EAST BAY MUNICIPAL UTILITY DISTRICT

Long-Term Infrastructure Investment

Board of Directors Meeting

November 13, 2018

Agenda

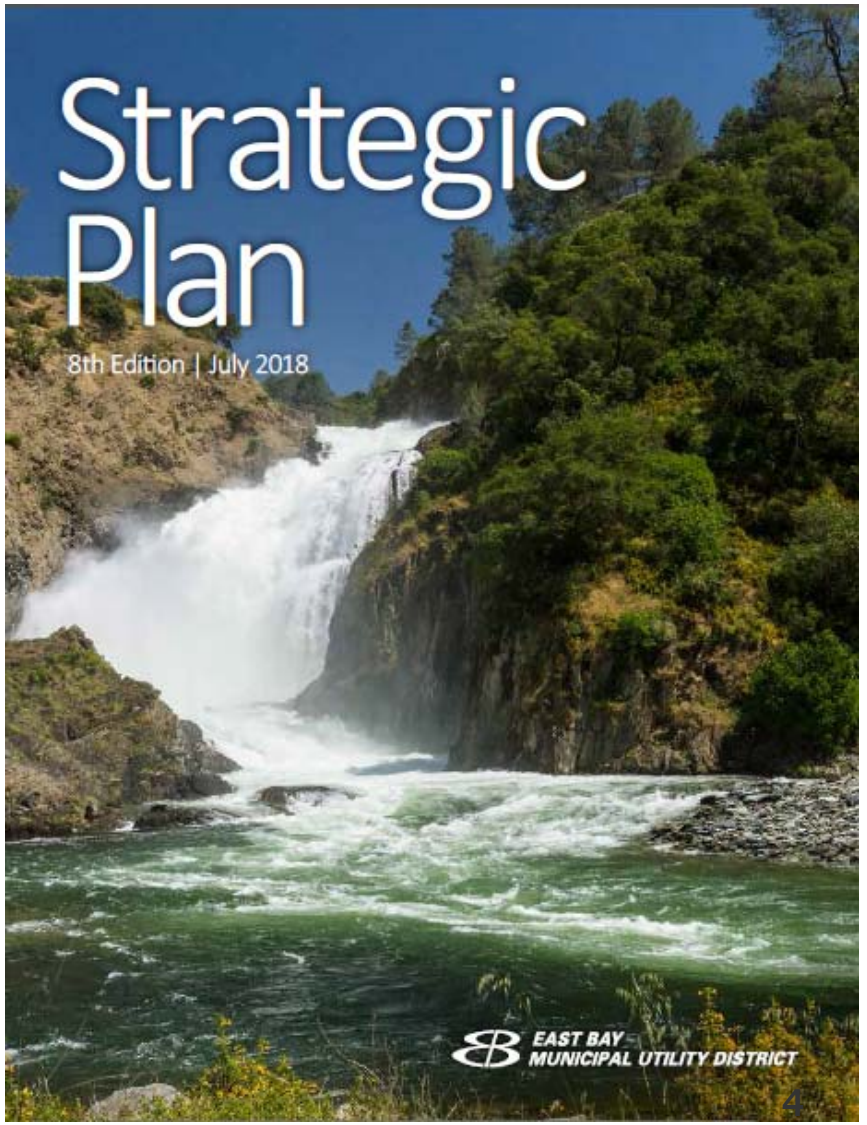
	Duration (minutes)
Introduction	5
Master Plans & Studies	20
Effective Maintenance	15
Break	5
Capital Improvement Plan	30
Board Input & Discussion	20

Workshop Purpose

- Present information on long-term infrastructure status and outlook
- Preview priorities to be addressed in upcoming FY 20-21 Capital Improvement Program (CIP) cycle
- Seek Board input on those priorities

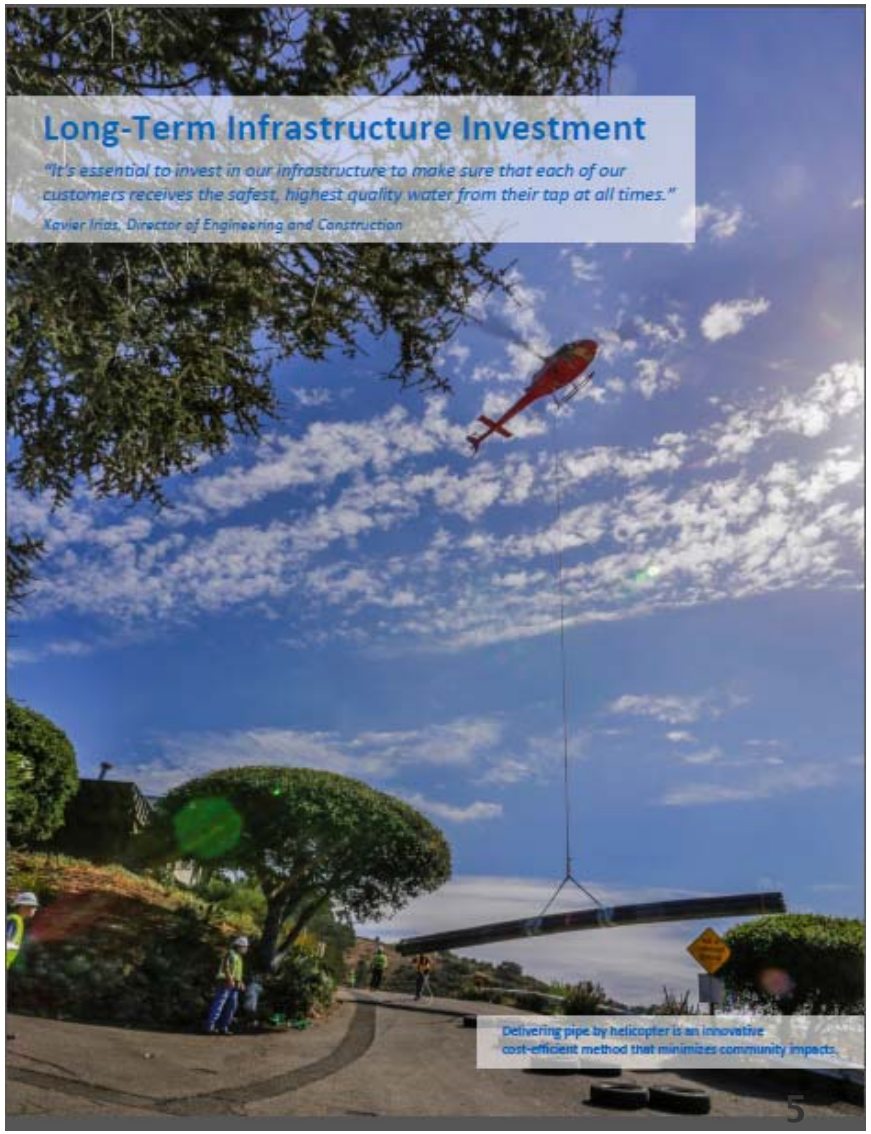
Strategic Plan Goal – Long-Term Infrastructure Investment

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

1. Master plans and studies
2. Effective maintenance
3. Capital improvement plan



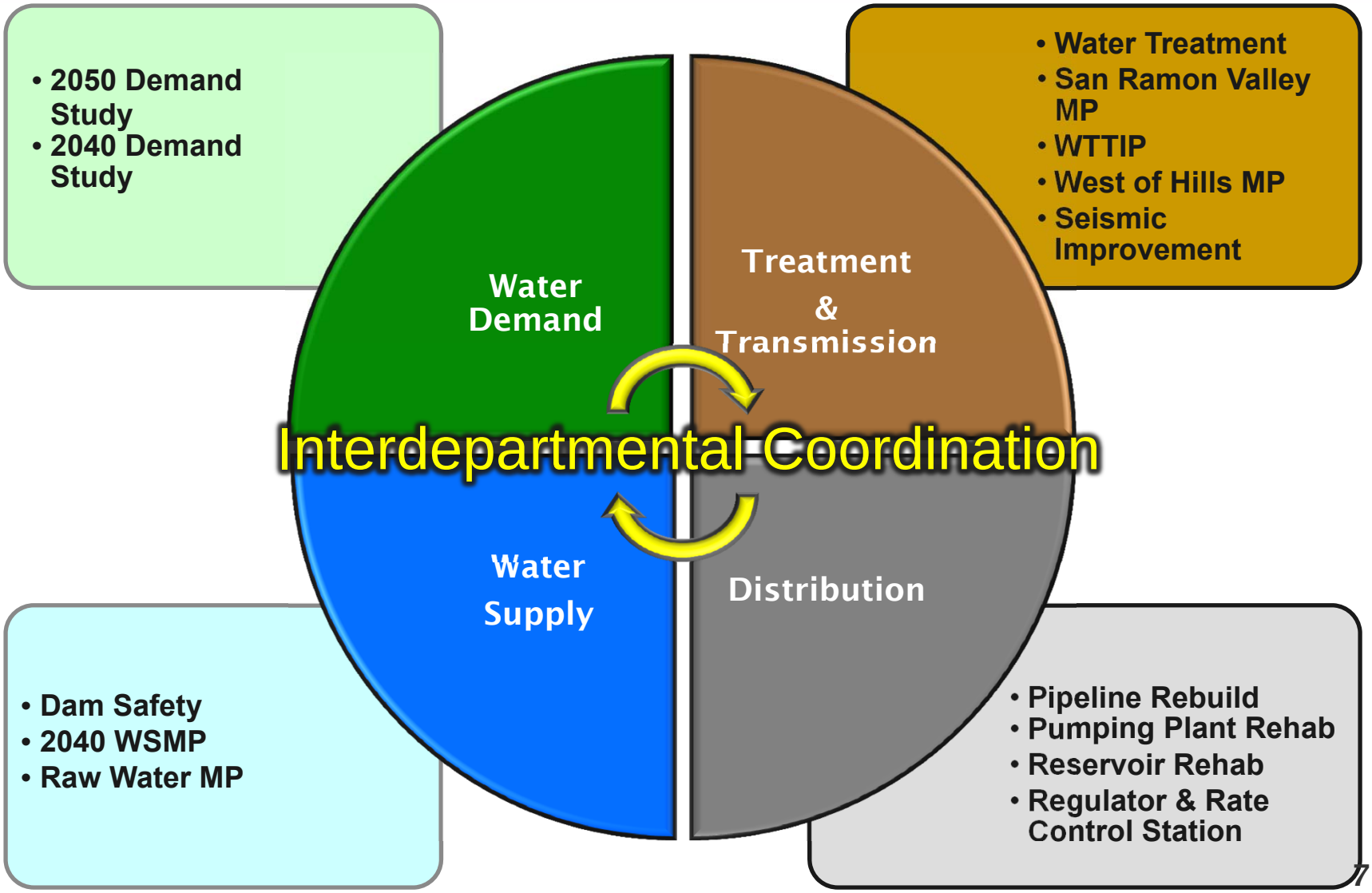
Strategy 1 – Master Planning & Studies

Drivers

What drives District Master Planning & Studies?

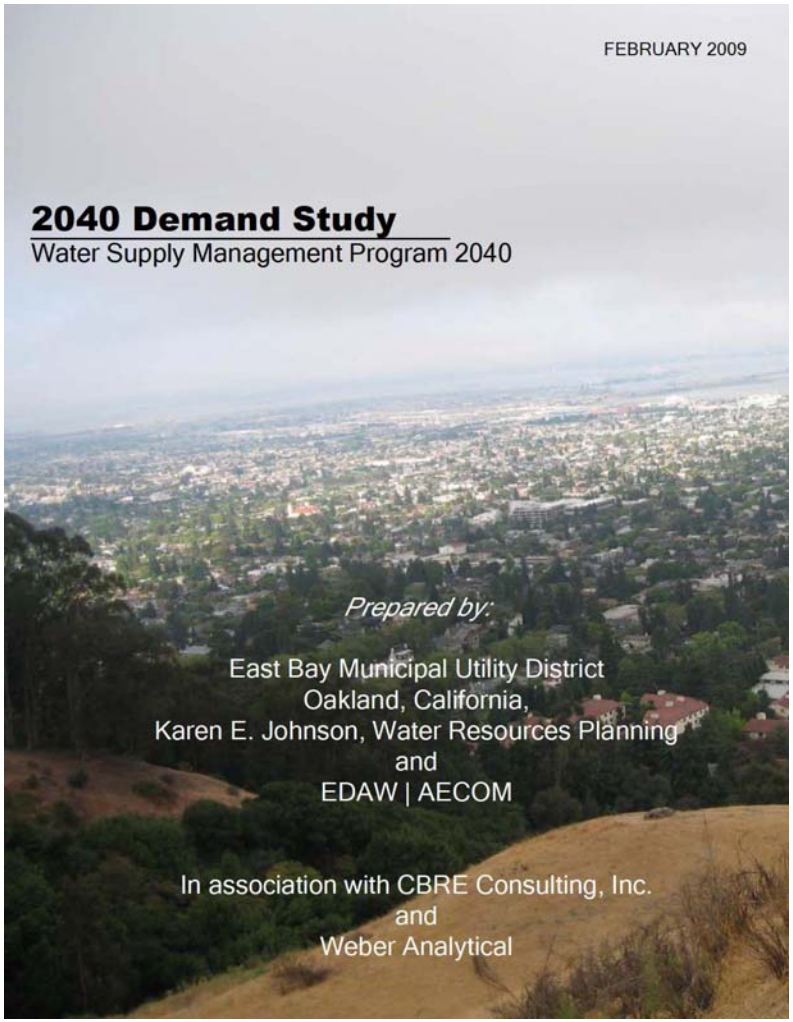
Strategy 1 – Master Planning & Studies

Coordination



Strategy 1 – Master Planning & Studies

Water Demand: *2050 Demand Study*



What about the 2050 Demand Study?

