2. ALTERNATIVES

This chapter describes the alternatives analyzed in this Final Environmental Impact Statement/Report for Phase 2 of the South Bay Salt Pond (SBSP) Restoration Project (referred to throughout as the Final EIS/R). Section 2.1, Alternative Development Process, describes the process of developing the project alternatives to meet the purpose and need and project objectives. Section 2.2, Phase 2 Project-Level Alternatives, describes the Phase 2 alternatives for the pond clusters considered in this Final EIS/R: the Alviso-Island ponds, the Alviso-Mountain View ponds, the Alviso-A8 ponds, and the Ravenswood ponds.

Section 2.3, General Mitigation Measures from the 2007 EIS/R, describes the mitigation measures from the 2007 EIS/R that are relevant to the Phase 2 alternatives and that would be incorporated into the project design of all Action Alternatives or would be important factors for the Final EIS/R impact analysis. By incorporating program-level mitigation measures into project-level designs, they become part of that project and are no longer "mitigation." For that reason, they are included here in the project descriptions for the various alternatives.

2.1 Alternative Development Process

The United States Fish and Wildlife Service (USFWS) and the California Department of Fish and Wildlife (CDFW) previously completed the 2007 EIS/R for the SBSP Restoration Project. The 2007 EIS/R developed long-term, end-project "target" habitat designations for each of the ponds in the project for the two action scenarios:

- Programmatic Alternative B: a split of 50 percent (by total acreage) restoration to tidal marsh and 50 percent managed ponds; and
- Programmatic Alternative C: a split of 90 percent restoration to tidal marsh and 10 percent managed ponds.

As discussed in the 2007 EIS/R, these program-level alternatives were chosen to be bookends, between which the final balance of restoration habitat will ultimately lie. Within that context, Programmatic Alternative C was selected for implementation. Phase 2 presents a range of project-level alternatives, each of which is intended to advance the overall goals and mission of the SBSP Restoration Project.

A broad range of alternatives was considered and developed to meet the Phase 2 purpose and need and project objectives. The National Environmental Policy Act (NEPA) requires development and consideration of a range of "reasonable alternatives." The California Environmental Quality Act (CEQA) requires alternatives that would "minimize significant impacts." A set of screening criteria was developed to assist in decision making and to elaborate a reasonable range of alternatives for analysis in this Final EIS/R that would minimize significant impacts. After this set of screening criteria was applied, several Action Alternatives were selected for detailed evaluation, and several alternatives were eliminated.

The alternatives for each pond cluster are not dependent on the alternatives for the other pond clusters. As such, each alternative would accomplish slightly different goals, including habitat restoration, recreation, and flood control. These restoration actions are incremental steps toward the larger programmatic goals. Decisions on the pond clusters to include in Phase 2 were based on the landowner's and the Project Management Team's (PMT's) assessment of which ponds present the best restoration opportunities that

would be consistent with the SBSP Restoration Project's other goals of maintaining flood protection and providing recreational opportunities. Of the four pond clusters included in Phase 2 for the Don Edwards San Francisco Bay National Wildlife Refuge (Refuge), two would involve only modifications of earlier project actions and would not change flood risk or recreational opportunities. The other pond complexes chosen are large ponds without major infrastructure conflicts or flood-risk constraints that would provide large tracts of tidal marsh habitat and other habitats once restored.

The Action Alternatives selected for detailed evaluation are discussed in Section 2.2. See Appendix B for the Alternatives Analysis Report containing the full description of the initial alternatives, the screening criteria, the selection of alternatives to be carried into this Final EIS/R, and the alternatives considered but removed from detailed study.

2.1.1 Programmatic Context of Phase 2 Alternatives

As discussed in Chapter 1, Introduction, Phase 2 of the SBSP Restoration Project is intended to tier from the analysis conducted for the 2007 EIS/R by advancing additional restoration activities within the area of the SBSP Restoration Project. The 2007 EIS/R assessed the environmental consequences associated with two long-term restoration alternatives. In consideration of the environmental consequences discussed in the 2007 EIS/R, the USFWS Record of Decision (ROD) and the CDFW Notice of Determination (NOD) state that the USFWS and CDFW will implement Programmatic Alternative C, the Tidal Emphasis Alternative, which would eventually convert 90 percent of the former salt ponds to tidal marsh, while 10 percent would remain as enhanced managed ponds. The USFWS and CDFW will retain the option of stopping tidal marsh restoration prior to restoring 90 percent of total acreage as tidal marsh if, for example, monitoring shows that pond-dependent species appear to be adversely affected by the losses of pond habitats. In this case, the SBSP Restoration Project may shift future project phases toward enhance managed pond habitat and achieve an end result somewhere between Programmatic Alternative B and Programmatic Alternative C. Phase 2, as the second project component of this long-term restoration project, would incrementally advance the project toward these end goals.

Construction, operations, and maintenance of Phase 2 activities at one pond cluster would be independent from any activities at other Phase 2 ponds. When considering and developing the project alternatives for Phase 2, each pond cluster has been independently considered in meeting the targeted habitat designated in Programmatic Alternative C (the 90/10 alternative), and separate sets of Action Alternatives were developed for each pond cluster.

The SBSP Restoration Project has an open and lengthy history of public processes to develop alternatives that was initiated with the Stakeholder Forums in 2003. Public input from scoping meetings and public comment periods for the 2007 EIS/R and from the annual Stakeholder Forums was used to help develop these alternatives. In developing a broad range of alternatives for each pond cluster, target habitat goals, major recreation and public access goals, and flood control management issues were considered. Individual components, their variations, and intended goals were developed for each pond cluster, and these components were bundled as complete alternatives for consideration.

Larger, program-level alternatives for the SBSP Restoration Project as a whole and for the pond complexes within it were analyzed in the 2007 EIS/R. Chapter 2 of the 2007 EIS/R explained the long-term project goals, the process of developing and selecting the program-level alternatives, and the Adaptive Management Plan (AMP) that will track progress toward those goals from project-level actions and ongoing research and monitoring. The 2007 EIS/R covered the 50-year-long plan for the SBSP

Restoration Project at the programmatic level. The 2007 EIS/R also covered the Phase 1 projects at the project level.

2.1.2 Alternatives Considered But Eliminated from Further Review

A number of alternatives were initially developed and included in a screening process to refine a set of alternatives for inclusion in the Draft EIS/R and in the conceptual designs. The Alternatives Analysis Report presented as Appendix B explains these initial alternatives, the components that constitute them, and the intentions or purposes behind them. The Alternatives Analysis Report also explains the screening criteria and processes by which these alternatives were considered but eliminated from further review.

2.1.3 Adaptive Management Plan

The AMP was developed by the PMT to be an integral component of the SBSP Restoration Project. The AMP allows for lessons learned during the multiple phases of implementing the SBSP Restoration Project to be incorporated in subsequent phases as management plans and designs for future actions are updated. The AMP has created a framework for adjusting management decisions as the cause-and-effect linkages between management actions and the physical and biological responses of the system are more fully understood. The AMP also creates a management framework for the SBSP Restoration Project area to avoid irreversible adverse environmental impacts during implementation of the SBSP Restoration Project.

The AMP identifies management triggers that indicate when restoration actions may cause significant adverse environmental impacts. If a management trigger is tripped, further restoration would not occur until a focused evaluation is conducted to assess if a potentially significant impact would result from the SBSP Restoration Project or other factors. Management actions would then be implemented to avoid or lessen a significant adverse environmental impact. The AMP also provides a mechanism to adjust, modify, or extend restoration actions implemented in a previous phase to better achieve the project's goals. The findings from ongoing monitoring are used to plan further restoration actions.

The framework of the AMP has been used during the development of the Phase 2 project alternatives, as evidenced by the inclusion in Phase 2 of some ponds that were part of previous restoration actions. The Island Ponds were breached under the Initial Stewardship Plan (ISP), and these ponds are being considered for further modifications in Phase 2. Similarly, Ponds A8 and A8S were part of Phase 1 actions and are being included in Phase 2. The AMP and its findings are being used to guide the inclusion of these ponds in the Phase 2 planning.

Continual implementation of the AMP is an integral component of each alternative considered in the Phase 2 project alternatives. Under all alternatives, monitoring and applied studies will occur, and the AMP will be an integral component in the operations and management decisions at all ponds under all alternatives as well as for restoration decisions in future project phases. More detail on how the AMP is used to make the significance determinations is provided in Section 3.1. The full AMP is provided in Appendix C.

2.1.4 Comprehensive Conservation Plan

The USFWS uses Comprehensive Conservation Plans (CCPs) to guide management of its refuges. The USFWS has prepared a Final CCP for the Refuge. The CCP serves as USFWS's plan for managing the

Refuge. It describes future conditions and long-range guidance to accomplish the purposes for which the Refuge was established. The CCP considered the SBSP Restoration Project, and the CCP is compatible and consistent with the SBSP Restoration Project and all phases of implementation of the SBSP Restoration Project (USFWS 2013). However, the CCP specifically excludes and does not address those lands included in the SBSP Restoration Project and already included in the 2007 EIS/R and other planning and management documents.

2.2 Phase 2 Project-Level Alternatives

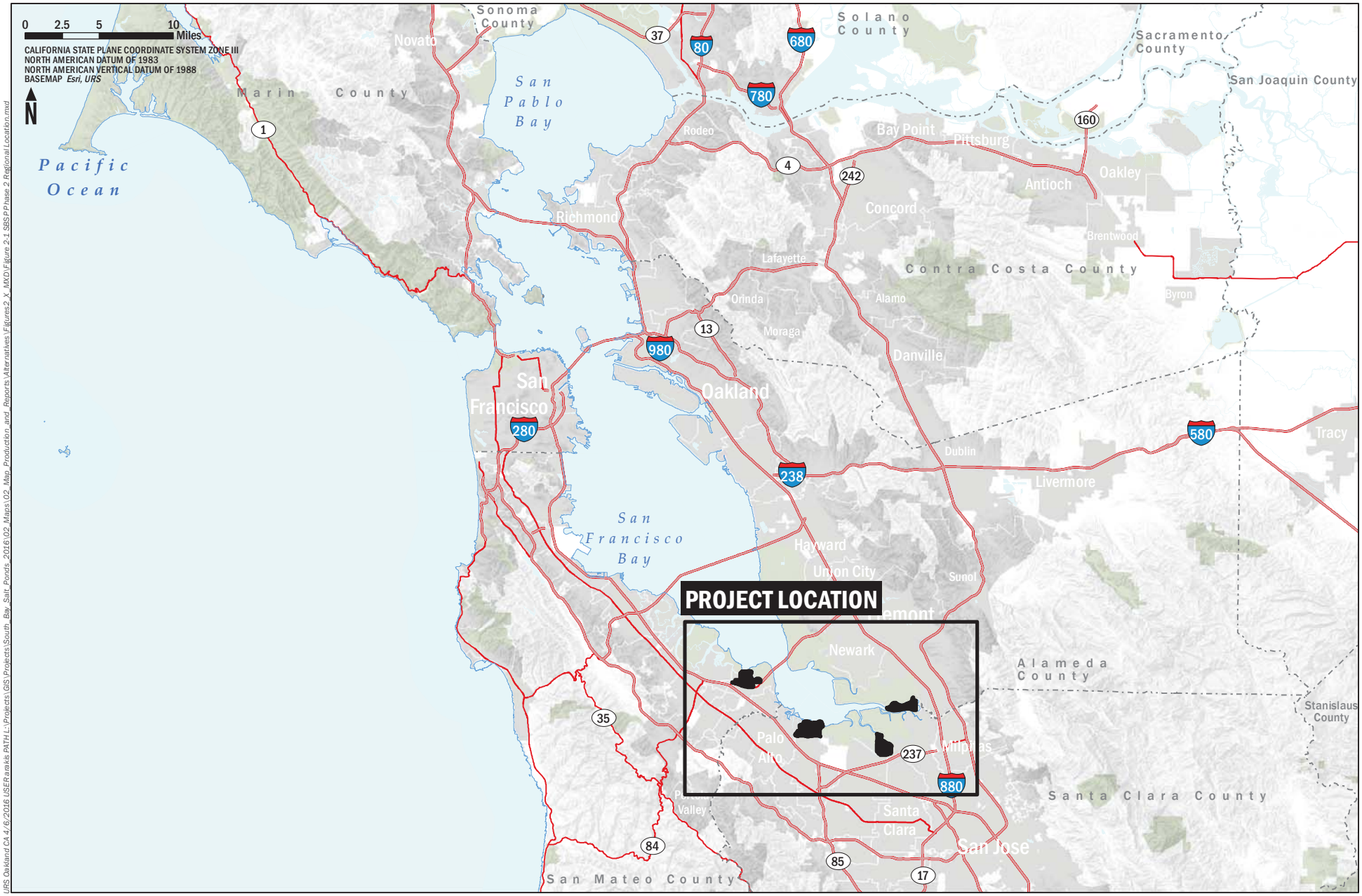
The Phase 2 Action Alternatives propose restoration, flood management, and recreation/public access activities at four separate pond clusters: the Alviso-Island Ponds, the Alviso-Mountain View Ponds, the Alviso-A8 Ponds, and the Ravenswood Ponds. Actions at each pond cluster could be undertaken independently from alternatives at the other clusters. A major consideration in selecting alternatives for Phase 2 was choosing ponds that would not require an extensive land-side flood control element to maintain the existing level of flood protection.

2.2.1 Phase 2 Project Locations

The Phase 2 project would be implemented on the Alviso-Island Ponds, the Alviso-Mountain View Ponds, the Alviso-A8 Ponds, and the Ravenswood Ponds. These pond clusters are at the Don Edwards San Francisco Bay National Wildlife Refuge in Alameda, Santa Clara, and San Mateo Counties, California (see Figure 2-1, SBSP Phase 2 Regional Location, and Figure 2-2, SBSP Phase 2 Project Area Boundary). The Phase 2 projects under consideration also include two areas that are not within the Refuge boundary: the City of Mountain View's Charleston Slough and a small portion of upland in the City of Menlo Park's Bedwell Bayfront Park. Table 2-1 summarizes the Phase 2 pond clusters, the ponds that compose the clusters, and the acreages of each. Alternatives are proposed for each pond cluster, including a No Action Alternative.

Table 2-1 Phase 2 Pond Clusters and Acreages

ALVISO-ISLAND POND CLUSTER		ALVISO-MOUNTAIN VIEW POND CLUSTER		ALVISO-A8 POND CLUSTER		RAVENSWOOD POND CLUSTER	
Pond	**Acres**	**Pond**	**Acres**	**Pond**	**Acres**	**Pond**	**Acres**
A19	265	A1	275	A8	410	R3	270
A20	65	A2W	435	A8S	160	R4	295
A21	150	Charleston Slough	115	—	—	R5	30
—	—			—	—	S5	30
Cluster Total	**480**	**Cluster Total**	**825**	**Cluster Total**	**570**	**Cluster Total**	**625**
						Total Area of Phase 2 Ponds	**2,500**



AECOM

South Bay Salt Pond Restoration Project

Figure 2-1

SBSP Phase 2 Regional Location

URS Oakland CA 4/7/2016 USER harmonk PATH L:\Projects\GIS\Projects\South Bay Salt Ponds 2016\02 Maps\02 Map Production and Reports\Alternatives\Figures2_X.MXD\Figure 2-2 SBSP Phase 2 Project Sites.mxd

AECOM

South Bay Salt Pond Restoration Project

Figure 2-2

SBSP Phase 2 Project Sites

These pond clusters and the alternatives for each are described in Sections 2.2.2, 2.2.3, 2.2.4, and 2.2.5, below. In each of those sections, a short introduction outlines the goals and major components of the alternatives there, and a table summarizes the differences between the alternatives. Maps of each of the alternatives are presented to illustrate and clarify the components and the differences between the alternatives. The No Action Alternative is then described, followed by the Action Alternatives that are under consideration for that cluster. In each group of ponds, Alternative A is the No Action Alternative, and each subsequently lettered alternative generally has successively more components and greater amounts of construction. Thus, at a given pond cluster, Alternative C would involve more components that Alternative B, which has more than Alternative A (No Action). One exception to this arrangement is at Ravenswood, where there are three Action Alternatives and where the defining feature of each alternative is not "more components versus fewer components" but rather a different restoration goal for some of the small ponds there.

2.2.2 Alviso-Island Pond Cluster

The Alviso-Island pond cluster (also referred to as the Island Ponds) consists of Ponds A19, A20, and A21, the levees surrounding each pond, and some of the fringe marsh outside of these levees, including the narrow marsh between Ponds A19 and A20. Ponds A19, A20, and A21 are in the eastern portion of the Alviso pond complex. These ponds are oriented east to west between Mud Slough to the north and west and Coyote Creek to the south. Mud Slough and Coyote Creek converge at the western edge of this pond cluster. The community of Alviso and the city of Milpitas are to the south and to the east of this cluster, respectively. The ponds are geographically isolated from urbanized and built-out areas by other waterbodies, other salt ponds, and a landfill. The former community of Drawbridge is on a strip of land between Pond A21 and Pond A20. That strip of land also holds an active Union Pacific Railroad (UPRR) track.

Under the No Action Alternative for the Alviso-Island Ponds (Alternative Island A), no new activities would occur in Phase 2. Alternatives Island B and Island C propose activities that increase habitat complexity and improve the distribution of sedimentation and vegetation establishment in these ponds as they transition to tidal marsh. To increase the complexity and connectivity of the Island Ponds and the waterways surrounding them, the activities proposed under these alternatives include breaches of the existing levees at various locations, removal or lowering of levees, and modification of existing breaches. This added aquatic habitat connectivity would benefit salmonids and other estuarine fish. The remaining levee sections would immediately become isolated high ground/island habitat that would eventually become marsh mounds, which have various ecological benefits as high-tide refugia and as focal points for sediment aggregation and vegetation formation. Details about each Phase 2 alternative for this pond cluster are described below.

The SBSP Restoration Project does not include recreation or flood control goals for these ponds because they are geographically isolated and difficult for the public to access. Therefore, no flood management or flood control activities or recreation components are proposed at these ponds for Phase 2.

Details about each Phase 2 Action Alternative for this pond cluster are summarized in Table 2-2, illustrated on Figures 2-3 through 2-6, and described in the following sections. The Preliminary Design Memorandum for the Action Alternatives for the Island Ponds is included as Appendix L to this Final EIS/R.

URS Oakland CA 4/7/2016 USER hammonk PATH L:\Projects\GIS Projects\South Bay Salt Ponds_archive\Maps\Alternatives\Final\Figure 2-3.17.mxd

LEGEND

Existing breach

Tidal marsh

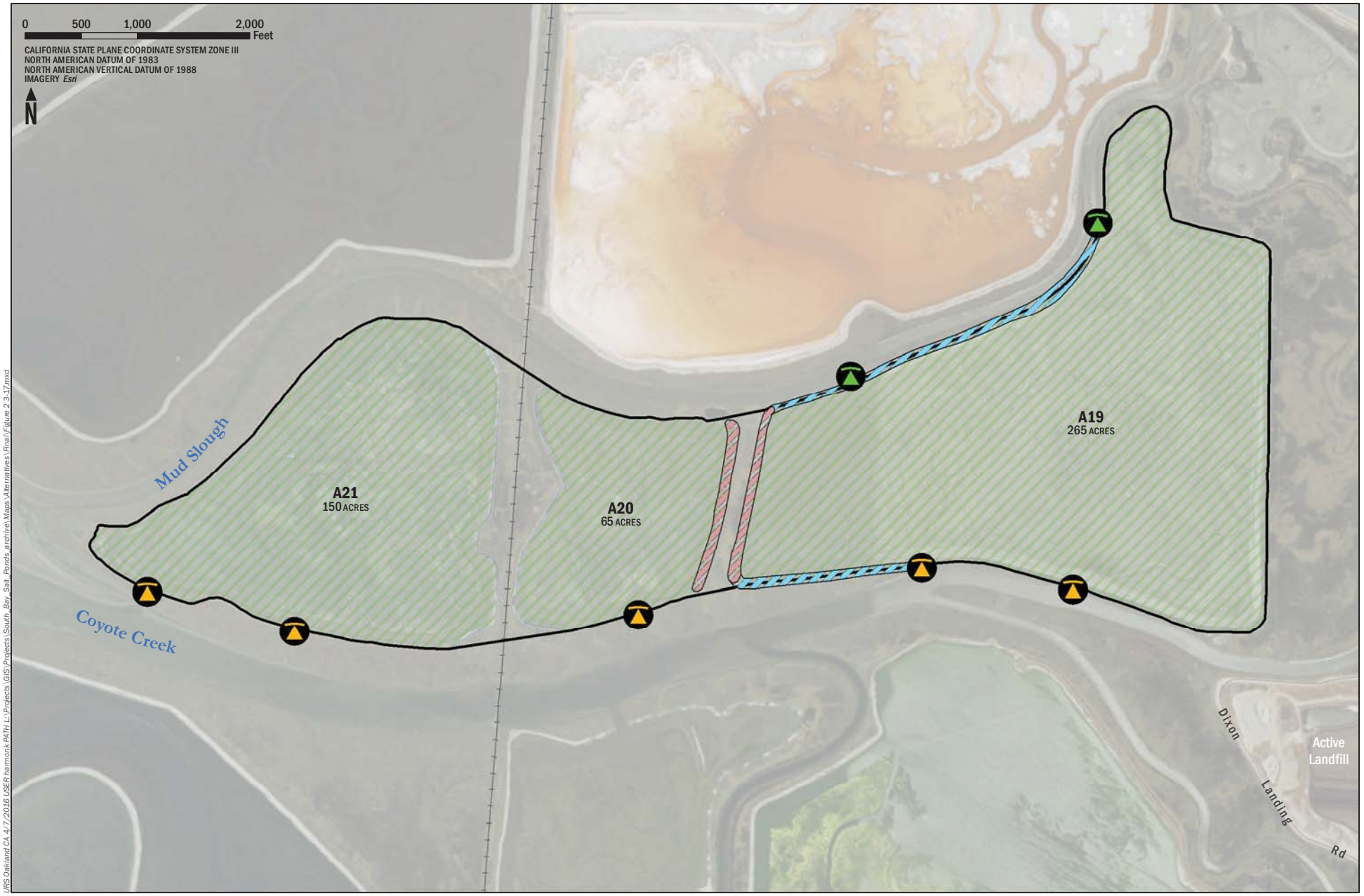
Pond boundary

AECOM

South Bay Salt Pond Restoration Project

Figure 2-3

Alternative Island A



URS Oakland CA 4/7/2016 USER hammonk PATH L:\Projects\GIS Projects\South Bay Salt Ponds_archive\Maps\Alternatives\Final\Figure 2-3_17.mxd

LEGEND

Proposed breach

Existing breach

Removed levee

Lowered levee

Tidal marsh

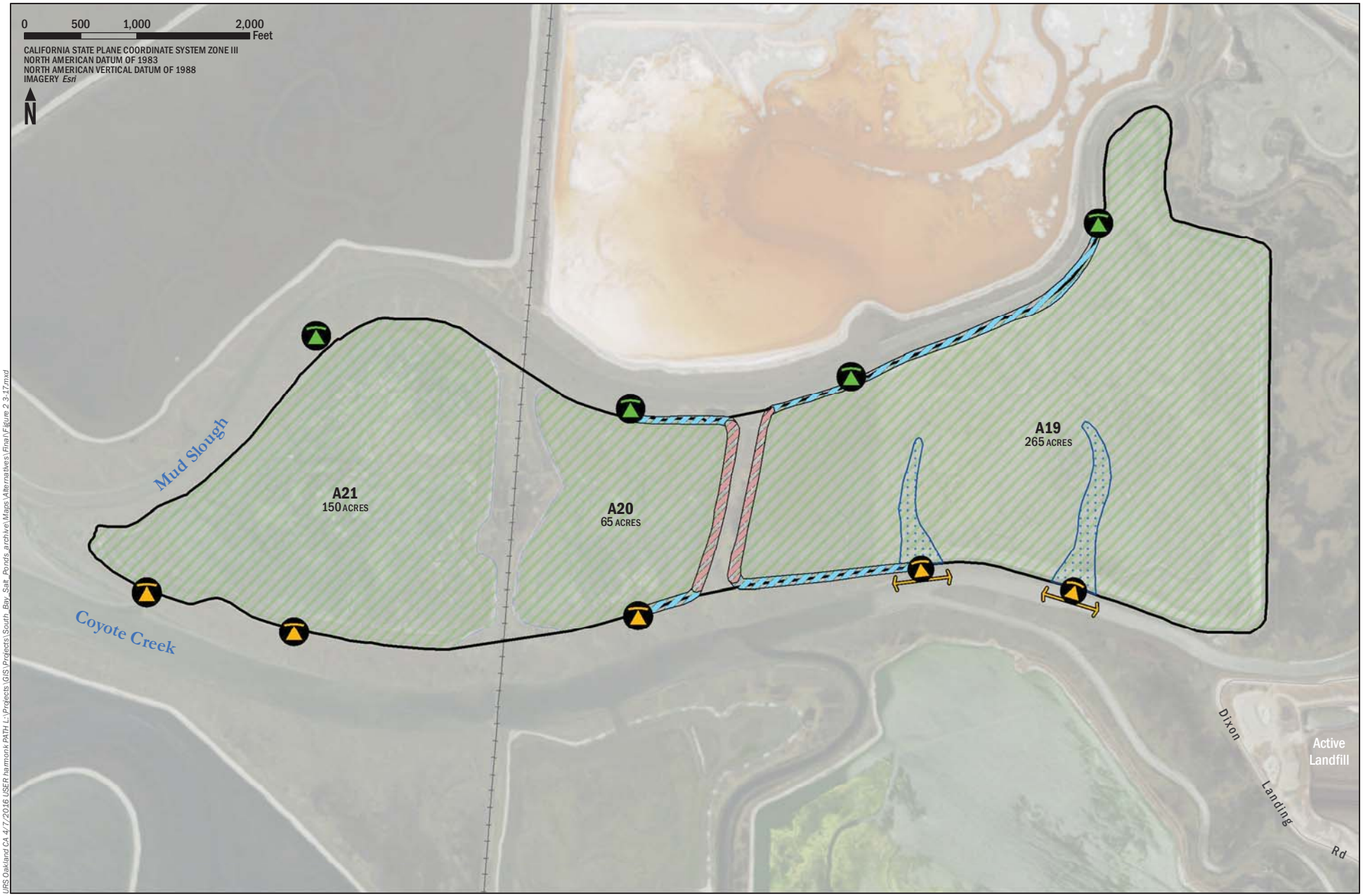
Pond boundary

AECOM

South Bay Salt Pond Restoration Project

Figure 2-4

Alternative Island B



URS Oakland CA 4/7/2016 USER hammonk PATH L:\Projects\GIS Projects\South Bay Salt Ponds_archive\Maps\Alternatives\Final\Figure 2-3_17.mxd

LEGEND

Proposed breach

Existing breach

Expand existing breach

Removed levee

Lowered levee

Pilot channel

Tidal marsh

Pond boundary

AECOM

South Bay Salt Pond Restoration Project

Figure 2-5

Alternative Island C

URS Oakland CA 4/6/2016 USER ana.ks PATH L:\Projects\GIS Projects\South Bay Salt Ponds_2016\02_Maps\02_Map Production and Reports\Alternatives Figures\2.X_MXD\Figure 2-6 Alviso-Island Ponds Access.mxd

LEGEND

Access Routes

Construction Equipment Access Route

Crew Vehicle Access Route

Phase II Project Areas

AECOM

South Bay Salt Pond Restoration Project

Figure 2-6

Alviso-Island Ponds Access Route

Table 2-2 Components of the Phase 2 Action Alternatives at the Island Ponds

ALTERNATIVE ISLAND B	ALTERNATIVE ISLAND C
Breach north side of Pond A19 in two places.	Breach north side of Pond A19 in two places.
Lower or remove much of Pond A19's northern and southern levees.	Lower or remove much of Pond A19's northern and southern levees.
Remove Pond A19's western levee and Pond A20's eastern levee to connect these two ponds.	Remove Pond A19's western levee and Pond A20's eastern levee to connect these two ponds.
—	Breach the north sides of Ponds A20 and A21.
—	Lower portions of Pond A20's northern and southern levees.
—	Widen existing breaches on Pond A19's southern side.
—	Excavate two pilot channels within Pond A19.

