



California Water Research Technical Memo

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Borrow sources for the California WaterFix

The California Water Fix Incidental Take Permit states that the project will need to borrow 21 million cubic yards for engineered fill:

Borrow Fill: The total amount of borrow material for engineered fill used in all aspects of the Project will be approximately 21 million cy. This total amount will include approximately 3 million cy for tunnel shaft pads, 6.5 million cy for the CCF embankments, 2 million cy for the IF embankments, 6.7 million cy at the three intake sites (approximately 2 million cy each), and 2.6 million cy at the CCFPP site. Source locations for this borrow material will be within the Project Area. Apart from engineering specifications, the criteria for selection of borrow sites will include the following:

- Borrow material will not require post-excavation processing (other than moisture conditioning).
- Borrow material will be exposed at surface and require no, or very limited, overburden removal.
- Borrow areas will be selected to minimize the impact or encroachment on existing surface and subsurface development and environmentally sensitive areas as much as possible.

Even without the new CCF embankments, the project will need 14.5 million cubic yards of engineered fill. The WaterFix Final EIR/EIS does not include a geotechnical evaluation for sources of borrow, although they have geotechnical boring data.

The In-Delta Storage Project Borrow Fill Geotechnical Report was done by URS corporation for the California Department of Water Resources. The report shows the kind of geotechnical investigation that should have been done for the California WaterFix project. URS evaluated potential borrow areas, assuming that the borrow pits were no more than 15 feet deep, and at least 1500 feet from the crests of the levees. This minimizes the risks of creating underseepage conditions which could cause levee failure.

The report found that extensive overburden removal was required to get to deposits that were usable for fill. Overburden (assuming excavation of no more than 15' deep) was 3.6:1 on Bacon Island (overexcavation of 3.6 feet for every one foot of usable fill). From the In-Delta Storage Borrow Area Geotechnical Report (p. 12):

Table 6-1. Summary of Available Borrow Volume Estimates

Estimated Area/Volume	Webb Tract	Bacon Island
Delineated Area (acres)	2330	2620
Volume of Overburden Excavation (CY)	36.9 million	49.6 million
Volume of Potential Borrow Materials within 15 feet of the Ground Surface (CY)	19.5 million	13.8 million
Ratio of Overburden Volume to Borrow Volume	1.9:1	3.6:1

The WaterFix boring logs for Bacon Island show that it is 18-23' feet down to a layer without organics, suitable for engineered fill. So borrow pits on Bacon Island may not be feasible in many locations. Bouldin Island (where there is a large tunnel muck pile) should be similar in peat depths to Bacon Island, based on isopachs of peat depth in the Central Delta.

Some of the borrow pits could be dug in future disposal areas for reusable tunnel muck (RTM), and the Incidental Take Permit requires that the borrow pits be filled with tunnel muck when possible. But the borrow needed near the intakes is much larger than the tunnel muck volume or disposal area.

Table 1.8 Volumes of spoils for each Project component and acreages of spoils disposition sites.

Disposal Site	Volume (cy)	Disposal Area (acres)
RTM and dredged material disposal site near Intake 2	1,020,000	45.6
RTM disposal sites near IF	9,060,000	404.7
RTM disposal site on Bouldin Island	8,340,000	1,208.8
RTM and dredged material disposal sites near CCF	5,370,000 (RTM) 7,000,000 (dredged)	899.6
TOTAL	30,790,000	2,558.7

Conclusion: Unless borrow fill is trucked or barged in, it will likely result in extensive additional surface impacts, not shown in the California WaterFix facilities maps in the Final EIR/EIS or Supplemental EIR/EIS.