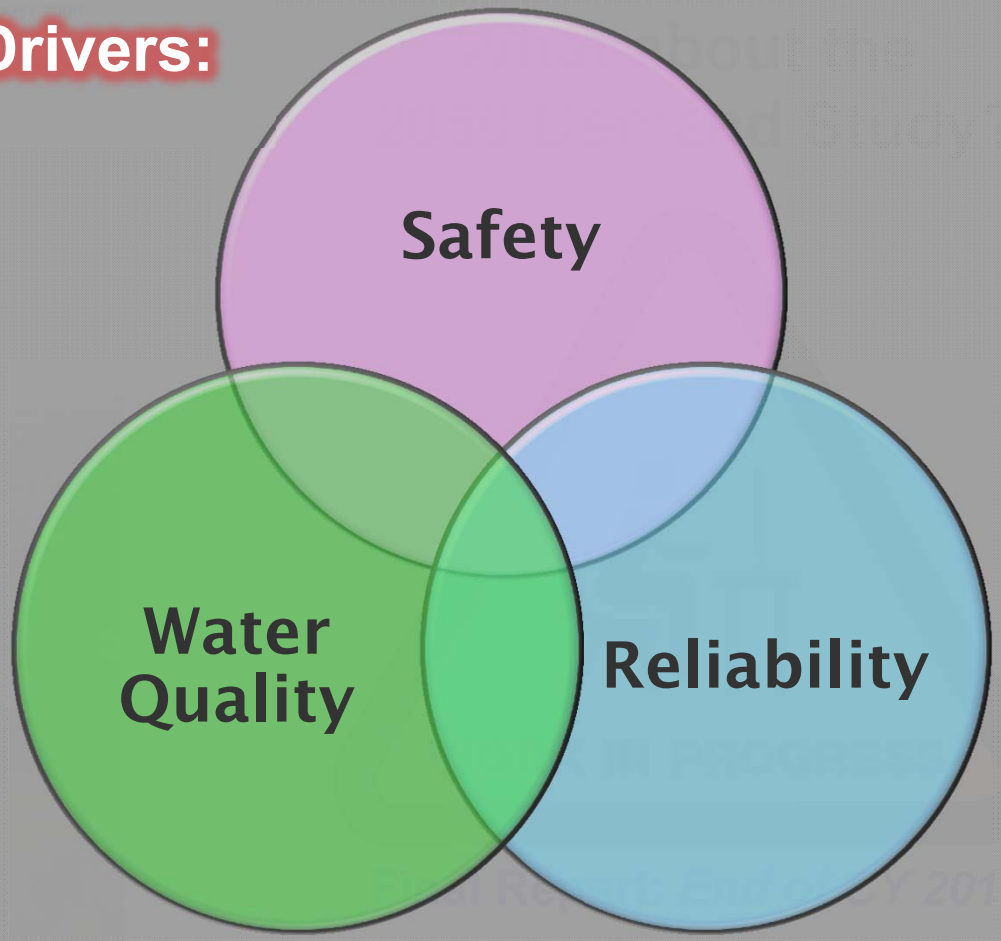
Final Report: *End of CY 2019*

Strategy 1 – Master Planning & Studies

Water Demand: *2050 Demand Study*

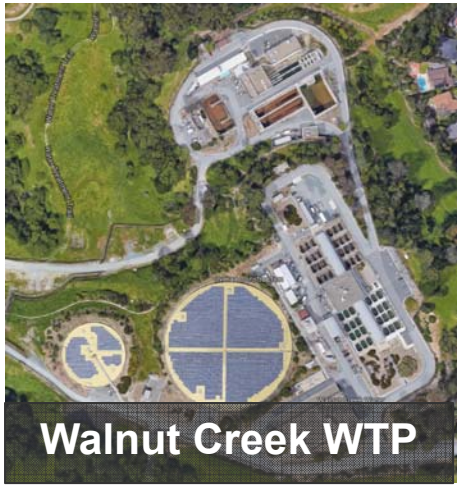
Water demands are not a driver.

Drivers:



Strategy 1 – Master Planning & Studies

Treatment & Transmission: *Water Treatment Studies*



- Treatment Studies
  - Pretreatment
  - Fouling
- Chemical Safety Study
- Condition Assessments
- Additional studies in next couple years to fine-tune road map for all six WTP's

Strategy 1 – Master Planning & Studies

Distribution: *Pipeline Rebuild*

- **Innovation Proposals**
  - Streamlined design
  - Modified pre-construction process
  - Various construction crew compositions
  - Alternative materials and methods

- **Long-term Logistic Support Studies**
  - Trench soils master planning
  - Additional sites for staging, warehouse, soils, stockpiles
  - Soil reuse and recycling

Strategy 1 – Master Planning & Studies

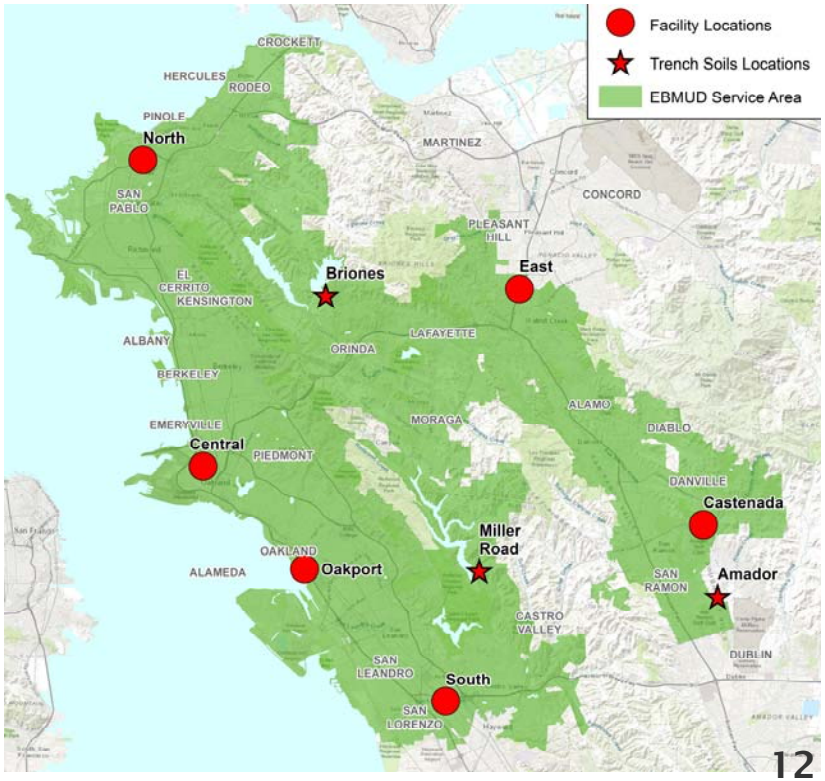
Distribution: *Pipeline Rebuild – Expansion Needs*

- **Plan to address increasing congestion**

Traffic congestion on major Bay Area freeways has grown 80 percent since 2010

Source: vitalsigns.mtc.ca.gov

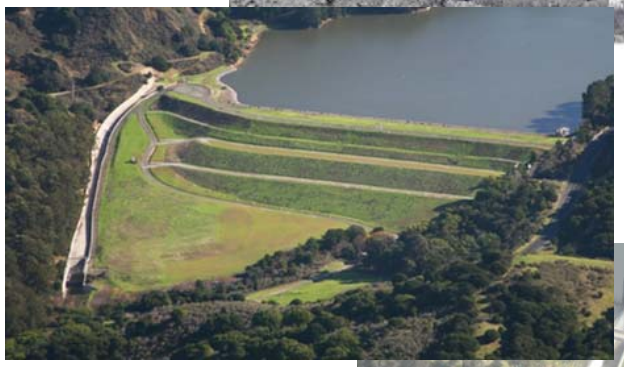
- **Plan to address space & capacity**
  - Yard space
  - Warehouse, equipment, staging
  - Trench soils capacity



Strategy 1 – Master Planning & Studies

Water Supply: *Dam Safety*

- Tower studies
  - Briones and Lafayette done
  - Planning & design underway
- FERC 12D study done, follow up studies to begin soon
- Dam Emergency Action Plan
- Inundation map updates under way
- Spillway assessments under way



Strategy 1 – Master Planning & Studies

Overview of Wastewater Issues

Eliminate discharges from WWFs under the Consent Decree

Wet weather flow can be ~14X of the average flow

Emerging Concern on Biosolids Management

Emerging Concern on Nutrient Discharge

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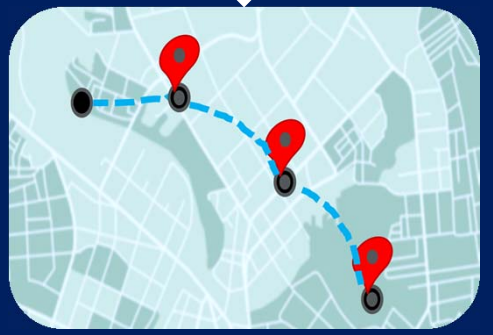
Master Planning Effort to Develop a Roadmap for Future

- Aging Infrastructure
- Regulatory
- Sustainability
- Capacity



Strategy 1 – Master Planning & Studies

Wet Weather Consent Decree (2014–2036)

Oversee Private Sewer Lateral Program

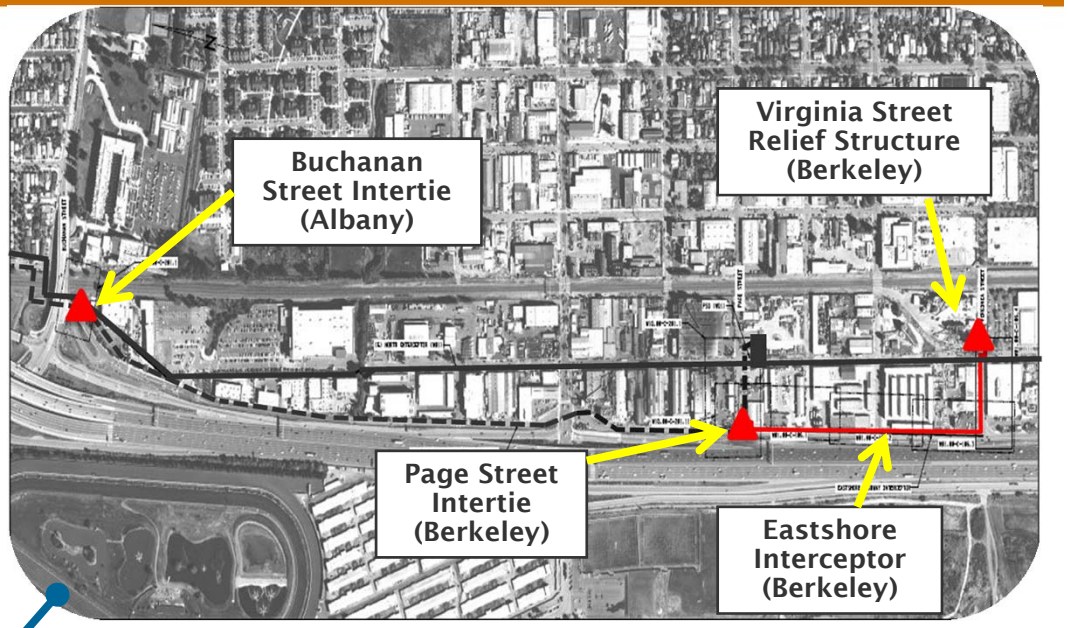
- To fix the root cause

Identify I&I Sources

Implement CIP projects

- TO eventually

Reduce discharge at WWFs and blending at the MWWTP



Construct North Interceptor Relief Sewer to reduce use of Point Isabel WWF during moderate wet weather events

Strategy 1 – Master Planning & Studies

Emerging Concern: *Biosolids as Landfill ADC*

- ~200 wet tons of biosolids produced daily (~10 trucks/day)
- No onsite storage capacity at the MWWTP
- ~$2.5M per year hauling & reuse cost ($3.6M awarded for 2018)

Current, nearly all biosolids go to landfill Alternative Daily Cover (ADC) during the wet weather season

This option is expected to be completely phased-out by 2025 or sooner

SB1383 requires

50% diversion of organics from landfill by 2020

75% by 2025

Strategy 1 – Master Planning & Studies

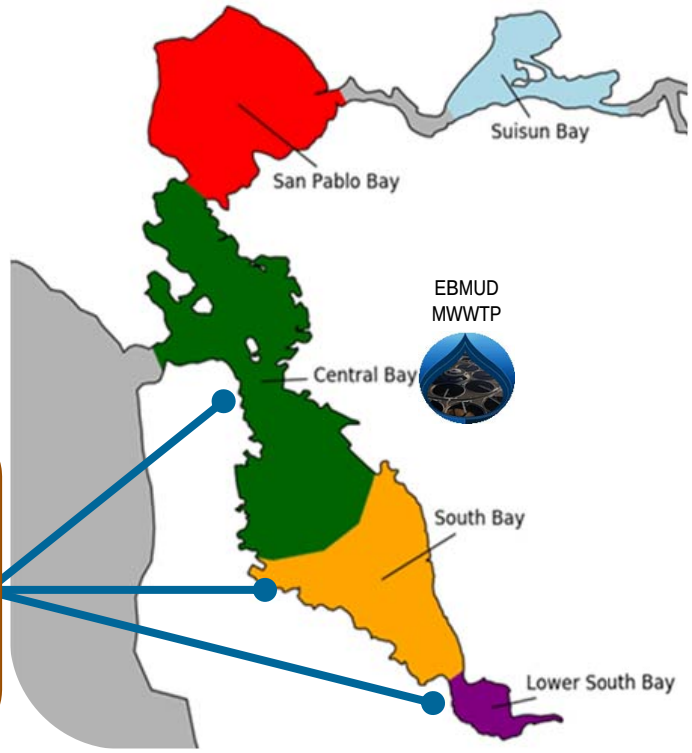
Emerging Concern: *SF Bay May be Adversely Impacted by Nutrients*

Wastewater discharge is the major nutrient source to the Bay

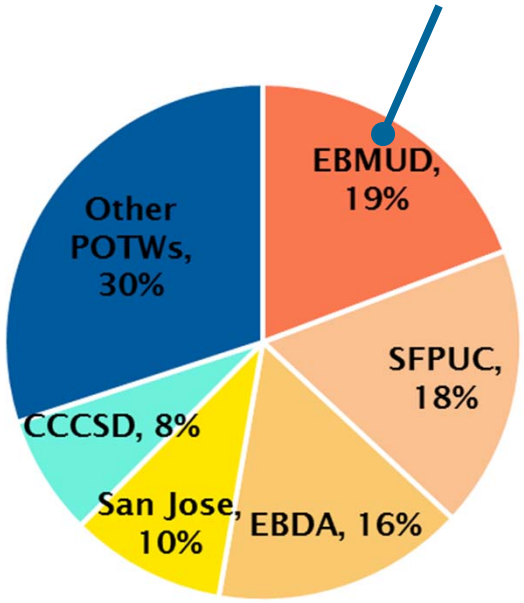
>90%

Of nutrients input are from WWTPs effluent

- Rest by storm water



District accounts for ~19% of the total nutrient discharge from 37 WWTPs combined



* Source: San Francisco Estuary Institute (SFEI, 2014)

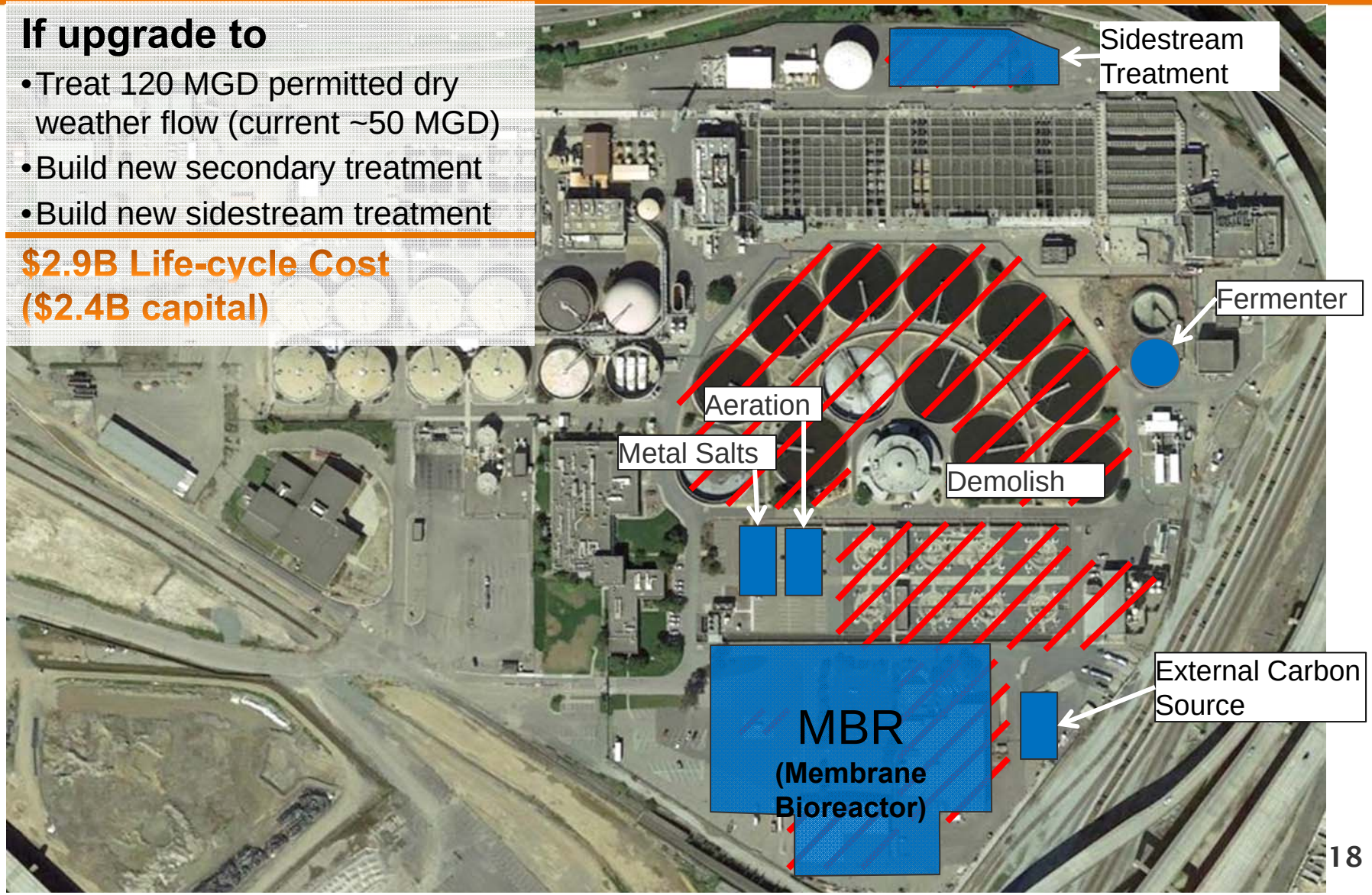
Strategy 1 – Master Planning & Studies

MWWTP Nutrient Upgrades May be Substantial

If upgrade to

- Treat 120 MGD permitted dry weather flow (current ~50 MGD)
- Build new secondary treatment
- Build new sidestream treatment

