South Bay Salt Pond Restoration Project, Phase 2 404(b)(1) Compliance Review

Prepared for the U.S. Fish and Wildlife Service, Don Edwards San Francisco Bay National Wildlife Refuge, and California State Coastal Conservancy, for submission to the U.S. Army Corps of Engineers, San Francisco District

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Acronyms and Other Abbreviations

AAC	All-American Canal
ABA	Architectural Barriers Act
ADA	Americans with Disabilities Act
AMP	Adaptive Management Plan
APE	Area of Potential Effect
Bay	San Francisco Bay
BA	Biological Assessment
Basin Plan	*Water Quality Control Plan for the San Francisco Bay Region*
BCDC	San Francisco Bay Conservation and Development Commission
BMP	best management practice
BO	Biological Opinion
Cargill	Cargill Incorporated
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
Coastal Conservancy	California State Coastal Conservancy
DO	dissolved oxygen
EFH	Essential Fish Habitat
EIS/EIR	Final 2007 Environmental Impact Statement/Environmental Impact Report
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
Guidelines	*Guidelines for Specification of Disposal Sites for Dredged or Fill Material*
LEDPA	Least Environmentally Damaging Practicable Alternative
mg/L	milligrams per liter
MHW	Mean High Water
MHHW	Mean Higher High Water
MLD	Most Likely Descendant
MOA	memorandum of agreement
NAVD88	North American Vertical Datum of 1988
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
O&M	operations and maintenance
PG&E	Pacific Gas and Electric Company
ppm	part(s) per million
Project	South Bay Salt Pond Restoration Project
QAPP	Quality Assurance Program Plan
Refuge	Don Edwards Regional National Wildlife Refuge
ROD	USFWS Record of Decision
RWQCB	Regional Water Quality Control Board
SBSP	Phase 2 South Bay Salt Pond
SCC	California State Coastal Conservancy
SCVWD	Santa Clara Valley Water District
SHPO	State Historic Preservation Officer
South Bay	South San Francisco Bay
SR	State Route
SWPPP	Stormwater Pollution Prevention Plan
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service

1 PROJECT SUMMARY

The California State Coastal Conservancy (SCC, Coastal Conservancy), California Department of Fish and Wildlife (CDFW), and U.S. Fish and Wildlife Service (USFWS) are working with the Santa Clara Valley Water District (SCVWD), the U.S. Army Corps of Engineers San Francisco District (USACE), and a local Stakeholder Forum to develop a long-term restoration, flood management, and public access plan for the South Bay Salt Pond (SBSP) Restoration Project (Project). When completed, the Project will restore 15,100 acres of commercial salt ponds purchased from Cargill, Incorporated (Cargill) in March 2003 to a mix of tidal wetlands and other habitats, using funds from the state and federal governments and private foundations. The Project will be implemented through specific adaptive management actions anticipated to extend over a period of 50 years, resulting in the restoration of 6,800–11,880 acres of tidal habitat.

The Phase 1 actions previously permitted by USACE, the U.S. Environmental Protection Agency (EPA), and other agencies have been completed. The Project has since moved on to the design, planning, and regulatory processes for Phase 2. The current permit request is for a subset of the Project area identified as the “Phase 2 actions.” Activities associated with the Phase 2 actions include tidal habitat restoration, reconfiguration and enhancement of some former salt ponds to managed ponds, flood management, and recreation/public access activities.

Unlike the Phase 1 actions, the Phase 2 actions are being planned and implemented independently at those lands owned by CDFW (the Eden Landing pond complex) and the lands owned by USFWS (the Alviso and Ravenswood pond complexes, part of the Don Edwards San Francisco Bay National Wildlife Refuge [Refuge]). This document describes and requests approval of Phase 2 actions only for portions of the USFWS-owned Alviso and Ravenswood pond complexes. Phase 2 actions at CDFW’s Eden Landing pond complex will be permitted separately in the coming months.

The purposes of the Phase 2 Project actions are to:

1) restore and enhance a mix of wetland and other habitats;

2) provide wildlife-oriented public access and recreation; and

3) maintain or improve flood management in those portions of the South San Francisco Bay (South Bay) that are near the Phase 2 areas.

Restoration of the South Bay salt ponds will create habitat for marsh-dependent fish and wildlife, improve water quality, avoid increasing the risk of local flooding, and open up new areas in the Southern San Francisco Bay (South Bay) for marsh-oriented recreation and public access. The Phase 2 actions covered under this permit application have the same purposes as the larger Project: restoration, recreation, and flood management. In contrast with Phase 1 actions, which were chosen because they did not require extensive flood control activities, the Phase 2 actions necessarily involve some flood protection measures and the concordant modifications to the existing landscape. The Phase 2 actions also draw from and apply the lessons learned from the Phase 1 actions, the ongoing applied studies, and findings of the Adaptive Management Plan (AMP). Phase 2 is the next step in the successful implementation of the ongoing Project.

As described in greater detail below, the purposes of fill placement for the Phase 2 actions are to create habitat for listed species (i.e., nesting islands, managed ponds, and tidal habitat), create habitat transition zones for a variety of purposes, and provide necessary flood protection. These are all essential aspects of the Project. Therefore, any actions that do not include at least some amounts of fill would clearly not meet the goals of the Project. Similarly, taking no action would not allow restoration of tidal marshes, enhancement of habitat, or maintenance and improvement of flood protection and would not achieve the Project's purpose.

The actions required for the Phase 2 portion of the Project have been designed to require the least possible placement of fill within USACE jurisdiction while still achieving the Project's goals for this phase. Any impacts (e.g., fill placement to create nesting islands) are done to create or enhance habitat for listed species, to optimize restoration activities, or to provide sufficient flood protection to allow the restoration processes to proceed; environmental benefits would result from implementing restoration.

This document does not present an exhaustive treatise on design alternatives for each proposed Phase 2 action. Nonetheless, it is important to understand that such an analysis has already occurred as part of the environmental impact statement/environmental impact report (EIS/EIR) review for the Project, and as part of the preliminary design review process. All activities proposed for the Phase 2 actions have been specifically chosen to minimize fill placement within USACE jurisdiction while still attaining Project goals.

Ponds associated with the Project are widely distributed throughout the south and east San Francisco Bay (the Bay) areas of north-central California (Figure 1). The Phase 2 Project's action area encompasses two pond complexes (Alviso and Ravenswood) and neighboring sloughs and waterways, recreation areas within those complexes and in neighboring city parks, portions of the Bay, associated wetlands, and adjacent fringing marshes and mudflats (Figure 2).

The Project will create or enhance a mix of restored tidal habitats and managed pond habitats. The tidal habitats will include salt and brackish marsh, mudflats, subtidal flats and channels, and habitat transition zones between marsh and uplands. (These features are also referred to in other documents as "ecotones," "horizontal levees," or "upland transition zones.") The managed pond habitats will be fewer in Phase 2 than in Phase 1. These habitats will include water control structures and pond reconfiguration to allow water regime management and operation of ponds with a variety of depths (including seasonally dry salt pannes, very shallow ponded areas, and deep-water areas) at appropriate salinities. As proposed, the Phase 2 Project actions would also involve improving levees, building habitat islands, and excavating channels to add aquatic habitat connectivity.

It is expected that the implementation of the proposed Phase 2 Project activities will be funded by a variety of sources, including, but not limited to: private foundations, local governmental sponsors, grants, bonds and appropriations, and other projects requiring mitigation.

Several other studies pertinent to this application were considered and reviewed during previous Project planning stages, and others specific to Phase 2 were developed and used, including:

- *South Bay Salt Pond Restoration Project Final Environmental Impact Statement/Report (for Program and Phase 1 document)* (EDAW et al. 2007);
- Phase 1 permitting documents, including:
    - Federal Endangered Species Act (ESA) Biological Assessments (H. T. Harvey 2008a, 2008b, 2008c, 2008d, 2008e, 2008f, 2008g, 2008h);
    - Section 404 Individual Permit application (H. T. Harvey 2008i);

    - Section 401 Water Quality Certification (Brown & Caldwell et al. 2008); and
    - *Section 404(b)(1) Alternatives Analysis Report for Phase 1 Actions* (H. T. Harvey et al. 2007);

- Invasive *Spartina* Control Program planning and implementation documents (CSCC and USFWS 2003);
- *Waste Discharge Requirements and Water Quality Certification Application to the California Regional Water Quality Control Board, San Francisco Bay Region* (Brown and Caldwell et al. 2008) and:
    - *RWQCB Order No. R2-2008-0078* (San Francisco Bay RWQCB 2008);
- *Preliminary Design Memoranda for Phase 2 Actions* (AECOM 2016a);
- *South Bay Salt Pond Restoration Project Environmental Impact Statement/Environmental Impact Report for Phase 2* (AECOM 2016b);
- *Phase 2 Alternatives Development and Screening Report* (AECOM 2013); and
- *Phase 2 Delineation of Jurisdictional Wetlands, Update* (AECOM 2016c).

2 PROJECT BASIC PURPOSE

The basic purpose of the SBSP Restoration Project (Project) as a whole has three parts:

1) Restore and enhance a mix of wetland habitats;

2) Provide wildlife-oriented public access and recreation; and,

3) Maintain or improve the current flood management in the South Bay.

The Project proposes to restore a mosaic of tidal and managed-pond habitats over a 15,100-acre footprint. The Project aims to do so through multiphase implementation at distinct groups of ponds and their surroundings.

The basic purpose of the Phase 2 Project is identical to that of the overall Project, and has the same three components, but pursues them at the four specific groups of ponds discussed in Section 3, “Project Description.” The purpose of the proposed Phase 2 actions is to restore a mosaic of habitats, including tidal marsh, mudflat, salt panne, and open water habitats (managed ponds), to support populations of fish and wildlife, special-status species, migratory waterfowl, shorebirds, and anadromous and resident fishes.

The Project is needed because historical losses of marsh ecosystems around the Bay have resulted in only approximately 10% of the original marshes to remain. Several animal and plant species native to California, including the salt marsh harvest mouse (*Reithrodontomys raviventris*) and the California Ridgway’s rail (*Rallus longirostris obsoletus*), have been listed as endangered on State and Federal lists because of the severe reduction of wetland habitats around the Bay. Public acquisition of the former Cargill salt ponds provides an opportunity to restore tidal marshes and associated habitats on a relatively large scale within the Bay system. These ponds will continue to provide good habitat for various types of birds.

Public access and recreation elements are important to the overall restoration strategy because of their role in educating the public, achieving regional public access and recreation goals (e.g., for the Bay Trail), and building public support for future restoration phases in this Project and generally. The Project’s goals of habitat creation and public access are being carefully balanced, and an adaptive management approach is being implemented to ensure that public access does not substantially affect the Project’s habitat goals.

3 PROJECT DESCRIPTION

The current application addresses only the Phase 2 actions portion of the larger SBSP Restoration Project. This alternatives analysis and associated permit request covers restoration and recreation actions included in Phase 2 actions of the Project, at the following locations:

- Ponds A19 and A20, known (with Pond A21) as the Alviso-Island Ponds;
- Ponds A8 and A8S, known as the Alviso-A8 Ponds;
- Ponds A1 and A2W, known as the Alviso–Mountain View Ponds; and,
- Ponds R3, R4, R5, and S5, known as the Ravenswood Ponds.

Phase 2 also includes public access and recreation features, including trails and viewing platforms, as well as levee enhancements. The ponds noted above were the locations of most of the construction activity and changes in pond management proposed for Phase 1 actions. As was the case for Phase 1, the proposed Phase 2 actions were selected based on the following criteria:

- likelihood of success,
- ease of implementation,
- feasibility for rapid habitat development,
- visibility and accessibility,
- protection of existing infrastructure,
- value in building support for the Project,
- available funding,
- certainty of investment, and,
- opportunities to inform future phases through adaptive management.

In Phase 2, the criteria also include the implicit goal of progressing toward restoring a minimum of 50% of the total Project area to tidal marsh.

To some degree, the landscape after implementation of Phase 1 shaped the choice of ponds included in Phase 2 and actions to be taken. Phase 1 was a test phase for the remainder of the Project. Phase 1 specifically tested the breakup of calcines for marsh restoration, the utility of bird islands, rates and types of mercury mobilization, and salinity management. It also established new empirical evidence for rates of sediment accretion and marsh development. The results of studies conducted during Phase 1 guided the design and selection of Phase 2 activities, which will be similarly studied to shape work on future Project phases.

3.1 Technical Project Description

The full Technical Project Description for Phase 2 is presented in Appendix A. Accompanying that narrative are Figures 3–6, which show the location of each design feature in the Project area. Engineering design drawings are presented in Appendix B. Tables 4 and 5 in Section 5.2, “Fill and Excavation Activities Proposed to Be Conducted in Waters of the United States,” summarize the extent of excavation and fill activities for each proposed Phase 2 improvement. Engineer-quantified impacts, therefore, include all Project impacts. The impacts described below include only impacts to USACE jurisdictional areas (Figures 7 and 8). USACE jurisdictional impact acreages, volumes, and linear feet for Phase 2 actions were obtained by digitizing proposed features (as described in the Design Memorandum for each pond cluster) onto the jurisdictional waters within the defined Project boundaries (Figure 9). The 2016 Updated

Wetland Delineation is presented in Appendix C. The impacts from these actions were generally quantified to estimate total impacts and are relatively precise. However, it should be noted that the quantities listed in the tables are best estimates only. Because of uncertainty regarding the design and detailed placement of materials, many of the impact assessments are conservative and likely overestimate the impacts.

3.2 Project Location

The Project area is located in the South Bay area of Northern California in San Mateo, Santa Clara, and Alameda Counties (Figures 1 and 2). The Project area as a while consists of three pond complexes, comprising 15,100 acres of former salt ponds and adjacent habitats in the South Bay that USFWS and CDFW acquired from Cargill in 2003. USFWS owns and manages the 8,000-acre Alviso pond complex and the 1,600-acre Ravenswood pond complex (Figures 3 through 6). All of these ponds contain Waters of the U. S. These waters are currently regulated as wetlands and other waters under Section 404 of the Clean Water Act (33 U.S. Code [USC] 1344) (Section 404), and are currently and were historically regulated under Section 10 of the Rivers and Harbors Act of 1899 (33 USC 403) (Section 10) (Figures 7, 8, and 9).

The Alviso pond complex consists of 25 ponds on the shores of the South Bay in Fremont, San Jose, Sunnyvale, and Mountain View, in Santa Clara and Alameda Counties (Figures 2, 3, and 4). The pond complex is bordered by the Palo Alto Baylands Nature Preserve and Charleston Slough on the west; on the south by the City of Mountain View and its Shoreline Park, Moffett Naval Air Station, the City of Sunnyvale and its Baylands Park, and the City of San Jose and its Alviso community; and to the east by Coyote Creek and New Chicago Marsh. Phase 2 actions in the Alviso complex would take place at the three groups of Alviso ponds (referred to as pond clusters) named in the bullet list at the beginning of Section 3.

The Ravenswood pond complex consists of seven ponds on the Bay side of the San Francisco Peninsula, along both sides of State Route (SR) 84 west of the Dumbarton Bridge, and on the bayside of the developed areas of the City of Menlo Park in San Mateo County (Figures 2 and 6). The City of Menlo Park's Bedwell Bayfront Park is directly west of the pond complex, and the Dumbarton Bridge approach on SR 84 is along its southern border. Phase 2 actions would occur in the western half of this pond complex, at the ponds listed above.

3.2.1 General Phase 2 Activities

3.2.1.1 Tidal Marsh Restoration

Restoring tidal habitat would include the following construction activities, not all of which are planned to be implemented at all Phase 2 ponds:

- breaching sections of outboard levees or widening existing breaches;
- lowering and removing sections of outboard levees;
- breaching or removing internal levees;
- raising and improving internal and external levees to maintain current levels of flood protection;
- armoring and bridging certain breaches to retain vehicle access;
- excavating pilot channels to sloughs through the existing fringing marsh outboard of levee breaches;

- excavating pilot channels inside of ponds to improve filling and draining;
- constructing ditch blocks in the internal borrow ditches with material excavated from the levee breaches and lowered levees, or from other clean sediment;
- importing and placing fill material from off-site upland excavation projects;
- building habitat islands;
- building habitat transition zones between pond bottoms and adjacent uplands or levees; and,
- removing or abandoning existing water control structures or other derelict salt works infrastructure.

3.2.1.2 Managed Pond Enhancement

Establishing or enhancing the habitat in managed ponds would include the following construction activities, not all of which may be used at a given pond:

- building habitat transition zones between pond bottoms and adjacent uplands or levees;
- building habitat islands;
- excavating and grading pond bottoms to achieve desired grades and elevations;
- installing water control structures to allow management of water depths, salinity, and other elements of water quality; and,
- raising and improving internal and external levees to maintain current levels of flood protection.

3.2.1.3 Public Access and Recreation

Installing or upgrading public access and recreation components would include the following construction activities, not all of which may be used at a given pond:

- constructing several miles of new trail, most of which would be spur trails off of the Bay Trail spine;
- constructing three viewing platforms with benches and interpretive panels and signage;
- reconstructing existing portions of the existing Bay Trail and other existing public access features that would be disturbed by construction; and,
- ensuring compliance of trails and viewing platforms with requirements of the Americans with Disabilities Act (ADA) and the Architectural Barriers Act (ABA).

3.2.2 Phase 2 Actions by Location

The Phase 2 actions of the Project include tidal habitat restoration, managed pond enhancement, and construction of public access/recreation features. The habitats to be restored or enhanced by the Phase 2 actions include a mix of managed pond habitats and restored tidal habitats. Details of each of these actions are provided in summary narrative form in the following text and Table 1, and in the selected alternative maps and design plan figures provided (Figures 3 through 6, Appendix B).

Phase 2 does not explicitly include the types of monitoring and applied studies that were permitted in Phase 1, although those activities would proceed as they have been doing.

Table 1. Areas of Phase 2 Project Activities by Pond Cluster

Phase 2 Activities	Wetlands [1] (acres)		Other Waters of the U.S. [2] (acres)		Upland [3] (acres)	
	Discharge	Dredge	Discharge	Dredge	Discharge	Dredge
Alviso-Island Ponds (A19 and A20)						
Install ditch blocks	0.22	–	1.00	–	–	–
Levee lowering/removal	--	2.00	--	0.40	--	3.87
Breaching levees	–	0.24	–	0.02	–	0.41
Widen breaches of southern levee	0.60	0.15	0.10	0.05	–	0.10
Beneficually re-used material	2.35		2.35		–	–
Alviso-A8 Ponds (A8 and A8S)						
Construct habitat transition zones	0.91	0	23	0	0.70	–
Alviso–Mountain View Ponds (A1 and A2W)						
Construct habitat transition zones	6.43	–	25.57	–	1.42	–
Build eight to 10 habitat islands	0.00	–	5.10	–	–	–
Raise and improve levees	2.62	0.65	6.23	–	5.04	–
Bridge piles, abutments	0.06	–	0.00	–	0.06	–
Breaching levees	–	0.55	–	0.14	–	0.43
Ravenswood Ponds (R3, R4, R5, S5)						
Excavate channels	–	0.16	–	4.05	–	–
Levee improvement	0.47	0.89	6.55	1.10	10.50	2.06
Build ditch blocks	0.01	–	0.28	–	–	–
Construct habitat transition zones	1.32	0.00	19.03	0.00	3.56	–
Install water control structures	0.10	0.08	0.10	0.08	0.09	–
Breaching levees	–	0.65	–	1.27	–	0.20
Create habitat island	–	–	–	–	1.75	–
TOTALS	**15.09**	**5.37**	**89.31**	**7.11**	**23.12**	**7.07**

Notes:
[1] "Wetlands" include tidal salt marsh, brackish marsh, and freshwater marsh habitats.
[2] "Other waters" include open water and subtidal habitat, former salt production ponds, and mudflat habitat.
[3] "Uplands" include upland/levee habitat.
Source: Data compiled by AECOM in 2017

3.2.2.1 Alviso-Island Ponds (A19 and A20) Tidal Habitat Restoration Enhancement

Alviso Ponds A19 and A20 and the adjacent Pond A21—referred to as the Alviso-Island Ponds—are already open to tidal flows, as they have been since 2006, when they were breached on their southern borders with Coyote Creek. In the Phase 2 actions, the ongoing restoration at Pond A19 and A20 would be enhanced by implementing levee modifications to increase habitat connectivity and complexity, speed the establishment of tidal marsh in the northern and central portions of these ponds, and improve aquatic habitat for fish, while retaining much of the existing levees for high-tide refugia and bird roosts. Pond A21 would not be directly modified by Phase 2 actions; however, some modifications at this pond were considered in the National Environmental Policy Act (NEPA)/California Environmental Quality Act (CEQA) process and eventually selected. Therefore, this pond is named as part of Phase 2 in some previous documents and is shown on the maps.

The construction process and equipment and personnel required for Phase 2 action at the Alviso-Island Ponds are summarized below.

Construction Process

- Transport construction equipment to the site on trucks via existing levee roads and/or via creeks and sloughs on barges (see “Access and Timing” below).
- Lower sections of outboard levees on Ponds A19 and A20 to mean higher high water (MHHW).
- Breach the northern levee of Pond A19 in two locations and the northern levee of Pond A20 at one location to connect them with Mud Slough.
- Remove the existing levees between Ponds A19 and A20 to marsh plain elevation to connect the two ponds to each other.
- Widen the westernmost of the existing breaches on the southern end of Pond A19.
- Utilize material from levee breaches and lowering/removal to construct borrow ditch blocks and otherwise fill borrow ditches.
- Use Best Management Practices (BMPs) such as silt fences, Environmentally Sensitive Area (ESA) fences, and fiber rolls will be used to keep construction equipment in designated areas and prevent impacts to areas not in the designated construction zone.

Equipment and Personnel

- Land-based construction equipment would likely include an excavator, a front-end loader, a bulldozer, a forklift, a vibratory roller, a dump truck, and a water truck, and would depend on the site conditions and design.
- A water truck would be used for dust control on the site as necessary. It is assumed that a water truck would refill three to five times per day, necessitating a drive off-site or the import of water. It may be possible to refill with brackish water from on-site.
- Water-based equipment would include small barges for equipment delivery and access and amphibious excavators to conduct work on the levee slopes.
- Ancillary equipment that would be used includes a diesel generator, a water pump, and a fuel pump.
- Construction would be performed by at least one construction worker team, typically consisting of fewer than a dozen people. More people per team and/or more teams may be used if construction timelines demand that work proceed simultaneously at multiple locations within a

site. This would shorten the construction period and reduce the temporal effects of construction impacts.
- It is assumed that each worker would drive his or her own vehicle each day to a parking area near the site. Access within the Alviso-Island Ponds work area would be provided along existing levees; outside of the work area, travel would occur along maintenance routes and public access roads.
- Mobilization and demobilization of equipment would take place over periods of approximately 25 days each at the beginning and the end of the project.
- Occasional delivery of supplies and materials would be necessary for fueling and water truck refilling. There would potentially be daily deliveries of materials for the duration of construction activities. Equipment would be refueled once per day.

Access and Timing

As shown in the design plan sheets (Appendix B), 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 would be available from levee roads. 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 an unnamed levee road that connects to the northeast corner of Pond A19 via small footbridge. No staging areas are necessary for work at the Alviso-Island Ponds. Equipment used for construction would stay within the project footprint, and no material would be brought into the ponds.

Construction activities are expected to occur for 4 months. As required by permits, the timing of construction (construction window) would avoid impacts to special-status and sensitive species. At all four pond clusters, certain special-status species regulated by USFWS, the National Marine Fisheries Service (NMFS), or CDFW may be affected by construction activities. The presence of these species may limit construction activities or require certain avoidance and minimization measures. The pond cluster–specific special-status species, and the limits and requirements for each species and their habitats, are addressed in the Conservation Measures of the SBSP Restoration Project’s Programmatic and Phase 1 EIS/R and permitting documents. These include the Biological Opinions (BOs) from NMFS and USFWS; the Clean Water Act Section 404 and Section 401 permits from USACE and the San Francisco Bay Regional Water Quality Control Board (RWQCB), respectively; the San Francisco Bay Conservation and Development Commission (BCDC) permit; and others. This overview is provided here as part of the Project design to help frame the construction sequences that follow.

The timing considerations below will be incorporated into detailed designs and Project planning to reduce the potential for adverse impacts and need for mitigation.

- *Bird nesting:* Regulatory work windows for bird nesting typically run from February 1 through September 15. Work occurring within this window would implement approved avoidance and minimization measures including the presence of an approved biological monitor and preconstruction surveys.
- *Steelhead migration:* Activities that may affect upstream migration of adults or downstream migration of juveniles would be avoided to the maximum extent practicable. In-water work that has potential to impact steelhead from December through February (adult upstream migration period) and from April through June (juvenile downstream migration period) would be avoided to the maximum extent practicable. If in-channel work were to be performed during these periods, fish exclusion methods may be implemented, including timing work during low tide cycles to

avoid or minimize potential in-water impacts. If the use of work windows is applicable, the NMFS acceptable work windows for steelhead are June through November.

- Longfin smelt and green sturgeon: There is potential for these species to be present year-round in the San Francisco Bay, therefore seasonal avoidance is not possible.

