

## 5-Agency Technical Recommendations for the Location of BDCP Intakes 1-7

December 13, 2011

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### **Purpose**

Technical staff from the 5-Agencies and ICF consultants participated in a selection criteria process and field visit (to potential intake sites 3, 4, and 5 on November 7, 2011) to provide management with recommendations on the siting of intakes 1-7.

### **Overview**

During the Fish Facilities Technical Team (FFTT) process it was discovered that multiple coordinates and associated footprints existed for intake locations 1-5. An initial set of GPS coordinates had been developed for the 2010 Conceptual Engineering Report (CER; referred to as CER and also labeled as EIR in Fig 1). After the release of the CER, DHCCP developed an altered version of those coordinates (labeled Alt in Fig 1). The differences between the two efforts can be seen visually in Figure 1, an excerpt from the 2011 FFTT Technical Memorandum. For the two locations furthest upstream (intakes 1 and 2), the alterations were minimal in comparison to the initial coordinates identified during the CER process. However, the locations for intakes 3, 4, and 5 differed greatly, which prompted the FFTT to recommend a field visit to those alternative intake sites with agency and consultant staff knowledgeable in the biology, engineering, botany, community/land use, and hydrology for the area. Recommendations by the 5-Agency technical staff are presented in this findings report for the approval of management to move forward with the effects analysis. Technical staff based their recommendations from previous siting efforts that have already taken place by the DHCCP/DWR (Alt Intakes) and the EIR/EIS consultants (CER or EIR Intakes) and/or by recommending modifications to those locations, rather than looking for new sites up- or downstream of each pair of alternative locations. All potential intake sites were on-bank and located on the east bank of the Sacramento River. As recommended in the 2011 FFTT report, sites with a near-bank bed elevation of -15' or greater were preferable.

Footprints developed by the DHCCP engineers represent the maximum temporary and permanent impacts that could occur from the construction and maintenance of the water diversions and fish screens. The footprints likely overestimate potential impacts from the proposed facilities creating some

flexibility within the current footprints being utilized to accommodate minor adjustments that may occur later in the process from outstanding side-bar analyses recommended by the FFTT. Outstanding analyses include concepts such as phasing, approach and sweeping velocities that could influence screen length.

Basic criteria used for site selection include, in no particular order, a site's ability to: minimize impacts to aquatic and terrestrial species, maintain a diversion structure's functionality, provide adequate river depth (bed elevations from LIDAR and bathymetry data), provide adequate sweeping flows (positioning along the river), maintain flood neutrality, and minimize impacts to land use and community (roadways, structures). In addition, criteria identified in the FFTT report were also used for site selection.

### **Recommendations**

*Intake 1* – The 5-Agencies recommend the use of CER 1 (or EIR 1) (See Fig 2).

Rationale - The center-point of the potential screens for Alt 1 and CER 1 are approximately 650 ft apart. The designed screen height of either diversion would be approximately 19 feet (Table 1). The differences between the two locations were not significant enough to warrant altering the footprints already developed by DWR during the CER process. The preliminary footprints for sites Alt 1 and CER 1 overlapped significantly.

*Intake 2* – The 5-Agencies recommend the use of CER 2 (or EIR 2) (See Fig 3).

Rationale – Similarly to intake 1, the center-point of the potential screens for Alt 2 and CER 2 are close in proximity with overlapping footprints. The differences between the two locations were not significant enough to warrant altering the footprints already developed by DWR during the CER process. The designed screen height of either diversion would be approximately 11 ft (Table 1). Alternative locations for intake 2 are shallower than the other seven locations; thus intake 2 could require the longest screen length. Alternatives solutions to reducing screen length will be pursued.

*Intake 3* – The 5-Agencies recommend the use of Alt 3 (see Fig 4).

