



Subsidence & Golden Mussel Briefing Central Coast Water Authority

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Topic

Subsidence

Subsidence – What we know now

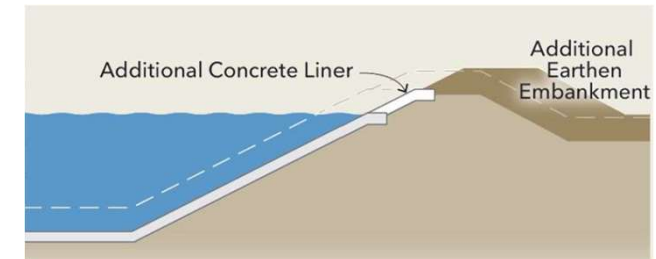
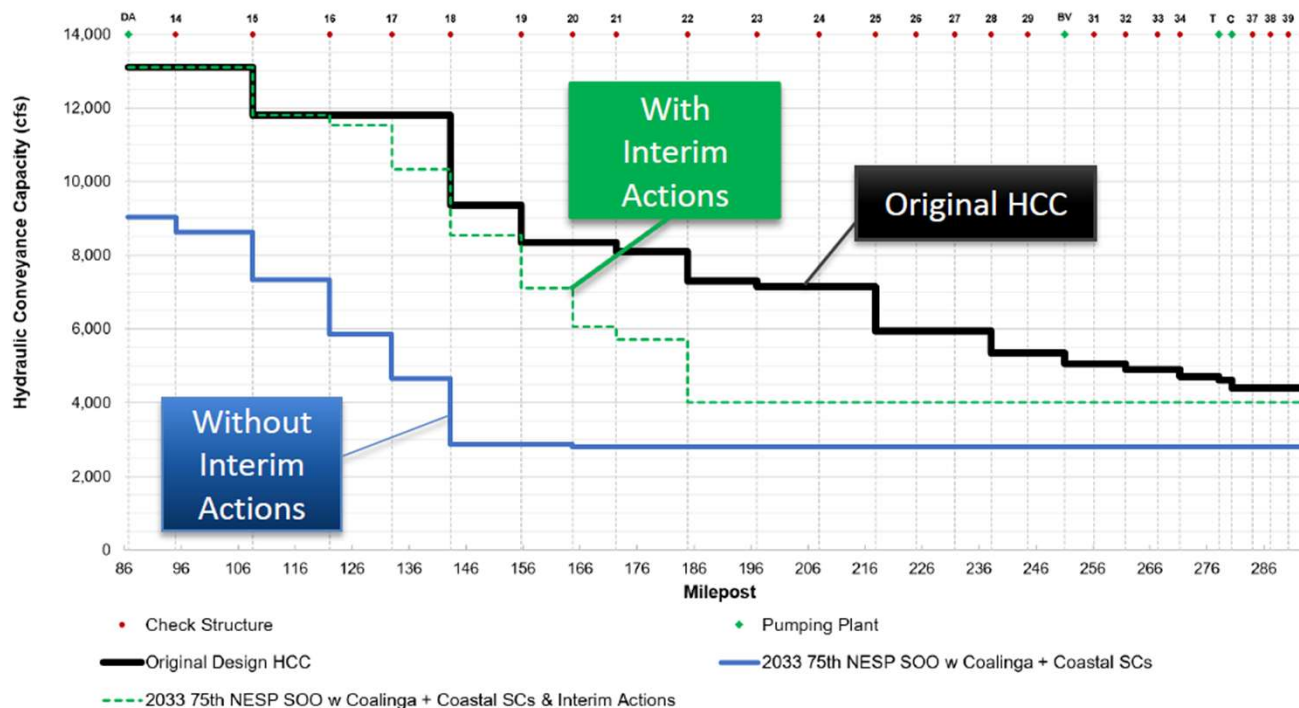
Sinking of land caused primarily by over-pumping groundwater and natural gas & oil has reduced aqueduct flow capacity in areas

- Currently models are indicating an approximate 3% reduction in Table A deliveries
- Higher risks due to reduced freeboard
 - Embankment breach
 - Seepage
- \$10 million (M) to \$20M in increased power cost
 - Lost operational flexibility
 - Increased pumping duration



Subsidence – Interim Mitigation Actions

- Interim actions prevent major reductions should additional subsidence occur
- Below plot simulates 0.6 feet additional subsidence at Check 17 from 2023 conditions