Alternative Island A (No Action)

Under Alternative Island A, the No Action Alternative, no new activities would occur in Phase 2. The pond cluster would continue to be monitored and managed through the activities described in the AMP and in accordance with current USFWS practices. The existing breached levees would continue to be scoured from hydraulic action and naturally degrade. Ongoing monitoring to track the progress of these ponds toward tidal marsh would be the principal component of the continued implementation of the AMP at this pond cluster. Additional details regarding the implementation of the AMP are described in Appendix C.

Ponds A19, A20, and A21 were breached on their southern sides in March 2006 as part of the ISP actions. The intent of the 2006 levee breaches was to bring tidal flows to these ponds and allow sediment to accrete until marsh plain elevation was reached. The unmaintained breaches would continue to scour from hydraulic action until equilibrium with the tidal flux is reached, and most levees would be allowed to degrade naturally. The levee containing the active UPRR track would be maintained by UPRR to allow the continued use of the tracks. Under this alternative, this transition to tidal marsh would be allowed to continue. Aside from the monitoring and management activities of the AMP and maintenance of the railroad track, no other operations and maintenance activities would occur. Alternative Island A is shown on Figure 2-3.

Alternative Island B

Alternative Island B would remove or lower the levees between Ponds A19 and A20 and lower westerly portions of the north and south perimeter levees of Pond A19 to increase connectivity and improve the ecological function of both ponds by altering circulation and sedimentation patterns in the ponds and improve the distribution of sediment accretion in Pond A19 and, to a lesser extent, in Pond A20. Alternative Island B also includes some improvements in habitat quality for juvenile salmonids and other fish. Any levee material moved would be used locally to fill borrow ditches (ditches that were created to construct the original levees) or raise the pond bottom elevation and further speed revegetation. The estimated volume of earth cut, fill, and net import for Alternative Island B is listed in Table 2-3.

Table 2-3 Earthwork Volumes of Phase 2 Alternatives

ALTERNATIVE	ESTIMATED EARTHWORK VOLUME (CUBIC YARDS [CY])		
	CUT	FILL	NET IMPORT
Alviso-Island Ponds			
Island A	—	—	—
Island B	109,600	—	—
Island C	202,600	—	—
Alviso-Mountain View Ponds			
Mountain View A	—	—	—
Mountain View B	20,400	316,800	296,400
Mountain View C	51,400	421,000	369,600
Alviso-A8 Ponds			
A8 A	—	—	—
A8 B	—	190,000	190,000
Ravenswood Ponds			
Ravenswood A	—	—	—
Ravenswood B	39,700	77,600	37,900
Ravenswood C	45,400	255,800	210,400
Ravenswood D*	87,900	73,000	—

* Earthwork volumes for Alternative Ravenswood D include SBSP Restoration Project activities, which would generate 56,700 cy of cut material, and the City of Redwood City's Bayfront Canal and Atherton Channel Project, which would generate 31,200 cy of surplus cut material.

Alternative Island B components are illustrated on Figure 2-4. The alternative would include the following activities:

- Breach north side of Pond A19 in two places. The levee on the north side of Pond A19 would be breached in two places to allow tidal flows from Mud Slough to enter the pond. Excavation of the breaches would include excavating a channel through the adjacent fringing tidal marsh. Levee material from the breach would be sidecast into the borrow ditches or pond bottom to speed the return to marsh plain elevation. All new breaches would be roughly 50 feet wide at the bottom with an invert elevation of 0.0 feet North American Vertical Datum of 1988 (NAVD88). The top width would be 120 feet with 3:1 (horizontal to vertical [h:v]) side slopes.

- Lower or remove much of Pond A19's northern and southern levees. Existing levees on the northern, western, and southern sides of Pond A19 would be lowered between the western levee and the existing western breach on the southern levee and between the western levee and the proposed eastern breach location on the northern levee. The western levee of Pond A19 would be removed. Levee lowering would scrape off the tops of levees down to the mean high water (MHW) elevation; levee removal would further lower levees to match the elevation of the surrounding marsh plain. Levee material from lowering and removal would be sidecast into the borrow ditches or pond bottom to speed the return to marsh plain elevation. Perimeter levee lengths of approximately 5,000 feet would be lowered from existing crest elevation to the MHW

elevation of 6.9 feet NAVD88. Also, approximately 1,600 linear feet of perimeter levees of Pond A19 would be removed to the elevation of the surrounding marsh plain and have a residual elevation of 6.6 feet NAVD88. (In the areas surrounding the Island Ponds, marsh plain elevation is already close to the MHW elevation in most places.)

- Remove Pond A19's western levee and Pond A20's eastern levee to connect these two ponds. The eastern perimeter levee of Pond A20 (approximately 1,600 linear feet) would be removed to marsh plain elevation of 6.6 feet NAVD88. Along with the levee removal in Pond A19 described above, this removal would increase the connection between Ponds A19 and A20. Levee material from the removal would be sidecast into the borrow ditches or pond bottom to speed the return to marsh plain elevation.

Alternative Island C

Alternative Island C would consist of all of the components of Alternative Island B and four additional components: levee breaches on the north sides of Ponds A20 and A21, lowering of portions of the levees around Pond A20, creation of pilot channels in Pond A19, and widening of the existing breaches on the southern levee of Pond A19. These additional components are intended to further increase the habitat complexity and connectedness as this pond cluster transitions to tidal marsh. Levee material from lowering would be sidecast into the borrow ditches or pond bottoms to speed the return to marsh plain elevation. These actions would alter circulation and sedimentation patterns in the ponds and improve the distribution of sediment accretion in Pond A19 and, to a lesser extent, in Ponds A20 and A21.

Similar to Alternative Island B, improvements would be made for habitat quality for juvenile salmonids and other fish. Under Alternative Island C, the projected increase in sediment accumulation would ensure that the rate of sedimentation accretion and marsh development would keep pace with expected sea-level rise. Any levee material moved would be used locally to fill borrow ditches and further speed revegetation. The estimated volume of earth cut, fill, and net import for Alternative Island C is listed in Table 2-3.

The components of Alternative Island C are described in detail below and illustrated on Figure 2-5:

- Alternative Island B components. Alternative C would implement all Island B activities.

- Breach the north sides of Ponds A20 and A21. Levees on the north sides of Ponds A20 and A21 would be breached. All new breaches would be roughly 50 feet wide at the bottom, with an invert elevation of 0.0 feet NAVD88. The top width is estimated to be 120 feet with 3:1 (h:v) side slopes. Creating the breaches would include excavating channels through the adjacent tidal marsh.

- Lower portions of Pond A20's northern and southern levees. Portions of the northern and southern levees of Pond A20 would be lowered. Perimeter levee lengths of approximately 1,500 linear feet (in addition to all of the levee removal discussed in Alternative Island B) would be lowered from existing crest elevation to the MHW elevation of 6.9 feet NAVD88.

- Widen existing breaches on Pond A19's southern side. The width of the existing southern breaches in Pond A19 would be expanded. The existing eastern breach and western breach along the south perimeter levee of Pond A19 would be widened to have a bottom width of 100 feet and

200 feet, respectively, with an invert elevation of 0.0 feet NAVD88 in both cases. The top widths would be roughly 200 feet and 275 feet, respectively, with 3:1 (h:v) side slopes.

- Excavate pilot channels within Pond A19. Pilot channels would be created in Pond A19 to allow for even delivery of sediment from Coyote Creek into the pond. The pilot channels would be designed to improve sediment distribution; they would extend from the existing breaches on the south levee northward into the pond. Any excavated material would be placed into the borrow ditches to speed the return to marsh plain elevation. Two pilot channels, extending roughly 1,100 feet and 1,500 feet in from the existing eastern and western breaches, respectively, on the south side of Pond A19, would be excavated through the existing pond bed. The invert elevation would be 0.0 feet NAVD88, similar to the invert elevation of the adjacent Coyote Creek. The pilot channels would start at the mouth of the breach with a width similar to that of the breach and gradually decrease to roughly 20 feet at the far end within the pond. The channels would have side slopes of 3:1 (h:v) or greater.

Construction Methods

Construction of Common Elements

Levee Lowering and Removal. All construction activities would involve either partial or complete removal of portions of levee to establish connections with surrounding waterways and/or with each other. Lowering or removal would be accomplished by using excavators. Levee material would be sidecast into the adjacent pond. Movement of the excavator between the perimeter levees of Ponds A19 and A20 would occur at low tide utilizing mats.

The construction access, staging areas, equipment, and construction timing considerations are common to both Action Alternatives at the Island Ponds.

Construction Access. As shown on Figure 2-6, primary access to the Alviso-Island Ponds would be from the adjacent levees at Ponds A22 and A23. Vehicle and heavy equipment access to these ponds is available from levee roads, as shown on Figure 2-6. An amphibious excavator would be offloaded and floated across Mud Slough. Daily access for crews would be from the Fremont Boulevard exit off of Interstate 880, onto Landing Road, and then onto an unnamed levee road that connects to the northeast corner of Pond A19 via small footbridge.

Construction Staging Areas. No staging areas are necessary for work at the Island Ponds. Equipment used for construction would stay within the project footprint, and no material would be brought into the Island Ponds.

Construction Equipment. Construction equipment would include excavators, a barge (for fueling and possibly access to the project site), low-bed truck, other common construction equipment, skiff, and pickup vehicles for transportation in and out of the project site.

Construction Timing Considerations. There are certain special-status species that may be affected by construction activities. The presence of these species may limit construction activities or require certain avoidance and minimization measures. The specific limits and requirements for each species and their habitats will be addressed during the permitting phase of the project. However, the timing considerations below will be incorporated into detailed designs and project planning to reduce the overall potential for adverse impacts and the need for mitigation.

- Bird nesting: Regulatory work windows for bird nesting typically run from February 1 through September 15. Work could likely occur within this window in the presence of a biological monitor and preconstruction surveys.
- Steelhead migration: Activities that may potentially affect adult upstream migration would be avoided from December through February. Similar avoidance of activities that would affect juvenile downstream migration would be avoided from April through June. If applicable, the National Marine Fisheries Service (NMFS) acceptable work windows for steelhead are June through November; a USFWS-approved biological monitor may be required during this period.
- Longfin smelt and green sturgeon: These species could be present year-round. In-channel work may require that a USFWS-approved biological monitor be present.

Construction of Alternative Island B

Order of Construction. In each pond, the construction scenario would likely start removal from the farthest end of the construction access point along the perimeter levees and proceed toward the starting point of the access. For this concept, the likely order of construction in Alternative Island B would be as follows:

1. Lower Pond A19 south perimeter levee.
2. Remove Pond A20 east perimeter levee.
3. Remove Pond A19 west perimeter levee.
4. Lower and breach Pond A19 north perimeter levee starting from west end and progressing to the east end.

Construction Schedule. The construction schedule would be affected by species windows, weather conditions, earthwork quantities, and land disturbance. Construction would be expected to begin in the summer or fall of 2017. A preliminary estimate shows that construction would likely be completed in approximately 16 months over two construction seasons. This estimate assumes that USFWS would permit heavy construction activities to occur during the bird-nesting window with the presence and under the direction of a biological monitor.

Construction of Alternative Island C

The only component of Alternative Island C with a construction method not already described in Alternative Island B is the excavation of the pilot channels. Alternative Island C would also include widening existing breaches and lowering longer sections of levees, but the construction method and equipment to do so would be the same as the method and equipment used to create the new breaches.

Pilot Channel. Excavated material would be sidecast on either side of the channel. Existing soil conditions at the pond bottom are likely to be soft, rendering the bottom unsuitable for driving or support of heavy equipment. Temporary mats with gravel bedding on top would be deployed at the pond bottom to create a firm surface that can handle heavy equipment such as an excavator, loader, and mini-dozer to access the locations where the pilot channels are to be established. Alternatively, amphibious equipment such as an amphibious excavator could be used to excavate in the wet to designed depths.

The construction methods and sequence for Alternative Island C would be similar to those for Alternative Island B. The likely order of construction within the Island Ponds would be follows:

1. Excavate Pond A19 pilot channel.
2. Expand Pond A19 breaches.
3. Lower Pond A19 south perimeter levee.
4. Lower Pond A20 south perimeter levee.
5. Remove Pond A20 east perimeter levee.
6. Breach Pond A21 north perimeter levee.
7. Lower and breach Pond A20 north perimeter levee, starting from west end and progressing to the east end.
8. Remove Pond A19 west perimeter levee.
9. Lower and breach Pond A19 north perimeter levee, starting from west end and progressing to the east end.

Construction Schedule. The construction schedule would be affected by species windows, weather conditions, earthwork quantities, and land disturbance. Construction would be expected to begin in the summer or fall of 2017. A preliminary estimate shows that construction would likely be completed in approximately 19 months over two or three construction seasons. This estimate assumes that USFWS would permit heavy construction activities to occur during the bird-nesting window with the presence and under the direction of a biological monitor.

Operations and Maintenance

Aside from the monitoring and management activities of the AMP and continued maintenance of the existing UPRR track, no other O&M activities would occur at the Island Ponds. The breaches would scour from hydraulic action until equilibrium with the tidal flux is reached, and most levees would be allowed to degrade naturally. The levee containing the existing railroad track would be maintained to allow the continued use of the tracks. Ongoing monitoring and studies to track the progress of these ponds toward restoration as tidal marsh would be a component of the continued implementation of the AMP.

2.2.3 Alviso-Mountain View Pond Cluster

The Alviso-Mountain View pond cluster (the Mountain View Ponds) consists of Pond A1, Pond A2W, the levees surrounding each pond, some of the fringe marsh outside of the pond and slough levees, Permanente Creek, and Mountain View Slough. Charleston Slough, which is owned by the City of Mountain View and is not part of the Refuge, is included as part of the Mountain View pond cluster, as are the levees surrounding Charleston Slough.

The Mountain View Ponds are in the western portion of the Alviso pond complex, between the Palo Alto Flood Basin to the west, Mountain View Shoreline Park and Stevens Creek Marsh to the south, Stevens Creek to the east, and open bay water to the north (Figure 2-7). The 115-acre Charleston Slough is at the western end of the cluster. Permanente Creek, which flows into Mountain View Slough, is between Ponds A1 and A2W. The cities of Mountain View and Palo Alto are immediately inland of the pond cluster to the south and west, respectively.

Under the No Action Alternative for the Alviso-Mountain View pond cluster (Alternative Mountain View A), no new activities would occur as part of Phase 2. The Action Alternatives (Alternatives Mountain View B and Mountain View C) propose activities transitioning the ponds to tidal marsh while maintaining or improving existing flood protection along the pond cluster borders with the cities of Mountain View and Palo Alto. Viewing platforms and trails would be established to improve recreation and public access to the pond cluster. The SBSP Restoration Project goals for this pond cluster are to transition to tidal marsh, maintain or improve flood protection, and improve recreation and public access. In addition, the connection of these large ponds to Stevens Creek and to the South Bay itself would provide nursery habitat and enhanced habitat connectivity for salmonids and other estuarine fish.

Restoration activities include breaches of levees at various locations, creation of wildlife habitat features, and other levee alterations to improve the overall ecological conditions of Pond A1, Pond A2W, and Charleston Slough.

As an adaptation to future sea level rise, the project is proposing the creation of habitat transition zones at several of the Phase 2 pond clusters. Habitat transition zones are specifically called out in documents such as the U.S. Fish and Wildlife Service's Tidal Marsh Recovery Plan and the recent Science Update to the Baylands Ecosystem Habitat Goals Project Report. A gradual transition from waters of the Bay or ponds to uplands is largely missing in the current landscape of the South Bay, where there is often a distinct and abrupt boundary between the bay and the built environment. The SBSP Restoration Project's intention in including transition zones in the Phase 2 alternatives is to restore this missing habitat feature. Doing so would:

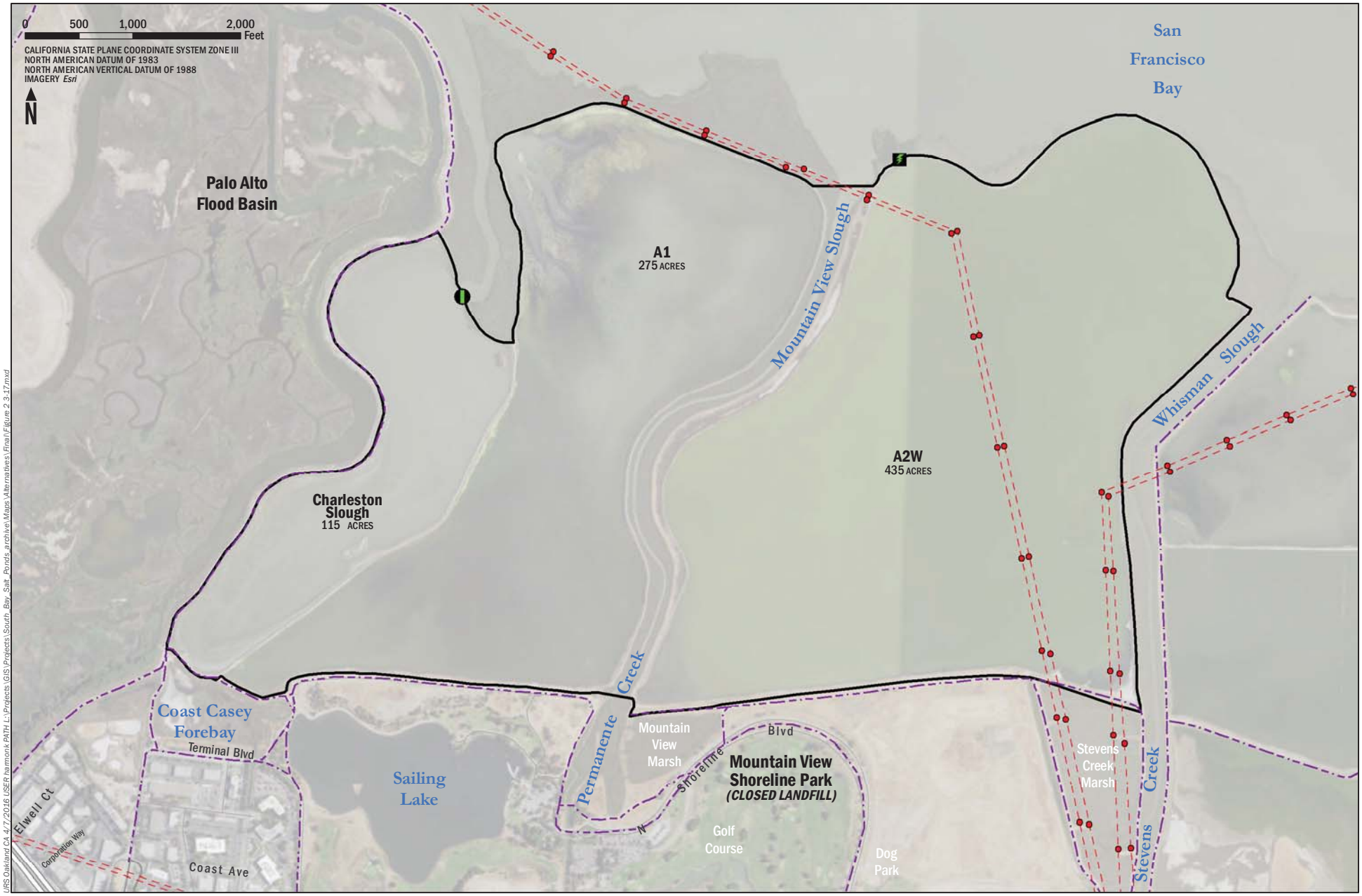
1. Establish areas in which terrestrial marsh species can take refuge during high tides and storm events, thereby reducing their vulnerability.

2. Expand habitat for a variety of special status plant species that occupy this specific elevation zone.

3. Provide space for marshes to migrate upslope over time as water levels in the Bay rise.

Before proposing these features, the SBSP Restoration Project examined the landscape to see if there are any areas adjacent to the project site where this could occur naturally. In general, the best locations for building these features would be located adjacent to open space or park land where the project can provide an even greater extent of transition into upland habitats.

However, at the edge of the Bay, these open space areas are largely former (now closed and capped) landfills which present a variety of challenges for creating the missing upland habitat. First, the existing elevation gradient between the restored marsh and the edge of the landfill is usually too steep to provide a gradual transition. Secondly, these landfills would otherwise pose a water quality risk from erosion if tidal action were introduced immediately adjacent to the protective clay liner or un-engineered rip rap slopes.



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South Bay Salt Pond Restoration Project

Figure 2-7

Alternative Mountain View A

In these instances, it is necessary that the project place material inside the former salt ponds to create the desired slope (15:1 to 30:1). At other locations, the actual elevations landward of the project sites are too low to create an uphill slope with the desired habitat functions. Therefore, once new levees are built to protect that area from tidal flooding, and the only area remaining to build the transition zones is into the salt ponds. Finally, most of the adjacent property is not within the SBSP Restoration Project's ability to acquire, whether or not it has the desired elevation profile, because it is currently developed. In addition to being very expensive to acquire these areas, it would be infeasible to relocate all of the residences and business that have built adjacent to the salt ponds.

For these reasons, the project plans to use fill from upland excavation projects to create habitat transition zones inside the former salt ponds. The transition zones would improve the habitat quality of the restored marsh, particularly for endangered and threatened species, and improve resiliency of the shoreline over time as sea levels rise.

While the greatest additional habitat benefits and resilience to sea-level rise would come from the shallowest slope (the 30:1 ratio being proposed), depending on the volume of material available, the constructed slope could be steeper (i.e., less than 30:1) if less material is available. This would reduce the footprint area of the habitat transition zone and the total volume of fill necessary. This Final EIS/R conservatively assumes and analyzes the greatest environmental impacts, which would come from the largest habitat transition zones (those with the shallowest slope).

Although a reduced slope would also potentially somewhat decrease the additional habitat value and resiliency provided by the transition zones, it would still provide substantial sea-level rise resilience and habitat benefits over the traditional 3:1 slops of the typical levee found at the edge of San Francisco Bay. Because this document will provide clearance under NEPA and CEQA for transition zones of up to 30:1 slopes, any smaller transition zones could be constructed under Phase 2 and enlarged up to that limit at a future time (following the necessary permitting processes) as material becomes available.

Upland fill material would also be used to create habitat islands and improve levees. All imported upland material would be screened in accordance with a new Quality Assurance Plan (QAP) being developed from the model QAP for the Bair Island Restoration Project by Life Sciences, Inc. The QAP will include protocols for off-site imported material testing, classification, and tracking.

It was initially considered possible that dredged material would also be placed in Ponds A1 and A2W to raise the bottom elevations and accelerate marsh formation at these ponds. However, doing so would require a delivery method such as either dredging a barge channel to the ponds or using a sediment slurry pipe and a pumping system. The act of establishing a slurry pipe system with the required offloader and booster stations or dredging a channel for barge delivery of sediments was not feasible to do on either a financial basis or a regulatory one. It would also create numerous additional environmental impacts. Therefore, due to the lack of a feasible delivery plan, a foreseeable dredging partner, and efficient regulatory clearance, this document does not include or analyze the effects of such beneficial reuse of dredged material as part of this project. If this component moves toward being included in the project designs and implementation plan, the appropriate NEPA and CEQA compliance processes (which may include a new EIS/R tiered from this document and the 2007 EIS/R or a supplemental/addendum EIS/R) would be completed before approving the activity.

Alternative Mountain View C would incorporate Charleston Slough into the project and include several actions that are necessary to provide additional flood protection to portions of the cities of Mountain View and Palo Alto and to help maintain the water supply to the sailing lake in Mountain View Shoreline Park.

Details about each Phase 2 Action Alternative for this pond cluster are summarized in Table 2-4, illustrated on Figures 2-7 through 2-10, and described in the following sections. The Preliminary Design Memorandum for the Action Alternatives for the Mountain View Ponds is included as Appendix M to this Final EIS/R.