$2.9B Life-cycle Cost ($2.4B capital)



Strategy 1 – Master Planning & Studies

Some Existing & Emerging Regulatory Requirements

- 2019: 2nd nutrient watershed permit
- 2020: National Polluant Discharge Elimination System (NPDES) permit renewal
- 2020: 50% diversion of organics from landfill (SB1383)
- 2022: Consent Decree check-in
- 2024: 3rd nutrient permit, possible nutrient discharge load cap
- 2025: 75% diversion of organics from landfill (SB1383)
- 2025: NPDES
- 2029: 4th nutrient permit
- 2030: NPDES
- 2030: Consent Decree check-in
- 2034: 5th nutrient permit
- 2035: NPDES
- 2036: Consent Decree ends

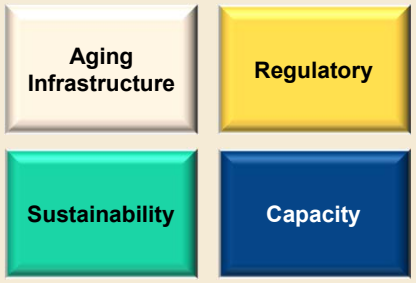
2019 2024 2029 2034 2039

Strategy 1 – Master Planning & Studies

Integrated MWWTP Master Plan

Drivers

- **Potential Regulatory Requirements**
  - Nutrients
  - Biosolids diversion
  - Air, Contaminants of Emerging Concern
- **Infrastructure Renewal Needs**
  - Aging facilities, reliability, seismic risk, sea level rise impact etc.
  - Repair, replace, or upgrade/repurpose?
- **Future Flow and Load**
  - Resource Recovery Program needs
  - Population/employment growth
  - Impact of I&I reduction
- **Operational Improvements**



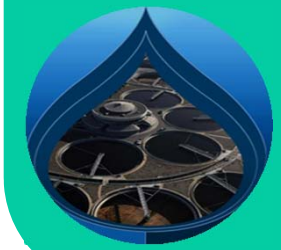
Master Planning

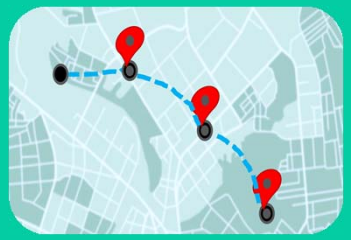
Combined Efforts
- District staff
- Consultant(s)

Outcomes

A roadmap to cost-effectively

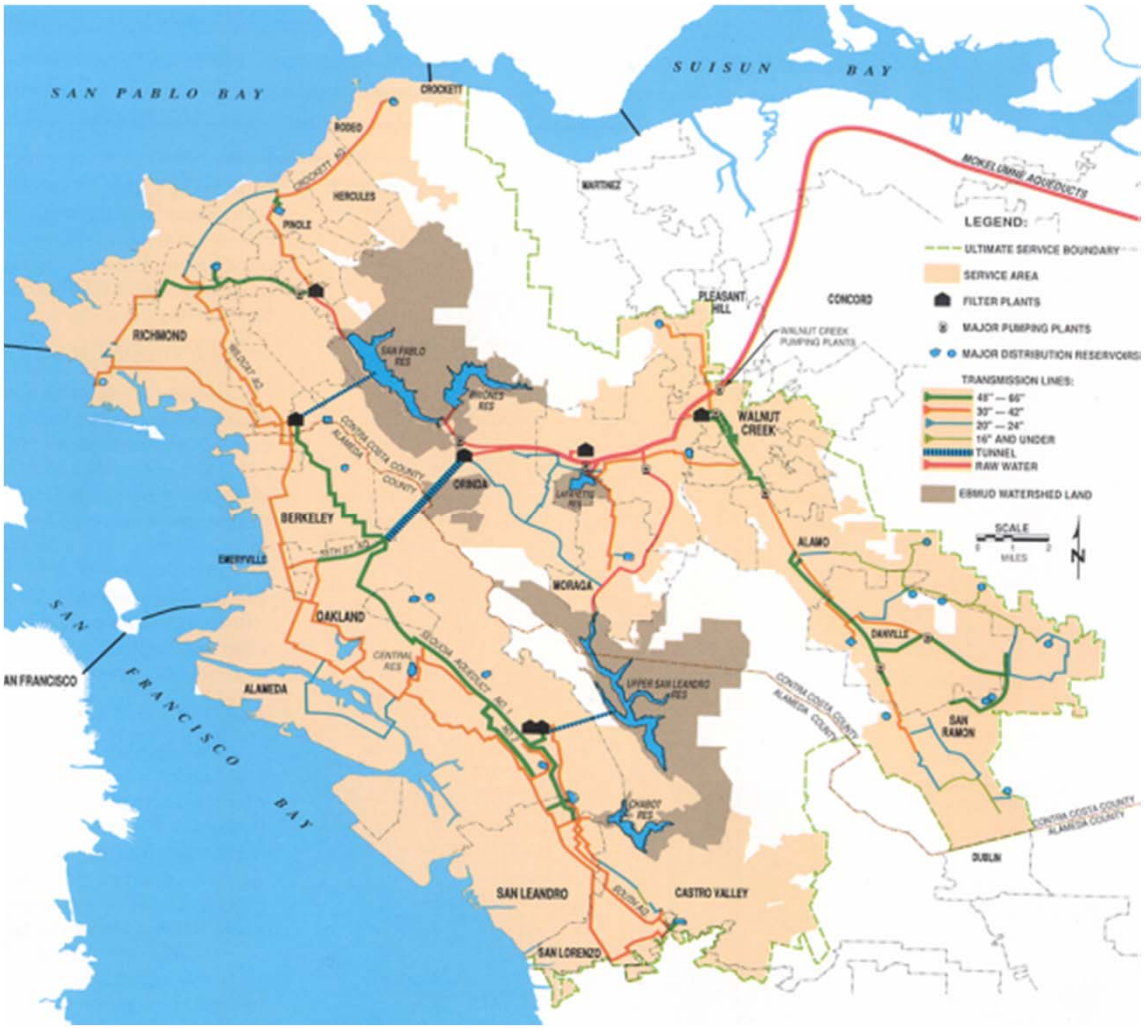
- Provide reliable wastewater services
- Optimize the use of infrastructures and limited land space
- Make no-regret infrastructure investment
- Meet increasingly stringent regulatory requirements
- Accommodate potential growth
- Achieve environmental sustainability, such as:
  - Multi-benefits (recycled water)
  - Recovery versus removal
  - GHGs
  - Energy





Strategy 2 – Effective Maintenance

Water System Overview



Raw Water System

- 7 reservoirs
- Aqueducts

Treatment System

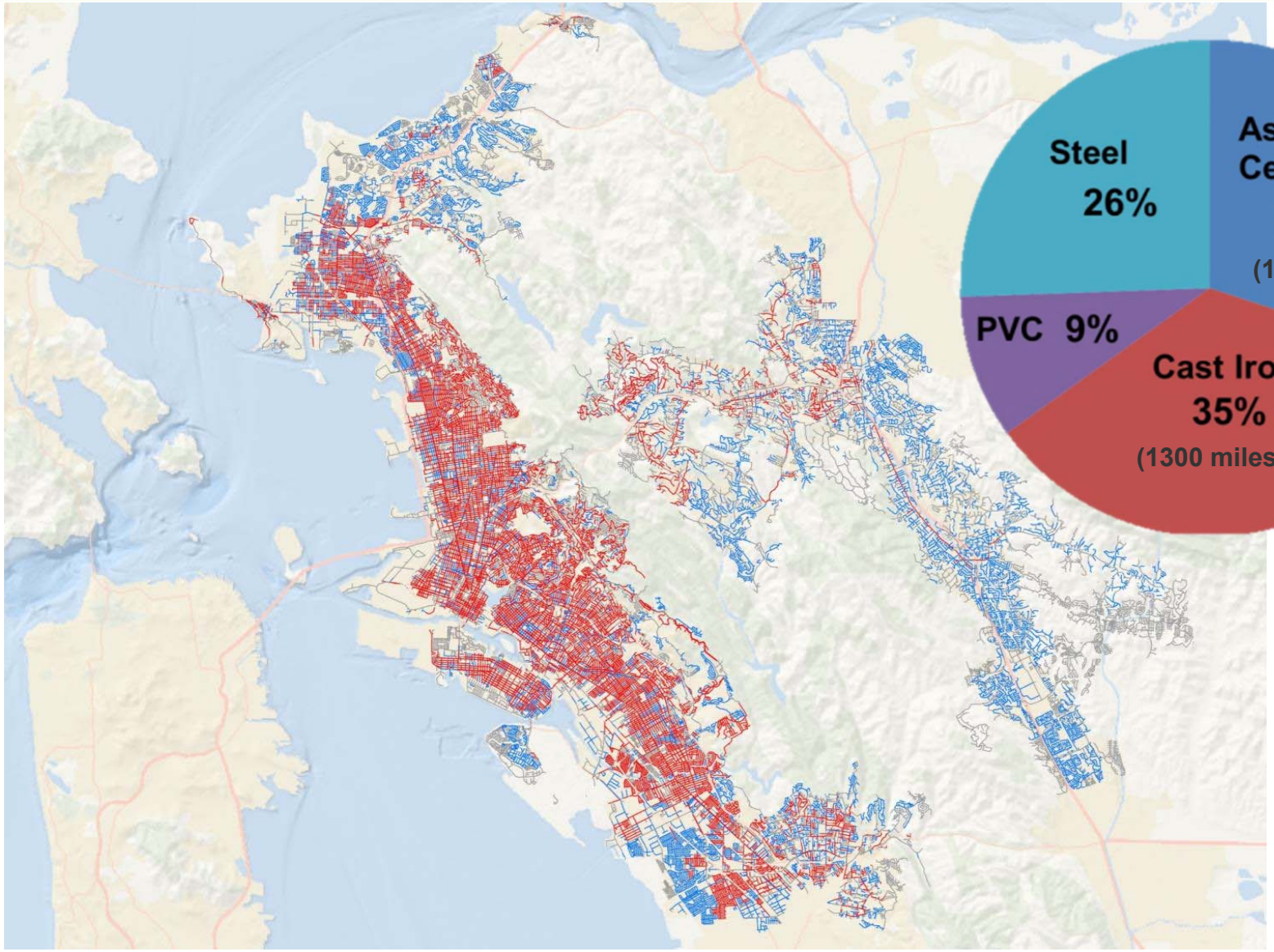
- 3 inline WTPs
- 3 conventional WTPs

Distribution System

- 4,200 miles of pipeline
- 122 pressure zones
- 164 reservoirs
- 135 pumping plants
- 100 regulators/RCS