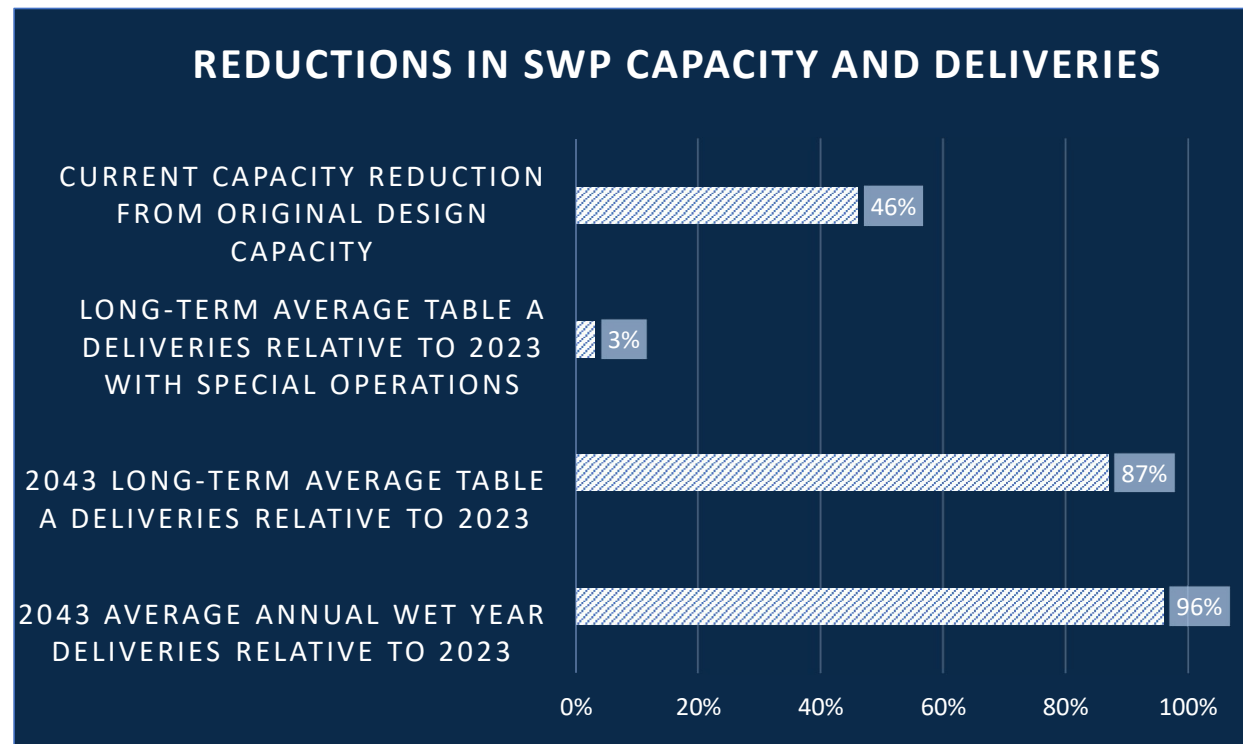
Subsidence – Interim Mitigation Actions

- **The JUF Subsidence Repairs**
 1. Check 17 Gates notice to begin work issued 8/21/2026 (\$1.6M)
 2. Pool 17 & 18 construction planned to begin in 1st quarter of 2027 (\$17M)
 3. Pool 20 & 21 construction planned to begin in January 2028 (\$21.4M)
- **Coastal Branch proportion of cost to be based on estimate of SWP share of \$22M**
- **SWP Aqueduct Only Repairs**
 - Pool 24 planned to begin construction in 2028 (\$27M)
 - Pool 31 planned to begin construction in 2031, if implemented (\$15.2M)

Subsidence – Forecasted Impacts



- Original overbuild of the canal and operational changes have buffered the effects of historical subsidence on water delivery capability.
- The 75% Level of Concern in the DCR shows a study decline in conveyance capacity.
- No additional freeboard remains to buffer effects of subsidence.
- Special operations can no longer buffer effects of subsidence.
- Conveyance capacity and loss of diversion capability at key locations by 2043 are a possibility.



Subsidence – Water Contractor Coordination

Policy and Technical Committees

- Develop a water agency-preferred approach, including major project features, planning-level cost range, and potential phasing.
- Develop a term-sheet-level agreement on the principles governing phasing triggers and cost strategy.
- Technical committee will ensure all parties have firm understanding of past and forecasted rate of subsidence, model assumptions, and alternative trade-offs and benefits

Key developments

- Restoring design freeboard to address past subsidence influences cost more than improvements to address forecasted future subsidence.
- You do not need to restore the original WSE to achieve the design conveyance capacity because of subsidence. This reduces the cost since less improvements are needed.
- DWR and Reclamation recommend that freeboard be calculated using DWR/Reclamation's criteria and a detailed risk assessment be performed for deviations in the pool-by-pool design.

