EAST BAY MUNICIPAL UTILITY DISTRICT

Research and Innovation at EBMUD

Planning Committee
August 10, 2021

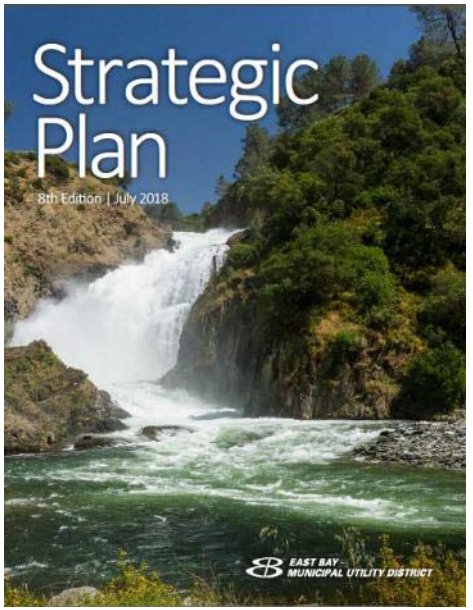
Agenda

- Innovation Practice
- District Innovation Initiatives
- Strategic Research and Innovation
- Smart Infrastructure Center
- Next Steps

Innovation Practice - Why Innovate?

Innovation is essential for utilities to:

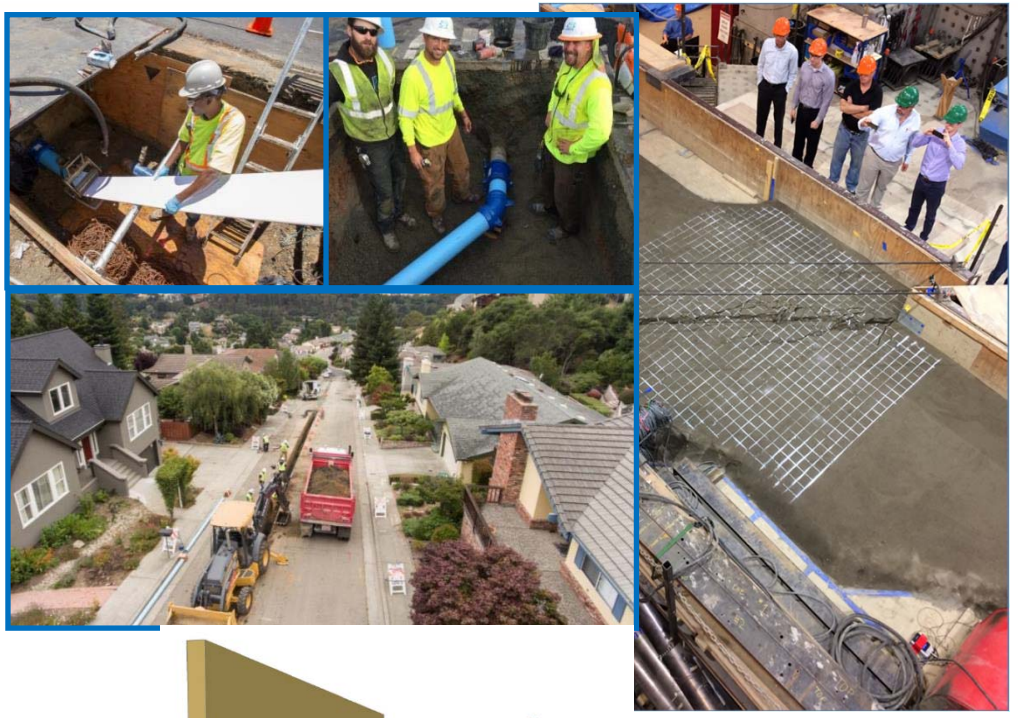
- meet increasingly stringent regulatory requirements,
- improve efficiency and effectiveness,
- reduce costs,
- meet increasing customer expectations and workforce needs, and
- attract future talent.

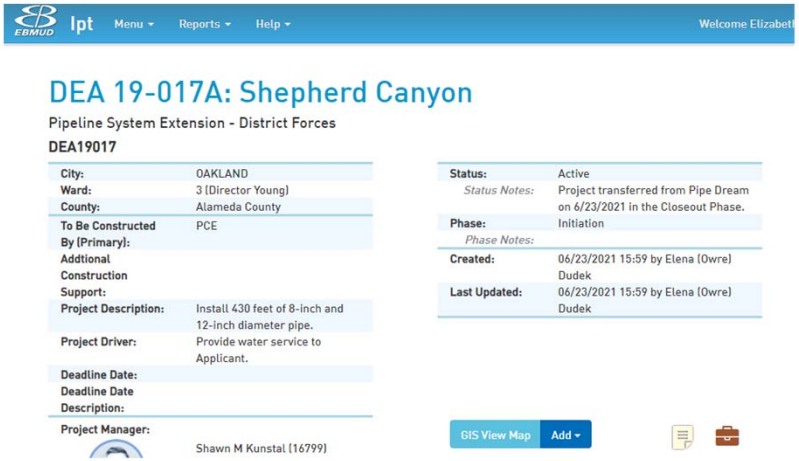


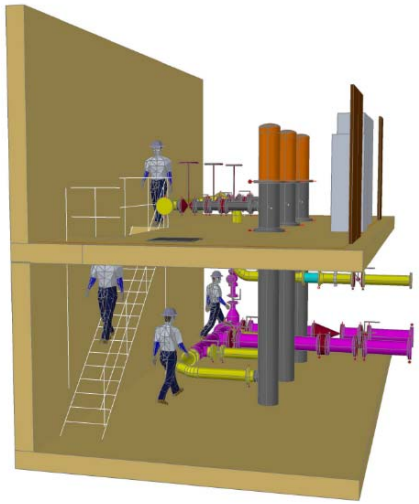
*A **structured** innovation program aligns with the District's Strategic Plan.*

Innovation in Action - Water

- Pipeline Rebuild Program
- Design Improvements
  - Building Information Modeling
  - Infrastructure Project Tracker
- Strategic Partnerships

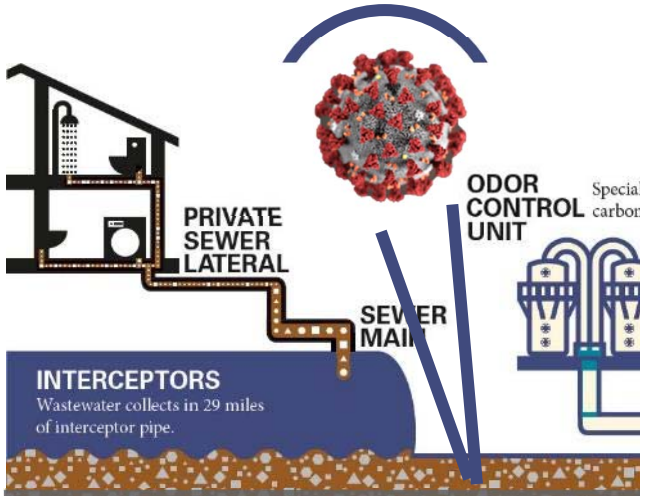






Innovation in Action - Wastewater

- Renewable Energy Program and Biogas Use
- COVID-19 Wastewater Epidemiology
- Climate Change: Carbon Sequestration via Biosolids



COVID-19 Epidemiology

Trucked Waste

Anaerobic Digesters

Onsite Cogeneration

Carbon Sequestration - Biosolids

WASTE → BIOGAS → ELECTRICITY

Strategic Research Innovation

Innovation Roadmap

Successfully developing the roadmap and implementing an innovation program requires:

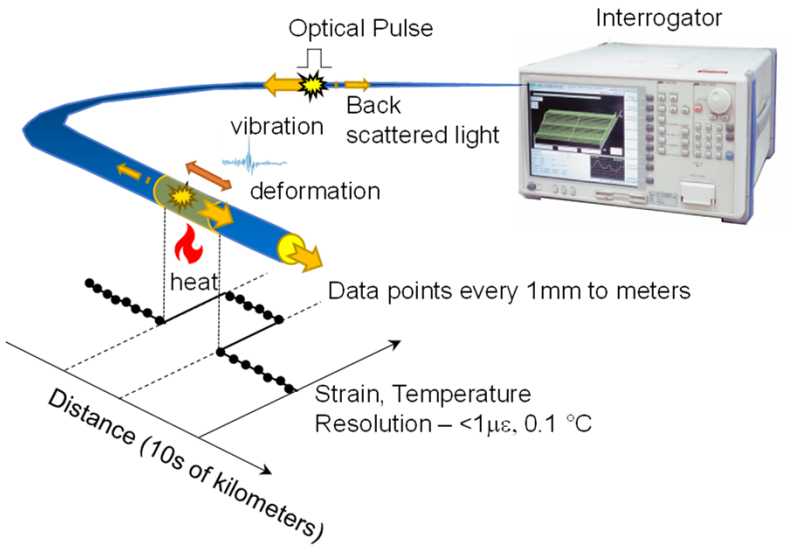
- A strong team
- Sustained senior management support
- Discipline
- A process to prioritize, evaluate, implement and manage change

Proposed District Office of Research and Innovation

- Coordinate the District's Innovation Efforts
  - Build on existing innovation efforts
- Office of Research and Innovation
  - Provide leadership and strategic direction
  - Instill a culture of innovation
  - Identify and develop Innovations
  - Prioritize funding
  - Oversee effective evaluation and deployment of new technologies and work processes

Smart Infrastructure Center: Proposal

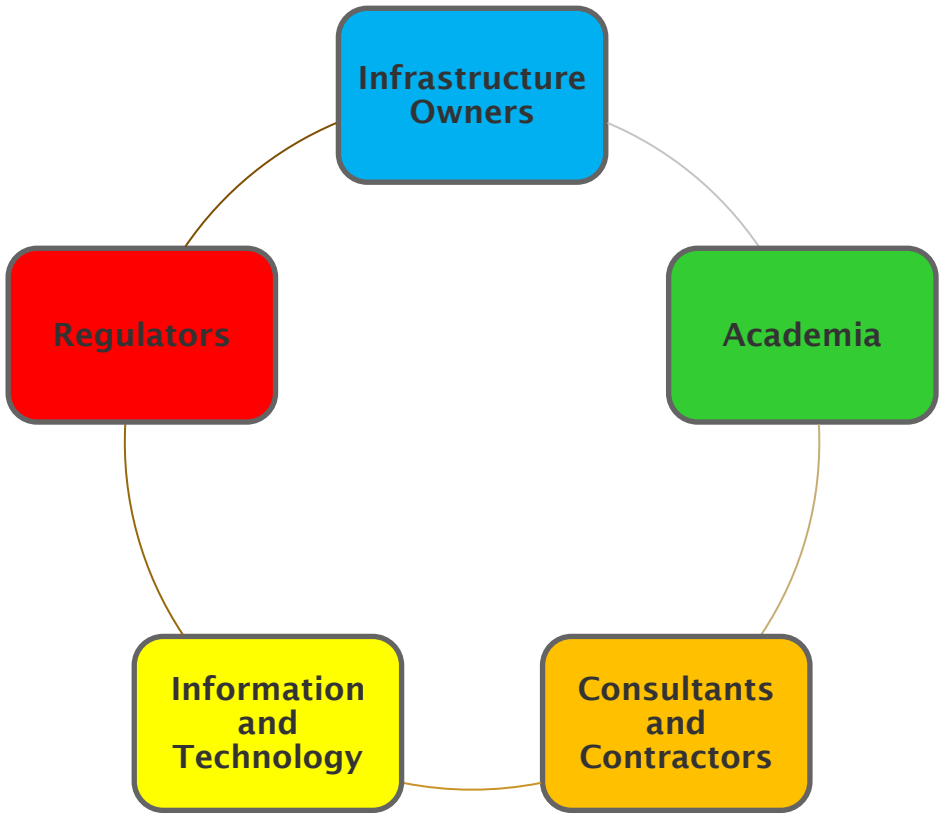
- Vision
  - Innovative solutions to realize adaptable infrastructure systems with “intelligence for life”



- Research and Innovation Hub
  - Pacific Earthquake Engineering Research
  - Berkeley Water
  - Institute of Transportation Studies
  - Lawrence Berkeley National Laboratory
  - Center for Information Technology Research in the Interest of Society
  - Global Metropolitan Studies

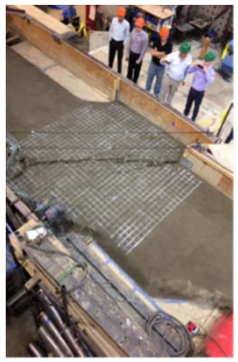
Smart Infrastructure Center: Innovation Ecosystem

- Objectives
  - Infrastructure
  - Water Supply and Natural Resources
  - Climate Change
  - Water and Wastewater Operations
  - Emergency and Community Preparedness



Smart Infrastructure Center: Opportunities

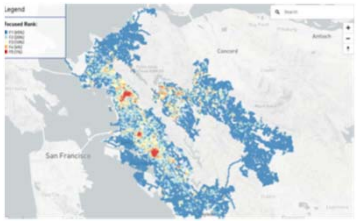
Infrastructure
- Large scale pipe testing facility
- Smart construction and maintenance



Monitoring and robotics technologies

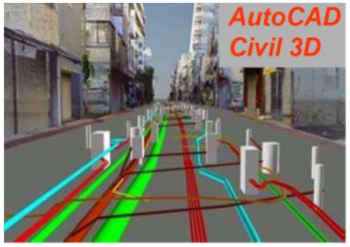
Big Data and Cyber threats

Community Resilience
- Engagement & Public trust
- Interdependent infrastructure
- Risk of cascading failures
- Resiliency planning and design



Resilient water network
- Aging physical infrastructure
- Water quality
- Energy management

Sustainability
- Water supply and natural resources
- Sea level rise, watershed
- Smart roads

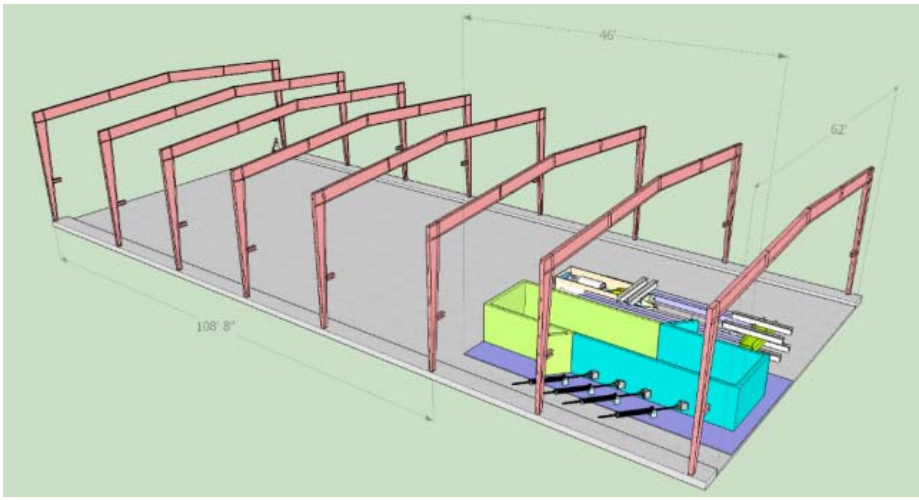


Smart Infrastructure Center: Diversity, Inclusion, Culture and Equity

- EMPOWER program
- EDGE in Tech Initiative
- Fannie Lou Hamer Black Resource Center
- Engagement with Local Community

