



CALIFORNIA  
**WATER FIX**  
RELIABLE. CLEAN. WATER.



# ENGINEERING OVERVIEW





## TOPICS OF DISCUSSION

- **California WaterFix proposed facilities and refinements**
- **Construction potential affects on other users of water and mitigation**
- **Flood protection measures**



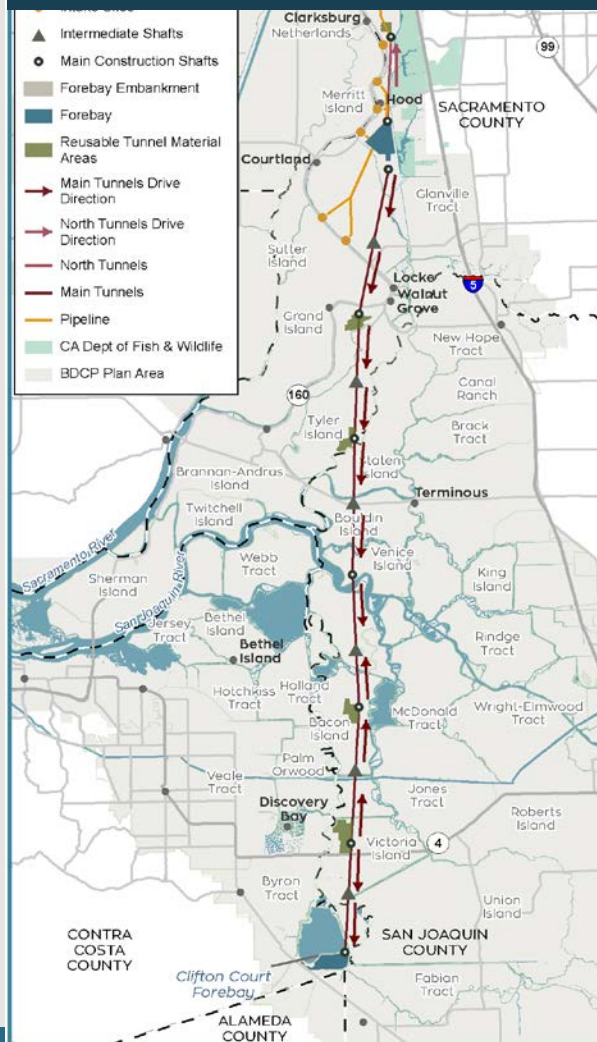
# PROPOSED FACILITIES

- **Intake facilities**
- **Tunnels**
- **Forebays**
- **Clifton Court Pumping Plant**
- **Head of Old River Operable Gate**



# ENGINEERING REFINEMENTS

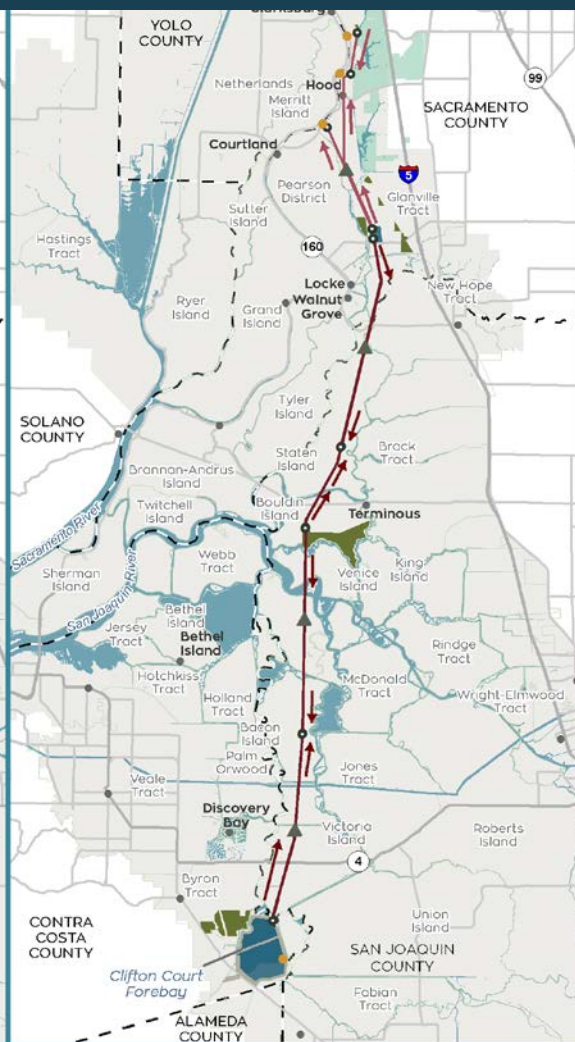
July 2012  
Pipeline Tunnel Option  
(Northern PP)



July 2013  
Modified Pipeline Tunnel  
Option (Northern PP)



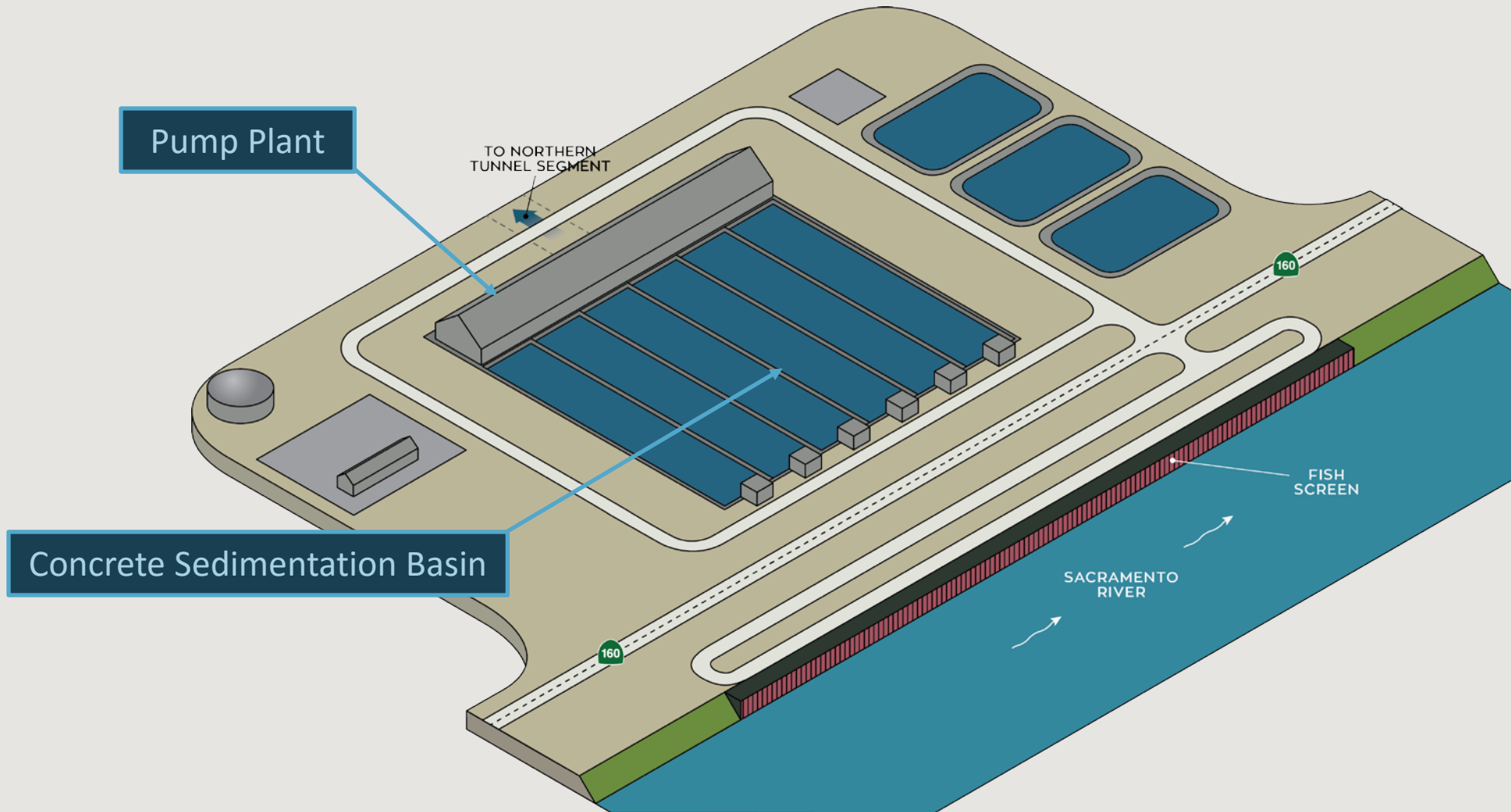
July 2015  
Californian WaterFix  
(Southern PP)





# INTAKE CHANGES

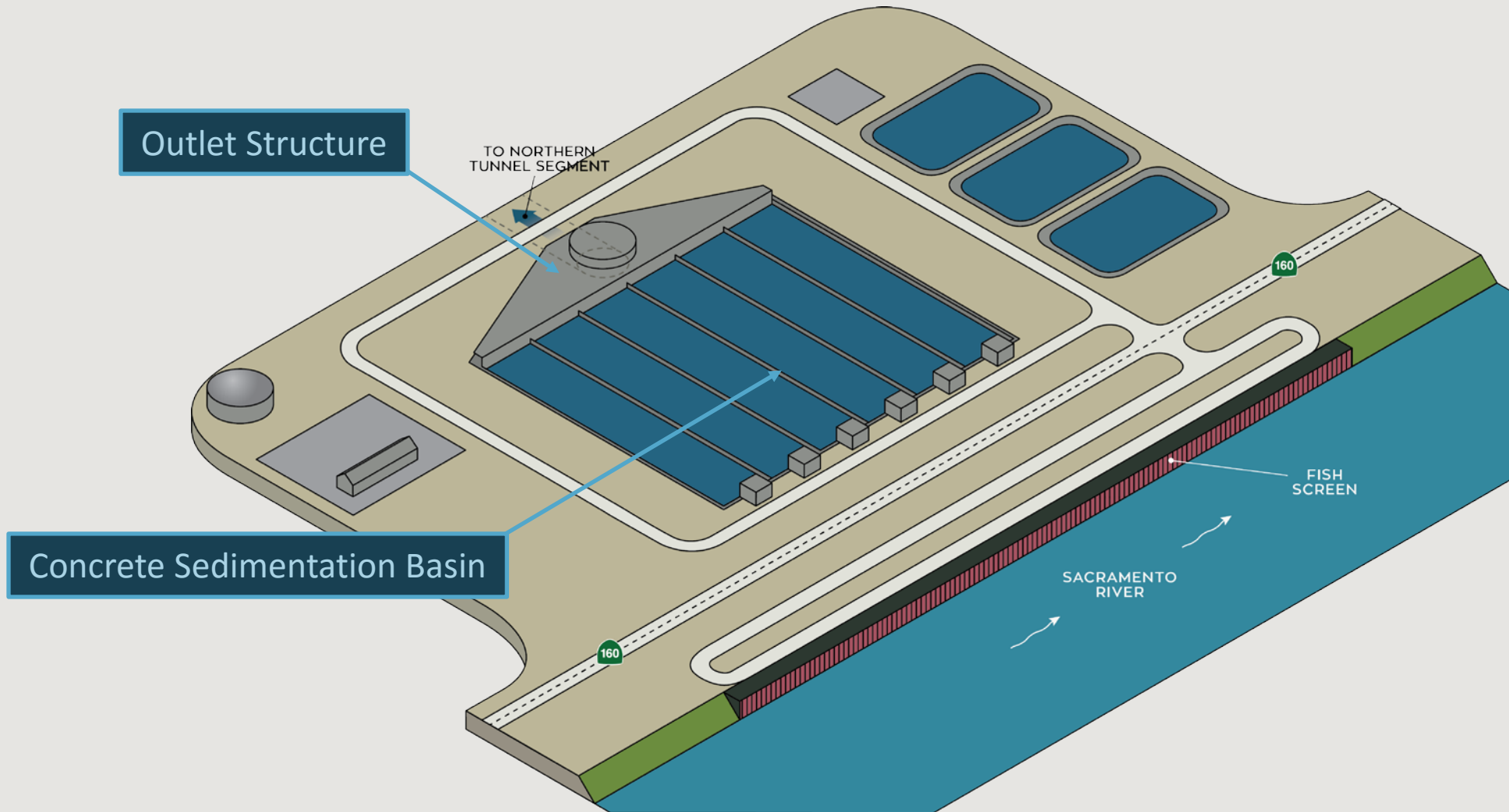
## 2013 Intake Facility with Northern Pumping Plant