Rationale – Alt 3 is located on the outer bend at the downstream end of a curve. Whereas, CER 3 is positioned on the inner bend of a relatively sharp river bend, with shallower bed elevations (Table 1). Design screen height for Alt 3 would be approximately 22 ft and 10 ft for CER 3 (Table 1). For both Alt 3

and CER 3, the inside of the levee is rip-rapped with sparse vegetation. During the field visit, CER 3 showed undesirable signs of shallow depths (exposed sandy edges near the water line) due to the location of the site relative to the river bend. The FFTT in their 2011 report rated CER 3 as poor due to the location on the bend. Deeper sites are more appropriate to avoid the potential sediment build-up over time that can occur in-front of the screens. Alt 3 was rated higher by the FFTT due to location on the river and adequate average bed elevations for screen placement. CER 3's proximity to the town of Hood (where Hood Franklin Road dead ends into 160) increases its potential for land use/community impacts. With respect to terrestrial biological resources, the two locations were similar. With respect to agricultural land use, CER 3 supports row crops and includes prime farmland under Williamson Act contract; Alt 3 supports pear orchards, alfalfa, wheat row crops, and grazing land on non-Williamson Act land.

*Intake 4* – The 5-Agencies recommend locating intake 4 in between Alt 4 and CER 4 (see Fig 5).

Rationale – CER 4 was rated as poor by the FFTT due to its location on the downstream end of a short river bend. The design screen height of Alt 4 would be approximately 16 ft and 11 ft for CER 4 (Table 1). In the field, CER 4 showed signs of shallow depths (exposed sandy edges), which validated the FFTT's identification of this site being a poor location for a diversion. Alt 4 met the depth requirements of the criteria, but had substantial land-side impacts from the temporary and permanent footprint to the town of Hood. Community/land use impacts were identified as a potential concern with the Alt 4 location. With respect to terrestrial biological resources, the river-side of the levee at CER 4 supported a cluster of large trees, which could serve as habitat for special-status species. A previous survey of CER 4 documented elderberry shrubs at the southern portion of the CER 4 location. At Alt 4, riparian vegetation associated with a slough could support special-status species. With respect to agricultural land use, CER 4 supports pear orchards and row crops, while Alt 4 supports row crops and grazing land. It was noted that a natural gas field (Hood-Franklin) was in the proximity of intake 4 site locations. In order to avoid potentially substantial impacts to the town of Hood, the group reviewed the bathymetry map for a location between Alt 4 and CER 4 that had suitable depths adequate for function of the structure. Just downstream of Alt 4, and upstream of CER 4, bed elevations occur in the -20' to -30' depths. The group recommends adjusting the placement of the screen in between the coordinates of Alt 4 and CER 4, as shown in red marking on Fig. 5, minimizing direct impacts to the town of Hood and potential special-status species habitat along the slough.

