

# **EBMUD's Mokelumne Aqueducts**

## **Testimony Summary**

**Xavier Irias**

(EBMUD Exhibit 102)

# EBMUD's Mokelumne Aqueduct System



- Mokelumne River supplies 90% of EBMUD's water
- EBMUD obtained first Mokelumne River water right in 1926.
- EBMUD completed first of three Mokelumne Aqueducts in 1929
- The three Aqueducts supply water to 1.4 million customers in the Bay Area.





**EAST BAY  
MUNICIPAL UTILITY DISTRICT**

# WATER SUPPLY

MOKELUMNE RIVER  
WATERSHED

WATER  
SERVICE AREA

EBMUD RESERVOIRS

SACRAMENTO  
SAN JOAQUIN DELTA

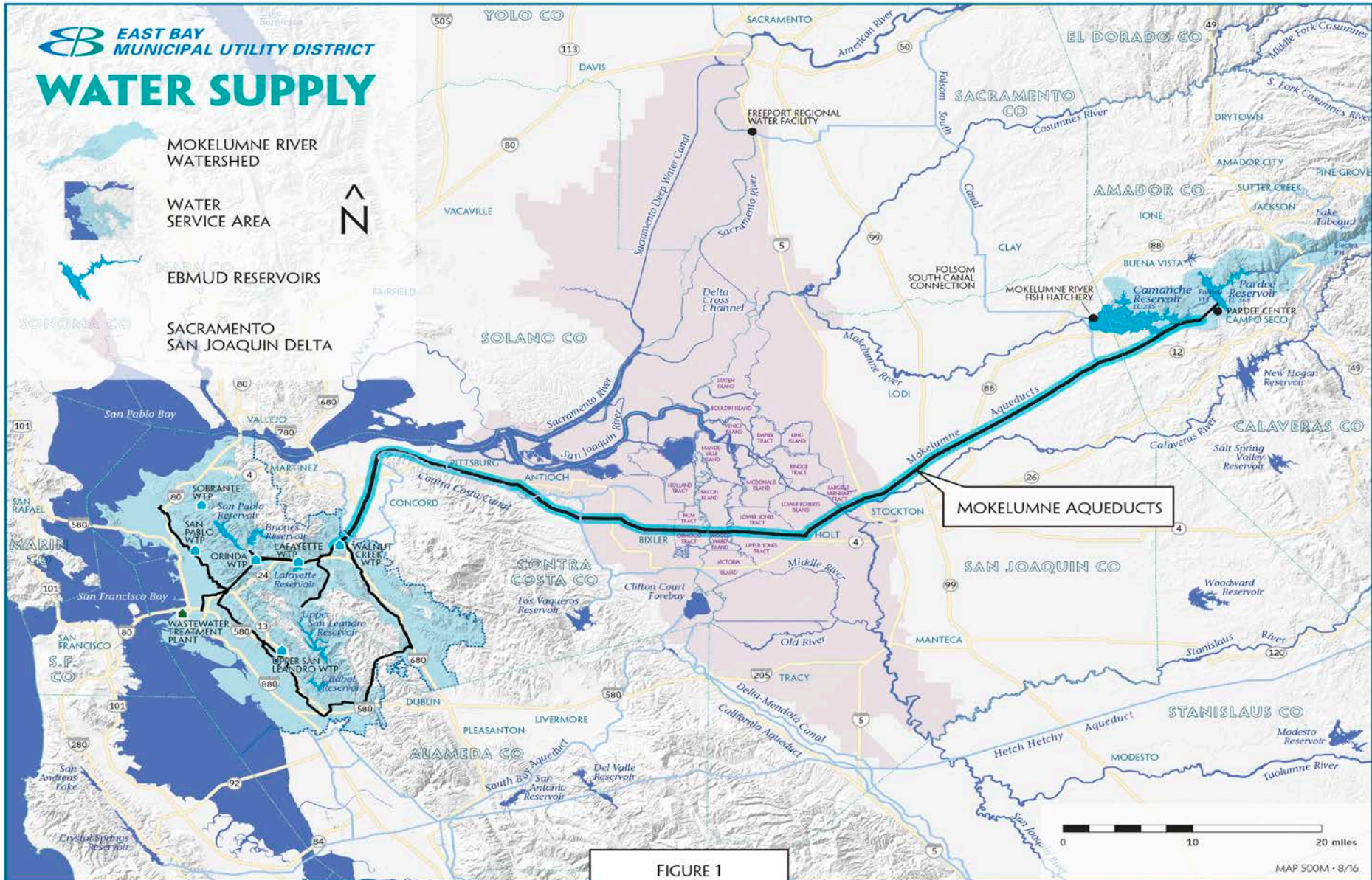
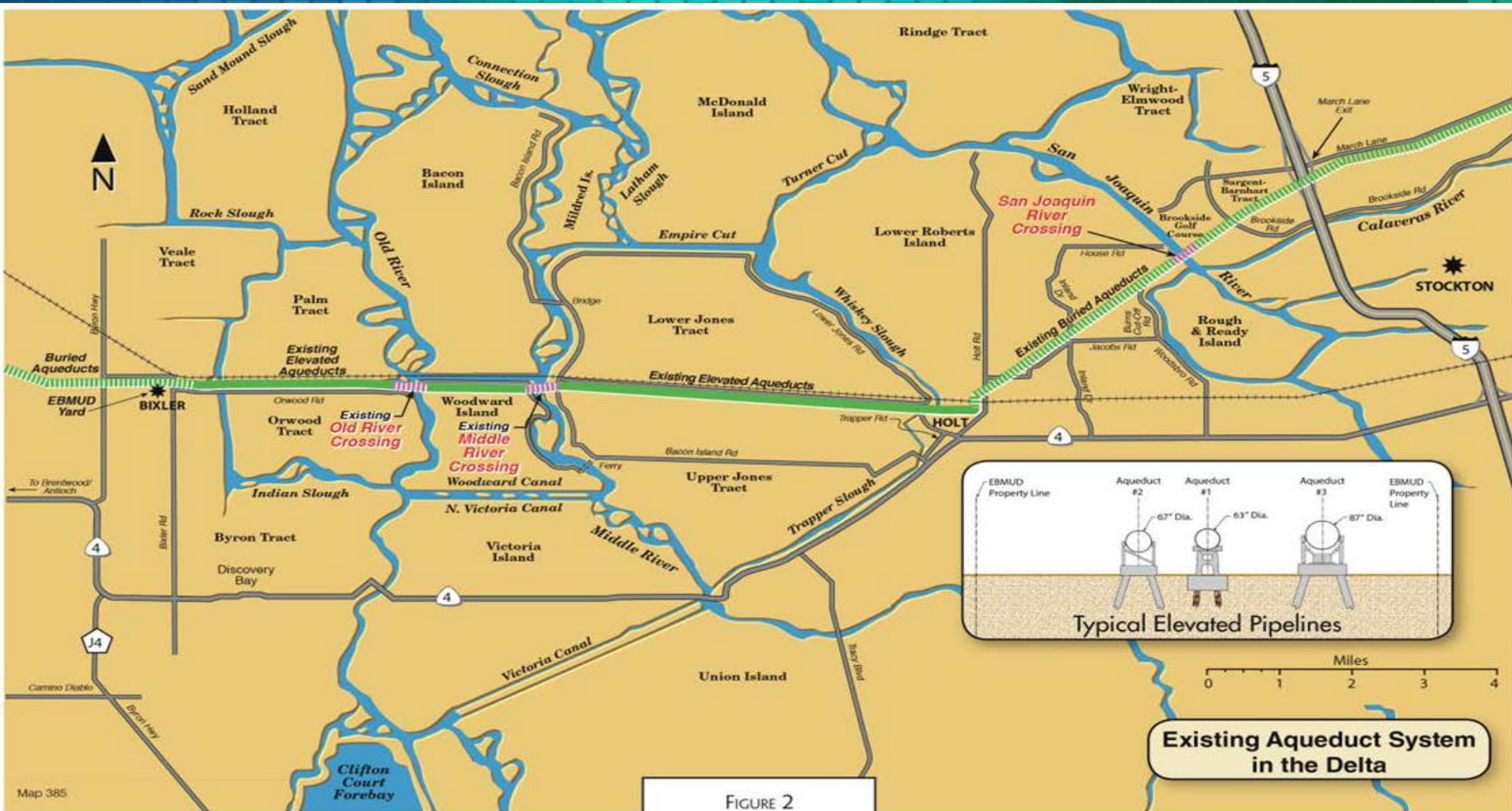