Strategy 2 – Effective Maintenance

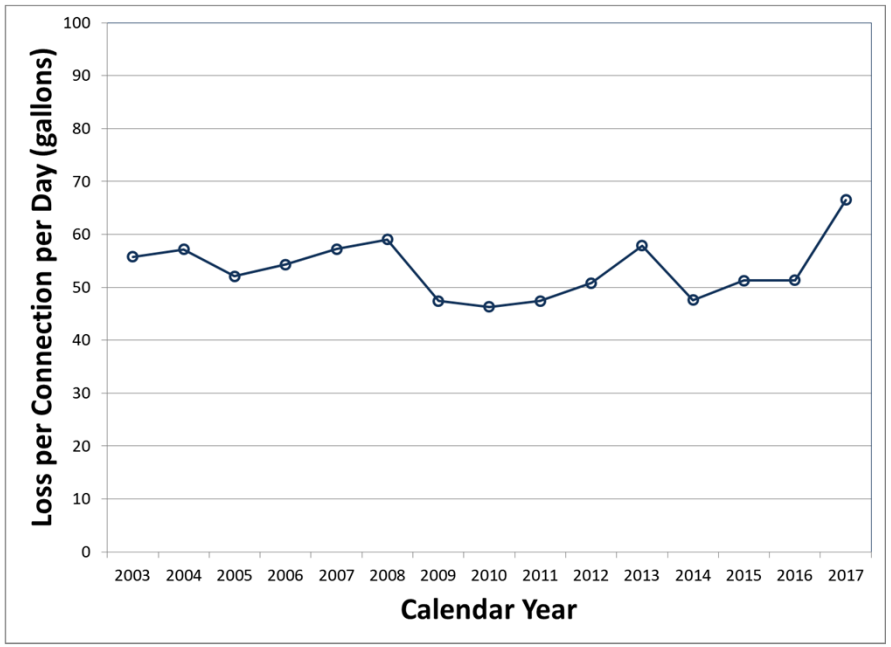
Pipeline Inventory



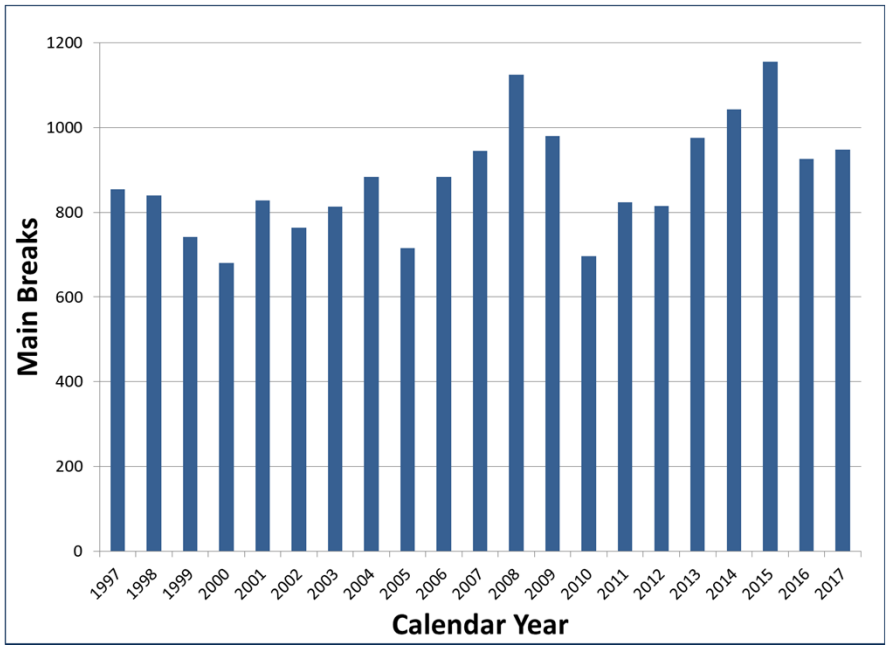
Strategy 2 – Effective Maintenance

Water Loss Strategy

Water Loss



Main Breaks



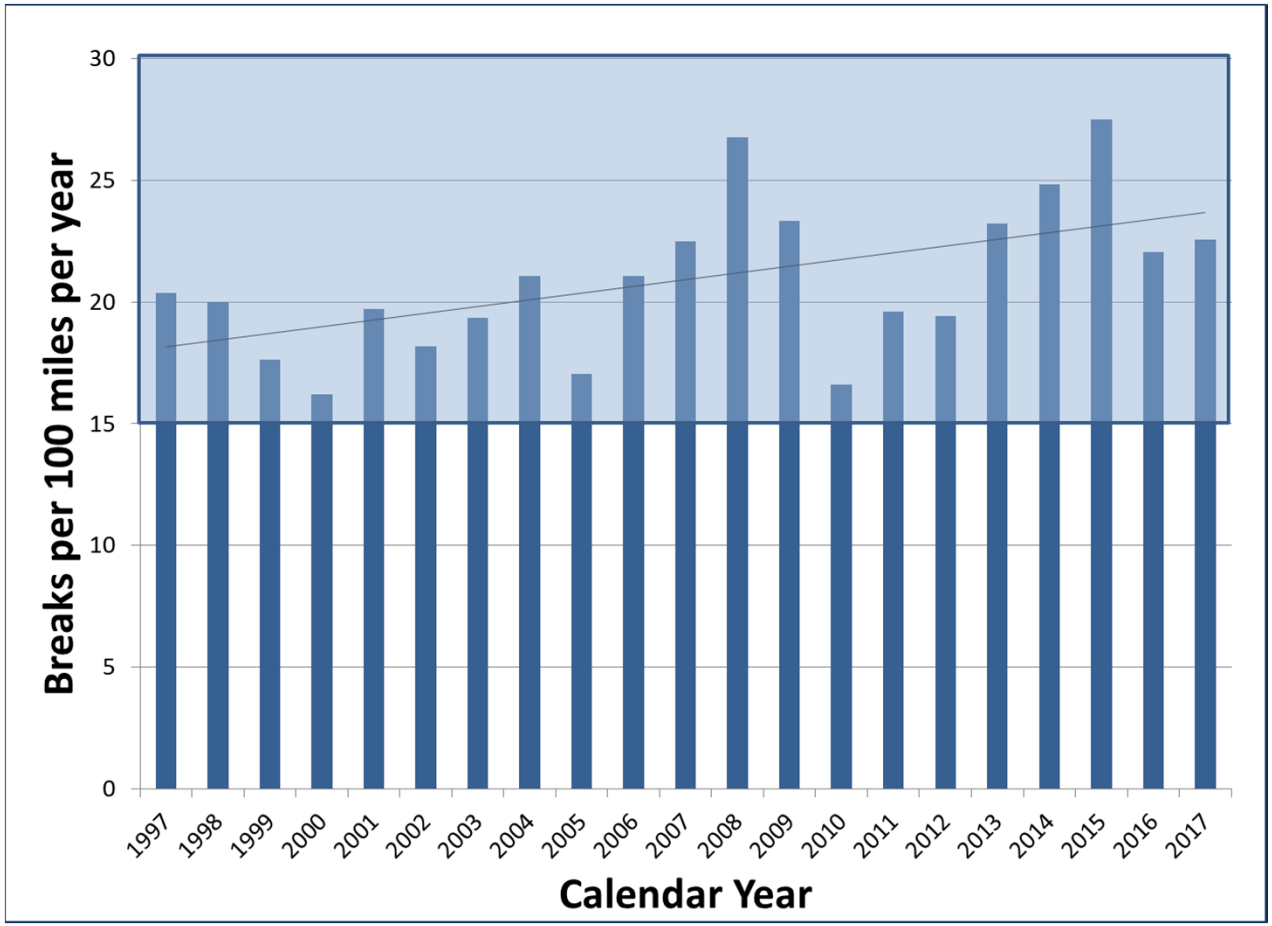
Goal: Reduce water loss and main break rate

Strategy 2 – Effective Maintenance

Main Break Rate

Industry Benchmark for a well maintained system

= 15-30 breaks/100 miles/year



Strategy 2 – Effective Maintenance

Addressing Water Loss and Main Breaks

Apparent Loss

- Meter accuracy
- Unauthorized consumption
- Data transfer errors
- Data analysis errors

Real Loss

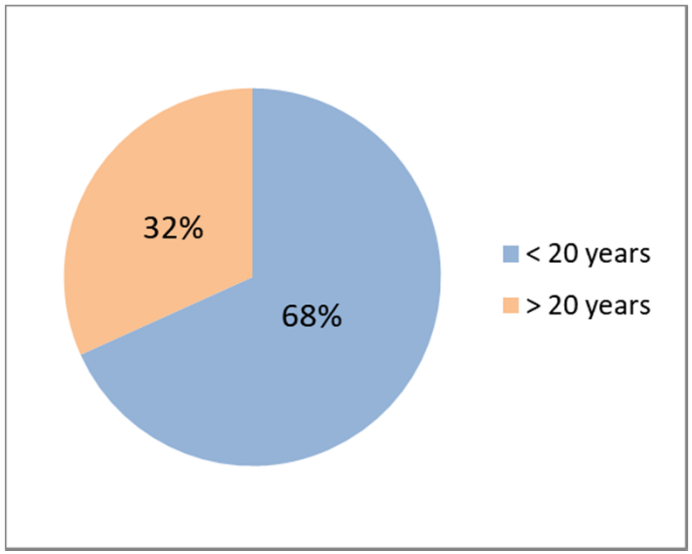
- Active leakage control
- Pressure management
- Speed and quality of repairs
- Infrastructure management

Strategy 2 – Effective Maintenance

Apparent Losses: *Customer Water Meters*

Meter Age

- Currently replace ~20,500 meter/year
- Approximately 15,000 meters replaced are older than 20 years
- Increase annual replacement to approximately 25,000 meters



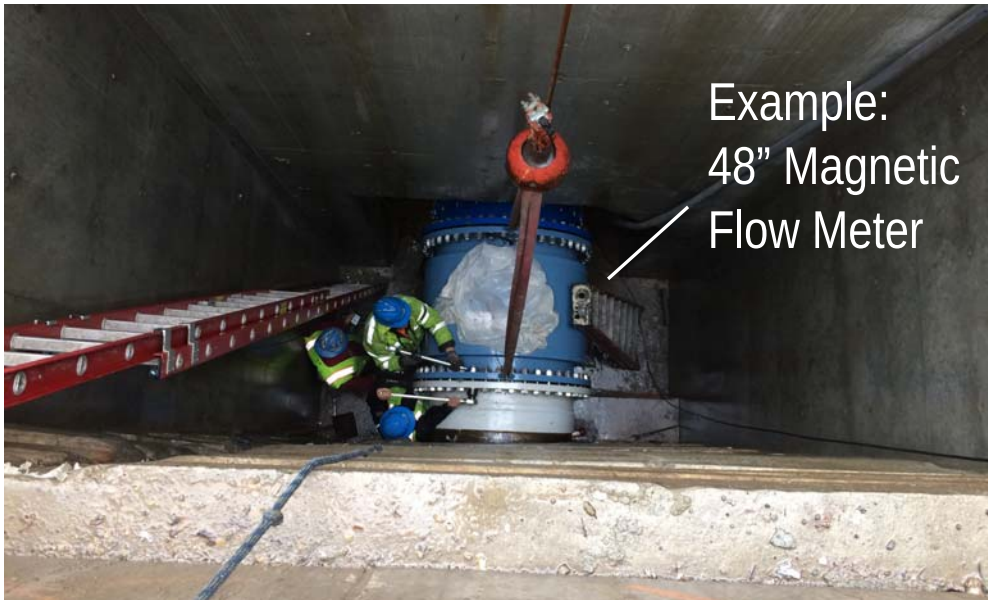
Meter Testing

- Meter testing
  - Small meters: Test 400 in FY19
  - Medium meters: Test 200 per year
  - Large meters: Test all 1,750 every two years
- Plan to increase testing of small and medium-sized meters

Strategy 2 – Effective Maintenance

Apparent Losses: *Water Treatment Plant Meters*

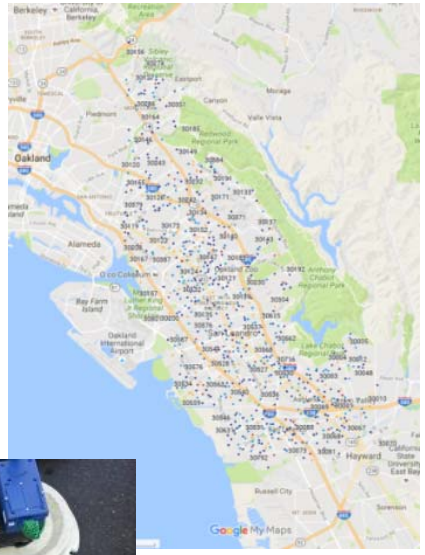
- Effluent flow meters at water treatment plants
  - Sobrante, USL, Lafayette, and Orinda
- Project to confirm the accuracy of water meters at all water treatment plants
- Includes vaults, new flow meters, and new taps



Strategy 2 – Effective Maintenance

Real Losses: *Finding leaks*

- Leak detection
  - Over 2,000 loggers deployed
  - Leading industry with use of innovative technologies
    - Satellite leak detection
    - Acoustic loggers
  - Over 1210 miles of pipe surveyed in FY18
  - Expanding leak detection



Strategy 2 – Effective Maintenance

Real Losses: *Pressure Management*

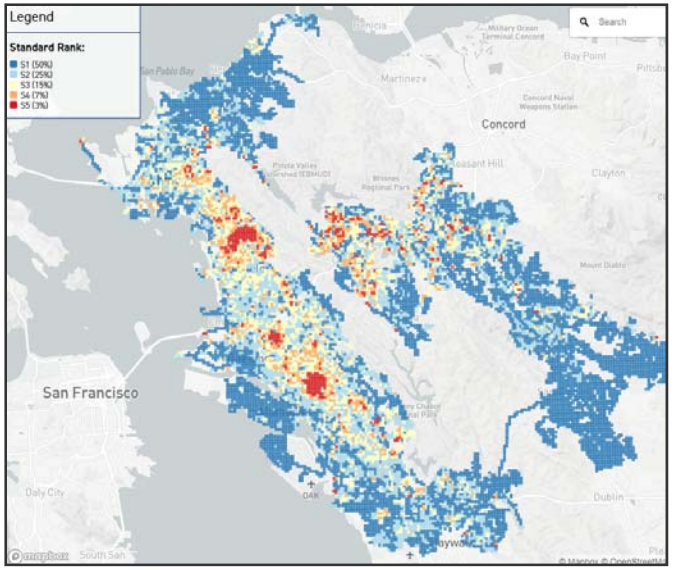
- Break rate increases with pressure
- Break rate increases due to pressure transients
- Next steps
  - Install more pressure monitors
  - Install more pressure management systems on regulators
  - District Metered Areas

Strategy 2 – Effective Maintenance

Real Losses: *Pipeline Replacement*

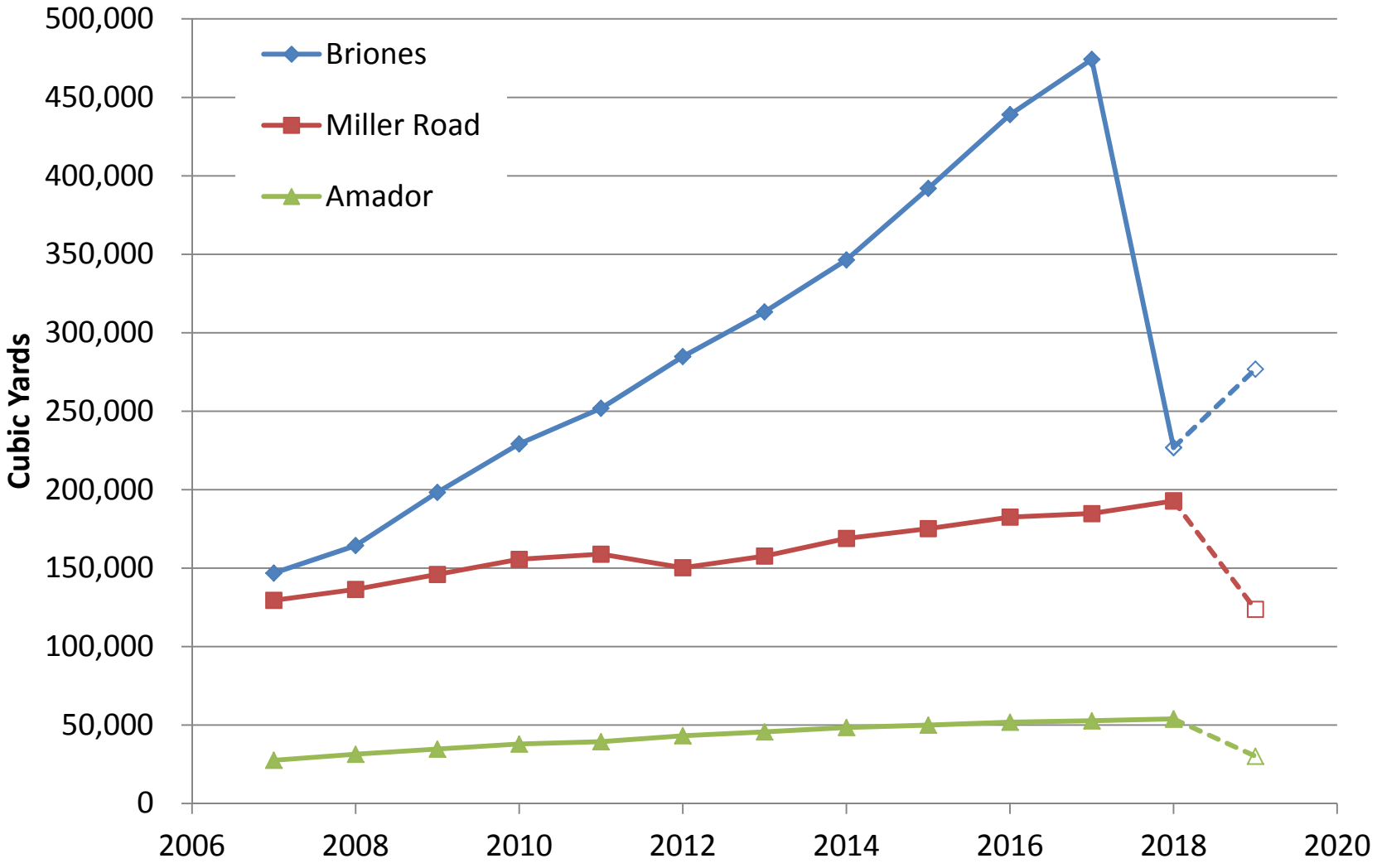
- Pipe replacement goal
  - FY19: 15 miles
  - FY20: 17.5 miles
  - FY21: 20 miles
- Important to replace the right pipe
- Targeted main replacement
- Consider likelihood and consequence of failure