Alternative Mountain View A (No Action)

Under Alternative Mountain View A, the No Action Alternative, no new activities would be implemented as part of Phase 2. The USFWS would maintain the ponds as part of the Don Edwards San Francisco Bay National Wildlife Refuge System, following the AMP and other management practices. The pond cluster would continue to be managed through the activities described in the AMP and in accordance with current USFWS practices. The levees around Ponds A1 and A2W are classified as high priority levees to be maintained for inland flood protection. These outboard levees would be maintained (or repaired upon failure). The ponds would not be actively managed except for the current water quality management in Pond A2W, which involves circulating water as needed to maintain dissolved oxygen per the existing AMP.

Existing trails on the levees along the boundary of the pond cluster would continue to be maintained. The current use of water in Charleston Slough to supply the water system the Shoreline Park would continue. Alternative Mountain View A is shown in Figure 2-7.

The PG&E towers and power lines that run through Pond A2W and outside of it and Pond A1 would be maintained as described in Appendix D. These activities are already permitted and would continue to take place under Alternative Mountain View A. These maintenance and repair activities include aerial and ground patrol, inspections, equipment inspections, electrical outage repair, and insulator washing and replacement.

Table 2-4 Components of the Phase 2 Action Alternatives at the Mountain View Ponds

ALTERNATIVE MOUNTAIN VIEW B	ALTERNATIVE MOUNTAIN VIEW C
Do not include Charleston Slough in tidal marsh restoration.	Include Charleston Slough in tidal marsh restoration.
Raise and improve western levee of Pond A1.	Lower and breach western levee of Pond A1.
Breach the west side of Pond A1 at one location.	Breach Pond A1 at three locations.
—	Breach Charleston Slough and connect it to Pond A1: ▪ Open Charleston Slough to full tidal exchange, by breaching the northern levee or by removing the tide gate structure itself, to allow vegetation to colonize the mud flats surrounding the slough's main channel; ▪ Raise and improve the western levee 1 of Charleston Slough, which separates it from the Palo Alto Flood Basin; ▪ Raise the Coast Casey Forebay levee1 along southern border of Charleston Slough and associated sailing lake water intake and pump station structures; ▪ Add a primary water intake 2 for the Mountain View Shoreline Park sailing lake at the breach in the levee between Charleston

Table 2-4 Components of the Phase 2 Action Alternatives at the Mountain View Ponds

ALTERNATIVE MOUNTAIN VIEW B	ALTERNATIVE MOUNTAIN VIEW C
	Slough and Pond A1; ▪ Lower western levee of Pond A1; ▪ Rebuild the existing viewing platform along the Coast Casey Forebay levee; rebuild the existing trail and replace benches and signage along the improved western levee of Charleston Slough; and ▪ Armor levee on landward side of breach between Pond A1 and Charleston Slough.
Construct bird habitat islands in Ponds A1 and A2W.	Add bird habitat islands in Ponds A1 and A2W.
Construct habitat transition zones across entire southern extent of Ponds A1 and A2W.	Construct a habitat transition zone across entire southern extent of Pond A1 but only across a portion of A2W.
Breach Pond A2W at four locations.	Breach Pond A2W at four locations.
Armor the two eastern breaches of Pond A2W and add railcar bridges over the two breaches for Pacific Gas and Electric Company (PG&E) access.	Armor the two eastern breaches of Pond A2W and add railcar bridges for PG&E access and recreational trail access.
Raise concrete footings of PG&E towers in Pond A2W; elevate existing PG&E access boardwalk in Pond A2W; construct new sections of boardwalk from Pond A2W to connect to existing boardwalk over Bay outside of the Palo Alto Flood Basin.	Raise concrete footings of PG&E towers in Pond A2W; elevate existing PG&E access boardwalk in Pond A2W; construct new sections of boardwalk from A2W to connect to existing boardwalk over Bay outside of Palo Alto Flood Basin.
Add viewing platform in Shoreline Park south of Pond A1.	Add viewing platform in Shoreline Park south of Pond A1.
Construct spur trail on improved western levee of Pond A1 to a viewing platform.	Construct spur trail on improved west levee of Pond A1 to a viewing platform at the armored breach.
—	Add a spur trail from Bay Trail spine along Charleston Slough's northern levee to a viewing platform at or near the breach location.
—	Add recreational trail on eastern and northern sides of Pond A2W to a bay side viewing platform near PG&E turnaround point.

[1] The proposed improvements to the Coast Casey Forebay levee and the western levee of Charleston Slough would be to an elevation beyond that required by SBSP Restoration Project's requirements; it would be higher to meet City of Mountain View's expectations for sea-level rise.

[2] The proposed water intake at the A1-Charleston Slough breach location requires the intake, pipes, and sump to be constructed under the existing levee out to the breach.

Alternative Mountain View B

Under Alternative Mountain View B, the Pond A1 and Pond A2W levees would be breached at several points to introduce tidal flow in the ponds. Habitat transition zones and habitat islands would be constructed in the ponds to increase habitat complexity and quality for special-status species. A new trail and viewing platform would be installed to improve recreation and public access at these ponds. Upland fill material would be imported into the ponds to raise levees, construct habitat islands, or build habitat transition zones.

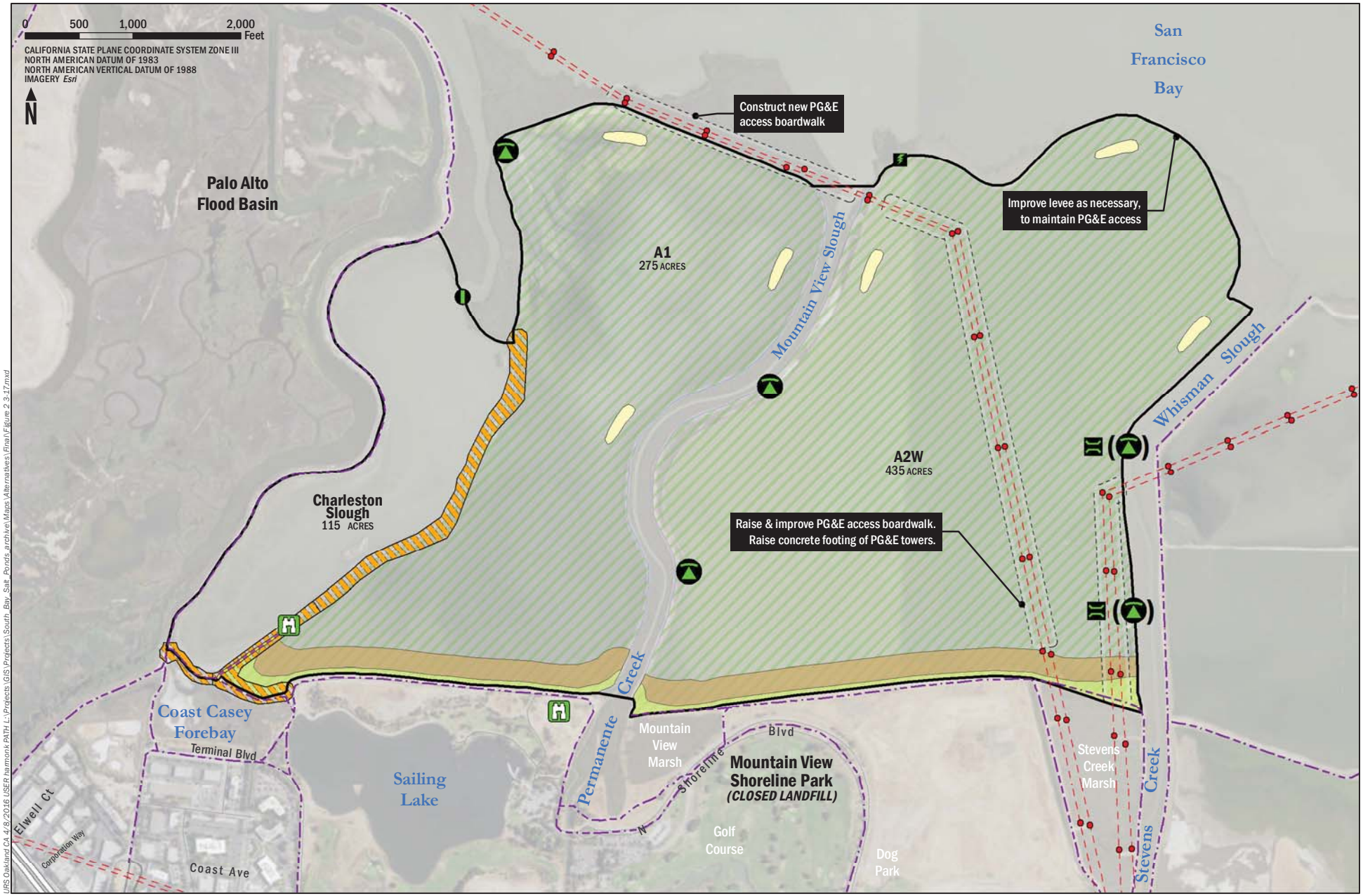
As shown in Table 2-3, Alternative Mountain View B would require approximately 316,800 cubic yards of fill; however, cut activities at the site would generate 20,400 cubic yards of material. Thus, only 296,400 cubic yards would be imported. The rest would be obtained from breached or lowered levees within the project area. Alternative Mountain View B would not include Charleston Slough.

The activities of this alternative are detailed below and illustrated on Figure 2-8.

- Breach the west side of Pond A1 at one location. The west levee of Pond A1 would be breached at a single location to allow tidal flows to enter, sediment to accrete, and vegetation to become established. The breach would be at the northwest corner of the pond on the western levee and would be outside of the Charleston Slough tide gate and levee. Material from the breached levee would be used to build habitat islands or habitat transition zones or improve levees or would be sidecast into Pond A1 to raise the bottom elevation. The northwest breach in Pond A1 would be 250 feet at the bottom width with an invert elevation of 2.0 feet NAVD88 and 3:1 (h:v) side slopes.

- Breach Pond A2W at four locations. Pond A2W would be breached at two locations on the west-side levee and two locations on the east-side levee to bring tidal flows into the pond. The specific locations of these breaches would be determined during advanced construction design, but their locations would generally follow the locations of historical slough traces. Material from the lowered levee would be used to build habitat islands or habitat transition zones or improve levees or would be sidecast into Pond A2W to raise the bottom elevation. The breaches on the west side of Pond A2W would have a bottom width of 100 feet with an invert elevation of 2.0 feet NAVD88 and side slopes of 3:1 (h:v). Pond A2W's east perimeter levee would be breached in two places; at each breach the bottom width would be 28 feet. The invert elevation of these breaches would be 2.0 feet NAVD88 with side slopes of 2:1 (h:v). These breaches would be designed such that the top width would be wide enough to span railcar bridges (described below). Both of the breaches on the eastern side of Pond A2W would be armored on both sides to protect the bridge abutments from future erosion or scour.

- Armor the two eastern breaches of Pond A2W and add railcar bridges over the two breaches for PG&E access. Railcar bridges would be used to create boardwalks; these bridges would be approximately 60 feet long and 10 feet wide. The bridges would span the two breaches along the Pond A2W east levee to provide a single-lane, all weather access route to the PG&E facilities to the north of Pond A2W. The deck would be 2 feet thick, and the top of the deck would be at an approximate elevation of 10.0 feet NAVD88. Each railcar bridge superstructure would weigh between 70 to 100 tons and would rest on top of cast-in-place concrete abutments. With seismic-resistant shear keys, the abutment stem would be approximately 15 feet long.



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South Bay Salt Pond Restoration Project

Figure 2-8

Alternative Mountain View B

- Raise and improve western levee of Pond A1. A portion of the western levee of Pond A1 would be raised to provide flood protection to inland areas west and south of the Mountain View pond cluster. The levee breach in Pond A1 (described above) would remove the flood protection currently provided by the outboard levees of Pond A1. Raising the western levee of Pond A1 would maintain current levels of flood protection in the communities and infrastructure to the southwest of Pond A1. Much of the material for raising the levee would come from off-site, upland sources, though some would come from on-site breaching. The length of levee that would be raised is approximately 4,350 feet. From the preliminary design, the improved levee would entail a minimum 10-foot-wide crest with side slopes of 5:1 (h:v) or flatter. The crest of the levee would be constructed to an elevation of 10 feet NAVD88. The cross-section would be further refined during the future design phase based on geotechnical investigations and evaluation.

- Construct habitat islands in Ponds A1 and A2W for birds. Nesting and roosting habitat for shorebirds, terns, and dabbling birds would be created through the construction of several habitat islands in Ponds A1 and A2W. The islands would be constructed largely of upland fill material from off-site projects. Depending on the availability of material, up to 16 islands, each with an area of roughly 11,000 square feet, would be constructed in Ponds A1 and A2W. (The actual number of islands constructed is expected to be lower – approximately three to six per pond.) Each island would have a top elevation of 8.0 feet NAVD88 (roughly 3 feet above mean higher high water [MHHW]) and side slopes no steeper than 6:1 (h:v) along the windward side and ranging from 28:1 (h:v) to 12:1 (h:v) along the leeward side. As the ponds transition to marsh, the island habitat will eventually become marsh mounds, which have various ecological benefits as high-tide refugia and as focal points for further sediment aggregation and vegetation formation.

- Construct habitat transition zones across entire southern extent of Ponds A1 and A2W. Habitat transition zones would be constructed in Ponds A1 and A2W along the southern levees of Ponds A1 and A2W to create upland transition habitat between the lower elevation of the pond and the levee. The habitat transition zones would provide habitat for salt marsh harvest mouse (*Reithrodontomys raviventris*) and other terrestrial species (once vegetated) and foraging habitat for a variety of shorebirds. They would also provide a gentle slope for dissipation of wave energy and reduction of erosion potential. The east-west extent of the habitat transition zones would depend on the amount of material available, but under Alternative Mountain View B the habitat transition zones are planned to extend all the way across the southern border of each pond. The habitat transition zones would be constructed primarily of upland fill material from off-site projects. Roughly 3,000 linear feet and 4,600 linear feet of habitat transition zones would be established along the inside slope of Ponds A1 and A2W, respectively. The habitat transition zones would start at elevation 9.0 feet NAVD88. The slope of the habitat transition zones would depend on the material available, but the most gradual slope (i.e., the longest extent of the habitat transition zones into the ponds) would be 30:1 (h:v).

- Add recreation and public access. Two recreation and public access features would be added. In the first, a viewing platform and sign with a bench would be constructed along or near the existing trail on the southern border of Pond A1 near the eastern end of the pond. Wildlife viewing opportunities from the trails along the southern shore of Pond A1 would be improved by brush clearing. This clearing would be conducted within the Mountain View Shoreline Park. In the second, a spur trail would be constructed along the improved western levee of Pond A1 to a

viewing platform. The trail would be designed to avoid the landfill cells below and behind the trail.

- Raise concrete foundations of PG&E towers in Pond A2W. Sixteen (16) transmission towers are within Pond A2W. Conversion of this pond to tidal marsh habitat would require PG&E to upgrade the tower foundations to account for the introduced tidal flux and to raise the maintenance/service boardwalks that run under the power lines and provide PG&E access to the towers. The concrete pedestals on which the 16 towers sit would be reinforced with additional concrete placed higher on the tower legs to protect the metal portions of the towers from the corrosive action of saltwater from the highest tides. The total combined area of the new concrete foundation is estimated to be 540 square feet (about 0.013 acre), and the total combined volume of that concrete is 2,160 cubic feet (80 cubic yards).

- Elevate existing PG&E access boardwalks in Pond A2W; construct a new section of boardwalk outside of Pond A1 to connect Pond A2W's outboard levee with the existing boardwalk outside of the Palo Alto Flood Control Basin. All existing boardwalks would be raised a maximum of 4 feet, utilizing the existing boardwalk pillars. The existing boardwalks in Pond A2W are made of wooden planks on a wooden frame that rests on concrete foundations set into the pond bottom. The decking is approximately 6,700 feet long, two to three feet wide, and only intermittently used by PG&E for pedestrian access to the towers. This boardwalk would be removed and replaced with a higher one to retain PG&E access to the towers. The replacement would increase the width of the boardwalk by approximately two feet and thus increase the shaded area of the Bay. The exact amount of added surface area would not exceed 13,500 square feet (0.31 acre). In addition to raising the boardwalk within the pond, a new section of boardwalk would be added to connect the end of the Pond A2W boardwalk with the end of an existing one that lies northwest of Pond A1. The additional boardwalk would be approximately 2,350 feet long and 3 feet wide (7,050 square feet or 0.16 acre). This area the area of new shade added to the bay. The total cross-sectional area of the piles to support this new boardwalk is less than 700 square feet (under 0.15 acre). The total volume of the piles to support the new boardwalk would be approximately 280 cubic yards, of which approximately 186 cubic yards would be below the bay floor (piles must be placed 12 vertical feet below the bay floor), and the remaining 93 cubic yards would be in the water column. The various access points to the boardwalks would be gated to protect against unauthorized human entry and would be designed to exclude terrestrial predators of marsh wildlife species that may use them. This boardwalk would also create a physical barrier that would prevent watercraft from inadvertently entering the ponds and getting stranded on restored marsh or contacting the bellies of the power lines. These boardwalk addition and improvement activities would undergo separate Section 7 consultation under the federal Endangered Species Act.

Alternative Mountain View C

Under Alternative Mountain View C, levees would be breached and lowered to increase tidal flows in Pond A1, Pond A2W, and Charleston Slough. The inclusion of Charleston Slough into the SBSP Restoration Project is the primary distinguishing feature between Alternative Mountain View B and Alternative Mountain View C. Other actions would include adding habitat transition zones, habitat islands, and allowing for possible future connectivity with two brackish marshes south (inland) of Pond A2W. Proposed activities under Alternative Mountain View C are intended to increase habitat complexity

and quality for special-status species. Flood control would be maintained with improvements to the southern and western levees of Charleston Slough. Several new trails and viewing platforms would be installed or replaced to improve recreation and public access at the pond cluster. Upland fill material would be imported into the ponds to raise levees, construct islands, or build habitat transition zones. To continue providing water to the Mountain View Shoreline Park sailing lake, a new water intake would be constructed at the proposed breach between Pond A1 and Charleston Slough. The current water intake would be retained as a secondary intake source for backup, maintenance, etc.

As shown in Table 2-3, Alternative Mountain View C is estimated to require approximately 421,000 cubic yards of fill; however, only 369,600 cubic yards would need to be imported. The rest would be obtained from breached or lowered levees or other earthwork.

Alternative Mountain View C actions are shown on Figure 2-9a and additional detail is provided on Figure 2.9b.

- Alternative Mountain View B activities. Alternative Mountain View C would include most of Alternative Mountain View B activities. Differences and exceptions are noted and described below.

- Breach Pond A1 at three locations. The western and eastern levees of Pond A1 would be breached at three locations each to allow for tidal flows, sediment accretion, and vegetation establishment in the pond. Specific locations of these breaches would be determined during advanced construction design, but would generally follow the locations of historical slough traces. One of the breaches would be located in the northwest corner of the pond, outside of the current location of the Charleston Slough tide gate. All breaches would be 100 feet at the bottom width with an invert elevation of 2.0 feet NAVD88 and side slopes of 3:1 (h:v). The southern side slope of the southwestern Pond A1 breach would be armored to protect the trail and viewing platform from erosion. Material from the levee breaches would be used to build islands or habitat transition zones or improve levees or would be sidecast into Pond A1 to raise the bottom elevation.

- Breach Charleston Slough and connect it to Pond A1. Charleston Slough would be made fully tidal and connected to Pond A1 by implementing the components listed in the following sub-bullets. Unlike most other project components, these measures are not independent activities; they must be implemented together or not at all.

    - Open Charleston Slough to full tidal exchange to allow vegetation to colonize the mud flats surrounding the slough's main channel. This component would likely be accomplished by removing the 50-foot-long tide gate near the outer bay side of the slough. The levees on either side of the breach would be cut back to create a breach with a bottom width of 80 feet at an elevation of 1.0 feet NAVD88. The end of the existing levee to the west of the tide gate would require armoring to protect it from scour and to maintain a trail to the viewing platform. Alternatively, the breach could be created by leaving the tide gate in its current position and breaching the existing levee to the east of it. The tide gate would serve as armoring for the on-levee trail and viewing platform above it.

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Figure 2-9a

Alternative Mountain View C

LEGEND

Exsiting pipeline
Existing general feature
Proposed pipeline
Proposed new feature

AECOM
South Bay Salt Pond Restoration Project

Figure 2-9b
Alternative Mountain View C - Detaill

- Raise and improve the western levee of Charleston Slough, which separates it from the Palo Alto Flood Basin. From the preliminary design, improved levees would consist of a minimum 36-foot-wide crest with side slopes of 4:1 (h:v) or flatter. The crest of the levee would be constructed to elevation 14 feet NAVD88 (with an option for future elevation to 16 feet NAVD88), with a freeboard of approximately 1.5 feet and to include 30 percent overbuild to allow for settlement over time. These levee improvements were designed to an elevation and with sufficient foundation support for the possible future buildup to meet the City of Mountain View's High Sea Level Rise projections.) The typical cross section includes 8 feet of levee fill underlain by 12 feet of young bay mud. The levee crest will include 4-inch-thick crushed gravel to provide all-weather access on the reconstructed trail.

- Raise the Coast Casey Forebay levee and associated structures. The City of Mountain View seeks to raise approximately 1,000 linear feet of the levee north of the Coast Casey Forebay and structures for the Mountain View Shoreline Park sailing lake pump station, pipelines, and valve vaults. To incorporate the highest sea-level rise prediction from the City of Mountain View's Sea Level Rise Study, Feasibility Report, and Capital Improvement Program (ESA PWA 2012), this levee improvement would build a levee base and foundation support sufficient to support a 16.0-foot NAVD88 cross section but without the top 2 feet (i.e., to a crest elevation of 14 feet NAVD88). This design levee height satisfies the Federal Emergency Management Agency (FEMA) design criteria for 100-year flood level plus 3 feet and gives the City of Mountain View the option of future improvements to address sea-level rise. This design levee height would also improve flood protection along the southern end of Charleston Slough and the communities and infrastructure behind it. In and around this levee are a pump station and a valve vault, and both would need to be raised along with the levee. A pump station control building to the west need not be raised but would be surrounded with a retaining wall. Finally, the existing wooden platform and viewing station that extend into the slough from the trail near the water intake will be elevated to match the raised Coast Casey Forebay levee.

- Add a water intake for the Shoreline Park sailing lake at the breach in the levee between Charleston Slough and Pond A1. As shown on Figure 2-9b, the intake would project into the breach, where it would draw water flowing between the slough and Pond A1. One sediment sump would be placed behind the intake, and a pipe would be placed into a trench on the remaining western levee of Pond A1. The pipe would be covered and would run to a second sediment sump at the base of the levee. To the west, the new pipe would connect to the existing pipe that runs to the sailing lake. This connection would allow for backwashing the new pipe from the lake to keep it clear. The new intake pipe would add approximately 1,000 feet of length to the intake piping. The pipe would be sized to minimize head loss so that backwashing can still occur. The new pipe is expected to be similar to the existing intake pipe: 42-inch internal-diameter high-density polyethylene (HDPE).

- Lower west levee of Pond A1. Approximately 4,730 feet of levee along the western edge of Pond A1 (bordering Charleston Slough) would be lowered from the existing crest elevation to the MHHW elevation of 6.6 feet NAVD88. This lowering would connect Pond A1 to Charleston Slough. The levee would be lowered between the two proposed breach locations to increase tidal flux, provide material to raise the elevation of the pond bottom, and increase habitat connectivity. Material from the lowered levee would be used to build islands or

habitat transition zones or improve levees or would be sidecast into Pond A1 to raise the bottom elevation.

- Rebuild the existing trail and replace benches and signage along the improved western levee of Charleston Slough (described with other recreational elements below).

- Construct a habitat transition zone in Pond A2W. As in Alternative Mountain View B, a habitat transition zone would be constructed in Pond A2W along the southern levee to create transition habitat zones between the lower elevation of the pond and the levee. However, in this alternative, the habitat transition zone would not reach the western or eastern borders of the pond. The eastern extent of this habitat transition zone would terminate along the southern levee to allow for potential future connectivity with the Stevens Creek Marsh immediately behind and to the pond's southeastern corner. Similarly, the western end of this habitat transition zone would terminate along the southern levee to allow for potential future connectivity with the Mountain View Marsh and/or to Stevens Creek Mitigation Marsh immediately behind and to the south of the pond's southwestern and southeastern corners, respectively. The other design details of Pond A1's and Pond A2W's habitat transition zones are unchanged from Alternative B.

- Add recreation and public access. The two recreation and public access features from Alternative Mountain View B would be constructed: the viewing platform along the southern trail on Pond A1 and the trail and viewing platform on the remaining levee on the west side of Pond A1. Also, the existing trail along the western levee of Charleston Slough would be rebuilt on the raised and improved levee described above. In addition, several new recreation and access features would be added: a spur trail and an interpretive feature at the northern end of Charleston Slough, a trail along the levee on the eastern and northern sides of Pond A2W to the end of the PG&E access road. The trail on the eastern and northern levees of Pond A2W would be 8,900 feet (almost 1.7 miles) long. The surfaces and side slopes of those levees would be maintained for PG&E access in Alternative Mountain View B. This alternative would open that route for public recreational access, add signage, and include more-frequent maintenance for safety. The new spur trail would extend 500 feet from the Bay Trail (along the levee between Charleston Slough and the Palo Alto Flood Basin) into the center of Charleston Slough along the remnant of the outer levee of Charleston Slough to the location of the breach (described above).

Construction Methods

Construction of Common Elements

Levee Lowering. Lowering would be accomplished by using an excavator and loader and hauling removed material to locations receiving fill for habitat transition zone or island construction.

Levee Breaching. Breaching would be accomplished from the levee crest using excavators and hauling material to locations receiving fill for levee improvement or habitat transition zone construction.

Habitat Islands. The material for the habitat islands would be placed using four portable barges that would be assembled in the pond. One barge would have a mounted excavator and the others would be used to transport fill material. The crane used to offload and assemble the barges would also be used to load them with fill. Once loaded, a skiff would transport the material barge to the island site where it would be tied up to the work barge. The excavator would place the material in the pond. While one barge is being offloaded, others will be loaded and transported to the work site to keep the operation continuous.