Long-term Rehabilitation – Water Contractor-Developed Approach

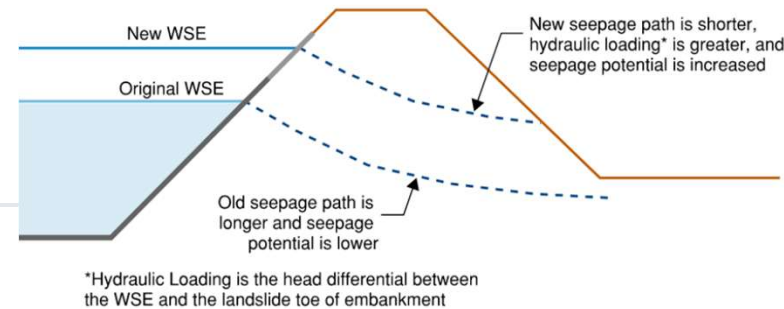


- **Future No Action Baseline**
 - Condition around which approaches will be formulated for addressing subsidence
 - Improves through conveyance
 - Reduces overall cost
 - DWR suggests using:
 - 2023 elevation data
 - 75th Non-exceedance subsidence probability representation of future subsidence
 - Interim actions
 - Operate to original freeboard
 - standard operations (rescind special operating orders and special conditions)

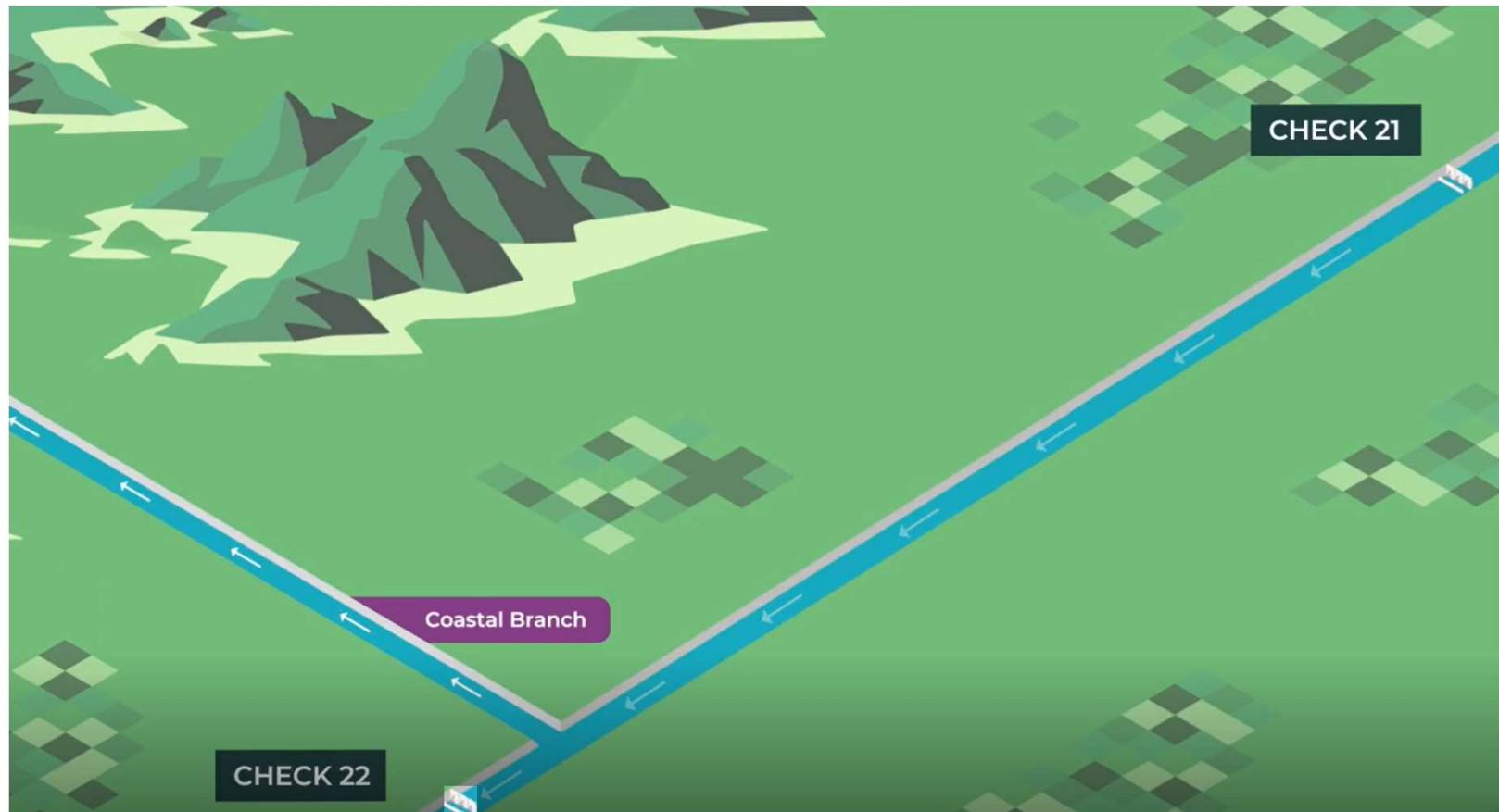
Subsidence – Operate to Freeboard Criteria