- Undergraduate Course
  - Technology and Engineering
  - Innovation
  - Community
  - Skill training

Smart Infrastructure Center: Pipeline Testing Facility



- Large-Scale Pipeline Testing Facility
- Extension of UC Berkeley's Civil and Environmental Engineering's Structure and Geotechnical Lab
- At the Richmond Field Station Building

Smart Infrastructure: Phased Approach

Phase 1 (2021-2022) $1.5m in Utility Contributions

- Development of large-scale pipeline testing facility
- Workshops to support business plan development
- Develop mid-term and long-term business plans
- Start utility sponsored course and community outreach

Phase 2 (2022-2025) $3-4 million in Utility and UC funding

- Expansion of large-scale pipeline testing facility
- Develop smart construction process testing facility
- Execution of the mid-term and long-term business plans

Phase 3 (2024 and beyond)

- Self supporting 'innovation' center

Next Steps

- Smart Infrastructure Center Agreement
- Large-Scale Pipeline Testing Facility at UC Berkeley
- Workshops with UC Berkeley Staff & Industry Partners
- District Office of Innovation & Research

Questions and Discussion

Formalize an Innovation Team

Goal – a strong team with sustained senior management support, bringing together efforts of innovation champions throughout the organization in partnership with our stakeholders

EAST BAY MUNICIPAL UTILITY DISTRICT

East Bay Plain Subbasin

Groundwater Sustainability Plan Development

Planning Committee

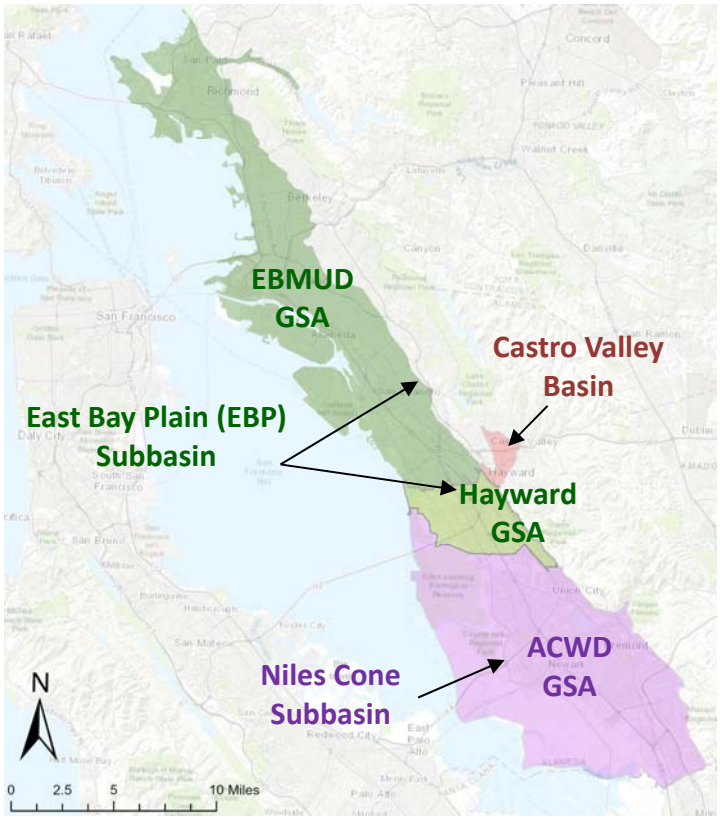
August 10, 2021

Agenda

- Background
- SGMA and Sustainability
- Future Scenario
- GSP Implementation
- Schedule Update
- Next Steps

GSP: Groundwater Sustainability Plan
SGMA: Sustainable Groundwater Management Act

Background



Phase 1
GSA Formation
Completed April 2017

Phase 2
GSA Development
By Jan 2022

Phase 3
GSA Implementation
Ongoing after GSP adoption

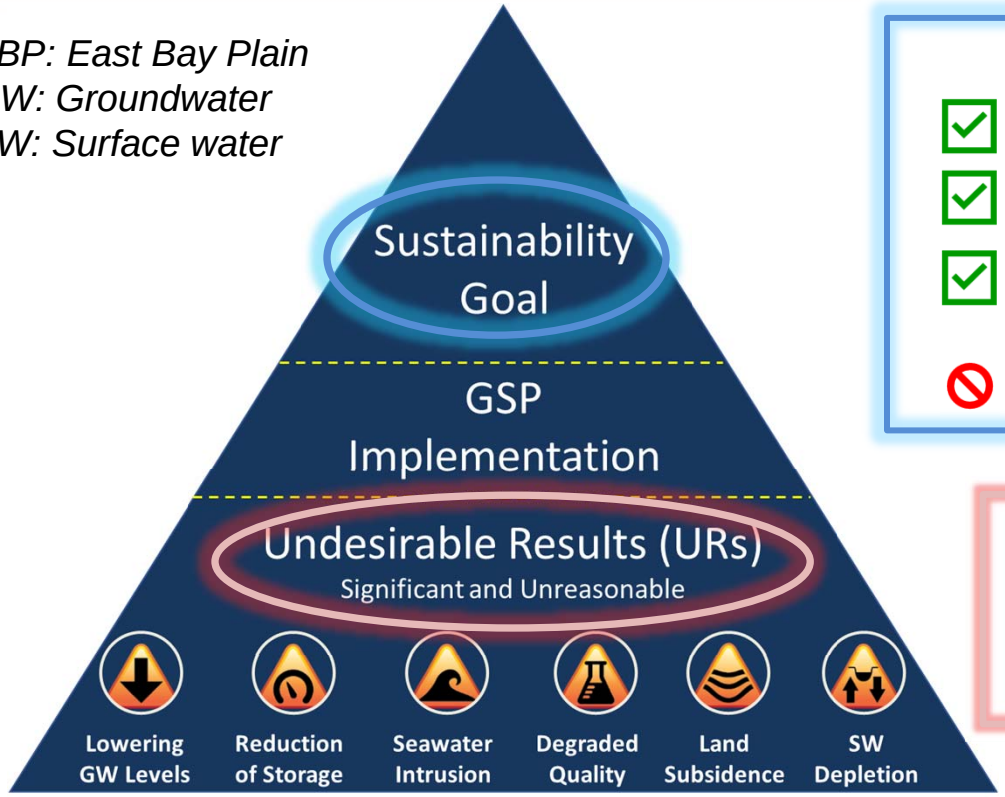
- Management Criteria
- Finalize Report
- Continued Stakeholder involvement

Key Takeaway

1 GSP development is in its final phases

SGMA and Sustainability

EBP: East Bay Plain
GW: Groundwater
SW: Surface water



Achieved in 20 years

- ☑ Manage & protect the East Bay Plain Subbasin
- ☑ Collect data to support science-based decisions
- ☑ Evaluate new opportunities for sustainable groundwater beneficial uses
- ⊘ Avoid undesirable results

Sustainable Management Criteria (SMC)

Metrics defining when URs occur and when sustainability goal is maintained/ achieved