A water truck would be used for dust control. The material would be piled in layers and compacted by a vibratory hand tamper or a roller. The top surface of the proposed habitat islands would be treated with a combination of rock, shell, and sand; current designs include a 12-inch-thick sand layer underlain by 6-inch-thick crushed rock to cover any surficial cracks and prevent weed establishment. The sand layer would be covered with a 4-inch-thick layer of oyster shells, if available, to provide a barren land sight that is typically preferred by some nesting birds.

Habitat Transition Zones. Habitat transition zones would be constructed by placing fill material at roughly 30:1 (h:v) side slopes and compacting to 70 to 80 percent dry density to enable vegetation establishment. Slope protection would be maintained by establishment of native vegetation. Hydroseeding or other seeding method with a native plant mix, development of a planting scheme, and invasive plant control would aid in establishing desirable vegetative habitat.

Railcar Bridges. The railcar bridge superstructure would rest on top of cast-in-place concrete abutments. The integrated concrete wing walls would be built with stem to contain the embankment. Because the bridge is not subject to busy traffic, a concrete approach slab is not required. The abutments would be supported with multiple 14-inch x14-inch precast pre-stressed concrete piles with an estimated total of eight piles at each abutment. The pile length is assumed to be 45 feet long.

A safety railing would be installed on both sides of the deck. These railings would be a heavy-duty barrier for truck crushing load or would be simplified steel-tube railing for walking personal protection.

Dewatering. Armoring and bridging of breaches on the east levee of Pond A2W would be done in dry conditions. Installation of cofferdams would be required at the breach and bridge locations to facilitate the construction of concrete abutments and wingwalls. Pumped water would be discharged downstream of the construction area and possibly directed to a slough.

Levee Improvements. Levee improvement would require clearing of vegetation, debris, and grooving. Fill would be placed in 8-inch-thick lifts and compacted either through a vibratory hand tamper or a roller to achieve 90 percent compaction. Borrow material would be sourced from off-site stockpiles. On-site sources would include excavated material from levee lowering and breaching activities. Levee crests destined for trail access would be finished with a 4-inch-thick layer of crushed gravel to provide all weather access and to be compliant with the Architectural Barriers Act (ABA) on federal lands and the Americans with Disabilities Act (ADA) where the trails are part of the Bay Trail system or where project partners (e.g., city, county, or state agency) have compliance obligations.

Trails, Platforms, Signs, and Benches. All rebuilt trails on existing levees that would be raised or modified as part of this project would be resurfaced to match the existing conditions.

A new trail would be built on the improved Pond A1 west levee. Eroded or uneven surfaces on existing levees would be regraded for ADA and ABA compliance. Surfacing materials would be decomposed granite with timber or concrete edging. These materials would be placed with dump trucks and bulldozers.

The new viewing platforms would be constructed of wood and placed on cast-in-place concrete abutments. The footings would be dug with an auger attachment on a bobcat. Concrete would be imported by concrete truck and the footings would be cast-in-place. Platform materials would be delivered by flatbed truck and assembled on-site. The signage at the platforms would be mounted on pedestals, and a bench would be located near each interpretive sign.

Boardwalk Improvement and Addition. The new boardwalks would be placed within the existing PG&E right-of-way (ROW), adjacent to the towers. All new sections of boardwalk would be built 3 to 5 feet above the height of the existing boardwalk. The boardwalk spans would be 3-foot-wide sections and would include a double handrail. The boardwalk spans would be built in 20-foot-long sections supported by 4-inch by 4-inch vertical plastic lumber posts, known as support footings, which would be spaced 10 feet apart along the boardwalk spans. The boardwalks would parallel the transmission line towers and would include additional lateral boardwalks, which would be used to access each tower from the main boardwalk.

PG&E crews would manually push the support footings into the bay floor to an approximate depth of 12 feet. A small amount of mud would be displaced by the support footings. PG&E is proposing to use only plastic lumber or untreated wood for boardwalk work. Plastic lumber would last longer than wood, and the use of untreated wood would ensure that the least amount of potential long-term environmental impacts will result. In general, an eight-person crew would at each site. All work would be conducted by hand, and equipment used to install the boardwalks—including generators and chainsaws—will be mobilized to the boardwalk locations on foot.

Working from the land-side end of the existing boardwalk at the southern end of Pond A2W, the decking/planks of the existing boardwalk would be removed, and the old piles pulled. Rebuilding each removed segment of the boardwalk would proceed before the next segment is removed, so that crews would be working from newly built segments. Some of this work may be done by a crew working from the existing boardwalk, but much of the demolition and removal would be done from a small boat and the use of an 8-foot by 10-foot floating device. Some of the old piles and decking would be placed on the floating device and hauled out, and some would be transported on special hand-built and hand-powered dollies. In the areas closest to shore, where water may be too shallow for a barge, some work may also be done while standing on temporary trellises or other work platforms, which would be placed on the pond bottoms. This would involve some foot traffic on the pond bottom and along the edge of the pond.

Wooden safety railings would be added in a similar manner. As is the current condition, gates and fences with razor wire would be placed on each end of the boardwalk to prevent public access and entry to the boardwalks; it would also deter mammalian predators. All boardwalks would be constructed according to PG&E specifications.

As shown on Figures 2-8 and 2-9, the two replacement boardwalks inside of Pond A2W would extend approximately 6,700 feet combined from the border with Mountain View Shoreline Park, through the pond to the outer bay-facing levee or to the levee bordering Stevens Creek. On the other side of the outer, bay-facing levee levee, the new length of boardwalk (approximately 2,350 feet long) would extend west-northwest from the Pond A2W levee to connect with the existing PG&E boardwalk to the north of Pond A1.

This boardwalk would be built in a similar, stepwise manner as the one inside of Pond A2W, with each new segment of boardwalk being built from the segment most recently constructed. This outer section of boardwalk would be in deeper water that is not expected to eventually become tidal marsh but rather to remain open bay.

The duration of the boardwalk-related construction activities would be 20 weeks, assuming PG&E crews would work 10-hour days, 7 days per week. These tasks would require 8 workers. Construction

monitoring will be conducted as directed by PG&E's Environmental Compliance Management Plan (ECMP).

Adding Concrete for Tower Foundation Improvements. Boardwalk work would be completed first for worker safety and to more efficiently transport materials and tools to the towers. Following the completion of boardwalk replacement and construction, work would be performed on the footings of the towers in Pond A2W. Multiple towers will be worked at the same time from each side of the boardwalks. All structures will require adding additional concrete to existing concrete foundations to a greater height of up to 4 feet above existing structure footing.

Equipment required for this project involve: wheel barrels, hand tools, drills, saws, jackhammers with air compressor, barge and pickup trucks. The material would be moved to each specific work site by hand or wheelbarrow. The new concrete would either be mixed at each tower location or hauled in with a wheelbarrow to each location to the levee and removed in wheelbarrows for disposal.

To upgrade the concrete foundations of the four legs of each tower, the following general steps would be taken: PG&E would construct a cofferdam around each of the footings, dewater the space between the cofferdam and the existing foundations, build a form for pouring additional concrete, pour the concrete, and remove the cofferdam.

The cofferdams would be installed at low tide to allow access to the foundation footing. The cofferdams would be constructed of 1-inch plywood and 4-inch by 4-inch wooden strongbacks. These would be placed around each footing. Mud would be removed by hand, and the dam pushed down to expose the solid piling, usually 3 feet below the mud line. The mud would be returned to the base of the footing after the cement is poured.

The dewatering would be done by pumping the enclosed pond water out of the cofferdam and back into the pond. Pumps would be gas- and diesel-powered. Each cofferdam could be dewatered in fewer than 6 hours of pumping. The pumps would be delivered to the towers via the boardwalks or by barge.

During the time that the tower foundations are exposed, new/replacement concrete footings would be poured between the reinforcements. Each footing would be chipped down to roughen concrete to accept the new concrete cap. Stockpiles would be necessary at each end of the boardwalks. Crews will use the existing boardwalk to transfer removed concrete to staging site located on the maintained outboard levee, loaded onto trucks, and transported to PG&E's facility in Newark for disposal. Any necessary steel repairs would be performed before the new concrete cap is added to the existing footing.

New pins would be inserted to form a new rebar cage around the pile to act as the form, and the concrete would then be poured. All concrete will be mixed by hand at each tower site. The new concrete caps would be at elevations three to five feet higher than the existing footing height. The cofferdam would be removed once the concrete is dry.

Footing repairs can be done within a work area extending approximately 2 feet from the footing. In very shallow water or at low tides, rubber mats could be used for short periods to gain temporary access to perform maintenance work and would be placed to help protect the vegetation around the boardwalk being built.

The duration of the tower foundation improvements would be 20 weeks, assuming PG&E crews would work 10-hour days, 7 days per week. These tasks would require 8 workers. Construction monitoring will be conducted as directed by PG&E's Environmental Compliance Management Plan. (ECMP).If necessary

for schedule compression, work on tower foundations near segments of boardwalk that have already been replaced or constructed could be implemented prior to the completion of all boardwalk work. However, this analysis assumes that these activities do not overlap.

Construction Access. As shown on Figure 2-10, primary access to the project site from U.S. 101 would be via North San Antonio Road, past Terminal Boulevard to the edge of Charleston Slough and Pond A1. The exact route(s) used for material delivery are subject to modification due to City of Mountain View requirements for traffic control, Shoreline Park activities, and (as described in Section 3.5) burrowing owl protection. The SBSP Restoration Project will develop the final haul routes in consultation with the City of Mountain View's traffic engineers to minimize potential traffic impacts. The preliminary routes shown on Figure 2-10 are intended for planning and impact analysis purposes.

Construction crews would typically consist of five to ten people. The pond cluster would likely be accessed by construction crews from U.S. 101, after which various arterial, collectors, and local streets provide access to Mountain View Shoreline Park and the ponds beyond it. Heavy vehicles would avoid crossing structures in the levees if the vehicle exceeds the weight-bearing capacity. If this is not possible, engineer-approved precautions would be taken to avoid damaging the structure.

Construction Staging Areas. Construction staging areas will be established within Mountain View Shoreline Park at locations to be determined in coordination with City of Mountain View. The staging areas will be adjacent to the southern borders of Ponds A1 and A2W in upland areas alongside existing roads and trails.

Construction Equipment. Construction would be accomplished using excavators, bulldozers, dump trucks, a compaction roller, a water tanker, refueling tanks, pile-driving equipment, pumps, sheet piles, cranes, a portable barge, skiffs, paving equipment, and pickup vehicles for transportation in and out of the project site. Helicopters may be needed in areas where new boardwalks are constructed. Temporary fill would also be used at staging locations if required. Fill material would be transported to the project area by trucks.

Construction Timing Considerations. There are certain special-status species that may be affected by construction activities. The presence of these species may limit construction activities or require certain avoidance and minimization measures. The specific limits and requirements for each species and their habitats will be addressed during the permitting phase of the project. However, the timing considerations below will be incorporated into detailed designs and project planning to reduce the overall potential for adverse impacts and the need for mitigation.

- Bird nesting: Regulatory work windows for bird nesting typically run from February 1 through September 15. Work could likely occur within this window in the presence of a biological monitor and preconstruction surveys.
- Steelhead migration: Activities that may potentially affect adult upstream migration would be avoided from December through February. Similar avoidance of activities that would affect juvenile downstream migration would be avoided from April through June. If applicable, the National Marine Fisheries Service (NMFS) acceptable work windows for steelhead are June through November; a USFWS-approved biological monitor may be required during this period.
- Longfin smelt and green sturgeon: These species could be present year-round. In-channel work may require that a USFWS-approved biological monitor be present.

URS Oakland CA 4/7/2016 USER:harmonk PATH:L:\Projects\GIS\Projects\South_Bay_Salt_Ponds_2016\02_Maps\02_Map_Production_and_Reports\Alternatives\Figures2_X_MXD\Figure 2-10 Alviso-Mountain View Access.mxd

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Figure 2-10

Alviso-Mountain View Ponds Access Route

Construction of Alternative Mountain View B

Construction Sequence. Construction could occur simultaneously at both ponds, but the activities could also proceed independently. Earthwork activities would be sequenced such that activities that would be efficient and feasible to perform in the dry season, such as working on levee tops, would be completed first. Levee lowering and breaching along the outer bounds of the ponds that are designed to establish hydraulic connection with adjacent sloughs would be performed after all the internal pond activities are completed. Construction of nesting islands would be performed prior to breaching the perimeter levees.

From this concept, the likely order of construction for this alternative would be as follows:

1. Raise and improve Pond A1 western levee.
2. Construct trail on Pond A1 western levee to viewing platform.
3. Construct PG&E tower and boardwalk improvements around Pond A2W (must be completed prior to levee breaching).
4. Construct habitat transition zones and nesting islands (must be completed prior to levee breaching).
5. Install cofferdams and construct bridges.
6. Breach perimeter levees at Ponds A1 and A2W.
7. Install viewing platform in Mountain View Shoreline Park and viewing platform on Pond A1 levee.

Construction Schedule. The construction schedule would be affected by species windows, weather conditions, earthwork quantities, and land disturbance. Construction is expected to begin in the summer or fall of 2017.

Construction of abutment structure and installation of railcar bridges would require up to 21 days. Installation of viewing platforms is estimated to take no more than a week each.

At contractor's preference, some of the construction activities could occur in tandem with multiple crews to achieve project goals. Construction would likely be completed in approximately 27 months over three construction seasons. This estimate is based on the assumption that some heavy construction activities would be permitted to occur during the nesting habitat window under the watch of a biological monitor.

Construction of Alternative Mountain View C

The methods of construction of Alternative Mountain View C, including construction access and staging areas, would be similar to those used for Alternative Mountain View B. However, some additional or different construction methods would be implemented for the following components:

- The western levee of Charleston Slough would be raised to 14 feet.
- The portion of trail (part of the Bay Trail spine) that is currently on top of the western levee of Charleston Slough would be reconstructed after the levee is raised.

- A spur trail from the Bay Trail along Charleston Slough would be built along the remaining levee that extends out into the slough to the breach location.
- The PG&E access road on the eastern levee of Pond A2W would be further modified to include a recreational hiking/bicycling trail out to the bay.
- Caution would be exercised when sourcing from levee-lowering activities at Pond A1 to stay at elevations above the MHHW until construction activities within the pond that need to be performed in the dry season (i.e., armoring the breaches that would have bridges over them) are complete. Levee crests destined for trail access would be finished with a 4-inch-thick crushed gravel layer to provide all weather access and to be compliant with the ABA on federal lands and the ADA where the trails are part of the Bay Trail system.

Construction Sequence. The text below summarizes the construction activities for Alternative Mountain View C. Construction would be similar to Alternative Mountain View B. The likely order of construction for Alternative Mountain View C would be as follows:

1. Improve west-side levee along Charleston Slough.
2. Construct PG&E tower and boardwalk improvements around Pond A2W (must be completed prior to levee breaching).
3. Rebuild trail on top of raised western levee of Charleston Slough.
4. Improve and armor Pond A1 southwestern levee and Coast Casey Forebay levee along southern border of Charleston Slough.
5. Construct new water intake system at breach location along Pond A1 west levee and make other improvements to pump station.
6. Rebuild existing viewing platform over Charleston Slough from raised and improved Coast Casey Forebay levee.
7. Construct habitat transition zones and nesting islands.
8. Install cofferdams and construct bridges on east levee of Pond A2W.
9. Construct trail on eastern levee of Pond A2W.
10. Construct spur trail on Charleston Slough's outer levee.
11. Breach perimeter levees at Ponds A1 and A2W; lower Pond A1 west-side levee near Charleston Slough.
12. Remove Charleston Slough tide gate; armor west side of that opening.
13. Construct trail along improved and armored western levee of Pond A1 to a viewing platform at the breach location.
14. Install viewing platforms.

Construction Schedule. The construction schedule would be affected by species windows, weather conditions, earthwork quantities, and land disturbance. Construction is expected to begin in the summer or fall of 2017.

Construction of abutment structure and installation of railcar bridges would require up to 21 days. Installation of water intake structures is estimated to take approximately 3 months. Installation of the viewing platforms is estimated to take no more than a week each.

At the contractor's preference, some of the construction activities could occur in tandem with multiple crews to achieve project goals. Construction would likely be completed in approximately 35 months over five construction seasons. This estimate is based on the assumption that some heavy construction activities would be permitted to occur during the nesting habitat window under the watch of a biological monitor.

Operations and Maintenance

Operations and maintenance of this pond cluster would be similar under Alternatives Mountain View B and Mountain View C. However, some of those maintenance activities would occur in different places (e.g., on the western levee of Charleston Slough instead of on the western levee of Pond A1) or over a larger or smaller area (e.g., Alternative Mountain View C has more trails to maintain and fewer square feet of habitat transition zones). Otherwise, the operations and maintenance activities described below apply to both Action Alternatives.

Operations and maintenance activities would continue to follow and be determined by the 2009 USACE permit #2008-00103S, applicable county operations, and the AMP. PG&E would continue to operate and maintain its infrastructure, which would occur in coordination with the Refuge managers to ensure consistency with the operations and maintenance of the pond cluster. The City of Mountain View would continue to operate and maintain its properties that are adjacent to the pond cluster, and these activities would also occur in coordination with the Refuge managers.

Periodic maintenance of the pond infrastructure would be required following construction. Maintenance activities would require a maintenance staff person to travel to the pond cluster one or two times a week to perform activities such as predator control, invasive plant control, and vandalism repairs. AMP monitoring activities would also occur, which would require additional workers (e.g., staff, consultants) to access the pond clusters. The frequency of visits to the pond cluster to conduct AMP monitoring activities would depend on the actual activities and would vary by season (e.g., during the bird breeding season there may be more trips to the site than during the non-breeding season).

In Alternative Mountain View B, the western levee of Pond A1 would require ongoing levee maintenance because it would provide flood protection. In Alternative Mountain View C, this maintenance would instead take place on the western and southern levees of Charleston Slough. These levee maintenance activities would include placement of additional earth on top of, or on the sides of, the levees as the levees subside, with the level of settlement dependent on geotechnical considerations. In general, pond levees that are improved to provide flood protection would likely exhibit the greatest degree of settlement. Levees that require erosion control measures would also require routine inspections and maintenance. If the levees that provide flood protection are improved to provide FEMA 100-year flood protection, a detailed levee maintenance plan would be required for certification to comply with FEMA standards.

The northern perimeter levee, eastern levee, northern portion of the western perimeter levee at Pond A1, and the western levee of Pond A2W would not be maintained and would be allowed to degrade naturally. The eastern and northern levees of Pond A2W would be maintained for PG&E access.

Improved levees would be inspected and maintained for slope stability, erosion control, seepage, slides, and settlement on an annual basis. Maintenance is expected to occur every 5 years to add additional fill material in areas where settlement occurs. Most of the maintenance would be accomplished during low tides and from the levee crest.

Maintenance of the nesting islands may require weed/vegetation removal as often as quarterly and the placing of fill material (sand, gravel, and/or oyster shells) before the onset of the nesting period in some years. Nesting islands would also be periodically examined for erosion.

Maintenance of habitat transition zones would include inspections and maintenance for slope stability, erosion control, seepage, slides, and settlement on an annual basis. As necessary, vegetation removal would occur to prevent colonization by invasive species. Fill material would be placed, when needed, to respond to areas where erosion is observed. Additional maintenance activities may also be a need to address an AMP-specified management trigger.

Public access and recreation features would be maintained as needed to keep trail surfaces safe and accessible. There would be a need for trash removal along trails and more intensely at staging areas and trailheads. The viewing platforms would be designed to minimize maintenance by utilizing durable and sustainable materials as much as possible to prevent degradation and the need for repeated maintenance. These would need to be checked periodically for defacement of interpretive boards and other forms of vandalism.

Railcar bridges placed in publicly accessible areas such as city streets and highways must be visually inspected every 2 years and a report on their condition may be required every 5 years. In Alternative Mountain View B, the bridges would not be publicly accessible, so this inspection and this report would not be required. However, because Alternative Mountain View C would include a public access trail along the eastern levee of Pond A2W, the railcar bridges over the breaches there would need to be visually inspected and reported on as described above.

The proposed bridges and the concrete abutments with wingwalls at both ends of the bridge would be basically maintenance free for the design life cycle of 50 to 75 years. The bridges' superstructures include main span girders, a lateral bracing system, deck slab systems, and a safety railing that would need basic erosion protection maintenance work every few years. These activities may include sanding, cleaning, and re-painting as needed, which are common activities for all steel structures permanently exposed to weather.

The PG&E towers, boardwalks, and power lines would be maintained in accordance with PG&E's current practices, which are described in Appendix D. The maintenance of Pond A2W's eastern and northern levees and the construction of new and improved boardwalks for PG&E's use would continue to provide the necessary access at the current levels.

2.2.4 Alviso-A8 Pond Cluster

The Alviso-A8 pond cluster (the A8 Ponds) consists of Ponds A8 and A8S and the levees surrounding each pond. This pond cluster is in the south-central portion of the Alviso pond complex, between the

Guadalupe Slough and Alviso Ponds A5 and A7 to the west; Sunnyvale Baylands County Park, Guadalupe Slough, and San Tomas Aquino Creek to the south; Alviso Slough to the east and northeast; and San Francisco Bay to the north. The cities of Sunnyvale and Santa Clara are inland of the pond cluster to the south; a capped landfill lies to the southeast.

The SBSP Restoration Project set the initial goals for this pond cluster to be reversibly tidal habitat to address mercury concerns and later to possibly become fully tidal habitat, maintain or improve flood protection, and improve recreation and public access. Ponds A8 and A8S were physically connected in the Phase 1 actions and were made "reversibly muted tidal habitat" by removing parts of the levees (and associated vehicle access) between them and between Pond A8 and the adjacent Ponds A5/A7 to the west. A reversible, armored notch (smaller than a full breach that can be closed seasonally) was made in the eastern levee of Pond A8 to allow some muted tidal exchange and to allow the USFWS to vary the size of the notched opening.

Ponds A8 and A8S are configured and managed such that they can also be used as flood storage basins during high-rainfall events. Pond A8 contains an overflow weir. During flood events greater than a 10-year flood in the lower Guadalupe River and Alviso Slough, water can overflow into Pond A8 for initial flood storage. Recreation and public access features at these ponds themselves are limited to a hunter check-in station and a small boat launch area along the western side.

Under Alternative A8 A (No Action), no new activities would occur under Phase 2. The Action Alternative (Alternative A8 B) would involve the placement of upland fill material to form habitat transition zones in the southwestern and southeastern corners of Pond A8S. All material used for the habitat transition zones would be sampled and screened for compliance with cleanliness requirements. The screening would be conducted in accordance with the new QAP being developed for the Bair Island Restoration Project by Life Sciences, Inc. That QAP includes protocols for off-site imported material testing, classification, and tracking. No other Phase 2 actions are planned for this pond cluster.

Details about each Phase 2 alternative for this pond cluster are illustrated on Figures 2-11 through 2-13 and described in the sections below. The Preliminary Design Memorandum for the Action Alternatives for the A8 Ponds is included as Appendix N to this Final EIS/R.

Alternative A8 A (No Action)

Under Alternative A8 A, the No Action Alternative, the USFWS would continue to operate and maintain the ponds in accordance with the AMP and other ongoing management practices that have been in place since the implementation of Phase 1 actions. These management practices include the wet season management of tidal exchange between Pond A8 and Alviso Slough to avoid fish entrainment and maintain existing levels of flood protection; inspections of pond infrastructure to ensure the pond is operating as intended, tidal connectivity is achieved as intended, and water quality requirements are being met; monitoring of restoration performance. This alternative is shown on Figure 2-11.