FIGURE 1





- In Delta, the Aqueducts are primarily supported on piles
- Pile depths typically range from -35 to -72 feet msl



PHOTO 2





PHOTO 3

# 2004 Flood of Upper Jones Tract



PHOTO 4





PHOTO 5



# Protecting the Aqueducts



- EBMUD began hazard assessment study in 2005
- 2007 Report called for
  - Short-term measures
  - Long Term Measures--  
Tunnel across the Delta

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Strategy for Protecting the  
Mokelumne Aqueducts in the Delta  
Summary Report

Prepared By  
East Bay Municipal Utility District  
October 2007

# EBMUD's Proposed Delta Tunnel



- Conceptual design for Delta Tunnel completed in 2014
- Tunnel alignment follows existing Aqueduct ROW
- Tunnel to house twin 87-inch pressurized steel pipes
- Includes conceptual plan and profile
- Currently: contract awarded for geotechnical investigation and report



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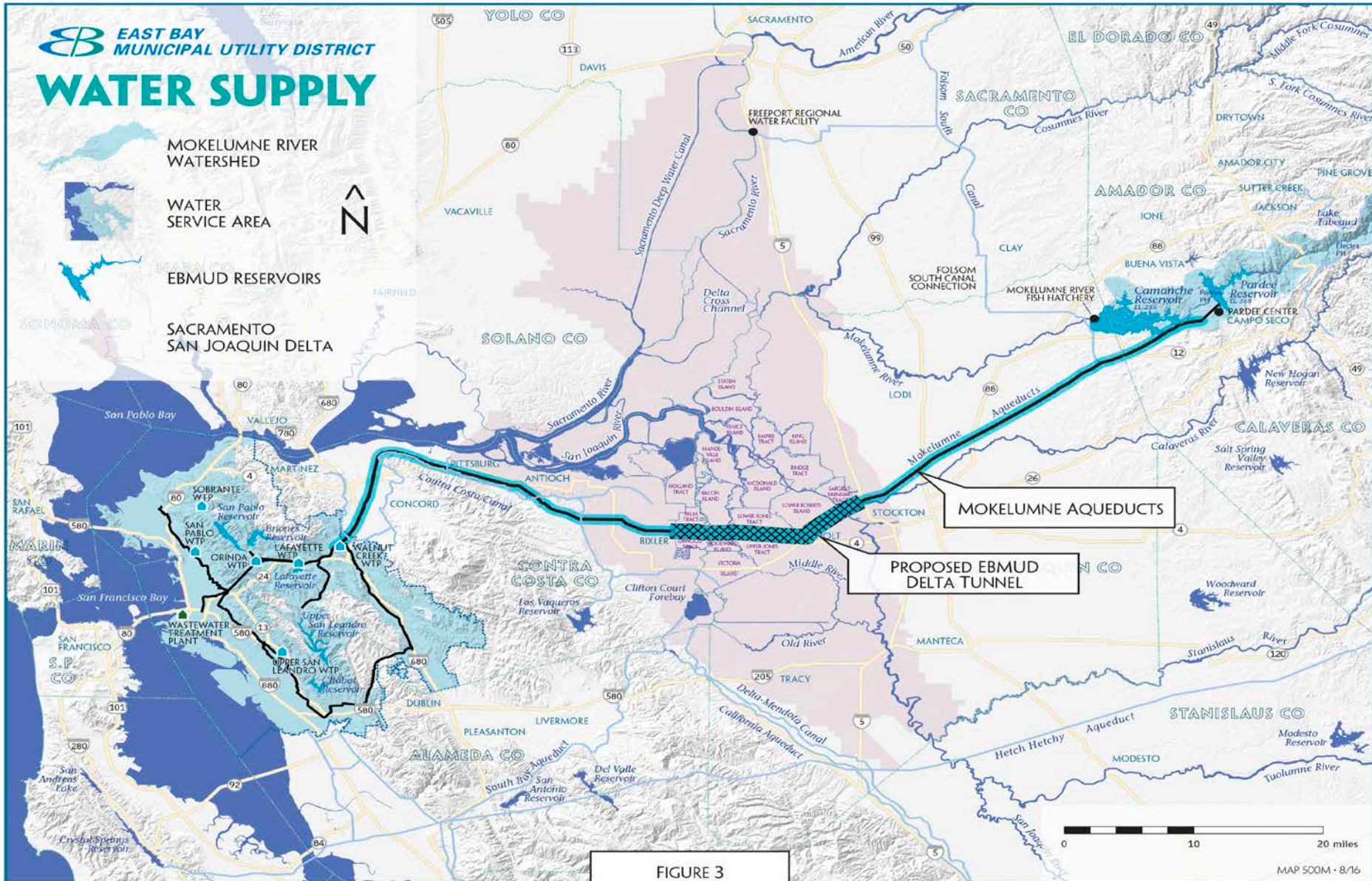


FIGURE 3



FIGURE 4





## LEGEND

- CPT
- Shaft
- Mokelumne Delta Tunnel
- - - Proposed BDCP Tunnel Alignment
- Ground Surface
- Mean Sea Level
- Pile Tips
- Tunnel
- Tunnel Band
- Geologic Unit**
- 1 - 3 Fill/Marsh Deposits/Peat
- 4 - 5 Holocene / Pleistocene

### Notes:

1. Stationing is approximate.
2. Horizontal: 1 inch = 2,000 ft
3. Vertical: 1 inch = 25 ft. (80 to 1 Vertical Exaggeration)
4. Upper line is highest possible tunnel crown. Lower line is likely lowest tunnel invert.
5. Position based on figure 3-21 in the draft EIR/EIS (2013).
6. Maximum depth based on text and figure 1'-6 in the Conceptual Engineering Report (2010, CDWS).

