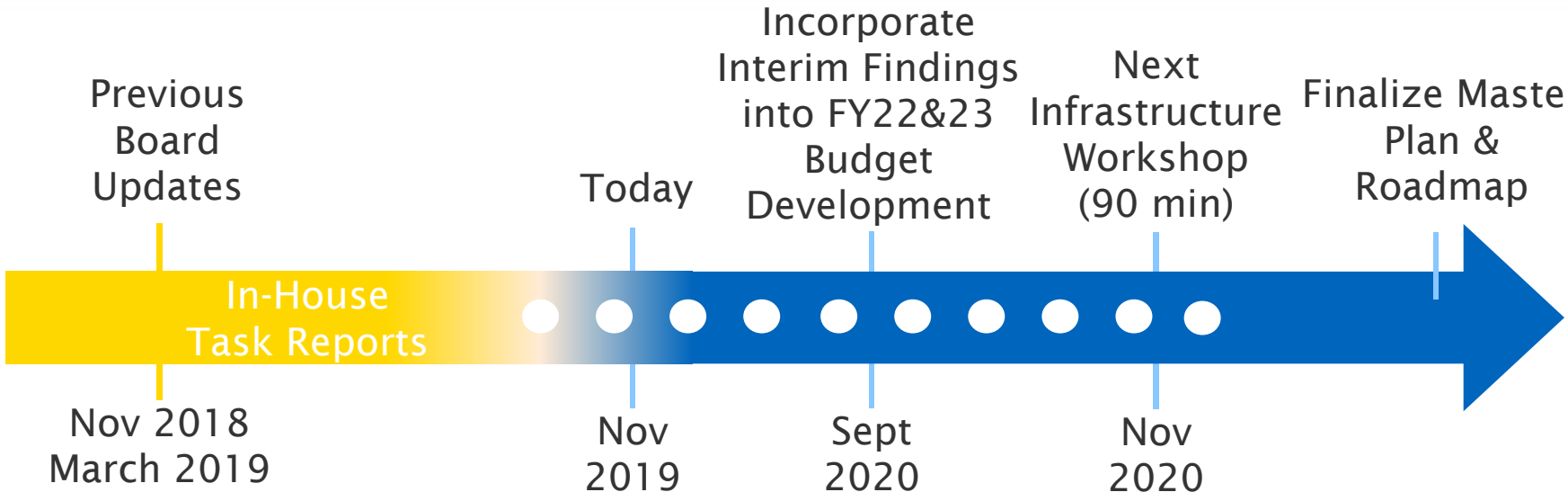
Roadmap



KEY TAKEAWAYS

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

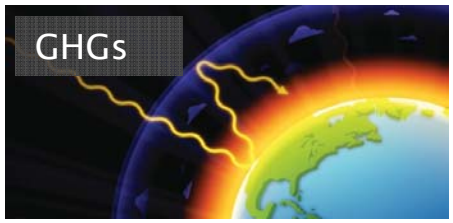
Next Steps



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



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