3.2.2.2 Alviso-A8 Ponds (Ponds A8 and A8S) Managed Pond Enhancement

Alviso Ponds A8, A8S, A5, and A7 were part of Phase 1 activities that breached the internal levees between them in many places to effectively create one large pond. That large pond was also made reversibly muted tidal, through installation of two culverts at the northern end of the ponds to provide managed connections with Alviso Slough and Guadalupe Slough and through installation of a reversible, armored notch that can be opened in 5-foot increments to a maximum of 40 feet. These actions established a large managed pond with enhancements to allow control of water levels, water exchange, and water quality. Other Project Phase 1 documents explain in detail the reasons these reversible and adjustable connections with surrounding waters were necessary and the way in which their operation has proceeded.

In Phase 2, however, the only proposed modification to the Alviso-A8 Ponds is to use fill material from upland excavation projects to construct habitat transition zones in the southwest and southeast corners of what was Pond A8S. As documented elsewhere, habitat transition zones bring a range of benefits by increasing the area over which a range of elevation-specific plant communities can grow and on which wildlife can live and forage. These zones also protect the levees and uplands behind them from erosion, may provide a ramp for marsh adaptation to sea-level rise, and make the aquatic habitat more complex and natural.

The construction process and equipment and personnel required for Phase 2 action at the Alviso-A8 Ponds are summarized below.

Construction Process

- Transport construction equipment to the site on trucks via existing levee roads (see “Access and Timing” section below).
- Import fill material on haul trucks from upland excavation projects to the site via the route described below.
- Place material in piles along the existing levee road and material stockpiles already established and used by SCVWD for similar projects.
- Place material in the habitat transition zone locations and compact to the specified degree.
- Plant native vegetation in appropriate elevational bands to prevent invasive plant species from becoming established.

Equipment and Personnel

- Land-based construction equipment would likely include bulldozers, compaction rollers, haul trucks, and a water truck. Vehicles would also be used to transport crew members in and out of the Project area.
- Construction would be performed by at least one construction worker team, typically consisting of fewer than a dozen people. More people per team and/or more teams may be used if construction timelines demand that work proceed simultaneously at multiple locations within a site. This would shorten the construction period and reduce temporal effects of construction.

- It is assumed that each worker would drive his or her own vehicle each day to a parking area near the site. Access within the Alviso-A8 Ponds work area would be provided along the existing levee-top road; outside of the work area, travel would occur along maintenance routes and public access roads.

Access and Timing

As shown in the design plan sheets (Appendix B), access to the Alviso-A8 Ponds for both workers and equipment/haul trucks would be off of SR 237 via a combination of North First, Hope, Mill, Gold, and Elizabeth Streets. If sufficient quantities of material are available, construction of habitat transition zones would take approximately 12 months over two construction seasons. As required by permits, the timing of construction (construction window) would avoid impacts on special-status and sensitive species, as discussed in Section 3.2.2.1, "Access and Timing," above.

3.2.2.3 Alviso–Mountain View Ponds (Ponds A1 and A2) Tidal Marsh Restoration, Flood Protection, Public Access Feature Addition, and PG&E Infrastructure Improvement

Alviso Ponds A1 and A2W have not been part of any previous Project restoration actions. In Phase 2, these ponds would be opened to tidal flows to begin accreting sediment and eventually reach marsh plain elevation. There would be four breaches in Pond A2W and two in Pond A1. The two breaches in the eastern levee of Pond A2W would be armored and bridged to provide continued Pacific Gas and Electric Company (PG&E) access on that levee road. That levee would also be improved to provide a public access trail as described below.

Because the ponds are a few feet deep now, a decade or more of tidal flows would likely be necessary to reach marsh plain elevation; however, modeling shows that the sediment accretion rate would be high enough to keep pace with sea-level rise. In the meantime, the ponds would become tidal lagoons, a beneficial habitat in its own right. Before breaching, other habitat enhancements, flood control measures, and public access features would be added. The habitat enhancements include the placement of a habitat transition zone and up to five habitat islands in each pond. The transition zones would be similar to those described for the Alviso-A8 Ponds. The islands would initially provide roosting and possible nesting habitat for a variety of bird species, but as the marsh forms around them, they would slowly transition to marsh mounds and provide a different habitat benefit (e.g., high-tide refugia) for marsh-dependent birds and terrestrial wildlife.

The flood control measures include raising the west levee of Pond A1 to keep tidal flows in the ponds from spilling over into the adjacent Charleston Slough (owned by City of Mountain View) and raising the Coast Casey Forebay levee at the southwest corner of Pond A1 to prevent those flows from entering the forebay (which is a stormwater detention basin) or the adjacent neighborhood. Because the City of Mountain View owns the Coast Casey Forebay and its levee, the Project needs to cooperate with that city for this part of Phase 2. Although the city supports the Project, the city is requiring that the improved Coast Casey Forebay levee be raised to a higher elevation than the other levees for which Phase 2 improvements are planned. Those improvements would all be to 11 feet elevation, but this levee would be raised to 14.7 feet elevation, per the City of Mountain View's plan for sea-level rise and the direction of SCVWD. The existing infrastructure in the Coast Casey Forebay levee would be retained and maintenance and service access to the levee would be retained by raising and improving those components as well.

Existing PG&E infrastructure within Pond A2W and just outside of Pond A1 would be raised and improved to remain accessible and serviceable by PG&E staff after implementation of the Phase 2 actions. The infrastructure improvements include raising the elevation of the concrete footings on the legs of each transmission tower within Pond A2W so that the higher tides after breaching would not reach the metal towers' legs. The existing service boardwalks (pedestrian only) within Pond A2W would similarly be rebuilt at a higher elevation so that they too would be above the high tides. In addition, a new section of boardwalk would be built under the existing power line outside of Pond A1. This is because the Pond A1 levee, currently available for PG&E use, would gradually erode after the breaching. This new section of boardwalk would continue to provide access to this section of power line. Finally, as noted above, PG&E needs to retain vehicle access along the eastern and northern levees of Pond A2W, so the two breaches on the east side of that pond would be armored and bridges would be constructed over the breaches to allow occasional service vehicle access.

There would also be a public access trail, approximately 8,380 feet long, on the improved eastern levee of Pond A2W that would end near the northeast corner of that pond. A simple viewing platform would be constructed at the end of that trail, consisting of a more widely graded section of the levee with benches and interpretive signage. On the improved west levee of Pond A1, another public access trail would be built for approximately 480 feet from that levee's intersection with the Coast Casey Forebay levee. Although the levee improvements and Refuge maintenance access would extend beyond this point, the trail would end at a viewing platform at that location. A similar viewing platform would be placed near the southeast corner of Pond A1, alongside the existing Bay Trail spine and within the border of the City of Mountain View's Shoreline Park. Both of these added trails would be spur trails off of the Bay Trail system and would comply with Bay Trail design guidelines to the maximum extent feasible, while remaining consistent with the Refuge's purpose. All of these trails and viewing platforms are illustrated in Figure 5 and the engineering design figures in Appendix B.

The construction process and equipment and personnel required for Phase 2 action at the Alviso–Mountain View Ponds are summarized below.

Construction Process

- Transport construction equipment to the site on trucks via existing levee roads (see "Access and Timing" below).
- Import fill material on haul trucks from upland excavation projects to the site via the route(s) described below.
- Place material in designated stockpile areas and/or within those portions of the ponds that would be filled by a Phase 2 action.
- Raise and improve the existing western levee of Pond A1 by raising it to 11 feet elevation and grading and compacting for stability. The initial material placement would be placed several feet higher than this end destination to account for settlement (i.e., overbuild).
- Raise or otherwise improve existing access to the City of Mountain View's infrastructure already present within and around the Coast Casey Forebay levee. This includes the pump station, the valve vault, and several utility access points for operations and maintenance (O&M) of the water intake and supply system for the Shoreline Park sailing lake.
- Raise and improve the existing Coast Casey Forebay levee to 14.7 feet elevation, and grade and compact for stability. The initial material placement would be overbuilt several feet higher to account for settlement.

- Place material into the habitat transition zone locations and compact to the specified degree; some overbuild is expected.
- Plant native vegetation in appropriate elevational bands to prevent invasive plant species from becoming established.
- Place material into the ponds to construct the habitat islands and compact to the specified degree; some overbuild is expected.
- Improve the existing PG&E infrastructure (boardwalks and concrete tower footings) and add a new PG&E boardwalk. Provide a PG&E turnaround near the northwest corner of Pond A2W.
- Construct a public access trail on the western levee of Pond A1.
- Install cofferdams, bridge abutments, and bridges at two breach locations on the east levee of Pond A2W.
- Improve the levee-top road and construct a public access trail on the east levee of Pond A2W.
- Install viewing platforms, each with benches and signage, at the following three locations: (1) inside Mountain View Shoreline Park near the southeastern corner of Pond A1, (2) at the end of the trail on the west levee of Pond A1, and (3) at the end of the trail on the east levee of Pond A2W.
- Excavate channels from breach locations through existing fringing marshes to connect to waterways.
- Breach perimeter levees at Ponds A1 and A2W.

In addition, as part of breaching activities, the existing water intake into Pond A1, the siphon between Ponds A1 and A2W, and outflow structure from Pond A2W to the Bay are likely to be removed.

All non-PG&E work is planned to be conducted from existing levees and uplands, though barges may be used to place the material for the habitat islands farther from the levees. Any barge used would be assembled in the pond after being delivered on trucks; no channel dredging or external aquatic disturbance would occur. No other watercraft-based work is planned. The PG&E infrastructure work would be performed from the replaced boardwalks as those improvements are being made.

Equipment and Personnel

- Land-based construction equipment would likely include excavators, dump trucks, compaction rollers, bulldozers, haul trucks, water trucks, refueling tanks, pile-driving equipment, sheet piles, and pumps. Cranes may be used to place the bridges. Vehicles would also be used to transport crew members in and out of the Project area. PG&E would use wheelbarrows, hammers, and other hand-operated equipment for the work on its infrastructure; PG&E may also use helicopters for material delivery.
- Construction crews would typically consist of fewer than a dozen people. It is assumed that each worker would drive his or her own vehicle each day to a parking area nearby the site. Access within the Alviso–Mountain View Ponds work area would be provided along the existing levee-top roads and adjacent uplands within Shoreline Park; outside of the work area, travel would occur along maintenance routes and public access roads.

Access and Timing

As shown in the design plan sheets (Appendix B), primary access to the Alviso–Mountain View Ponds would be from U.S. Highway 101 and any of several local roads, including North San Antonio Road or Shoreline Boulevard. The exact route(s) used for material delivery are subject to modification based on

City of Mountain View requirements for traffic control, Shoreline Park activities, and burrowing owl protection. The Project would develop the final haul routes in consultation with the City of Mountain View's traffic engineers to minimize potential traffic impacts. Heavy vehicles would avoid crossing structures in the levees if the vehicles exceed the weight-bearing capacity. If this is not possible, engineer-approved precautions would be taken to avoid damaging the structures.

Earthwork activities would be sequenced so that activities that would be efficient and feasible 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 internal pond activities are completed. Habitat islands and habitat transition zones would be constructed before breaching of the perimeter levees. Construction would likely be completed in approximately 29 months over four construction seasons.

Construction could occur simultaneously at both ponds or at each pond sequentially. The activities could also proceed independently with multiple crews. As required by permits, the timing of construction (construction window) would avoid impacts on special-status and sensitive species, as discussed in Section 3.2.2.1, "Access and Timing," above.

3.2.2.4 Ravenswood Ponds (R3, R4, R5, and S5) Tidal Marsh Restoration and Managed Ponds Enhancement, Flood Protection, and Public Access Feature Addition

Within the larger Ravenswood pond complex, some Phase 1 actions were taken at Pond SF2 and within the City of Menlo Park's Bedwell Bayfront Park. However, the western half of the Ravenswood pond complex was not part of Phase 1 or any other previous restoration actions. Phase 2 would address the four ponds in the western half of the complex—Ponds R3, R4, R5, and S5—in a mix of tidal marsh restoration and reconfiguration of enhanced managed ponds. In addition, improvements would be made to some of the internal levees for flood protection and several public access features would be added.

More specifically, Pond R4 would be breached to open it to tidal flows. Because the pond bottom elevation is much closer to tidal marsh plain elevation than the ponds at the Alviso pond complex, this marsh restoration is expected to occur sooner. To further facilitate this transition, a channel would be excavated through the fringing marsh between Ravenswood Slough and Pond R4. A similar pilot channel would be dug within the pond, and ditch blocks would be placed within the borrow ditches near the breach location and would be filled to deliver tidal flows into the pond's interior. Further, a section of the northern levee of Pond R4 would be lowered to allow occasional overtopping and improve habitat connectivity between this forming marsh and existing marsh habitat at Greco Island.

The existing levees around the All-American Canal (AAC) (between Ponds R3 and R4) and along the eastern edge of Ponds R5 and S5 would be raised and improved to offset the loss of flood risk management that would occur by opening Pond R4 to the tides. Two habitat transition zones would then be built into Pond R4; these would be larger than but similar in design and intent to the ones described above for the other pond clusters.

Pond R3 would be enhanced with two water control structures to allow better management of the water levels, quality, and timing of the water that collects in the borrow ditches and slough traces within this pond. Ponds R5 and S5 would also receive water control structures to provide managed connections with Ponds R4 and R3 and with the adjacent Flood Slough. These ponds would also be reconfigured to connect them to each other and slightly deepened to make them more suitable as managed ponds with shallow to moderate depths.

Finally, a public access trail and viewing platform would be built along the improved eastern levees of Ponds R5 and S5. The viewing platform would be at a location where the levee meets the improved AAC levee, providing a view of three different restoring or enhanced habitats from a single vantage point.

The construction process and equipment and personnel required for Phase 2 action at the Ravenswood Ponds are summarized below.

Construction Process

- Transport construction equipment to the site on trucks via existing levee roads (see “Access and Timing” below).
- Import fill material on haul trucks from upland excavation projects to the site via the route(s) described below.
- Place material in designated stockpile areas and/or within those portions of the ponds that would be filled by a Phase 2 action.
- Raise and improve the existing levees around the AAC by raising them to 11 feet elevation and grading and compacting for stability. The initial material placement would be placed several feet higher than this end destination to account for settlement (i.e., overbuild).
- Raise and improve the existing levee between the Ponds S5/R5 group and Ponds R3 and R4 by raising them to 11 feet elevation and grading and compacting for stability. The initial material placement would be placed several feet higher than this end destination to account for settlement (i.e., overbuild).
- Construct a public access trail (approximately 2,750 feet long) on the improved levee on the eastern border of Ponds R5 and S5.
- Install a viewing platform with benches and signage at the approximate midpoint of the trail on the improved eastern levees along Ponds R5 and S5.
- Place material into the habitat transition zone locations and compact to the specified degree; some overbuild is expected.
- Plant native vegetation in appropriate elevational bands to prevent invasive plant species from becoming established.
- Excavate Ponds R5 and S5 and remove the interior levees at this pond group, leaving some material in place to construct the habitat island.
- Install cofferdams, dewater, and then install water control structures at four locations. One of these locations, between Pond S5’s forebay and Flood Slough, would require coordination with City of Menlo Park to allow for excavation and subsequent rebuilding of the entry road into the city’s Bedwell Bayfront Park.
- Lower the levee along the northwest edge of Pond R4 to MHHW.
- Use the material from levee lowering to construct ditch blocks in the interior borrow ditches of Pond R4.
- Excavate pilot channels within Pond R4 to direct tidal flows into the interior of the pond.
- Excavate channels from the breach locations through existing fringing marshes to connect to waterways.
- Breach the perimeter levee at the northeast corner of Pond R4.

All work is planned to be conducted from existing levees and uplands; no barge- or other watercraft-based work is planned.

Equipment and Personnel

- Land-based construction equipment would likely include excavators, dump trucks, compaction rollers, bulldozers, haul trucks, water trucks, refueling tanks, pile-driving equipment, sheet piles, and pumps. Cranes may be used to place the bridges. Vehicles would also be used to transport crew members in and out of the Project area.
- Construction crews would typically consist of fewer than a dozen people. It is assumed that each worker would drive his or her own vehicle each day to a parking area near the site. Access within the Ravenswood work area would be provided along the existing levee-top roads and adjacent uplands within Bedwell Bayfront Park; outside of the work area, travel would occur along maintenance routes and public access roads.

Access and Timing

As shown in the design plan sheets (Appendix B), primary access to the Ravenswood Ponds would be from U.S. Highway 101 on Marsh Road and/or SR 84. The exact route(s) used for material delivery into the Ravenswood Ponds is/are subject to modification because of City of Menlo Park requirements for traffic control and Shoreline Park activities. The Project will develop the final haul routes in consultation with the City of Menlo Park's traffic engineers and park management to minimize potential traffic and recreation impacts. Heavy vehicles would avoid crossing structures in the levees if the vehicles exceed the weight-bearing capacity. If this is not possible, engineer-approved precautions would be taken to avoid damaging the structures.

Earthwork activities would be sequenced such that activities that would be efficient and feasible 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 internal pond activities are completed. Habitat islands and habitat transition zones would be constructed before breaching of the perimeter levees. Construction would likely be completed in approximately 16 months over two construction seasons. As required by permits, the timing of construction (construction window) would avoid impacts on special-status and sensitive species, as discussed in Section 3.2.2.1, "Access and Timing," above.

3.2.3 Operations, Maintenance, and Management Activities

Operations, management, and maintenance activities would be performed periodically for all Project facilities, including reconfigured and managed ponds, recreational/public access facilities, and (less frequently) tidal habitat restoration. In general, operations, maintenance, and management actions are not specific to Phase 2. Many of the activities would take place regardless of Phase 2 implementation, although the locations, timing, and frequency of those activities may differ from current practices following Project completion.

These activities are currently being performed by Refuge staff and other researchers and technical assistants in ways described in the various programmatic and Phase 1 permits and the 2007 EIS/EIR for the Project as a whole. Further, the Refuge's levee O&M permit governs many of the activities that are most relevant to USACE and EPA and their shared purview over fill and other impacts Waters of the U.S. These activities would include import and placement of fill (e.g., riprap, upland dirt, dredged material) as preventative maintenance to prevent unplanned breaching, overtopping, or other types of levee failures, as well as repairs to these sorts of failures.

As at the City of Mountain View, the Refuge, and other landowners where appropriate, may assume responsibility for the operations, management, and maintenance activities of specific Project elements on their lands (e.g., the Coast Casey levee or parking lot improvements at Bayfront Park). Programmatic permits have been issued by the relevant agencies for these activities and related impacts and avoidance and minimization measures in a general way. The Phase 2–specific versions of these permits would be sought for the locations and activities that are applicable to Phase 2. The levees, managed ponds, water control structures, bridges, trails, and other aspects of the Phase 2 project would then be routinely operated and maintained according to the protocols described in those permits and the BOs.

These Phase 2 maintenance activities would include the following:

- Repairing, grading, or otherwise shoring up levees that would be raised and improved as part of Phase 2.
- Operating water control structures to achieve the goals for which each of them was installed. These include:
  - Periodic (generally monthly to seasonal) opening and closure of the outermost structure in Pond R3, where it meets Ravenswood Slough, to improve the quality of water in the borrow ditches and slough channels.
  - More frequent (approximately weekly, but potentially more as needed) opening and closure of the three water control structures that connect Ponds R5, S5, and the S5 forebay to (respectively) Pond R4, Pond R3, and Flood Slough. The operation here would be to manage the R5/S5 pond group as shallow-water (~2- to 4-foot-deep) pond habitat for small shorebirds and dabbling ducks. This would require seasonal variations in water levels, and regular circulation or flushing of the ponds with tidal water from Pond R4 and Flood Slough would be necessary to retain appropriate water quality. They would be operated as needed to provide the flows. Water could also be discharged out of all three of these water control structures as needed.
- Cleaning and repairing water control structures as needed to maintain functionality.
- Resurfacing and grading trails as necessary to retain safe public access in compliance with the ABA and ADA.
- Removing invasive plant species from habitat transition zones.
- Occasional resurfacing or re-elevating habitat islands as needed to continue to provide the intended habitat values.
- Inspecting and repairing as needed the bridges over the breaches on the east levee of Pond A2W to the standards required for public access.
- Cleaning and/or repairing benches, signage, and other viewing platform features.
- Closing gates to prevent pedestrian access where it is prohibited, and keeping the gates locked except for maintenance access. Other gates are expected to be closed only if public access is adversely affecting a sensitive species.
- Monitoring ongoing conditions of Phase 2 features, including invasive species on habitat transition zones, islands, or levees; fish, bird, and other wildlife use of Phase 2 features; sediment accretion rates; and mosquito larvae formation.

PG&E would maintain its boardwalks, towers, and power lines in accordance with its existing permitted practices; there would be no Phase 2–specific changes.

3.2.4 Mitigation Measures

In developing the 2007 EIS/EIR for the Project, USFWS and CDFW (then known as the California Department of Fish and Game) developed program-wide comprehensive mitigation measures that could be expanded into actions when designing the project-level phases to implement the 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/EIR. 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, the project-level EIS/EIR followed that practice and will implement those measures as standard parts of the Project designs.

This section presents the mitigation measures from the 2007 EIS/EIR that are common to and relevant to the Phase 2 alternatives and that were therefore included in the project-level EIS/EIR for Phase 2. These measures have been incorporated into the Project design for all action/Project alternatives; they are thus part of the Phase 2 Project and not actually “mitigation measures.” These measures have been slightly edited for relevance to Phase 2 actions and to make them specific to the portions of the Phase 2 area that are within the Refuge (e.g., references to Eden Landing have been removed).

In addition, a new Phase 2–specific mitigation measure was developed to address traffic delays associated with the import of fill material to the Ravenswood Ponds. That measure is Phase 2 Mitigation Measure 3.11.1, and its text is included at the end of the list of traffic-related mitigation measures in the Phase 2 Project EIS/EIR.

3.2.4.1 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 reuse 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.

3.2.4.2 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. 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.

<u>Site Survey</u>. 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 or the California Register of Historical Resources. 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.

<u>Pre-Construction Contractor Education</u>. 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.

4 PHASE 2 STUDIES AND OTHER DOCUMENTS PROJECT

In addition to the many Project-wide studies and reports and the many program-level and Phase 1–specific permitting and other regulatory documents, the following studies and Phase 2 documents are summarized here for the convenience of the reviewer. Section 7, "References," provides full references for these and other documents that may be useful. Any of these documents can be provided to USACE and EPA upon request, and any issued permits, BOs, or other regulatory agreements will be forwarded to both agencies upon receipt.

4.1 CEQA/NEPA Review

In accordance with both CEQA and NEPA, a joint EIS/EIR specific to the Phase 2 Project was prepared, published, circulated, modified, and finalized in accordance with the Council on Environmental Quality's Regulations for Implementing NEPA (40 Code of Federal Regulations [CFR] 1500–1508) and CEQA (Public Resources Code Section 21000 et seq.). This Phase 2 EIS/EIR tiered from the programmatic portion of a 2007 EIS/EIR, which included the NEPA/CEQA review and clearance for the overall multiphase Project and for the Phase 1 actions.

USFWS was the Federal lead agency and the Coastal Conservancy was the State lead agency for the Phase 2 EIS/EIR. The Coastal Conservancy approved and adopted the Final EIS/EIR in May 2016. USFWS cannot make final approval of the EIS/EIR and complete the Record of Decision (ROD) until after the issuance of the Phase 2 BOs, but the ROD has been drafted and is currently in review. All other NEPA and CEQA processes for Phase 2 are complete.

The appendices to that EIS/EIR included several relevant to this document. One appendix was the 2013 jurisdictional delineation report discussed below. Another was a report on the process of developing and screening individual components for inclusion in one or more Phase 2 alternatives. Another contained a report on the process by with the Project's lead agencies, landowners, and lead funding entities selected the individual ponds that would be included in consideration for the Phase 2 project actions. Other appendices included preliminary design memoranda with design details for each pond cluster. Subsequent to the EIS/EIR, the designs for the selected Preferred Alternative have been developed in more detail, sufficient to support the various permitting and other regulatory processes.

4.2 Delineation of Jurisdictional Waters of the United States

A delineation of jurisdictional wetlands and other Waters of the United States in the Phase 2 project area was conducted in summer 2013, and the report on that delineation was submitted to USACE in summer 2016. Figures 7–9 show the extent and distribution of potentially jurisdictional Waters of the U.S. within the defined study area boundaries at the Phase 2 pond clusters. This mapping was done using photo-interpretation of high-resolution aerial imagery and subsequent site reconnaissance to ground-truth the interpretation of the imagery. The areas of historic and current Section 10 and Section 10/404 wetlands and other (non-wetland) Waters of the U.S. illustrated in those figures are presented in Tables 2 and 3. Based on that analysis, a total of 583.1 acres of potentially jurisdictional wetlands and 2,469.6 acres of other Waters of the U.S. were identified within the study area (Figure 7). In addition, 477.0 acres of historic Section 10 Waters and 2,083.2 acres of current Section 10 Waters were identified (Figure 8).

Existing outboard waters including Mud Slough, Coyote Creek, Guadalupe River/Alviso Slough, Guadalupe Slough, Stevens Creek/Whisman Slough, Permanente Creek/Mountain View Slough, Charleston Slough, Ravenswood Slough, West Point Slough, Flood Slough, and the Bay were identified as estuarine, intertidal, emergent, regularly flooded, or estuarine, intertidal, unconsolidated shore, regularly flooded habitat. Upland areas, primarily levees, roads, closed landfills, and city parks, are also shown in the map figures (Figures 7 and 8).