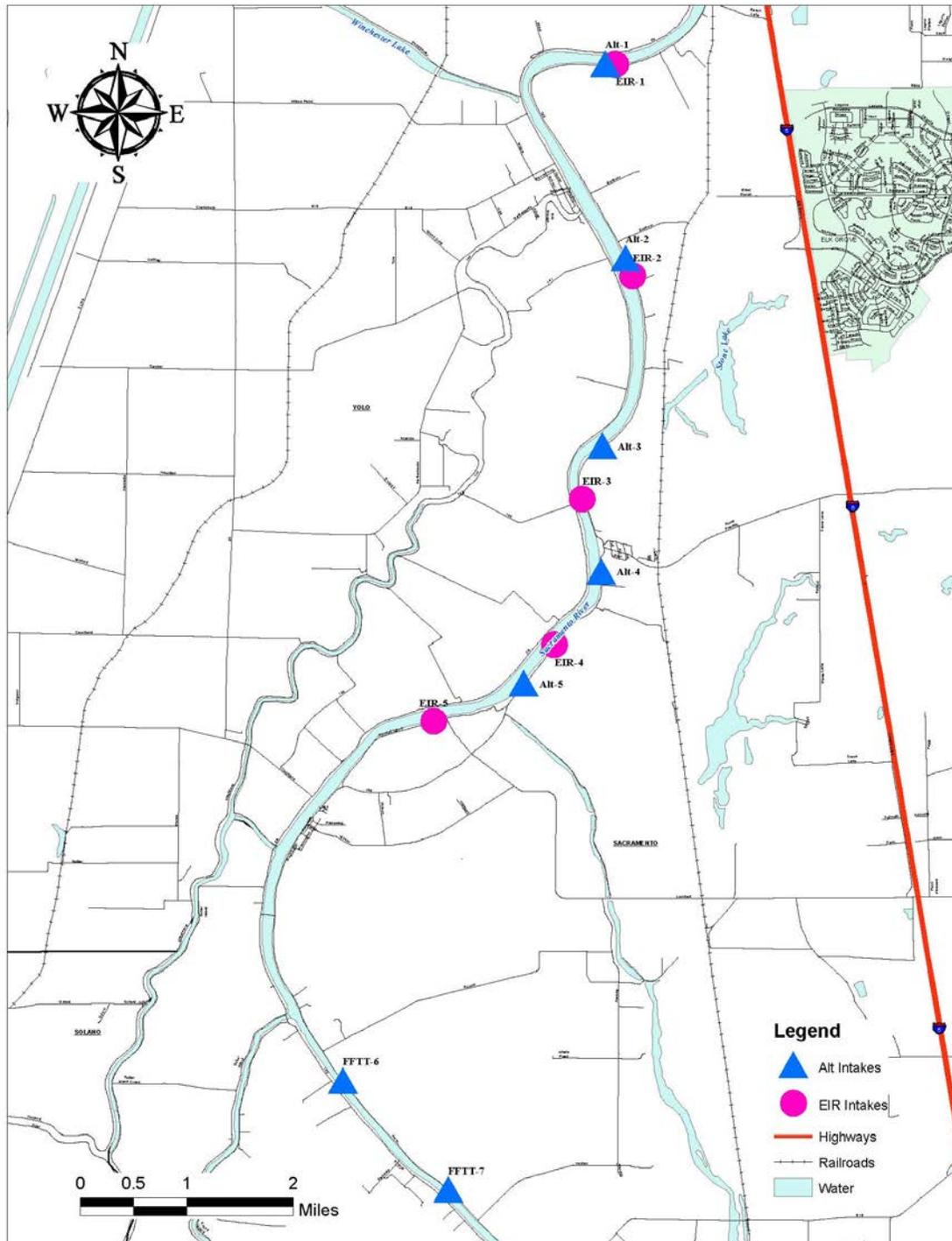
*Intake 5* – The 5-Agencies recommend the use of Alt 5 (see Fig 6).

Rationale – Alt 5 is located on an outer bend near the upstream end of a gentle river bend. The FFTT rated it good to moderate based on its position along the river bend. CER 5 is located on Randall Island, on the downstream end of a short river bend with shallow bed elevations (Table 1). This site rated poor to moderate by the FFTT due to location relative to the river bend. The design screen height for Alt 5 is approximately 15 ft and 10 ft for CER 5 (Table 1). When evaluating the land-side impacts for the two options, it was noticed that Alt 5 would require scenic-route Hwy 160 to be relocated, whereas CER 5 had no footprint impacts to Hwy 160. The footprint for Alt 5 would have impacts to the tip of Snodgrass Slough, which was identified as suitable habitat for the giant garter snake. With respect to agricultural land use, CER 5 supports row crops and includes prime farmland under Williamson Act contract; Alt 5 supports pear orchards, alfalfa, and wheat row crops on non-Williamson Act land. CER 5 is located over a natural gas field (Merritt Island). The preferable location for intake 5 would be to locate the screen along the outside curvature of the river bend in-between Alt 5 and CER 5, in order to take advantage of the suitable deeper river bottom elevations on this stretch of the river (ranging from -25' to -35' deep) to reduce the overall length of the screens. However, it was recognized that locating the diversion in-between Alt 5 and CER 5 would have a detrimental hydraulic impact on the facility. Also, moving the site into a narrower section of the river would make it more difficult to keep from encroaching into the flood freeboard, both during and after the construction of the facility. In order maintain operational function of the facility, Alt 5 location is recommended by the group. Since Alt 5 would result in a design screen height below the preferred 15 ft minimum height, it was acknowledged that other efforts to reduce the screen length would be examined. Concepts for addressing the screen length issue include but are not limited to variations to screen height, approach and sweeping velocity, diversion capacities per diversion, phasing, and examining alternative locations such as Intakes 6 & 7.

*Intake 6 & 7* – The 5-Agencies recommend continuing to use the locations for sites 6 & 7 developed during the FFTT process (see Fig 1).

**Table 1.** Average calculated elevations, water depth, screen height, and screen length for intakes 1-7, Alt and CER locations.