- **Insufficient Freeboard Risks**

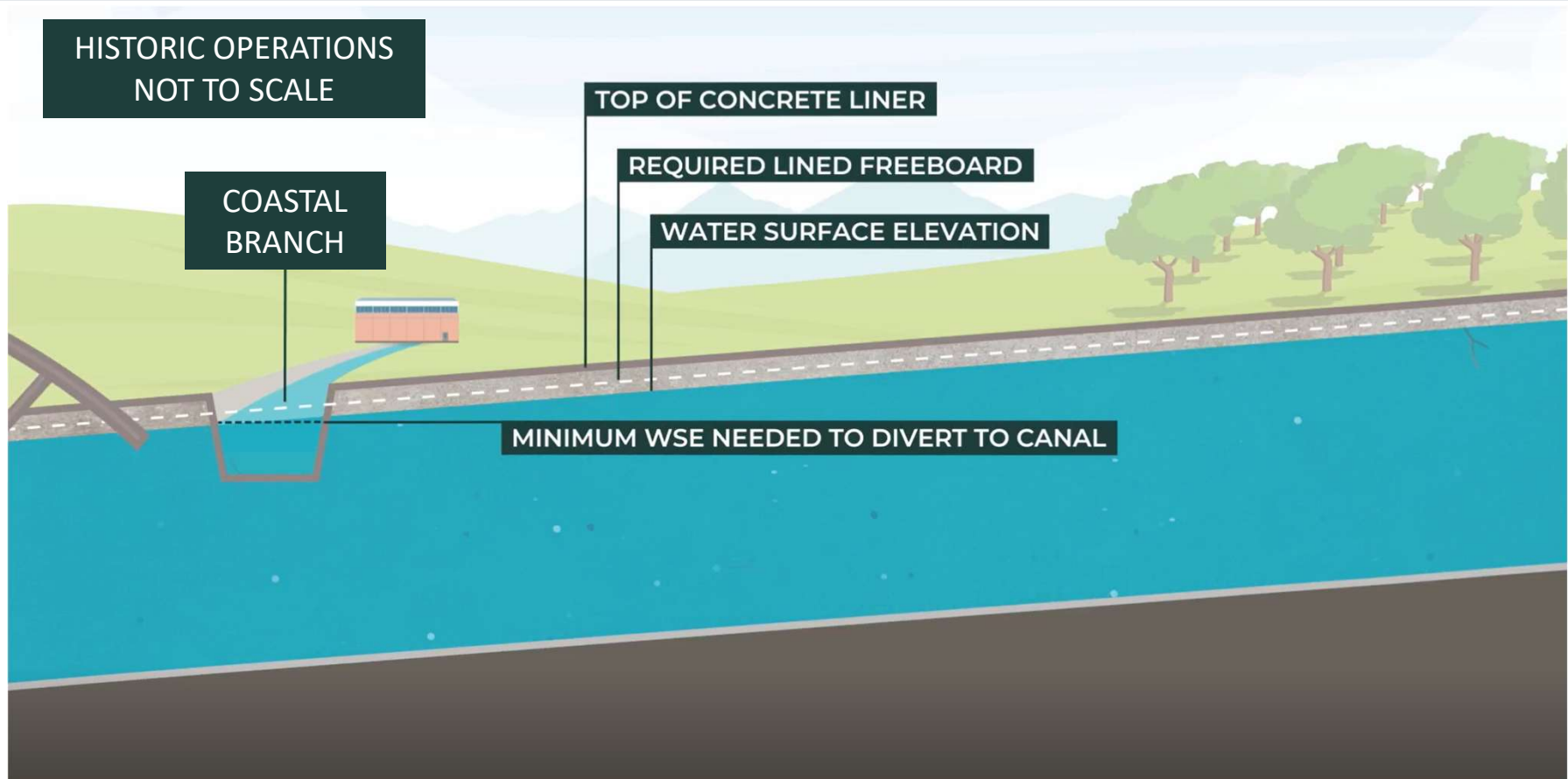
- Increased hydraulic loading
- Transient waves 1.5' to over 4'
- Wind-wave loading – over 4'
- Flood inflows in the SLC
- Lack of operational flexibility