Table 2. Areas of Jurisdictional Wetlands and Other Waters of the U.S.

Section 404 Features in the Project Area	
Pond Complex	**Area (acres)***
Wetlands	
Alviso-Island Ponds	301.7
Alviso-A8 Ponds	50.3
Alviso–Mountain View Ponds	147.1
Ravenswood Ponds	84
Total acres of wetlands	*583.1*
Other Waters of the U.S.	
Alviso-Island Ponds	386.3
Alviso-A8 Ponds	589.6
Alviso–Mountain View Ponds	846.8
Ravenswood Ponds	646.9
Total acres of other Waters of the U.S.	*2,469.60*
TOTAL OF POTENTIALLY JURISDICTIONAL SECTION 404 FEATURES	**3,052.70**

*The sums of wetlands and other waters features may not add up to the total exactly due to rounding.
Source: Data compiled by AECOM in 2017

Table 3. Current and Historic Section 10 Waters in the Project Area

Historic and Current Section 10 Waters in the Study Area		
Pond Complex	**Section 10 Waters**	**Area (acres)***
Alviso-Island Ponds	Historic	98.2
Alviso-A8 Ponds	Historic	26.5
Alviso–Mountain View Ponds	Historic	174.7
Ravenswood Ponds	Historic	177.5
Total acres of historic Waters		**477**
Alviso-Island Ponds	Current	554.2
Alviso-A8 Ponds	Current	622.6
Alviso–Mountain View Ponds	Current	892.4
Ravenswood Ponds	Current	14
Total acres of current Waters		**2,083.20**

*The sums of waters features may not add up to the total exactly due to rounding.
Source: Data compiled by AECOM in 2017

4.3 Clean Water Act Section 404 Individual Permit

Concurrent to the preparation of this Alternatives Analysis Report for Section 404(b)(1) of the Clean Water Act, the Project is also preparing an application for an Individual Permit under Section 404. This application will be submitted to the San Francisco District of USACE, and an issued permit is expected in spring 2017. This 404(b)(1) document is a companion to the Section 404 Individual Permit application document and related supplementary files.

4.4 Endangered Species Act Section 7 Consultation

> *Except as provided under Section 404(b)(2), no discharge of dredged or fill material shall be permitted if it jeopardizes the continued existence of species listed as endangered or threatened under the Endangered Species Act of 1973, as amended, or results in the likelihood of the destruction or adverse modification of critical habitat.* (33 CFR Part 230, Section 230.10, Vol. 45, No. 249, 24 December 1980)

Several special-status species are known in the Project vicinity, including six federally listed species: salt marsh harvest mouse (*Reithrodontomys raviventris*), California Ridgway's rail (*Rallus longirostris obsoletus*), western snowy plover (*Charadrius alexandrinus nivosus*), California least tern (*Sterna antillarum browni*), green sturgeon (*Acipenser medirostris*), and Central California Coast steelhead (*Oncorhynchus mykiss*). Programmatic Biological Assessments (BAs) were obtained for the overall Project to be submitted to USFWS and NMFS.

For Phase 2, BAs are being prepared and will be submitted concurrent with this application. BOs from these agencies are expected in summer 2017. These are expected to reach determinations of "Not Likely to Adversely Affect" or "Likely to Adversely Affect but Not Jeopardize" these species. Further, for most of these species, the potential adverse effects would be from short-term construction disturbance or brief exclusions from habitat, with a longer-term expansion of and improvement in suitable habitats.

There are Programmatic BOs for the Project as a whole from both USFWS and NMFS, and these two agencies also issued BOs for the Phase 1 project-level actions. The Phase 1 BAs to request the BOs tiered from the Programmatic BOs, and the Phase 2 BAs will do the same. Those documents are being prepared now. One Phase 2 BA will be submitted to USFWS for the species that are regulated under its purview, and a second Phase 2 BA will be submitted to NMFS for the species it regulates. In accordance with NMFS guidance, the BA to NMFS will also contain Essential Fish Habitat (EFH) consultation under the Magnuson-Stevens Fishery Management and Conservation Act. The BOs and EFH consultation outcomes are expected in summer 2017.

4.5 Clean Water Act Section 401 Water Quality Certification

State Water Quality Standard

> *No discharge of dredged or fill material shall be permitted if it causes or contributes, after consideration of disposal site dilution and dispersion, to violations of any applicable State water quality standard.* (33 CFR Part 230, Section 230.10, Vol. 45, No. 249, 24 December 1980)

One State water quality standard for which permits must be obtained is applicable to the Project. The Clean Water Act, under Section 401, requires that as a prerequisite for any Section 404 permit (Nationwide or Individual) issued by a federal agency (USACE) involving a discharge of fill, the State (in this case, California) must certify that the discharge will comply with water quality standards established by the State. The Phase 2 Project action will need to obtain an Individual Permit under Section 404. Therefore, an application for a Section 401 Water Quality Certification and Waste Discharge Requirements from the San Francisco Bay RWQCB is being submitted, concurrent with this application, for discharges of fill material into Waters of the U.S./State within the current Project area.

Concurrent to the preparation of this Alternatives Analysis Report for Section 404(b)(1) of the Clean Water Act, the Project is also preparing an application for a Water Quality Certification and Notice of Discharge under Section 401 of the Clean Water Act. That application will be submitted to the San Francisco Bay RWQCB, and a 401 Certification and Waste Discharge Requirements are expected to be issued in spring or summer 2017.

4.6 National Historic Preservation Act Section 106 Cultural Resources Consultation

To comply with Section 106 of the National Historic Preservation Act (Section 106), USFWS submitted a letter to the State Historic Preservation Officer (SHPO) on July 16, 2004, requesting confirmation of the Area of Potential Effect (APE) map for the Project in its entirety. The APE map designated the Project boundary, shown in Figure 1-2 of that 2007 EIS/EIR, as the Project's APE. The SHPO sent a letter to USFWS dated November 19, 2004, indicating that the agency concurred with USFWS's determination of the project's APE. The Project similarly evaluated the Project area against a cultural landscape status. The determination was made that the Alviso Salt Works ponds, as a whole, constitute a Historic Landscape with the primary contributing elements being the ponds themselves, whereas the Ravenswood Salt Works ponds do not constitute a Historic Landscape. The SHPO has concurred with a finding of adverse effect on the Alviso Salt Works Historic Landscape, which is considered a historic property under Section 106, and Historic American Landscape Survey (HALS) documentation has been undertaken as mitigation for effects on this historic landscape.

The 2007 EIS/EIR concluded that (1) impacts on unanticipated cultural resources would be less than significant with implementation of Mitigation Measure 3.8-1, and (2) impacts on the historic salt ponds cultural landscape would be less than significant with implementation of Mitigation Measure 3.8-2. Both of those mitigation measures are discussed in the Technical Project Description (Appendix A).

Since that consultation, completion of the 2007 EIS/EIR and implementation of Mitigation Measure 3.8-2 has consisted of surveys and determinations of eligibility for the Alviso Salt Works Historic Landscape and the Eden Landing Salt Works Historic Landscape, and the Ravenswood salt works was determined to not constitute a historic resource. Mitigation for impacts on the Alviso and Eden Landing landscapes was codified in the Memorandum of Agreement (MOA) between USFWS and the SHPO, titled *Regarding the South Bay Salt Pond Restoration Project, Including Restoration of Former Industrial Salt Ponds to Tidal Salt Marsh and Other Wetland Habitats, Including the Former Salt Works Sites within the Alviso Unit on the Don Edwards San Francisco Bay National Wildlife Refuge and California Department of Fish and Game's Eden Landing Ecological Reserve; Alameda and Santa Clara Counties, California* (MOA) (USFWS 2012).

Execution of that MOA constitutes completion of the Section 106 process. All stipulations of the MOA, including survey and recordation, have been completed, except for Stipulation IIB and ongoing monitoring stipulations that will occur during each phase of the Project. Stipulation IIB consists of public interpretation that would be included as part of Phase 2.

5 PROJECT IMPACTS

5.1 Statement of Impact Minimization

The actions required for the Phase 2 portion of the Project have been designed to require the least possible placement of fill within USACE jurisdiction while still achieving the Project's goals for this phase. Any impacts (e.g., fill placement to create nesting islands) would be taken to create or enhance habitat for listed species, to optimize restoration activities, or to provide sufficient flood protection to allow the restoration processes to proceed. Environmental benefits would result from the implementation of restoration.

This document does not present an exhaustive treatise on design alternatives for each of the proposed Phase 2 actions. Nonetheless, it is important to understand that such an analysis has already occurred as part of the EIS/EIR review for the Project, and as part of the preliminary design review process. All activities proposed for the Phase 2 actions have been specifically chosen to minimize fill placement within USACE jurisdiction while still attaining Project goals.

Further, the Project has developed and committed to a wide range of program-level mitigation measures, including avoidance and minimization measures, BMPs, a detailed AMP, and other programs to help anticipate, detect, reduce or avoid, and correct any adverse impacts before they rise to significant levels. The lessons learned from the implementation and outcomes of the Phase 1 Project actions have shaped the selection and design of Phase 2 actions. The insights of the ongoing applied studies and other Refuge, CDFW, and Bay-wide monitoring programs have also been incorporated. These programs and impact minimization measures are discussed in more detail below.

5.2 Fill and Excavation Activities Proposed to Be Conducted in Waters of the U.S.

As described in greater detail below, the proposed Phase 2 actions to restore habitats, maintain or improve flood protection, and add public access features include levee and trail improvements; installation of new water control structures for improved water quality and wildlife habitat; levee breaches; pilot channels; starter channels; ditch blocks; supplemental levee lowering and removal; habitat transition zones; habitat islands; and two bridges with abutments. Many of the Phase 2 actions necessarily include adding fill and/or excavating channels in Waters of the U.S..

The Project would necessitate the import by haul truck of more than 900,000 cubic yards of upland fill material to raise levees and build habitat transition zones and islands, but the bulk of this material would otherwise be trucked to a landfill for disposal. Further, although much of it would be placed in Waters of the U.S., in most cases such placement would not result in conversion of all of those waters to uplands. Rather, much of that fill would convert non-wetland waters (dry ponds or open-water managed ponds) to wetland waters (subtidal and intertidal marsh habitats). Only at those portions of the new features that are above mean high water (MHW) elevation would a loss of jurisdictional Waters of the U.S. Ecologically, even fill placed up to the MHHW elevation would have the ecological functions and values of the high intertidal marsh zone, which would be an improvement over the steep sides of former salt pond levees. Against this loss of waters, it is important to note that breaching and removing levees could also create new Waters of the U. S., thus converting some of those existing uplands to waters. In addition, almost all of the material excavated or otherwise moved as part of the Project activities would be reused on-site as fill to enhance habitat features.

Habitat transition zones involve the beneficial reuse of fill material to create transitional habitats from the pond or marsh bottom to the adjacent upland habitat along portions of the upland edge. These "habitat transition zones" are sometimes referred to elsewhere as "upland transition zones," "transition zone habitats," "ecotones," or "horizontal levees." Transition zones are specifically called out in documents such as USFWS's *Tidal Marsh Recovery Plan* and the recent Science Update to the Baylands Ecosystem Habitat Goals Project Report (USFWS 2013; Goals Project 2015). A gradual transition from submerged Baylands, ponds, or open waters to uplands is largely missing in the current landscape of the South Bay, where there is often an abrupt boundary between the Bay or ponds and the built environment. The Project's intention in including habitat transition zones in the Phase 2 alternatives is to restore this missing habitat feature. Doing so would:

- establish areas in which terrestrial marsh species can take refuge during high tides and storm events, thereby reducing their vulnerability;
- expand habitat for a variety of special-status plant species that occupy this specific elevation zone; and
- provide space for marshes to migrate upslope over time as sea-level rise occurs.

Before proposing these features for Phase 2, the Project examined the landscape to determine whether there are any areas adjacent to the Project site where these changes could occur naturally. In general, the best locations for building these features would be located adjacent to open space or parkland where the Project could 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, presenting 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 non-engineered riprap slopes. In these instances, the Project would have to place material inside the former salt ponds to create the desired slope (generally around 30:1). At other locations, the actual elevations landward of the Project site 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, the only area remaining to build the transition zones is into the salt ponds. Finally, most of the adjacent property is not within the Project's ability to acquire, whether or not the property has the desired elevation profile, because it is currently developed. In addition to the great expense of acquiring these areas, relocating all of the residences and businesses built adjacent to the salt ponds would be infeasible.

Based on the acreages of the ponds involved in the proposed actions, Phase 2 of the Project would result in the formation of approximately 930 acres of new tidal marsh habitat, improvement of 320 acres of currently establishing tidal marsh habitat, and the creation or enhancement of up to 900 acres of managed pond habitat. This would be achieved via fill and excavation work at the total estimated volumes and areas presented in Table 3 and Table 4. In addition, indirect impacts to Waters of the U.S. could result from scour of existing outboard marshes and intertidal mudflats along Mud Slough, Coyote Creek, Alviso Slough, Guadalupe Slough, Stevens Creek/Whisman Slough, Permanente Creek/Mountain View Slough, Charleston Slough, Ravenswood Slough, West Point Slough, and Flood Slough. Estimates of potential scour of these and other nearby mudflats were developed for the Phase 1 Project actions. Subsequent monitoring over the years since implementation indicated that the actual scour was much less than anticipated. In some areas, no scour has been observed, and in others, there has been added accretion. As a conservative projection, the Project now anticipates that the total area of indirect scour from the Phase 2 activities could be up to a few dozen acres. The actual area is expected to be much less.

Table 4 presents a breakdown of the total areas and volumes of fill (discharge) from the Phase 2 activities as well as those in Section 404 jurisdiction (i.e., below MHW). Table 5 presents the areas and volumes for the excavation (dredging) proposed to take place in Waters of the U.S. as part of the Phase 2 actions. These areas and volumes are presented for each pond cluster, although Phase 2 is a single project that would be implemented at four locations, and not four separate projects. More detailed breakdowns of the individual components of these features are provided in the Technical Project Description (Appendix A).

Table 4. Phase 2 Fill (Discharge) Volumes and Areas by Project Location

Location	Total Volume (Cubic Yards)	Section 404 Volume (Cubic Yards)	Section 10 Volume (Cubic Yards)	Total Area (Acres)	Section 404 Area (Acres)	Section 10 Area (Acres)
Alviso-Island Ponds	25,500	25,500	25,500	6.6	6.6	6.6
Alviso-A8 Ponds	179,000	174,000	169,860	24.6	23.9	23.9
Alviso–Mountain View Ponds	327,100	243,670	230,370	52.8	46.4	45.8
Ravenswood Ponds	310,300	164,190	145,770	41.9	27.8	27.7
Totals	**842,440**	**607,360**	**571,500**	**125.9**	**104.8**	**104.0**

Notes: Some individually listed values may not sum to the listed total because of rounding. Totals presented are sums of unrounded values, which are then rounded.
Additional fill volumes and areas from work associated with Pacific Gas and Electric Company infrastructure improvements would be 124 cubic yards/0.18 acre in USACE jurisdiction in addition to that provided above. The distribution of these volumes and areas of fill would be 12.4 cubic yards/0.018 acre in wetlands and 111.6 cubic yards/0.162 acre in other waters.
Source: Data compiled by AECOM in 2016

Table 5. Phase 2 Dredge Volumes and Areas by Project Location

Location	Total Cut (Cubic Yards)	Section 404 Volume (Cubic Yards)	Section 10 Volume (Cubic Yards)	Area (Acres)	Section 404 Area (Acres)	Section 10 Area (Acres)
Alviso-Island Ponds	25,500	1,590	1,500	6.6	2.4	0.1
Alviso-A8 Ponds	NA	NA	NA	NA	NA	NA
Alviso–Mountain View Ponds	15,200	8,270	7,800	2.2	1.3	1.3
Ravenswood Ponds	43,100	35,300	34,780	10.4	8.2	7.9
Total	**83,800**	**45,160**	**44,080**	**19.2**	**12.0**	**9.4**

Notes: NA = not applicable. Some individually listed values may not sum to the listed total because of rounding. Totals presented are sums of unrounded values, which are then rounded.
Additional fill volumes and areas from work associated with Pacific Gas and Electric Company infrastructure improvements would be 124 cubic yards/0.18 acre in USACE jurisdiction in addition to that provided above. The distribution of these volumes and areas of fill would be 12.4 cubic yards/0.018 acre in wetlands and 111.6 cubic yards/0.162 acre in other waters.
Source: Data compiled by AECOM in 2016

5.3 Water Quality

The general approach of the Phase 2 actions is to increase water circulation and the connectivity of aquatic habitats relative to the baseline. In the Phase 2 ponds that would be part of tidal marsh restoration (Ponds A19, A20, A1, A2W, and R4), the ponds would be reconfigured to increase tidal flows in and out, thereby reducing the potential for and severity of water quality problems associated with low dissolved oxygen (DO), high residual salinity, and high algal growth. However, in the immediate aftermath of the breaching and other construction activities, there would be increases in localized turbidity, salinity, and circulation of any contaminants present in or around the ponds during the initial release. The Phase 1 actions were noted to cause these brief and local effects but did not cause substantial adverse water quality impacts.

However, breaching ponds also increases the mobilization and dispersal of any residual mercury in the ponds' sediments or waters. The Project's AMP and the applied studies have been conducting ongoing monitoring and analysis of the levels and the dispersal of different types of mercury in waters, fish, and bird eggs. Substantial information about these effects is available in various reports from the Project's science program, the Phase 2 EIS/EIR, and other documents, and more will be presented in the Section 401 Water Quality Certification application for Phase 2. The highest concentrations of mercury in the South Bay are at the Alviso-A8 Ponds, which have been managed to study the many mercury-related questions while retaining those ponds as muted tidal to contain the mercury until it is better understood. These studies have shown that there was a large increase in mercury levels in water, fish tissues, and bird eggs immediately after the Alviso-A8 Ponds were connected to Alviso Slough and other waters, but that the spike faded to background levels within a year in the water and in bird eggs and within 3 months in fish tissues. Because the Phase 2 action at the Alviso-A8 Ponds would not create new hydraulic or aquatic habitat connections (it would only build habitat transition zones), no similar spike would be expected. Mercury levels are much less elevated (essentially background) at the Ravenswood Ponds, the Alviso–Mountain View Ponds, and the Alviso–Island Ponds, the latter of which are already open to tidal flows.

In the other ponds that would be part of managed pond restoration (Ponds A8S, R3, R5, and S5), the proposed enhancements generally either would have negligible effects on water quality or would increase the ability of Refuge management to actively circulate, draw down, or refresh the water in the ponds to avoid water quality issues. The same sorts of temporary, localized, construction-related effects on turbidity, other contaminants, DO, and salinity described for the tidal ponds would also be expected at these managed ponds.

5.4 Endangered Species

Phase 2 impacts on endangered species are expected to be both adverse and beneficial. As is the case with most restoration projects, many of the adverse impacts would be related to construction activities and thus would be immediate and temporary. Conversely, many of the permanent benefits would be realized over time, as the marsh establishes and begins to provide habitat for ESA-protected species that also take time to arrive at and start consistently utilize the habitat. Some permanent adverse impacts would be immediate, however, such as those related to the conversion of habitat from one type to another.

The Phase 2 Project impacts on ESA-protected species are fully described in the BAs being prepared for submission to USFWS and NMFS. Those BAs will include the following "categories" of impacts, which are evaluated separately at each Phase 2 pond cluster and then integrated into an overall determination of impacts:

- Potential direct loss of an individual
- Habitat loss, degradation, enhancement, or creation of new habitats
- Construction disturbance
- Disturbance from O&M and public access

In addition, the long-term benefits to each species are described and used to relate the magnitude of the negative effects to the much larger benefits. The Project-wide and species- and location-specific mitigation measures—including those to avoid and minimize adverse effects on ESA-listed species—will be described in those BAs and will implemented as described.

With the careful implementation of the conservation measures described in the BAs, only relatively small areas of mostly low quality habitat would be lost for some species. Habitat conversion losses would include the following:

1. Channels would be excavated through fringing marsh outside of breached levees to connect the ponds to the Bay. These marshes may be used by California Ridgway's rails and salt marsh harvest mouse.

2. Sections of internal levee slopes and adjacent pond bottoms and aquatic habitat would be filled by the placement of fill for levee improvements, and the creation of habitat transition zones and habitat islands.

3. A portion of western snowy plover nesting habitat in what is currently a seasonally dry salt panne would be converted to tidal marsh.

In the long term, there would be large habitat benefits to most threatened or endangered species at the Phase 2 ponds. The proposed actions would result in considerable increases in the quantity, quality, and connectivity of tidal marsh and other estuarine habitats in the South Bay, and would enhance several managed ponds. These positive outcomes would far outweigh the small areas of lost, converted, or degraded habitat from filling in existing habitats. Minimal and temporary adverse effects on habitat would be expected during construction, operation, and maintenance activities.

5.5 Cultural Resources

Few, if any, changes to cultural resources are expected as a result of Phase 2 activities beyond those on the cultural landscape for the Project as a whole. As described, these changes have already been permitted and mitigated for at the programmatic level, and Section 106 compliance is complete. However, this summary statement is largely from the regulatory perspective. In terms of on-the-ground changes, the Phase 2 Project would involve the removal of some derelict water control structures (wooden drop-gate culverts), former wooden hunting blinds, and a few newer gates and siphons that were added to manage water quality. These would be removed as part of restoration at the Alviso–Mountain View Ponds and the Ravenswood Ponds. The visual aspect of the cultural landscape (i.e., the conversion from a salt-production landscape to tidal marshes and managed ponds) would necessarily change. These changes have already received regulatory approvals.

6 COMPLIANCE REVIEW (ALTERNATIVES ANALYSIS)

This section presents information regarding a Section 404(b)(1) compliance review of the Project following the guidelines presented in the Section 404(b)(1) *Guidelines for Specification of Disposal Sites for Dredged or Fill Material* (33 CFR Part 230, Vol. 45, No. 249, 24 December 1980). During this review all requirements in Section 230.10 were assessed in view of the potential Project-specific impacts; however, the depth of analysis of the compliance, as presented below, was adjusted to reflect the magnitude of the potential for adverse impacts on the aquatic ecosystem posed by the Project.

In brief, the 404(b)(1) Guidelines generally prohibit the discharge of fill materials into jurisdictional waters under the following conditions:

- There is a practicable, less damaging alternative.
- Discharges jeopardize the continued existence of species that are listed as endangered or threatened.
- The discharge violates water quality standards.
- Discharges will cause or contribute to significant degradation of Waters of the U.S.
- Appropriate and practicable steps have not been taken that will minimize potential adverse impacts of the discharge on the aquatic ecosystem.

This section addresses each of these conditions as presented in five major categories:

1. Review of practicable alternatives to the preferred Project.

2. Compliance with State water quality standards.

3. Consideration of potential project-related impacts on species listed as endangered or threatened under the ESA.

4. Potential of the Project to cause significant degradation to Waters of the U.S.

5. Consideration of appropriate and practicable steps to minimize potential adverse impacts of the discharge on the aquatic ecosystem.

Each of these categories is presented in greater detail below.

6.1 Practicable Alternative

This section considers practicable alternatives to the proposed Project. The matter of “water dependency” is also addressed. This information is collectively termed the “Alternatives Analysis.”

6.1.1 Proposed Federal Action

USFWS and the Coastal Conservancy propose to breach levees, build habitat transition zones, build habitat islands, excavate channels, infrastructure maintenance, install water control structures, raise and improve levees, and add several public access trails and viewing platforms in a mix of tidal marsh restoration (at Ponds A1, A20, A1, A2, and R4) and enhance managed ponds (at Ponds A8S, R3, R5, and S5). These actions would restore more natural tidal marsh and enhance habitat values for a wide range of wildlife species, including several endangered or threatened species like the salt marsh harvest mouse, California Ridgway’s rail, western snowy plover, Central California Coast steelhead, and others, while maintaining or improving on current levels of flood protection and adding wildlife-compatible public access features. These proposed habitat restoration, flood protection, and public access activities would result in fill placement volume and area totals and excavation volume and area totals shown previously in Table 3 and Table 4. Of those totals for the fill, however, the amounts in Waters of the U.S. would be lower, because only those portions of the implemented Project features above MHW are within that jurisdiction. Those areas and volumes are also presented in the tables. All excavation activities would occur in Waters of the U.S..

The proposed federal action for this Project would be the issuance of a Section 404 Individual Permit by USACE for excavation and placement of fill materials within Waters of the U.S., over which USACE has jurisdiction under Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act.

6.1.2 Relationship to the Clean Water Act

Section 404 of the Clean Water Act, originally enacted in 1972, established a program for evaluation of permits for the discharge of dredged or fill material into waters of the United States. In the 1977 amendments to Section 404, additional requirements were enacted for the program, which ultimately resulted in the promulgation by EPA of the *Guidelines for Specification of Disposal Sites for Dredged or Fill Material* (Guidelines) (40 CFR 230) in December 1980.

The 1980 EPA Guidelines were promulgated specifically pursuant to Section 404(b)(1) of the Clean Water Act. These 404(b)(1) Guidelines govern, in part, the issuance of permits by USACE. The USACE 1986 Regulations state at Section 320.4(a)(1), "For activities involving 404 discharges, a permit will be denied if the discharge that would be authorized by such permit would not comply with the Environmental Protection Agency's 404 (b)(l) Guidelines."