	99% Exceedence Elevation (ft)	River Bottom Elevation at Screen Face (ft)	Screen Sill Elevation (ft)	Design Water Depth (ft)	Design Screen Height (ft)	Screen Face Length (ft)
Alt 1/ CER 1	3.1	-21	-15.9	24.1	19	1085
Alt 2/ CER2	1.9	-12	-9.1	13.9	11	1765
Alt 3	1.6	-26	-20.4	27.6	22	915
CER 3	0.7	-12	-9.3	12.7	10	1935
Alt 4	0.7	-20	-15.3	20.7	16	1255
CER 4	0.7	-14	-10.3	14.7	11	1765
Alt 5	0.7	-16	-12.3	16.7	13	1595
CER 5	0.7	-13	-9.3	13.7	10	1935
Alt 6	0.8	-20	-15.2	20.8	16	1255
Alt 7	0.8	-23	-18.2	23.8	19	1085



**Figure 1.** Potential North Delta Diversion Locations Reviewed by the FFTT [Extracted from the 2011 FFTT Technical Memorandum]. Note that the symbols reflect the center-point of the potential screens.

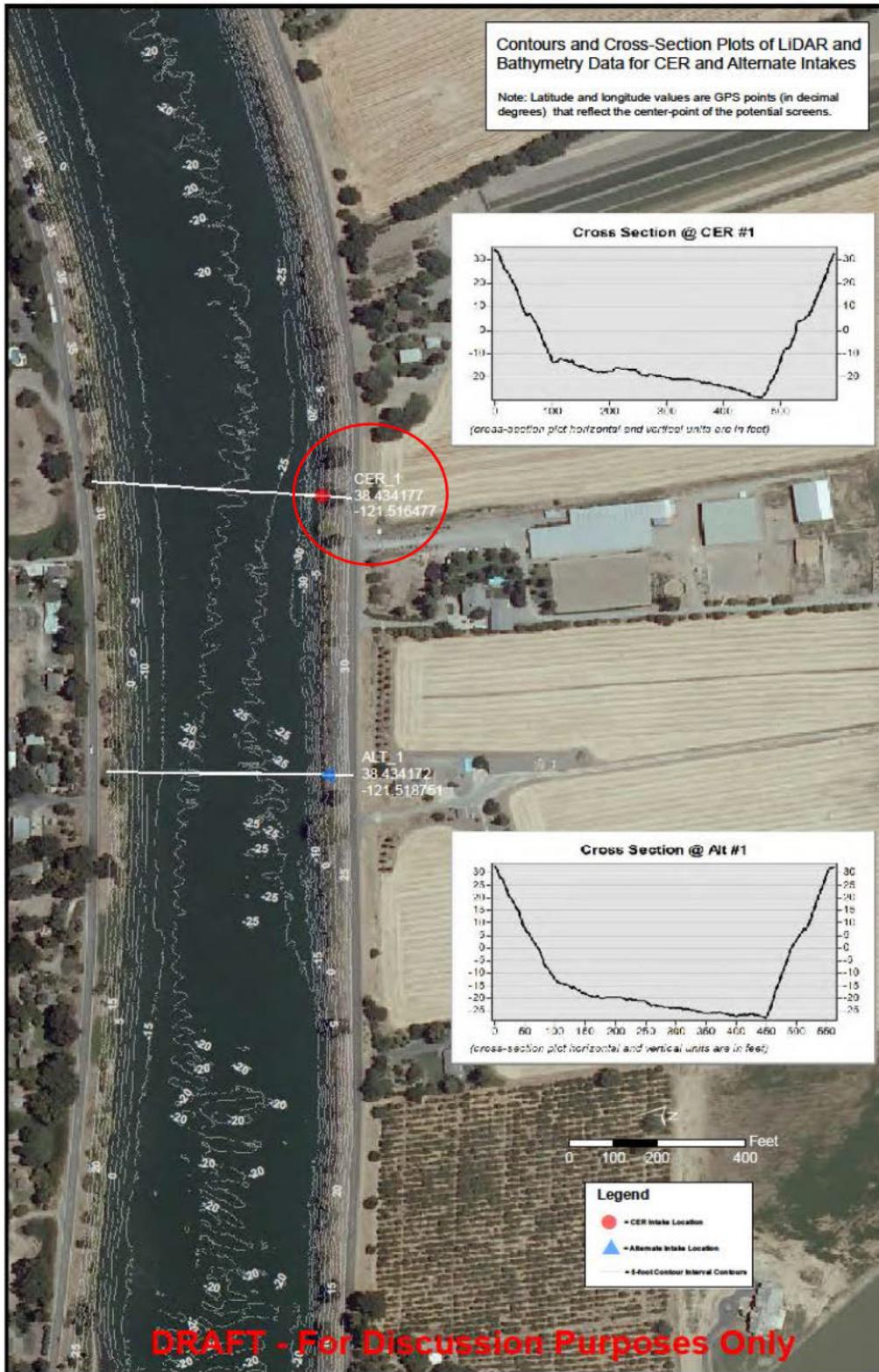


Figure 2. Alt 1 and CER 1. Note, recommendation circled in red.

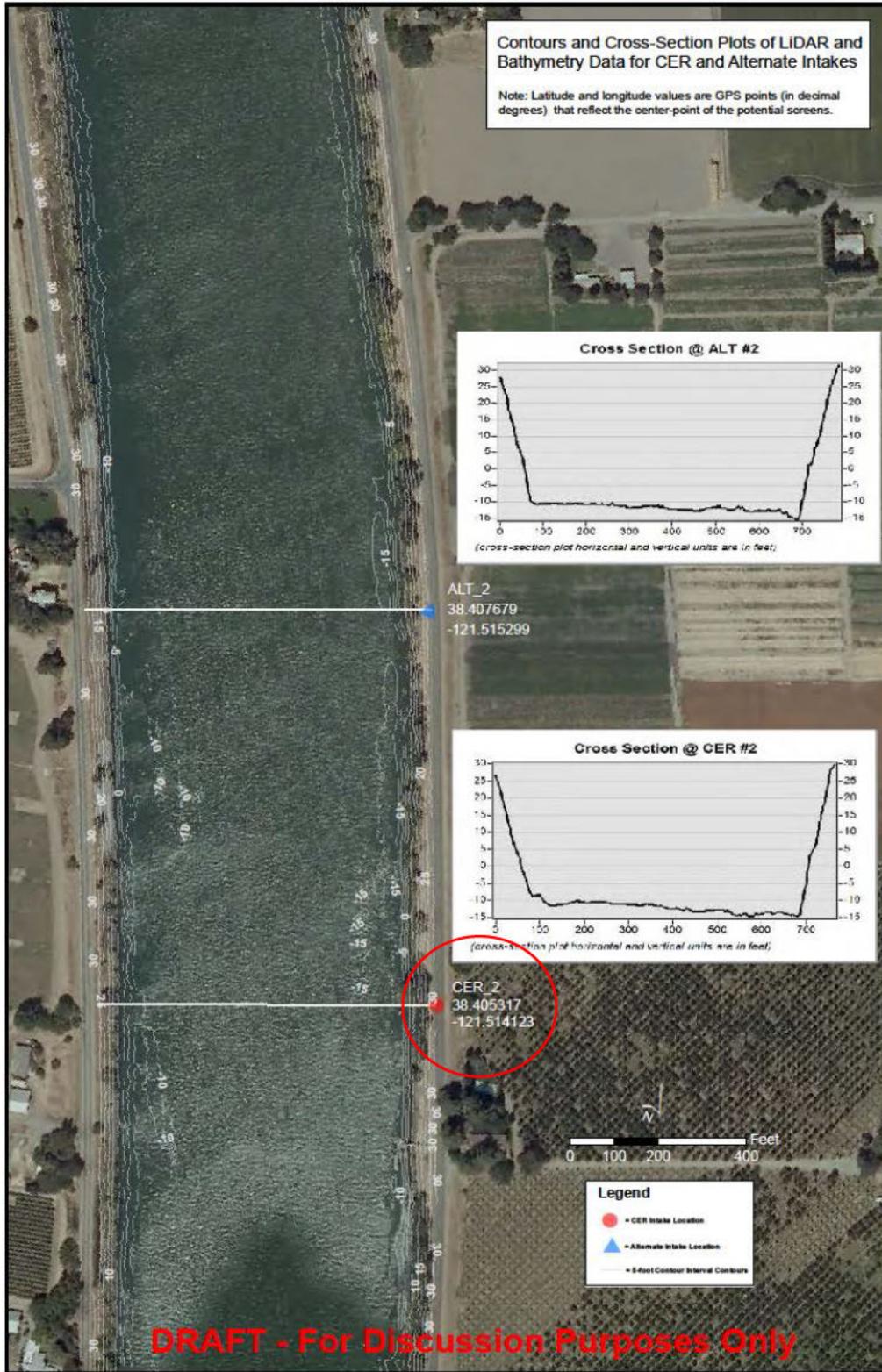


Figure 3. Alt 2 and CER 2. Note, recommendation circled in red.