# INTAKE CHANGES

## 2014 Intake Facility with Southern Pumping Plant

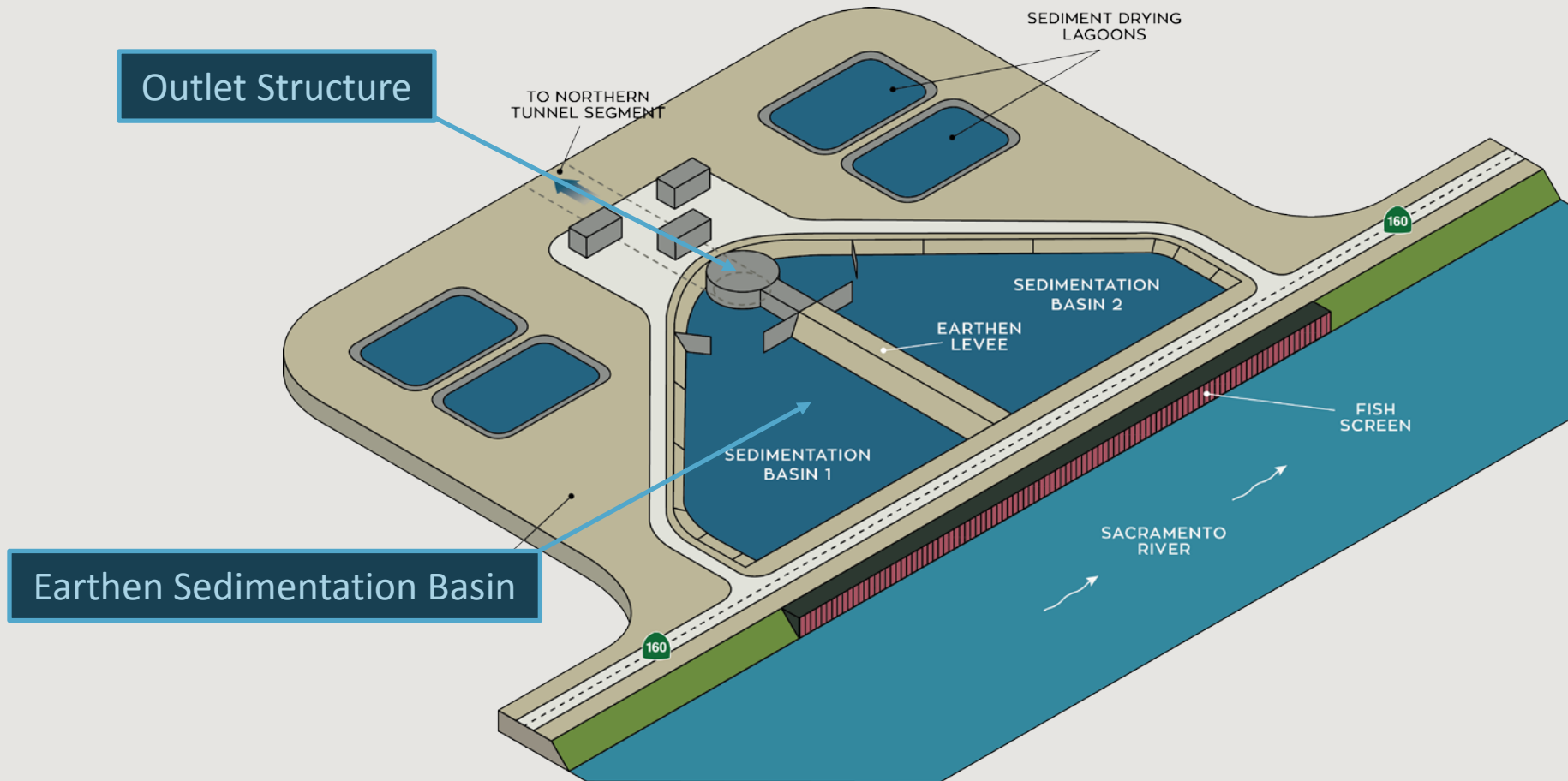






# INTAKE CHANGES

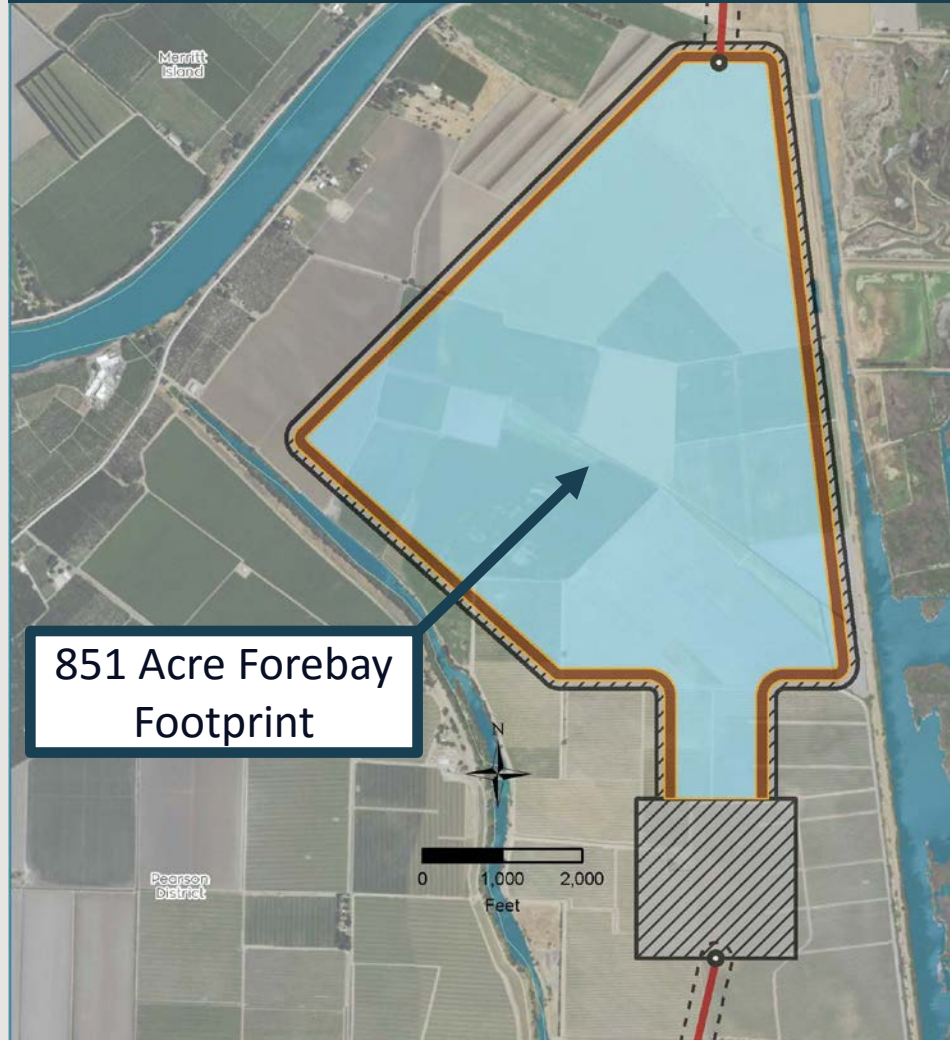
## 2015 Intake Facility with Southern Pumping Plant



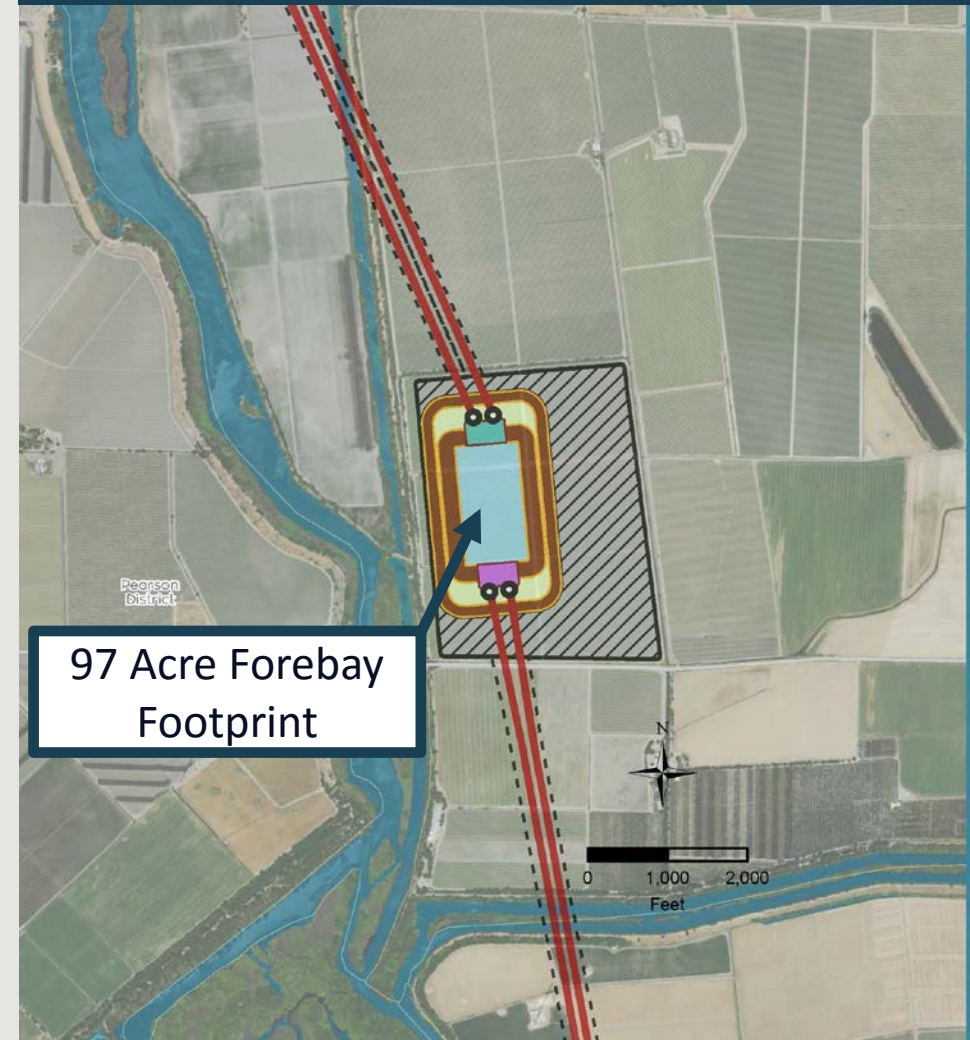


# INTERMEDIATE FOREBAY CHANGES

Pipeline Tunnel Option  
(Northern PP)