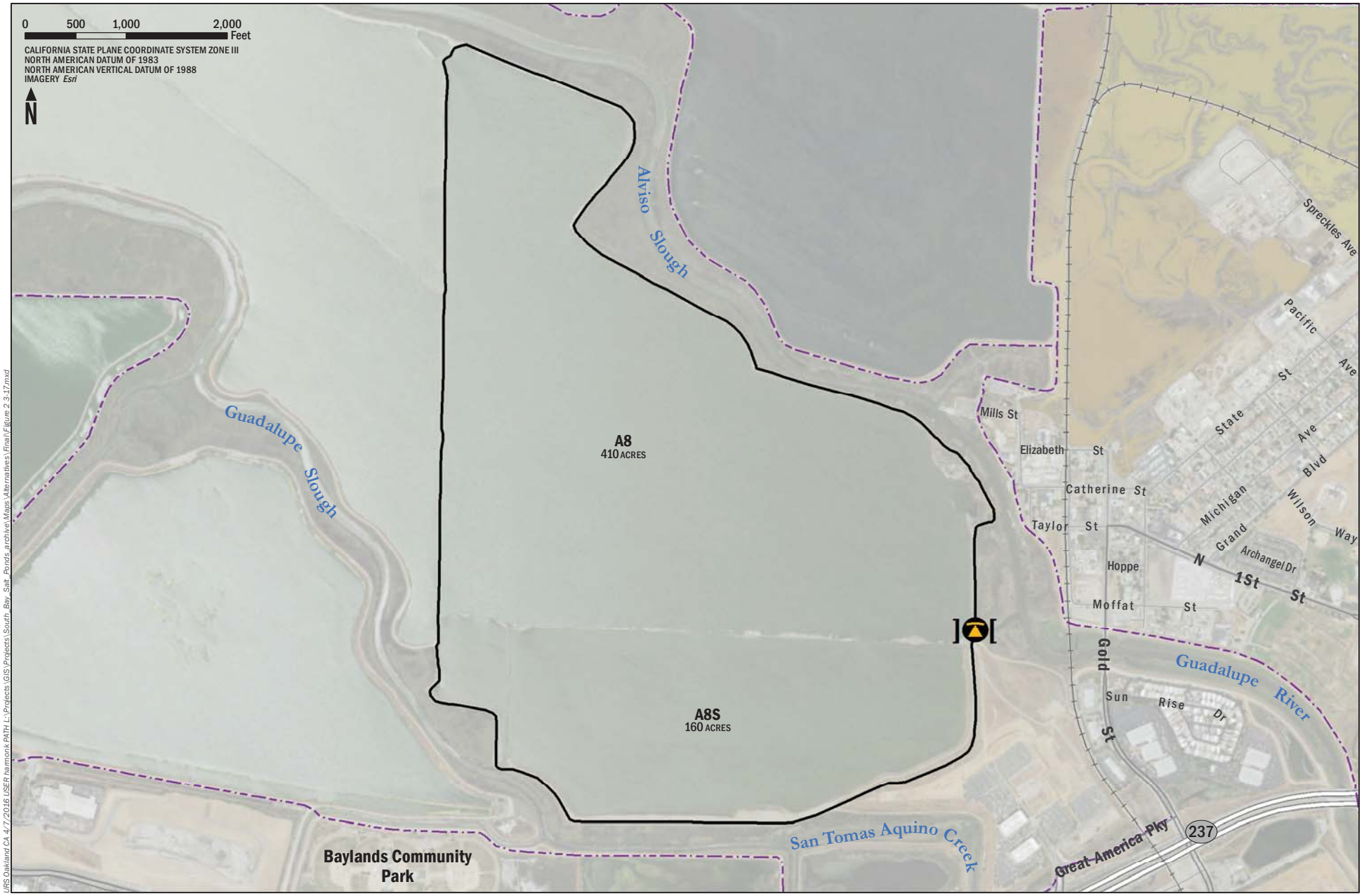

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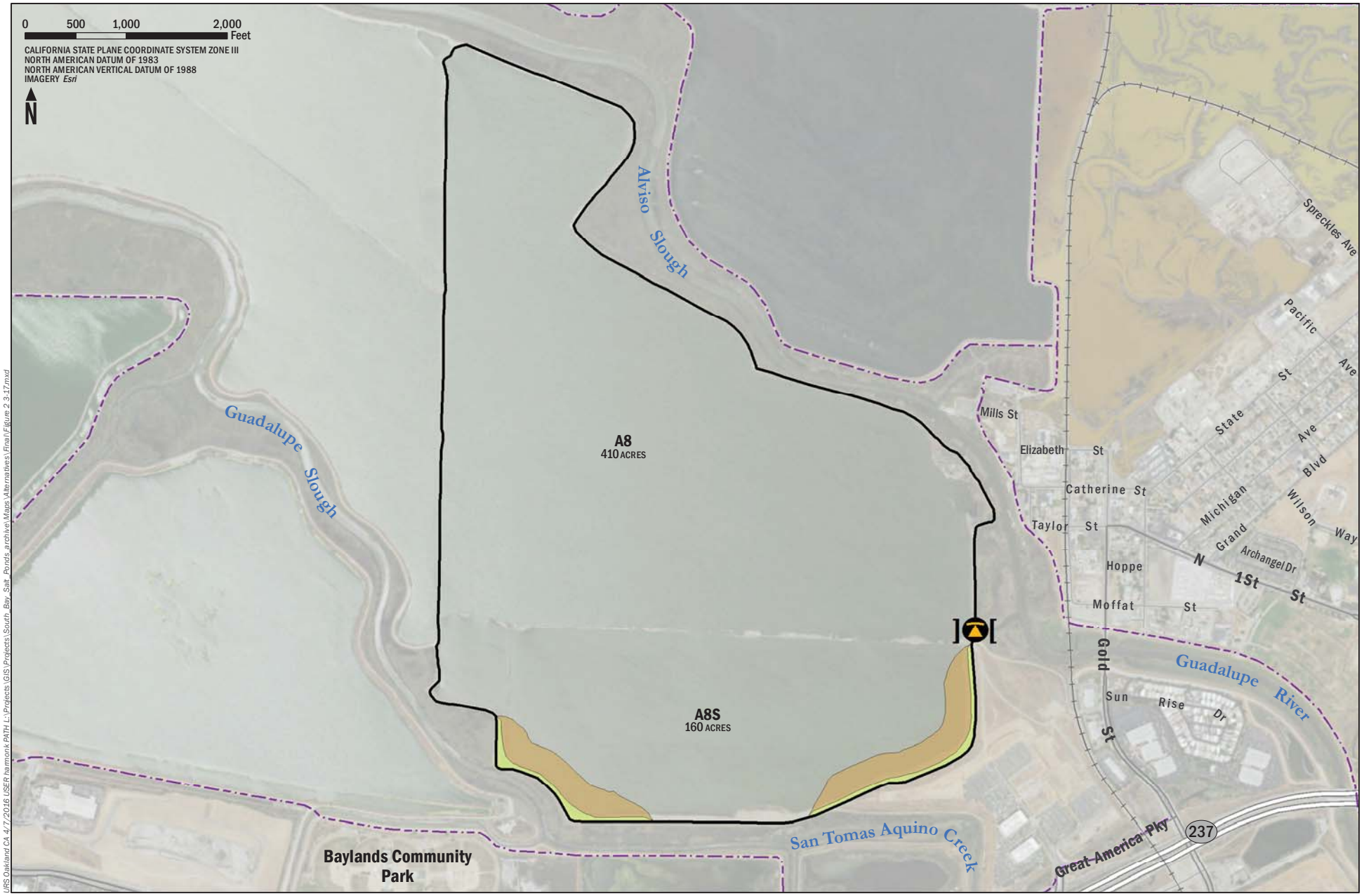
Figure 2-11

Alternative A8 A



LEGEND

Existing reversible armored notch

Existing trail

Pond boundary

Habitat Transition Zone

High marsh habitat

Intertidal habitat

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South Bay Salt Pond Restoration Project

Figure 2-12

Alternative A8 B

Alternative A8 B

Alternative A8 B proposes the construction of habitat transition zones in Pond A8S's southwest corner, southeast corner, or both, depending on the amount of material available. This document assumes both are constructed and analyzes the impacts associated with that assumption. The habitat transition zones would perform several functions: adding some flood protection, adding transitional habitat for salt marsh harvest mouse and Ridgway's rail, and protecting the adjacent landfill. The transition zone features would not affect the existing hunting access feature, which is further to the west. This alternative is shown on Figure 2-12.

Up to 1,400 linear feet of habitat transition zone would be established along the southwest corner of perimeter levee of Pond A8S, and up to 1,500 linear feet of habitat transition zone would be established along the southeast corner of perimeter levee of Pond A8S. The habitat transition zones for Alternative A8 B would be constructed of approximately 190,000 cubic yards of upland fill material, as shown in Table 2-3 would extend into the center of the pond at a slope of 30:1 (h:v) or steeper, and would start at elevation 9.0 feet NAVD88. Additional detail on the grading and extent of the transition zones has corrected the initial estimate of the volume of fill to build those features over that which was presented in the Draft EIS/R. Also, the top elevation of the transition zones has since been raised to 9.0 feet NAVD88. Together, these two adjustments have increased the volume of material that is needed to construct the transition zones. The corrected and updated material volume estimate is presented here and throughout this Final EIS/R. In the designs presented as Appendix N, the tops of these habitat transition zones were set at elevation 7.5 feet NAVD88.

Construction Methods

Construction would include earth-moving activities at the pond levees and within the southern end of the pond to construct habitat transition zones in the southeastern and southwestern corners of Pond A8S.

Habitat Transition Zone. Habitat transition zones would be constructed by placing fill material along the slopes and compacting to 70–80 percent density to enable vegetation establishment. Slope protection would be maintained by establishment of native vegetation. Hydroseeding or other seeding method with a native plant mix, development of a planting scheme, and invasive plant control would aid in establishing desirable vegetative habitat.

Construction Access. As shown on Figure 2-13, access to the A8 Ponds (Ponds A8 and A8S) would be from Gold Street or America Center Road near the southeast corner of Pond A8S and the levee crests along the perimeter levees. The ponds would be accessed by haul trucks using existing roadways and levee roads. No work would occur on the pond levees or within the ponds. Construction crews would typically consist of five to ten people. The existing levees are known to be capable of handling heavy construction equipment and trucks carrying dirt because the Santa Clara Valley Water District (SCVWD) uses these access roads to import material dredged from creek channels in Santa Clara County.

Construction Staging Areas. A staging area would be established for equipment and possible material stockpiling. The location would be within the hard-pack access and turnaround areas that exist within the landfill access areas or within the construction area along the southern border of Pond A8S.

Construction Equipment. Construction equipment would include haul trucks, bulldozers, water trucks, compaction rollers, other construction equipment, and vehicles for transportation in and out of the project site.

Figure 2-13
Alvisio-A8 Ponds Access Route

Construction Timing Considerations. There are certain special-status species that may be affected by construction activities. The presence of these species may limit construction activities or require certain avoidance and minimization measures. The specific limits and requirements for each species and their habitats will be addressed during the permitting phase of the project. However, the timing considerations below will be incorporated into detailed designs and project planning to reduce the overall potential for adverse impacts and the need for mitigation.

- Bird nesting: Regulatory work windows for bird nesting typically run from February 1 through September 15. Work could likely occur within this window in the presence of a biological monitor and preconstruction surveys.
- Steelhead migration: Activities that may potentially affect adult upstream migration would be avoided from December through February. Similar avoidance of activities that would affect juvenile downstream migration would be avoided from April through June. If applicable, the National Marine Fisheries Service (NMFS) acceptable work windows for steelhead are June through November; a USFWS-approved biological monitor may be required during this period.
- Longfin smelt and green sturgeon: These species could be present year-round. In-channel work may require that a USFWS-approved biological monitor be present.

Construction Schedule. The project would begin in summer of 2017, depending on the material available for use in the Alviso-A8 Ponds or in other Phase 2 project ponds. If sufficient quantities of material are available, construction of habitat transition zones would take approximately 8 months in one construction season.

Operations and Maintenance

The USFWS would continue to operate and maintain the ponds in accordance with the AMP and other ongoing management practices that have been in place since the implementation of Phase 1 actions. These ongoing management practices would not change during or after the construction activities described above.

2.2.5 Ravenswood Pond Cluster

The Phase 2 Ravenswood pond cluster consists of Ponds R3, R4, R5, and S5; the levees surrounding each pond; some of the fringe marsh outside of these levees; and the All-American Canal (AAC). The pond cluster is bordered by Menlo Park's Bedwell Bayfront Park to the west, State Route (SR) 84 and the city of Menlo Park to the south, Ravenswood Slough to the east, and Greco Island and open bay water to the north. A small triangular pond is to the immediate west of Pond S5. This pond is unnamed and is labeled or described in various documents in three different ways: part of Pond S5, a separate but unnamed pond, or as the forebay of Pond S5. This document treats it as part of Pond S5 and frequently refers to it as the forebay.

There are a number of complicated easements as well as several different landowners in the area where Flood Slough, the Pond S5 forebay, SR84, Marsh Road, Bedwell Bayfront Park, and the driveway into the park, all come together. Figure 2-14 illustrates the most current information available to the SBSP Restoration Project. It shows the various parcels and their owners, as well as easements for utilities or access. Cargill holds fee title on much of Flood Slough and has a 10-foot wide pipeline strip of property

Source:
Parcel and Easement Data (Synthesis of Conflicting Information from Bohley Consulting, 12/2/2014)
Imagery (NAIP, 6/8/2014)

AECOM

South Bay Salt Pond Restoration Project

FIGURE 2-14

Parcels at the Entrance to Bedwell Bayfront Park

along the entire southern border of Ponds S5 and R3. Cargill's coordination and approval would be required for any proposed activities that would take place on, cross, or otherwise affect lands or properties it owns or to which it holds fee title. This includes proposed additions of fencing, building a trail that would cross Cargill's pipeline easement, and connecting Flood Slough to the S5 forebay. Similar statements would apply to the City of Menlo Park and the West Bay Sanitary District, which are also landowners, and to the California Department of Transportation and other holders of utility easements.

Under Alternative Ravenswood A (No Action), no new activities would be implemented as part of Phase 2. Alternatives Ravenswood B, Ravenswood C, and Ravenswood D propose activities that would initiate the transition of Pond R4 from a seasonal pond to tidal marsh while maintaining or improving the existing flood protection and the conversion of Ponds R5 and S5 from seasonal ponds to a variety of enhanced managed pond habitat types.

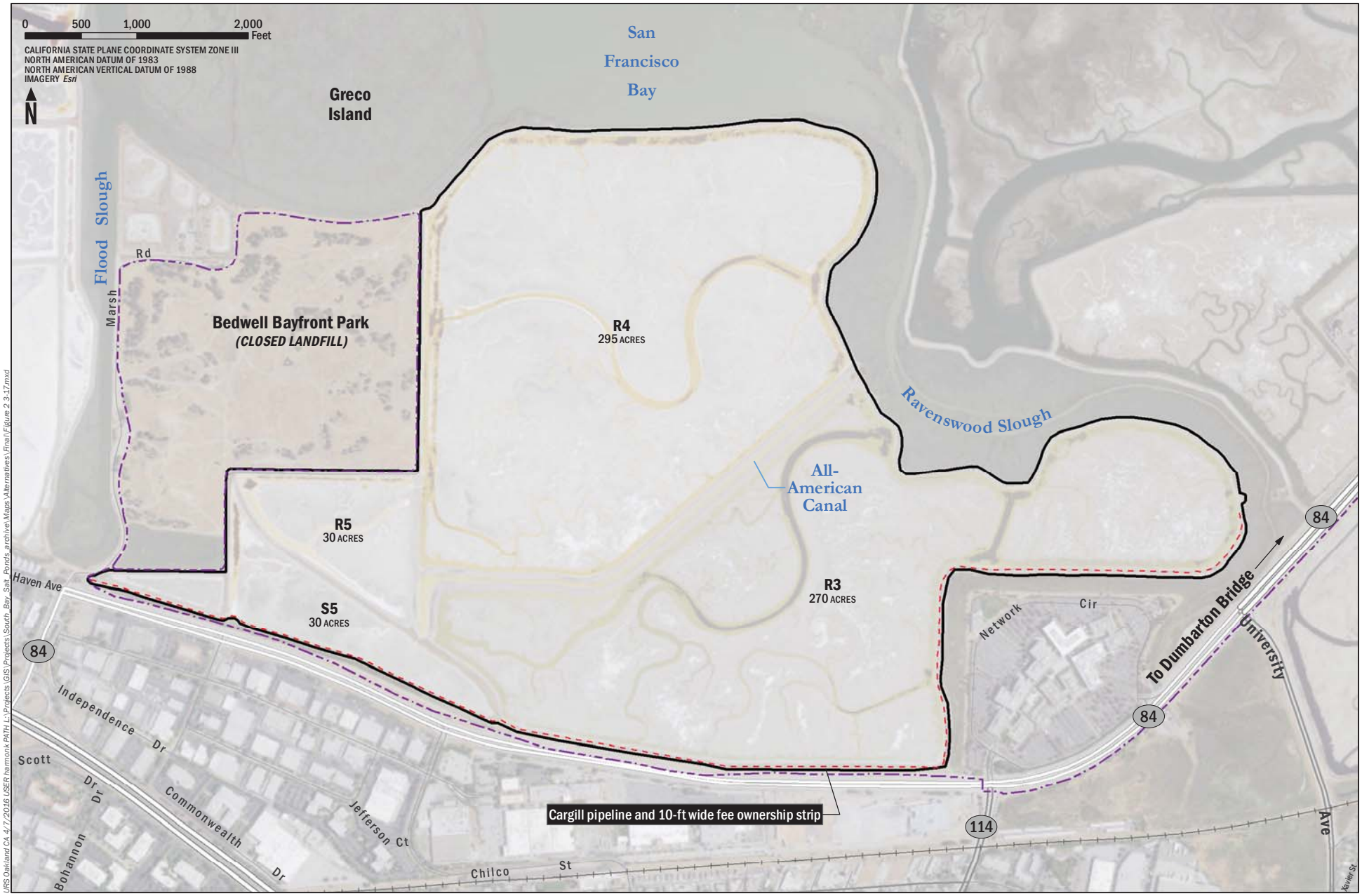
In Pond R3, the existing western snowy plover (*Charadrius alexandrinus nivosus*) habitat would be improved by adding a water control structure to improve water circulation (and thus forage quality) within the pond. The habitat features and improvements targeted for western snowy plover are included in Phase 2 at the Ravenswood Ponds because those ponds have been the location of the most snowy plover nests in the west bay in recent years, and the SBSP Restoration Project is attempting to provide restoration balance across a range of types of locations in all three pond complexes. Building upon recent nesting success in these areas is a rational approach that has more potential to succeed than others.

Upland fill material would also be placed in ponds to construct habitat transition zones in these ponds and enhance levees around them. All material used for the habitat transition zones would be sampled and screened for compliance with cleanliness requirements. The screening would be conducted in accordance with a new QAP being developed for the Bair Island Restoration Project by Life Sciences, Inc. That QAP includes protocols for off-site imported material testing, classification, and tracking. Up to several hundred thousand cubic yards of fill in the form of appropriate upland material would be imported and used in Ponds R4, R5, or S5 to enhance levees, fill borrow ditches, and build the habitat transition zone. The majority of any imported fill material would be used for habitat transition zone and levee improvements; therefore, the information needed to assess the impacts of accepting and placing fill material is included in those parts of this project description.

There was also a possibility for beneficial reuse of dredged material to fill borrow ditches or to construct habitat transition zones or improve levees. However, these actions are not currently part of the project planning, and the impacts of delivering and placing that material are not analyzed here. Beneficial reuse of dredged material at the Ravenswood pond complex would only take place if the impact analysis and associated NEPA and CEQA processes (including a supplemental/addendum EIS/R or a full EIS/R tiered from this document and the 2007 programmatic EIS/R) and other regulatory or permitting issues were performed by the source or provider of that material.

Viewing platforms and trails would be established to improve recreation and public access to the pond cluster. Details about each Phase 2 alternative for this pond cluster are described below.

Details about each Phase 2 Action Alternative for this pond cluster are summarized in Table 2-5, illustrated on Figures 2-15 through 2-20, and described in the following sections. The Preliminary Design Memorandum for the Action Alternatives for the Ravenswood Ponds is included as Appendix O to this Final EIS/R.

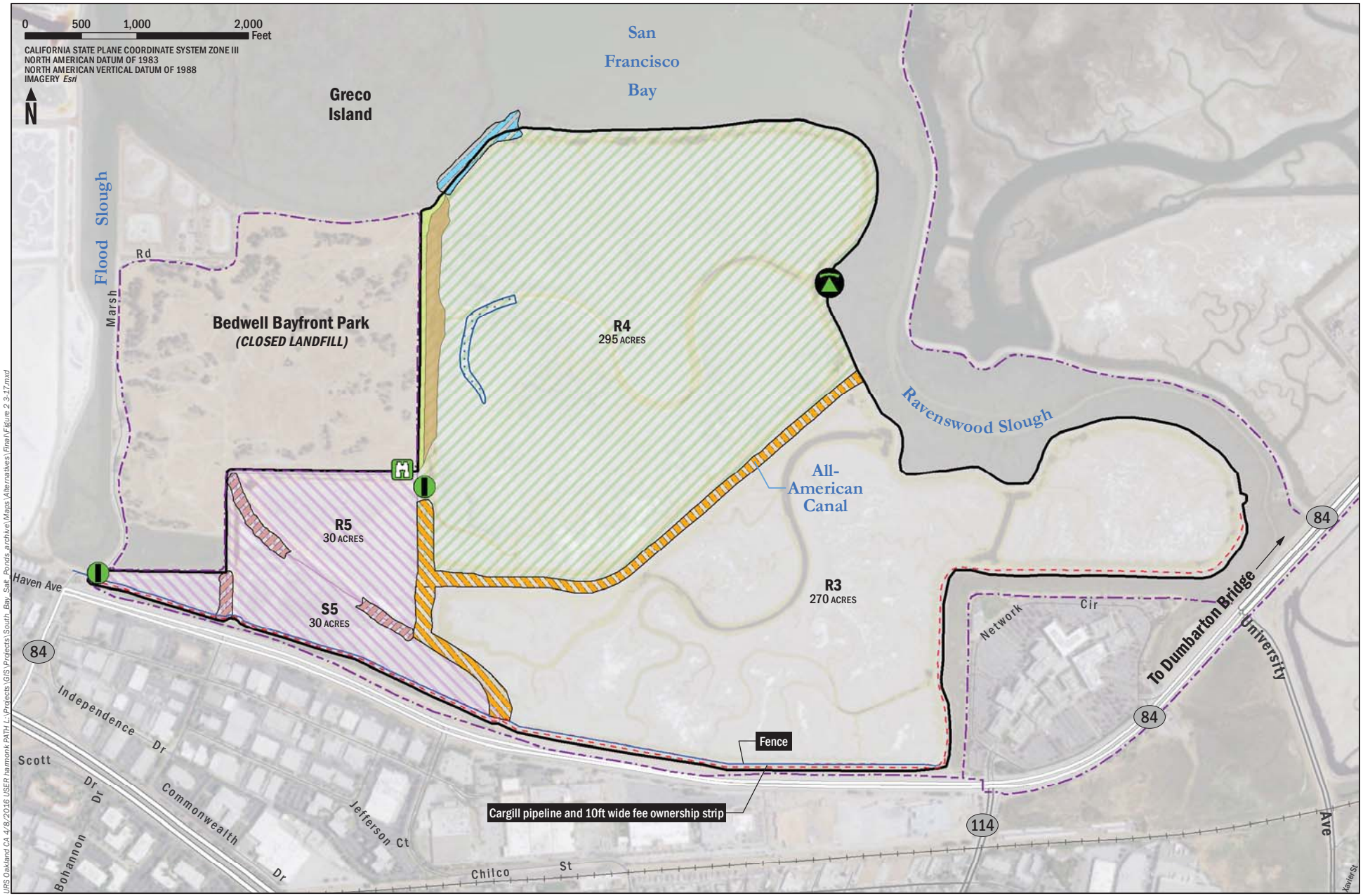


AECOM

South Bay Salt Pond Restoration Project

Figure 2-15

Alternative Ravenswood A



AECOM

South Bay Salt Pond Restoration Project

Figure 2-16

Alternative Ravenswood B

LEGEND

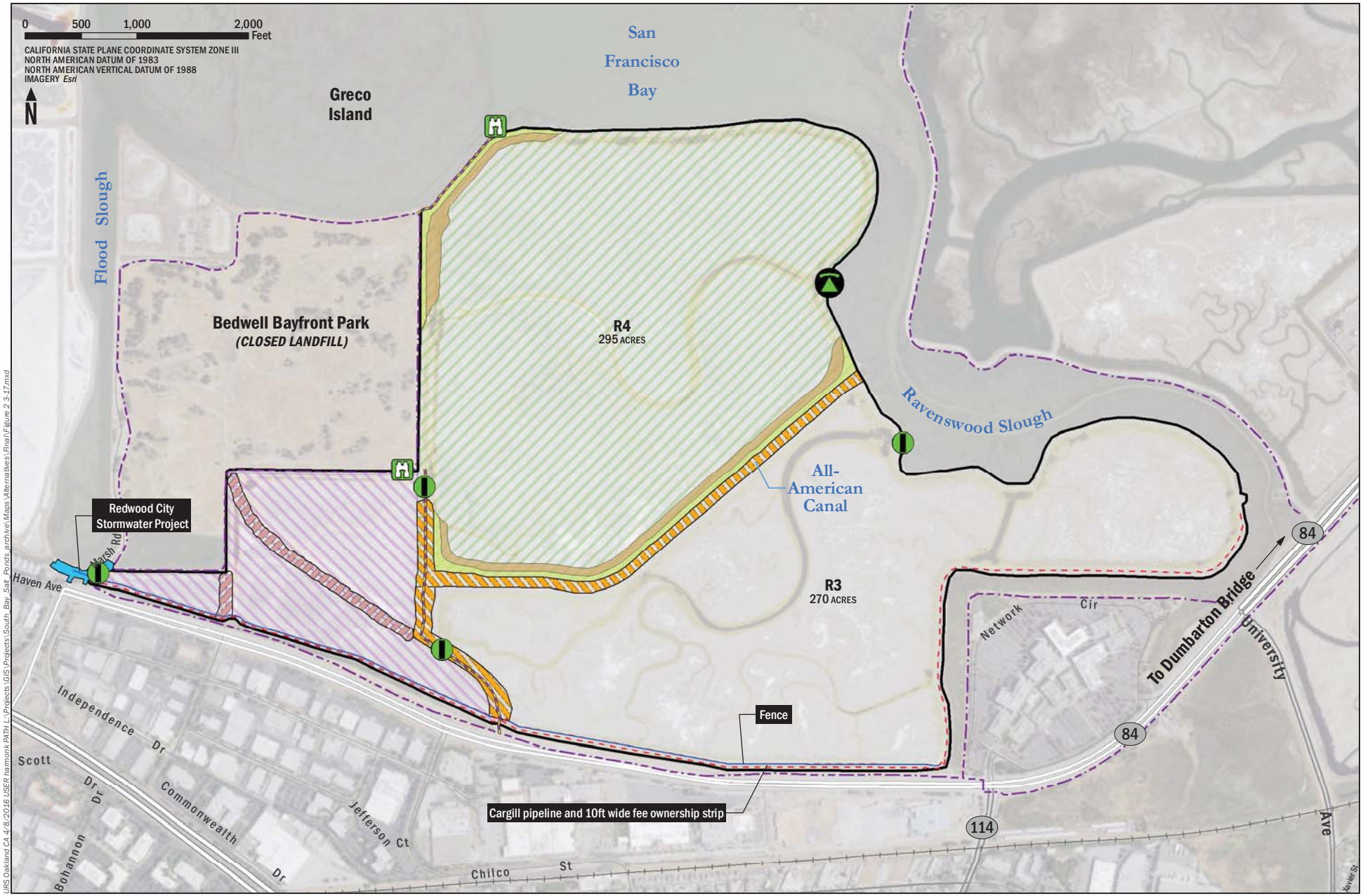
- Proposed breach
- Proposed control gate
- Viewing platform
- Existing trail
- Phase 2 trail
- Boardwalk trail
- Cargill pipeline
- Fence
- Lowered levee
- Removed levee
- Improved levee
- Pilot channel (optional)
- Tidal marsh
- Tidal mud flats
- Pond boundary
- Transition Zone Habitat
  - High marsh habitat
  - Intertidal habitat