Material	Miles	% Total	% Main Breaks
Cast Iron	1,300	31%	72%
Asbestos Cement	1,100	27%	18%
Steel	1,300	31%	8%



Strategy 2 – Effective Maintenance

Real Losses: *Pipeline Replacement – Trench Soils*



Strategy 2 – Effective Maintenance

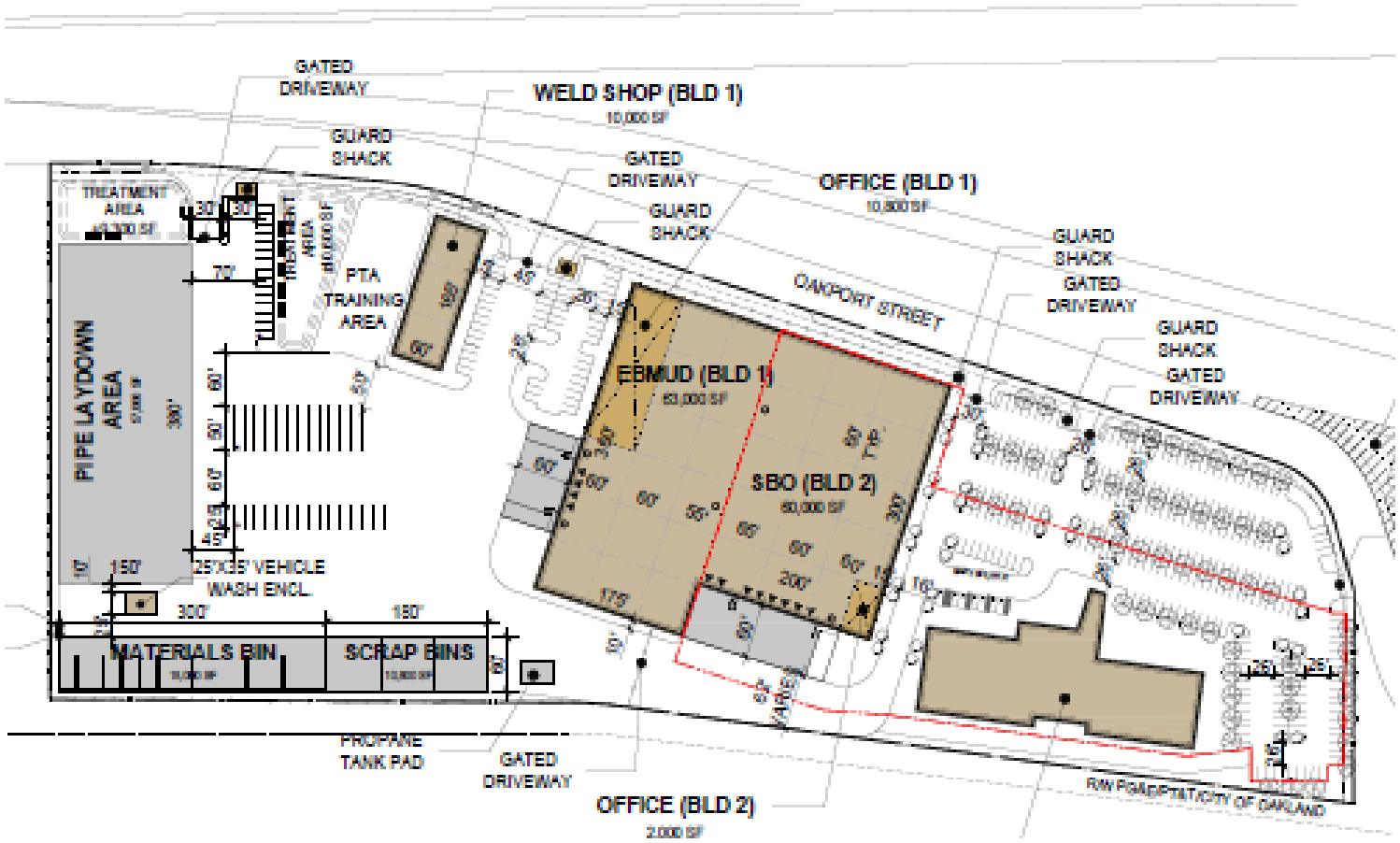
Real Losses: *Pipeline Replacement – Resource Needs*

- Pipeline crews
  - Supervisor, plumbers, equipment operators, truck drivers
  - FY19: 10 pipeline crews
  - FY20/21: Add 2 pipeline crews
- Support staff
  - Engineers, drafters, surveyors, water system inspectors
- Fully-Maintained and Operated Usage
  - Provides flexibility
  - Evaluating usage

Strategy 2 – Effective Maintenance

Expanding Yard & Storage Space

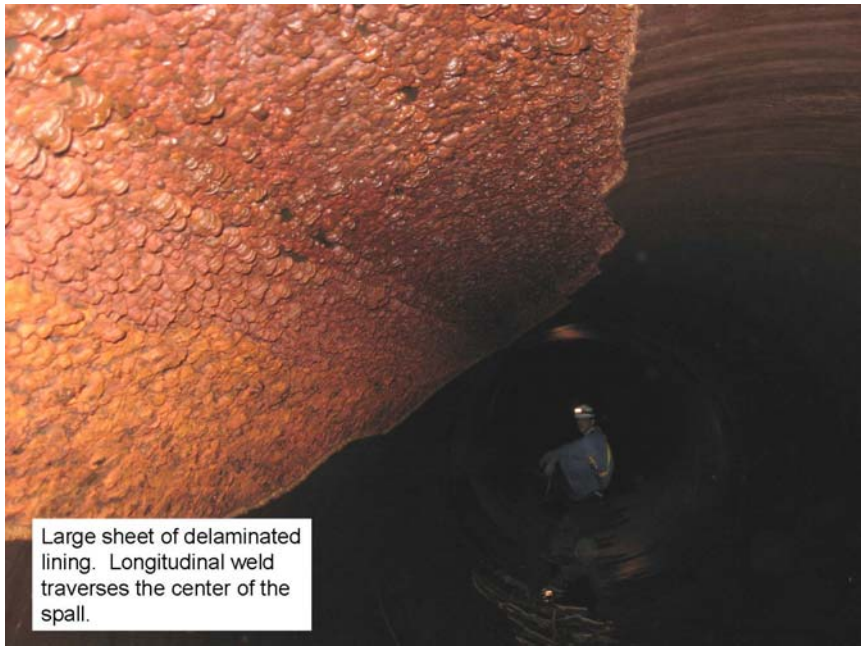
- Oakport: Additional yard and storage
- Central Area Service Center: Exploring options for a new maintenance yard



Strategy 2 – Effective Maintenance

Operational Drivers for Transmission Improvements

- Improve corrosion control to extend useable life of Mokelumne Aqueducts
- Rehabilitation of Mokelumne and Lafayette Aqueducts to increase reliability and unplanned outages



Large sheet of delaminated lining. Longitudinal weld traverses the center of the spall.

Delaminated lining accumulated on pipe invert

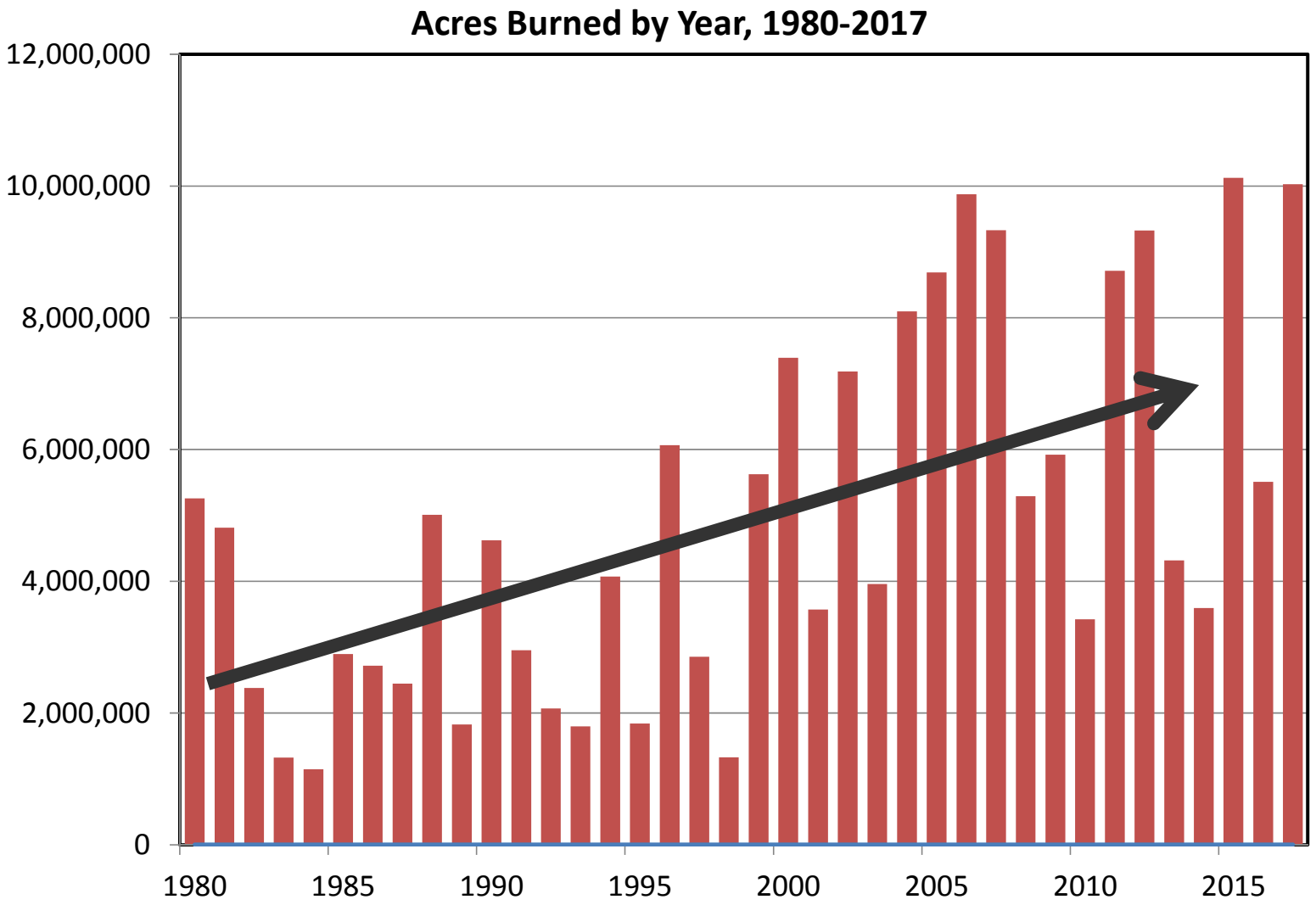
Strategy 2 – Effective Maintenance

Water Quality Drivers for WTP Improvements

- Improve disinfection
- Reduce disinfection byproducts
- Increase treatability of variable and diversified raw water sources
- Reduce taste and odor-causing compounds
- Account for future regulated compounds to the extent possible
- Address climate change

Strategy 2 – Effective Maintenance

Wildfire Risks Are Increasing



National Interagency Fire Center

Strategy 2 – Effective Maintenance

Post-Butte Fire Water Quality Degradation

Nov. 2015

Jan. 2016

Strategy 2 – Effective Maintenance

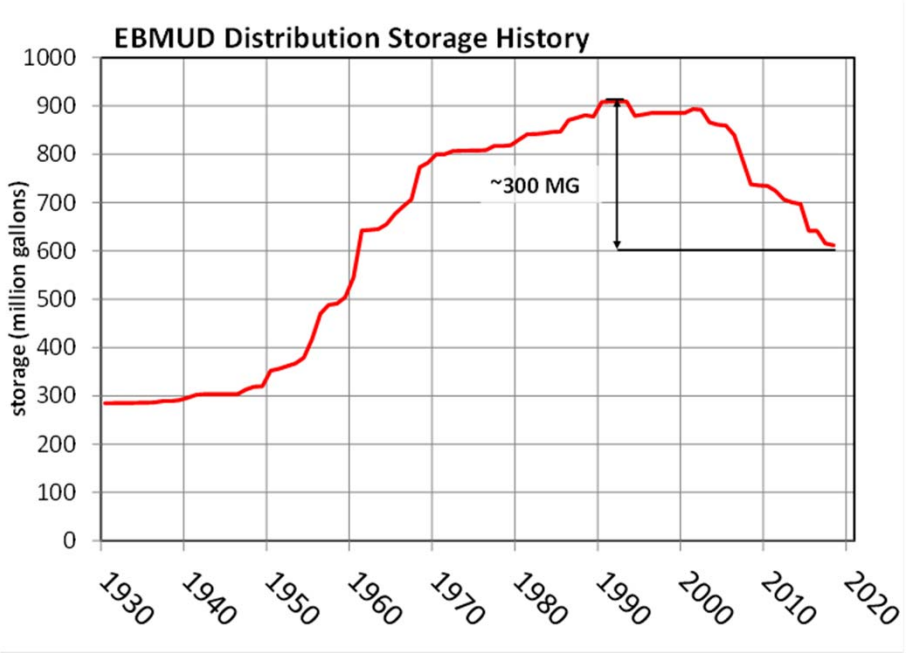
Protecting Water Quality Through Forest Management

- Agreement with the US Forest Service (2016) allows UMRWA to contract for forest fuel reduction and restoration projects.
- Agreement leverages $1 million from Sierra Nevada Conservancy with $1.3 million in US Forest Service expenditures.
- Active projects on nearly 2,200 acres within the upper watershed.

Strategy 2 – Effective Maintenance

Operational Drivers for Distribution Improvements

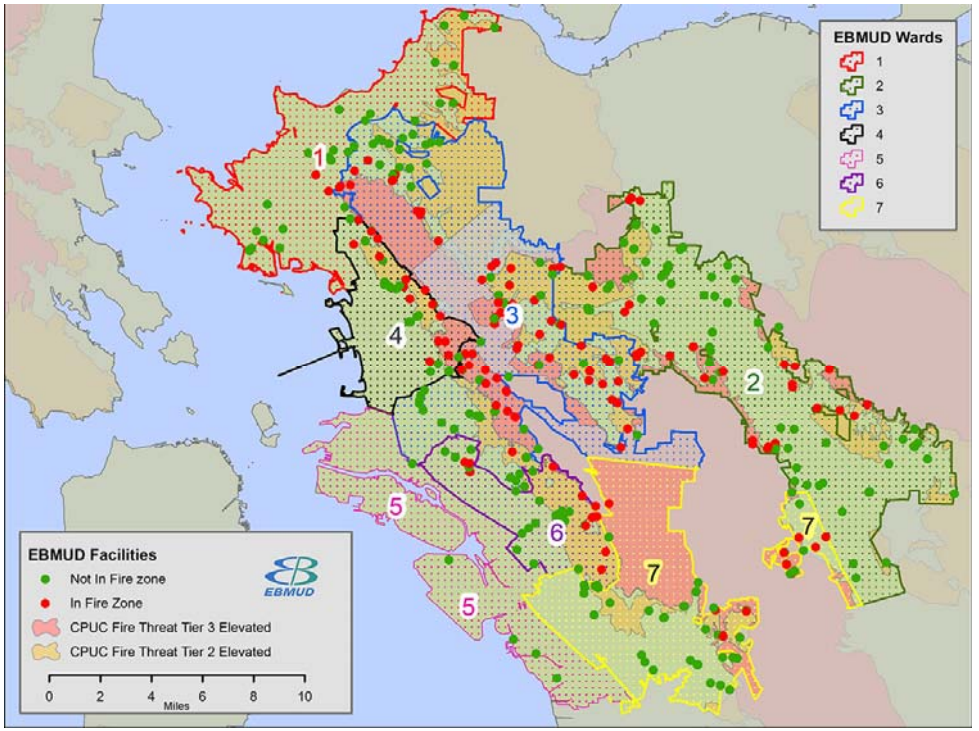
- Reducing water age improves water quality
  - Lower disinfection byproducts
  - Higher disinfectant residual
  - Lower nitrification rates
- Must be balanced with emergency supply storage needs
- Potential power interruptions by PG&E



Strategy 2 – Effective Maintenance

Operational Continuity During Power Outages

- Additional standby power at critical facilities
- Additional mobile generators and pumps
- Ensure advance notification from PG&E



break

Strategy 3 – Capital Improvement Program

- Capital Improvement Program (CIP) is the primary means of addressing this strategy
- Currently beginning revision of CIP
- Will present proposed CIP in spring 2019

"Implement the master plans and set priorities in the operating and capital budget process to reflect the needs identified in those plans."