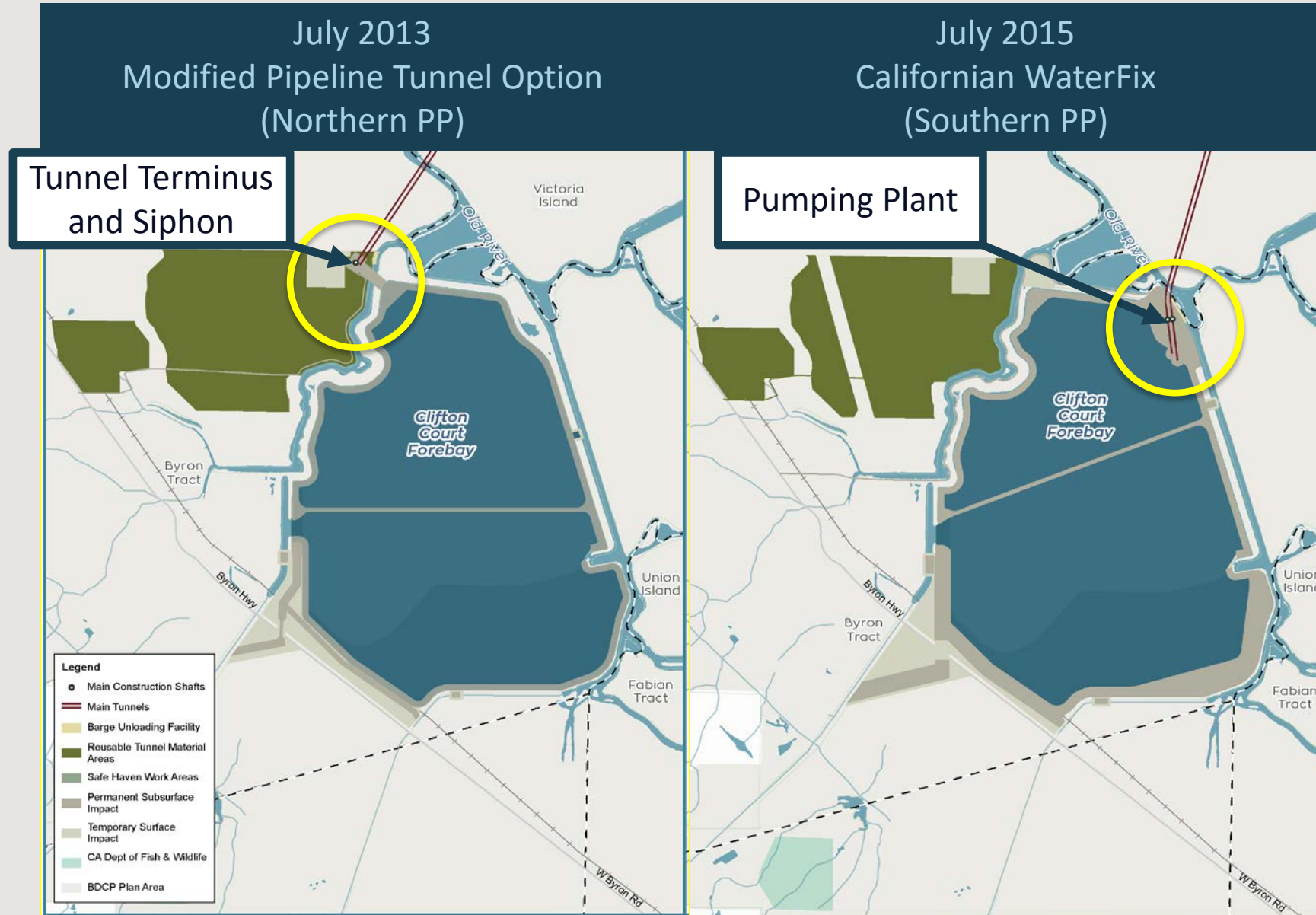


Modified Pipeline Tunnel and  
California WaterFix





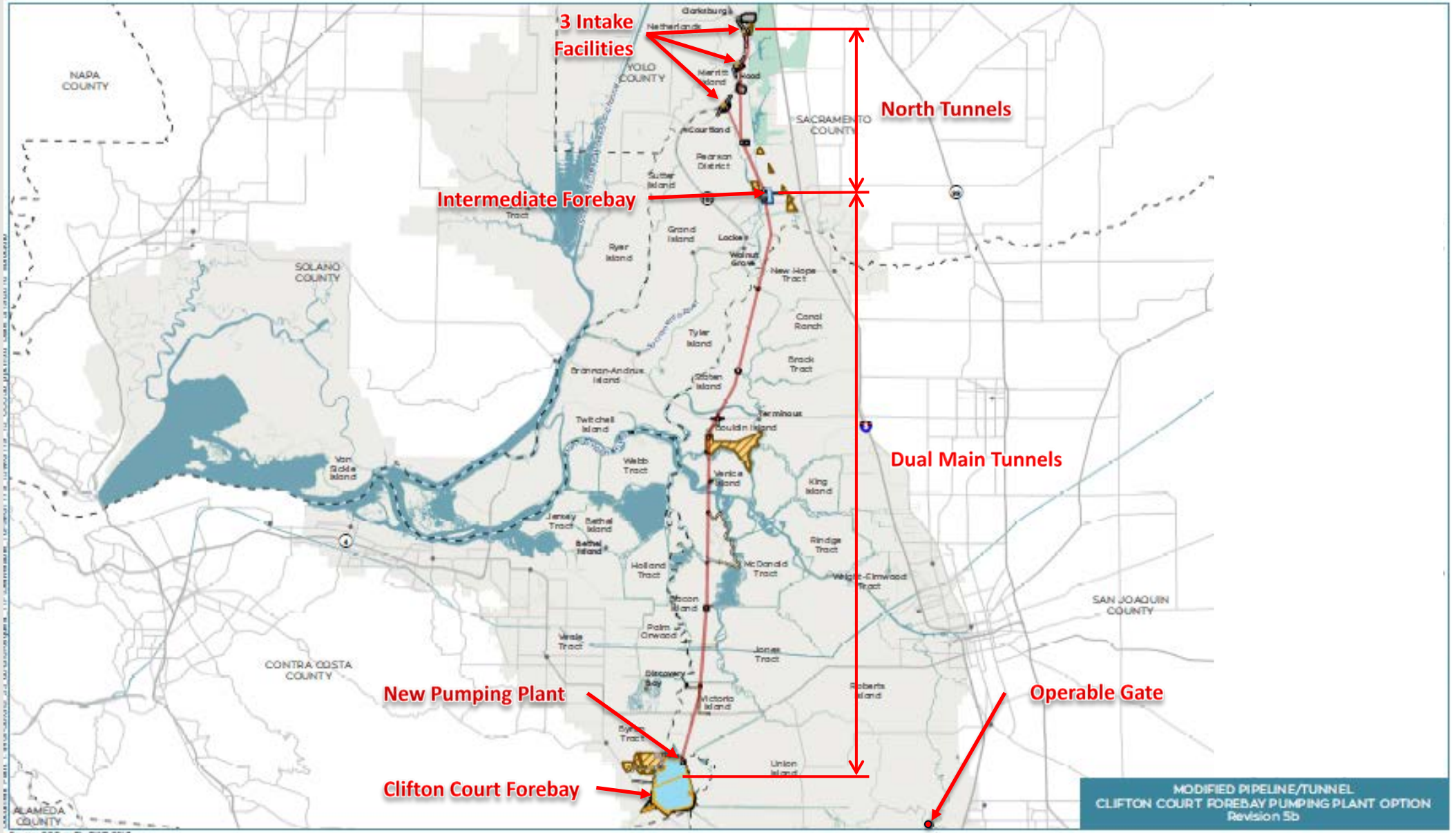
# CLIFTON COURT CHANGES







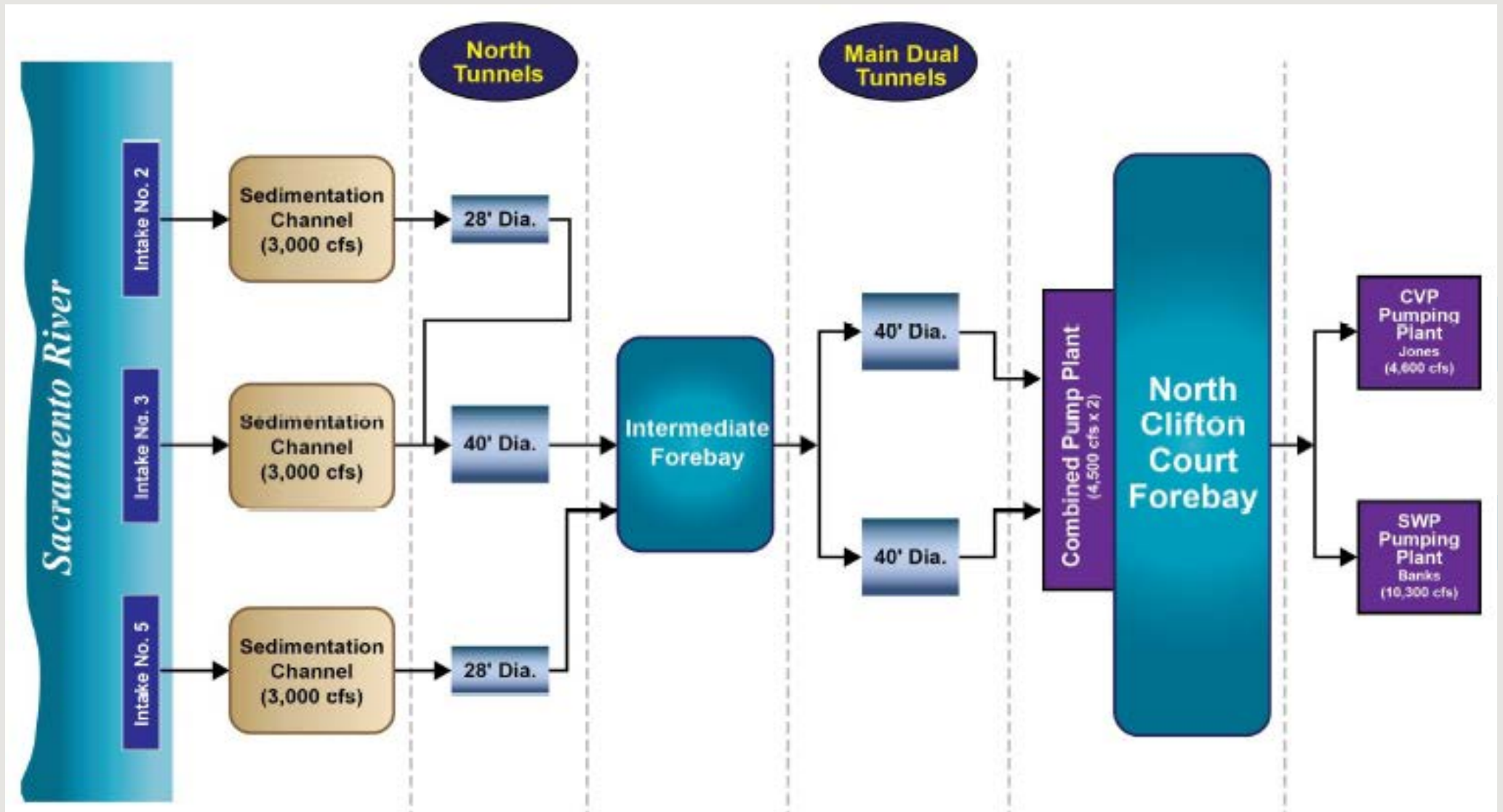
# CALIFORNIA WATER FIX FACILITIES





# CONVEYANCE SCHEMATIC

9,000 CFS GRAVITY SYSTEM





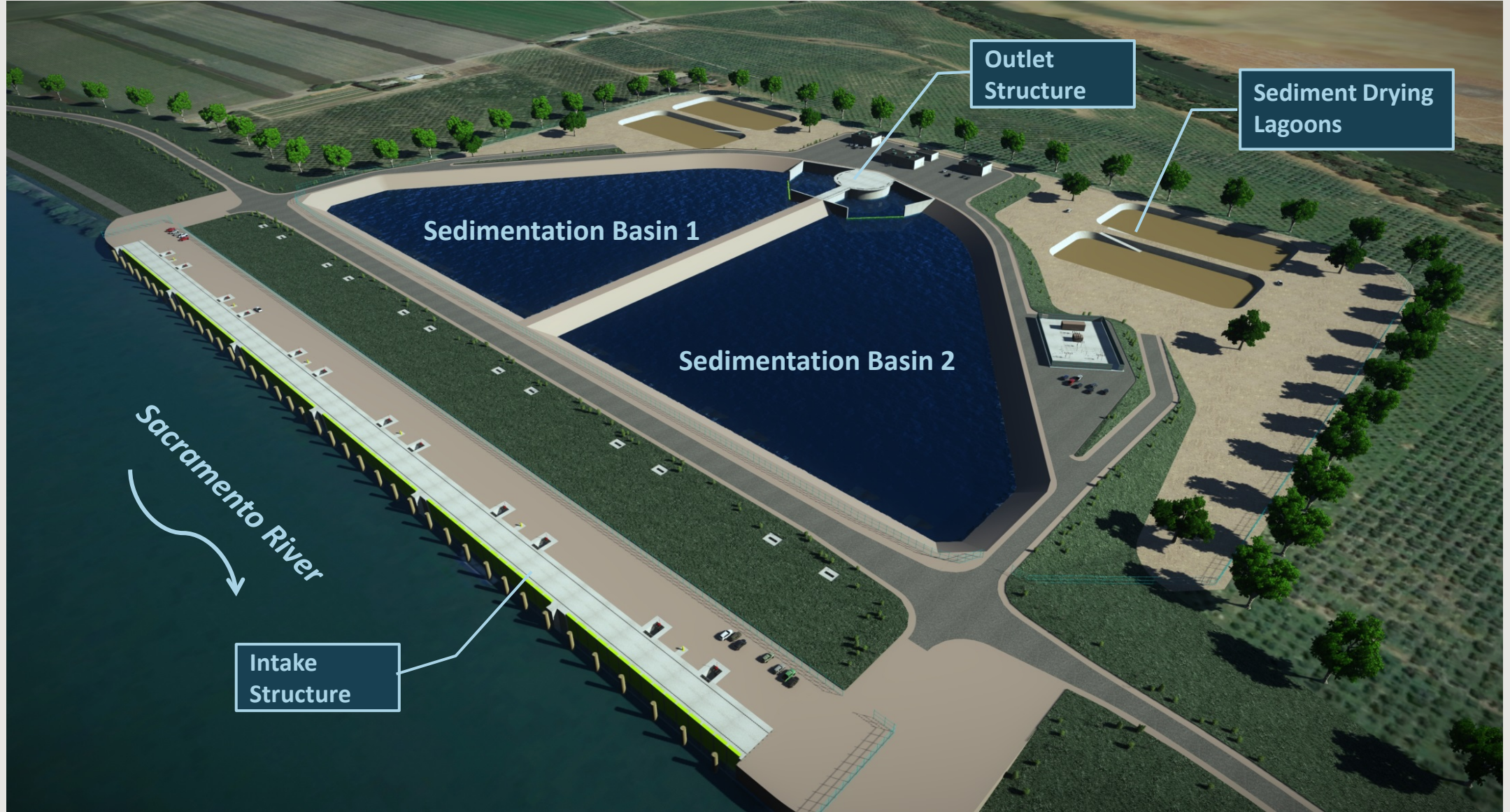
# GENERAL INTAKE DESIGN CRITERIA

General	
Intake	On-bank
Number of Intakes	3
Maximum Single Intake Capacity	3,000 cfs
Maximum System Flow Capacity	9,000 cfs
Hydraulic Intake Criteria	
Screen Approach Velocity	.20 fps