AECOM

South Bay Salt Pond Restoration Project

Figure 2-17

Alternative Ravenswood C

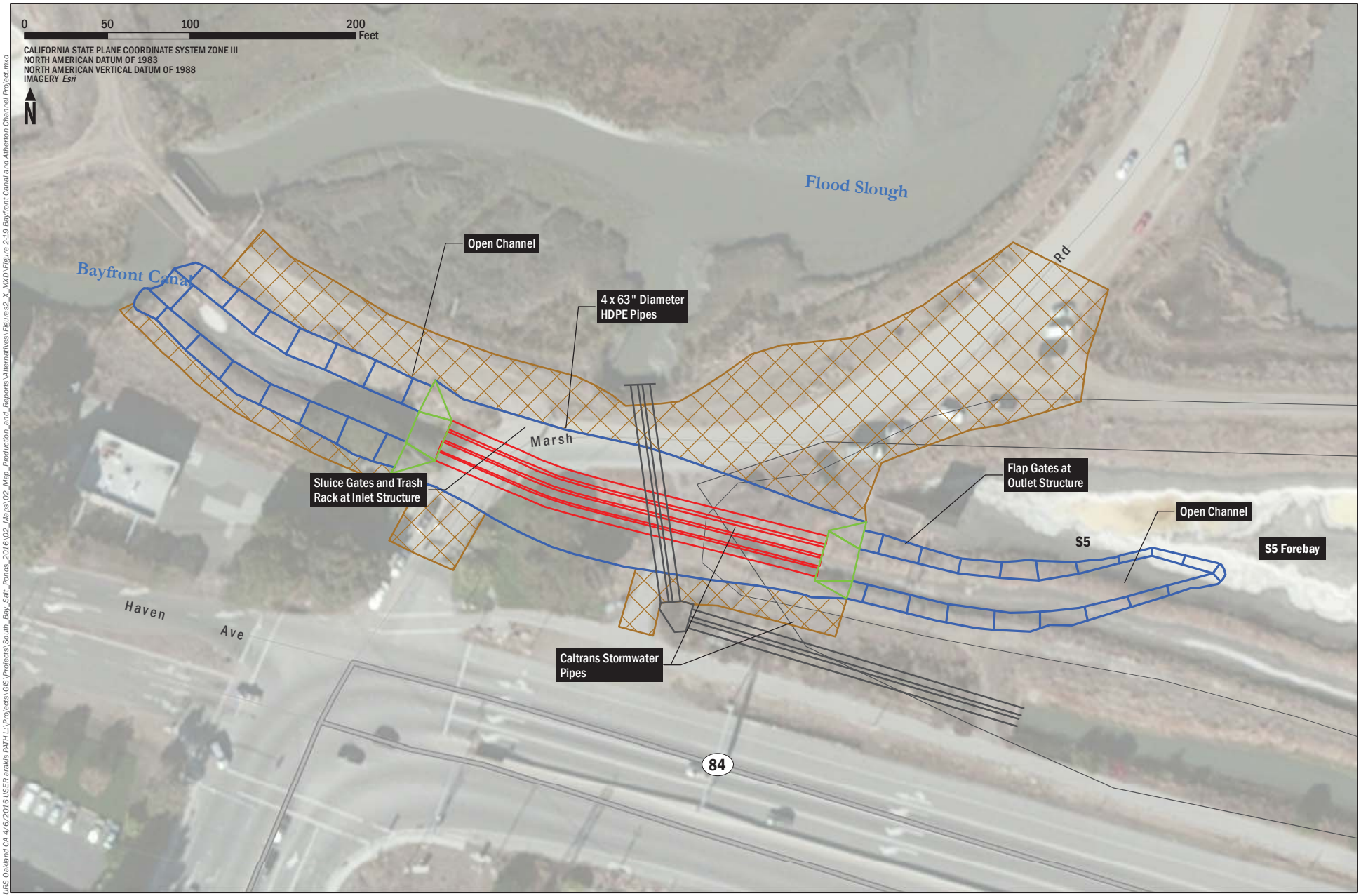


AECOM

South Bay Salt Pond Restoration Project

Figure 2-18

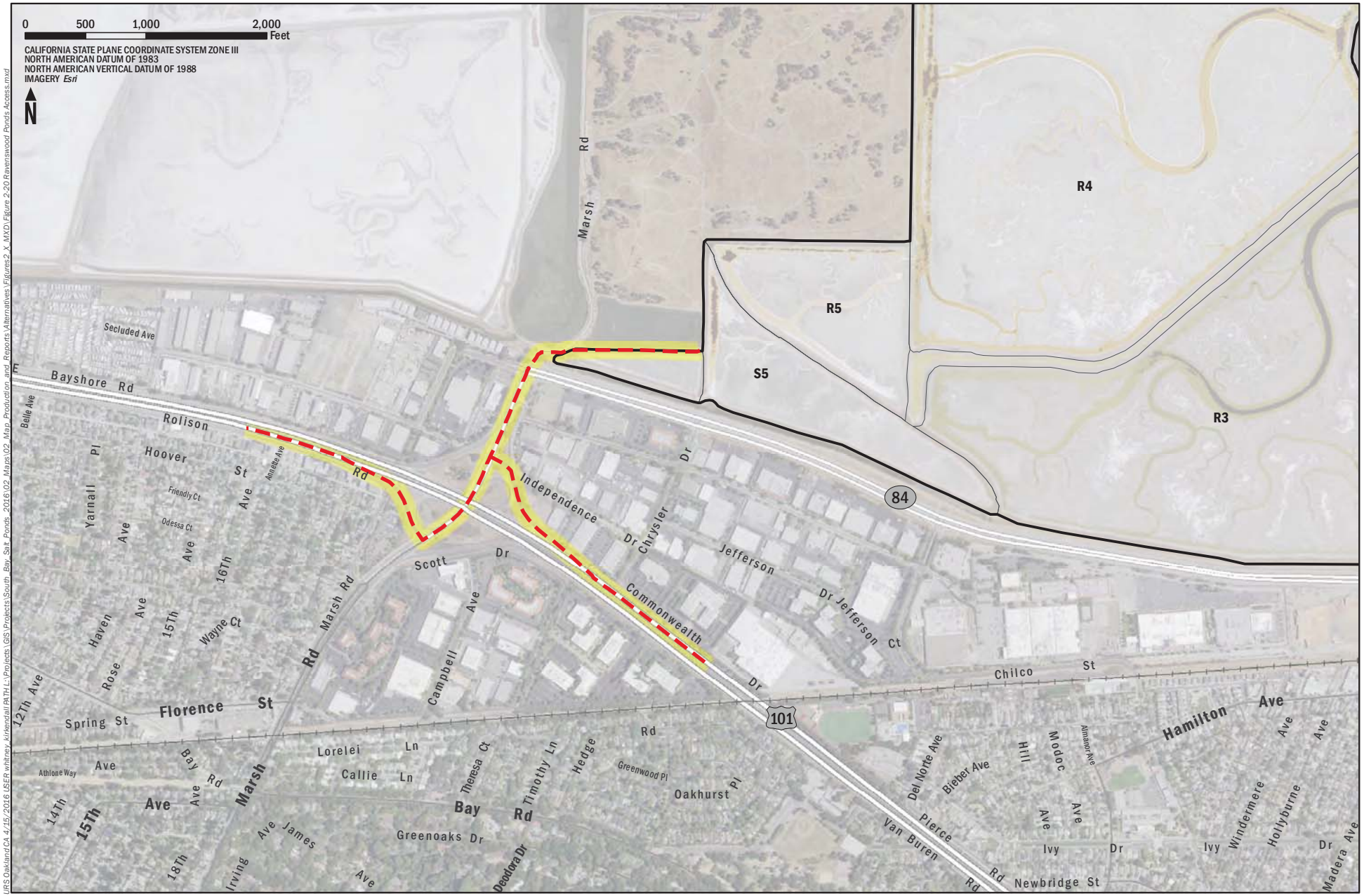
Alternative Ravenswood D



URS Oakland CA 4/6/2016 USER arakis PATH L:\Projects\GIS\Projects\South_Bay_Salt_Ponds_2016\02_Maps\02_Map_Production_and_Reports\Alternatives\Figures2_X_MXD\Figure 2-19 Bayfront Canal and Atherton Channel Project.mxd

LEGEND

- Proposed new pipes
- Proposed grading boundary
- Caltrans culvert
- Staging areas
- Proposed concrete structures



URS Oakland CA 4/15/2016 USER whitney_kirkendall PATH L:\Projects\GIS\Projects\South_Bay_Salt_Ponds_2016\02_Maps\02_Map_Production_and_Reports\Alternatives\Figures2_X_MXD\Figure 2-20 Ravenswood Ponds Access.mxd

LEGEND

Access Route

Phase II Project Area

AECOM

South Bay Salt Pond Restoration Project

Figure 2-20

Ravenswood Ponds Access Route

Table 2-5 Components of the Phase 2 Action Alternatives at the Ravenswood Ponds

ALTERNATIVE RAVENSWOOD B	ALTERNATIVE RAVENSWOOD C	ALTERNATIVE RAVENSWOOD D
Improve All-American Canal levee	Improve All-American Canal levee	Improve All-American Canal levee
—	All-American Canal habitat transition zone	All-American Canal habitat transition zone
Bedwell Bayfront Park habitat transition zone	Bedwell Bayfront Park habitat transition zone	—
—	—	Pond R4 Northwest habitat transition zone
Remove parts of Ponds R5 and S5 internal levees	Remove parts of Ponds R5 and S5 levees	Remove all of Ponds R5 and S5 internal levees
—	Grade and partially fill Ponds R5/S5	—
Ponds R4/R5 water control structure	Ponds R4/R5 water control structure	Ponds R4/R5 water control structure
—	Ponds R3/S5 water control structure	Ponds R3/S5 water control structure
Pond R3/Ravenswood Slough water control structure	Pond R3/Ravenswood Slough water control structure	Pond R3/Ravenswood Slough water control structure
—	—	Connect to Bayfront Canal and Atherton Channel Project
Pond S5/Flood Slough water control structure	Pond S5/Flood Slough water control structure	Pond S5/Flood Slough water control structure
Pond R4 pilot channel	Pond R4 pilot channel	—
Pond R4 east breach	Pond R4 east breach	Pond R4 east breach
—	Pond R4 northwest breach	—
Lower Pond R4 northwest levee	Lower Pond R4 northwest levee	—
Ponds R5 and S5 bird habitat island	Ponds R5 and S5 bird habitat island	—
Viewing platform near Pond R5	Viewing platform near Pond R5	Viewing platform near Pond R5
—	Pond R4 boardwalk trail at northwest corner	Pond R4 trail on northwest levee
—	Pond R4 viewing platform	Pond R4 viewing platform
—	Complete loop trail around Ponds R5 and S5 to connect to Bay Trail	Complete loop trail around Ponds R5 and S5 to connect to Bay Trail

Alternative Ravenswood A (No Action)

Under Alternative Ravenswood A, the No Action Alternative, no new activities would be implemented as part of Phase 2. The USFWS would maintain the ponds as part of the Don Edwards San Francisco Bay National Wildlife Refuge system following the AMP and other management practices. The Ravenswood pond cluster would continue to be managed through the activities described in the AMP. Ponds R3, R4 and R5/S5 would function as seasonal ponds. The outboard levees along Ponds R3 and R4 provide inland flood protection and would continue to be maintained or repaired as a component of the 2009 USACE operations and maintenance (O&M) permit. Trails of the adjacent Bedwell Bayfront Park, owned by the City of Menlo Park, would continue to be used and maintained separately.

The components of Alternative Ravenswood A are illustrated on Figure 2-15.

Alternative Ravenswood B

Alternative Ravenswood B would open Pond R4 to tidal flows, improve levees to provide additional flood protection, create habitat transition zone along the western edge of Pond R4, establish managed ponds to improve habitat for diving and dabbling birds, increase pond connectivity, and improve recreation and access. Surplus upland fill material (after completing the habitat transition zone and improving levees) would be used to fill borrow ditches and speed tidal marsh restoration. The estimated volume of earth cut, fill, and net import for Alternative Ravenswood B is listed in Table 2-3.

The components of this alternative are described in detail below and illustrated on Figure 2-16:

- Breach the eastern side of Pond R4. Construct a breach along the eastern levee of Pond R4 at a historic slough trace to open the pond to tidal flows from Ravenswood Slough. Material from the breached levee would be used to fill borrow ditches or construct habitat transition zone. The bottom width of this breach would be 150 feet, with an invert elevation of 2.0 feet NAVD88. The top width is estimated to be approximately 200 feet with side slopes of 3:1 (h:v).

- Improve levees along the All-American Canal. Approximately 4,700 feet of levees along the AAC would be improved. The berm-like levees along one or both sides of the ACC would be raised, widened, and strengthened to replace the flood protection currently provided by the outboard levees on Pond R4 to SR 84. Improvements at the western end of the AAC would extend north along the Ponds R4/R5 border. These activities would build up the levee on the north side of the AAC and extend it farther into Pond R4. This decision would be based in part on the amount of material available. Material for the improvements would come from off-site sources. The improved levee would consist of a 10-foot-wide crest with side slopes ranging from 4:1 (h:v) along the southern levee slope to 8:1 (h:v) along the northern slope extending into Pond R4. The crest of the levee would be at elevation 10.0 feet NAVD88.

- Construct a habitat transition zone in Pond R4. Construct a habitat transition zone beginning in the northwestern corner of Pond R4 and extending down the pond's internal western edge to provide habitat. The habitat transition zone would be 2,300 feet long on the west perimeter levee of Pond R4 bordering Bedwell Bayfront Park (a closed landfill). The habitat transition zone would start at an elevation of 9.0 feet along the levees or the high ground of the park and have side slopes ranging from 15:1 (h:v) to 30:1 (h:v). The habitat transition zone would be constructed primarily of upland fill material brought in from off-site locations.

- Water control structure for Pond R3. A water control structure (included and described in Table 2-6) would be installed at the eastern levee of Pond R3 where the historical slough trace intersects with Ravenswood Slough. This water control structure would allow direct control and management of the water levels in the pond to provide for the improvement of the existing western snowy plover habitat in Pond R3.

- Excavate a pilot channel in Pond R4. Portions of the bottom of Pond R4 would be modified to direct the new tidal flows (introduced by the levee breach) into the interior of the pond by creating and extending pilot channels in former slough traces. The proposed pilot channel would be roughly 1,500 feet long and would be excavated through the existing pond bed. The invert elevation would be at 2.0 feet NAVD88 to roughly match the invert elevation of the existing channels within Pond R4. The bottom width would be roughly 50 feet wide with side slopes of

3:1 (h:v). The moved material would be used to enhance levees, fill borrow ditches, and construct ditch blocks.

- Lower the levee in the northwest corner of Pond R4 near Greco Island. Approximately 1,000 linear feet of the northwestern levee on the edge of Pond R4 that borders Greco Island would be lowered to MHW. This modification would provide habitat connectivity between Pond R4 and Greco Island and high-tide refugia for salt marsh harvest mouse and other species. The levee would be designed for the highest tides to spill over the levee into Pond R4, thus speeding the rate of sediment accretion. The new MHW elevation would be 6.6 feet NAVD88. Material from the lowered levee would be used to fill borrow ditches or construct a habitat transition zone.

- Convert Ponds R5 and S5 to fully managed ponds. Ponds R5 and S5, which are currently seasonal managed ponds, would be converted into enhanced managed ponds through removal or modification of levees within and between the ponds, the construction of water control structures, creation of a habitat island, and specific operational techniques. To allow for improved habitat diversity, the levee between Ponds R5 and S5 would be modified, and the levee within Pond S5 (i.e., between the forebay and the main part of Pond S5) would be removed to an elevation of 4.5 feet NAVD88 to match the surrounding pond bottoms.

  A water control structure would be installed at the levee between Ponds R4 and R5, and a second such structure would be installed between Pond S5 and the Flood Slough. By providing the means for year-round control of water levels and some control of the salinities of the ponds, this modification would allow for the creation of managed pond habitat for birds with maintained bottom depths at subtidal elevations. Water would also flow into Pond R4 as needed for flood control or other management purposes.

  The water control structures would include prefabricated concrete box culverts or circular HDPE or corrugated metal pipe (CMP) through the levee and with headwalls, as required. The number, size, and invert elevations of the water control structures that would be installed at proposed locations around the project site, depending on the types that are chosen, are listed in Table 2-6. The water control structures would be gated at the inlet and/or outlet.

Table 2-6 Water Control Structure Details for the Ravenswood Action Alternatives

WATER CONTROL STRUCTURE	ALTERNATIVE(S)	(NUMBER), SIZE, TYPE	INVERT ELEVATION, FEET (NAVD88)
Ponds R4/R5	Ravenswood B, C, and D	One 4-foot x 4-foot concrete box culvert or 30-inch-diameter HDPE/CMP, 100 feet long	Pond R4: 4.9; Pond R5: 5.4
Pond S5/Flood Slough	Ravenswood B, C, and D	Three 4-foot x 8-foot concrete box culvert or 40-inch-diameter HDPE/CMP, 200 feet long	Pond R5: 5.4; Flood Slough: 4.9
Pond R3/Ravenswood Slough	Ravenswood B, C, and D	One 36-inch-diameter culvert, 400 feet long	4.9
Ponds R3/S5	Ravenswood C and D	One 4-foot x 4-foot concrete box culvert or 30-inch-diameter HDPE/CMP, 150 feet long	Pond R3: 4.9; Pond R5: 5.4

- Construct a habitat island between Ponds R5 and S5. A habitat island would be created between Ponds R5 and S5 from the remnants of the internal levee currently between those ponds. The

island would be modified to optimize its usefulness as upland wildlife habitat. The habitat island would be approximately 17,800 square feet in area with a relatively flat top surface at elevation 9 feet NAVD88 (above the MHHW elevation) with side slopes of 5:1 (h:v) down to the adjacent pond bottom. Sand, shell, or other suitable topping would be added to the island to enhance its usefulness for the birds that would use it and to help control invasive vegetation.

- Additional recreation and public access. A viewing platform would be constructed along an existing trail near Ponds R5 and S5. The exhibit would include signage on a pedestal and would improve public access and supplement the benefits available at the adjacent wildlife habitat in Ponds R5 and S5. A bench would be located near the exhibit's signage. This action would allow the public to enhance the recreational experiences at the relatively high-use Bedwell Bayfront Park in Menlo Park by incorporating the interpretive opportunities at these ponds.

- Fence the southern border of Ponds R3 and S5. A low (3-foot-high) chain-link fence would be installed inside the Refuge property and adjacent to the existing Cargill Inc. (Cargill) pipeline property, north of the Bay Trail. The purpose of the fence is to deter people and their pets from leaving the trail and entering the restored habitat there. The fence would also help keep trash from blowing into the ponds and keep chicks from straying from Pond R3 onto the paved trail and roadway to the south.

Alternative Ravenswood C

Alternative Ravenswood C would be similar to Alternative Ravenswood B with the following exceptions: Ponds R5 and S5 would be converted to a particular type of managed pond that is maintained at mud flat elevation for shore birds; water control structures would be installed on Pond R3 to allow for improvement to the habitat for western snowy plover; an additional habitat transition zone would be constructed; and additional recreational and public access components would be constructed. The estimated volume of earth cut, fill, and net import for Alternative Ravenswood C is listed in Table 2-3. The components of this alternative are described in detail below and are illustrated on Figure 2-17.

- Alternative Ravenswood B activities. Alternative Ravenswood C would include many but not all of the activities from Alternative Ravenswood B. Exceptions and differences are noted in the list that follows.

- Breach Pond R4 at two locations. The northwestern levee of Pond R4 at the corner of the pond near the narrow waterway separating Pond R4 from Greco Island would be breached (in addition to the eastern breach outlined in Alternative Ravenswood B). This breach would be 40 feet wide at the bottom with an invert elevation of 3.0 feet NAVD88. The top width would be approximately 100 feet with side slopes of 3:1 (h:v). The breaches would open the pond to tidal flows. Material from the breaches would be used to fill borrow ditches or construct habitat transition zones.

- Construct two habitat transition zones in Pond R4. One habitat transition zone, of approximately 5,100 linear feet, would be constructed to extend northward into Pond R4 from the improved AAC levee. The second habitat transition zone would begin in the northwestern corner of Pond R4 and extend down the internal western edge of the pond, for about 2,300 feet, abutting the levee separating Pond R4 and the Bedwell Bayfront Park. The northern terminus of the second habitat transition zone would be designed and built to accommodate the proposed breach and the

lowering of the northwestern levee of Pond R4 that is described above. The habitat transition zones would be constructed primarily of upland fill material and would start at elevation 9.0 feet along the levees and have side slopes ranging from 15:1 (h:v) to 30:1 (h:v).

- Convert Ponds R5 and S5 to managed ponds at tidal mud flat elevations. Ponds R5 and S5 would be converted into enhanced year-round managed ponds to deliver regular flows through the removal or modification of levees within and between the ponds, construction of water control structures, creation of islands, and specific operational techniques. The levee between Ponds R5 and S5 and the levee within Pond S5 would be removed, and additional fill would be used to raise the overall pond bottom elevations. These actions would create a relatively flat area that would receive regular flows via water control structures at the boundary with Pond R4 and between Pond S5 and Flood Slough. Preliminary hydraulic modeling results indicate that the bottom of Ponds R5 and S5 would need to be elevated to between 5 and 6 feet NAVD88 to drain the pond completely. The existing pond bottoms would be raised to an average elevation of 5.25 feet by placing approximately 0.5 feet of fill within the ponds. These activities would allow for these ponds to be maintained with the pond bottoms at an intertidal elevation to form mud flats for foraging shorebirds. Water could also be controlled to flow into Pond R4 as needed for water quality maintenance or other management purposes.

  Water control structures would be installed in the levees between Ponds R4 and R5 and between Pond S5 and Flood Slough. The structures would include prefabricated concrete box culverts or circular HDPE or CMP through the levees and with headwalls, as required. The number, size, and invert elevations of the water control structures installed, depending on the types chosen, are listed in Table 2-6. The water control structures would be gated at the inlet and/or outlet. The operational techniques are described in detail in the “Operations and Maintenance: All Action Alternatives” section for this alternative (below).

- Water control structures for Pond R3. Two water control structures (included and described in Table 2-6) would be installed on Pond R3: one on the eastern levee of Pond R3 where the historical slough trace intersects with Ravenswood Slough and one on the levee border between Ponds R3 and S5. Alternative Ravenswood B only had the latter of these. These water control structures would allow direct control and management of the water levels in the pond to provide for the improvement of the existing western snowy plover habitat in Pond R3.

- Complete Ponds R5 and S5 loop trail. A trail along the eastern levees of Ponds R5 and S5 would be constructed and linked to the existing trails outside of these ponds. This trail would be approximately 2,700 feet long, 6 feet wide, and would likely require some levee improvements between Ponds R3 and R5 and between Ponds R3 and S5. Surfacing materials would be decomposed granite with timber or concrete edging. The proposed water control structures between Ponds R4 and R5 and between Ponds R3 and S5 would be set low enough to allow trail construction. This trail would necessitate a break in the fence with a gate and appropriate signage along the southern border of Ponds R5 and S5 where it leaves the Refuge and connects to the Bay Trail.

- Spur trail and viewing platform on Pond R4. A spur trail and viewing platform would be constructed along the northwestern corner of Pond R4. Because this portion of the Pond R4 levee would be breached and lowered, the trail would be placed on a slightly elevated boardwalk above the levee. The boardwalk trail would begin at the northeast corner of the Bedwell Bayfront Park

and extend approximately 600 feet to the northeast above the lowered and breached levee. The viewing platform would be constructed at the northern terminus of the trail. The boardwalk and viewing platform would be approximately 8 feet wide and approximately 600 feet long with anti-perch railings to reduce predator perching.

- Fence the southern border of Ponds R3 and S5. A low (3-foot high) chain-link fence would be installed inside the Refuge property and adjacent to the existing Cargill pipeline property, north of the Bay Trail. The purpose of the fence is to deter people and their pets from leaving the trail and entering the restored habitat. The fence would also help keep trash from blowing into the ponds and keep chicks from straying from Pond R3 onto the paved trail and roadway to the south.

Alternative Ravenswood D

Alternative Ravenswood D would open Pond R4 to tidal flows, improve levees to provide additional flood protection, create two habitat transition zones in Pond R4, establish enhanced managed ponds in Ponds R5 and S5, increase pond connectivity, enhance Pond R3 for western snowy plover habitat, remove the levees within and between Ponds R5 and S5, and improve recreation and public access. Alternative Ravenswood D would also allow stormwater outflow from Redwood City and other surrounding communities (including parts of Menlo Park, Atherton, and unincorporated San Mateo County) to flow into Ponds R5 and S5 (via connections with the Bayfront Canal and Atherton Channel), including open channel improvements, installation of a system of pipes or culverts, temporary removal of California Department of Transportation (Caltrans) stormwater pipes, and installation of a water control structure. This alternative would address a problem with residual salinity in Ponds S5 and R5 and would reduce flood risk in the neighborhood to the southwest. The estimated volume of earth cut, fill, and net import for Alternative Ravenswood D is listed in Table 2-3. These actions are described in detail below and are illustrated on Figure 2-18.

- Alternative Ravenswood B and C activities. Alternative Ravenswood D includes many but not all of the activities from Alternatives Ravenswood B and C. Exceptions and differences are noted in the list that follows.

- Improve the AAC levees. As in Alternatives Ravenswood B and C, the levees around the AAC would be improved and raised to maintain current levels of flood protection.

- Breach the eastern side of Pond R4. This action would be in the same location and have the same dimensions as the breach described for Alternative Ravenswood B.

- Construct two habitat transition zones in Pond R4. One habitat transition zone would be identical to that described for Alternative Ravenswood C. It would be approximately 5,100 feet and would extend northward into Pond R4 from the improved AAC levee. The second habitat transition zone would be placed in the northwestern corner of Pond R4 abutting the levee separating Pond R4 from Greco Island. Its length would be about 2,300 feet. The habitat transition zone would be constructed primarily of upland fill material and would start at elevation 9.0 feet along the levees and have side slopes ranging from 15:1 (h:v) to 30:1 (h:v).