Key Takeaways

1. SGMA requires that the GSAs consider 6 sustainability indicators in the GSPs
2. Interim SMC criteria for each indicator were developed with stakeholder input and using best available science & data with the caveat that major data gaps exist

Future Scenario

Followed DWR guidelines

2022 → **50 Years** → **2071**

Historical pumping

Consistent with land use plans

Climate change & sea level rise

Projects that are reasonable to occur

EBMUD Bayside Phase I

Hayward Emergency Wells

Key Takeaway

1. Future Bayside phases as described in EBMUD's Urban Water Management Plan will be evaluated pending data & science

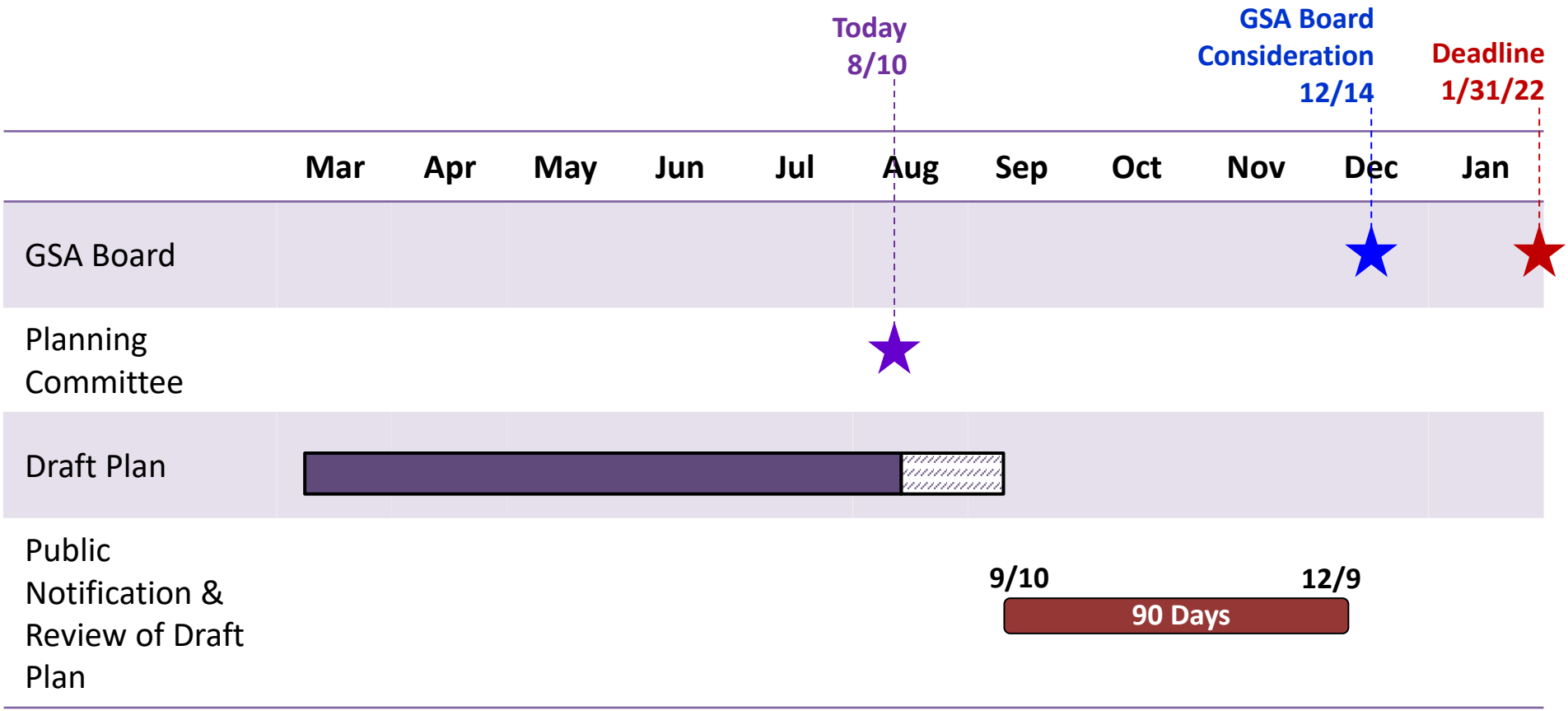
GSP Implementation

- **Annual reports and 5-year updates**
- **Monitoring**
  - Groundwater level & quality
  - Install additional monitoring wells
  - Land subsidence - extensometer
  - Data management system
- **Interconnected surface water characterization**
  - Streamflow measurements
  - Install stream gages
  - Isotopic sampling
  - Habitat surveys

Key Takeaway

1 Implementation costs are estimated at $2.5M over the next 5 years, and the first two years ($675,000) is funded by the FY 22/23 adopted budget.

