Matilija Dam Ecosystem Restoration Project

Technical Updates
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Brian Person, PE, AECOM

February 11, 2020
Preferred Alternative – DRC 2A - Uncontrolled Orifices

- Two 12-ft diameter orifices bored partially through the dam from downstream at the approximate original streambed location
- Engineered “plugs” of undisturbed concrete remain at the upstream end of both orifices
- Charge holes are drilled into the “plugs” to later accept explosives
- Prior to the onset, or during the beginning stages, of a forecast flushing storm event, explosives are placed into the charge holes and are detonated, initiating the flushing of fine sediment through the dam
Preferred Alternative - DRC 2A - Uncontrolled Orifices
CDFW 65% Design Planning Study Grant – Scope of Work

- Field Investigations (AECOM, Gregg Drilling, NV5, Test Labs America)
- Dam Structural Evaluations (AECOM)
- Sediment and Hydraulic Analysis (Stillwater)
- Predictability of Flushing Event (AECOM)
- Re-evaluation of D/S Project Components and Real Estate Plan Update (AECOM)
- Short-term Water Supply Mitigation Project Components (AECOM)
- Long-term Water Supply Mitigation Project Components (AECOM)
• Dam Removal (AECOM)
• Camino Cielo Bridge Replacement (Dokken)
• Levee Project Components (Tetra Tech)
  • Casitas Springs Levee
  • Live Oak Acres Levee
  • Meiners Oaks Levee
• CEQA Update and Permitting Plan (Aspen)
• Independent Technical Review (TBD)
## Planning Design Schedule

<table>
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<tr>
<th>Task Name</th>
<th>Duration</th>
<th>Start</th>
<th>Finish</th>
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<td>Matilija Dam Removal 65% Design Planning Project</td>
<td>160.6 wks</td>
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<td>34 wks</td>
<td>Mon 9/9/19</td>
<td>Fri 5/1/20</td>
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Geotechnical Investigations
Physical and Analytical Testing
Concrete Coring – Upstream Face and Crest
Core Drilling
Upstream Face
And Crest
Core Drilling – Downstream Face
Cores
Structural Evaluations

USLC-3 (With Uplift)
Structural Evaluation Findings

- Conclusions drawn from the 2013 study confirmed
- Model results and trends compared favorably with those of the 2013 study
- Dam expected to have adequate structural capacity to safely withstand all design load cases for the current year
- Maximum compressive stresses are below allowable values, except at small areas around the left orifice.
- Tensile stresses are below the allowable values, with the exception of limited areas on the surface of the concrete near the slip joint and near the left abutment
- “Matilija Dam is concluded to have adequate safety against concrete overstressing, before and after installing the proposed orifices, for the assumed static and dynamic loading conditions.”
DSOD Coordination

- Consistent interaction with DSOD throughout the course of this and prior structural evaluations
- February 2019 meeting at DSOD offices in Sacramento
  - Presentation on structural evaluation approach, methods, and initial findings
  - Discussion and further analysis of proposed orifices
  - Discussion and analysis of structural stability under static and dynamic loading
  - Discussion of operating restrictions
  - DSOD-imposed operating restriction
- DSOD currently reviewing AECOM’s draft report; meeting to discuss review comments and to determine next steps
Sediment Transport Analysis

Matilija Creek/Ventura River, Distance from Matilija Dam

- Mill Canyon Road Bridge (21.3 km)
- Casitas Vista Road Bridge (16.9 km)
- Coyote Creek (16.3 km)
- Santa Ana Bridge (11.6 km)
- Baldwin Road Bridge (8.3 km)
- Robles Diversion Dam (3.7 km)
- Camino Cielo (1.5 km)
- Main St/HW101 Ramp Bridge (25.4 km)
- North Fork Matilija Creek (1.0 km)
- HW101 Bridge (25.7 km)
- River mouth (26.2 km)

Flow Direction

Matilija Dam

Watershed Overview
- Point of Interest
- USGS gage

Ventura River Watershed
Erosion of reservoir sediment: relatively fast, as expected

- After one storm, it should function as a natural river allowing for fish migration
Hydraulic Analysis - Translation from DREAM-2 to HEC-RAS

- Increased bed elevation within HEC-RAS cross sections based on DREAM-2 results
- Upstream of Robles: deposition within channel and floodplains
- Downstream of Robles: deposition within channel only
Modeled Changes in Channel Bed Elevations and 100-yr Water Surface Elevations (WSEs) for Future Conditions with Dam Removal

- Changes in WSEs for Future Conditions with Dam Removal during 100-yr storm event occurring within the first 68 years post-dam removal
- Changes in Channel Thalweg Elevation for Future Conditions with Dam Removal during 100-yr storm event occurring within first 68 years post-dam removal