- Spur trail and viewing platform on Pond R4. A spur trail and viewing platform would be constructed along the northwestern corner of Pond R4. Unlike in Alternative Ravenswood C, where the levee is lowered, the trail would be on the levee itself and not on an elevated boardwalk. The trail would begin at the northeast corner of the Bedwell Bayfront Park and extend

approximately 1,200 feet. The viewing platform would be constructed at the northern terminus of the trail. The trail and viewing platform would be approximately 8 feet wide and approximately 600 feet long with anti-perch railings to reduce predator perching.

- Water control structures for Pond R3. As in Alternative Ravenswood C, two water control structures would be added to Pond R3 to improve the ability of the USFWS to manage the pond for western snowy plover habitat. These structures are listed in Table 2-6 and described in the text for Alternative Ravenswood C.

- Fence the southern border of Ponds R3 and S5. A low (3-foot high) chain-link fence would be installed inside the Refuge property and adjacent to the existing Cargill pipeline property, north of the Bay Trail. The purpose of the fence is to deter people and their pets from leaving the trail and entering the restored habitat there. The fence would also help keep trash from blowing into the ponds and keep chicks from straying from Pond R3 onto the paved trail and roadway to the south.

- Convert Ponds R5 and S5 to enhanced managed ponds. Ponds R5 and S5 would be converted into enhanced managed ponds through the removal of levees within and between the ponds, excavation to deepen the ponds, installation of water control structures, and specific operational techniques. The operational techniques for this alternative are described in detail in the "Operations and Maintenance: All Action Alternatives" section (below). Approximately 2,230 linear feet of levees between Ponds R5 and S5 and within Pond S5 (between the forebay and the main part of the pond) would be removed to 3.0 feet NAVD88 to increase the capacity of these ponds for salinity treatment and temporary stormwater detention.

  Two water control structures would be installed as part of the SBSP Restoration Project: one at the levee between Ponds R4 and R5 and one between Pond S5 and Flood Slough. These two structures are identical to those described for Alternative Ravenswood C. The inclusion of the City of Redwood City's Bayfront Canal and Atherton Channel Project (often referred to as the Bayfront Canal Project, the draft project description for which is included as Appendix I) would create a more complex connection between Flood Slough and Pond S5's small, triangular forebay. This action is discussed below.

  The water control structures would be gated at the inlet and/or outlet. The design calls for a prefabricated concrete box culvert to reduce corrosion concerns typically expected in brackish water. Alternatively, solid-wall HDPE pipes could be employed because they provide a longer service life (greater than 50 years). The number, size, and invert elevations of water control structures that would be installed at proposed locations around the project site, depending on the types that are chosen, are listed in Table 2-6.

  Together, all of these activities would allow for the creation of managed pond habitat for diving and dabbling ducks and other birds with pond bottom depths maintained at subtidal elevations by enabling year-round control of water levels and some control of the salinities of the ponds.

- Incorporate Redwood City's Bayfront Canal and Atherton Channel Project. In this component, a combination of culverts and open channels would be installed to direct peak stormwater runoff from the Bayfront Canal into the triangular forebay of Pond S5 and into Ponds S5 and R5 beyond that. Open channel improvements would be made upstream and downstream of the proposed

culvert installation to enhance flow to and from the culvert. The water control structures described above would allow the freshwater outflow from the culvert to move between ponds, and ultimately to the Bay, and also to manage water quality in the ponds during the dry season. Details for the Bayfront Canal and Atherton Channel Project improvements are shown on Figure 2-19.

Additionally, peak stormwater runoff from occasional large storms would be allowed to be temporarily diverted from the Bayfront Canal and Atherton Channel into Ponds S5 and R5 to help reduce existing salinity conditions in Ponds R5 and S5. This connection would also reduce the risk of heavy runoff from the Bayfront Canal backing up and causing flooding when high tides in Flood Slough prevent it from draining quickly. Water would also be controlled to flow from Ponds R5 or S5 into Ponds R4 or R3as needed for flood control or other management purposes.

The Bayfront Canal Project would include the components described below.

1. Open channel improvements. Open channel improvements would be conducted on the existing vegetated channels both immediately upstream and downstream of the proposed culvert.

2. Excavation. The culverts associated with the Bayfront Canal Project would pass under the Bedwell Bayfront Park entrance road.

3. Culvert installation. A culvert consisting of four 63-inch-diameter HDPE pipes would connect the upstream open channel to the downstream open channel, ultimately connecting to the Pond S5 forebay. A trash rack and operational sluice gates would be incorporated into the inlet headwall structure for the culvert and the outlet headwall structure. The culvert would be fitted with flap-gates.

4. Caltrans stormwater pipe installation. The proposed culvert would cross underneath an existing Caltrans double 48-inch-diameter stormwater pipes, necessitating temporary removal and reinstallation after the culvert is in place.

Construction Methods

Construction of Common Elements

Site Clearance and Demolition of Existing Water Control Structures. Prior to performing construction activities, areas to be disturbed would be cleared of any existing vegetation and disposed off-site. An existing water control structure at Pond R5 consists of a 72-inch-diameter corrugated metal pipe through the levee between Ponds R4 and R5. During construction, this culvert and all associated support structures would be demolished and disposed off-site or recycled as appropriate.

AAC Levee Improvements. Levee improvements at the AAC would consist of preparing the subgrade to receive additional fill material by clearing vegetation, debris, and grooving. Fill would be placed in 8-inch-thick lifts and compacted either through a vibratory hand tamper or a roller to achieve 95 percent compaction. Borrow material would be sourced on-site from levee lowering at Pond R4, internal levee removal at Ponds R5 and S5, pilot channel excavation, and off-site upland re-use materials. Levee lowering at Pond R4 would remain at elevations above the MHHW until construction activities within the pond that need to be performed in dry conditions are complete.

Levee Breaches. From the preliminary design, it is estimated that tidal volumes of 345 acre-feet would be required to exchange per day with the ponds. To accomplish this tidal exchange, several breaches of varying sizes are proposed. Breaching would be accomplished from levee crest using long-reach excavators and hauling material to on-site locations receiving fill for levee improvement or habitat transition zones.

Levee Removal. An excavator would be used to remove all or part of the levees within and between Ponds R5 and S5. Removed material would be used to fill borrow ditches in Pond R4 or to construct habitat transition zones.

Water Control Structures. The design calls for a concrete box culvert to reduce the corrosion concerns typically expected in brackish water. Alternatively, solid-wall HDPE pipes would also be suitable because they provide a longer service life (greater than 50 years).

Habitat Transition Zones. Habitat transition zones would be constructed by placing fill material along the slopes and compacting to 70–80 percent density to enable vegetation establishment. Slope protection would be maintained by establishment of native vegetation. Hydroseeding or other seeding method with a native plant mix, development of a planting scheme, and invasive plant control would aid in establishing desirable vegetative habitat.

Dewatering. Construction could occur in the wet or the dry. If the contractor decides to perform construction in the dry, some localized dewatering would be required. Dewatering of pond bottom would be accomplished by evaporating the pond beds to provide access to excavate pilot channels. Limited, local dewatering using portable, generator-powered pumps would likely take place during the installation of water control structures. Pumped water would be discharged downstream of the construction area.

Construction Access. As shown on Figure 2-20, the Ravenswood Ponds would be primarily accessed from the Marsh Road exit on U.S. 101 via the entrance to the City of Menlo Park's Bedwell Bayfront Park. The USFWS has an access easement with the city for this purpose. Alternate access to the southern edge of Pond R3 is possible from the paved bicycle path/hiking trail just north of SR 84.

The construction areas in and around the ponds themselves would be accessed via existing trails in Bedwell Bayfront Park and on the Refuge levee crests. The USFWS Refuge staff drive on the levees for maintenance, cleanup, and other management purposes, and it is assumed that the existing levees are capable of handling heavy construction equipment. Ponds R4, R5, and S5 can be accessed via existing trails on the edge of Bayfront Park and the outboard perimeter levee in Ponds R3 and R4. The crests of the berms on either side of the AAC or the levee around the perimeter of Pond R4 would be used to access various construction areas in Ponds R3 and R4.

If conditions warrant, levee improvements, including the widening of the crest to provide adequate pathway for construction equipment, would be undertaken. Heavy vehicles would avoid crossing structures in the levees if the vehicle exceeds the weight-bearing capacity of a structure. If this is not possible, engineer-approved precautions would be taken to avoid damaging the structure.

Construction Staging Areas. Staging areas would be established for equipment and material storage for each of the Action Alternatives. Some agreements with the City of Menlo Park may need to be made to arrange for staging areas within Bedwell Bayfront Park. Three possible locations for staging purposes are as follows:

- Vacant space at the corner intersection of Marsh Road and Bayfront Expressway near the site entrance from Marsh Road;
- The parking area along Marsh Road that borders Bedwell Bayfront Park; and
- The internal trails and lightly vegetated areas within Bedwell Bayfront Park that border Ponds R4 and R5 (would be widened as needed to establish a temporary staging area).

Equipment. Excavators, bulldozers, amphibious equipment (e.g., an aquatic excavator), dump trucks, compaction rollers or vibratory plates, a water tanker, pumps, sheet piles, refueling tanks, and pickup vehicles for transportation in and out of the project site would be used during construction. Depending on the soil conditions within the ponds, temporary heavy equipment mats or wooden mats with gravel cover would be employed to provide access and establish working conditions to excavate pilot channels at the pond bottom. Temporary fill would also be used at staging locations if required. Upland fill material would be transported to the project area by trucks.

Construction Timing Considerations. There are certain special-status species that may be affected by construction activities. The presence of these species may limit construction activities or require certain avoidance and minimization measures. The specific limits and requirements for each species and their habitats will be addressed during the permitting phase of the project. However, the timing considerations below will be incorporated into detailed designs and project planning to reduce the overall potential for adverse impacts and the need for mitigation.

- Bird nesting: Regulatory work windows for bird nesting typically run from February 1 through September 15. Work could likely occur within this window in the presence of a biological monitor and preconstruction surveys.
- Longfin smelt and green sturgeon: These species could be present year-round. In-channel work may require that a USFWS-approved biological monitor be present.

If construction is to occur entirely outside of the species windows, or if fill material is not all available at once, completion of construction activities would likely extend into a second construction season.

Construction of Alternative Ravenswood B

The following components of Alternative Ravenswood B are not common to all Action Alternatives, though many of them are included in one of the other Action Alternatives.

Pilot Channel Excavation. Existing soil conditions at the pond bottom are likely to be too soft to support vehicles or heavy equipment. Temporary mats with gravel cover would be deployed at the pond bottom to create a firm surface that can handle heavy equipment such as an excavator, loader, or mini-dozer to access locations where pilot channels are to be established. Alternatively, amphibious equipment such as an aquatic excavator would be used to excavate in the wet to designed depths. It is likely that removed material would be unsuitable to be used as levee fill material and would instead be used to fill borrow ditches within Pond R4 or as fill for habitat transition zones.

Levee Lowering or Removal. Levee lowering at the northwest corner of Pond R4 would be accomplished by using an excavator and loader and hauling the removed material to fill borrow ditches in Pond R4 or to construct habitat transition zones. Levee lowering at Pond R4 would remain at elevations above the MHHW until construction activities within the pond that need to be performed in the dry are

complete. Portions of the internal levees between and within Ponds R5 and S5, with lengths ranging from 1,500 feet to 2,230 feet would be lowered to pond bottom elevation of 3.0 feet NAVD88. This activity would also use an excavator and loader. Removed material would be used to fill borrow ditches in Pond R4 or to construct habitat transition zones.

Habitat Island. The expected treatment for the top surface of the island is a 12-inch-thick sand layer underlain by a 6-inch-thick crushed rock to minimize weed establishment. The sand layer would be mixed with bay mud to prevent formation of cracks. The sand layer would be covered with 4-inch-thick layer of oyster shells, if available, to provide a barren land site that is typically preferred by nesting birds. Other combinations of rock, sand, dirt, or other materials may be used as available. These materials would be brought in and placed prior to removal of the portions of the levee to be breached.

Construction Sequence. Earthwork activities would be sequenced such that activities that would be efficient to perform in dry conditions would be completed first. These activities would include levee improvements, hydraulic controls, pilot channel excavation, and internal levee lowering. Levee lowering and breaching along the outer bounds of the ponds that are designed to establish hydraulic connection with adjacent sloughs would be performed after the internal pond activities are completed.

From this concept, the likely order of construction for Alternative Ravenswood B would be as follows, though availability of upland material for various actions could alter the sequence:

1. Clear site and demolish existing water control structure.
2. Modify central portion of levee between Ponds R5 and S5 with gravel, sand, and shells in preparation for its use as a habitat island.
3. Remove internal levees between Ponds R5 and S5 and within Pond S5, as described above.
4. Improve levee along the All-American Canal.
5. Excavate pilot channels in Pond R4.
6. Construct a habitat transition zone along the western edge of Pond R4 levee.
7. Install water control structures.
8. Lower Pond R4 levee near Greco Island.
9. Breach levee near eastern slough trace.
10. Install viewing platform.
11. Install fencing along southern border of pond cluster.

Once sufficient upland fill material to complete the initial construction plans for habitat transition zones and levee improvements is in place, additional material would be used as available to expand habitat transition zones or further raise or improve flood protection.

Construction Schedule. The construction schedule would be driven by the habitat windows, weather conditions, and volume of earthwork quantities to be moved. For Ravenswood Alternative B, there would be approximately 39,700 cubic yards of earth moving for the cut processes and 77,600 cubic yards for the

fill processes. The 37,900 cubic yards of fill that cannot be generated from on-site cut activities would be imported from other construction sites.

Installation of a viewing platform would take approximately 2 weeks. These activities would not affect the construction schedule significantly compared to the earthwork. Although, it is assumed that the ponds would be sufficiently dry by the beginning of the construction season and that active draining or dewatering of pond bottoms would be unnecessary, limited installation of cofferdams and dewatering of small portions of the pond may be necessary for installing water control structures.

Construction is expected to begin in the summer or fall of 2017. Some of the construction activities could occur in tandem, with multiple crews to achieve project goals. A preliminary estimate shows that construction would be completed over approximately a 5-month period in a single construction season, assuming all upland material would be available. This estimate is also based on the assumption that some heavy construction activities would be permitted to occur during the nesting habitat window under the watch of a biological monitor.

Construction of Alternative Ravenswood C

The following components of Alternative Ravenswood C are not common to all Action Alternatives, though many of them are included in one of the other Action Alternatives.

Pilot Channel Excavation. The pilot channel would be excavated as described for Alternative Ravenswood B.

Levee Lowering or Removal. Levee lowering at the northwest corner of Pond R4 would be accomplished by using an excavator and loader and hauling the removed material to fill borrow ditches in Pond R4 or to construct habitat transition zones. Levee lowering at Pond R4 would remain at elevations above the MHHW until construction activities within the pond that need to be performed in the dry are complete. Portions of the internal levees between and within Ponds R5 and S5, with lengths ranging from 1,500 feet to 2,230 feet, would be lowered to pond bottom elevation of 3.0 feet NAVD88. This lowering would also use an excavator and loader. Removed material would be used to fill borrow ditches in Pond R4 or to construct habitat transition zones.

Ponds R5/S5 Bottom Fill for Alternative C. Fill from the excavation activities within Ponds R5 and S5—as well as from the Ponds R5/S5 levee and from the smaller levee between Pond S5 and its triangular forebay—would be used to raise the pond bottoms in Ponds R5 and S5 to tidal mud flat elevation. Bulldozers and graders would be used to spread the material as required.

Habitat Island. The expected treatment for the top surface of the island is a 12-inch-thick sand layer underlain by a 6-inch-thick crushed rock to minimize weed establishment. The sand layer would be mixed with bay mud to prevent formation of cracks. The sand layer would be covered with 4-inch-thick layer of oyster shells, if available, to provide a barren land site that is typically preferred by nesting birds. Other combinations of rock, sand, dirt, or other materials may be used as available. These materials would be brought in and placed prior to removal of the portions of the levee to be breached.

Trail Construction. The trail would be at least 6 feet wide and would be built on improved or existing levees. Erosion or uneven surfaces on existing levees would be regraded for compliance with the ABA on federal lands and the ADA elsewhere. Levees would be graded and compacted. Geotextile fabric would

be laid out and gravel imported and compacted in place. Quarry fines would then be compacted over the gravel with a smooth drum compactor to create an accessible surface.

Construction Sequence. Earthwork activities would be sequenced such that activities that would be efficient to perform in the dry would be completed first. In Alternative Ravenswood C, these activities would include levee improvements, hydraulic controls, pilot channel excavation, and internal levee lowering. Levee lowering and breaching along the outer bounds of the ponds that are designed to establish hydraulic connection with adjacent sloughs would be performed after the internal activities are completed.

From this concept, the order of construction within the Ravenswood complex would be as follows, though availability of upland material for various actions could alter the sequence:

1. Clear site and demolish existing water control structure.
2. Modify central portion of levee between Ponds R5 and S5 with gravel, sand, and shells in preparation for its use as a habitat island.
3. Remove all or part of internal levees between Ponds R5 and S5 and within Pond S5.
4. Fill and grade Ponds R5 and S5 bottoms.
5. Improve levee along the All-American Canal.
6. Excavate pilot channels in Pond R4.
7. Construct habitat transition zones along the western edge of Pond R4 levee and along the All-American Canal levee.
8. Install water control structures.
9. Lower Pond R4 levee near Greco Island.
10. Construct boardwalk trail.
11. Construct trail on Ponds R4/R5, Ponds R3/R5, and Ponds R3/S5 levees.
12. Breach levee near eastern slough trace, northwest border of Pond R4.
13. Install viewing platforms.
14. Install fencing along southern border of pond cluster.

Once sufficient upland fill material to complete initial construction plans for habitat transition zones and levee improvements is in place, additional material would be accepted as available to expand the habitat transition zones or further raise or improve flood protection.

Construction Schedule. Construction schedule would be driven by the habitat windows, weather conditions, and volume of earthwork quantities to be moved. Approximately 45,400 cubic yards of earth moving for the cut processes and 255,800 cubic yards for the fill processes would be required. The 210,400 cubic yards of fill that cannot be generated from on-site cut activities would be imported from other construction sites.

Installation of most walkway and viewing platforms is estimated to take no more than 2 weeks. The elevated boardwalk trail would take several weeks to construct.

Construction is expected to begin in the summer or fall of 2017. Some of these construction activities could occur in tandem with multiple crews to achieve project goals. Construction would be completed in one 7-month-long construction season, assuming all upland material would be available for construction. This estimate is also based on the assumption that some heavy construction activities would be permitted to occur during the nesting habitat window under the watch of a biological monitor.

Construction of Alternative Ravenswood D

The methods of construction of most of the individual components of Alternative Ravenswood D were discussed in either the common components section or in Alternatives Ravenswood B or C. The exceptions are described below.

Levee Lowering or Removal. All of the internal levees between and within Ponds R5 and S5 and the pond bottoms themselves would be lowered to pond bottom elevation of 3.0 feet NAVD88. This lowering would require the use of an excavator and loader. Removed material would be used to fill borrow ditches in Pond R4 or to construct habitat transition zones. Unlike Alternatives Ravenswood B and C, the northwest levee of Pond R4 would not be modified.

Trail Construction. Two trails would be constructed as part of Alternative Ravenswood D. The trail on northwest levee of Pond R4 would be approximately 1,200 feet long along the northwest levee of Pond R4. The trail on eastern edge of Ponds R5 and S5 would be approximately 2,700 feet long along the eastern levee of Ponds R5/S5 adjacent to Ponds R3 and R4.

The trails would be at least 6 feet wide and would be built on improved or existing levees. Erosion or uneven surfaces on existing levees would be regraded for compliance with the ABA on federal lands and the ADA elsewhere. Levees would be graded and compacted. Geotextile fabric would be laid out and gravel would be imported and compacted in place. Quarry fines would then be compacted over the gravel with a smooth drum compactor to create an accessible surface.

Bayfront Canal and Atherton Channel Project. A combination of culverts and open channels would be installed to direct peak stormwater runoff from the Bayfront Canal into the triangular forebay of Pond S5 and Ponds R5 and S5 beyond that. Open channel improvements would be made upstream and downstream of the proposed culvert installation to enhance flow to and from the culvert. The proposed alignment for the culverts crosses beneath existing Caltrans stormwater pipes; therefore, the Caltrans pipes would be temporarily removed during the culvert installation and replaced afterward.

The Bayfront Canal and Atherton Channel Project would include construction of the components described below.

1. Open channel improvements. Open channel improvements would be conducted on the existing vegetated channels both immediately upstream and downstream of the proposed culvert. Approximately 2,200 cubic yards of material would be removed, and grading to a 2:1 (h:v) side-slope and 1.5:1 (h:v) side-slope, respectively would take place. The upstream inlet of the open channel at the Bayfront Canal would be stabilized. Approximately 700 square feet of articulating concrete block mat or rock riprap would be placed at a 2:1 (h:v) slope at the channel inlet.

2. Excavation. The culverts associated with the Bayfront Canal and Atherton Channel Project would pass under the Bedwell Bayfront Park entrance road. This location would require excavation of a strip of road and the ground under it for culvert placement and temporary removal of the existing Caltrans stormwater pipes. This excavating would also affect the phasing of the construction of this structure because it is assumed that only a portion of the roadway width would be closed at any given time. The culvert would likely need to be installed along one portion of its length and then the remainder, leaving one lane of the entrance road open at all times. After construction is completed, the ground and roadway would be replaced and resurfaced to return the roadway to its pre-project condition.

3. Culvert installation. A culvert consisting of four 63-inch-diameter HDPE pipes would connect the upstream open channel to the downstream open channel and ultimately connect with the Pond S5 forebay. A trash rack and operational sluice gates would be incorporated into the inlet headwall structure for the culvert and the outlet headwall structure. The culvert would be fitted with flap-gates. Approximately 6,800 cubic yards of material would be excavated for the pipe installation. A cast-in-place concrete headwall would be constructed for the inlet and outlet structures. Approximately 120 cubic yards of 1.5-foot-thick rock, covering approximately 2,100 square feet, would be placed at the outlet of the culvert to prevent erosion in the open channel. Marsh Road would be re-paved and vegetation re-planted at the completion of the project. To enhance outflow from the culvert, the Pond S5 forebay would also be excavated and material placed into the All-American Canal levee or one of the habitat transition zones, similar to the material removed from the upstream open channel. Approximately 4.3 acres would be excavated (about 24,600 cubic yards of material).

4. Caltrans stormwater pipe installation. The proposed culvert would cross underneath existing Caltrans double 48-inch-diameter stormwater pipes. To install the culvert, approximately 70 linear feet of the Caltrans reinforced concrete pipe (RCP) would be removed during the dry season for construction and replaced on completion.

Construction Sequence. Earthwork activities would be sequenced such that activities that would be efficient to perform in the dry would be completed first. This sequence would include levee improvements, hydraulic controls, and internal levee lowering. Levee breaching at Pond R4 along the outer bounds of the ponds that are designed to establish hydraulic connection with the adjacent slough would be performed after the internal activities are completed.

From this concept, the likely order of construction within the Ravenswood complex would be as follows, though availability of upland material for various actions could alter the sequence:

1. Clear the site and demolish the existing water control structure.

2. Remove the internal levees between Ponds R5 and S5 and within Pond S5.

3. Improve levee along the All-American Canal.

4. Construct habitat transition zones along the All-American Canal levee, the northwestern levee of Pond R4 near Greco Island, and the southern edge of Pond R3.

5. Construct Redwood City's Bayfront Canal and Atherton Channel Project.

6. Install water control structures and finalize connections with Redwood City's stormwater connection.
7. Breach Pond R4 levee near the eastern slough trace.
8. Construct a trail on the Pond R4 levee near Greco Island and a trail on the Ponds R4/R5, Ponds R3/R5, and Ponds R3/S5 levees.
9. Install viewing platforms.
10. Install fencing along the southern border of the pond cluster.

Once sufficient upland fill material to complete initial construction plans for habitat transition zones and levee improvements is in place, additional material would be accepted as available to expand habitat transition zones or further raise or improve flood protection.

Construction Schedule. The construction schedule would be affected by the habitat windows, weather conditions, and the volume of earthwork quantities to be moved. For Ravenswood Alternative D, the SBSP Restoration Project designs indicate that there would be approximately 56,700 cubic yards of earth moving for the cut processes and 73,000 cubic yards for the fill processes. In addition to these volumes, in Alternative Ravenswood D, excavation planned for Redwood City's Bayfront Canal and Atherton Channel Project would generate an additional surplus of 31,200 cubic yards of earth that would be used for levee raising or habitat transition zone construction. These amounts lead to an overall surplus of 14,900 cubic yards. No net import of material from off-site projects would be necessary under Alternative Ravenswood D.

Installation of most walkway and viewing platform is estimated to take approximately 2 weeks. These activities would not affect the construction schedule significantly compared to the earthwork. It is assumed that the ponds would be dry by the beginning of the construction season and that active draining or dewatering of ponds would be unnecessary. However, limited installation of cofferdams and dewatering of small portions of the pond may be necessary for installing water control structures.

Construction is expected to begin in the summer or fall of 2017. One likely construction sequence scenario is as described in "Construction Sequence," above. Some of these construction activities could occur in tandem with multiple crews to achieve project goals. A preliminary estimate shows that construction could be completed in 15 months spanning two construction seasons, assuming all upland material would be available to be accepted and placed in those seasons This estimate is also based on the assumption that some heavy construction activities would be permitted to occur during the nesting habitat window under the watch of a biological monitor. During construction of the inlet headwall for the Bayfront Canal culvert and during channel excavation, public vehicle access to the Bedwell Bayfront Park would be maintained. After completion of the inlet headwall, excavation would continue eastward and public vehicle access to the park would be prohibited. Public foot traffic would be allowed around the fenced construction site to Bedwell Bayfront Park until excavation of the culvert outlet begins, at which point public access would be prohibited until the completion of the project (approximately 1.5 months). The contractor would provide traffic safety control throughout the duration of the project. Removal of the Caltrans stormwater pipe would occur during the summer months to avoid stormwater flow; otherwise a temporary bypass would be constructed.