Screen Sweeping Velocity	≥0.20 fps



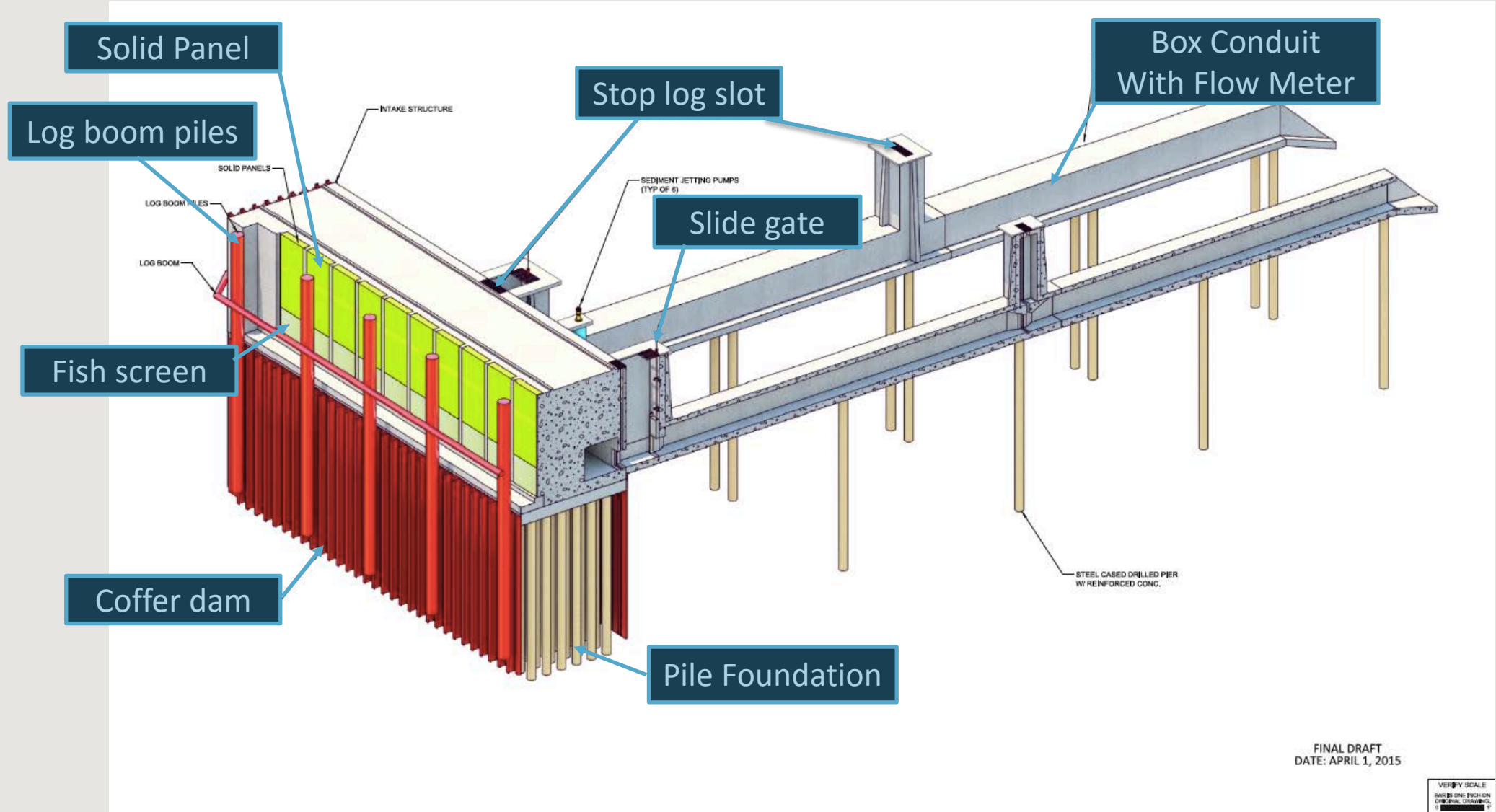


# TYPICAL RIVER INTAKE RENDERING





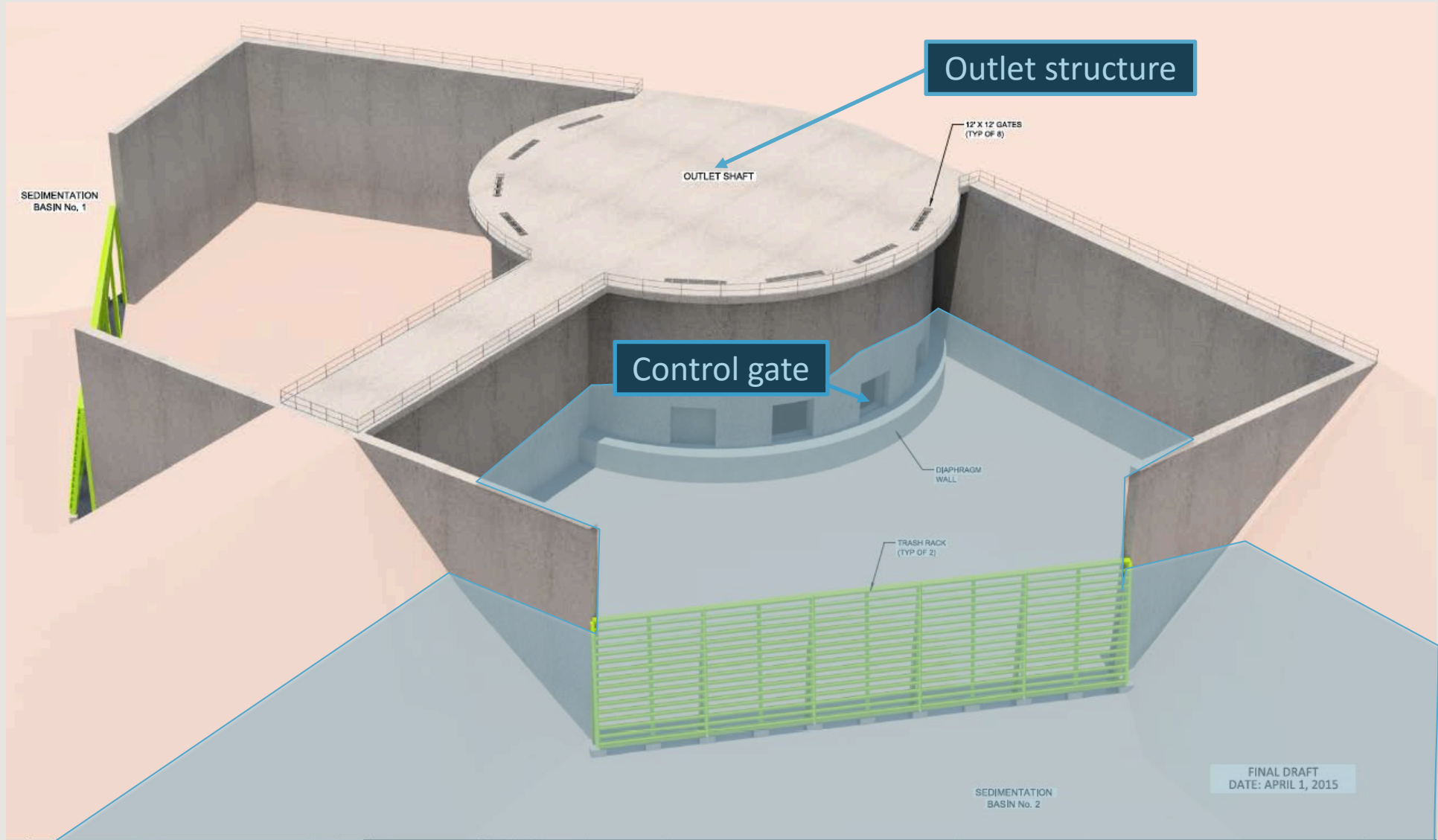
# ISOMETRIC VIEW OF AN INTAKE BAY







# OUTLET STRUCTURE





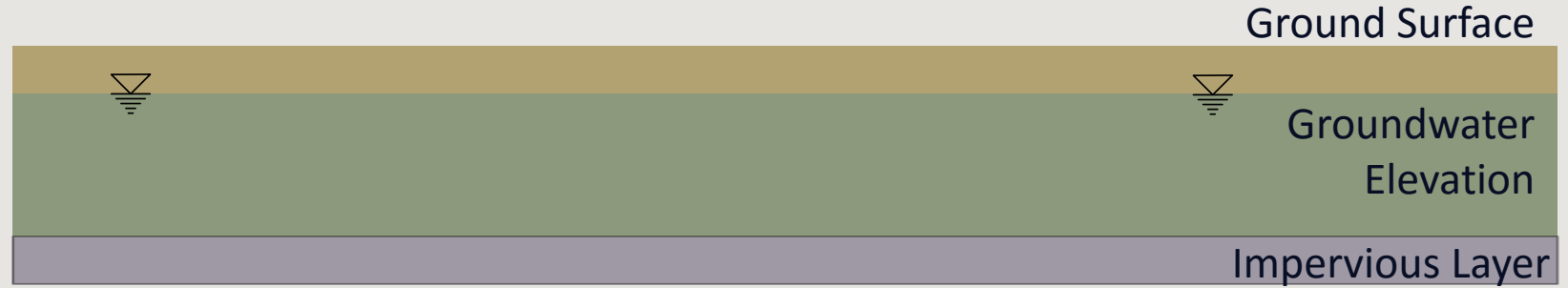
# GROUNDWATER CONTROL MEASURES

- **Slurry Cutoff Walls**
  - Hydraulically isolate construction areas for dewatering
  - Control Seepage from forebays and sedimentation basins
- **Toe drains**
- **Tunnel lining system**
- **Geotechnical studies and monitoring program**