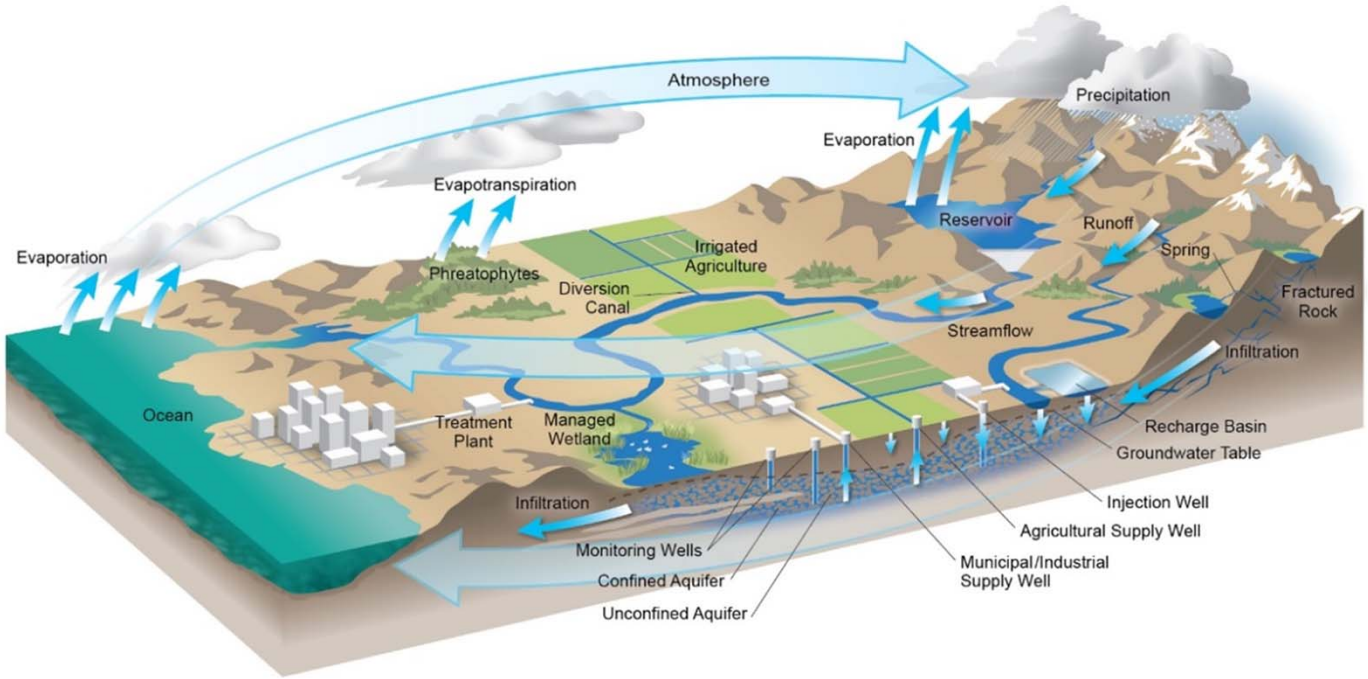
Schedule Update



Key Takeaway

1 The GSP is on track to be submitted before the January 31, 2022 regulatory deadline

Questions



The Hydrologic Cycle, DWR Water Budget BMP, 2016

EAST BAY MUNICIPAL UTILITY DISTRICT

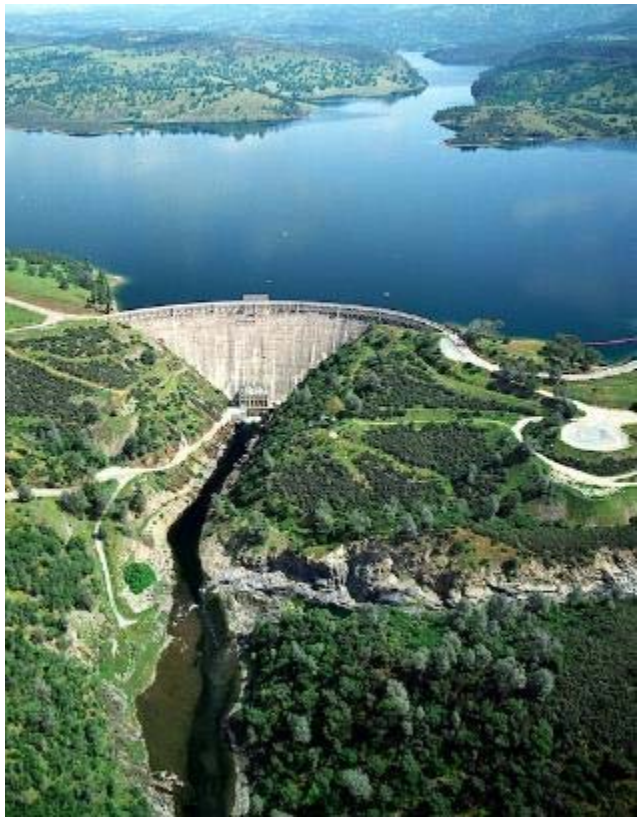
2021 Dam Safety Program Annual Report

Planning Committee

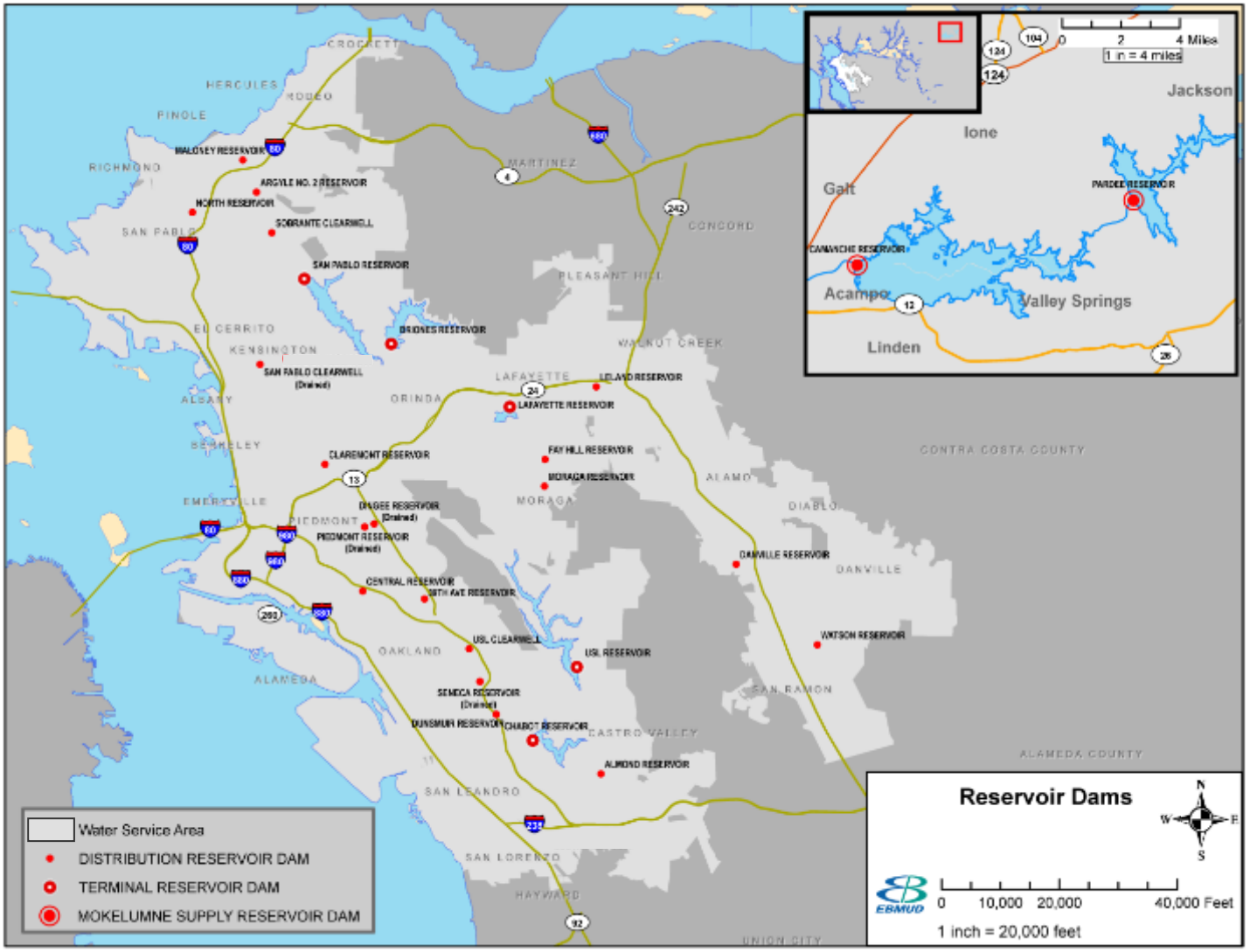
August 10, 2021

Presentation Outline

- Inspection, Surveillance and Reporting
- Emergency Response and Preparedness
- Studies and Improvements
- Upcoming Activities
- Summary and Next Steps



District Dams



Inspection, Surveillance & Reporting

- Monthly inspections of all dams
- DSOD annual inspections & surveillance reports:
  - Pardee/Camanche
  - Terminal & Open Cut
- FERC annual inspections, surveillance reports & plans for Pardee and Camanche

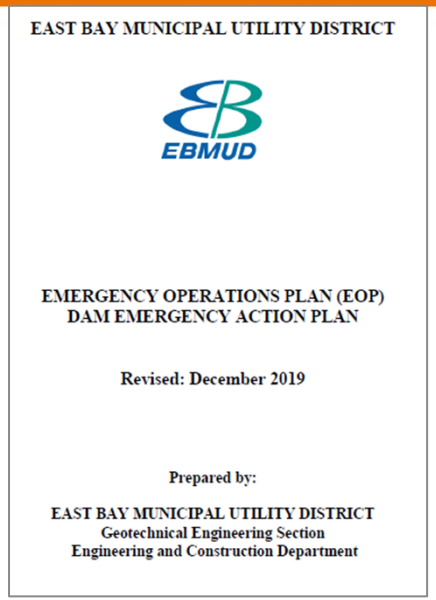

Pardee Dam

All District dams are considered safe for continued operations


Camanche Dam

Emergency Response & Preparedness

- Policy 7.03 requires an active Emergency Preparedness Program including an Emergency Operations Plan
- Dam-specific Emergency Action Plans
- Regulatory oversight by CalOES and DSOD. Additional FERC oversight for Pardee and Camanche
- Earthquake response:
  - Engineers perform damage assessments and develop recommendations
  - Trained inspectors deployed and results are reviewed by dam safety engineers
  - The District's EOP would be activated for response to a dam emergency