![Graph showing changes in channel bed elevation and WSEs](image-url)
Modeled Changes in Channel Bed Elevation and 100-yr Water Surface Elevations for Future Quasi-equilibrium Conditions

- Changes in WSEs for Future Quasi-equilibrium Conditions with Dam Removal during 100-yr storm event
- Average Changes in Channel Thalweg Elevation for Future Quasi-equilibrium Conditions with Dam Removal
Storm Predictability - Flushing Storm Event

- Maximize sediment passage through the dam during initial orifice opening by removing “plugs” or opening gates
- Flushing storm event will ideally provide a minimum flow rate of 1,700 cubic feet per second (cfs) for a day
- To prepare for orifice opening, target rainfall prediction at least 3 days in advance of a given date
- Avoid opening orifises preceding a “false positive” indication of a flushing storm event
Multiple Regression Model

\[
Q = 0.351Q_{t-1} + 190.05P_{3t} + 187.9 P
\]
Equation Testing

- Used to predict flows based on precip records 1965 to present
- If daily precipitation exceeds 4.5 inches or total 3-day flow exceeds approximately 8 inches, equation will predict flow exceeding 1,700 cfs.
- Equation tended to under-predict large flows (>4,000 cfs) and over-predict smaller flows (1,000 to 4,000 cfs)
- Data set limited to flows 1,200 to 6,000 cfs, yielding 37 values, with evenly-distributed errors
Upcoming AECOM Work

• Update to Real Estate Plan – April 2020
• Re-evaluation of D/S Project Components – April 2020
• Short-Term Water Supply Alternatives Refinement – May 2020
• Long-Term Water Supply Alternatives Refinement – August 2020
• Dam Removal 10% Plans – May 2020
Camino Cielo Alternatives
Public Meeting – Held January 15, 2020

• Public Meeting held onsite (at local residence)
• Approximately 20 attendees, local residents and business owners
• Project need and alternatives presented
  • Alternative 2 (on existing alignment) overwhelmingly preferred
Alternative 2 – At Existing Alignment
Alternative 2 – At Existing Alignment

Looking south on Camino Cielo Rd at Conform

Looking upstream at Existing Bridge

Roadway Conform

Roadway Elevation
Levee Locations

- Meiners Oaks Levee
  - New Levee
  - Left Bank of River
  - 4,480 ft (0.85 mi) Long

- Live Oak Acres Levee
  - Existing Levee
  - Right Bank of River
  - 5,635 ft (1.07 mi) Long

- Casitas Springs Levee
  - Existing Levee
  - Left Bank of River
  - 5,877 ft (1.11 mi) Long
Casitas Springs Levee

Alt 1

Alt 2

Alt 3

Alt 4

Alternative Alignments

Legend

Alt

Alt A (Current Existing Alignment)

Alt B

VENTURA COUNTY Watershed Protection District Ventura River 2 Levee System
Live Oak Acres Levee

Alt 1

Alt 2

Legend
System Name

Live Oak Acres Levee System
Meiners Oaks Levee

Alt 1

Alt 2

Alt 3

Alt 4

Legend

System Name
Meiners Oaks Levee System

Meiners Oaks Levee Location Map
Landside Improvements

**Landside Improvement A**
Continuation of riverside material onto crown and landside

**Landside Improvement B**
Grouted stone on landside slope

**Landside Improvement C**
Wire mesh

**Landside Improvement D**
Raptor perch/owl box
Purpose of CEQA Update and Permitting Plan

• To conduct an environmental review of the updated project in conformance with the requirements of the California Environmental Quality Act (CEQA).

• To identify permits required from other agencies and formulate a plan for obtaining those permits at the appropriate time.
SEIR Process

1. **Notice of Preparation**: Q2 2020
2. **Comment Analysis & Issue Identification**: Q2 2020
3. **Publish Draft SEIR**: Early Q4 2020
4. **Draft SEIR 45-day Public Review Period**: Q4 2020
5. **Respond to Draft SEIR Comments**: Q4 2020 - Q1 2021
6. **Publish Final SEIR**: Late Q1 or Early Q2 2021
7. **Project Decision**
National Fish and Wildlife Foundation Grant

• Project Objective - Evaluate the effect of dam removal on estuary and coastal ocean dynamics and habitat

• Approach
  • Multi-model approach to predict dynamics over range of timescales
  • Focus on impact of dam removal compared to current conditions
  • Bound range of anticipated dam removal impacts
  • Evaluate impact to habitat
New Santa Ana Bridge Alignment
- Widen river 150 ft to 230 ft
- Improve fish and sediment passage
- Retain existing bridge until new bridge completed
## Project Schedule

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Questions?