Operations and Maintenance: All Action Alternatives

Operations and maintenance activities for the components of the pond clusters within the Refuge would continue to follow and be dictated by 2009 USACE permit #2008-00103S, applicable County operations, and the AMP. The City of Menlo Park would continue to operate and maintain its properties that are adjacent to the pond cluster, in coordination with the Refuge managers. In Alternative Ravenswood D, the City of Redwood City would also coordinate its management and maintenance of the Bayfront Canal and Atherton Channel water diversion system with other O&M activities, as described below.

Periodic maintenance of the pond infrastructure would be required following construction. Maintenance would require a staff person to travel to the pond cluster one or two times a week to perform activities such as water structure control operation, invasive plant control, and vandalism repairs. In addition, AMP monitoring activities would occur, which would require additional workers (e.g., staff, consultants) to access the pond clusters. The frequency of visits to the pond clusters to conduct AMP monitoring activities would depend on the actual activities and would vary by season (e.g., during the bird-breeding season, there would be more trips to the site than during the non-breeding season).

Ongoing levee maintenance would continue for existing levees that provide flood protection (as part of the O&M activities described above and in consistency with USACE permit #2008-00103S). Levee maintenance activities would include the placement of additional earth on top of or on the pond side of the levees as the levees subside, with the level of settlement dependent on geotechnical considerations. In general, pond levees that are improved to provide flood protection would likely exhibit the greatest degree of settlement. Levees that require erosion control measures would also require routine inspections and maintenance. The northern perimeter levee at Pond R4 would not be maintained and would be allowed to degrade naturally.

Improved levees would be inspected and maintained for slope stability, erosion control, seepage, slides and settlement on an annual basis. Maintenance is expected every 5 years to add additional fill material in areas where settlement occurs. Most of the maintenance work can be accomplished during low tides and from the levee crests. If the levees that provide flood protection are improved to provide FEMA 100-year flood protection, a detailed levee maintenance plan would be required for certification to comply with FEMA standards.

Water control structures would require inspection for structural integrity of gates, pipes, and approach way; obstruction to flow passage and preventative maintenance such as visual functionality of gates, seals; and removal of debris. In Alternative Ravenswood D only, these same activities would be required for the Redwood City stormwater connection. Inspection would be required every month until the first year and semi-annually thereafter. Maintenance would be required on an annual basis. O&M would be accomplished during low tides in Pond R4 and sloughs and by maintaining low storage conditions in the managed ponds.

Maintenance of habitat transition zones would include inspections and maintenance for slope stability, erosion control, seepage, slides, and settlement on an annual basis. As necessary, vegetation removal would occur to prevent colonization of invasive species. Fill material would be placed, when needed, to respond to areas where erosion has been observed. Maintenance activities would also be dictated by the AMP if an AMP management trigger is reached, especially a trigger related to a biological resource (e.g., salt marsh harvest mouse) that would utilize habitat transition zone as habitat.

Maintenance of public access and recreation features is similar but not identical across the Action Alternatives. The viewing platforms would be designed to minimize maintenance utilizing durable and sustainable materials as much as possible to prevent degradation and the need for repeated maintenance. All features would need to be checked periodically for defacement of interpretive boards and other forms of vandalism. Alternatives Ravenswood C and D would also include occasional trail maintenance to keep them safe and accessible. There would be a need for trash removal along trails and more intensively at staging areas and trailheads.

Operations and maintenance of water levels in Ponds R3, R5, and S5 would differ across the three Action Alternatives, as described below.

Alternative Ravenswood B:

- The water levels in Ponds R5 and S5 would be actively managed year-round by opening and closing the water control structures as needed to maintain desired surface elevations, flows, and water quality. The salinity of these ponds would also be somewhat controlled through the use of the water control structures. USFWS Refuge staff would operate the water control structures and provide maintenance and cleaning as needed.
- The water levels of Pond R3 would be actively managed using one new water control structure to provide for the improvement of the existing western snowy plover habitat in Pond R3. USFWS Refuge staff would operate all of the water control structures and provide maintenance and cleaning as needed.

Alternative Ravenswood C:

- The water levels in Ponds R5 and S5 would be actively managed year-round by opening and closing the water control structures as needed to maintain desired surface elevations, flows, and water quality. Water surface elevation in Ponds R5 and S5 would be managed to receive regular damped or muted tidal flows and maintain the pond bottoms at an intertidal elevation to form mudflats for shorebirds. The salinity of these ponds would also be somewhat controlled through the use of the water control structures. In addition, water would be controlled to flow into Pond R4 as needed for flood control as an overflow stormwater detention pond from Ponds R5 and S5 or other management purposes.
- The water levels of Pond R3 would be actively managed using two new water control structures to provide for the improvement of the existing western snowy plover habitat in Pond R3. USFWS Refuge staff would operate all of the water control structures and provide maintenance and cleaning as needed.

Alternative Ravenswood D:

- The water levels in Ponds R5 and S5 would be actively managed year-round using the water control structures that would be installed as a part of meeting the habitat restoration goals of these ponds. Water surface elevation in Ponds R5 and S5 would be managed to create open water habitat for diving and dabbling ducks and other birds. Water levels would be maintained such that bottom depths are at subtidal elevations except during storm events. Prior to and during storm events when the tide in Flood Slough is high, the ponds would be drawn down to provide capacity for temporary detention of stormwater runoff from the City of Redwood City. Stormwater would

enter into Pond S5 through new water control structures that would be installed to connect the Redwood City storm drain outflow to the forebay of Pond S5. This stormwater would then be discharged back into Flood Slough through a new water control structure between the pond and the slough when the tide is low and the slough can accept that volume of stormwater. The salinity of Ponds R5 and S5 would also be somewhat controlled through the use of the water control structures by receiving low salinity stormwater. Additionally, water would also be controlled to flow into Pond R4 as needed for flood control as an overflow stormwater detention pond from Ponds R5 and S5 or for salinity dilution or other management purposes.

- The water levels of Pond R3 would be actively managed using two new water control structures to provide for the improvement of the existing western snowy plover habitat in Pond R3. USFWS Refuge staff would operate the water control structures for habitat and water quality management purposes and provide maintenance and cleaning as needed.

2.3 General Mitigation Measures from the 2007 EIS/R

In developing the 2007 EIS/R for the SBSP Restoration Project, the USFWS and CDFW developed program-wide comprehensive mitigation measures that could be expanded into actions when designing the project-level phases to implement the SBSP Restoration Project or direct the environmental analyses for the future phases. The intent of these mitigation measures was to avoid or reduce the environmental effects of any project alternative through the project design or focus the impact analysis on key impact issues recognized in the 2007 EIS/R. When mitigation measures are developed in program-level NEPA and CEQA documents and adopted by the lead agencies and other project partners, the expectation is that those measures will be included as part of the project-level designs whenever it is feasible to do so. With very few exceptions, this project-level EIS/R has followed this practice and will implement those measures as standard parts of the project designs; therefore, these measures need not be repeated in each of the alternative described above.

The notable exception of a program-level mitigation measure that is not feasible to implement is Mitigation Measure 3.12-1: Timing of construction-related truck trips. That measure is discussed at length below.

This section presents the mitigation measures from the 2007 EIS/R that are common to and relevant to the Phase 2 alternatives included in this project-level EIS/R. These measures would be incorporated into the project design of all action/project alternatives; they are thus part of the Phase 2 projects and not actually "mitigation measures." For this reason, they are included in this chapter. These measures have been edited for relevancy with Phase 2 actions.

2.3.1 Surface Water, Sediment and Groundwater Quality

SBSP Mitigation Measure 3.4-5c: Actions to Minimize Illegal Discharge and Dumping

The SBSP Restoration Project will undertake the following activities to ensure that existing programs and practices avoid impacts due to illegal discharge and dumping:

- Gate structures upstream of the SBSP Restoration Project area will include a trash capture device that will prevent fouling of marsh and pond complexes.

- Plans for recreational access in the SBSP Restoration Project area will include appropriate trash collection receptacles and a plan for ensuring regular collection and servicing.
- "No Littering" signs will be posted in public access areas.

SBSP Mitigation Measure 3.4-5d: Monitoring Sediments to Follow Existing Guidance and Comply with Emerging Regulations

Sediment monitoring data will be used to determine appropriate disposal or beneficial re-use practices for sediments. If sediment monitoring data indicate that tidal scour outside a levee breach could remobilize sediments that are significantly more contaminated than Bay ambient conditions, the SBSP Restoration Project will consult with the appropriate regulatory agencies regarding other potentially required actions.

SBSP Mitigation Measure 3.4-5e: Urban Runoff Management

The project proponents will notify the appropriate Urban Runoff Program of any physical changes (such as breaches) that will introduce urban discharges into the project area, and request that the Urban Runoff Program consider those changes when developing annual monitoring plans.

SBSP Mitigation Measure 3.4-6: USFWS and the Conservancy (Project Proponents) Will Coordinate with SCVWD to Ensure That the Following Activities Take Place

If any abandoned wells are found before or during construction they will be properly destroyed by the project as per local and state regulations by coordinating such activities with the local water district. If abandoned wells are located during restoration or other future activities within SCVWD boundaries, a well destruction work plan will be prepared in consultation with SCVWD (as appropriate) to ensure conformance to SCVWD specifications. The work plan will include consulting the databases of well locations already provided by SCVWD. The project will properly destroy both improperly abandoned wells and existing wells within the project area that are subject to inundation by breaching levees. Well destruction methods will meet local, county, and state regulations. The project proponents will also lend support and cooperation with any well identification and destruction program that may be undertaken as part of the Shoreline Study or other projects.

2.3.2 Cultural Resources

SBSP Mitigation Measure 3.8-1: Discovery of Unknown Resources

Background

Restoration actions planned for the SBSP Restoration Project area shall be treated as individual archaeological projects. The overall record search for this EIS/R was performed in June 2006. A new record search shall be performed for any projects within the SBSP Restoration Project area where the previous record search is more than 5 years old.

Site Survey

Prior to the beginning of any project construction activity that could affect the previously un-surveyed portions of the project area, qualified professional archaeologists shall be retained to inventory all

portions of the restoration site that have not been examined previously or have not been examined within the last 15 years. The survey(s) shall be conducted during a time when the ground surfaces of potential project sites are visible so the natural ground surface can be examined for traces of prehistoric and/or historic-era cultural resources. If the survey(s) reveals the presence of cultural resources on the project site (e.g., unusual amounts of shell, animal bone, bottle glass, ceramics, and structure/building remains), and those resources have not been dealt with sufficiently in any Cultural Landscape documentation, the resources shall be documented according to current professional standards. The resources shall be evaluated for potential eligibility to the National Register of Historic Places (NRHP) or the California Register of Historical Resources (CRHR). Depending on the evaluation, additional mitigation measures may be required, including avoidance of the resource through changes in construction methods or project design or implementation of a program of testing and data recovery, in accordance with all applicable federal and state requirements.

Pre-Construction Contractor Education

Prior to any project-related construction, a professional archaeologist shall be retained to address machinery operators and their supervisors, preferably by giving an on-site talk to the people who will perform the actual earth-moving activities. This will alert the operators to the potential for finding historic or prehistoric cultural resources.

Construction Monitoring

Any project-related construction that occurs within 100 feet (30 meters) of a known prehistoric resource shall be monitored by a qualified professional archaeologist and a Native American monitor. If elements of the known resource or previously unknown cultural resources are encountered during project construction, all ground-disturbing activities shall halt within a 100-foot radius of the find. The archaeologist shall identify the materials, determine their possible significance, and formulate appropriate measures for their treatment in consultation with the Native American monitor, Most Likely Descendant (MLD), or appropriate Native American representative and the appropriate Lead Agency. Potential treatment methods for significant and potentially significant resources may include, but would not be limited to, no action (i.e., resources determined not to be significant), avoidance of the resource through changes in construction methods or project design, or implementation of a program of testing and data recovery, in accordance with all applicable federal and state requirements. These measures shall be implemented prior to resumption of project construction.

Unanticipated Finds

If contractors identify possible cultural resources, such as unusual amounts of bone, stone, or shell, they shall be instructed to halt operation in the vicinity of the find and follow the appropriate contact procedures. Work shall not resume in the vicinity of the find until a qualified professional archaeologist has had the opportunity to examine the finds. The archaeologist shall identify the materials, determine their possible significance, if the finds are prehistoric, formulate appropriate measures for their treatment in consultation with the Native American monitor, MLD, or appropriate Native American representative and the appropriate Lead Agency. Potential treatment methods for significant and potentially significant resources may include, but would not be limited to, no action (i.e., resources determined not to be significant), avoidance of the resource through changes in construction methods or project design, or implementation of a program of testing and data recovery, in accordance with all applicable federal and state requirements. These measures shall be implemented prior to resumption of project construction.

Human Remains

California law recognizes the need to protect interred human remains, particularly Native American burials and associated items of patrimony, from vandalism and inadvertent destruction. The procedures for the treatment of discovered human remains are contained in California Health and Safety Code Section 7050.5 and Section 7052 and California Public Resources Code Section 5097. The California Health and Safety Code require that if human remains are found in any location other than a dedicated cemetery, work is to be halted in the immediate area.

The appropriate agency or the agency's designated representative shall be notified. The agency shall immediately notify the county coroner and a qualified professional archaeologist. The coroner is required to examine all discoveries of human remains within 48 hours of receiving notice of a discovery on private or state lands (Health and Safety Code Section 7050.5[b]). If the coroner determines that the remains are those of a Native American interment, then coroner shall contact the Native American Heritage Commission within 24 hours.

The Native American Heritage Commission shall identify the person or persons it believes to be the most likely descended from the deceased Native American. The MLD may make recommendations to the landowner or the person responsible for the excavation work for means of treating or disposing of, with appropriate dignity, the human remains and any associated grave goods, as provided in Public Resources Code Section 5097.98. The landowner or his authorized representative shall rebury the Native American human remains and associated grave goods with appropriate dignity on the property in a location not subject to further subsurface disturbance if: (1) the Native American Heritage Commission is unable to identify an MLD or (2) the MLD fails to make a recommendation within 24 hours after being notified by the commission or (3) if the landowner or his authorized representative rejects the recommendation of the descendant, and the mediation by the Native American Heritage Commission fails to provide measures acceptable to the landowner.

SBSP Mitigation Measure 3.8-2: Cultural Landscape, Inventory of Resources, Treatment of Finds

In June 2012 the USFWS and California State Historic Preservation Officer (SHPO) signed a Memorandum of Agreement (FWS0407121A) that established a set of stipulations and a treatment plan that would allow the USFWS to carry out the project while satisfying the requirements of Sections 106 and 110(b) of the National Historic Preservation Act (NHPA). On consultation with the SHPO, the USFWS developed a historic properties treatment plan that will be implemented prior to and during the project. This historic properties treatment plan and the mitigation measures established within this treatment plan are hereby incorporated by reference. Appendix F of the 2007 EIS/R contains a copy of the Memorandum of Agreement (MOA) and historic properties treatment plan.

2.3.3 Traffic

SBSP Mitigation Measure 3.12-1: Timing of Construction-Related Truck Trips

This mitigation measure required the landowner (USFWS) to include in construction plans and specifications the requirement that construction-related truck trips, specifically deliveries of fill and equipment, shall occur outside the weekday am and pm peak commute traffic hours. This mitigation measure is not feasible to implement in the Phase 2 actions because of the large amount of upland

material that needs to be imported by truck to three of the pond clusters in relatively condensed periods of time.

Finding source projects with sufficient quantities of upland fill material is difficult for several reasons. The excavation must occur in a year and season when the SBSP Restoration Project can accept it. Stockpiling material or moving it more than once is prohibitive and would increase environmental impacts. Then, to be used in a restoration project, the material must pass a screening to demonstrate its lack of contamination. The source project should also be located close enough to the restoration project that bringing it there would both have fewer environmental impacts and be less expensive than bringing to a landfill or other destination. Successfully meeting all of those criteria is likely to limit the number of suitable source projects. It would not, then, be feasible to further constrain the source project and dirt broker/haulers by limiting the hours of material delivery to the non-peak commute periods. Assuming these entities would be willing to comply, their own costs would increase, and they would pass that on to the SBSP Restoration Project, raising associated costs by an estimated 30 percent at a minimum.

Collectively, these barriers make the implementation of the restricted hours from MM 3.12-1 infeasible. However, importantly, the nearest likely disposal site for upland fill material generated at projects in San Mateo County and Santa Clara County is at a former quarry in Fremont, just north of the eastern landing of the Dumbarton Bridge. This location means that, in the absence of the SBSP Restoration Project, the likely haul route for transporting the material would go past one or more of the Phase 2 pond clusters. The traffic, air quality, and noise impacts are expected to be equal to or worse than the impacts if the material cannot be used at the Phase 2 project locations and has to go to the default disposal site.

For these reasons, the SBSP Restoration Project will not uniformly be implementing this mitigation measure and instead conducted a full analysis of the number of truck trips and the impacts associated with them. These are presented in Chapter 3, Environmental Setting, Impacts, and Mitigation Measures.

SBSP Mitigation Measure 3.12-3: Parking at Recreational Facilities

The landowner (USFWS), in coordination with the cities with jurisdiction over the proposed recreation improvements (where applicable), shall design recreational facilities with sufficient parking spaces to accommodate the projected increase in vehicles that access the site, unless adequate off-site parking is available to meet the demand for parking spaces.

SBSP Mitigation Measure 3.12-4: Video Record of Road Conditions

If residential streets are part of the designated haul route for any future phases of the SBSP Restoration Project, the landowners shall prepare a video record of road conditions prior to the start-up of construction for the residential streets affected by the project. The landowner (USFWS) shall prepare a similar video of road conditions after project construction is completed. The pre- and post-construction conditions of haul routes shall be reviewed by staff of the local Public Works Department. An agreement shall be entered into prior to construction that will detail the pre-construction conditions and post-construction requirements of the roadway rehabilitation program.

2.3.4 Noise

SBSP Mitigation Measure 3.13-1: Short-Term Noise Effects

The landowners shall include in construction plans and specifications the following requirement:

- All construction activities shall be limited to the days and hours or noise levels designated for each jurisdiction where work activities occur, as specified below:

Alviso

- City of San Jose: Construction activities shall not exceed 55 A-weighted decibels (dBA) at residential-zoned districts except upon issuance of and in compliance with a Conditional Use Permit.
- City of Fremont: There are no restrictions for temporary construction activities.
- City of Sunnyvale: Construction activities shall occur between 7 am and 6 pm Monday through Friday and 8 am to 5 pm on Saturday. Construction activities shall not occur during Sunday or national holidays.
- Santa Clara County: Construction activities shall occur during the daytime hours of 7 am to 7 pm Monday through Saturday, except legal holidays.
- City of Mountain View: construction activities shall occur between 7 am and 6 pm Monday through Friday. Construction activities shall not occur during Saturdays, Sundays, or holidays unless prior written approval is granted by the building official.

Ravenswood

- Locate all construction equipment staging areas at the furthest distance possible from nearby noise-sensitive land uses.
- Construction equipment shall be properly maintained and equipped with noise control, such as mufflers, in accordance with manufacturers' specifications.
- For City of Menlo Park only: Construction activities shall occur between 8 am and 6 pm Monday through Friday only.

SBSP Mitigation Measure 3.13-2: Traffic-Related Noise

The landowners shall include in construction plans and specifications the following requirements:

- Contractors shall use haul routes that minimizes traffic through residential areas.

SBSP Mitigation Measure 3.13-4: Operation of Portable Pumps

Where portable pumps would be operated in the vicinity of sensitive receptors such that noise levels would exceed noise standards established by affected jurisdictions, the landowners shall enclose the portable pump to ensure that a reduction of up to 10 decibels (dB) at 50 feet (15 meters) is achieved and the noise levels of affected jurisdictions are met.

2.3.5 Air Quality

The project design features would include a number of fugitive dust control measures, as discussed in the 2007 EIS/R for the SBSP Restoration Project. The control measures described in the 2007 EIS/R reflect the Bay Area Air Quality Management District (BAAQMD) Basic Control Measures, as outlined in the

BAAQMD 1999 CEQA Guidelines. BAAQMD has since revised this guidance and has updated this list of best management practices with additional control measures. Therefore, mitigation is required to meet the BAAQMD's updated Basic Construction Mitigation Measures Recommended for All Proposed Projects (BAAQMD 2010, 2011). Mitigation Measure 3.13-1 would require the implementation of these additional control measures.

Mitigation Measure 3.13-1: Basic Construction Mitigation Measures

The following Basic Construction Mitigation Measures shall be implemented for all construction sites within the project area:

- Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations [CCR]). Clear signage shall be provided for construction workers at all access points.
- All construction equipment shall be maintained and properly tuned in accordance with manufacturer‘s specifications. All equipment shall be checked by a certified visible emissions evaluator.
- Post a publicly visible sign with the telephone number and person to contact at the lead agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. The BAAQMD's phone number shall also be visible to ensure compliance with applicable regulations.

These control measures, in addition to those included in the project design features, would meet BAAQMD Basic Construction Mitigation Measures Recommended for All Proposed Projects (BAAQMD 2010, 2011).

SBSP Mitigation Measure 3.14-1: Short-Term Construction-Generated Emissions

The following Basic Control Measures shall be implemented at all construction sites within the project area, regardless of size:

- Water all active construction areas at least twice daily, and more often during times of high wind.
- Cover all trucks hauling soil, sand, and other loose materials or require all trucks to maintain at least 2 feet (0.6 meter) of freeboard.
- Pave, apply water three times daily, or apply (non-toxic) soil stabilizers on all unpaved access roads, parking areas, and staging areas at construction sites.
- Sweep daily (with water sweepers) all paved access roads, parking areas, and staging areas at construction sites.
- Sweep streets daily (with water sweepers) if visible soil material is carried onto adjacent public streets.

The following Enhanced Measures shall be implemented at construction sites larger than 4 acres:

- Hydroseed or apply (non-toxic) soil stabilizers to inactive construction areas (previously graded areas inactive for 10 days or more).
- Enclose, cover, water twice daily, or apply (non-toxic) soil binders to exposed stockpiles (e.g., dirt, sand).
- To the extent practicable, limit traffic speeds on unpaved roads to 15 mph.
- Install sandbags or other erosion control measures to prevent silt runoff to public roadways.
- Replant vegetation in disturbed areas as quickly as possible.
- Install wheel washers for all exiting trucks, or wash off the tires or tracks of all trucks and equipment leaving the site.

These additional "Optional Measures" shall be implemented if further emission reductions are necessary to meet a BAAQMD requirement or address other concerns:

- Suspend excavation and grading activity when winds (instantaneous gusts) exceed 25 mph.
- Limit the area subject to excavation, grading and other construction activity at any one time.

SBSP Mitigation Measure 3.14-3a: TAC emissions

Toxic air contaminant (TAC) emissions from construction within 500 feet (152 meters) of sensitive receptors will require the following:

- Pursuant to BAAQMD Rule 6, the project shall ensure that emissions from all off-road diesel-powered equipment used on the project site do not exceed 40 percent opacity for more than 3 minutes in any one hour. Any equipment found to exceed 40 percent opacity (or Ringelmann 2.0) shall be repaired immediately, and USFWS, CDFW, and BAAQMD shall be notified within 48 hours of identification of noncompliant equipment. A visual survey of all in-operation equipment shall be made at least weekly, and a monthly summary of the visual survey results shall be submitted throughout the duration of the project, except that the monthly summary shall not be required for any 30-day period in which no construction activity occurs. The monthly summary shall include the quantity and type of vehicles surveyed as well as the dates of each survey. BAAQMD and/or other officials may conduct periodic site inspections to determine compliance.
- USFWS and the State Coastal Conservancy (SCC) shall provide a plan for approval by BAAQMD demonstrating that the heavy-duty (more than 50 horsepower) off-road vehicles to be used in the construction project, including owned, leased, and subcontractor vehicles, would achieve a project-wide fleet average 45 percent particulate reduction compared to the most recent California Air Resources Board (CARB) fleet average. Acceptable options for reducing emissions may include use of late-model engines, low-emission diesel products, alternative fuels (e.g., Lubrizol, Puri NOx, biodiesel fuel) in all heavy-duty off-road equipment.
- USFWS and the SCC shall require in construction plans and specifications that the model year of all off-road construction moving equipment shall not be older than 1996.

- USFWS and the SCC shall require in construction plans and specifications a provision that prohibits contractors from operating pre-1996 heavy-duty diesel equipment on forecast Spare-the-Air Days or on days when air quality advisories are issued because of special circumstances (e.g., wildfires, industrial fires).
- USFWS and the SCC shall minimize idling time to 5 minutes for all heavy-duty equipment when not engaged in work activities, including on-road haul trucks while being loaded or unloaded on-site.
- Staging areas and equipment maintenance activities shall be located as far from sensitive receptors as possible.

In addition, where feasible and applicable, USFWS and the SCC shall do the following:

- Establish an activity schedule designed to minimize traffic congestion around the construction site.
- Periodically inspect construction sites to ensure construction equipment is properly maintained at all times.
- Require the use of low-sulfur fuel (diesel with 15 parts per million or less).
- Utilize United States Environmental Protection Agency (EPA)-registered particulate traps and other appropriate controls to reduce emissions of diesel particulate matter and other pollutants at the construction site.

SBSP Mitigation Measure 3.14-3b: Health and Safety Plan

The landowners and/or their contractors shall prepare a Health and Safety Plan that includes project-specific monitoring procedures and action levels for dust. The portion of the plan that relates to the control of toxic contaminants contained in fugitive dust shall be prepared in coordination with BAAQMD. The recommendations of BAAQMD to prevent the exposure of sensitive receptors to levels above applicable thresholds (probability of contracting cancer for the Maximally Exposed Individual [MEI] that exceeds 10 in one million or if ground level concentrations of non-carcinogenic contaminants result in hazard index greater than one for the MEI) shall be implemented. The Health and Safety Plan, applicable to all excavation activities, shall establish policies and procedures to protect workers and the public from potential hazards posed by hazardous materials (including notification procedures to nearby sensitive receptors within 1,000 feet informing them of construction activities that may generate dust containing toxic contaminants). The plan shall be prepared according to federal and California Occupational Safety and Health Administration (OSHA) regulations. The landowners and/or its contractors shall maintain a copy of the plan on-site during construction activities.

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