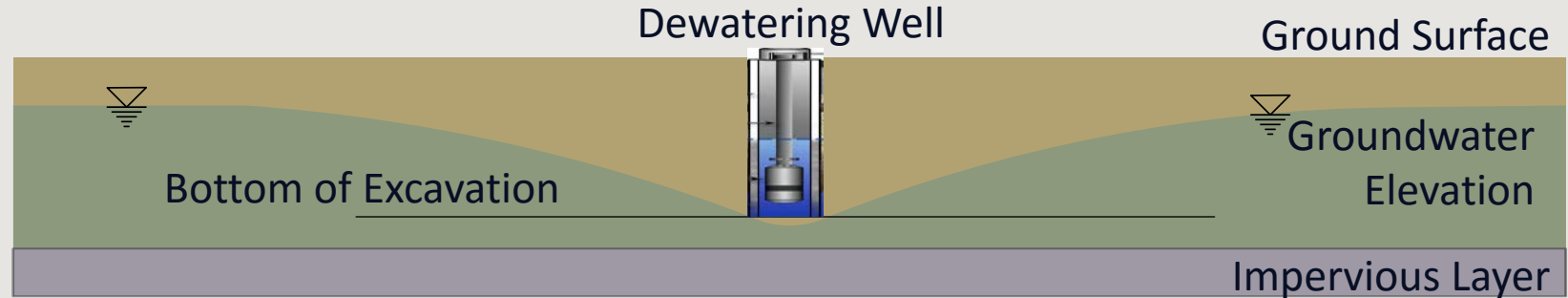


# DEWATERING

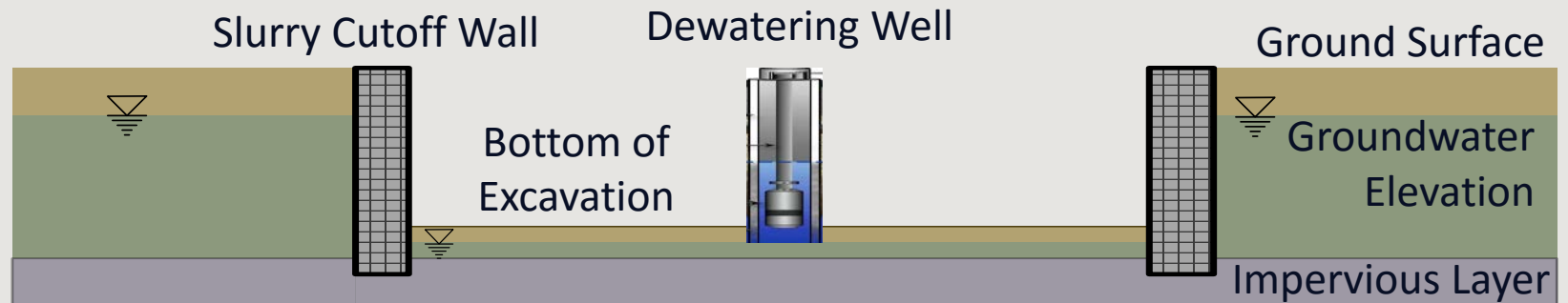
**Long-Term Groundwater Elevation Prior to Construction**



**Groundwater Elevation During Dewatering Actions**



**Groundwater Elevation During Dewatering with Slurry Cutoff Walls**







# INTAKE CONSTRUCTION





# EXISTING WATER DIVERSIONS

- **Total number of affected water rights**
  - Temporarily affected: 10
  - Permanently affected: 5
- **Mitigations for temporarily affected diversions**
  - Provide new groundwater wells
  - Provide alternate water supply from a permitted source

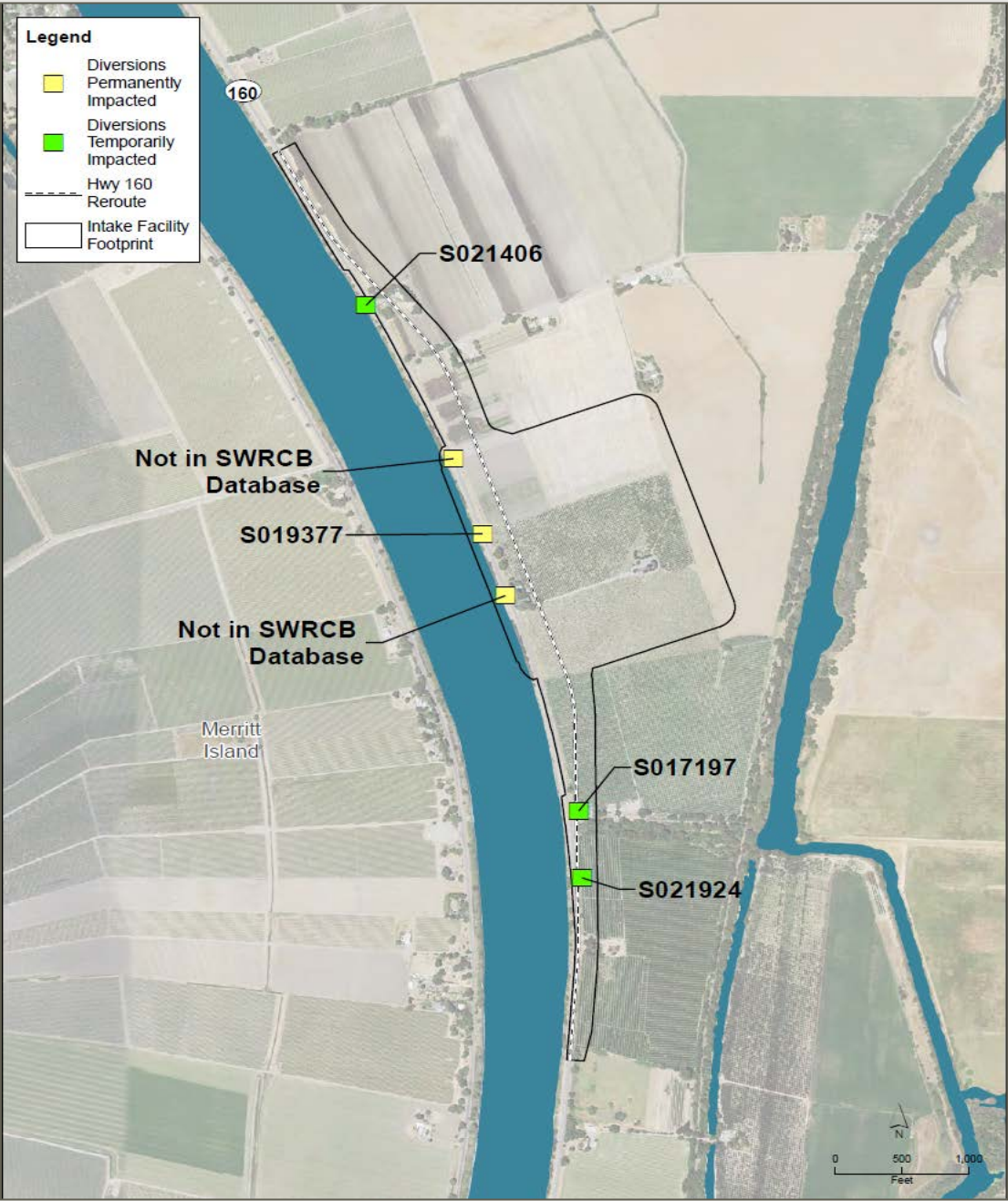


# EXISTING WATER DIVERSIONS

- **Mitigations for permanently affected diversions**
  - Provide temporary mitigation measures until the mitigation measures below are completed:
    - Relocate existing diversions outside of the intake structure footprint
    - Provide a new turnout from the proposed CWF sedimentation basins