The Guidelines generally require USACE, to determine whether to issue a permit, and to determine whether there are any practicable alternatives to the proposed discharge that would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences (40 CFR 230.10a]). The Guidelines generally preclude permitting a discharge if there is such a practicable alternative. In making this determination, USACE may consider alternatives off, as well as on, the proposed Project site:

> *An alternative is practicable if it is available and capable of being done after taking into consideration cost, existing technology and logistics in light of overall project purposes. If it is otherwise a practicable alternative, an area not presently owned by the applicant which could reasonably be obtained, utilized, expanded or managed in order to fulfill the basic purpose of the proposed activity may be considered [40 CFR, Sec. 230.10(a)(2)]. Where, as here, the basic purpose is not water dependent, then practicable off-site alternatives are presumed to be available [40 CFR, Sec. 230.10 (a)(3)]. If and when the applicant demonstrates otherwise, this rebuttable presumption disappears.*

The analysis and determination of practicable alternatives allows for flexibility and professional judgment. Accordingly, over the years, USACE has issued guidance confirming as much. In Regulatory Guidance Letter 84-9 (USACE 1984), USACE, while offering instructions on permit decision documentation, stated:

> *The discussion of practicable alternatives for any or all of the above requirements (i.e., the Corps' permit regulations and the EPA Guidelines) should be guided by the rule of reason, and*

> *should consider alternatives both in terms of the applicant's wishes and capabilities, and in terms of the need for or purpose to be served by the proposed activity.*

USACE issued Regulatory Guidance Letter 93-2 (USACE 1993), which presents a Memorandum to the Field by USACE and EPA "to clarify the appropriate level of analysis required for evaluating compliance with the Clean Water Act Section 404(b)(1) Guidelines requirements for consideration of alternatives." In that memorandum, USACE and EPA observed:

> *The Guidelines are, as noted above, binding regulations. It is important to recognize, however, that this regulatory status does not limit the inherent flexibility provided in the Guidelines for implementing these provisions. The preamble to the Guidelines is very clear in this regard:*
>
> *Of course, as the regulation itself makes clear, a certain amount of flexibility is still intended. For example, while the ultimate conditions of compliance are "regulatory", the Guidelines allow some room for judgment in determining what must be done to arrive at a conclusion that those conditions have or have not been met.* Guidelines preamble, "Regulation versus Guidelines", 45 FR 85336 (24 December 1980).

After discussion of the flexibility of the Guidelines to adjust the level of analysis to take into account the relative extent of the environmental impacts, and the scope and cost of the proposed Project, USACE and EPA close with general guidance:

> *A reasonable, common sense approach in applying the requirements of the Guidelines' alternatives analysis is fully consistent with sound environmental protection. The Guidelines clearly contemplate that reasonable discretion should be applied based on the nature of the aquatic resource and potential impacts of a proposed activity in determining compliance with the alternatives test. Such an approach encourages effective decision-making and fosters a better understanding and enhanced confidence in the Section 404 program.*

6.1.3 Historic Section 10 Jurisdiction at the Project Site

Historic Section 10 Waters occur behind levees, are currently not exposed to tidal or muted tidal influence, and meet certain criteria. These criteria include: (1) the area is presently at or below MHW; (2) the area was historically at or below MHW in its "unobstructed, natural state"; and (3) there is no evidence that the area was ever above MHW (H. T. Harvey 2008i).

Procedures for determining Historical Section 10 jurisdiction behind levees are as follows (H. T. Harvey 2008i):

1. First, determine present MHW for the area in question.
    a) Use surveyed elevation data from the prospective applicant.
    b) If elevation data are not available, use the survey technique for determining MHW on the outboard side of the dike and project the MHW line back to the area in question.
    c) Those areas behind dikes that are presently above MHW are not subject to Section 10 permit requirements (provided they were above MHW prior to 28 January 1972 or were filled to above MHW thereafter under USACE permit) because they are presently at or above MHW.

d) Those areas that are presently at or below MHW may be subject to Section 10 permit requirements. To determine whether these areas are subject to Section 10, two additional facts must be obtained (which are numbers 2 and 3 of the historical Waters definition provided above).

2. The second step is to determine whether those areas presently at or below MHW were historically below MHW before the dikes were built.

   a) If available, use elevation data that were surveyed just prior to or just after the dikes were built. More often than not, this information is not available but potential sources include city and county planning commissions, public works departments, Caltrans, State Lands Commission, etc.

   b) If historic elevation data are not available, use the T-charts of 1850-90 to determine the location of the historic sloughs, if any, in those areas that are presently below MHW. The premise is that the historic sloughs were subject to the ebb and flow of the tides, and thus were below MHW.

   c) Those areas presently below MHW and historically below MHW as determined by elevation data or T-charts would be considered at or below MHW historically (H.T. Harvey 2008h).

The acreages of historic Section 10 jurisdiction are presented in Tables 2 and 5. Areas that were historically below MHW and filled above MHW (as shown by reliable data) but are now below MHW because of subsidence are not subject to Section 10 authority, but may be subject to Section 404 jurisdiction.

6.1.4 Current Section 10/404 Jurisdiction at the Project Site

Areas meeting the regulatory definition of Waters of the U.S. (jurisdictional waters) are subject to the jurisdiction of USACE. USACE, under provisions of Section 404 of the Clean Water Act (1972), has jurisdiction over Waters of the U.S.. These waters may include all waters used, or potentially used, for interstate commerce, including all waters subject to the ebb and flow of the tide, all interstate waters, all other waters (e.g., intrastate lakes, rivers, streams, mudflats, sandflats, playa lakes, natural ponds), all impoundments of waters otherwise defined as Waters of the U.S., tributaries of waters otherwise defined as Waters of the U.S., the territorial seas, and wetlands adjacent to Waters of the U.S. (33 CFR 328.3). Upland levee areas and Section 404 jurisdictional wetlands and other waters as well as current and historic Section 10 Waters were classified and mapped using aerial image interpretation and field verification, as described in the accompanying jurisdictional delineation report.

Other Waters and Current Section 10 Waters were identified as follows:

1. *Other waters* are non-wetland waters, including sloughs, seasonal ponds and seasonal springs. Such areas are identified by the presence of standing or running water and generally lack hydrophytic vegetation. The Project site was surveyed for areas meeting the regulatory definition of other waters.

2. *Mudflats* are special aquatic sites that are not vegetated. The project site was surveyed for areas meeting the regulatory definition of mudflats.

3. *Current Section 10 Waters in tidal waters* includes tidal channels and adjacent special aquatic sites up to the limit of the MHW in areas currently exposed to fully tidal or muted-tidal action.

Section 10/Section 404 wetlands and other waters within the Project boundary shown in Figures 7 through 9. Waters acreages are presented in Tables 2 and 3, and summarized in Table 6. Note that this is the total of all Waters of the U.S. identified within the Phase 2 study area boundaries for the wetland delineation and is not the sum total of Waters of the U.S. within the ponds or of the adjacent sloughs.

Table 6. Summary of USACE Jurisdictional Areas for Phase 2 Actions (in acres)

Pond Cluster	Current Section 404 Wetlands	Current Section 404 Other Waters	Current Section 10 Waters	Historic Section 10 Waters	Uplands
Alviso-Island Ponds	301.6	386.3	554.2	98.2	27.6
Alviso-A8 Ponds	50.3	589.6	622.6	26.5	20.2
Alviso–Mountain View Ponds	147.1	846.9	892.4	174.7	45.6
Ravenswood Ponds	84	647	14	177.5	50.5
Total	**583**	**2469.7**	**2,083.20**	**477**	***143.9***

Source: Data compiled by AECOM in 2017

6.1.5 Achievement of Section 404(b)(1) Project Purposes

In accordance with the Section 404(b)(1) Guidelines' compliance requirements, this section specifically analyzes practicable alternatives to the proposed Phase 2 restoration activities. Defining a project purpose for a 404(b)(1) Guidelines analysis is different from defining a "Purpose and Need" for a NEPA document. Most notably, the 404(b)(1) Guidelines analysis of project purpose does not require assessment of "need"; the applicant's need for a project is assumed for these purposes. In addition, a 404(b)(1) statement of project purpose is to be structured to support analysis of a Least Environmentally Damaging Practicable Alternative (LEDPA). A key aspect of supporting this analysis is that when a project has multiple purposes (as this one does), multiple project purpose statements are developed, then a LEDPA is determined for each project purpose.

The only alternatives that must be analyzed are practicable ones. USACE defines "practicable" to mean available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes (Section 230.3[q]). This section, therefore, attempts to answer the question: Is there a practicable alternative to the proposed discharge?

The practicability of alternatives to the proposed project is, in part, determined by the extent to which they attain the basic and overall project purposes. The 404(b)(1) Guidelines provide the following statements for the definition of basic and overall project purposes.

Basic Project Purpose: The basic project purpose as referenced in the 404(b)(1) Guidelines (Section 230.10[a][3]) relates to the question of "water dependency" and is a general description of the project purpose:

> *Where the activity associated with a discharge which is proposed for a special aquatic site does not require access or proximity to or siting within the special aquatic site in question to fulfill its*

> *basic purpose (i.e., is not "water dependent "), practicable alternatives that do not involve special aquatic sites are presumed to be available, unless clearly demonstrated otherwise. In addition, where a discharge is proposed for a special aquatic site, all practicable alternatives to the proposed discharge which do not involve a discharge into a special aquatic site are presumed to have less adverse impact on the aquatic ecosystem, unless clearly demonstrated otherwise* (33 CFR Part 230, Section 230.10, Vol. 45, No. 249, 24 December 1980).

As described in an earlier section, the purposes of the Project as a whole and of the Phase 2 actions are to:

1. restore and enhance a mix of wetland and managed pond habitats;
2. provide wildlife-oriented public access and recreation; and,
3. provide for flood management in the South Bay.

Restoration of the former South Bay salt ponds would create habitat for marsh-dependent fish and wildlife, improve water quality, maintain or decrease the risk of local flooding, and open up new areas in the South Bay for wildlife-compatible, marsh-oriented recreation.

Because the basic Project purposes of the Phase 2 actions are to enhance and restore tidal marsh habitats (marsh restoration activities) and to maintain/enhance pond habitats (managed pond restoration activities) while providing marsh-, pond-, and Bay-related public access and continued flood protection, the basic purposes are clearly water dependent. In other words, implementation of restoration efforts does necessarily require placement in, access to, or proximity to jurisdictional Waters of the U.S. and various special aquatic habitats within them.

When a proposed activity is not water-dependent, the subsequent analysis must provide for a consideration of off-site alternatives of similar size that are available in the market area that would not involve the placement of fill materials into Waters of the U.S.. In this case, however, because all of the Phase 2 actions are water-dependent, the current application does not analyze off-site locations to the proposed actions. In addition, although there are other in-water locations in the South Bay where similar restoration projects are feasible, these areas are not owned by the Refuge, but are owned by Cargill or other landowners.

An analysis of possible lands where restoration was feasible was conducted as part of the Programmatic Project analysis and overall development of the long-term plans for Project development. As much land was purchased or otherwise acquired by the federal and state governments as funding allowed. Some other lands were listed as being part of what was then termed an “authorized expansion boundary,” should funds and other resources become available and should there be a landowner willing to sell or otherwise release the lands for restoration. All other available land owned by the state or Refuge is currently being restored or has been restored (e.g., Bair Island).

For those activities that are water-dependent, the 404(b)(1) analysis need not concentrate on the rebuttal of the presumption that the basic and overall project purpose can be attained by some other alternative that does not require access or proximity to or siting within the special aquatic site. However, USACE is still required to determine that the proposed discharges constitute the LEDPA. Thus, if a clearly superior site for the activity is available to the applicant, USACE must consider it. In such a situation, the analysis needs to consider alternatives to the proposed discharge that attempt to minimize or eliminate the discharge of fill materials to determine whether such alternatives are practicable and also less environmentally damaging.

The overall goal of this analysis is to choose an alternative that would have the least adverse impact on the aquatic ecosystem while still attaining the basic Project purposes. The analysis must show that the Project attempts to minimize the discharge of fill material to the maximum extent practicable. This section attempts to answer the question: Is there an alternative to the proposed Project activities, within the Phase 2 action area, that involves a lesser level of discharge of fill materials into Waters of the U.S. and still that fulfills the basic Project purpose?

Overall Project Purpose: The overall project purpose, as referenced in the 404(b)(1) Guidelines (Section 230.10[a][2]), relates to the determination of practicability of alternatives. An alternative is practicable if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes. If it is otherwise a practicable alternative, an area not presently owned by the applicant that could reasonably be obtained, utilized, expanded or managed to fulfill the basic purpose of the proposed activity may be considered (33 CFR 230.10).

The first overall Project purpose is to restore tidal salt marsh habitats and to maintain and enhance managed pond habitats using methods and approaches with a high potential for success and that maintain or improve the existing levels of flood protection.

USACE has an obligation to take into account the project applicant's objective when reviewing project alternatives. The analysis must provide for a consideration of habitat restoration alternatives within the project that would involve a lesser discharge of fill materials into Waters of the U.S..

This section attempts to answer the question: Is there a habitat restoration and recreation alternative within the Phase 2 action area that is capable of being implemented and that attains the overall Project purpose and meets the evaluation criteria (which include cost, changes to existing flood protection, existing technology and logistics, and other factors)?

In assessing alternatives, a key aspect of this analysis is logistical feasibility and site availability. The Phase 1 actions were able to proceed with little or no added flood protection, but a substantial portion of the remaining former salt ponds in the Project study area cannot be restored as part of Phase 2 without first implementing substantially improved flood protections. The Phase 2 pond clusters were chosen because they were seen as the ponds in the Refuge requiring the smallest amount of added flood protection. The need to not only fund additional flood protection but also acquire and place the material in a timely manner constitutes material logistical constraints on the Phase 2 actions. In addition, certain ponds owned by the Refuge are currently being used for salt production pursuant to rights possessed by Cargill. Unless and until Cargill elects to cease these operations, these ponds are not available for implementation of the Phase 2 restoration program. Similarly, other salt ponds are currently being restored by USFWS. Because this restoration work is currently underway, these ponds are not available for the Project.

The second overall Project purpose is to provide access to these habitats for management and public use purposes in a manner that protects environmental functions while achieving, to the extent feasible, human use goals.

Service roads, trails, and other facilities (including drivable levees) are necessary to meet the Project purpose to accommodate needed site management functions and to allow for environmentally acceptable public access. Because, by its terms, this Project purpose is limited to the sites being restored in the Project area, alternatives at sites not considered in the analysis of the first Project purpose would be inconsistent with this Project purpose. In addition, discharges and resulting impacts are minimized through design alternatives. Specifically, the designs for proposed recreational features utilize existing levees and upland areas to the maximum extent possible. No fill is added solely for public access purposes, but only in combination with necessary flood protection or other required constraints (i.e., PG&E access).

Several early rounds of alternative development considered and decided against public access features that would have added fill or otherwise adversely affected Waters of the U.S. and/or wildlife. The ongoing site management strategies would also minimize impacts, clustering public access features in areas that are accessible to human visitors and leaving large stretches of restored habitat isolated from human disturbance. The new trails are planned to be permanent and year-round public access features, but there would be gates and fences to allow seasonal or permanent closures if ongoing monitoring shows that recreational access has materially impaired habitat values.

6.1.6 Discussion of Phase 2 Action Alternative

6.1.6.1 Discussion of Design Element Selection for Phase 2 Actions

As part of the selection of individual components and design elements for the Phase 2 actions, several design considerations were used to ensure the highest quality outcomes with the least environmental impact. Numerous technical studies were performed to inform the program-level alternatives and the Phase 1 actions. The Phase 2 planning used those studies and their outcomes as starting points and as inputs for updated assessments of environmental dynamics such as sediment accretion rates. Phase 2 modeling of tidal flows occurred at the Alviso-Island Ponds, Alviso–Mountain View Ponds, and Ravenswood Ponds to appropriately locate and size breaches, channels, and water control structures, as needed. Flows and tidal elevations were also used to assess the degree of levee elevation increases that would be needed in various locations. Geotechnical investigations and analyses were done at locations specific to Phase 2 and to add to existing information on subsurface conditions. The results of these analyses were used to assess settlement, slope stability, and other aspects of levee improvements, habitat transition zones, and island construction, and include them in the restoration design. The restoration design was developed in close coordination with the Project sponsors (SCC, CDFW, USACE, and SCVWD), with substantial input from the Science Team, Project Management Team, local flood control agencies, and other stakeholders.

Ultimately, the design alternatives for the Phase 2 actions, relative to which specific design elements (e.g., levee breaching, pilot channels) should be included, were based on consideration of the factors listed below. This list was adapted for Phase 2 from a similar list in the 404(b)(1) document for the Phase 1 Project.

1. *Habitat restoration potential.* The Project must include the potential for development of favorable habitat for flora and fauna as outlined in the goals and objectives.

2. *Maximization of habitat values.* The Project must attempt to maximize habitat values in the Phase 2 restoration areas to the extent practicable. This may include building habitat transition zones in Project ponds to simultaneously provide important habitat for birds and terrestrial wildlife, help reduce levee erosion and wave run-up, and provide a location for natural marsh to

form over time. It may also include building nesting islands in reconfigured managed ponds and former ponds that are transitioning to marshes. Further, maximizing habitat values may involve using the results of and guidance from previous Project habitat islands to inform the number, size, shape, location, and slope of these islands to achieve the greatest habitat/ecological benefit with the least fill in Waters of the U.S. and with the least material.

3. *Flood management.* The Project must maintain or improve existing levels of flood protection. The designs need to include levee raising and other improvements at the Ravenswood Ponds (the AAC levees) and at the Alviso–Mountain View Ponds (west levee of Pond A1 and the Coast Casey Forebay levee).

4. *Opportunities for public access features.* The Project must provide new public access and recreation features (e.g., trails and viewing platforms) that are compatible with use of the Refuge lands by wildlife species.

5. *Water quality.* The Project must provide water quality conditions that meet discharge requirements and provide acceptable control of water quality in managed ponds, including R3, R5, S5, and the Alviso-A8 Ponds.

6. *Hydrology.* The Project must include physical and hydrological considerations, such as potential levee erosion; existing bathymetry and topography; sediment accretion rates in ponds opened up to tidal action; location of historical sloughs and channels; potential to establish full tidal inundation; potential for beneficial sedimentation rates and distribution; potential for reestablishing the historical slough system; and other changes in hydrologic conditions.

7. *Adjacent land use.* The Project must consider potential effects of levee breaching or lowering along ponds situated adjacent to other lands, especially those that would need flood protection and/or that contained closed landfills that may need protection.

8. *Land ownership.* The Project must consider adjacent land ownership and the various opportunities and constraints it presents. At the Alviso–Mountain View Ponds, the City of Mountain View owns the Coast Casey Forebay levee and the forebay detention basin itself, as well as the adjacent Shoreline Park, which is built atop a closed landfill and through which material hauling would have to occur. Similar conditions exist at the Ravenswood Ponds, where the City of Menlo Park’s Bedwell Bayfront Park (also atop a closed landfill) would be used for access and where Cargill still has private land and other interests. There is also an adjacent property containing a closed landfill at the Alviso-A8 Ponds, and the cap of that closed landfill extends underneath what is now Refuge land at the surface.

9. *Assisting or incorporating external projects.* The Project should help Project partners and neighboring communities pursue their flood protection, restoration, and public access projects to the extent that doing so is practicable and consistent with the Project’s own goals. Examples include (1) maintaining compatibility with the City of Mountain View’s Lower Stevens Creek Levee Improvement Project, (2) attempting to include the City of Mountain View’s Charleston Slough tidal restoration effort, and (3) attempting to include the City of Redwood City’s Bayfront Canal and Atherton Channel Project for flood protection.

10. *Infrastructure.* The Project must maintain the services provided by existing infrastructure. The condition of existing water control structures and levees must be maintained. The Project also

needs to consider potential flooding impacts on existing regional infrastructure, such as the PG&E towers, Coast Casey Forebay, and Shoreline Park and its sailing lake infrastructure at the Alviso–Mountain View Ponds and of Menlo Park's Bedwell Bayfront Park, SR 84, and Cargill infrastructure at Ravenswood.

11. *Beneficial reuse of material.* The Project should try to incorporate the beneficial reuse of dredged material or fill from upland excavation projects to the extent that doing so is practicable and cost effective. Phase 1 dredged material could not be beneficially reused because of a lack of infrastructure for delivering it and the prohibitively high costs of doing so. However, the Phase 2 actions include beneficial reuse of large amounts of fill material that would otherwise go to landfills.

12. *Water management.* The Project must include an adequate ability to manage water to avoid water quality issues or inadequate water supplies. Management of water levels and flows in enhanced Ponds R3, R5, and S5 is designed to provide shallow shorebird foraging or habitat, acceptable water quality, and management flexibility and efficiency.

13. *Construction feasibility*. The Project must consider construction access and the degree of difficulty in implementing the designs while minimizing construction-related environmental disturbance.

14. *Pond access for construction equipment.* The Project designs must consider the ability of construction equipment to access the ponds. Soft soils on-site and limited land and water access affect construction methods, timing, and cost. Ponds, R4, R5, and S5 are the only interior pond bottoms that would be directly accessed and manipulated by construction equipment. They are expected to be sufficiently dry to allow use by construction equipment but may also require construction mats.

15. *Potential effects of wave action on levees and habitat development.* The Project designs should consider wave energy effects because they could cause levee erosion and delay habitat development, but could also help redistribute sediment deposited during flood tides and fluvial events. Buildout of upland fill material in habitat transition zones can help resist levee erosion and wave run-up while also providing substantial habitat benefits and new substrate onto which a natural gradient of marsh vegetation communities can form.

16. *Cost effectiveness.* The Project should be as cost effective as possible. Many restoration features can be either constructed up front (such as by filling, excavating, and planting) or allowed to evolve over time through natural physical and biological processes (sedimentation, scour, and vegetation recruitment). The design approach is to reduce construction costs by creating an initial site template to guide future evolution along the desired trajectory, within the level of risk acceptable to the Project. The designs represent a balance between costs and benefits. For example, the number of water control structures represents a balance between water quality and operational flexibility (which tend to increase the number of structures) and construction implementation and management costs (which tend to reduce the number of structures that can reasonably be included).

17. *Self-sustaining/reduce ongoing O&M.* The Project should establish site conditions conducive to the natural evolution of tidal marsh and a diversity of tidal wetland habitats to perform better,

have more ecological value, and reduce maintenance requirements. The design seeks to reduce the extent of O&M required for ongoing water management.

18. *Tidal drainage.* For tidal marsh restoration components, the Project's designs should achieve full drainage on a regular basis wherever possible. Tidal drainage refers to the depth and duration of tidal inundation within a site compared to tides in the slough or Bay outside the site. Full tidal drainage promotes sedimentation and vegetation development, and reduces the period of regular wave action above the pond bed compared to a site that does not drain well. Poor drainage can delay or inhibit habitat development and increase wave action and erosion. Although full drainage may not take place at the Alviso–Mountain View Ponds for several years, the modeling and analysis that was done shows that expected sediment accretion rates would be high enough to reach marsh plain elevation before sea levels rise would swamp them.
19. *Disturbance of protected habitats.* The Project must avoid or minimize loss of existing marsh habitat during construction, such as in the outboard marshes. This includes avoiding and minimizing erosion of, or direct impacts on, existing fringe marshes along sloughs, and minimizing impacts of pilot channel excavation through the existing outboard marshes.
20. *Disturbance of protected species.* The Project must avoid and minimize disturbance to potential and existing special-status species habitat, especially for California Ridgway's rail and salt marsh harvest mouse.
21. *Potential for fish stranding.* The restoration must not result in ponded areas that are hydraulically isolated from the main channels at low tide. The Project design includes pond bottom channels to ensure the interconnectivity of aquatic habitats.
22. *Potential for mosquito production.* The restoration must not result in poorly drained intertidal areas that would promote mosquito production. The habitat transition zones, in particular, must contain no reverse slopes that would lead to ponded areas.
23. *Seasonal avoidance/protection periods for listed species and nesting birds.* The restoration design and construction activities should observe protection periods defined by the presence of certain bird species to the maximum extent practicable. The presence of nesting birds in the area is the primary factor that dictates the window of time during which construction may occur. Nesting birds also affect construction sequencing and methods.
24. *Consistency with adaptive management applied studies.* The Project's restoration design should include components that are consistent with the previously conducted adaptive management studies. The designs should also offer the opportunity for adaptive management applied studies. These were incorporated into the design as possible.
25. *Experimental design and use as an applied study.* The Project should provide a basis for experimental testing of restoration concepts to inform the AMP and build on the Phase 1 applied studies. For example, some habitat transition zones have varied slopes (and thus area and extent) to inform future Project designs and the related body of knowledge. Also, the Phase 2 designs have used the Phase 1 lessons learned to inform the design of the Phase 2 islands and test the hypotheses about the best size and shape for bird nesting success.

From this process, the current designs were chosen and determined to be those that would result in the development of the intended habitat restoration, the necessary flood protection, and additional public access features with the least disturbance to existing environmental resources, in a reasonable timeline. The design elements are presented in Figures 3–6, summarized in Table 1, and described in the Technical Project Description (Appendix A).