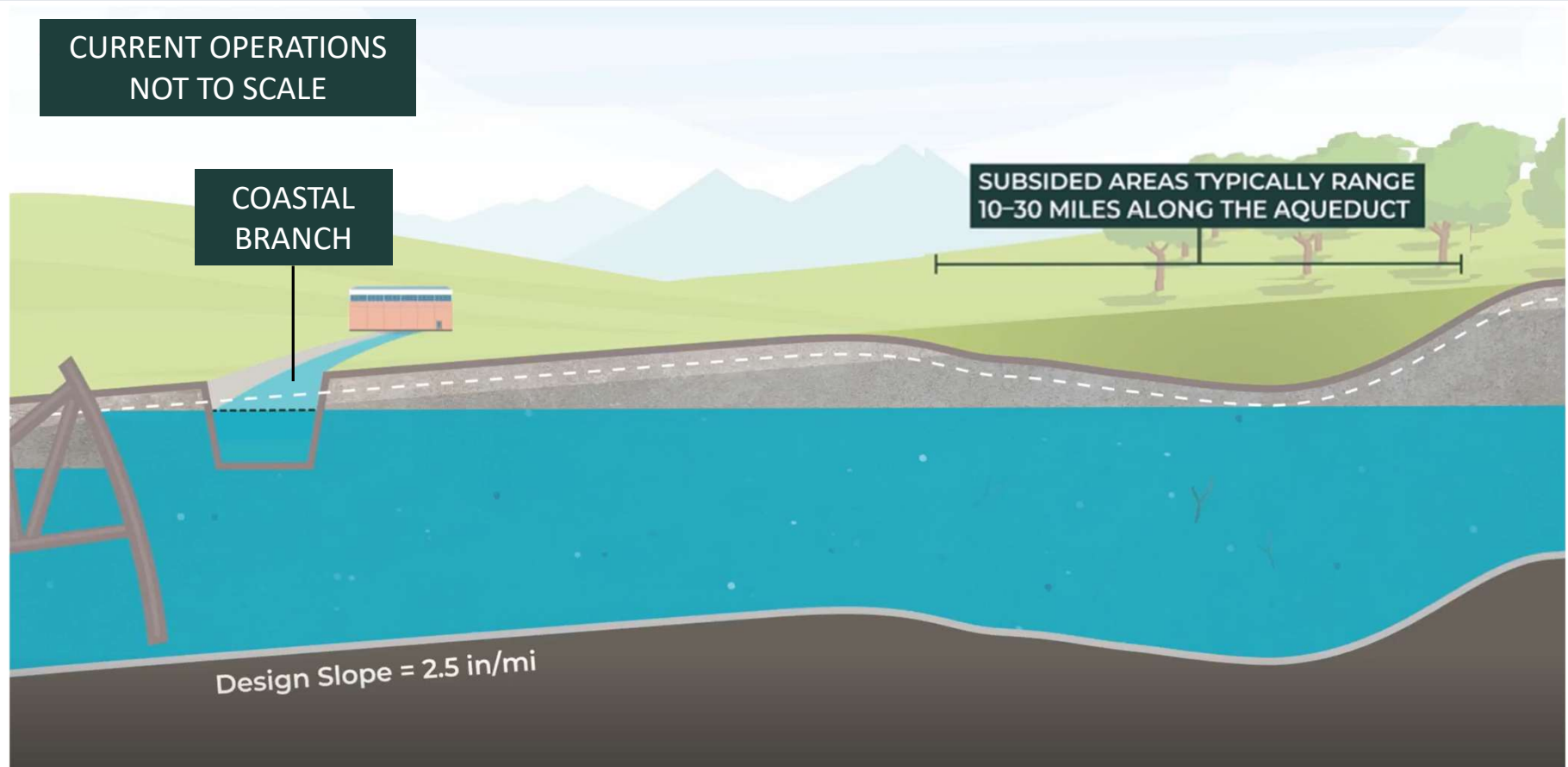
Subsidence – Impacts to Coastal Branch



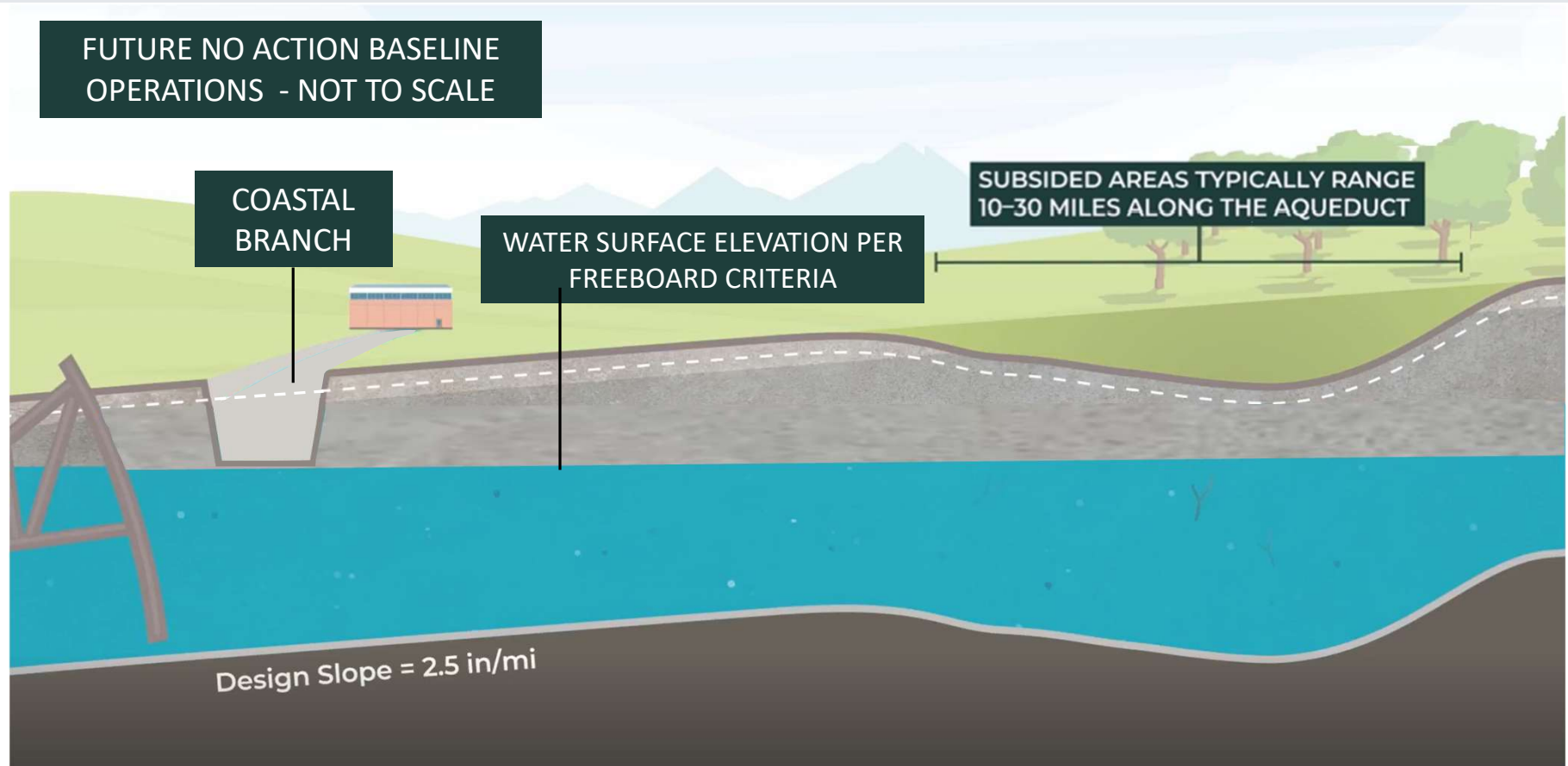
Subsidence – Impacts to Coastal Branch



Subsidence – Impacts to Coastal Branch



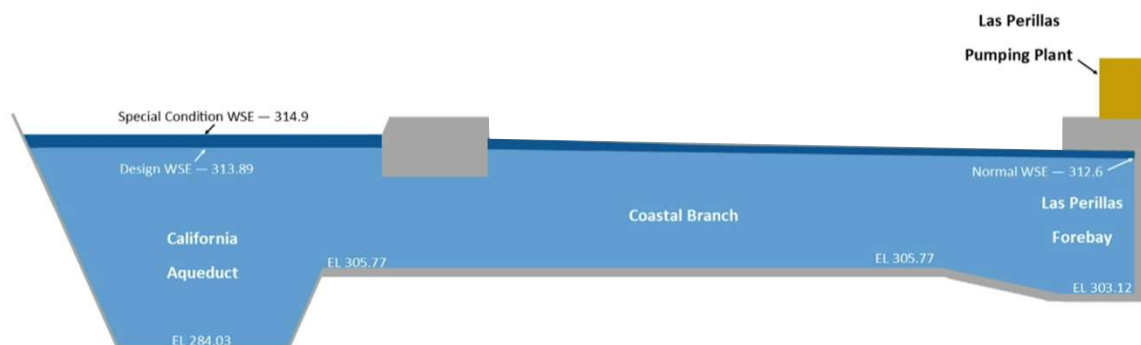
Subsidence – Coastal Branch Impacts



Subsidence – Coastal Branch Improvements



- Establishes lower water surface profile which lessens lining, embankment, and crossing structure raises
- 3 new low-lift pumping plants alternatives to be further evaluated
- DWR is indicating power costs will be relatively low
- Other diversions modifications will be required