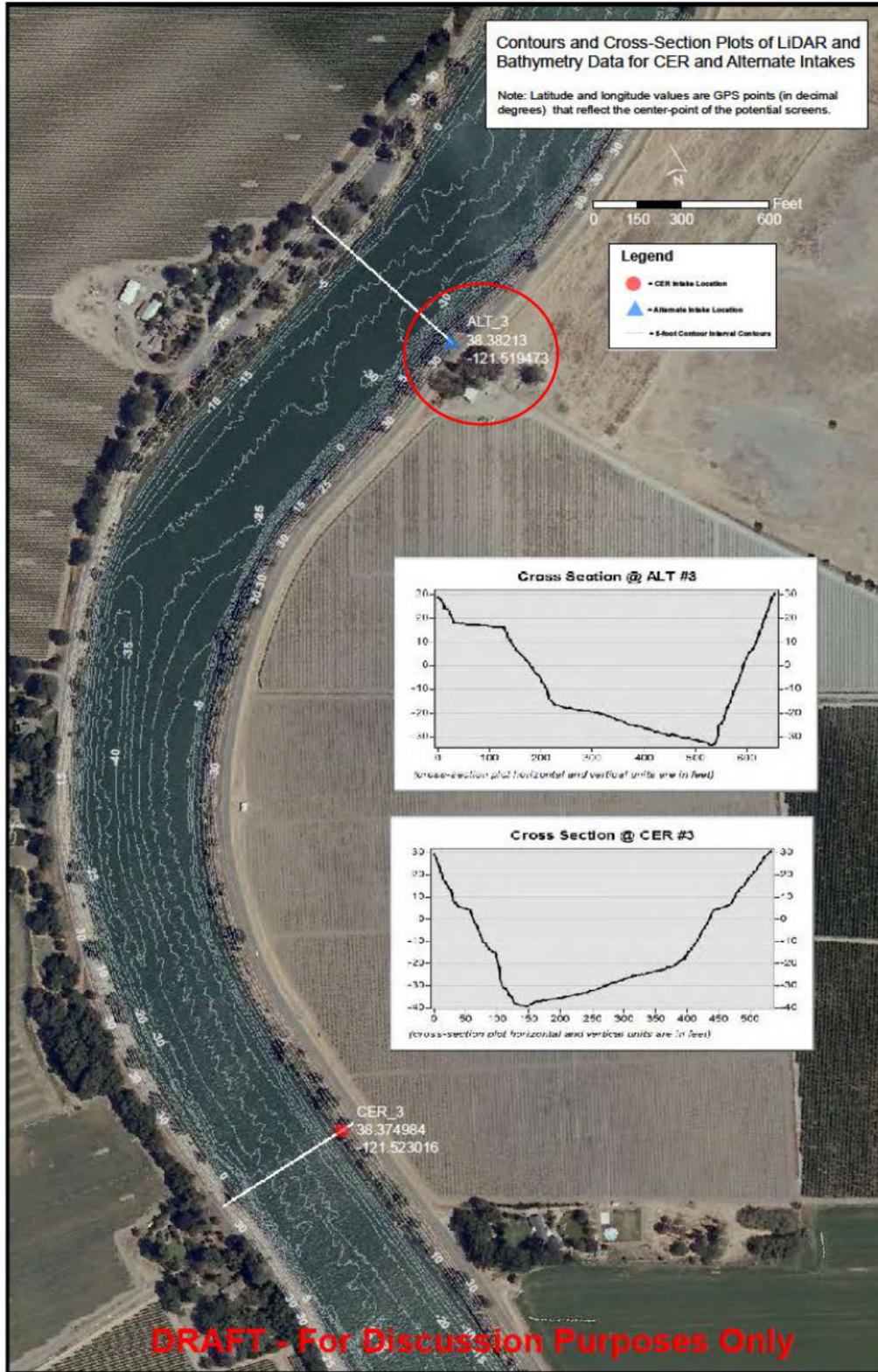


Figure 4. Alt 3 and CER 3. Note, recommendation circled in red.

