

**Appendix E.**  
**Plan Formulation Evolution**

## **APPENDIX E. PLAN FORMULATION EVOLUTION**

### **Changes to Selected Plan after the Draft Report**

This appendix summarizes and explains major changes that were made to the Tentatively Selected Plan (TSP) following review of the draft Feasibility Report/Environmental Impact Statement (FR/EIS).

The draft FR/EIS, released for public review in April 2014, made a tentative recommendation for plan selection (Figure 1) which included the restoration of 89.5 acres of intertidal marsh at Big Break and Little Frank's Tract for an estimated cost of \$21.9 million. A primary restoration feature of the TSP was subsidence reversal in order to reestablish intertidal marsh elevations. Subsidence reversal was to be accomplished by two methods: (1) direct placement of dredged material from the Stockton Deep Water Ship Channel during annual maintenance dredging activities over a period of five years, and (2), pumping previously dredged material stockpiled at nearby locations.

Subsequent to release of the draft FR/EIS, the document underwent a number of reviews, to include policy, legal, and technical reviews. Designs, construction assumptions, and costs were revised and refined through this review process. Ultimately, costs for pumping previously dredged material increased dramatically based on refined construction assumptions. For this reason, additional options for the use of dredged material placed directly from annual maintenance dredging activities were sought. An additional "direct placement" increment was evaluated which included an additional five years of direct placement of dredged material from the Stockton Deep Water Ship Channel during annual maintenance dredging activities for an additional five years (construction years six through ten).

Based on updated costs and outputs, a revised plan (Figure 2) was identified at USACE's internal Agency Decision Milestone (ADM), which at the time included the restoration of roughly 84 acres of intertidal marsh at Big Break for an estimated cost of \$23.7 million. The revised plan does not include pumping previously dredged stockpiled material due to the high costs of moving the material; therefore restoration at Little Frank's Tract is not included, as stockpiled material was to be used for this area. Consistent with the draft FR/EIS description, subsidence reversal to reestablish intertidal marsh elevations is the primary restoration feature of the revised plan. Subsidence reversal is to be accomplished by direct placement of dredged material from the Stockton Deep Water Ship Channel during annual maintenance dredging activities over a period of ten years.

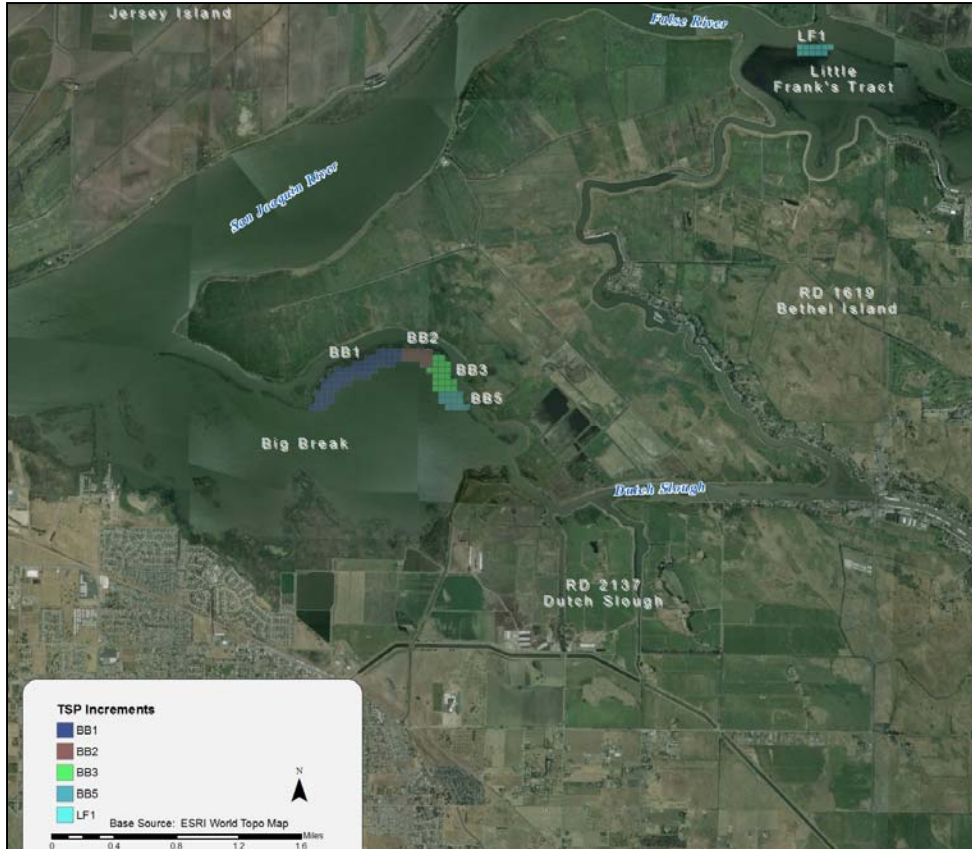


Figure 1. Draft FR/EIS Tentatively Selected Plan.