6.1.6.2 Discussion of Phase 2 Action Alternative Selection

The purpose of the analysis described in this section is to address the statutory presumption of the existence of a less-damaging practicable alternative to the proposed Phase 2 actions (i.e., one that would require less fill or dredge in jurisdictional Waters). The process is usually to compare the proposed project to alternative sites using evaluation criteria. The criteria are derived from the basic and overall project purposes, and consideration of biotic resources, cost, technology, and feasibility. As described above, however, because of the water-dependent nature of the proposed activities and the unavailability of other sites, the process for the Phase 2 actions was not to look at “off-site” alternatives (i.e., other ponds), but to identify and analyze alternative restoration actions for each specific pond or pond cluster included in Phase 2.

Usually, in considering the activities available and logistically feasible for projects that result in discharge into Waters of the U.S., it is appropriate to consider a range of alternatives including No Action, No Discharge, and Discharge-based Alternatives to determine which of the alternatives that achieve the project purpose is least environmentally damaging. For the Phase 2 actions, however, the purposes of fill placement and dredge activities are as follows:

- Provide the necessary flood protection in the form of widened and raised levees to allow the Project to proceed with restoration activities.
- Create habitat transition zones that not only will be habitat for a wide range of special-status species but will also increase the resilience of the uplands, levees, and landfills behind them against erosion, wave run-up, and sea-level rise, and increase the area on which a range of important native marsh plants can establish and grow.
- Create habitat islands, high-tide refugia, and other habitat enhancements for ESA-listed species and other special-status species.
- Build ditch blocks and fill borrow ditches to create and restore natural flows in tidal habitats.
- Connect the restoring marshes and managed ponds with surrounding waterways and allow appropriate tidal or gated water circulation to achieve the restoration goals.
- Add habitat connectivity and complexity for aquatic species and marsh species.
- Add water control structures to create or enhance managed ponds.

Clearly, the “No Action” alternative would not achieve the Project purpose, as it would not allow restoration of tidal marsh or enhancements of managed pond habitat, nor would it provide wildlife- and marsh-oriented public access, while maintaining the existing levels of flood protection. Similarly, a “No Fill” alternative in any of the Phase 2 pond clusters would not meet the Project purpose. The Phase 2 actions at the Ravenswood Ponds and the Alviso–Mountain View Ponds would require fill for levee enhancements before any restoration activities could be implemented and would also involve using fill for habitat transition zones. The Phase 2 action at the Alviso-A8 Ponds consists entirely of constructing transition zones, and so fill cannot be eliminated. Finally, the Phase 2 action at the Alviso-Island Ponds involves breaching and otherwise modifying levees to enhance habitat connectivity and complexity and speed the transition to tidal marsh.

The local placement of former levee material in borrow ditches would achieve those goals. Similarly, the Phase 2 actions at the Alviso-Island Ponds, the Alviso–Mountain View Ponds, and the Ravenswood Ponds would all require excavation through existing marshes outside of the ponds to connect the pond interiors to the surrounding waterways. These excavated channels would connect to the breaches in or water control structures through the pond levees and deliver water and sediment to and from the ponds.

The proposed activities for Phase 2 have been specifically chosen to minimize fill placement and channel excavation (dredge) within USACE jurisdiction while still attaining the full scope and vision of the Project's goals. Any actions (e.g., fill placement to raise levees or create habitat transition zones) would be taken to enable sufficient flood protection to allow restoration to proceed, to create or enhance habitat for listed species, and to optimize restoration activities. The net effect of the fill and excavation in Waters of the U.S. would be the wide range of environmental benefits resulting from implementation of restoration.

This document does not present an exhaustive treatise on design alternatives for each proposed Phase 2 actions described above. Nonetheless, such an analysis has already occurred in a general way in the 2007 Programmatic EIS/EIR's environmental review for the Project, and more specifically in the Phase 2 EIS/EIR completed in 2016 (especially Appendix B to that document, which is an Alternatives Analysis) and in the associated preliminary and intermediate design review processes.

The alternatives analysis specific to permitting under the Section 404(b)(1) process is presented below in four subsections:

- Tidal Habitat Restoration Alternatives
- Managed Pond Alternatives
- Flood Management Alternatives
- Public Access and Recreation Feature Alternatives

Tidal Habitat Restoration Alternatives

Restoration of tidal marsh habitat is one of the main purposes of the Project as a whole. The Phase 2 Project actions include tidal marsh restoration at the Alviso–Mountain View Ponds (A1 and A2W) and at Ravenswood Pond R4, and improvements to ongoing tidal marsh restoration at Ponds A19 and A20 (which are part of the Alviso-Island Ponds). No tidal habitat restoration would occur at the Alviso-A8 Ponds, so the rest of this discussion pertains only to the Phase 2 actions at the other three pond clusters.

Note first that alternatives involving tidal marsh restoration necessarily involve creating breaches in pond levees and excavating channels through existing fringing marsh to connect the ponds to the surrounding streams. There would thus be some immediate loss of existing marsh (on the order of half a dozen acres in total at all pond clusters) to open up more than 1,000 acres of former salt pond to tidal marsh formation. Alternatives that would not include breaching and excavation to connect pond interiors to streams and the Bay could not achieve the Project goals.

Further, at all three pond clusters with tidal marsh restoration actions, the material from levee breaching (and other modifications like lowering and removal) would be placed into the borrow ditches and pond bottoms to speed the transition to marsh restoration. This is a way of converting open water pond habitat (at the Alviso–Mountain View Ponds), dry seasonal ponds (at the Ravenswood Ponds), or tidal lagoons (at the Alviso-Island Ponds) to tidal wetland. Such a conversion is not a loss or impairment of Waters of the U.S., but rather a conversion of non-wetland waters (interiors of former salt-production ponds) to a rarer and more ecologically valuable form of waters (tidal marsh). Importantly, the numbers and locations of the breaches and associated channels were chosen to require the shortest extent and the smallest total area of fringing marsh to be lost through excavation, while still leveraging the existing network of historic slough channels and existing waterways to obtain full filling and draining with the tides. Although other locations and different numbers of breaches are conceivable, they would have greater short-term impacts and would therefore not be the least environmentally damaging of the practicable alternatives.

In the Phase 2 actions at both the Alviso–Mountain View Ponds and the Ravenswood Ponds, however, opening these ponds to tidal flows necessitates the improvement of existing levees and berms to provide flood protection that matches or improves on that which exists now. These are the reasons for the fill associated with the levee improvements at these pond clusters. An alternative that would not include these improvements and the associated fill would not achieve the Project goal of maintaining flood protection while restoring tidal marsh. These levee improvements have been designed with the steepest possible slopes that can reliably provide the necessary stability and erosion protection. This was done to reduce the area and volume of fill for the levee improvements themselves that would be placed in Waters of the U.S.. Although other alternatives are possible using wider levee bases and more material, they would not meet the criteria of being the least environmentally damaging of the practicable alternatives. At the Alviso-Island Ponds, no additional flood protection is necessary, so no levee improvement would occur there.

At the Alviso–Mountain View Ponds, an even more extensive tidal marsh restoration alternative was considered: that of including the City of Mountain View's Charleston Slough in the Phase 2 actions. As discussed at length in the Phase 2 EIS/EIR, the City of Mountain View is under a BCDC permit requirement to achieve 53 acres of tidal marsh in inner Charleston Slough (about half of its total area). One of the action alternatives considered in the Draft EIS/EIR would have removed the levee between Pond A1 and Charleston Slough (instead of raising it as in the Preferred Alternative), added breaches, and raised the west levee of Charleston Slough (between it and the Palo Alto Flood Control Basin). However, NMFS voiced concerns regarding the resultant connection that would be achieved between Stevens Creek to the east and the water intake for the city's sailing lake in Shoreline Park. That connection would have exposed an ESA-listed species, the Central California Coast steelhead, to unacceptably high levels of take via entrainment into the lake's pumps and pipes. This alternative was thus removed because although it would have achieved a number of Project goals and possibly created greater areas of tidal marsh, it would not have been the least environmentally damaging.

At the Ravenswood Ponds, Ponds R3, R5, and S5 were also considered for tidal marsh restoration, along with Pond R4. However, there is so little existing flood protection along the southern end of this pond cluster that opening all of the ponds to tidal flows would have created an unacceptable flood risk to the adjacent communities and to SR 84. Although it would be technically possible to provide large levees along this entire southern border, such added flood protection would need to be a fully engineered levee because there would be no salt pond area behind it to provide redundant levels of protection. That level of design and construction would have prohibitively high costs and would not be practicable for the Project to undertake.

Second, and as importantly, the Ravenswood Ponds receive regular use by nesting western snowy plover. Converting all of these ponds to tidal marsh would have resulted in a more serious loss of habitat for this federally listed species than would be prudent under the Project's AMP. There is a similar, though less severe constraint for small shorebirds. Therefore, by setting aside Pond R3 for plover and Ponds R5 and S5 for small shorebirds and dabbling ducks, the proposed Phase 2 actions would continue to achieve a mix of habitat enhancements for a wide range of wildlife species while also maintaining flood protection. This is a least environmentally damaging practicable outcome.

In Phase 2, habitat transition zones and islands would be built at the Alviso–Mountain View Ponds and the Ravenswood Ponds. In addition, habitat transition zones (but no islands) would be built at the Alviso-A8 Ponds. These are important habitat enhancement features that do necessitate fill in Waters of the U.S. and bring other impacts that should be discussed in turn. To consider habitat islands first: though not strictly necessary for tidal marsh restoration, habitat islands are necessary to meet the Project goal of restoring marshes while continuing to provide a mix of enhanced habitats for a range of wildlife species. They are also necessary to avoid overly affecting pond-dependent species that currently use the salt pond levees and allow for future monitoring and response actions under the Project's AMP. The full omission of habitat islands would risk causing significant impacts on these other species, which would not achieve the Project goal and would not be the least environmentally damaging.

The habitat transition zones are similar. Although they are not strictly necessary for tidal marsh restoration, they would speed and enhance it. As with the islands, their absence could result in a detrimental effect on a number of special-status species, especially small birds and terrestrial wildlife. The salt marsh harvest mouse and the California Ridgway's rail in particular would benefit from these transition zones and the range of cover and forage habitats they would provide. The transition zones would also enhance the Project's overall long-term flood protection in the face of sea-level rise and, critically, may be a key part of the Project's goal of successfully sustaining marsh habitat for many decades to come. Finally, and importantly, the habitat transition zones, though clearly made of fill placed in jurisdictional waters, are a kind of "beneficial fill" in the form of habitat enhancements; they should not be considered environmentally damaging, particularly in light of all of the benefits they provide. Their inclusion does not lead to a more environmentally damaging outcome, and their omission very well may do so.

The argument for the construction of ditch blocks is similar to the previous arguments for habitat transition zones and islands. These simple features are a way to avoid the environmentally damaging impacts of removing levee material from the ponds and finding off-site places to dispose of it. Instead, ditch blocks realize the environmentally beneficial impacts of using that material to speed the reaching of marsh plain elevation, and thus, achievement of a primary Project goal of tidal marsh restoration.

Managed Pond Alternatives

The Phase 2 actions include enhanced managed ponds at the Alviso-A8 Ponds and at three of the Ravenswood Ponds: R3, R5, and S5. The potentially environmentally damaging features of these managed ponds include water control structures, levee modification and deepening, and habitat transition zones.

The water control structures at all three of the managed ponds at Ravenswood are necessary to achieve the necessary management control of water circulation, elevation, and other conditions, and thereby maintain water quality goals. Further, the water control structures on Pond R3 and the channels to connect to Ravenswood Slough are specifically necessary to achieve the Project's goal of improving existing habitat for western snowy plover enough to offset the reduction in total habitat from making Pond R4 tidally influenced. Failure to include them would not result in a successful Project, would violate a number of goals, and would cause several different kinds of adverse impacts. Further, although different locations of water control structures are possible, they would not be as effective in achieving the intended control over water quality. The locations chosen were those that would make the best use of historic slough traces and potential connections to Ravenswood Slough and Flood Slough. Other locations would not reduce the already minor adverse impacts of the related fill and disturbance but would reduce the effectiveness of those features.

The modification of internal levees at the S5/R5 pond group and the excavation to deepen Ponds S5 and R5 would allow sufficient enhancement of these small ponds that they could be useful habitat for small shorebirds and dabbling ducks. This is a way of balancing the Project's potentially adverse impacts on pond-dependent species elsewhere, and such balancing is a key part of the Project's continued implementation of the already-approved AMP. The Project also considered other possible restoration uses of these ponds, as discussed above, but they all had flaws or constraints that would have led to more adverse impacts or failed to achieve Project goals as well. For example, early concepts included willow groves or tidal marsh in these ponds, but those were not feasible because of a lack of freshwater input or high flood risk, respectively. One subsequent alternative included operating them as intertidal mudflat, but this would have entailed far more risk of operational failure to achieve the desired habitat outcomes. Another alternative considered diverting stormwater runoff into these ponds as a way of reducing flood impacts in the neighborhood behind the Ravenswood pond complex, but this risked a number of different water quality violations.

The proposed habitat transition zones in the southern corners of the Alviso-A8 Ponds would bring the same kinds of benefits to this currently muted tidal managed pond group as discussed in the "Tidal Habitat Restoration Alternatives" section above. However, some of these benefits would be for different species and/or may not be fully realized until the Alviso-A8 Ponds are opened to tidal flows. Nevertheless, until that time, the fill associated with these features is a necessary and environmentally beneficial way to protect the southern levees here from the recent erosion they have been experiencing: more than 10 feet of horizontal loss has been resulted from erosion, and the cap of the landfill behind these ponds is now at risk. Other forms of protection are available, but these would be largely riprap and other forms of environmentally damaging fill. Instead, the habitat transition zones are beneficial features that are also a necessary step toward the future goal of making the Alviso-A8 Ponds fully tidal. Omitting these structures entirely would not achieve the Project goals and would likely allow the continued unintended erosion of existing levees.

Flood Management Alternatives

As discussed above, flood protection via levee improvements does necessitate fill, and thus, impacts to Waters of the U.S. and other resources. However, the proposed flood management components of the Phase 2 alternatives are limited to those that would be strictly necessary to allow tidal marsh restoration at the Alviso–Mountain View Ponds and the Ravenswood Ponds. Doing less extensive levee improvements at those pond clusters would fail to achieve the Project's goal of maintaining existing levels of flood protection and might also fail to fulfill legal requirements to not increase flood risk.

Other flood management alternatives could have enabled a different mix of habitat restoration outcomes; the reasons for not choosing those alternatives were discussed above. So, too, were the options of building wider levee improvements (i.e., wider base, more fill in waters, and no additional habitat restoration benefits). The actions proposed for Phase 2 provide efficient habitat restoration by matching many levee improvements with habitat transition zones wherever practicable to provide the largest area of transitional habitat, greater potential for sea-level rise adaptation, and the most erosion protection. The Phase 2 designs thereby maximize the restoration enabled by each levee improvement and are considered a critical component to determining the LEDPA.

No flood management alternatives are necessary at the Alviso-A8 Ponds or at the Alviso-Island Ponds. Thus, the inclusion of flood management alternatives there would have caused adverse environmental impacts in the form of fill in Waters of the U.S. that would not have led to the successful achievement of Project goals. An alternative with fill-added flood management at the A8 or Island Ponds would have violated the requirement to be the least environmentally damaging practicable alternative. Exclusion of flood control features at the A8 and Island Ponds in the Phase 2 Designs is considered to be a component of the LEDPA.

Public Access and Recreation Feature Alternatives

Increased and improved public access and recreation facilities are listed as one of the three primary Project goals. This is true, even though the public access and recreation components of Phase 2 alternatives are not strictly necessary to achieve the flood control and restoration goals. Public access is a goal in itself. Any alternative that would not include increases in public access features where practicable would not achieve one of the Project's fundamental purposes.

Unlike the restoration and flood management aspects of the Phase 2 actions, the public access features at the Ravenswood Ponds and the Alviso–Mountain View Ponds (public access features are not included in Phase 2 at the Alviso-A8 Ponds or the Alviso-Island Ponds) would not require fill or dredging or other potentially adverse impacts to Waters of the U.S.. These features would be placed only on existing levees, on levees that would be improved for flood protection, or in existing parks. This outcome is a conscious choice of the Phase 2 designs; the Project team did initially consider other practicable alternatives that included trails built on elevated boardwalks (e.g., at the southwestern corner of Pond A1 or the northwestern corner of Pond R4) or on spits that would have been constructed solely to host the trail (e.g., along the southern edge of Pond A1 or the northwestern corner of Pond R4). Those options would have added to the fill in Waters of the U.S. (though to different extents) while not achieving the Project goals any more fully than the less environmentally damaging options that were chosen instead.

Further, the locations and lengths of the various trails and public access features were chosen to minimize the possibility of adverse effects on wildlife by clustering them in areas already heavily used by people and that would leave undisturbed large areas of the Project ponds for sensitive wildlife. Alternatives were also proposed that had trails on existing levees, but that would have impaired habitat connectivity or the intended habitats of the intended wildlife species that would use habitats. The proposed levee-top trail proposed in the Draft EIS/EIR at the northwest corner of Pond R4 is an example of this; it was removed from the Preferred Alternative in the Final EIS/EIR. Additionally, the long trail on the eastern levee of Pond A2W was shortened so that it would provide access to a viewing platform on the edge of the South Bay, and it would not bring people too close to the habitat islands being built for the various bird species that use Pond A2W.

The Phase 2 actions proposed strike a balance between adding extensive new public access and recreation features while still providing large tracts of wildlife habitat. All of this illustrates that alternatives with more public access would not be "wildlife compatible" and/or would have necessitated more fill in Waters of the U.S.. They would therefore not be the least environmentally damaging. The addition of public access features in Phase 2 designs meet the Project goals with the least possible impact to wildlife and without adding new fill to Waters of the U.S. and are considered to be a component of the LEDPA.

6.2 Significant Degradation of Waters of the United States

Except as provided under Section 404(b)(2), no discharge of dredged or fill material shall be permitted which will cause or contribute to significant degradation of the waters of the United State. Findings of significant degradation related to the proposed discharge shall be based upon appropriate factual determinations, evaluations and tests required by Subparts B and G, after consideration of Subparts C-F, with special emphasis on the persistence and permanence of effect outlined in those subparts.

Under these Guidelines, effects contributing to significant degradation considered individually or collectively include significantly adverse effects of the discharge of pollutants: on human health or welfare, including but not limited to effects on municipal water supplies, plankton, fish, shellfish, wildlife, and special aquatic sites; on life stages of aquatic life and other wildlife dependent on aquatic ecosystems including the transfer, concentration, and spread of pollutants or their by-products outside of the disposal site through biological, physical, and chemical processes; aquatic ecosystem diversity, productivity, and stability. Such effects may include, but are not limited to, loss of fish and wildlife habitat or loss of the capacity of a wetland to assimilate nutrients, purify water, or reduce wave energy, or; on recreational, aesthetic, and economic values. (33 CFR Part 230, Section 230.10, Vol. 45, No. 249, 24 December 1980).

In keeping with the guidance cited above, the Project's Phase 2 actions were reviewed for potential short-term and long-term effects of the proposed discharge of dredged or fill material on the physical, chemical, and biological components of the aquatic environment in light of Subparts C–F of the Guidelines. As described below, such factual determinations of effects of each proposed discharge included:

- physical substrate determinations;
- water circulation, fluctuation, and salinity determinations;
- suspended particulate/turbidity determinations;
- contaminant determinations;
- aquatic ecosystem and organism determinations;
- proposed disposal site determinations;
- determination of cumulative effects on the aquatic ecosystem; and,
- determination of secondary effects on the aquatic ecosystem.

6.2.1 Factual Determinations

6.2.1.1 Physical Substrate Determinations

<u>Substrate elevation and slope</u>. The Project area includes former salt-production ponds of varying water depths and seasonal changes, levees and levee-top roads, fringing marshes, sloughs, mudflats, enhanced managed ponds that were part of a previous Project phase, transitioning tidal marshes that were part of a previous Project phase, closed landfills, city parks and their associated recreational facilities and trails, and PG&E infrastructure. Of these, the substrate elevation and slopes most relevant to this section of this document are the former salt ponds, the previously modified ponds and marshes, the existing fringing marshes, the levees, and the adjacent sloughs and mudflats.

The vegetation communities in the Project area include tidal marsh, restored salt pond, abandoned salt pond, and levees. Tidal marsh communities can be segregated into three elevation zones: lower tidal marsh (between mean sea level and MHW [3.3 to 5.5 feet North American Vertical Datum (NAVD88)]), middle tidal marsh (between MHW and MHHW [5.5 to 6.0 feet NAVD88]), and upper tidal marsh (from MHHW and up several feet [greater than 6.0 feet NAVD88]). Those elevations are approximate and conceptual; there are many local variations in slope and hydrology that shift the elevation ranges at which different marsh communities and plant species may form. The lower portions of the levees and habitat transition zones support upper tidal marsh species; higher elevations, above tidal influence, support riparian and upland species.

The existing pond bottom elevations at the Alviso–Mountain View Ponds are below lower tidal marsh, near mean lower low water at about 0–1 foot NAVD88. The existing pond bottom elevations at the Ravenswood Ponds are closer to lower tidal marsh elevation at 4–5 feet NAVD88. The Alviso-Island Ponds vary between lower and middle tidal marsh elevations around 5 feet NAVD88. The pond bottoms at the Alviso-A8 Ponds are deeper still at 0 to -1 foot NAVD88, but would not yet be exposed to tidal flows.

Other than former slough channels and existing borrow ditches, the slopes of the pond bottoms are relatively flat. The former salt-production pond levees and berms are sloped to varying degrees.

Habitat restoration would result in a substantial increase in subtidal habitat, intertidal mudflat, low marsh, middle marsh, and high marsh habitats over the long term at all three Phase 2 pond clusters that would include tidal flows. At the fourth, the Alviso-A8 Ponds, the habitat transition zones are proposed to prepare these ponds for future conversion from managed, muted tidal ponds into fully tidal areas.

Sediment type. With implementation of the Project, the sediment type would be similar to that found in the Project area now, except where upland fill material would be placed to improve levees and build transition zones or islands. That material would be screened per the protocols of an updated Quality Assurance Program Plan (QAPP) that was accepted by the San Francisco Bay RWQCB. A similar QAPP was used for the screening of imported fill material for restoration of Bair Island, another part of the Refuge. This QAPP is specific to the Phase 2 ponds.

Fill/dredged material movement. All of the material from on-site cut activities such as levee breaching, lowering, or removal and channel excavation would be used for features such as habitat transition zones, nesting islands, and ditch blocks; however, a large amount of material would need to be imported from off-site upland excavation projects. The details of the material volumes and placement methods are described in the Technical Project Description (Appendix A). Once placed and compacted, little movement of the materials is expected.

Physical effects on benthos. Construction of the Project's water control structures, bridges, and levee improvements, as well as ongoing maintenance of all of these features, would require movement of substrate, which could disturb local benthic organisms. However, recolonization of the area by benthic organisms is expected to occur shortly after construction is completed. Moreover, benthic organisms are adapted to changing salinity, as long as the salinity does not increase above annual maximums. Therefore, the Project would not have a significant effect on benthic organisms.

Other effects. Despite best efforts to prevent such outcomes, as tidal water is brought into the ponds, fish or zooplankton could be entrained into the ponds. See Section 6.2.1.5, "Aquatic Ecosystem and Organism Determinations," below.

6.2.1.2 Water Circulation, Fluctuation, and Salinity Determinations

Current patterns and water circulation. No work would occur in any river currents. Near pond clusters that would include breaches and/or water control structures as part of Phase 2, the associated sloughs and creeks (Mud Slough, Coyote Creek, Stevens Creek/Whisman Slough, Permanente Creek/Mountain View Slough, Charleston Slough, Flood Slough, Ravenswood Slough, and West Point Slough) may not have to be dredged as regularly as a result of the Project because of an expanded tidal prism. Tidal channels on and adjacent to restored marshlands would be larger after restoration than under existing conditions, increasing the flood conveyance capacity of these channels. The spatial distribution and extent of tidal mudflats and fringing marshes outside of the Phase 2 ponds may change after implementation of Phase 2; however, based on changes following the Phase 1 actions and others taken in the Initial Stewardship Plan (Life Science! 2003), the net change is expected to be relatively small, and a new equilibrium would be reached relatively quickly.

Normal water fluctuation. Breaching the levee system would open Ponds A1, A2W, and R4 to daily tidal flows that may result in periods of time when the ponds are deeper than under existing conditions. In all of these cases, the water levels in those former salt pond units would change by several feet each day. In addition, Pond A19 would be opened to tidal flows from a waterway to which it does not currently connect, but because it is already tidal, no water level changes would occur. The water levels in the Alviso-A8 Ponds would not change as a result of Phase 2 actions. To prevent channel erosion and potential damage to adjacent levee systems outside of the Project area, the Project sponsors would repair unintended levee breaches if they pose a potential hazard to levees outside of the Project area.

Salinity and other water quality determinations. The Project would not change the clarity, color, odor, or taste of water. Elevated levels of salinity would occur only on a short-term basis, primarily after breaching of Pond R4 and installation of water control structures on the rest of the Ravenswood Ponds. These are all seasonal ponds that are dry salt pannes most of the year, and connecting them to the Bay through the surrounding sloughs is expected to temporarily increase salinity. This is a necessary effect to reconnect these ponds and achieve the resultant increases in aquatic habitats. Similarly, pH, nutrients, and other parameters are not expected to adversely affect water quality. Water quality standards would be adhered to (see below); these effects are expected to be nominal.