EAST BAY MUNICIPAL UTILITY DISTRICT

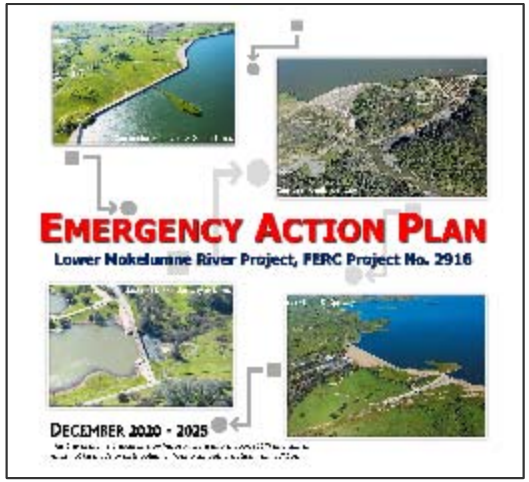
EBMUD

EMERGENCY OPERATIONS PLAN (EOP)
DAM EMERGENCY ACTION PLAN

Revised: December 2019

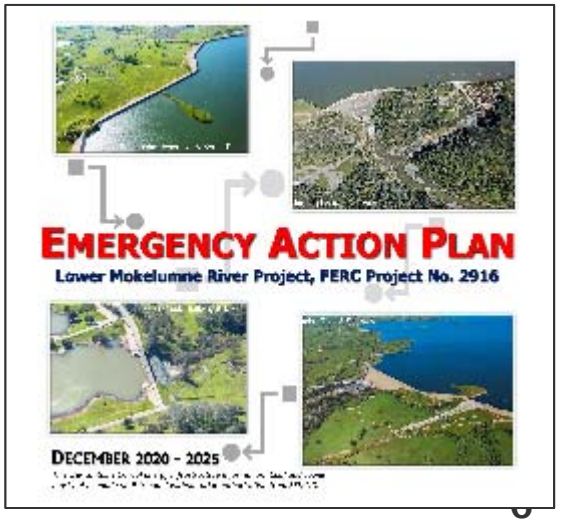
Prepared by:

EAST BAY MUNICIPAL UTILITY DISTRICT
Geotechnical Engineering Section
Engineering and Construction Department

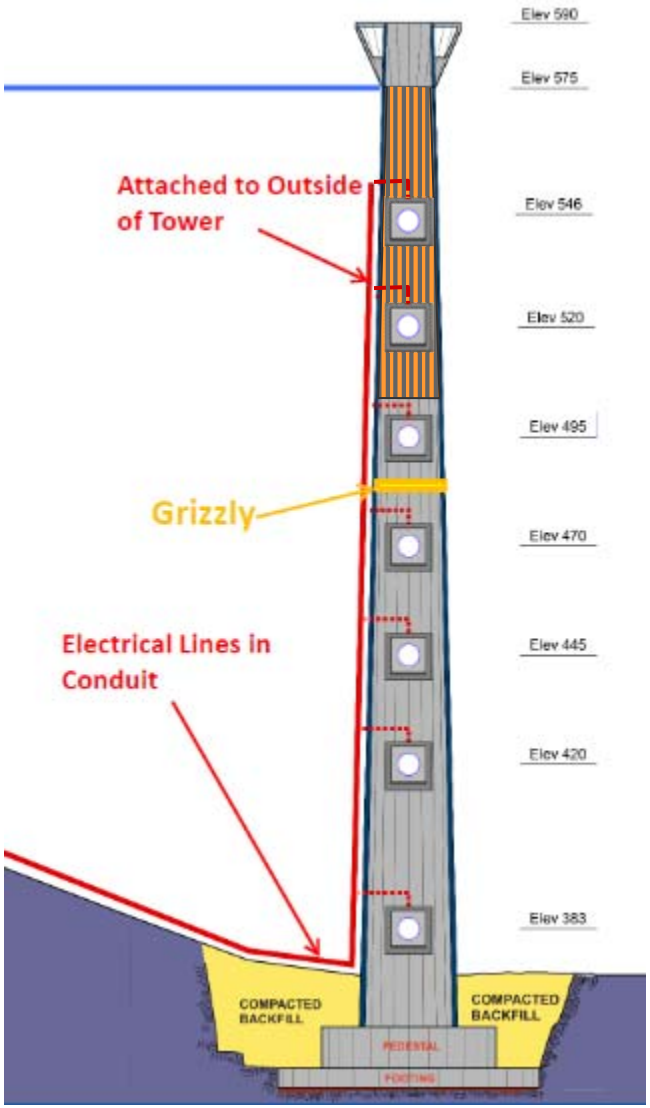


Emergency Response & Preparedness - Annual FERC Events

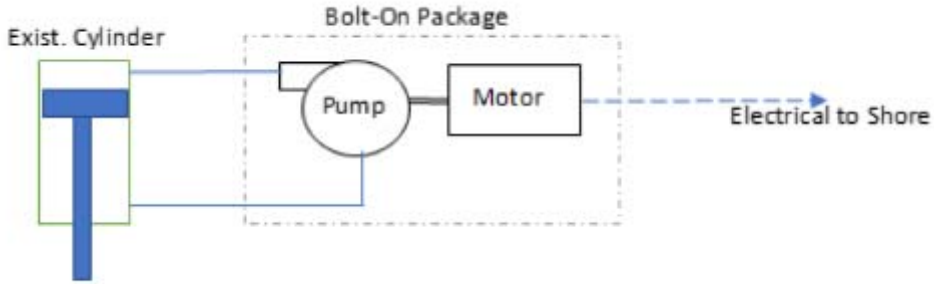
- Annual Notification Drill on October 21, 2020
  - Conducted by videoconference
  - All EAP holders
  - Test communication, share information, build relationships, provide training, and evaluate protocols
- Annual Seminar on December 2, 2020
  - Conducted by webinar
  - Jointly with JVID, CPUD, and PG&E, with over 80 attendees from USACOE, NWS, DWR, and emergency service agencies
  - Improve understanding of response plans, identify areas of improvement, strengthen relationships
- Completed FERC EAP 5-year reprint in March 2021



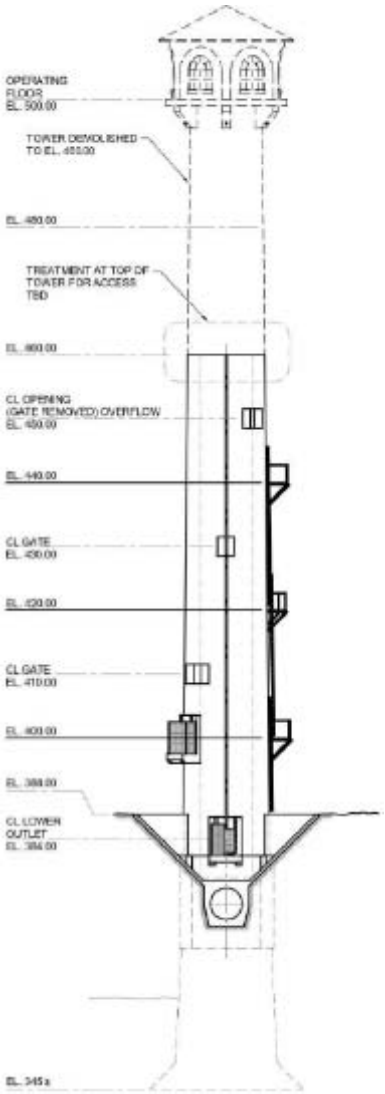
Studies and Improvements
Briones Tower Modifications