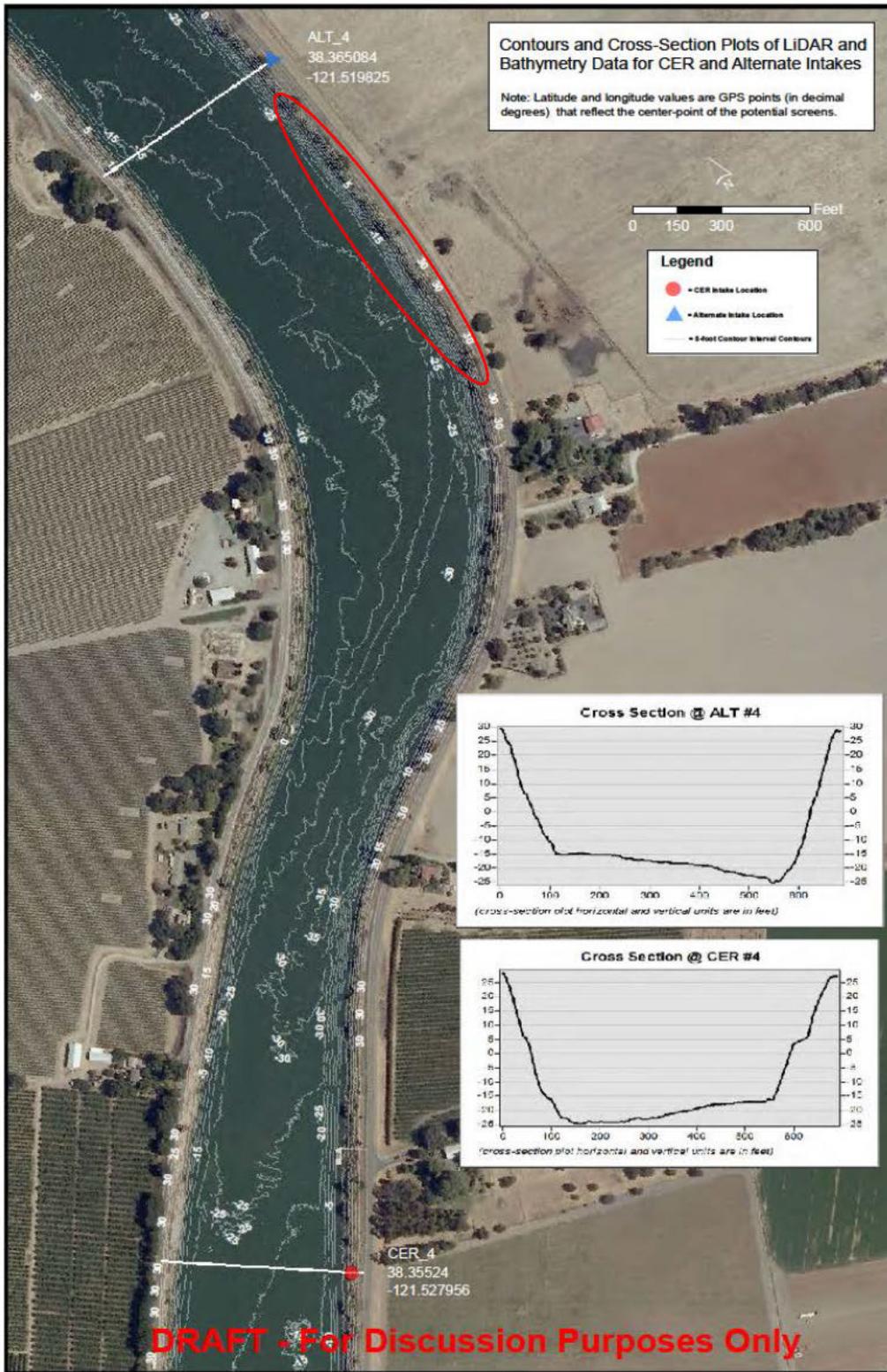


Figure 5. Alt 4 and CER 4. Note, recommendation to locate screen between Alt 4 and CER 4 coordinates as marked in red.