Coastal Branch Diversion Alternatives	
1	New Pumping Plant, Propeller Pumps Offset from Coastal Canal
2	New Pumping Plant, Propeller Pumps Located in Coastal Canal
3	New Semi-Permanent Pumping Plant, MWI Pumps Located in Aqueduct
4	New Pumping Plant at Bifurcation, Submersible Pumps Located in Aqueduct
5	Parallel Canal
6	New Pumping Plant, Screw Pumps
7	Modify Las Perillas Pumping Plant
8	Replace Las Perillas Pumping Plant
9	New Pumping Plant, Propeller Pumps Offset from Aqueduct

Subsidence – Next Steps

- **Determine risks of future no action baseline**
 - Lack of quantification of risk as to why freeboard needs to be restored
 - Reclamation to review XM report at milestones and will flag risks and deviations from federal process
 - Need to determine diversions that will be impacted due lower WSEs
- **Track Coastal Branch improvements through workgroup**
- **Continue to track Westlands' Groundwater Sustainability Plan**
- **Advocate for public funding**



Topic

Golden Mussels

Golden Mussels – Invasion



Golden mussels were first detected in the Port of Stockton in Oct. 2024, most likely arrived in the Port of Stockton in the ballast water of cargo ship(s).

Golden mussels pose threats like quagga and zebra mussels, but they can adapt to a wider range of environmental conditions and so a wider range of waters are at risk of infestation.

- **Biofouling:** They attach in dense clusters, clogging water conveyance systems, pipelines, pumps, filters, and hydropower facilities.
- **Highest area of concern for water systems are small diameter pipelines (6 inches or less) transporting untreated water.**



Oso Pumping Plant – Unit 7 Trash Rack

Golden Mussels – Invasion

Biology

- Spawn – Veligers – Attach – Adult – Spawn Adults live about 2-3 years
- Can produce thousands of veligers
- Optimal water temperature is 61°F - 82°F for veliger growth
- Adults can survive in colder waters but do not like to reproduce

SWP Coastal Branch

- Larger numbers found at main California Aqueduct facilities
- Found in Las Perillas PP discharge line and bio-box at Devil's Den PP

Golden Mussels – DWR SWP Response



- Feb 2025 -Formation of the “Golden Mussel Strike Team”
- Multi-disciplinary team composed of Environmental Scientists, Engineers, Electricians, Plant Operators and Mechanics, Consultants & Contractors
- Tasked with development of near-term and long-term mussel mitigation and response plans
- June 2026 – Formulated Golden Mussel Invasion Incident Command Team for:
 - Additional dedicated resources to expedite multiple parallel response actions
 - Improved structure and communication within DWR



Golden mussel mobile lab staff perform hot water immersion studies to determine the minimum duration and temperature to kill adult mussels.

Golden Mussels – SWP Three-Pronged Golden Mussel Strategy



1

Immediate

Protect SWP operations today

- Expand inspections, monitoring, early detection and eDNA analysis
- Apply low-dose sustainable copper; increase manual cleaning, flushing and power washing
- Replace equipment as needed; prevent spread through exit inspections, decontamination and Clean–Drain–Dry outreach

2

Midterm

Build stronger protection for critical infrastructure

- Mitigate priority SWP facilities: pumping plants, hydropower, fish protection and hatcheries
- Install UV systems to kill veligers before settlement in cooling, fire protection and service-water pipelines
- Evaluate chemical treatments, antifouling coatings, operational improvements and emergency potash registration

3

Long-term

Prepare California for long-term management

- Advance research on treatment methods, biology, reproduction and physiological requirements
- Develop engineering solutions and incorporate invasive-species mitigation into future SWP designs
- Refine monitoring methods and share findings across California and North America