Source:  
 CWDD, 1991  
 ESA, 1992  
 Treadwell & Rollo, 2010  
 URS, 2007  
 LIDAR Data from DWR, 2007



TITLE:

## Proposed Delta Tunnel Plan & Profile from Stockton to Jones Tract

PROJECT:

Mokelumne Aqueducts Delta Tunnel Study

DRAWING REFERENCES:

Coordinate System: NAD 1983 StatePlane California III FIPS 4003 Feet  
 Horizontal and Vertical Units: Foot US



Updated: 7/24/2014

FIGURE 5

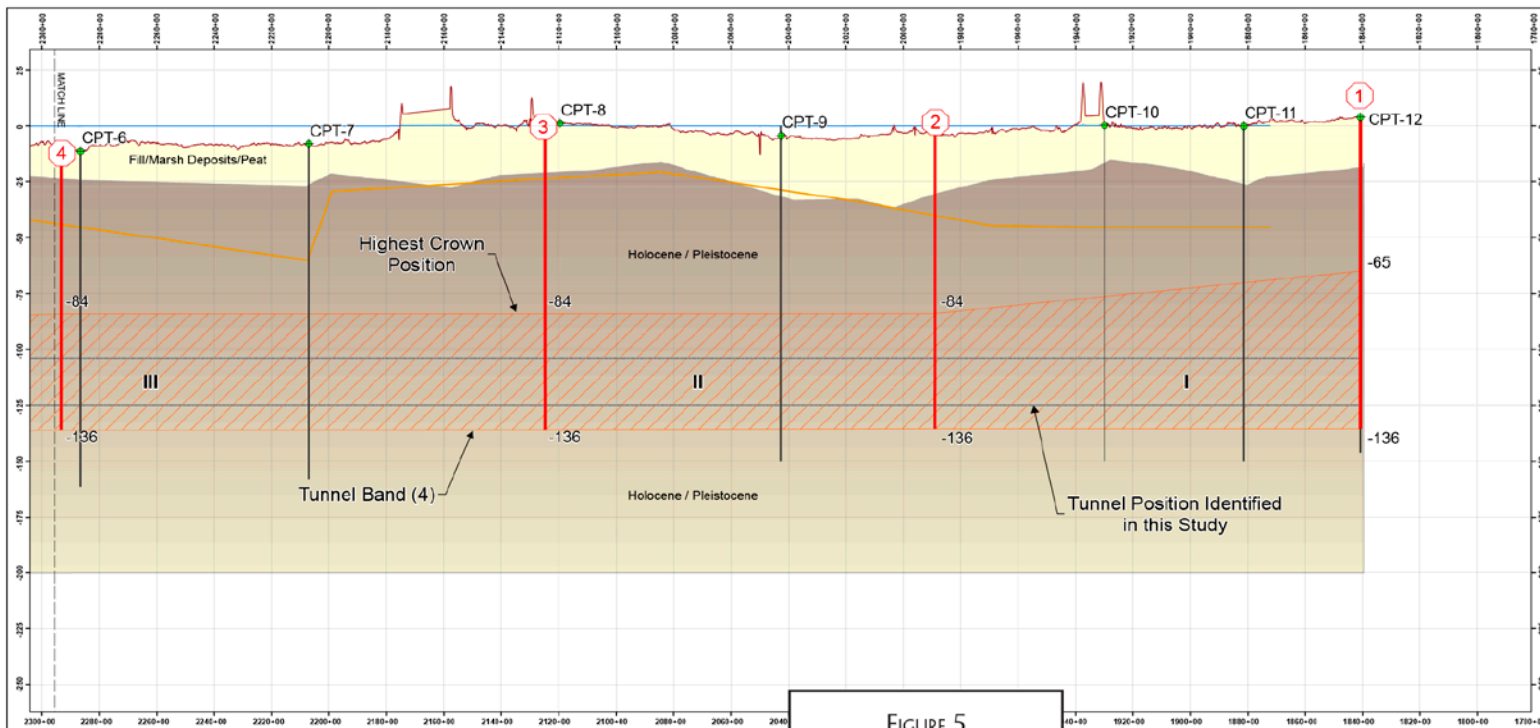


FIGURE 5

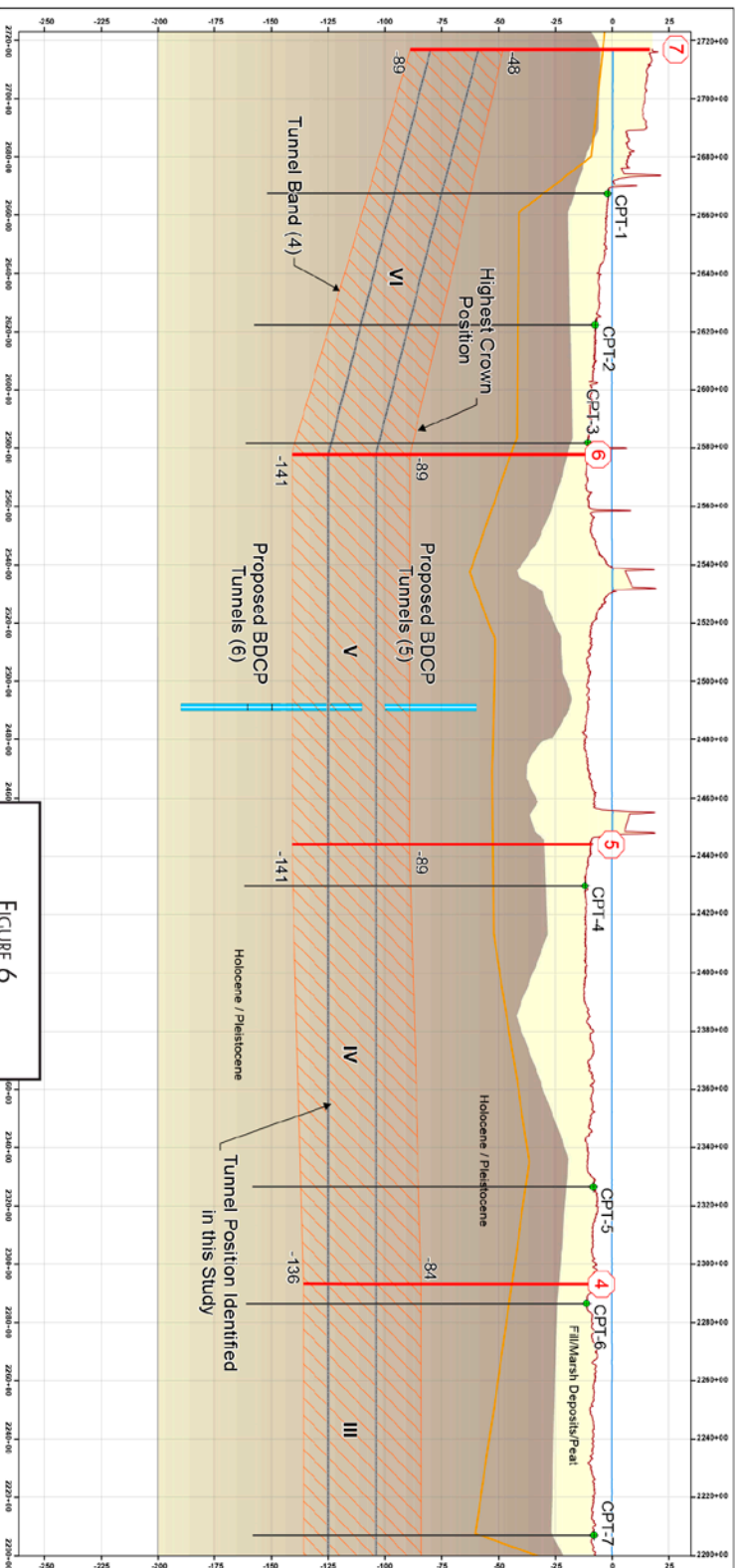
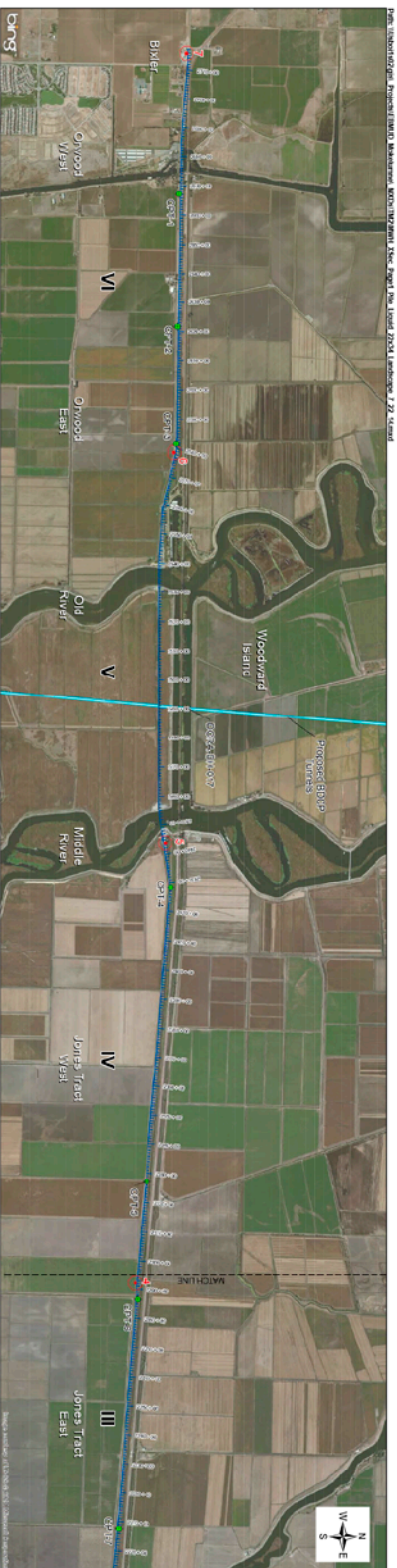