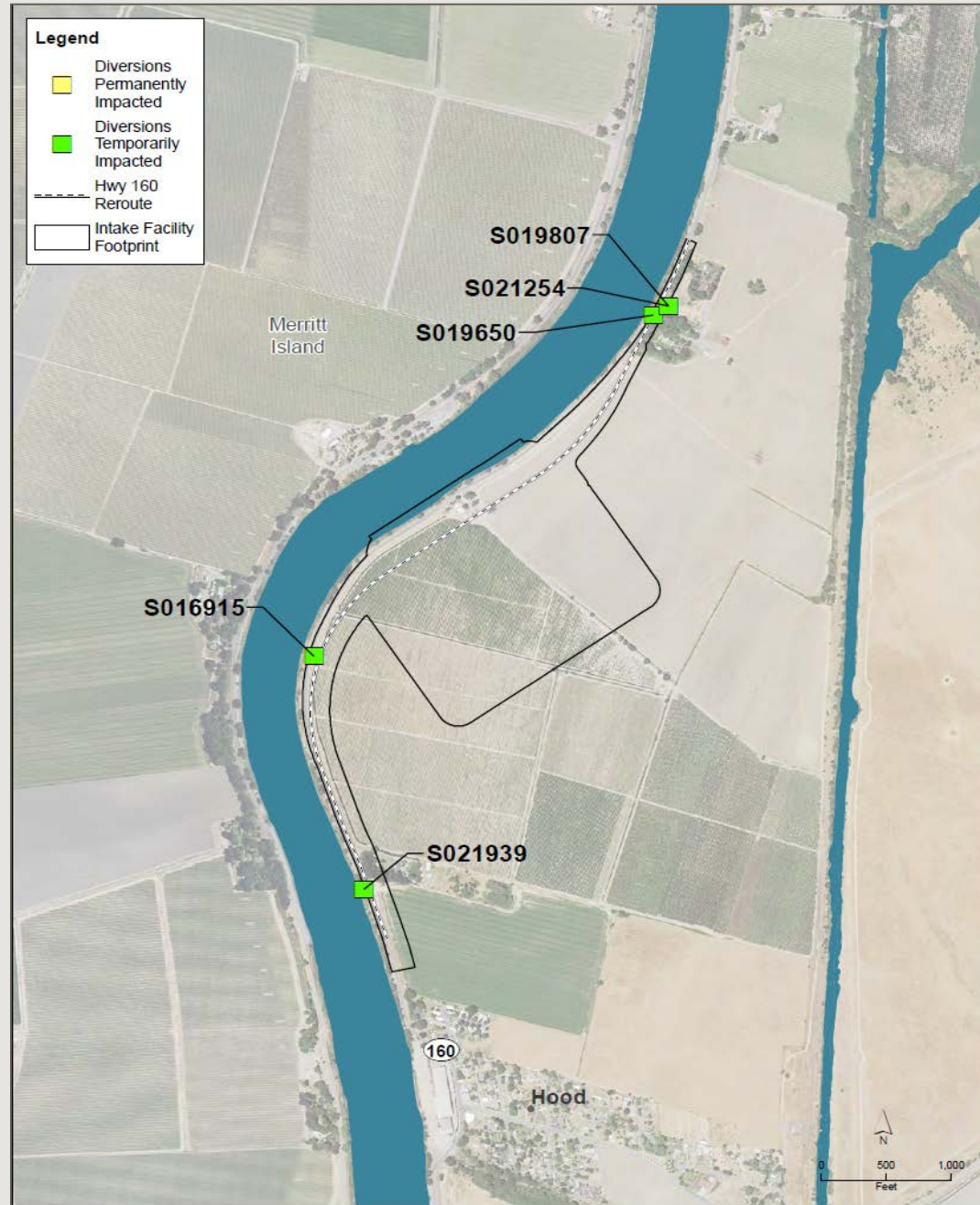


# INTAKE 2 DIVERSIONS





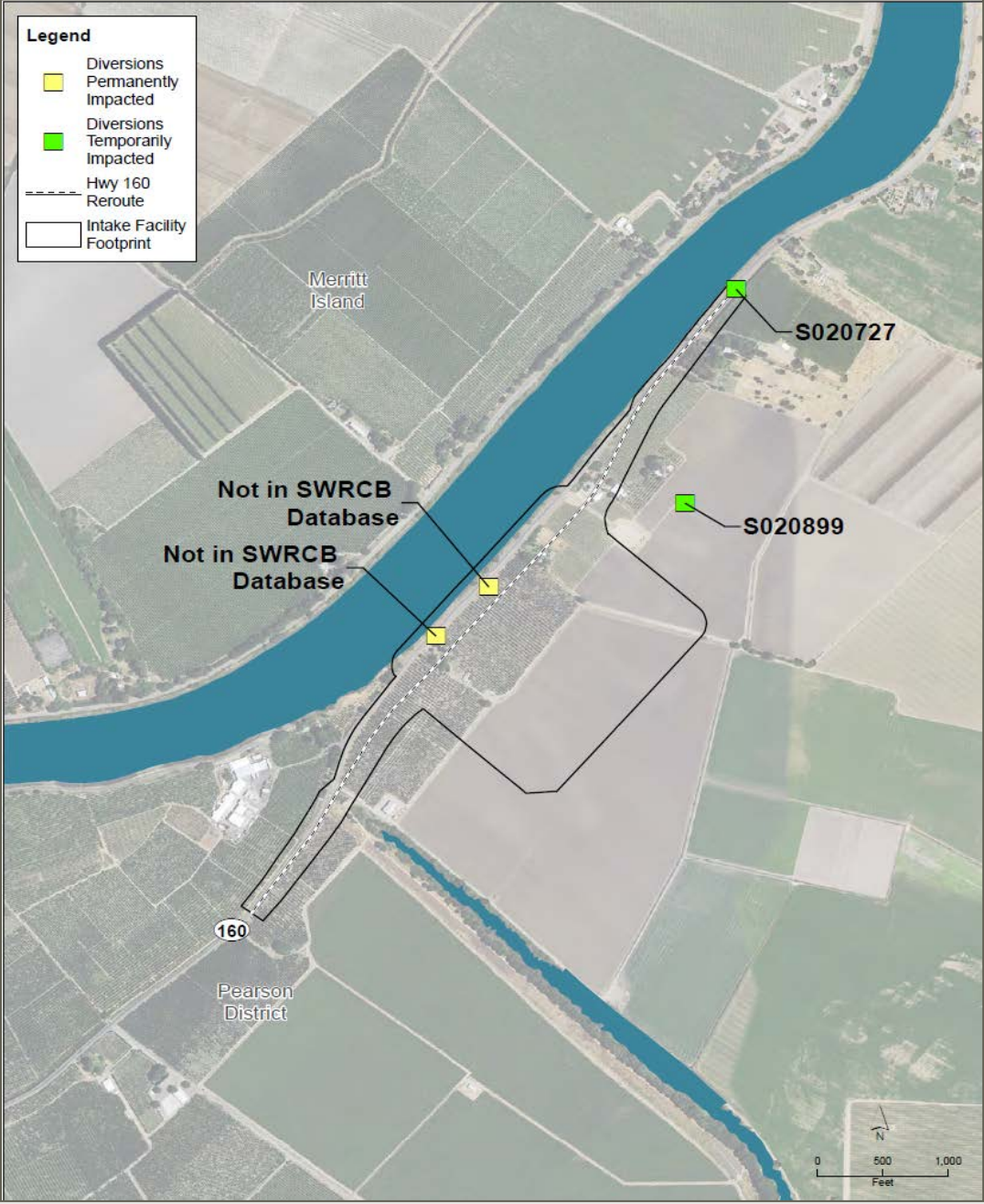
# INTAKE 3 DIVERSIONS





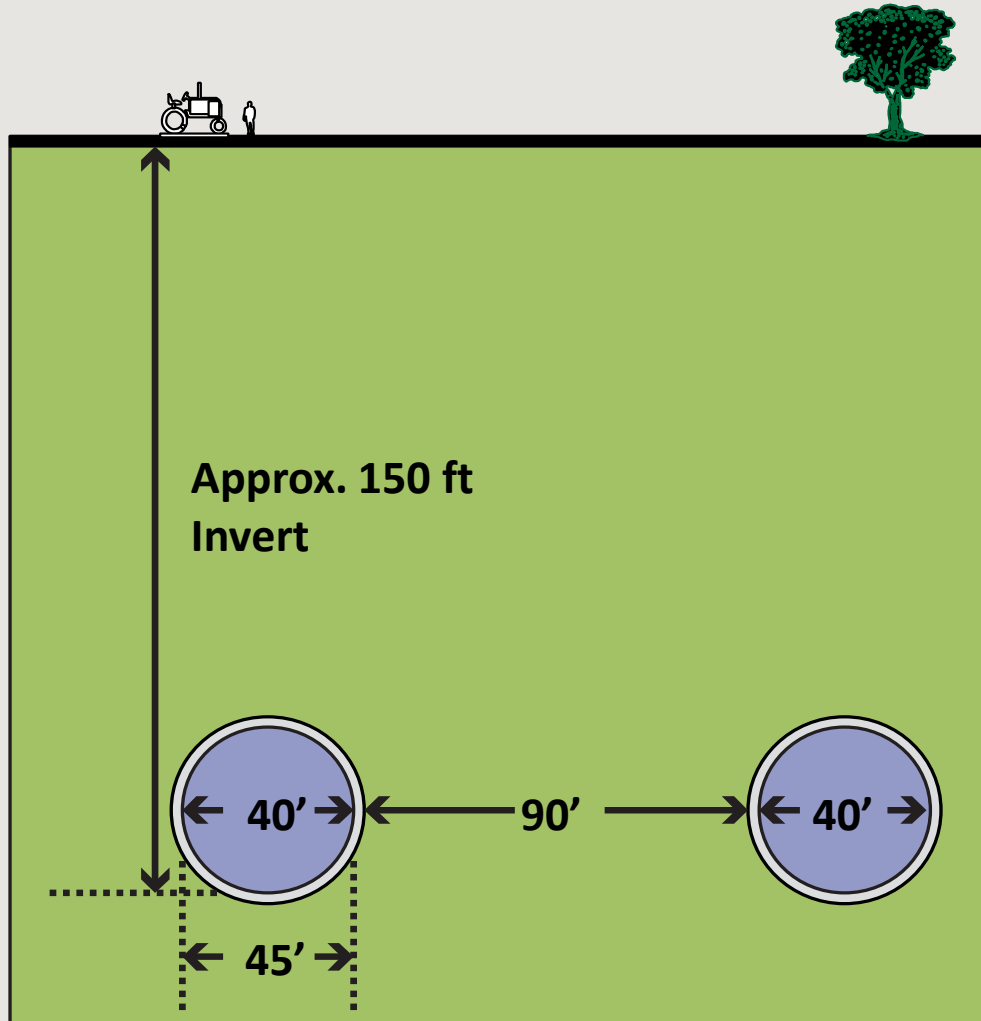


# INTAKE 5 DIVERSIONS



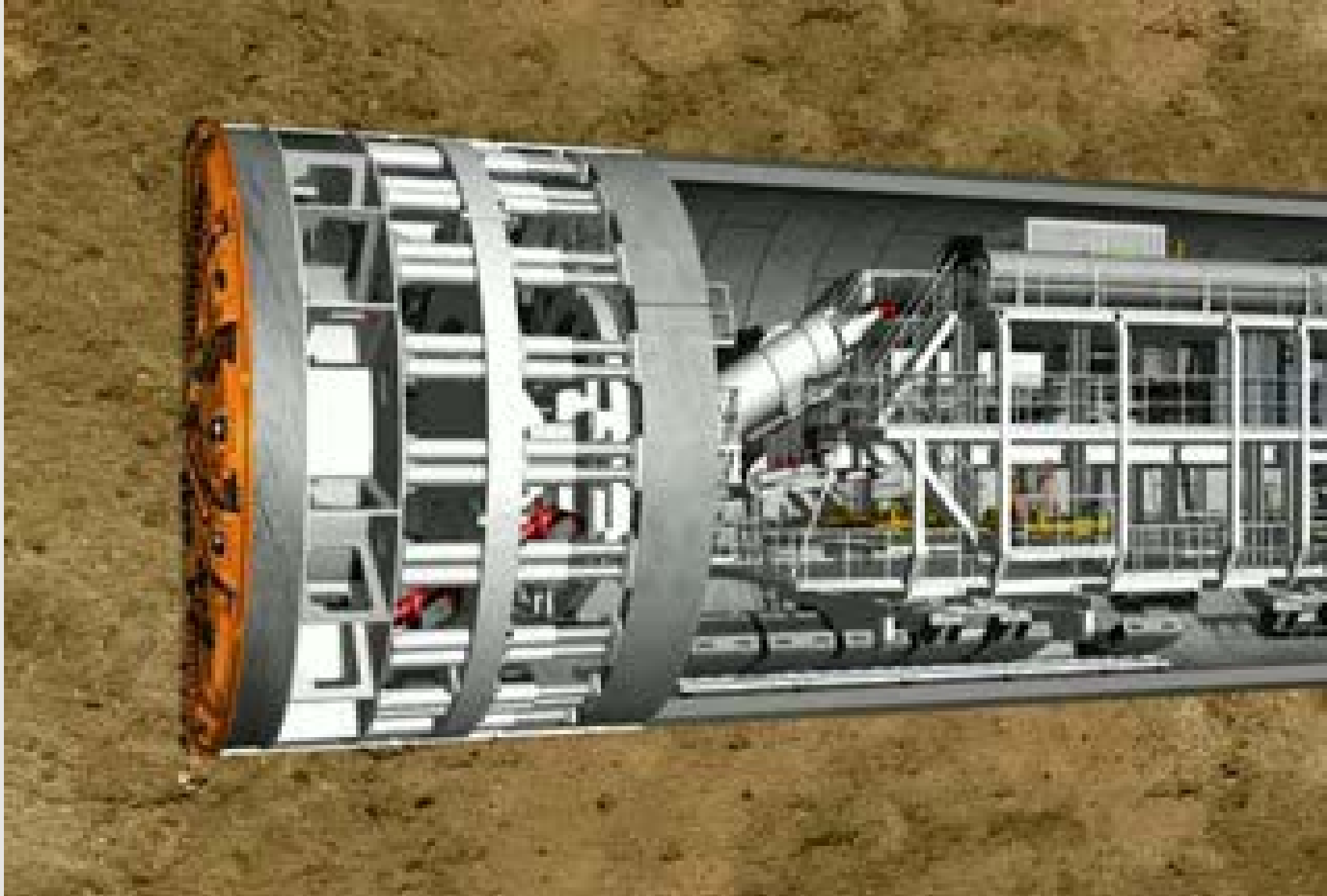


# MAIN TUNNELS





# TUNNEL BORING MACHINE EXCAVATION ANIMATION







# TUNNEL SEGMENT INSTALLATION ANIMATION





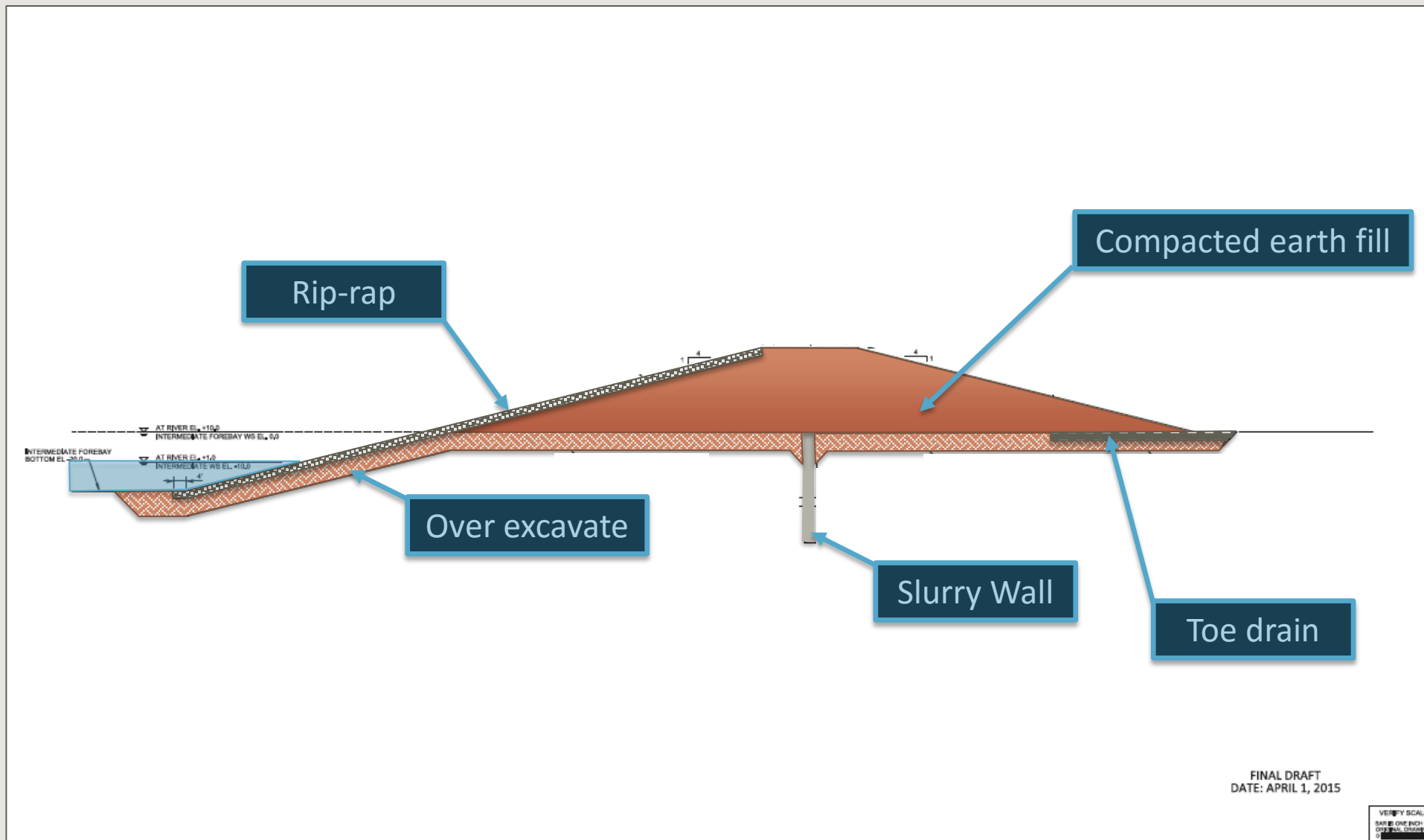
# SHAFT CONSTRUCTION

- Excavate diaphragm wall
- Install reinforcing steel
- Place concrete
- Remove soil inside shaft
- Install tremie concrete bottom
- Dewater shaft
- Install dewatering pump