Strategy 3 – CIP

CIP Priorities

- CIP Priorities informed by plans, studies, O&M experience
- The FY 20-21 CIP will continue the District's focus on infrastructure ***renewal*** vs expansion
- Prioritized according to:
  1. Safety
  2. Reliability
  3. Water Quality

Strategy 3 – CIP

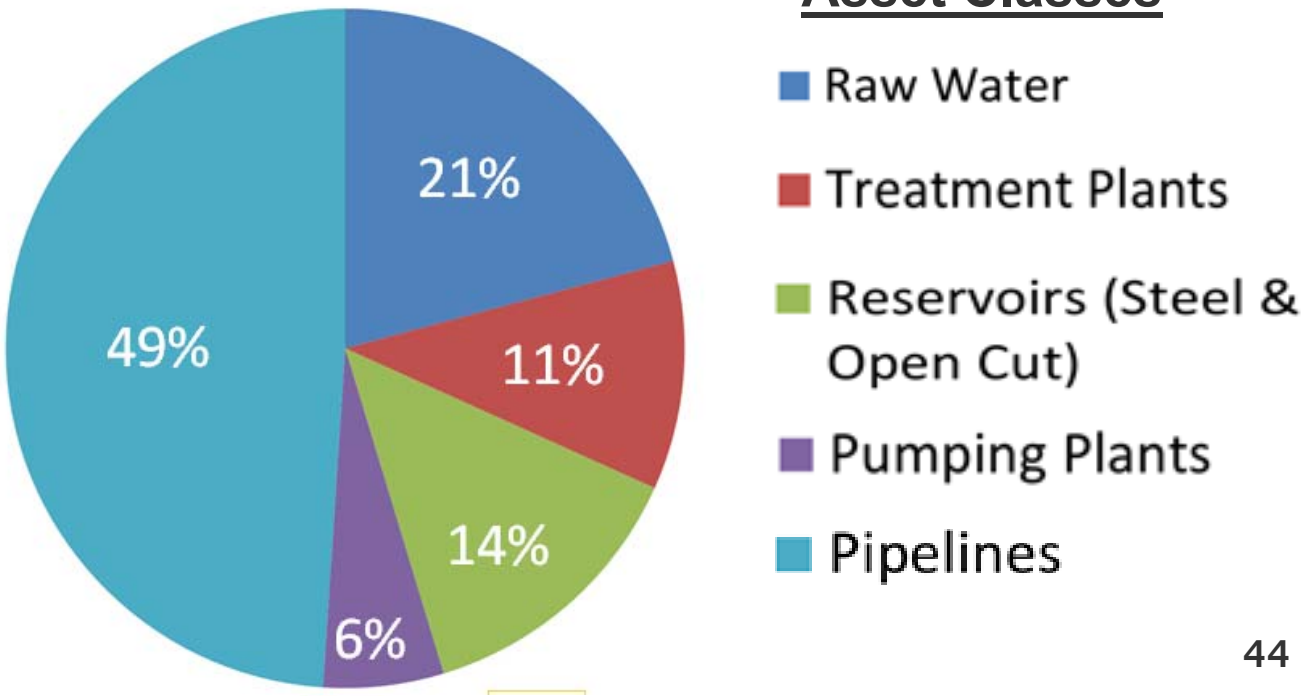
CIP Budget by Asset Class (FY18-22)

Strategy 1: Master Plans & Studies

Strategies 1 & 2 set priorities for 5 year CIP

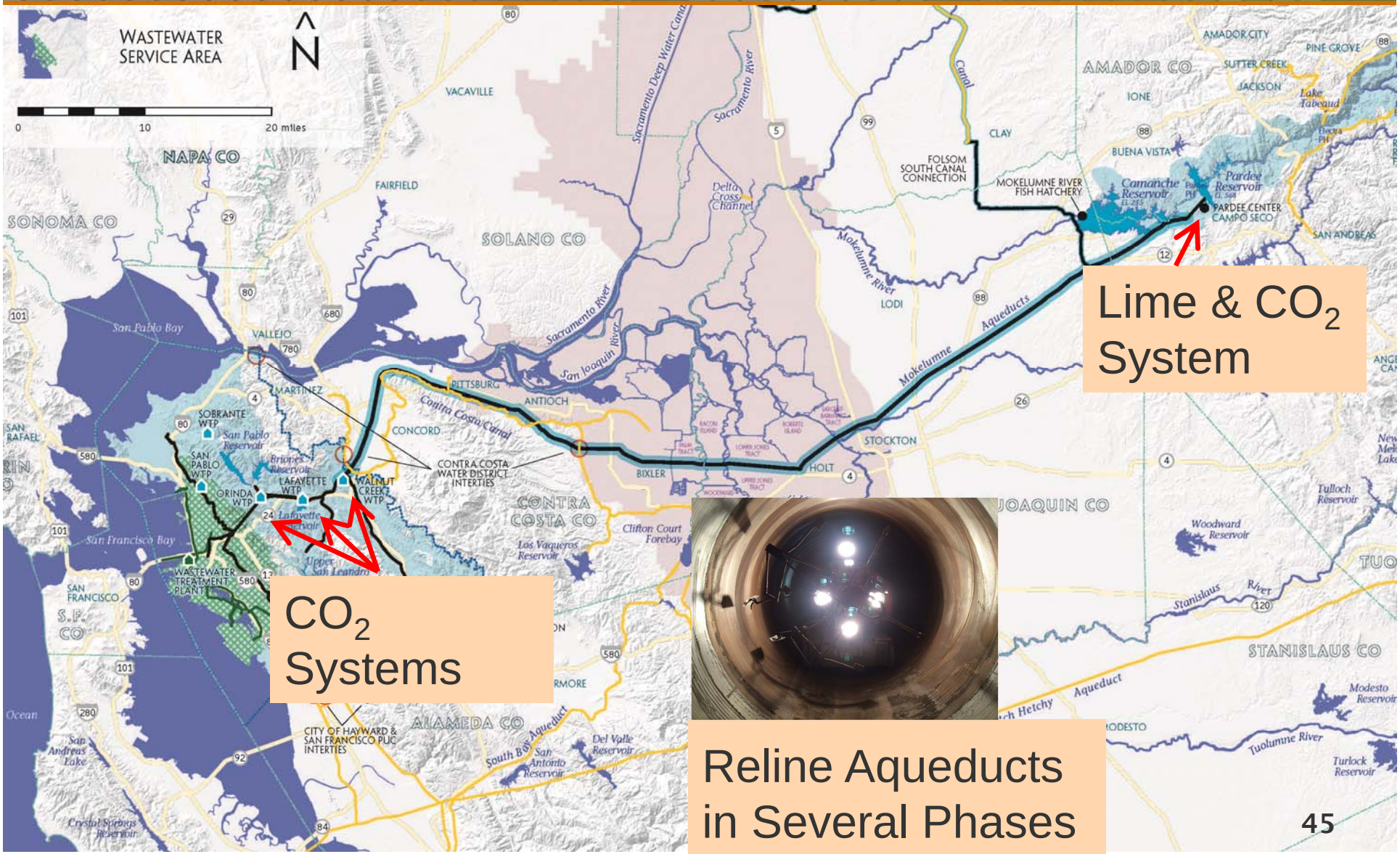
Strategy 2: Effective Maintenance

Strategy 3: 5 Year CIP



Strategy 3 – CIP

Raw Water Improvements



Strategy 3 – CIP

Water Treatment Plant Improvements Drivers

- Improve safety
- Improve reliability
  - Treatment capacity
  - Drought and disaster resilience
- Improve water quality
  - Taste and odor
  - Disinfection by-products

Strategy 3 – CIP

Highlights of Recently Constructed WTP Projects

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 Ozone Improvements (Water Quality)

Strategy 3 – CIP

Driver # 1: *Chemical Safety Improvements*

Highlights of Current (FY19) and Upcoming Work (FY20-21):

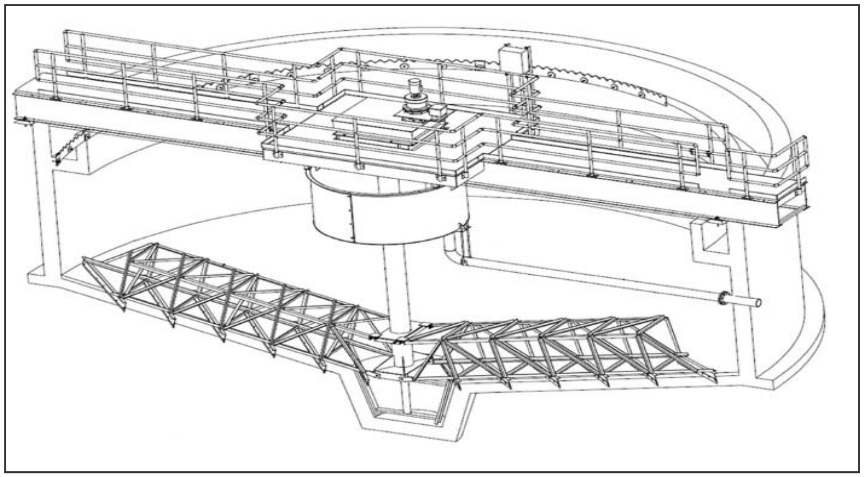
- Performed a safety audit of WTPs
- Identified list of improvements and developed scope of work for design
- Started design in FY19
- Construction scheduled for FY20-21 will include:
  - Emergency power for life safety systems
  - Improved chemical secondary containment
  - Improved monitoring for leaks and safety equipment

Strategy 3 – CIP

Driver #2: *Reliability Improvements*

Highlights of Current (FY19) and Upcoming Work (FY20-21):

- Started design in FY19 on USL WTP Maintenance and Reliability Improvements Project
- Construction of USL WTP Maintenance and Reliability Project scheduled for FY20-21 will include:
  - Improved Solids Handling
  - Reduced Water Loss at WTP (90% reduction of flows to sewer)
- Scheduled to start planning (FY20) and design (FY21) of Sobrante WTP Maintenance and Reliability Improvements Project

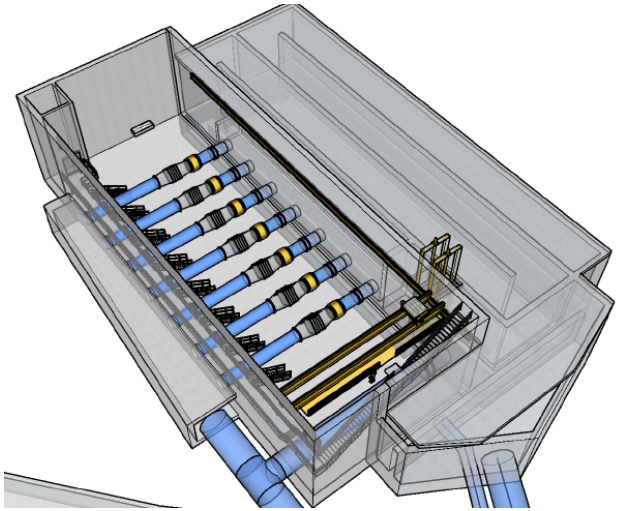


Strategy 3 – CIP

Driver #3: *Water Quality Improvements*

Highlights of Current (FY19) and Upcoming Work (FY20-21):

- Completed Inline WTP Study and started design of UV-CCB Facility in FY19
- Construction on Orinda WTP Disinfection Improvements scheduled to start in FY21 will include
  - Improve Disinfection Capability
  - Improve Reliability
  - Address Future DBP Issues
- Started design for San Pablo Reservoir Oxygenation System in FY19 to reduce
  - Taste & Odor Compounds
  - Manganese



UV Facility and Chlorine Contact Basins

UV lamps disinfect water without Disinfection by-products

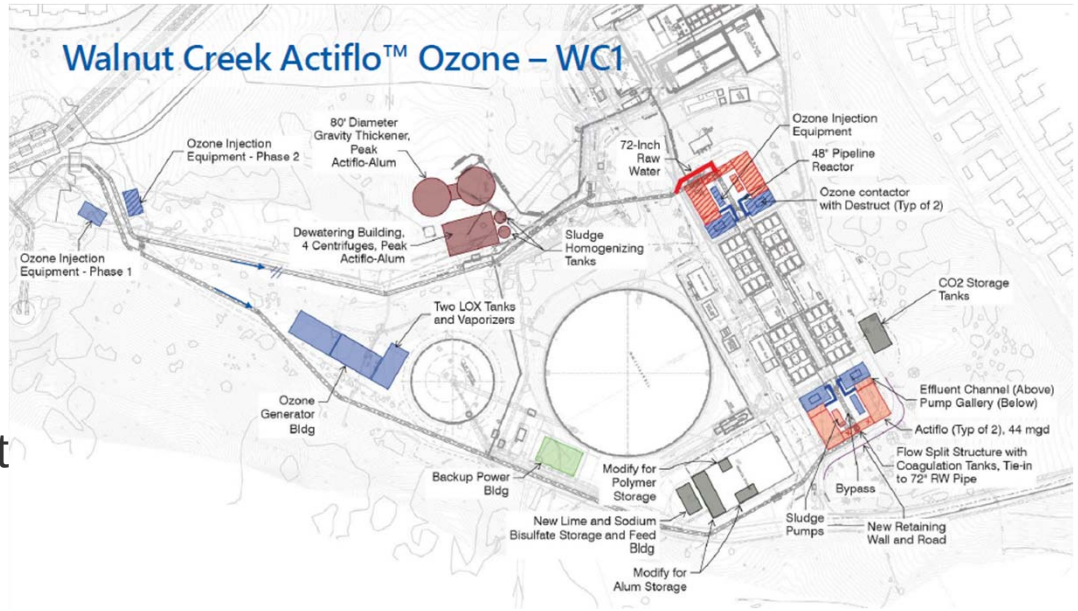
Strategy 3 – CIP

Driver #4: *Drought/Resilience (Reliability)*

Highlights of Planning Efforts to Meet Future Needs

Current (FY19) and Upcoming Work (FY20-21):