FIGURE 6

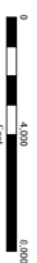
- LEGEND**
- CPT
  - Shaft
  - Mokuilume Delta Tunnel
  - Proposed BDCP Tunnel Alignment
  - Ground Surface
  - Mean Sea Level
  - Pie Tips
  - Proposed BDCP Tunnels
  - Tunnel
  - Tunnel Band
  - 1 - 3 Fill/Marsh Deposits/Peat
  - 4 - 5 Holocene / Pleistocene

**Notes:**

1. Stationing is approximate.
2. Horizontal: 1 inch = 2,000 ft.
3. Vertical: 1 inch = 25 ft.
4. (80 to) Vertical exaggeration
5. Tunnel crown. Lower line is likely lowest tunnel invert.
6. Position based on figure 3-21 in the State Circular (2015) based on text and figure 11-3 in the Conceptual Engineering Report (2010, COWI).

**Sources:**

- COWI, 1981
- ESA, 1992
- Treadwell & Rolo, 2010
- URS, 2007
- LDAR Data from DMR, 2007



**Proposed Delta Tunnel Plan & Profile from Jones Tract to Bixler**

PROJECT:  
Mokuilume Aqueducts Delta Tunnel Study - TM2

REVISIONS/REFERENCES:  
Coordinate System: NAD 1983 StatePlane California III FIPS 5003 Feet  
Horizontal and Vertical Units: Foot US