6.2.1.3 Suspended Particulate, Turbidity, and Water Quality Determinations

Expected changes in suspended particles and turbidity levels. Construction activities may cause temporary water quality impairment from discharges to nearby sloughs and other waterways. If allowed to occur when sensitive organisms are present, discharges of soils and associated contaminants could cause adverse changes in turbidity, aquatic habitat sedimentation, or exposure to toxic substances. The extent of potential environmental impacts depends on the erodibility of soil types encountered, types of construction practices, extent of disturbed area, duration of construction activities, timing of precipitation, and proximity to drainage channels. However, the Project sponsors will obtain authorization from the San Francisco Bay RWQCB under Waste Discharge Requirements, once issued, to construct proposed elements of the Project. The Project sponsors would prepare a Stormwater Pollution Prevention Plan (SWPPP) and require all construction contractors to implement BMPs identified in the SWPPP for controlling soil erosion and discharges of other construction-related contaminants, including from refueling stations. In addition, almost all construction activities would occur inside the ponds before they are breached, which would prevent releases to adjacent sloughs or creeks.

Short-term channel incision would likely result in increased sediment suspension and water turbidity downstream of areas where erosion is taking place. However, appropriate site-specific designs would help ensure that this effect would be comparatively minor and that it would decrease and disappear as the system equilibrates as part of habitat restoration.

The Project would use the following BMPs as appropriate to minimize these localized potential impacts on water quality:

- Baffles, fiber rolls, or hay bales
- Construction of temporary containment berms
- Erosion control measures such as straw application or hydroseeding with native grasses on disturbed slopes
- Floating sediment booms and/or curtains

Compliance with applicable water quality standards. All managed ponds would comply with water quality discharge requirements and objectives set by the San Francisco Bay RWQCB. In addition, BMPs identified in the SWPPP to be prepared by the Project sponsors, and the terms and conditions of the BOs and other permits, would be employed to limit turbidity and sediment transport. Further, because of water quality concerns, the Project chose not to incorporate into Phase 2 a related project, the Bayfront Canal and Atherton Channel Project, which would have directed peak stormwater runoff into Ponds R5 and S5 at Ravenswood. This decision was based on the lack of sufficient water quality information about the runoff and the potential for contaminated water to be directed into the restoration area. There was not enough information to determine whether or not a water quality standard or a San Francisco Bay RWQCB policy would be violated, so it was removed. It may be incorporated into the Project at a later date if sufficient San Francisco Bay RWQCB–approved water quality monitoring and control systems are developed, approved, and implemented. The necessary environmental permitting processes would be implemented at that time. Note that the Phase 1 Project actions had few measurable water quality impacts, and those that occurred were associated with mercury releases from the Alviso-A8 Ponds, after it was opened to muted tidal flows. Phase 2 would not include any similar or analogous changes to circulation in the Alviso-A8 Ponds or other areas known to be contaminated with mercury or other pollutants.

Contaminant determinations. The results of testing indicate that organic chemicals (including pesticides, polychlorinated biphenyls, dioxins, and semi-volatile organic compounds) are encountered only rarely in the Project area. When detected, they are present in concentrations well below hazardous materials thresholds.

Conventional construction activities would include transporting construction materials, such as fuels and oils, and using heavy machinery. Fuel and other hazardous materials associated with the operation of the machinery would have to be transported through the sloughs for construction activities, increasing the potential for accidental releases of these materials into the environment. However, mitigation has been adopted to reduce this impact to a less-than-significant level.

Project construction activities may cause temporary water quality impairment because disturbed and eroded soil, petroleum products, and miscellaneous wastes could be discharged to nearby water and/or drainage channels. Construction during the winter rainfall season could increase the potential for discharges of contaminated stormwater runoff from construction sites; discharge of contaminated stormwater constitutes a violation of the water quality objectives specified in the *Water Quality Control Plan for the San Francisco Bay Region* (Basin Plan).

However, as mitigation of these effects, and as described under "Expected changes in suspended particles and turbidity levels" above, the Project sponsors would prepare a SWPPP and require all construction contractors to implement BMPs identified in the SWPPP for controlling soil erosion and discharges of other construction-related contaminants. Construction would be performed during the dry-weather season to the maximum extent possible.

Other contaminants. More specific water and sediment quality concerns also accompany Project activities. As discussed below, these involve mercury mobilization and low DO in managed ponds and releases from these ponds.

Mercury-related activities. Sediments in some parts of the Project area, particularly in and along Alviso Slough, contain high levels of mercury contamination. Remobilization of mercury-contaminated sediments into the water column, either directly (e.g., during excavation of pilot channels) or indirectly (through increased sediment scour after a pond is opened to tidal action), can lead to exceedance of water quality objectives for mercury and result in adverse effects on South Bay biota. The results of the mercury monitoring study conducted for Phase 1 have shown that mercury levels in water, fish, and bird eggs did spike after the Alviso-A8 Ponds were opened to muted tidal flows, but that the levels quickly returned to background levels. The plan is for the notch to remain open year-round, pending ongoing monitoring of potential steelhead-entrainment risks (a separate question from that of mercury contamination) and subsequent approval to do so from NMFS.

For mercury, the Project would attempt to avoid causing or contributing to mercury levels that would cause an exceedance of 0.2 part per million (ppm) wet weight in large fish and 0.03 ppm wet weight in small fish, both in the Project area and in the Bay. These thresholds are driven by the Basin Plan's water quality objectives. The water quality attainment strategy in the Basin Plan and the total maximum daily load plan for mercury in waters of the Guadalupe River watershed also require that activities avoid releasing sediments into the Bay that have a median mercury concentration greater than 0.2 ppm dry weight, and that existing water quality objectives for mercury be attained.

The Phase 2 actions would include work within the Alviso-A8 Ponds, immediately adjacent to and also connected to the Guadalupe River/Alviso Slough (and thus the Guadalupe River watershed) through the reversible notch that was installed in Phase 1. However, the proposed action would consist of building habitat transition zones with the pond and would not generate any new connections or otherwise change the management of the pond's notch or culverted connections. The in-pond work could be conducted with the notch closed to limit possible spread of mobilized mercury or other contaminated sediments.

Further, the other Phase 2 pond clusters either are already open to tidal flows (Alviso-Island Ponds) or are farther north in the Bay, away from the areas known to be most contaminated with mercury (Ravenswood Ponds and Alviso–Mountain View Ponds).

As was the case in Phase 1, protective actions would be implemented as adaptive management actions if monitoring of mercury levels indicates unacceptable levels in sediments, the water column, or biotic tissues. These activities may include:

- adding an upper layer of clean sediment in managed ponds to decrease mercury concentrations in resuspended sediments;
- placing berms or islands in ponds to decrease fetch length and decrease wind-driven resuspension of sediments; and,
- removing mercury-contaminated sediments from areas of particularly high concentrations, or areas where mercury-laden sediments are being scoured and resuspended.

Activities related to low DO. Dissolved oxygen is depleted in pond and marsh environments by respiration and chemical and microbial aerobic processes. DO is replenished in the system through photosynthesis and oxygen transfer from the atmosphere, termed "reaeration." Microbial degradation of organic matter in pond and marsh sediments can be a substantial oxygen demand in the system. This sediment oxygen demand is dependent on the amount of organic matter available to decay. Death of algae and aquatic organisms contributes to the supply of organic matter. Respiration may be a substantial oxygen demand if algae and organism populations are large. Algae are net oxygen consumers at night, when wind-driven reaeration is also low. This creates periods of low DO. DO is then replenished during the day when the algae photosynthesize instead of respiring and wind-driven reaeration increases. Waters flowing slowly through a pond will not be as well mixed as faster-moving waters. Stagnant conditions lead to anoxic waters as oxygen demands exceed reaeration. Potentially significant impacts resulting from low DO include depressed species diversity, fish kills and death of other aquatic organisms, and odor problems.

For water discharges from the Project area, the goal of the Project is to avoid discharges that result in DO less than 5 milligrams per liter (mg/L) in the Bay, which is established by the regional water quality regulations. In managed ponds in the Project area, where lower DO levels are expected to occur more commonly, the Project would attempt to avoid DO levels less than 2 mg/L. Several activities would be undertaken to prevent DO levels in managed ponds and releases from these ponds from becoming too low or increase DO levels when monitoring indicates that they are too low. These activities include:

- decreasing hydraulic residence time to counter algal growth and increase reaeration;
- altering levee configurations to increase wind-driven reaeration and/or improve pond circulation;
- decreasing water depth to counter sediment oxygen demand;
- installing baffles to redirect flow from low-DO areas or discharge water from high-DO areas; and,
- installing passive or active re-aeration systems.

The changes to ponds proposed as part of Phase 2 actions would generally always increase water circulation and mixing, which would help alleviate problems with low DO. Greater mixing decreases algal productivity and prevents the kinds of algal blooms that reduce DO levels in managed ponds and discharges from these ponds to sloughs and to the Bay. This is true at the Alviso–Mountain View Ponds and the Alviso-Island Ponds, and in Pond R4 where circulation would increase. At the Alviso-A8 Ponds, the proposed action would neither increase or decrease circulation and should not affect DO at all. At the proposed Phase 2 managed ponds at Ravenswood, the proposed water control structures would provide substantial management control over the water quality in the shallow-water ponds that R5 and S5 would become and over the water quality in the borrow ditches and historic slough channels inside of Pond R3. Thus, water quality would improve there.

6.2.1.4 Terrestrial Ecosystem and Organism Determinations

Short-term disturbance. Implementation of the Project may result in a temporary reduction in sensitive communities and habitat for special-status plant species. Although nonnative smooth cordgrass (*Spartina alternifolia* and its hybrids) and/or non-native peppergrass (*Lepidium latifolium*) could become established, invasive exotic plant species would be monitored and managed to minimize or prevent the establishment of the species in the area. The previous success of the Invasive *Spartina* Project (CSCC and USFWS 2003) in near eradication of this species from the Refuge ponds demonstrates that such controls are feasible.

Construction may affect several federally listed and/or state-listed wildlife species: California Ridgway's rail, California least tern, western snowy plover, salt marsh harvest mouse, Central California Coast steelhead, green sturgeon, and longfin smelt. Avoidance measures similar to those successfully implemented in Phase 1 would be modified as needed and adopted to reduce these impacts to less-than-significant levels. Reestablishment of tidal connectivity as a result of habitat restoration could expose wildlife to contaminants in sediments and waters; however, this impact would not be significant because the Project would substantially increase suitable habitat and increase habitat values.

Long-term benefit. The Phase 2 Project actions would result in a long-term net increase in sensitive communities and in the size, connectivity, and quality of habitat for most of the aforementioned federally listed species and other special-status species. The Project would also result in a substantial long-term increase in low and middle marsh habitat suitable for special-status wildlife species and an overall increase in the availability and quality of marsh fringe aquatic habitats. Although there would be a loss of habitat as part of the restoration activities (e.g., converting the salt pannes in Pond R4 used by western snowy plover to tidal marsh), concurrent improvements would be made to habitats for those species (e.g., retaining Pond R3 as salt panne and adding features to improve the water quality in the borrow ditches and slough traces in which the plover forages). The ESA Section 7 consultation being undertaken for these species will address these and other similar concerns and keep potential adverse effects below significance thresholds.

6.2.1.5 Aquatic Ecosystem and Organism Determinations

Short-term disturbance. During construction, the placement of cofferdams and other activities could result in entrainment of fish and other aquatic organisms. Construction noise and other forms of disturbance could similarly affect these organisms. Implementation of seasonal avoidance work windows may successfully avoid affecting migrating steelhead, but green sturgeon and longfin smelt have the potential to be present year-round. However, the use of exclusion nets and other mechanisms to flush fish out of cofferdams before they are sealed would limit this effect. Further, whenever practicable, in-water construction activities—especially pile driving in the few places where it is needed—would be done during low tides to limit the distance over which harmful noise levels would propagate. In regard to marine mammals, an analysis conducted for the loudest Project activity (the pile driving to support the bridge abutments on the eastern levee of Pond A2W) has shown that no Incidental Harassment Authorization under the Marine Mammal Protection Act is needed because harmfully high noise levels would not reach the Bay itself.

Once construction is complete, fish could also be entrained in the enhanced managed ponds or the restoring marshes. There, they could be subjected to detrimental water quality conditions and predation by non-native species. Fish that could be affected include northern anchovy, leopard shark, starry flounder, English sole, Chinook salmon, and other elasmobranchs (big skate, soupfin shark, and spiny dogfish). However, the number of fish entrained and proportion of the species' populations affected is likely small. Further, such entrainment would be minimized in a manner consistent with the terms and conditions of take authorization provided in the BO (for those species covered by it) and in other documents addressing Refuge management operations.

Long-term benefit. The Project would result in the reestablishment of natural features, such as cordgrass, tule marsh, and shallow and deep-water habitats, which would reactivate and maintain ecological processes that sustain healthy fish, wildlife, and plant populations. There would be a greater variety of slough channel sizes, a large increase in slough habitat, and greater connections among the Bay, its associated sloughs and creeks, and the tidal salt marsh, which would be beneficial to estuarine fish.

6.2.1.6 Proposed Disposal Site Determination

The release of saline water from the ponds would comply with waste discharge requirements issued by the San Francisco Bay RWQCB and stipulations imposed by USFWS and NMFS. See also "Compliance with applicable Water Quality Standards" in Section 6.2.1.3, "Suspended Particulate, Turbidity, and Water Quality Determinations," above.

6.2.1.7 Determination of Cumulative Effects on the Terrestrial and Aquatic Ecosystem

Terrestrial. Implementation of the Phase 2 actions and other restoration projects in the vicinity may result in a temporary reduction in sensitive communities and habitat for special-status plant species, although longer-term increases above the pre-Project conditions are expected. It is considered unlikely that potential short-term effects from multiple projects would coincide such that the viability of sensitive communities or any one special-status plant species would be threatened in the region. Although non-native smooth cordgrass and/or peppergrass could become established, invasive exotic plant species would be monitored and managed to minimize or prevent the establishment of the species in the area. As noted above, the previous success of the Invasive *Spartina* Project (CSCC and USFWS 2003) in the near eradication of this species from the Refuge ponds demonstrates that such controls are feasible.

In addition, depending on which other restoration/mitigation projects are implemented in the region, there could be either an increase or a decrease in open-water habitat for migratory shorebirds and waterfowl; proposed monitoring of the use of such habitat could provide important direction for future adaptive management decisions.

Through the addition of habitat transition zones, the Phase 2 actions would also result in a long-term increase in lower and middle marsh habitat suitable for special-status wildlife species and an overall increase in the availability and quality of marsh fringe aquatic habitats throughout the Bay Area. The resulting reestablishment of tidal exchange between restored marshlands and waters of the Bay is expected to cause the quality of water and sediments in the ponds to become closer to the quality of water in the Bay; the levels of some constituents are expected to increase and others to decrease.

On a regional level, contaminants may have an adverse effect on biological resources, including a reduction of reproductive success at multiple levels of the ecosystem, immune-system effects, and overall reduced population viability. However, the U.S. Geological Survey and other Project-funded researchers, as well as Refuge staff, will continue to monitor conditions at the Project sites. The Project sponsors will continue to implement the AMP and contribute to additional mitigation of any regional problems.

Aquatic. The Project's Phase 2 actions, in conjunction with other projects, are expected to result in an overall increase in the availability, and ultimately the quality, of marsh fringe aquatic habitats and associated channels throughout the Bay Area. Nursery habitat for many species would be greatly enhanced by the implementation of this and other restoration efforts.

6.2.1.8 Determination of Secondary Effects on the Aquatic Ecosystem

Marsh scour. Restoration of tidal action to former salt production ponds would result in local increases in tidal prism. An increase in the tidal prism is expected to result in a loss of fringing marsh and mudflats and channels. As noted in Section 5.2, "Fill and Excavation Activities Proposed to Be Conducted in Waters of the United States," some scour of nearby tidal mudflats and channels from increased tidal prism is expected. The total area of this effect is expected to be less than a few dozen acres. This is based on the very small amounts of mudflat scour from Phase 1 activities, which were conservatively projected at 200 acres and were subsequently observed to be far less than that.

6.2.1.9 Potential Effects on Human Use

Municipal and private water supply. The Project would not affect any municipal or private water supply.

Recreational and commercial fisheries. Commercial and recreational fisheries would not be adversely affected by the Project. As species populations and composition increase, recreational use of the site for fishing is expected to increase.

Water-related recreation. Water-related recreational opportunities are expected to improve, thereby increasing public use of the site, as species populations and composition increase as a result of the Project. Specifically, recreational use of some of the Phase 2 sites for kayaking, birdwatching, hunting, and fishing is expected to increase. The addition of viewing platforms, new trails and trail connectivity, and the extension of the Bay Trail and spurs will further increase recreational use of the area.

Aesthetics. Construction activity associated with the Project would temporarily change the visual character of the area; however, it is anticipated that areas disturbed by construction would be returned to pre-Project conditions or better at the end of the proposed construction activities. Visual resources would be beneficially affected by the restoration of habitat as the improvement of habitat quality would increase populations of wildlife species, making the chance of seeing wildlife more likely. The Project would not create any nighttime glare or impede the quality of the scenic vista.

Parks, National and Historical Monuments, National Seashores, wilderness areas, research sites, and similar preserves. The Alviso and Ravenswood pond complexes are located within the Refuge, which is owned and managed by USFWS. USFWS, CDFW, and the Coastal Conservancy are Project sponsors, and the Project is consistent with their use and management of the site. Proposed alignments of the Bay Trail spine and various spur trails are located within the Project area; implementation of the Project would not conflict with the Bay Trail and would instead improve on the existing degree of completeness.

6.2.2 Finding of Compliance or Noncompliance with the Restrictions on Discharge

In accordance with the Guidelines, the Factual Determinations presented above were used to make findings of compliance or non-compliance with restriction on discharge in Section 230.10. The determination of effects of each proposed discharge included the following:

Finding 1. The Section 404(b)(1) Guidelines were not substantially adapted relative to this evaluation.

Finding 2. The Project, of which the Phase 2 actions are a component, is the result of extensive planning and screening of potential options. The long-term goal of the Project is to produce a natural, self-sustaining habitat that can adjust to naturally occurring changes in physical processes with minimum ongoing intervention. This goal would be met by designing and engineering a restoration project that would restore tidal marsh and enhance managed ponds in a way that would maximize wildlife habitat diversity while maintaining flood protection and adding public access features. The proposed fill, discharge, and dredge necessary to achieve these goals have been designed to maximize beneficial environmental effects and increase the quality and amount of aquatic habitat on the site compared to existing conditions. The proposed fill and discharge would result in a small adverse impact in terms of lost total Waters of the U.S. (i.e., where the uppermost portions of the habitat transition zones, islands, and raised levees would be above MHW). However, the overall quality and ecological value of the aquatic habitat would increase substantially because the overwhelming majority of the change would be from open waters to tidal marsh wetlands and/or from seasonally dry salt pannes (currently unavailable to aquatic species) to tidal marsh wetlands and enhanced managed ponds. These changes are further designed to and expected to increase the South Bay's resilience to sea-level rise and the higher tides expected in the coming decades. Therefore, implementation of the Project would result in a less adverse impact on the aquatic ecosystem than the No-Project Alternative. It would also result in a more beneficial and sustainable shoreline than other Project alternatives that did not include such extensive transition zones and levee improvements.

Finding 3. The Project would not violate applicable state water quality standards. To minimize adverse effects, the Project has been designed in compliance with resource agency requirements; in addition, water quality monitoring would be conducted to protect the aquatic resources of the creeks and sloughs adjacent to the Project.

Finding 4. The Project would not violate any applicable toxic effluent standard or prohibition under Section 307 of the Clean Water Act.

Finding 5. In general, long-term impacts of the habitat restoration on endangered species and their habitats would be beneficial. Construction may temporarily affect federally listed and state-listed plant and wildlife species. Mitigation has been adopted to reduce these impacts to less-than-significant levels. Most federally listed species would realize a large net increase in the amount and quality of their habitats as well as better connectivity between the sections of their habitats. One area of habitat loss for one species, the western snowy plover, is expected, even as an equally large area immediately adjacent to that is being enhanced and improved for that species.

Finding 6. The Project would not violate any requirement imposed by the Secretary of Commerce to protect marine sanctuaries designated under Title III of the Marine Protection, Research, and Sanctuaries Act of 1972 (16 USC 1431–1445). All materials dredged during Project operations would be beneficially re-used on-site.

Finding 7. Phase 2 of the Project would not result in significant adverse impacts on human health and welfare, including effects on municipal and private water supplies, plankton, fish, shellfish, wildlife, and special aquatic sites; on life stages of aquatic life and other wildlife dependent on aquatic ecosystems; on aquatic ecosystem diversity, productivity, or stability; or on recreational, aesthetic, or economic values.

Therefore, Phase 2 of the Project would not cause or contribute to significant degradation of Waters of the U.S..

Finding 8. The Project would result in a long-term benefit to aquatic ecosystems. Adverse impacts could result in the short term from construction activities and from incremental losses of low-quality former salt-production ponds and small reductions in Waters of the U.S.. However, mitigation measures would be implemented to reduce the construction-related impacts to less-than-significant levels; these measures include installing cofferdams or other barriers to decrease short-term water quality effects. Further, the large increases in the areas and the quality of connected marshes and other intertidal and aquatic habitats are considered self-mitigating features of the Project Phase 2 designs.

Finding 9. The proposed site for the discharge of dredged and fill material for the Project complies with the Section 404(b)(1) Guidelines.

6.3 Minimization of Potential Impacts

> *Except as provided under Section 404(b)(2), no discharge of dredge or fill material shall be permitted unless appropriate and practicable steps have been taken which will minimize potential adverse impacts of the discharge on the aquatic ecosystem.* (33 CFR Part 230, Section 230.10, Vol. 45, No. 249, 24 December 1980).

Actions to minimize adverse effects of the proposed fill activities were reviewed during site design and incorporated into the Project description (33 CFR, Part 230, Subpart H, Sections 230.70 through 230.80). Specific actions applicable to the Project include:

- timing fill placement and other major construction activities to minimize impacts on wildlife species;
- selecting a restoration scenario that would protect developing tidal marsh wetlands from wave action of sufficient strength to impair their formation;
- conducting fill placement, pond bottom and channel excavation, and other sediment-disturbing activities before ponds are breached, or as far away from existing breaches as possible; and,
- selecting a restoration plan that would have the fewest adverse potential impacts on existing Section 404 Waters as possible.

The full list of Project-wide mitigation measures is presented in the Technical Project Description(Appendix A).