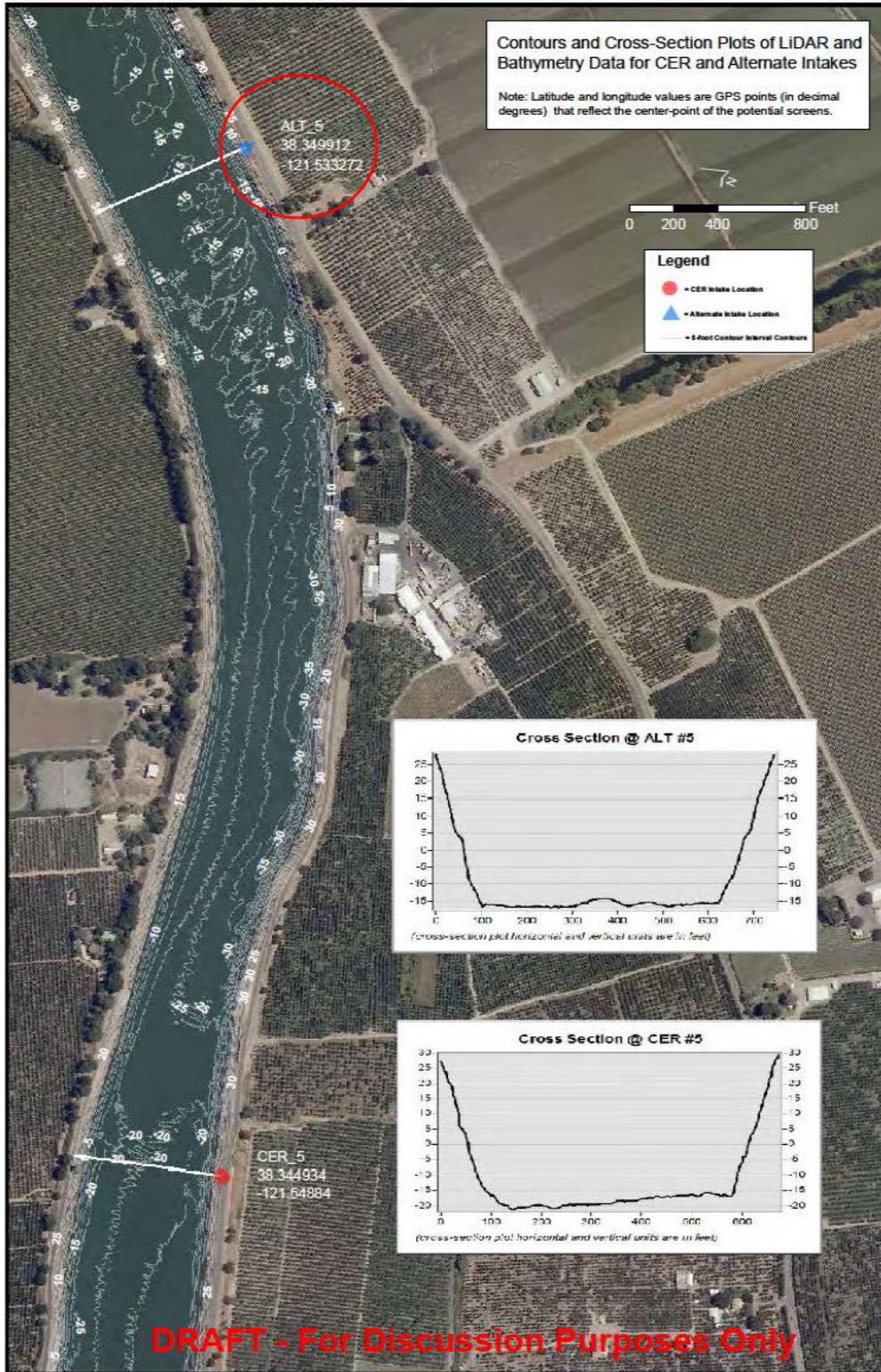


Figure 6. Alt 5 and CER 5. Note, recommendation circled in red.