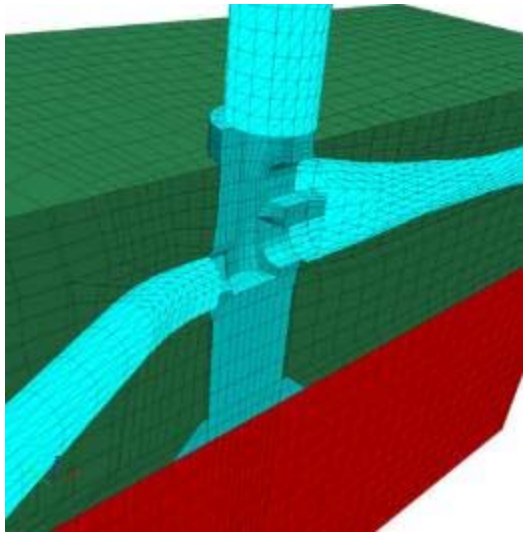
- Reinforcement to be added to top of tower
- Onshore operating system to improve response time
- 90% design submittal comments from DSOD in July
- Construction scheduled for 2022



Studies and Improvements
Lafayette Tower Modifications

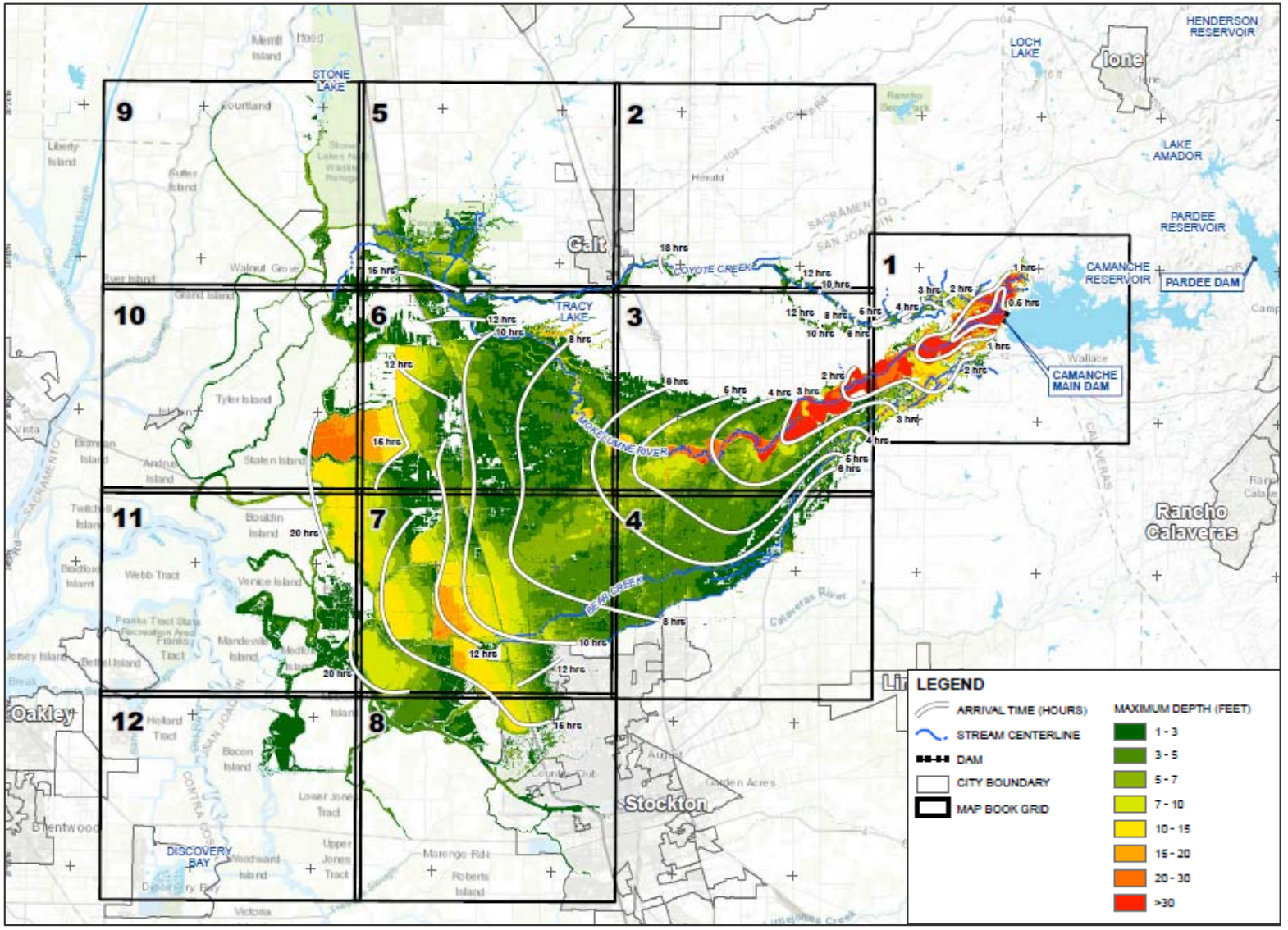


- Additional evaluations of the tower and conduit performed to ensure seismic safety and post earthquake performance
- Revised report submitted to DSOD in April 2021
- Upon DSOD approval, the District will complete CEQA, Permitting and Public Outreach
- Construction scheduled for 2023



Studies and Improvements

Inundation Mapping



Studies and Improvements
Camanche Relief Well Cleaning

- Wells relieve water pressure in foundation at downstream toe of dam
- Performed video inspections of the interior of nine relief wells at Camanche Dam
- Mechanical removal of organics and sediments

Upcoming Activities
Camanche Spillway Assessment

- Joint inspection performed in February 2021
- Underdrain cleaning, video inspection, and coring through concrete slab to inspect is planned pending CDFW permit approval

Upcoming Activities
Terminal Spillway Condition Assessments

- April 2020 and 2021 – Received comments on Terminal Reservoir Spillway Condition Assessment Reports from DSOD
- Cleaning stilling basins and supplementary inspection of Terminal Reservoir Spillways in response to DSOD comments planned for Fall 2021


San Pablo Spillway


Briones Spillway

Innovation Partnerships

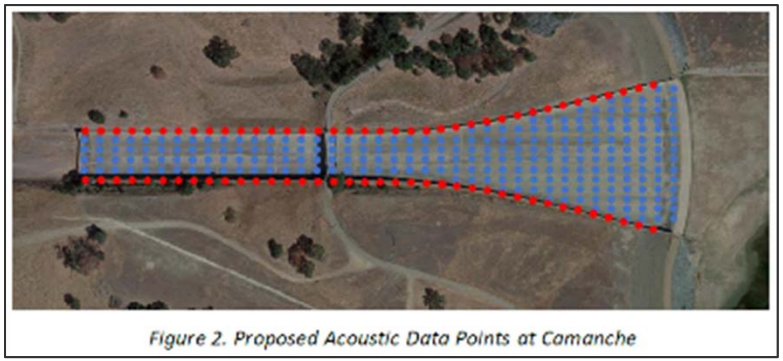
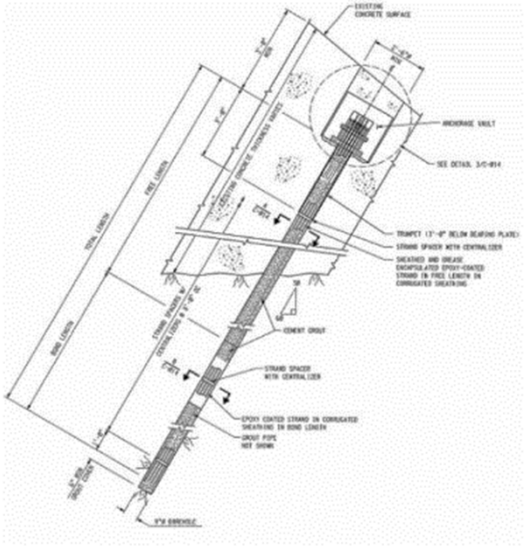