DATE: 7/24/2014

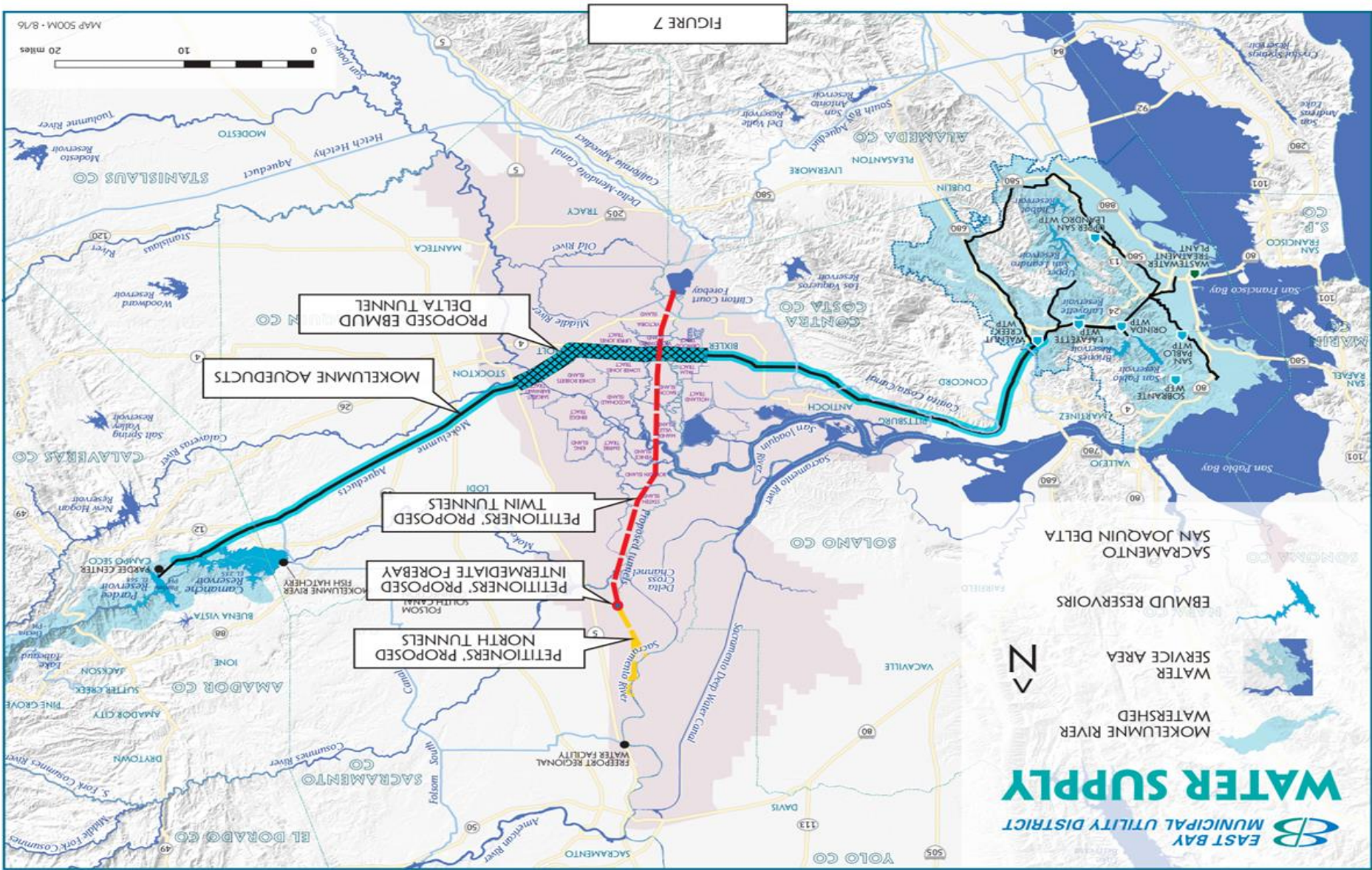
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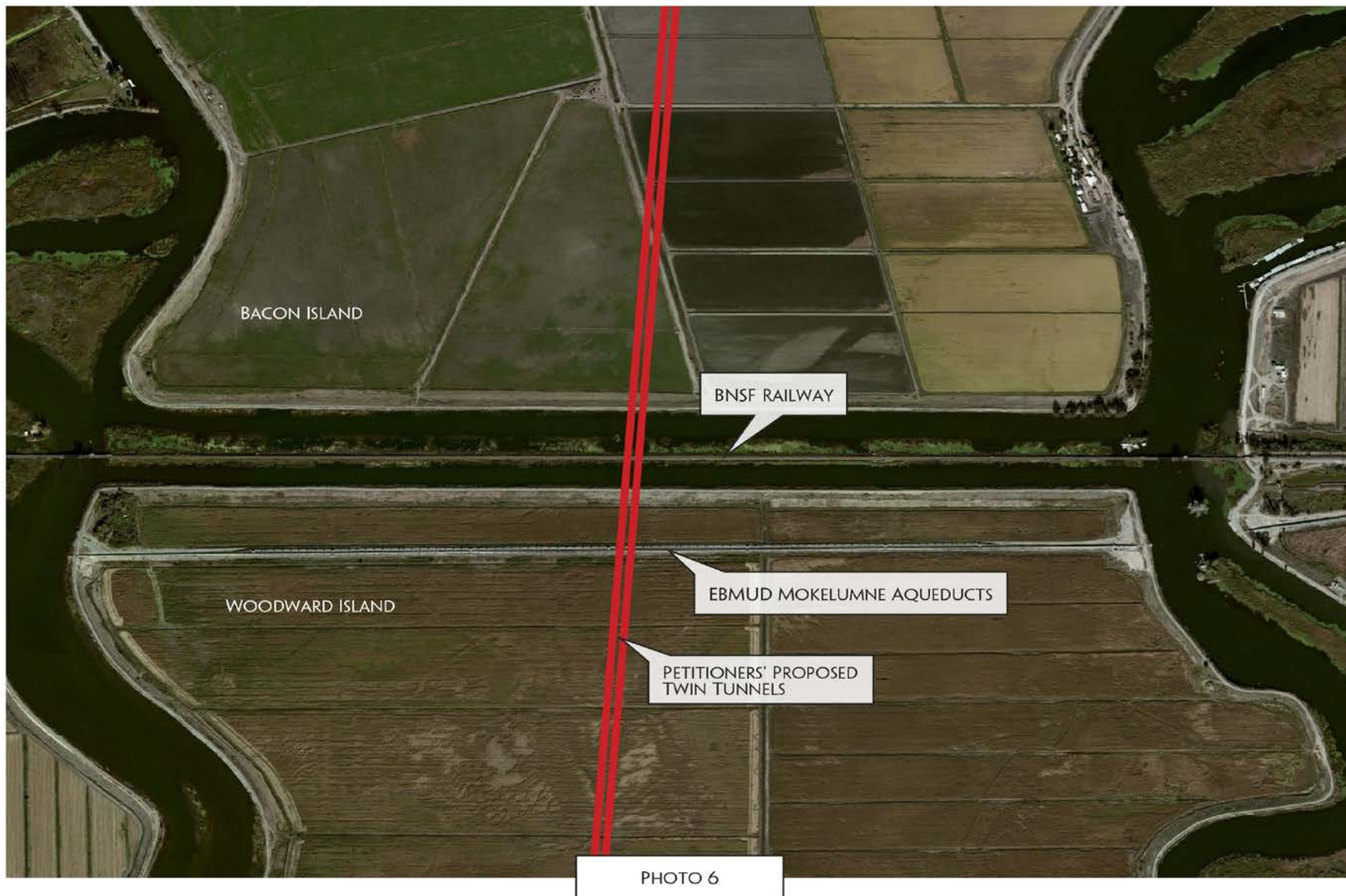
# Petitioners' Proposed Twin Tunnels