- Completed inline WTP study
- Piloted pretreatment processes at Walnut Creek WTP
- Completed predesign for Walnut Creek WTP Pretreatment
- Scheduled to start CEQA process for Walnut Creek WTP Improvements in FY20-21, followed by design starting in FY22



Adding Pretreatment to Walnut Creek will allow for greater operational flexibility and reliability

Strategy 3 – CIP

Steel Tanks Reservoirs

Projects in Construction

Reservoir	City	Ward
Mendocino	Hercules	1
Larkey	Walnut Creek	2
Acorn	Blackhawk	
Bacon	Lafayette	
Rheem	Lafayette	
Round Hill (Complete)	Alamo	
Pearl	Richmond	3
University	Oakland	4
Eden (Complete)	Castro Valley	7
Arcadian	Castro Valley	
Faria No. 1 & 2	San Ramon	

Upcoming Construction Projects

Reservoir	City	Ward
Birch	Rodeo	1
Castenada No. 1 & 2	San Ramon	2
Scenic & Scenic East	Blackhawk	
Sherwick	Oakland	3
Cull Creek	San Ramon	7
Derby	San Ramon	


Acorn

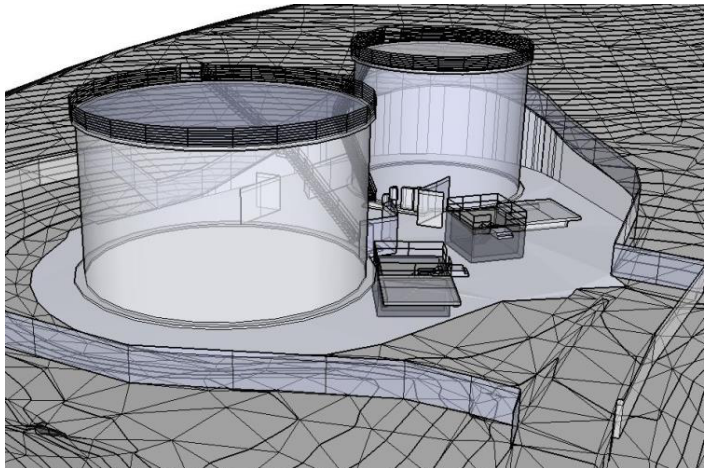

Round Hill


Eden

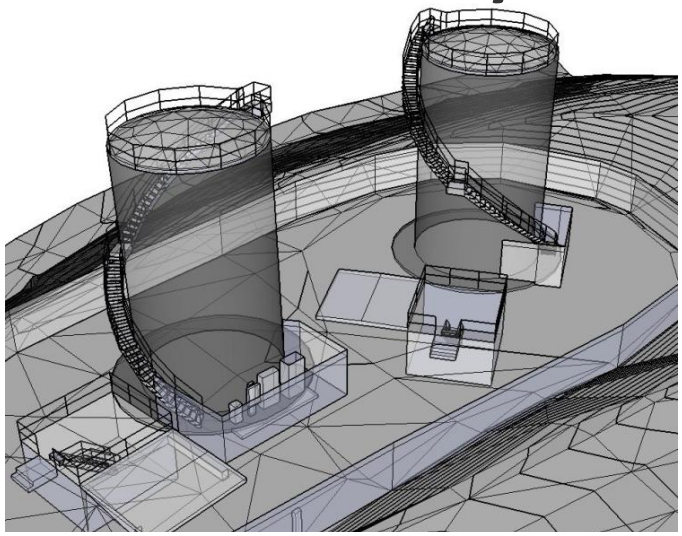
Strategy 3 – CIP

Steel Tank Reservoirs

Acorn No. 1 and No. 2 Reservoirs



University No. 1 and No. 2 Reservoirs



Strategy 3 – CIP

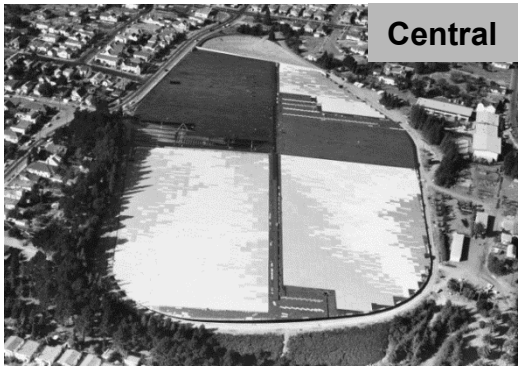
Open-Cut Reservoirs

Recent Accomplishments

- Summit Reservoir, Berkeley (Ward 4)
- South Reservoir, Castro Valley (Ward 7)

Upcoming Projects

- San Pablo Clearwell, Kensington (Ward 4)
- Leland Reservoir, Lafayette (Ward 2)
- Central Reservoir (CEQA), Oakland (Ward 6)



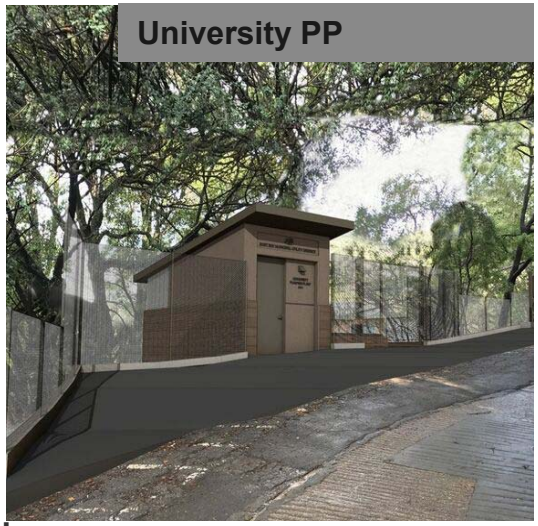
Strategy 3 – CIP

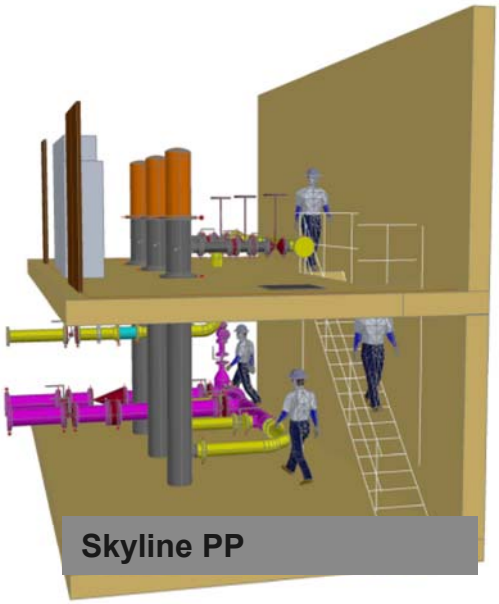
Recently Completed Pumping Plant Projects

Recent (FY18-19) Accomplishments

Upgraded 9, Demo'd 2 PPs

- Diablo Vista (Ward 2)
- Diablo (Ward 2)
- Gwin & Laguna (demo) (Ward 3)
- Shasta & Woods (Ward 4)
- Skyline (Ward 3)
- Shapiro, Rd 24, Country Club, Berryman North (demo) (Wards 1, 3, and 4)


University PP


Skyline PP


Diablo PP

Strategy 3 – CIP

Upcoming Pumping Plant Projects

Anticipated FY19 Awards

- Fire Trail & Jensen (Ward 7)
- University (Ward 4)
- Bayfair, Peralta, and May (Ward 6)
- Happy Valley, Sunnyside (Ward 2 & 3)
- Maloney, Greenridge (Ward 3)


Fay Hill

Upcoming FY20-21 Projects

- Bryant PP, Lafayette (Ward 2)
- Fay Hill, Moraga (Ward 3)
- Hill Mutual, Crest, and Ridgewood, Walnut Creek & Alamo (Ward 2)


Hill Mutual

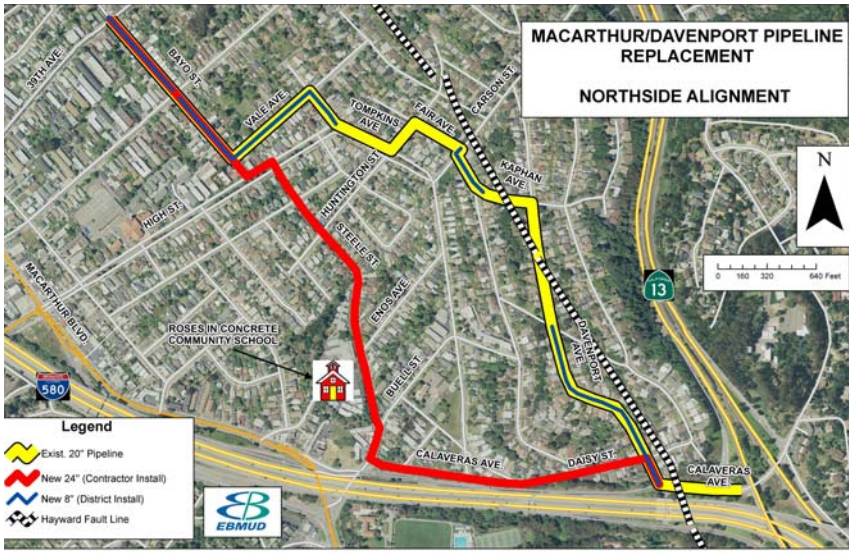
Strategy 3 – CIP

Pipeline Highlights

- Large Diameter Pipelines
- Pipeline Rebuild

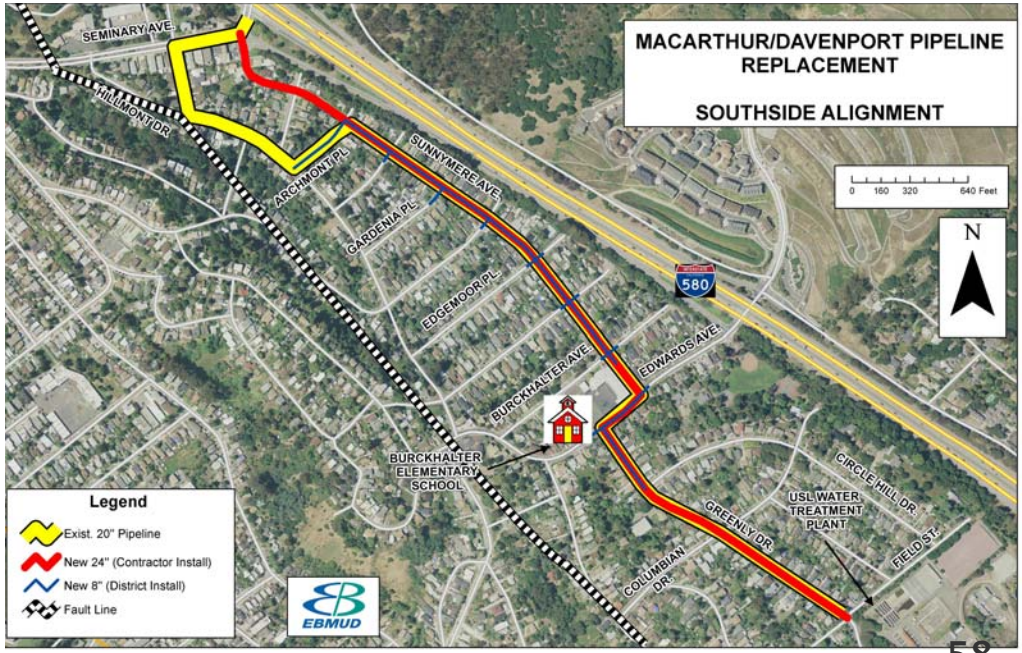
Strategy 3 – CIP

Large Diameter Pipeline: MacArthur-Davenport



MacArthur-Davenport

Example of large diameter pipeline project



Strategy 3 – CIP

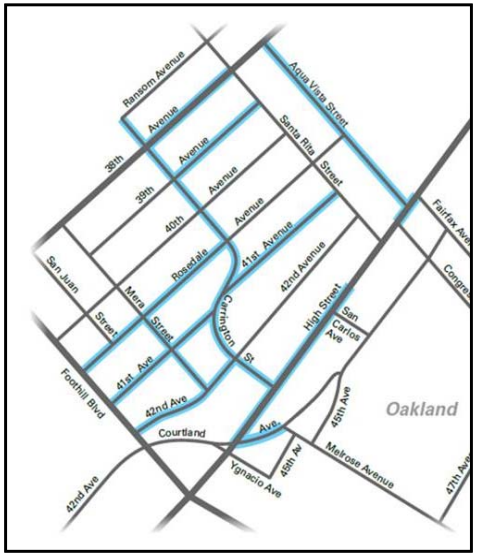
Distribution Pipeline Highlights

Pipeline REBUILD

Renew. Reinvest. Ready.

Accomplishments

- 10 mi/year → 15 mi/year
- Piloted new methods and materials
- Tested new technology
- Developed metrics reporting structure
- Documented findings
- Increased use of clustering
- Piloted different crew staffing models

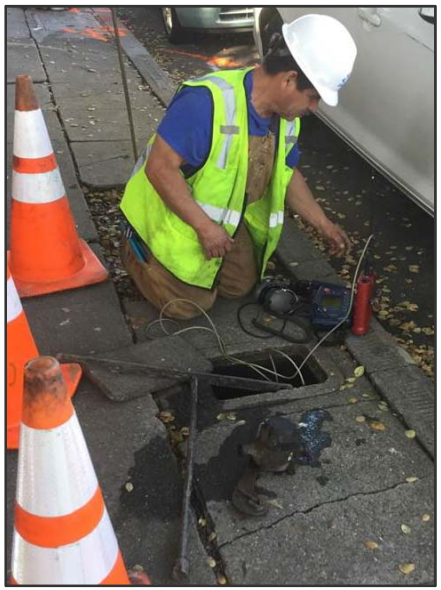


Strategy 3 – CIP

Upcoming Distribution Pipeline Work

Where Are We Headed

- 15 mi/year → 20 mi/year by FY21
- Hiring new resources
- Improving existing District facilities to handle additional needs
- Staying innovative and focused on teamwork



Strategy 3 – CIP
Wastewater Accomplishments in FY18 &19

South Interceptor: 3rd street Interceptor Rehab Phase 1

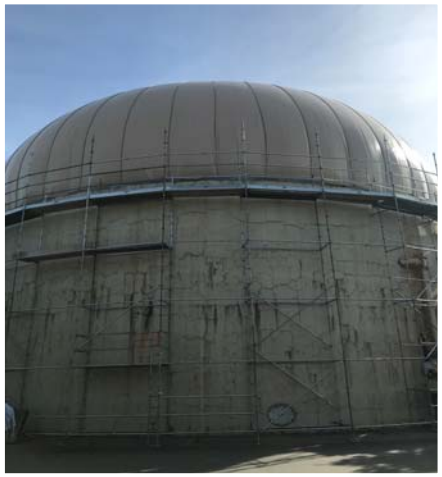
Pump Station Q Force Main Gravity Interceptor Reverse Flow