Figure 2. Proposed Acoustic Data Points at Camanche

UAV-Based Spillway Assessments

- Pilot to assess spillway defects at USL and Camanche spillways using acoustic, thermal, & optical data
- Developed by Niricson Software Inc., in partnership with Gonzaga University

Fall 2021 & Summer 2022



Performance-Based Tests of Spillway Anchors

- Non-invasive method to estimate the anchor's tension based on its vibration behavior
- Developed by Harvey Mudd College, in partnership with Engineering Innovation, LLC
- Test to be performed at Pardee South Spillway in September 2021

Upcoming Activities
Dam Safety Program Audit

- FERC-required 5-year independent audit of Pardee and Camanche Dams
  - Review documents, perform site inspections, and interview staff
  - Identify improvements, evaluate performance and report on findings and recommendations
  - Findings will be integrated into the Dam Safety Program

Summary and Next Steps

- **Dams safe for continued operations**
- Plan for FY22:
  - Complete Briones Tower construction & Lafayette Tower design
  - Continue spillway investigations and detailed assessments
  - Complete Dam Safety Program Audit
- Next report to the Board – August 2022

EAST BAY MUNICIPAL UTILITY DISTRICT

Dump Truck Services (FM&O)

Planning Committee

August 10, 2021

Agenda

- Background
- FY21 cost drivers
- Assumptions for FY22
- Contract Equity Program (CEP) data
- Next steps

Background
Dump Truck Functions

- Off-haul from job site
  - Asphalt to recycler
  - Trench soils to District-owned storage sites or permanent disposal
- Deliver to job site
  - Rock backfill
  - Asphalt

Background
Factors Driving FM&O Use

- Planned/unplanned leave
- Vacancies
- Construction activity
- Specialized equipment
- Haul route/length

Background
FM&O Contracts

Costs vary from $112/hour to $143/hour based on type of truck

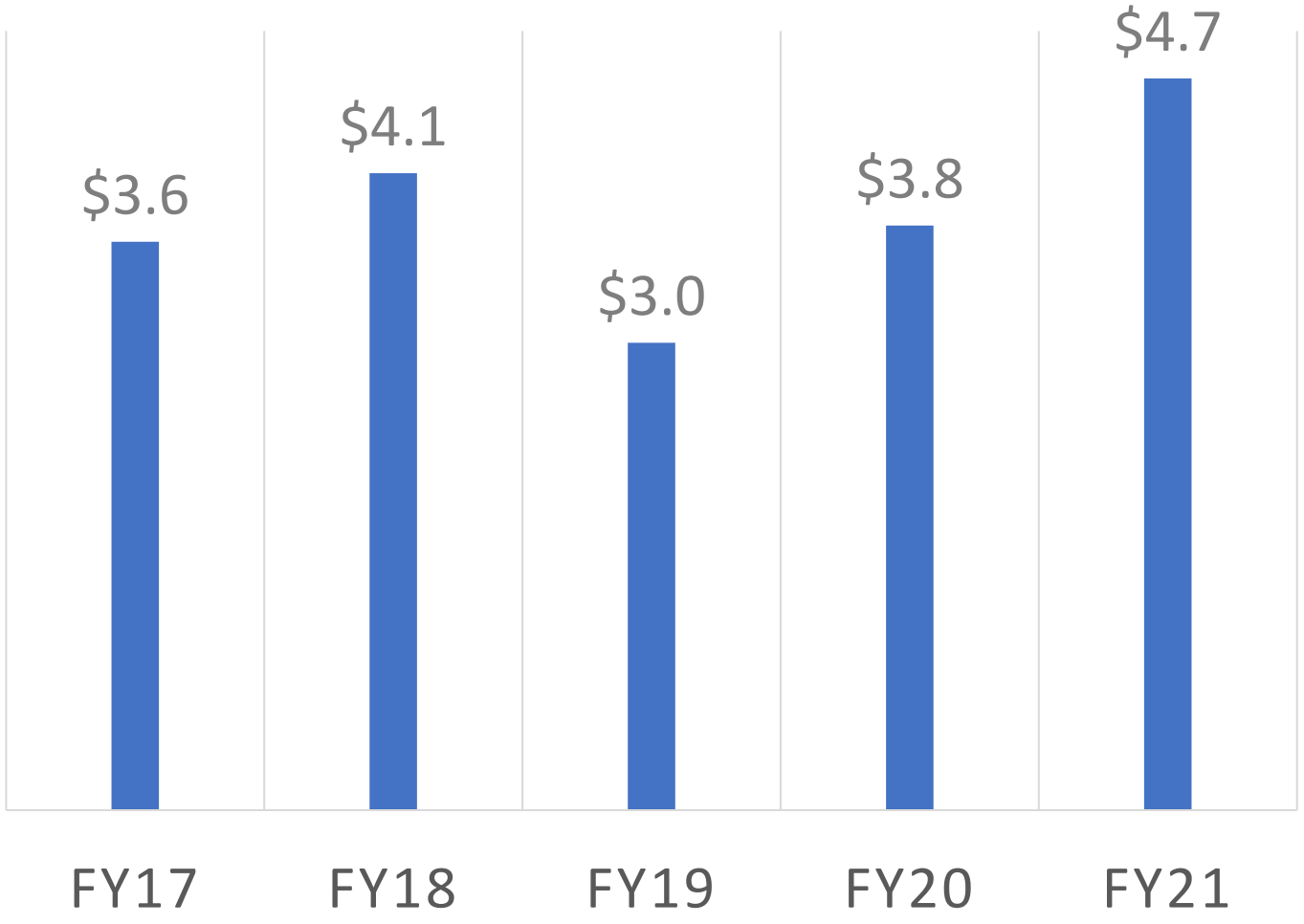
- Travel to/from site not directly billed to District
- Hourly rates assume 2-hour minimum

Historical Use/Pipe Mileage Installed

Fiscal Year	Pipe Installed* (miles)	Hours FM&O/mile
FY14	10.7	1,223
FY15	11.5	1,660
FY16	13.0	1,582
FY17	15.6	1,603
FY18	15.0	1,742
FY19	17.2	967
FY20	17.6	1,123
FY21	23.2	897

* Does not include applicant work

FM&O Spending (millions)



FY21 Cost Drivers

- COVID-19 Impacts
  - Field recruitment suspended
  - Additional leave granted/mandated
  - 9,500 District staff hours unavailable and required $1.1 million FM&O costs to offset
- Applicant work remains high

Assumptions for FY22

- Applicant surge Q1 of FY22 due to reduced SCCs
- Vacancies get filled
- Pipe Rebuild mileage of 20 miles
- Inflation of 2.5%

CEP Data Participation (FY17-FY21)

Category	Participation
Ethnic Minority	50%
White Female	5%
Small Business Enterprise	56%
Local Business Enterprise	84%

Next Steps

- Board to consider $3.7 million amendments and extend the agreement terms for one additional year for FM&O dump truck services