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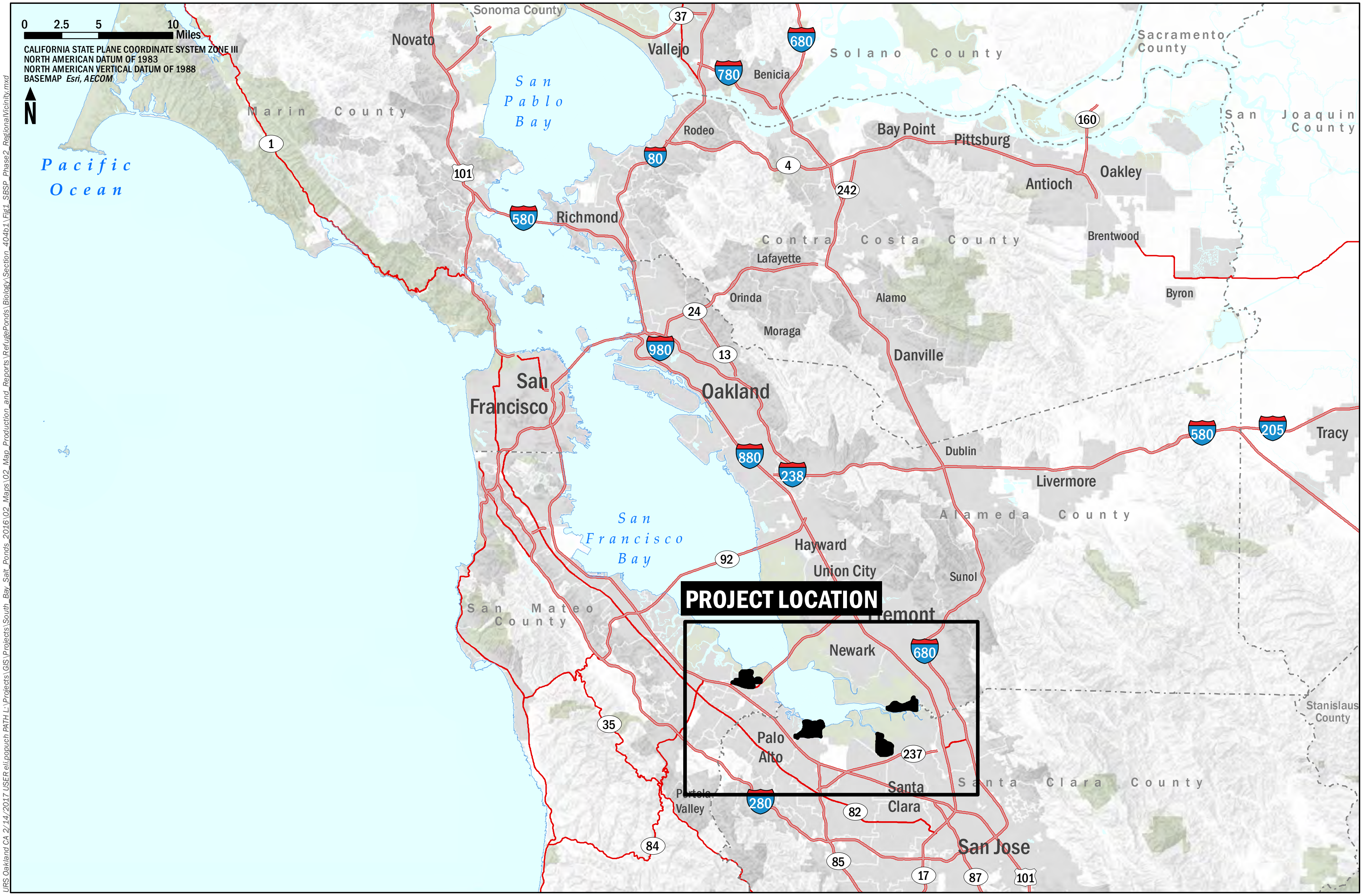

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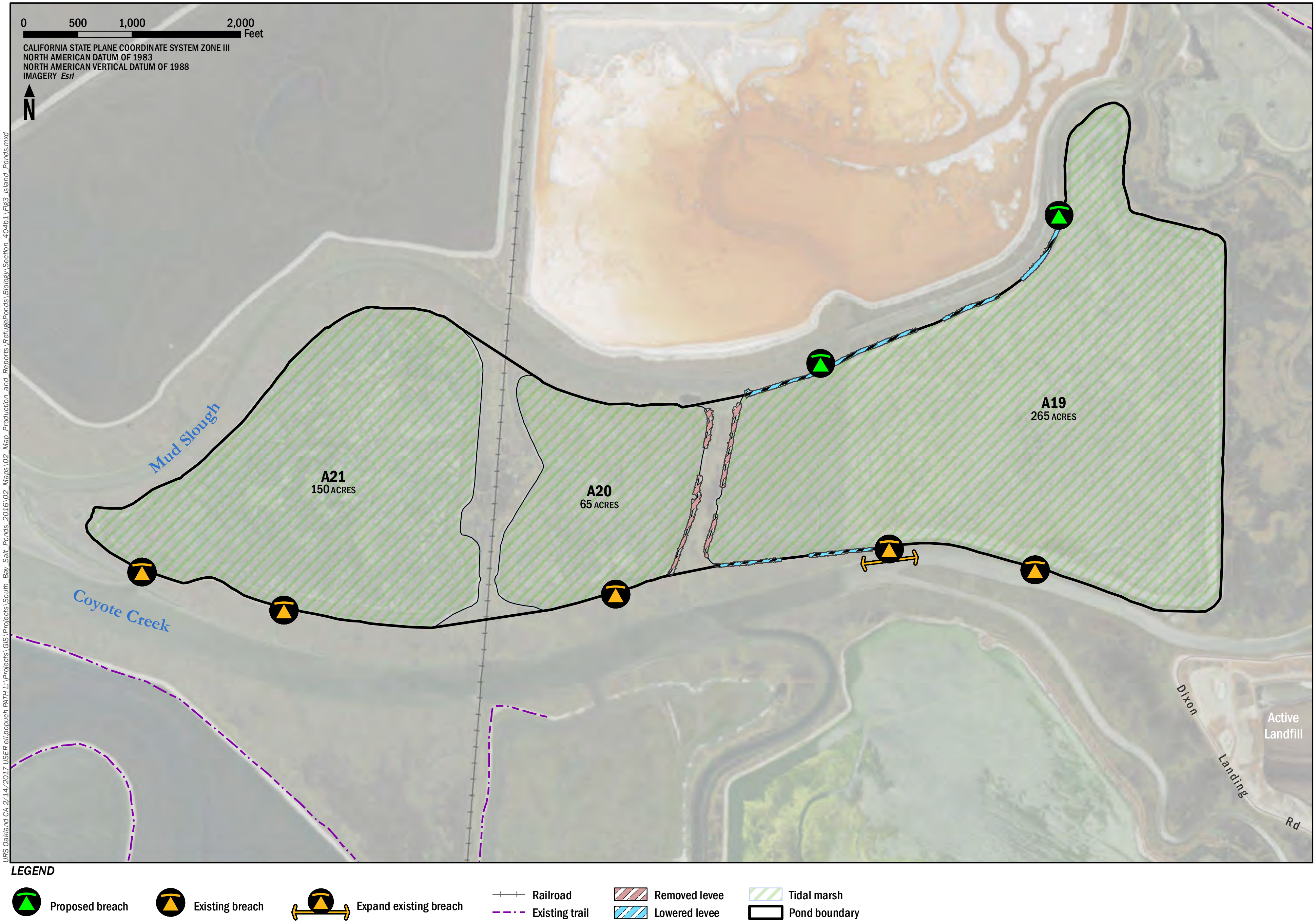
AECOM
South Bay Salt Pond Restoration Project

Figure 1
SBSP Phase 2 Regional Location

AECOM
South Bay Salt Pond Restoration Project

Figure 2
SBSP Phase 2 Project Sites



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South Bay Salt Pond Restoration Project

Figure 3

Alviso Island Ponds

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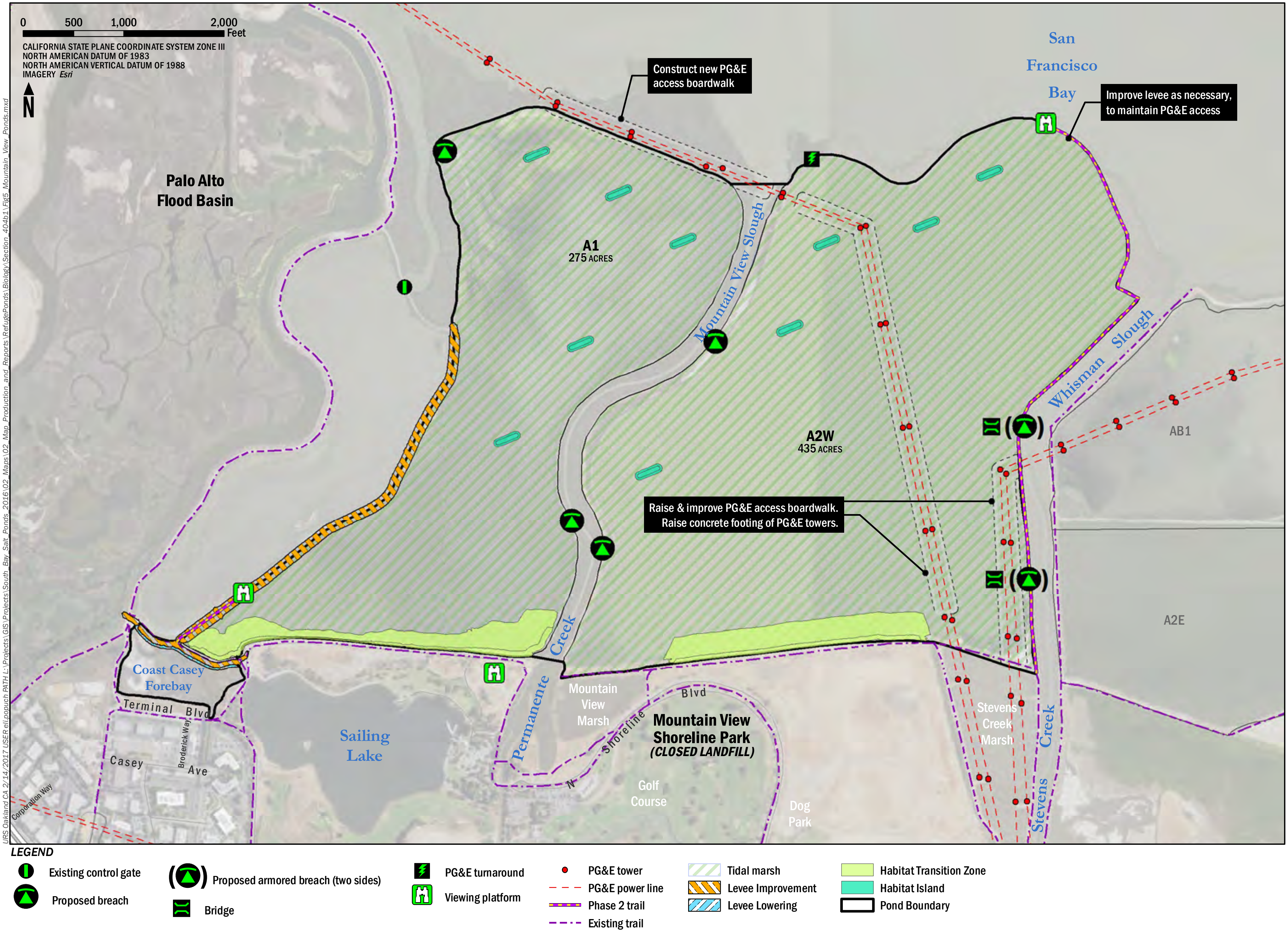
LEGEND

- Existing reversible armored notch
- Railroad
- Existing trail
- Pond boundary
- Habitat Transition Zone

AECOM
South Bay Salt Pond Restoration Project

Figure 4
Alviso A8 Ponds



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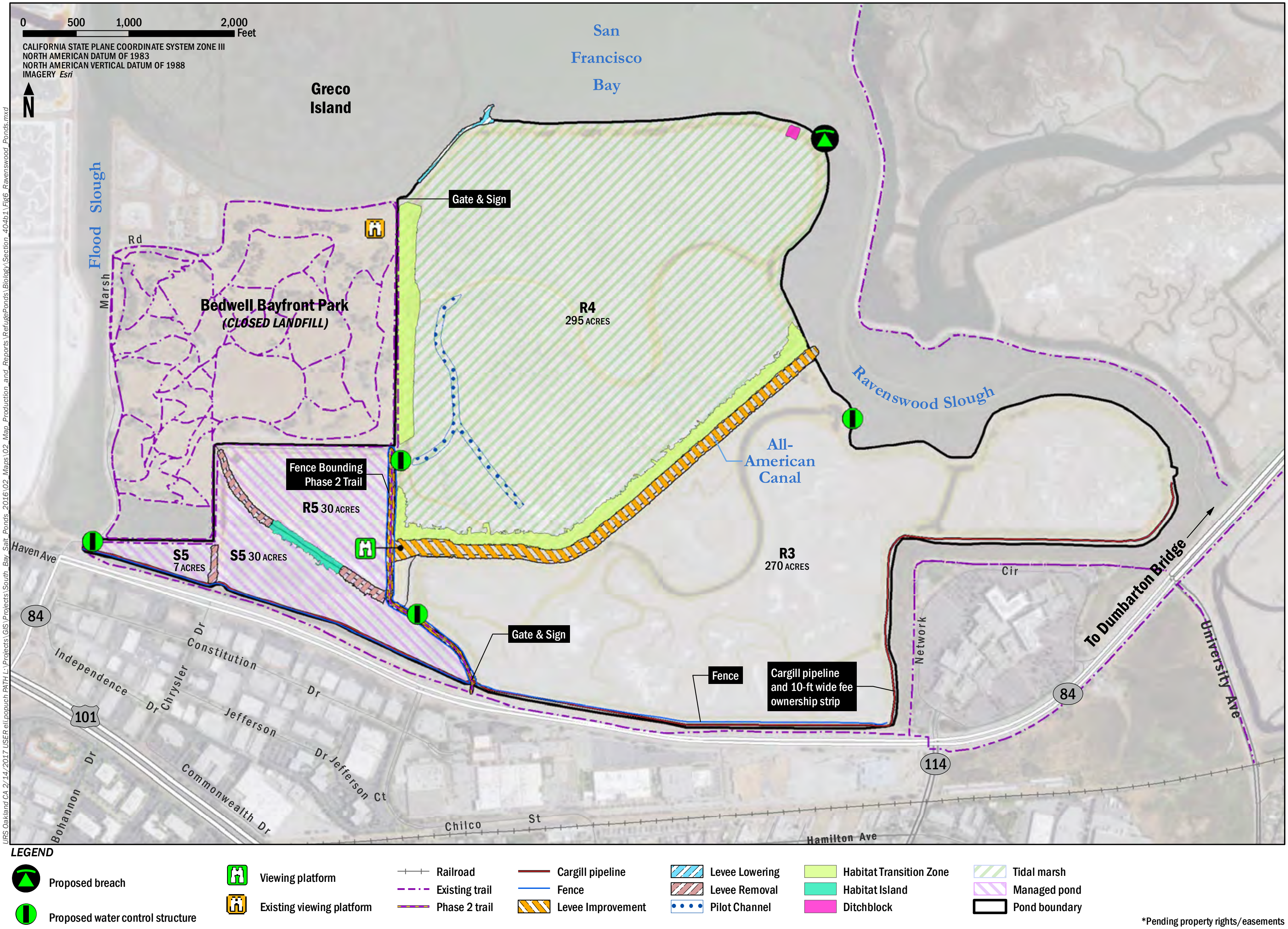
South Bay Salt Pond Restoration Project

Figure 5

Alviso-Mountain View Ponds



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South Bay Salt Pond Restoration Project

Figure 6
Ravenswood Ponds

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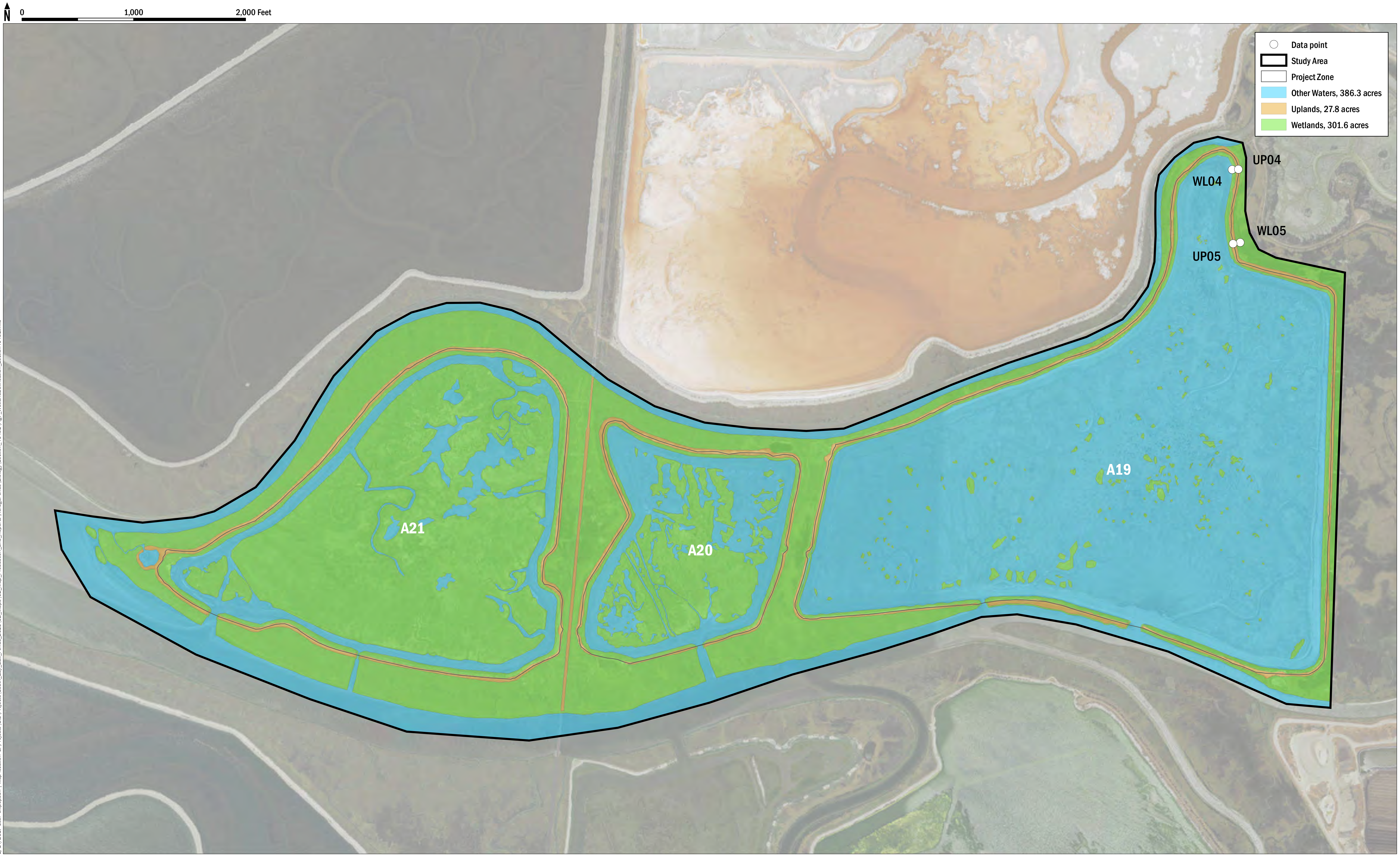
South Bay Salt Pond Restoration Project

FIGURE 7

Section 404 Waters of the U.S.

Alviso A8 Ponds



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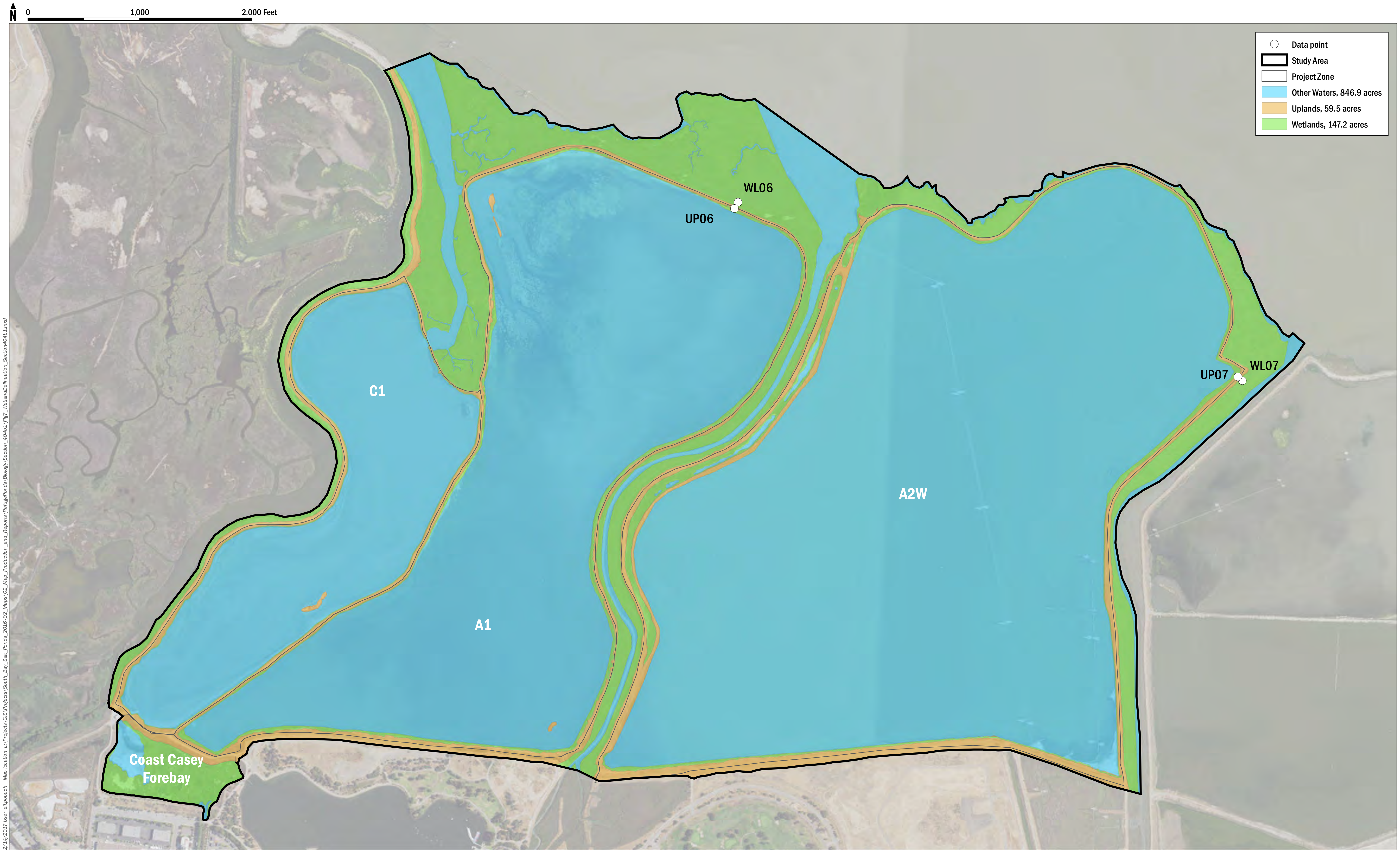
AECOM

South Bay Salt Pond Restoration Project

FIGURE 7

Section 404 Waters of the U.S.

Alviso Island Ponds



AECOM

South Bay Salt Pond Restoration Project

FIGURE 7

Section 404 Waters of the U.S.

Alviso Mt. View Ponds

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AECOM

South Bay Salt Pond Restoration Project

FIGURE 7

Section 404 Waters of the U.S.

Ravenswood Ponds

AECOM

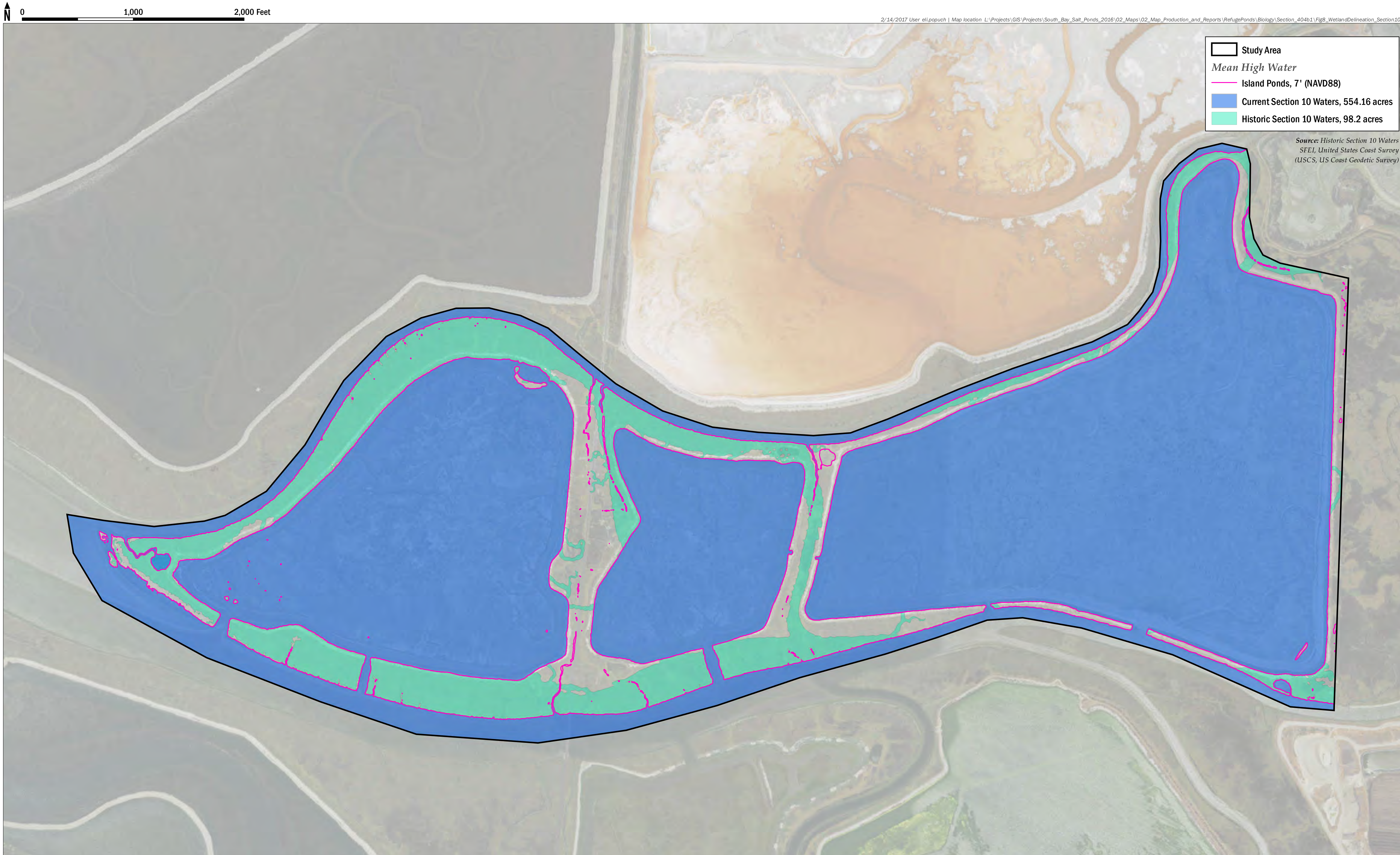
South Bay Salt Pond Restoration Project

FIGURE 8

Current & Historic Section 10

Based on 2016 Delineation & Aerial Interpretation

Alviso A8 Ponds



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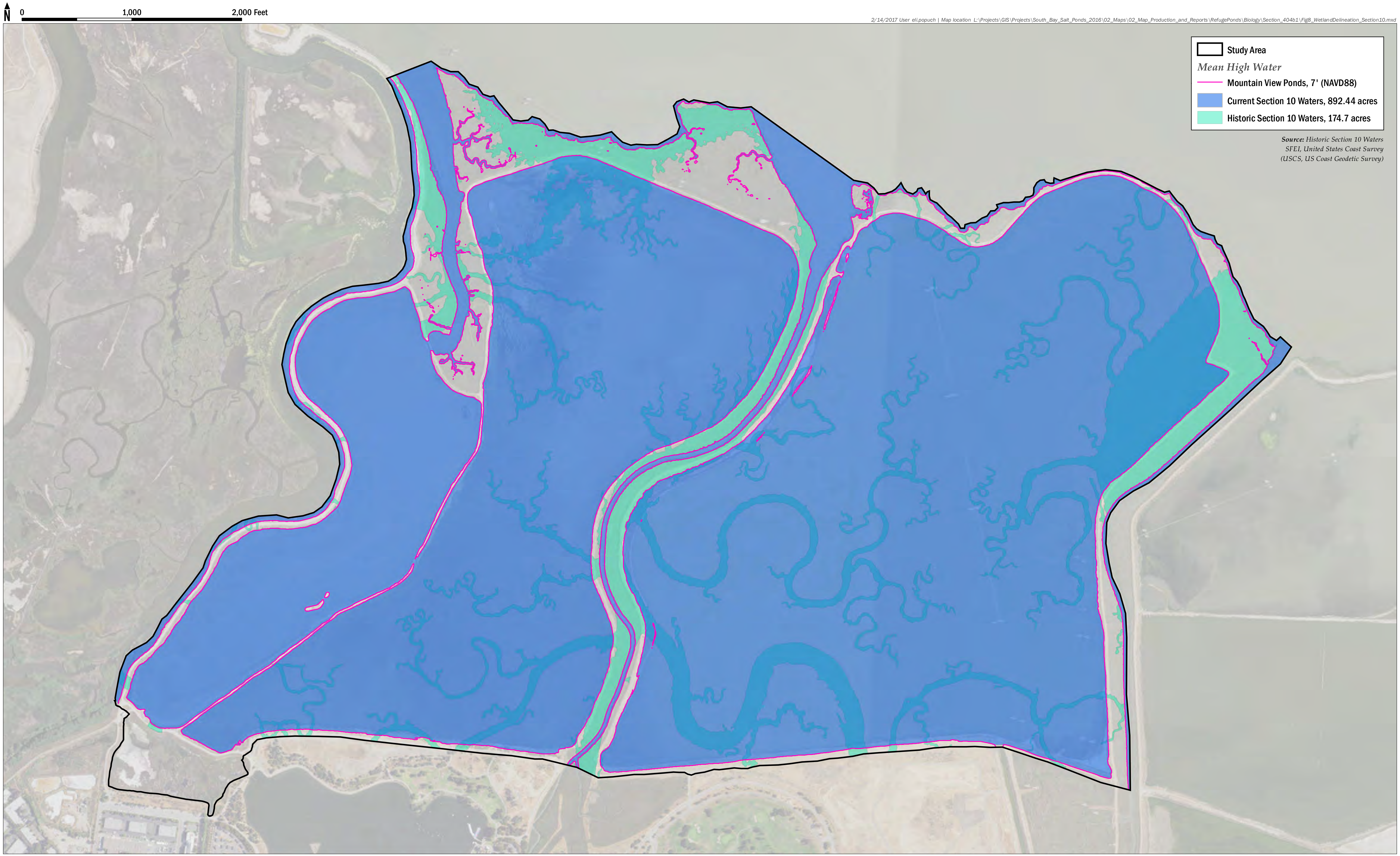
South Bay Salt Pond Restoration Project