Figure 2. Revised Plan from ADM.

## **Feasibility Level Design**

After concurrence on the revised plan during the ADM, the design of the recommended plan was developed in greater detail, consistent with USACE policy. Two factors were of particular importance throughout this process. First, additional data and information regarding the composition of dredged material to be used in the recommended plan indicate the material will be predominantly fine sand, rather than silt as previously assumed. As a sandy material will form into mounds when placed via hydraulic dredging, the design of the recommended plan changed to incorporate varying topography and channels and improve constructability. Second, building off of the change in the sediment composition, designs of the recommended plan were refined using a more diverse, multi-species, ecosystem approach, which ultimately decreased the initial overall design elevations. Both of these changes incorporated the lessons learned from the Donlon Island restoration project, which focused on a need to provide more water circulation through the site, and allowed for an improvement in aquatic habitat quality in addition to an increase in marsh wren habitat. These two factors would apply to all final alternatives under consideration in this study; therefore, previous evaluations and comparisons of alternatives were not revisited because plan selection would not change.

These refined design characteristics resulted in an increase in the size of the restoration area to 340 acres due to the varying topography, increased channels, and decrease in design elevations, with the estimated total cost decreasing to \$22.3 million; and the annual cost per acre decreasing from \$274,000 to \$66,000. Figures 3 and 4 show the revised Recommended Plan based on feasibility level design.

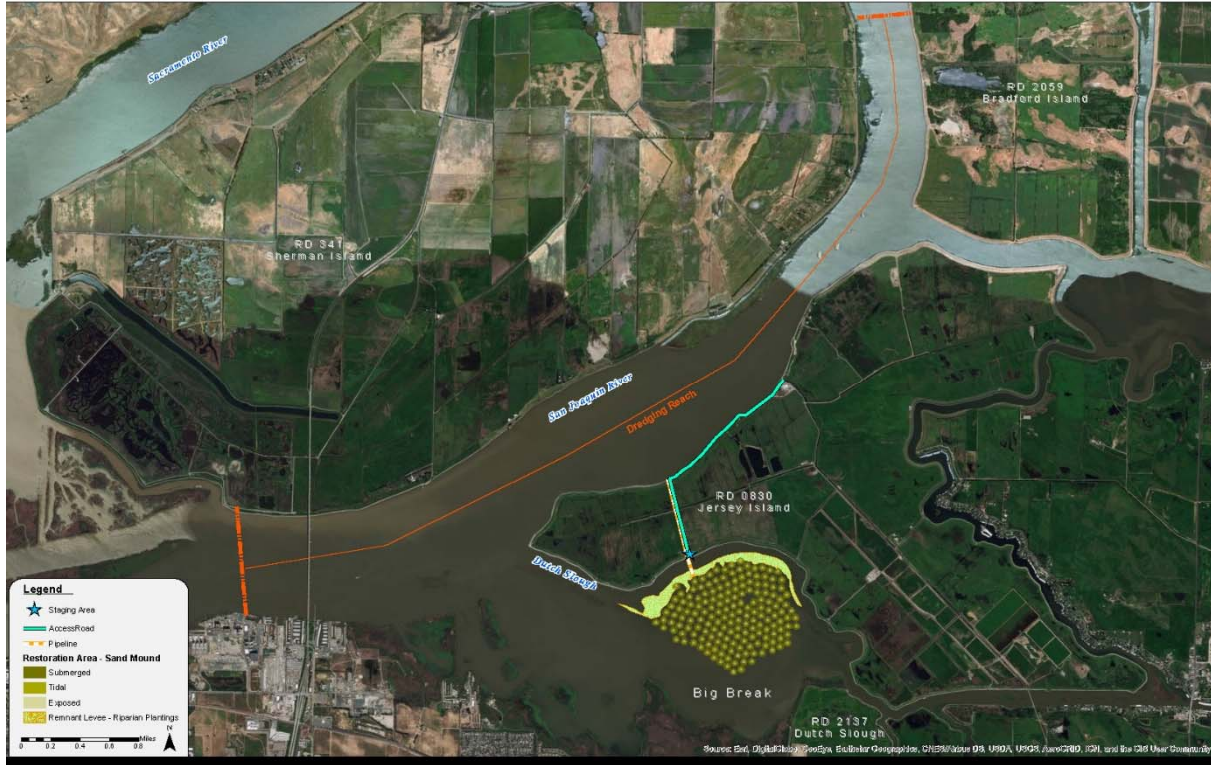


Figure 3. Recommended Plan.



Figure 4. Conceptual Long-Term Marsh Development.