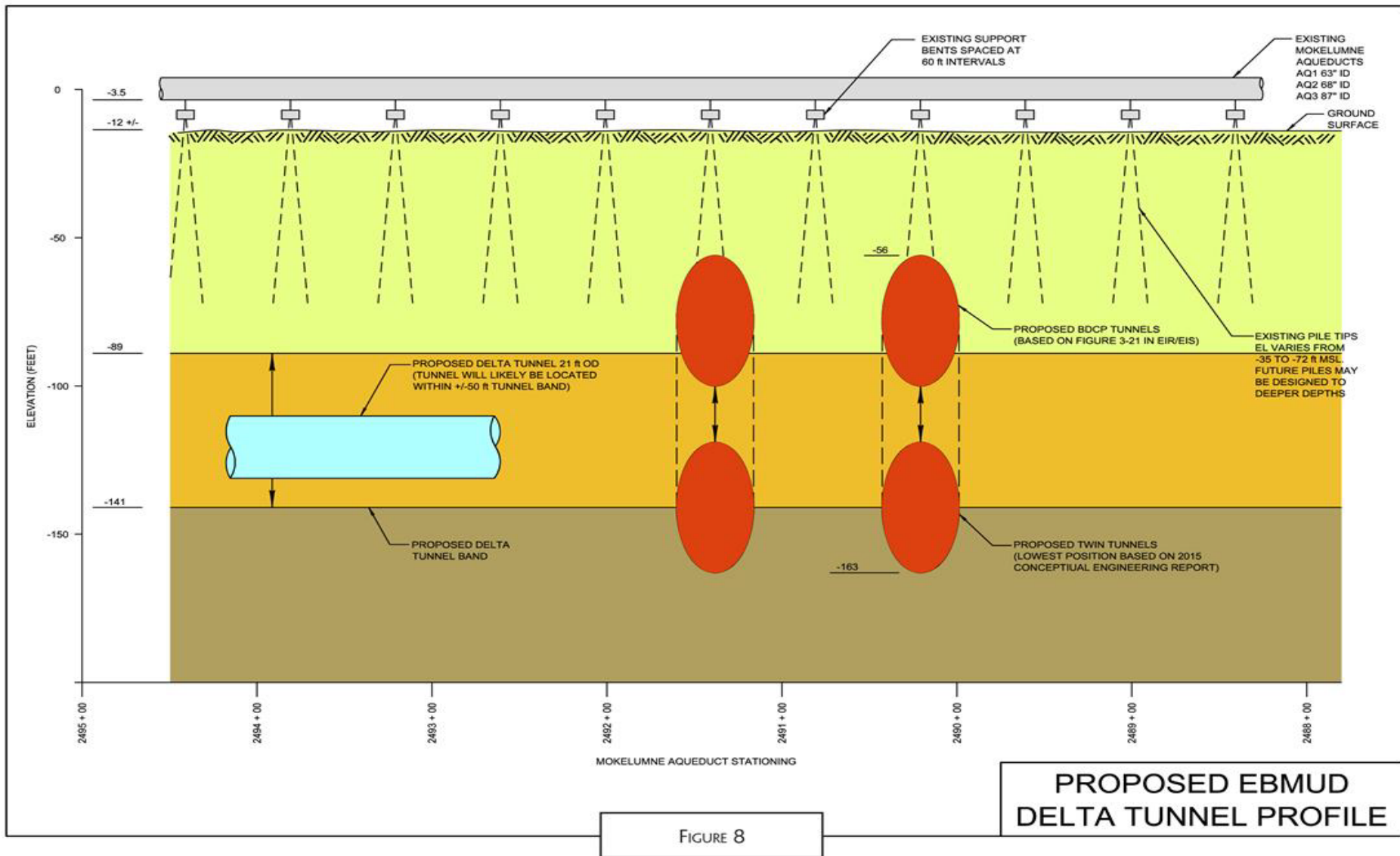


- Proposed 40-foot diameter Twin Tunnels
- Twin Tunnels would cross underneath Mokelumne Aqueducts on Woodward Island
- The elevation ranges for the Twin Tunnels could interfere with EBMUD's Delta Tunnel











# Impacts of Twin Tunnels on Aqueducts & EBMUD Delta Tunnel



1. ROW encroachment
2. Direct interference with EBMUD structures
3. Undermining and settlement
4. Changed groundwater levels causing soil settlement
5. Construction shafts causing lateral earth movement
6. Seepage into Twin Tunnels during lifespan

# Impacts of Twin Tunnels – (cont.)



7. Lining failure in Twin Tunnels
8. Added costs of EBMUD's Delta Tunnel (construction and operation)
9. Damage from Twin Tunnels access roads and utilities
10. Damage from Twin Tunnels power transmission facilities
11. Twin Tunnel power transmission and AC induced interference
12. Twin Tunnel power transmission fall hazard



# Conditions to Address Impacts



- Make provisions in design and construction to protect EBMUD infrastructure
- Provide strip of land in crossing zone to allow tunnel conflict to be avoided
- Accept responsibility for damage and disruption to EBMUD facilities