Golden Mussel – Coastal Branch Pilot Project



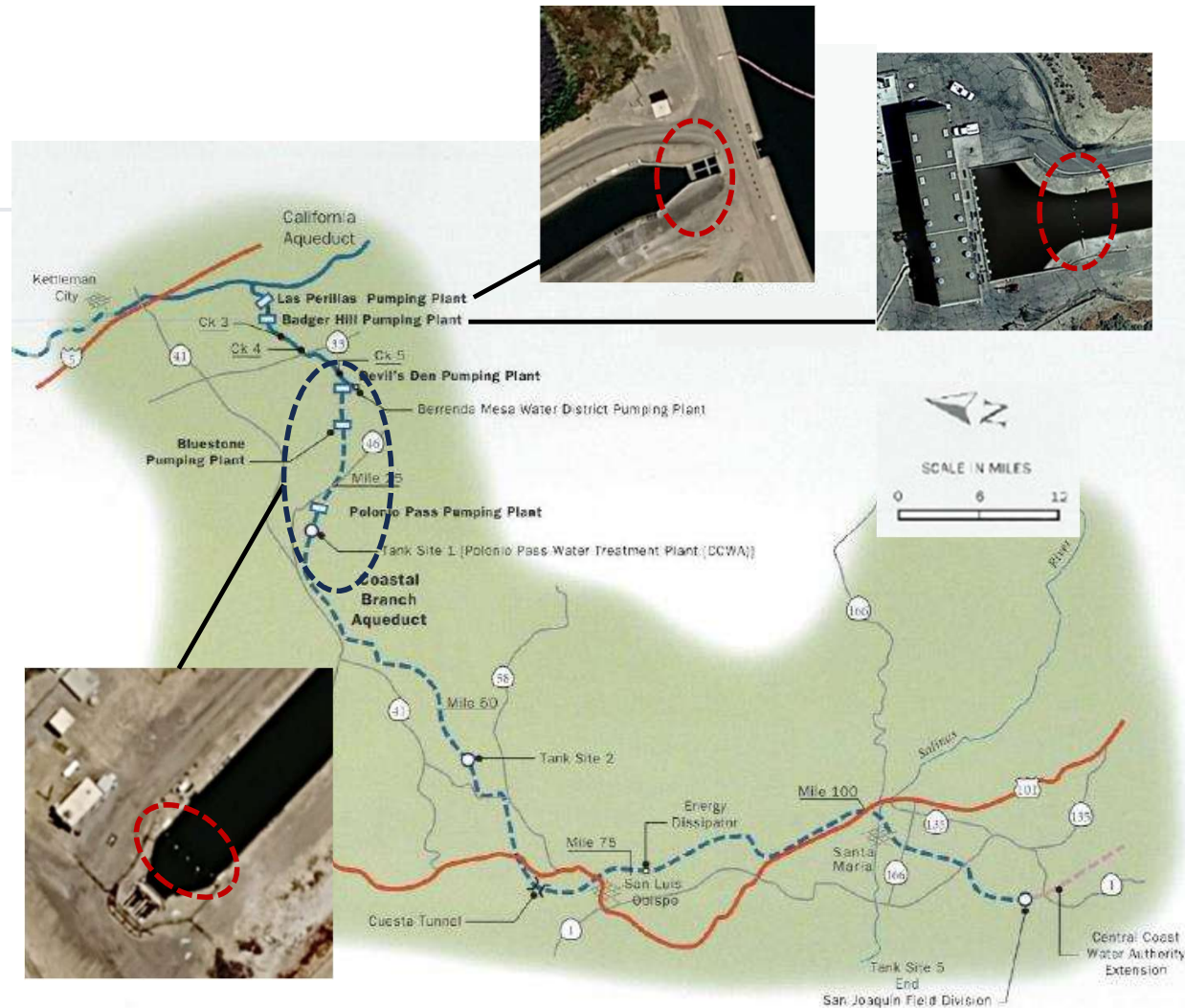
Constant Low-dose chemical treatment to prevent mussel settlement

- Prevents veligers from settling in the area, may not kill them
- Won't kill the adult mussels or remove the shells
- Dosing is dependent on water flow
- Cost is about the same as doing several short-term high-concentration treatments to kill adult mussels
- The high-dose approach results in a lot of shells being left behind

Golden Mussel – Coastal Branch Pilot Project

At Las Perillas Pumping Plant, Badger Hill Pumping Plant, and another downstream location.

- Dosing based on total canal flow rate at each location
- Assumed flow is 100-160 cfs average for the year
- Dosing at 60 ppb (as copper)
- Will be adjusted based on non-mussel uptake and efficacy results
- Planned to begin in March
- First year costs \$1.9M to \$2.8M



Golden Mussel – SWC Golden Mussel Activities



On-going Activities:

- Plan Golden Mussel Public Water Agency meetings
- Participate in CDFW's golden mussel work group
- Track state & federal legislative affairs
 - AB 1894 (Rubio) – Assemblymember Rubio's golden mussels spot bill. Sponsored by the City of Burbank and the Upper San Gabriel Valley MWD. Aimed to ensure that only the state can halt deliveries of water for the purposes of preventing golden mussels spread. (vetoed)
 - AB 1772 (Papan) – Pulled
 - AB 2032 (Ransom) – Amendments to Assemblymember Ransom's golden mussels spot bill are forthcoming. The bill focuses on supporting the response of agencies that operate water supply systems in their efforts to prevent, mitigate, control, and eradicate golden mussels, through permitting streamlining. (passed)
- Routine coordination with Golden Mussel SWP liaison



swc.org

Lower WSE to meet design conveyance capacity