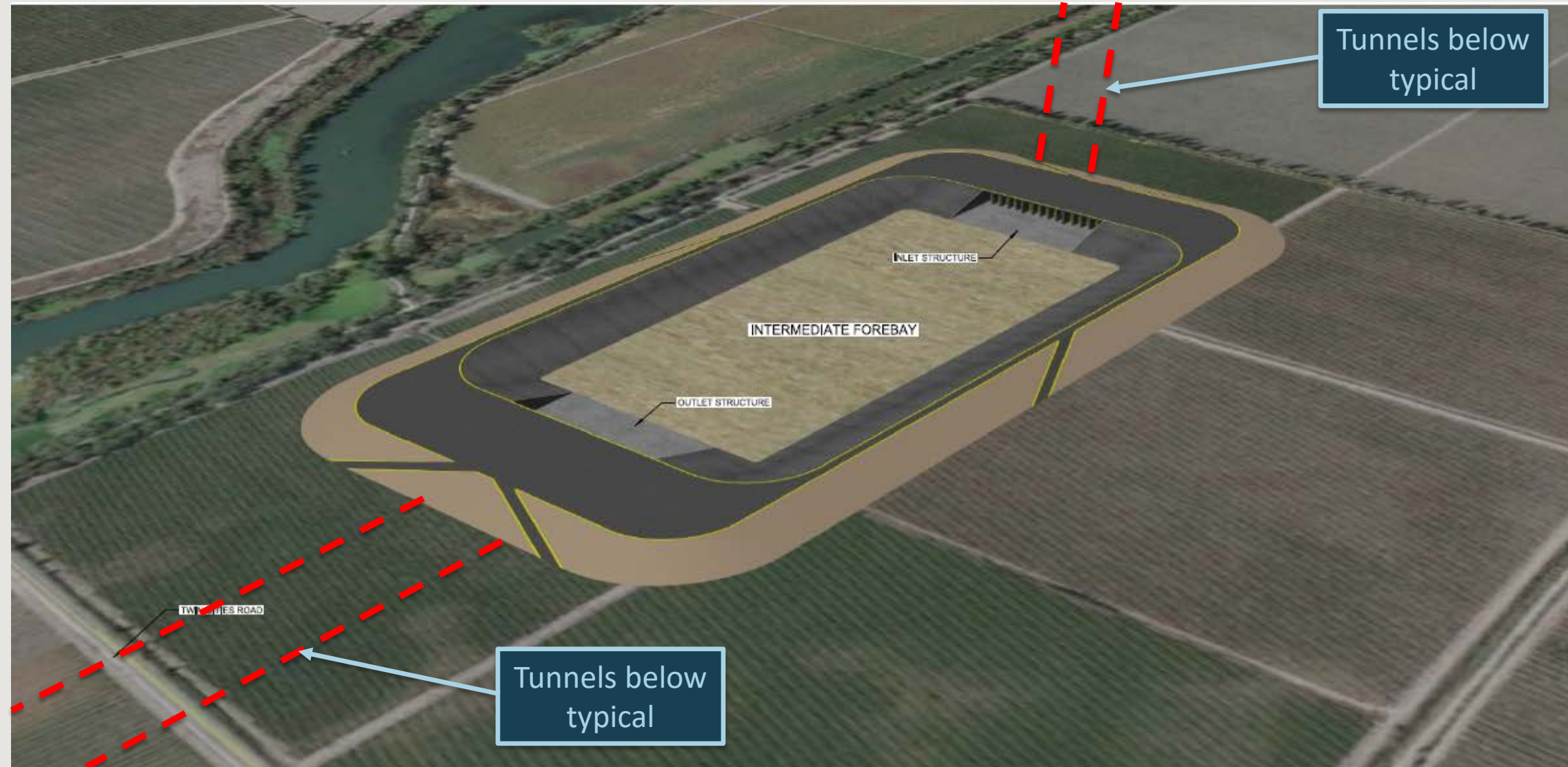
# FOREBAY EMBANKMENT





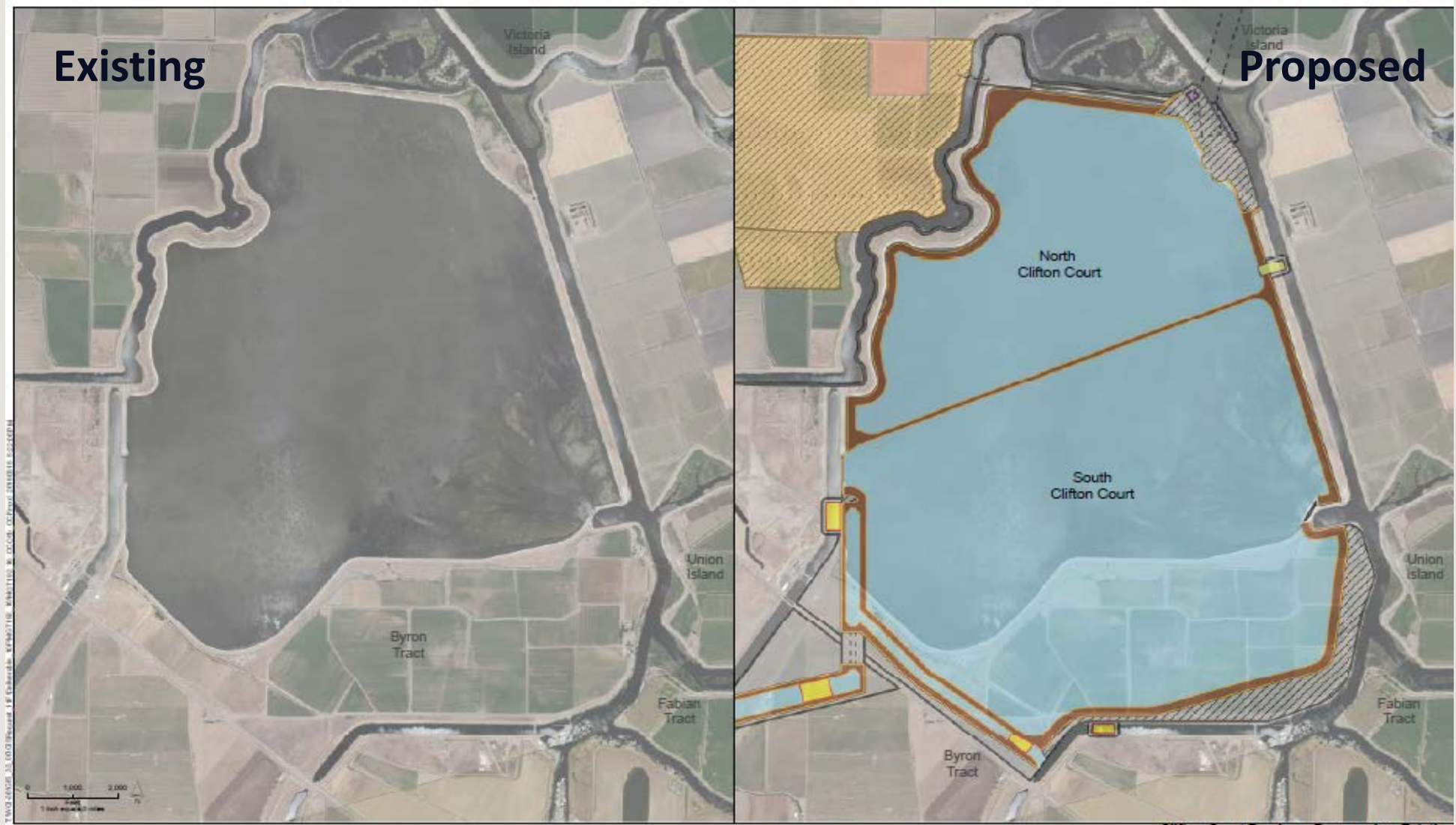


# INTERMEDIATE FOREBAY RENDERING





# CLIFTON COURT FOREBAY







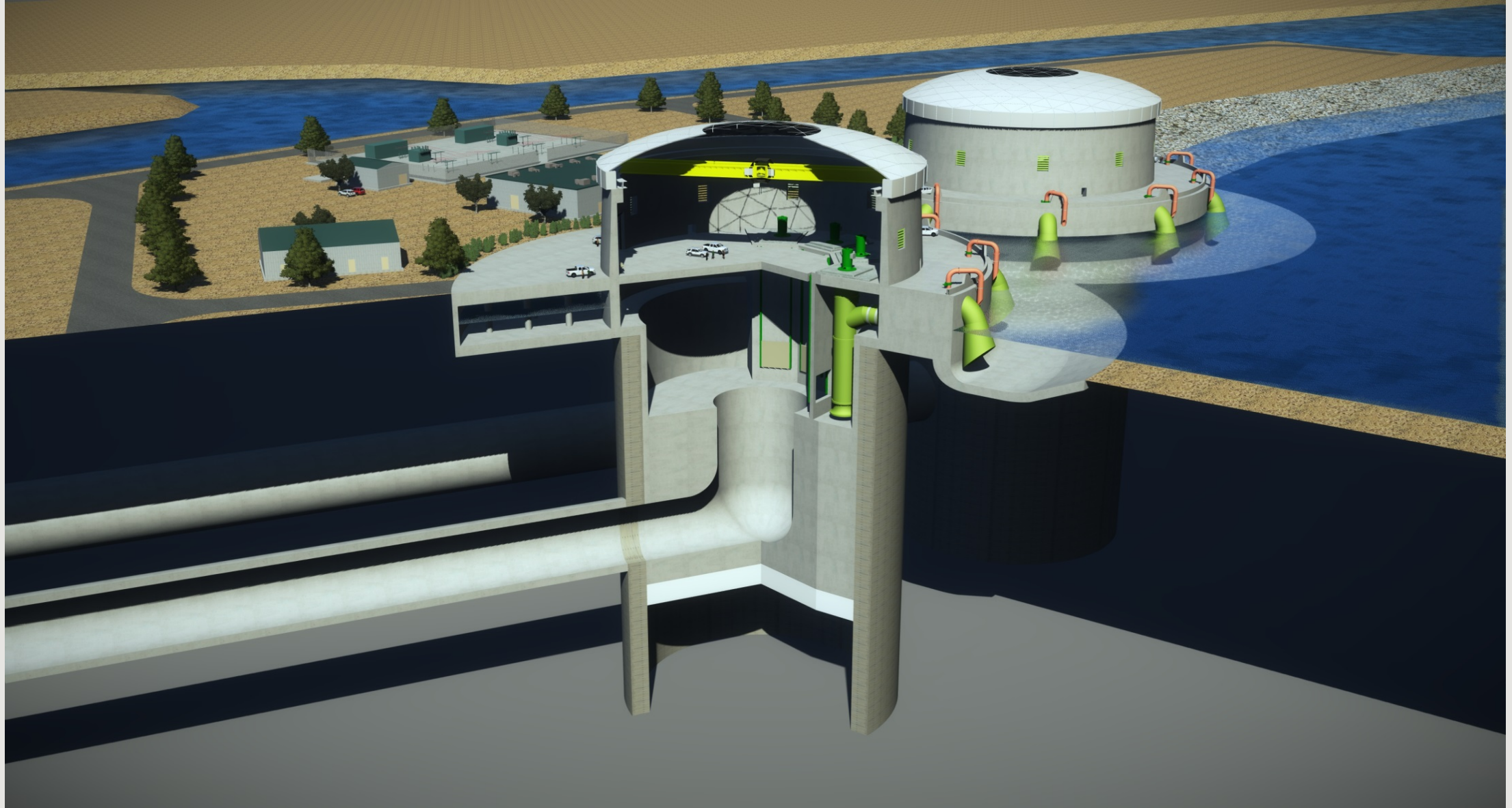
# CLIFTON COURT PUMPING PLANT RENDERING





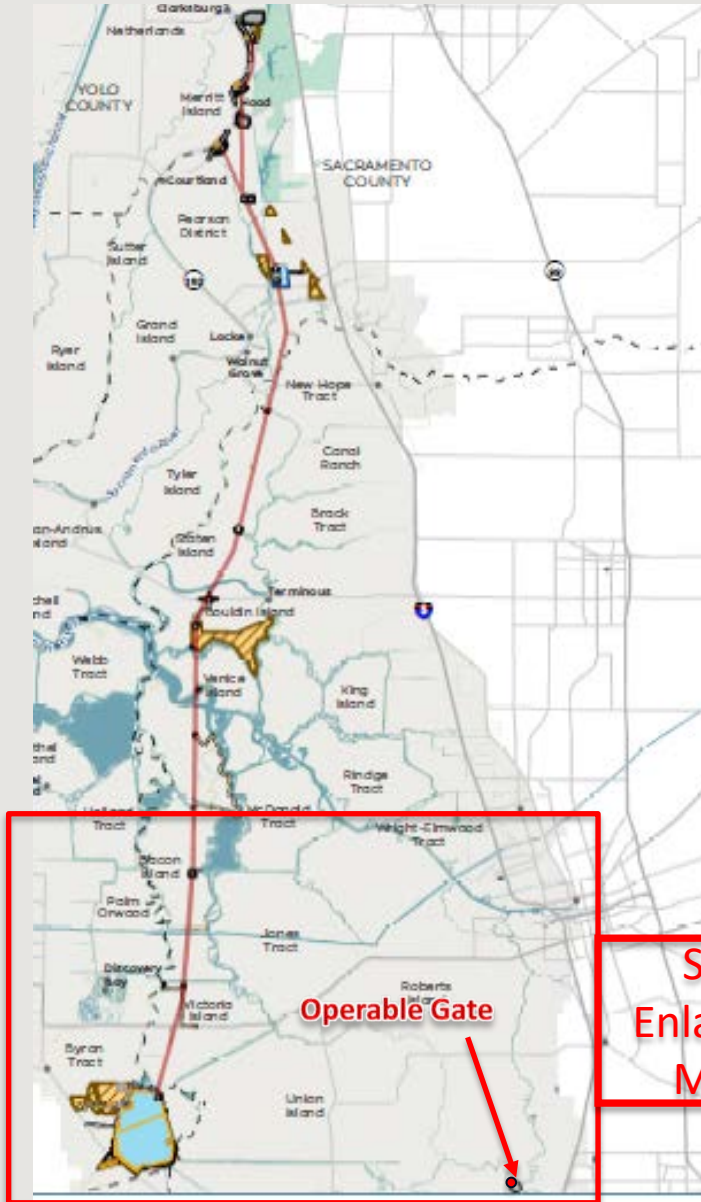


# CLIFTON COURT PUMPING PLANT RENDERING

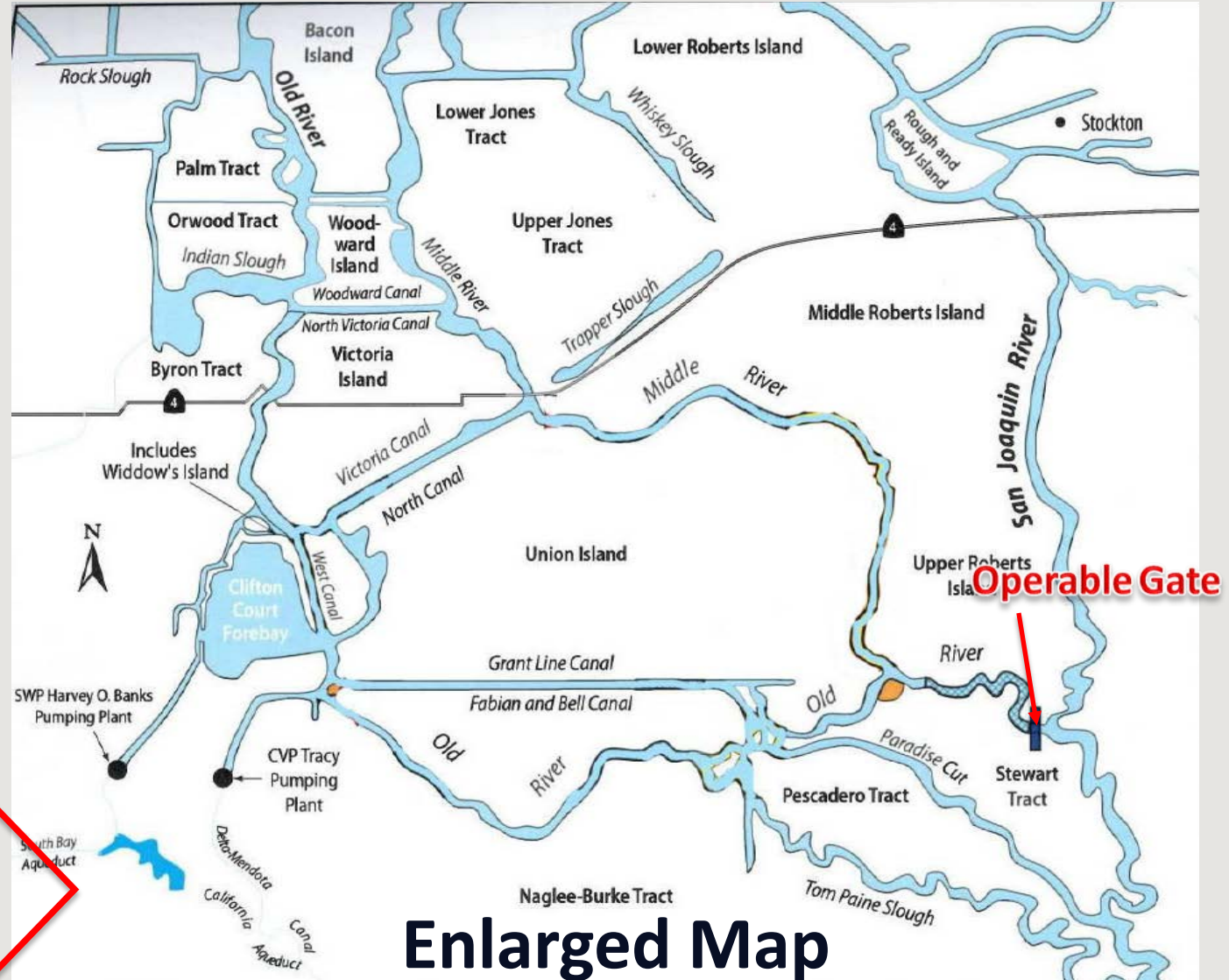




# HEAD OF OLD RIVER OPERABLE GATE LOCATION



See  
Enlarged  
Map





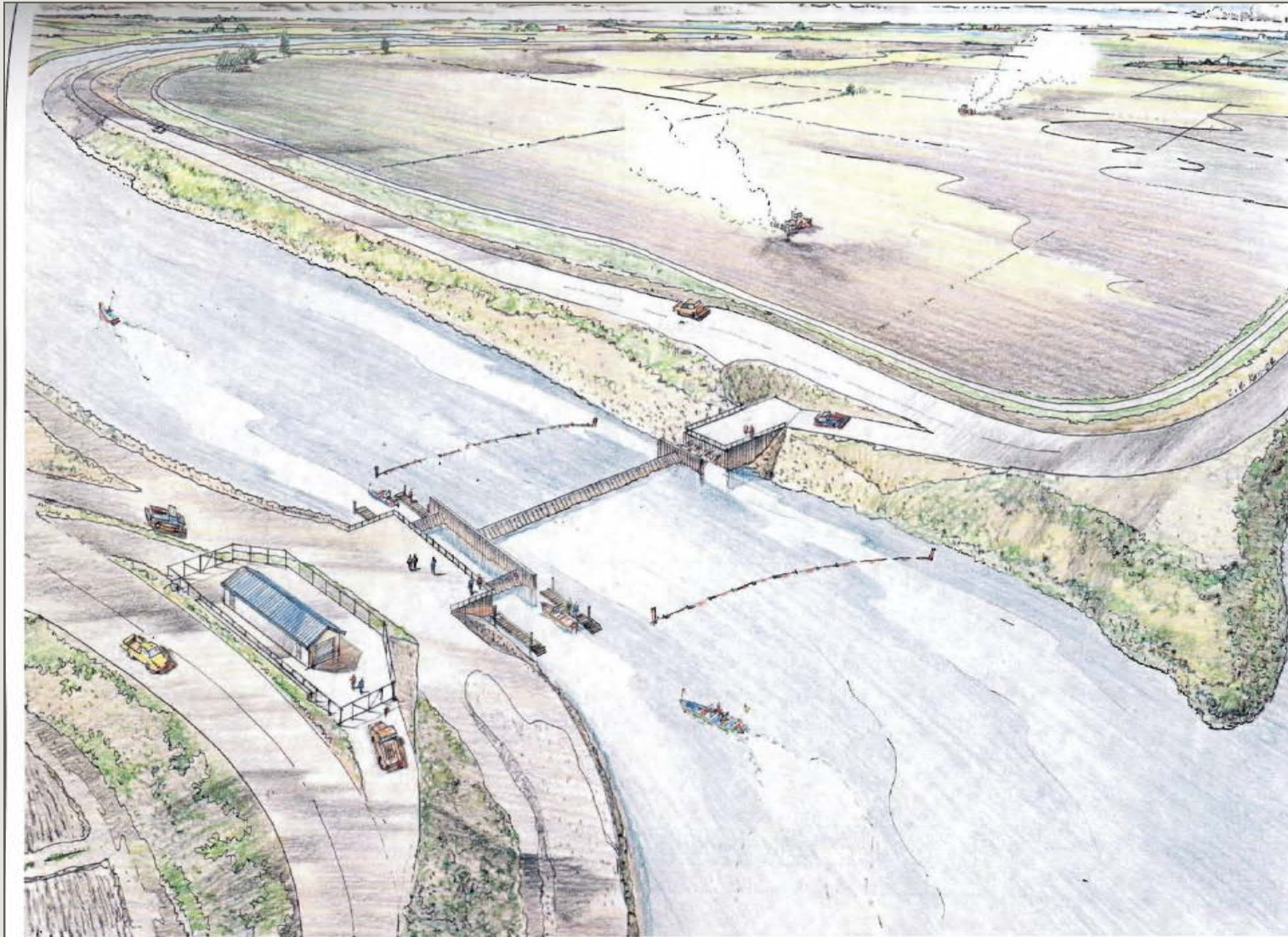


## HEAD OF OLD RIVER OPERABLE GATE

- **Located where San Joaquin and Old Rivers diverge**
- **Consists of five bottom-hinged gates, fish passage structure, boat lock, and other appurtenant facilities**
- **Within the confines of the existing channel (no levee relocation)**



# HEAD OF OLD RIVER OPERABLE GATE RENDERING



Source: California Department of Water Resources.



# FLOOD PROTECTION

- **At intake sites**
  - Temporary and long term protection measures
  - In accordance with USACE Section 408 permitting
- **Along surrounding levees**
  - Assessment of existing conditions
  - Improvements to be performed
  - Monitoring program before and during construction