New Odor Control System at Influent Pump Station

Primary Sedimentation Tanks Rehab Phase 4

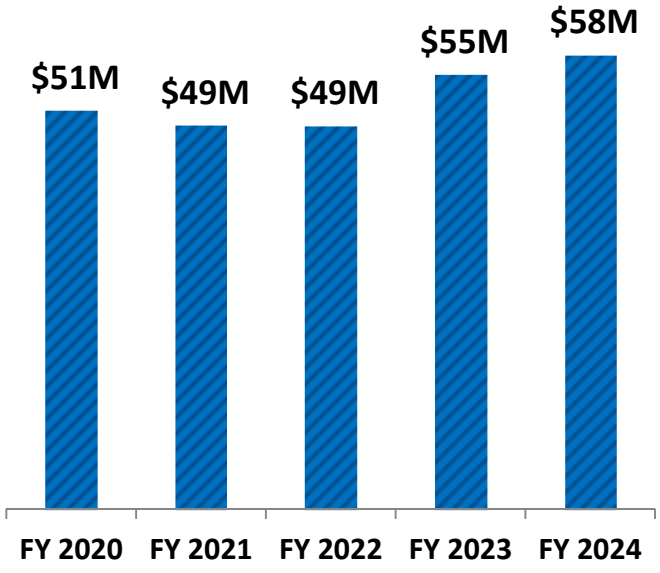
Secondary Clarifiers Rehab. Phase 1 (2 clarifiers)

Replacement of Dual Membrane Cover for Digester 2



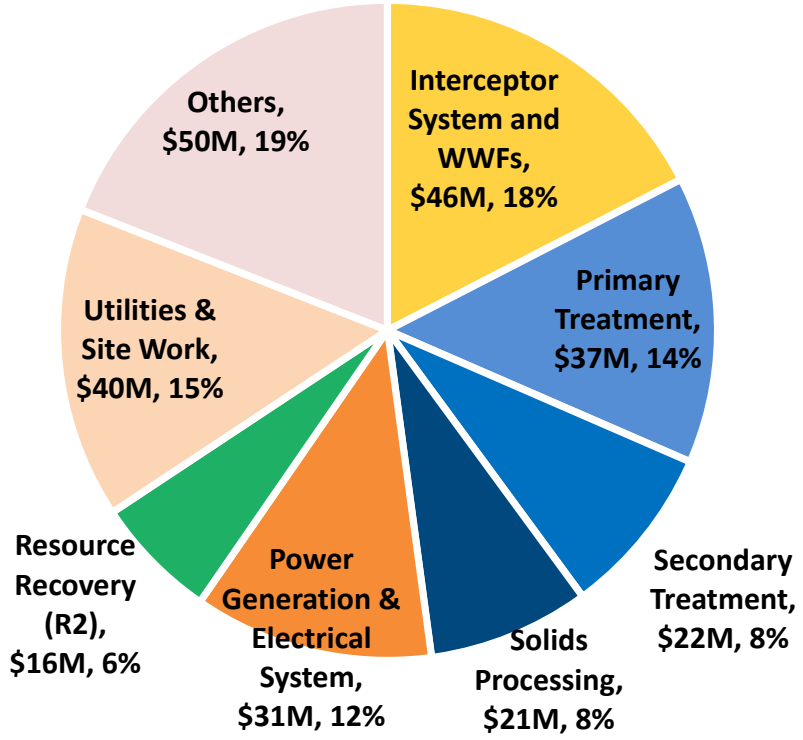
Strategy 3 – CIP
FY20–24 Wastewater CIP Outlook

Total 5-Year CIP: $262M

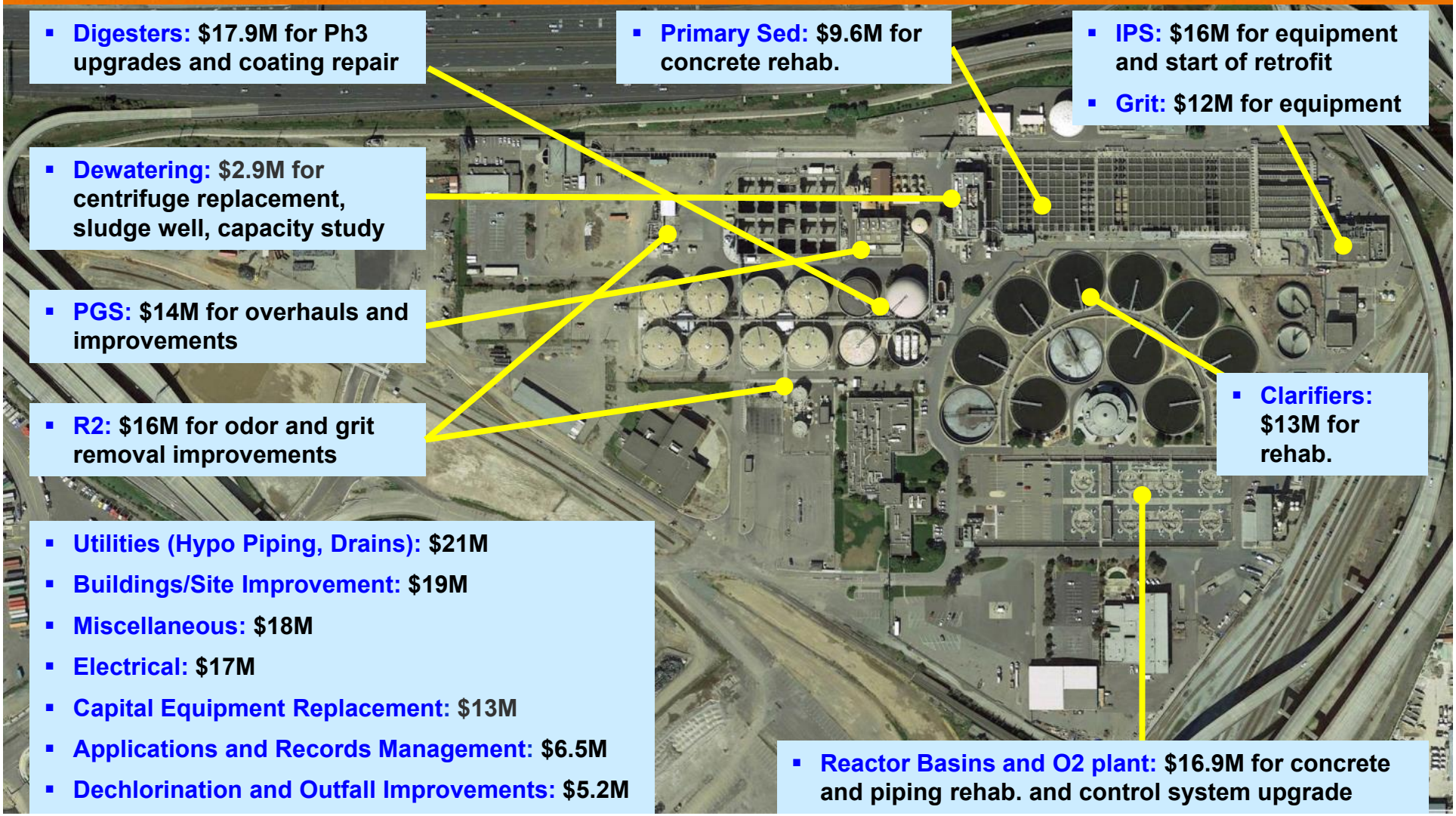


CIP Breakdown

~20% for Interceptor System; ~80% for MWWTP



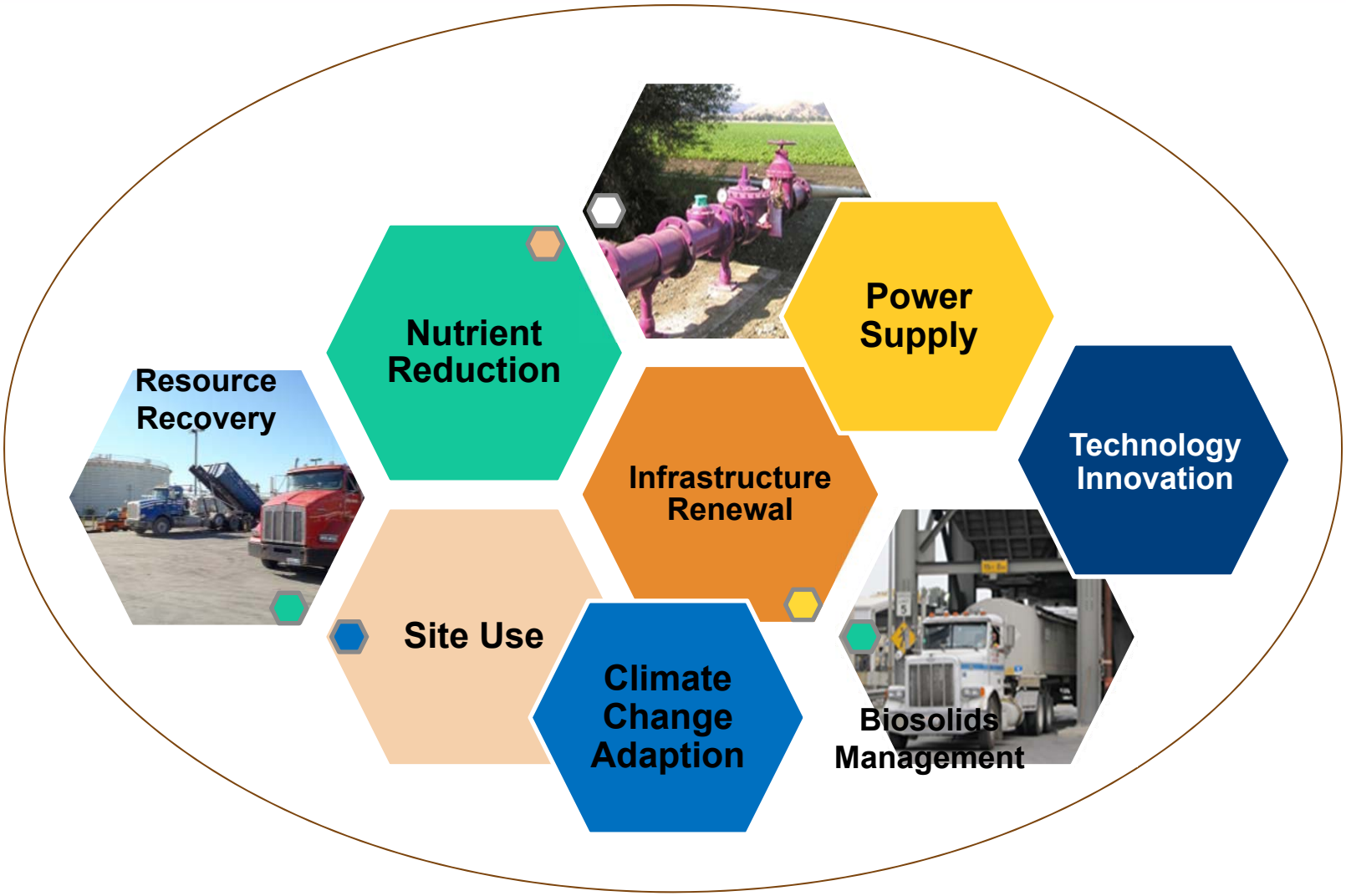
Strategy 3 – CIP
MWWTP Planned Investments



- **Digesters:** $17.9M for Ph3 upgrades and coating repair
- **Primary Sed:** $9.6M for concrete rehab.
- **IPS:** $16M for equipment and start of retrofit
- **Grit:** $12M for equipment
- **Dewatering:** $2.9M for centrifuge replacement, sludge well, capacity study
- **PGS:** $14M for overhauls and improvements
- **R2:** $16M for odor and grit removal improvements
- **Clarifiers:** $13M for rehab.
- **Utilities (Hypo Piping, Drains):** $21M
- **Buildings/Site Improvement:** $19M
- **Miscellaneous:** $18M
- **Electrical:** $17M
- **Capital Equipment Replacement:** $13M
- **Applications and Records Management:** $6.5M
- **Dechlorination and Outfall Improvements:** $5.2M
- **Reactor Basins and O2 plant:** $16.9M for concrete and piping rehab. and control system upgrade

Strategy 3 – CIP

MWWTP Master Plan Will Inform Future Investments

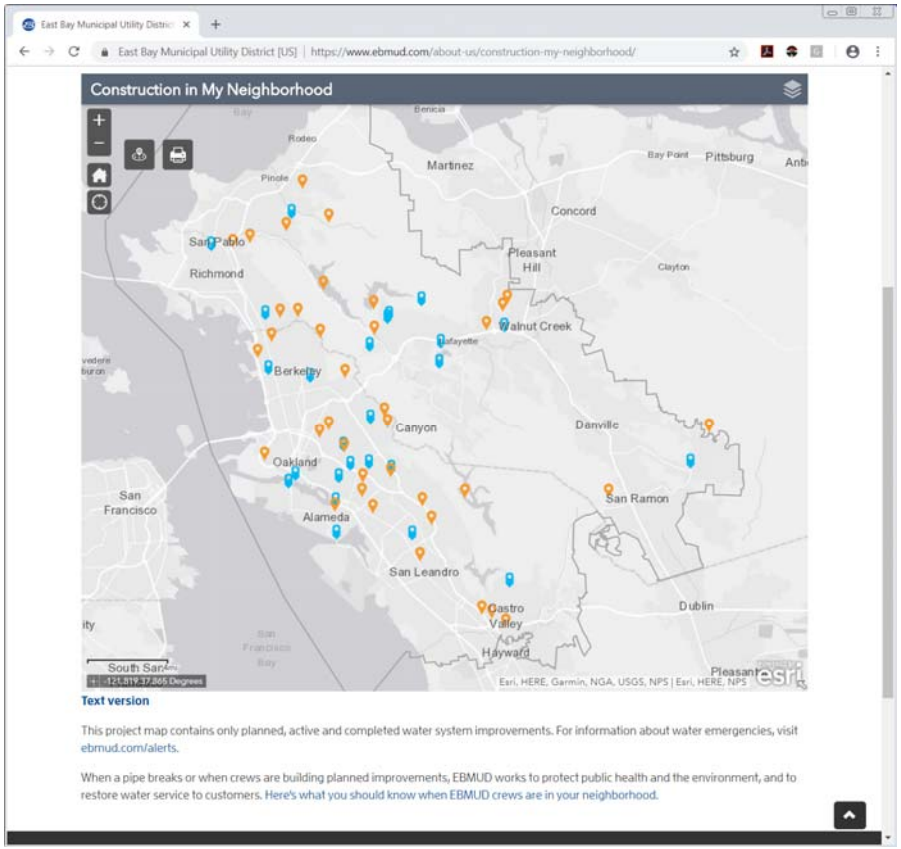


Overarching Infrastructure Issues

- Community Engagement
- Information Technology
- Macroeconomic Climate

Community Engagement

- Current methods for building collaboration
  - Project-specific outreach
  - Periodic meetings with agencies
  - Social media
- Continued future focus on
  - Enhancing agency-to-agency communications
  - Further enhancing social media presence



Information Technology:
Supporting Long-term Infrastructure Investment

Focus Areas

1. Respond to Security Threats
2. Prepare for Changing Environment/Cloud-based Computing
3. Enable Mobile Workers
4. Enhance Collaboration with Customers and Agencies

Information Technology Efforts

- Data Center Improvements Enhance Security:
  - Single Sign On Expansion
  - Network and Endpoint Protection Projects
  - Mobile Infrastructure Buildout
- Migration to Cloud Computing via refresh of major obsolescent systems
  - Geographic Information Systems (GIS)
  - Financial & Procurement (FIS)
  - Laboratory Information (LIMS)
  - Human Resources and Payroll (HRIS)
  - Asset and Work Management (WMS)

Economic Challenges

- Tariffs on key construction materials have affected prices already, future effects uncertain
- Booming construction market has impacted some types of work more than others

Summary

- Infrastructure investments have positioned EBMUD well to fulfill its mission
- Infrastructure renewal focus on
  - Continued pipeline ramp-up
  - Treatment plant investment
- CIP update starting now; proposal to Board scheduled for March 2019
- New CIP planned to be within previously projected rates