FIGURE 8

Current & Historic Section 10

Based on 2016 Delineation & Aerial Interpretation

Alviso Island Ponds



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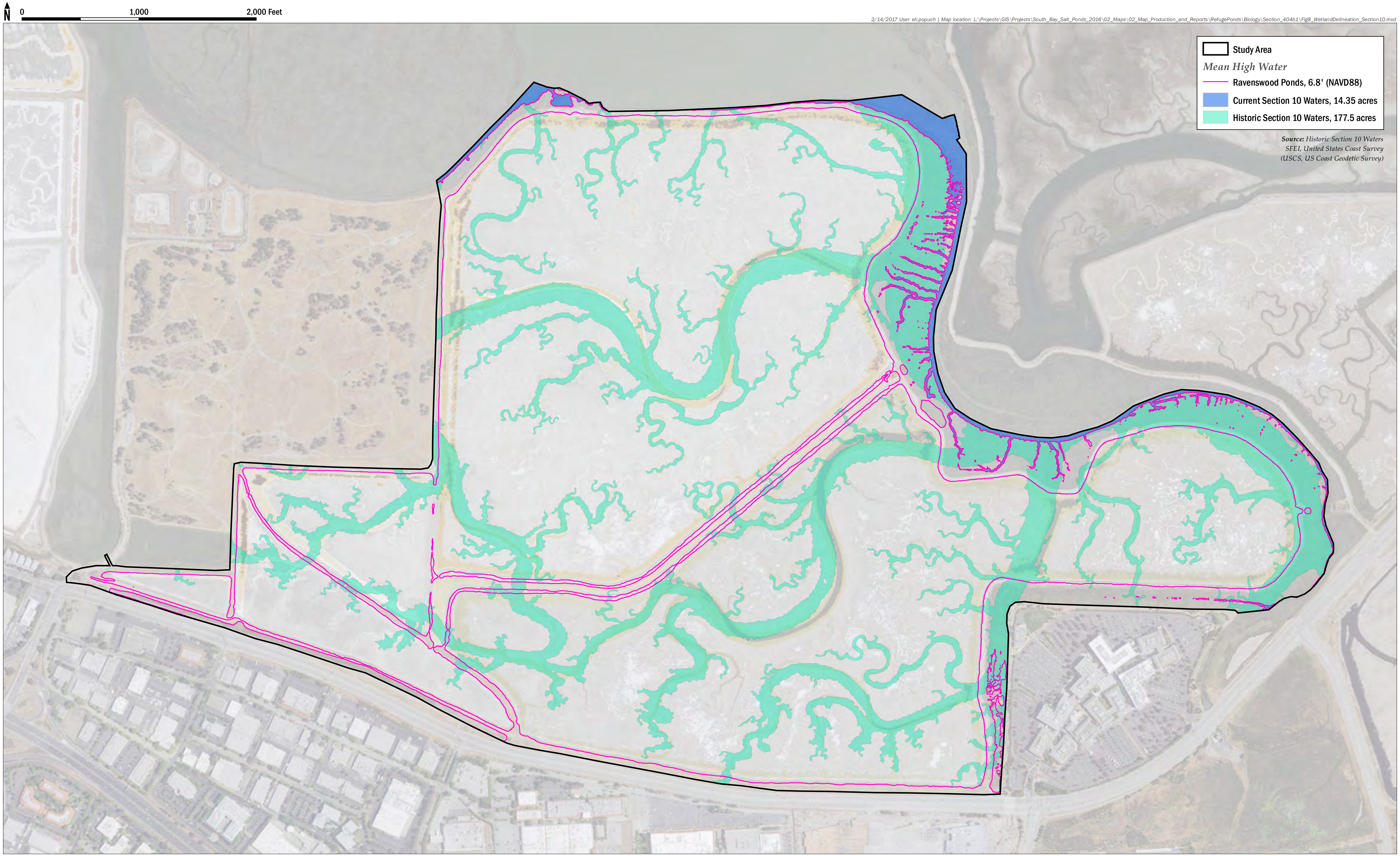
South Bay Salt Pond Restoration Project

FIGURE 8

Current & Historic Section 10

Based on 2016 Delineation & Aerial Interpretation

Alviso Mt. View Ponds



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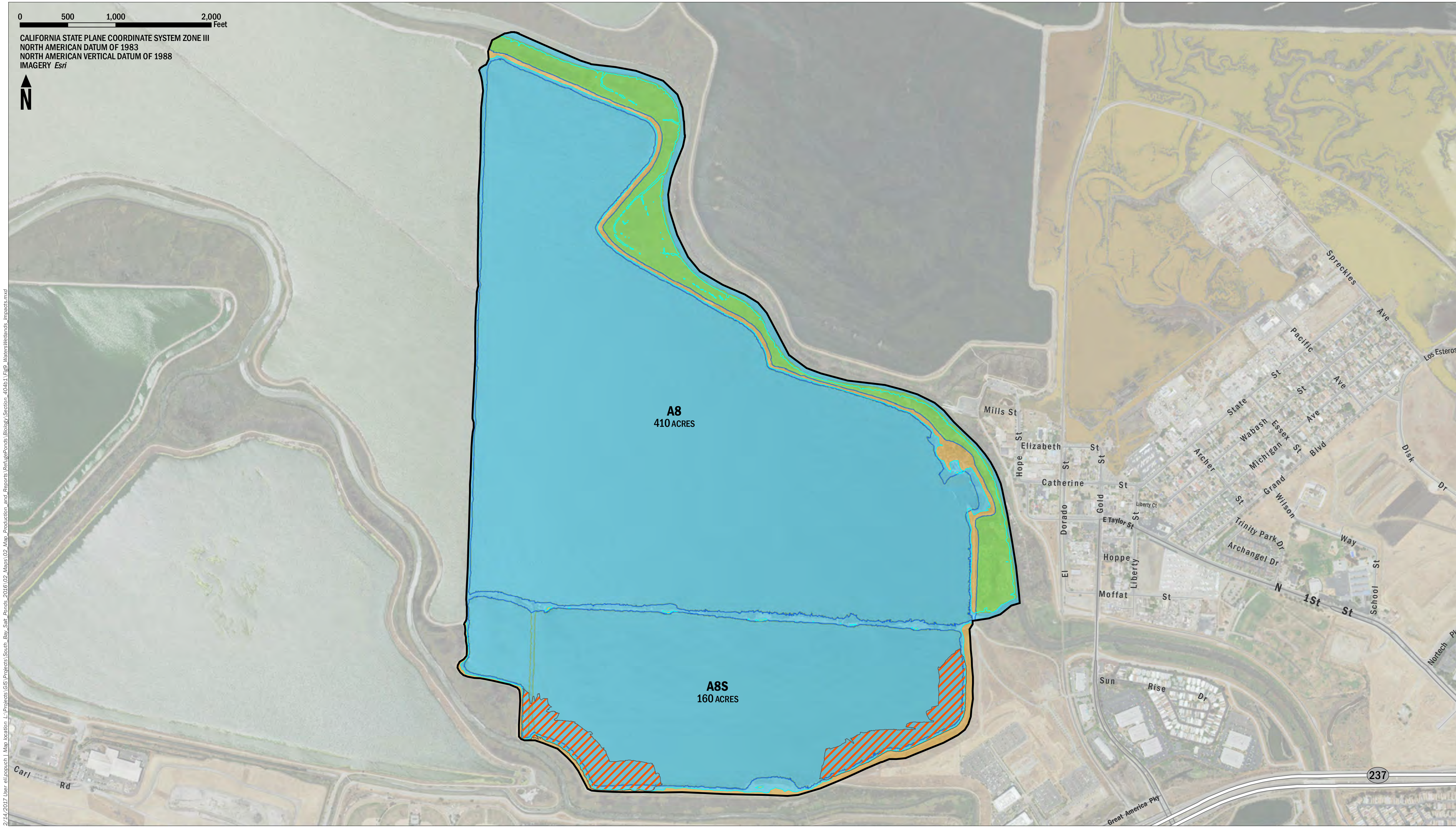
South Bay Salt Pond Restoration Project

FIGURE 8

Current & Historic Section 10

Based on 2016 Delineation & Aerial Interpretation

Ravenswood Ponds



LEGEND

- High Tide Line
- Mean High Water Line
- Study Area
- Wetland Habitat, 50.27 acres
- Open Water Habitat, 613.24 acres
- Upland Habitat, 20.16 acres
- Cut Impacts
- Fill Impacts

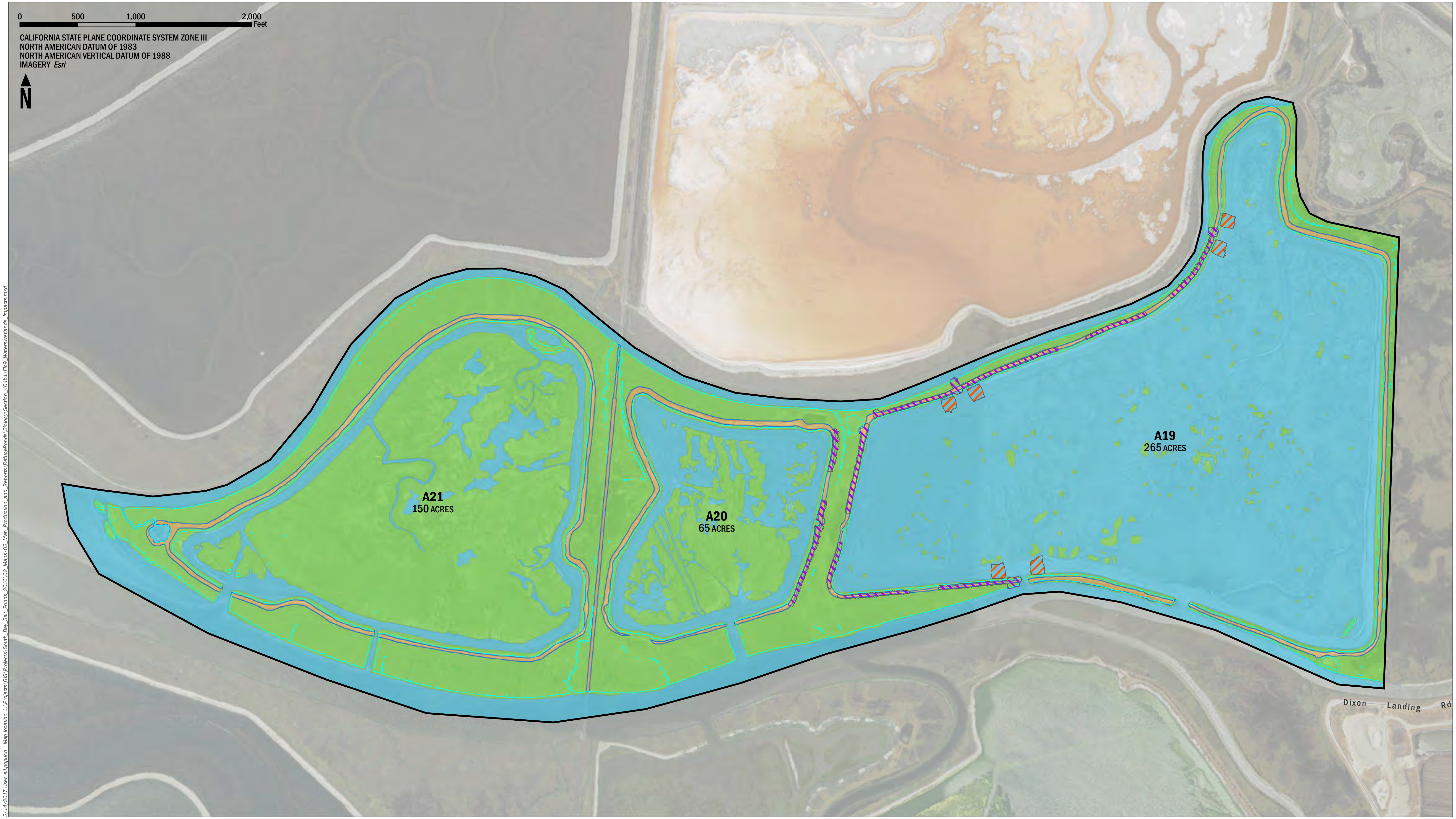
AECOM

South Bay Salt Pond Restoration Project

Figure 9

Impacts to Wetlands and Waters of the U.S.

Alviso A8 Ponds



LEGEND

- High Tide Line
- Mean High Water Line
- Study Area
- Wetland Habitat, 301.59 acres
- Open Water Habitat, 386.49 acres
- Upland Habitat, 27.63 acres
- Cut Impacts
- Fill Impacts

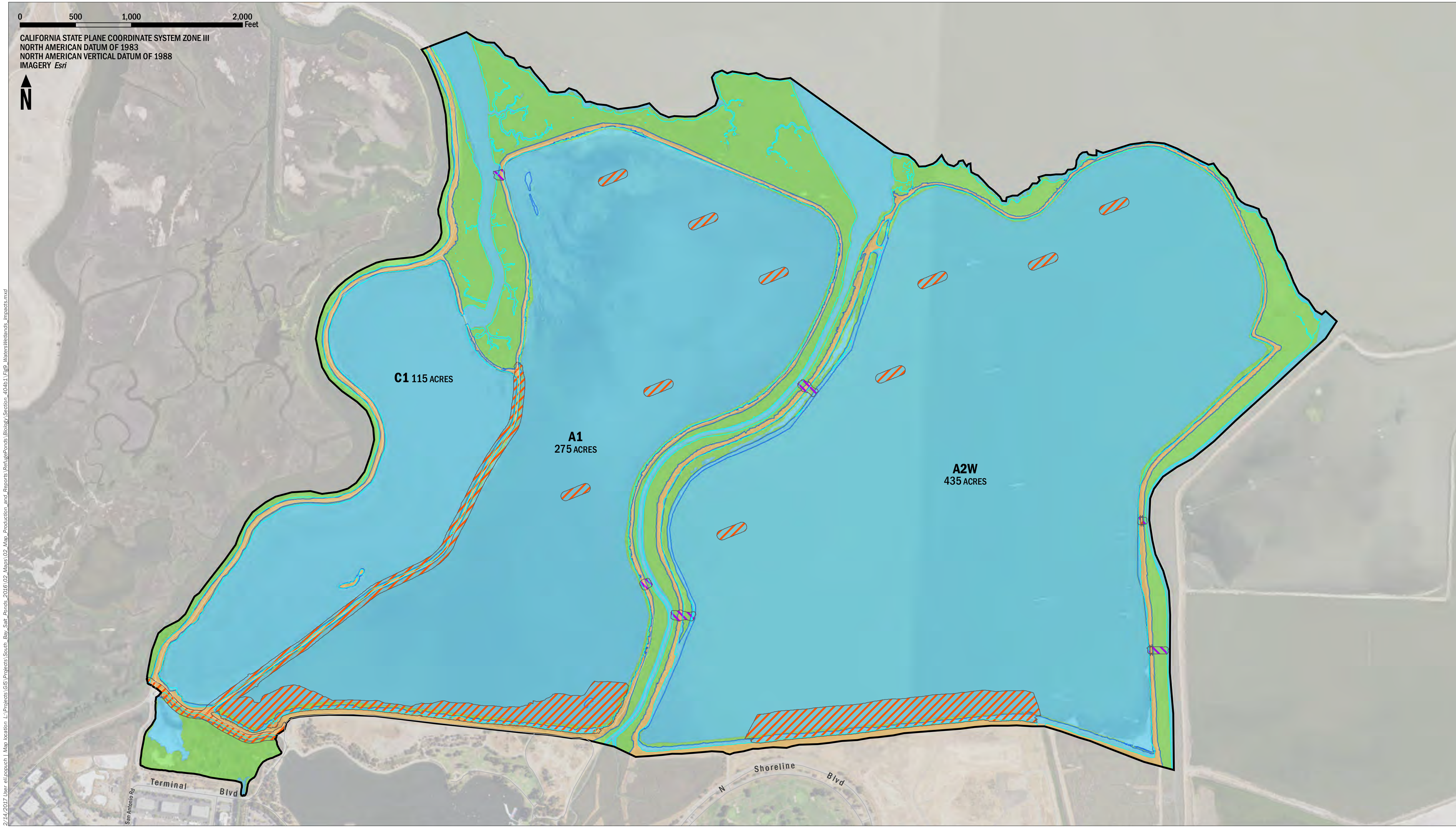
AECOM

South Bay Salt Pond Restoration Project

Figure 9

Impacts to Wetlands and Waters of the U.S.

Alviso Island Ponds



LEGEND

High Tide Line	Wetland Habitat, 147.15 acres	Cut Impacts
Mean High Water Line	Open Water Habitat, 860.63 acres	Fill Impacts
Study Area	Upland Habitat, 45.69 acres	

AECOM

South Bay Salt Pond Restoration Project

Figure 9

Impacts to Wetlands and Waters of the U.S.

Alviso Mt. View Ponds

AECOM

South Bay Salt Pond Restoration Project

Figure 9

Impacts to Wetlands and Waters of the U.S.

Ravenswood Ponds

Appendix A: Technical Project Description

1. INTRODUCTION

The South Bay Salt (SBSP) Restoration Project is a multi-agency effort to restore tidal marsh habitat, reconfigure managed pond habitat, maintain or improve flood protection, and provide recreation opportunities and public access in 15,100 acres of former salt-evaporation ponds purchased from and donated by Cargill Incorporated (Cargill) in 2003. The former salt-production areas are no longer used for that purpose, and, in many cases, they are no more saline than San Francisco Bay (Bay) itself. Immediately after the March 2003 acquisition and subsequent transfer of those ponds from Cargill, the landowners, the U.S. Fish and Wildlife Service (USWFS) and California Department of Fish and Wildlife (CDFW), began implementation of the Initial Stewardship Plan (ISP) (USFWS and CDFG 2003), which was designed to maintain open water and unvegetated pond habitats with enough water circulation to preclude salt production and maintain habitat values and conditions until the long-term restoration actions of the SBSP Restoration Project could be implemented.

The longer-term planning effort involves a 50-year programmatic-level plan for restoration, flood risk management, and public access. This effort has already seen the implementation of Phase 1 projects, which are described in the SBSP Restoration Project's 2007 EIS/R. That longer-term planning was facilitated by the California State Coastal Conservancy (SCC) working with the two landowner agencies listed above and was completed in January 2009. The planning phase of the SBSP Restoration Project was completed in January 2009 with the publication of the Final 2007 Environmental Impact Statement/Report (EIS/R).

Phase 2 of the SBSP Restoration Project is a collaborative effort among federal, state, and local agencies working with scientists and the public to develop and implement project-level plans and designs for habitat restoration, flood management, and wildlife-oriented public access. The former salt ponds are part of the USFWS-owned and managed Don Edwards San Francisco Bay National Wildlife Refuge (Refuge), and cover approximately 9,600 acres in the South Bay. The Refuge ponds in Phase 2 are collectively nearly 2,400 acres in size.

The ponds that were neither part of Phase 1 nor part of Phase 2 will continue to be actively managed according to the goals set forth in the ISP and the Refuge's Pond management Plan until further implementation planning and the appropriate adaptive management studies are completed. They may be included in future project phases as well.

2. PROJECT LOCATION

The SBSP Restoration Project is in South San Francisco Bay (South Bay) in Northern California (see Figure 1). Phase 2 of the SBSP Restoration Project includes parts from two complexes of former salt ponds and adjacent habitats in the South Bay that the USFWS acquired from the Cargill in 2003. The pond complexes consist of the 8,000-acre Alviso pond complex and the 1,600-acre Ravenswood pond complex, both of which are owned and managed by USFWS as part of the Refuge (see Figure 2). Within these two pond complexes, there are four groups of ponds (or “pond clusters”) that are included in the proposed Phase 2 actions; these are illustrated in Figure 3 through Figure 6. They are as follows:

- Alviso–Island Ponds (Island Ponds) shown in Figure 3 in the Alviso pond complex
- Alviso–A8 Ponds (A8 Ponds) shown in Figure 4 in the Alviso pond complex
- Alviso–Mountain View Ponds (Mountain View Ponds) shown in Figure 5 in the Alviso pond complex
- Ravenswood Ponds, shown in Figure 6 in the Ravenswood pond complex

The Alviso pond complex consists of 25 ponds on the shores of the South Bay in the cities of Fremont, San Jose, Sunnyvale, and Mountain View, within Santa Clara and Alameda Counties. The pond complex is bordered on the west by the Palo Alto Baylands Park and Nature Preserve and the City of Mountain View’s Charleston Slough; on the south by commercial and industrial land uses, Mountain View’s Shoreline Park, the National Aeronautics and Space Administration (NASA) Ames Research Center, and Sunnyvale Baylands Park; and on the east by Coyote Creek in San Jose and Cushing Parkway in Fremont. The Phase 2 project actions in the Alviso pond complex focus on three clusters of ponds. The first cluster, the Island Ponds, containing Ponds A19, A20, and A21 is between Coyote Creek and Mud Slough near the eastern end of the Alviso pond complex. The Island Ponds were breached in 2006 as part of tidal marsh restoration actions covered by the ISP.

The second cluster, the A8 Ponds, containing Ponds A8, and A8S is in the southern and central portion of the Alviso pond complex. The A8 Ponds are west of the town of Alviso, north of Sunnyvale and State Route (SR) 237, and east of other parts of the Alviso pond complex. Ponds A8 and A8S were also included in the Phase 1 work; they were made reversibly tidal through the installation of a variable-size and reversible “notched” gate that opened in July 2010. Ponds A5 and A7 were also connected to Pond A8 and Pond A8S as part of Phase 1 actions. There would be no Phase 2 actions at that end of this group of ponds.

The third cluster, the Mountain View Ponds, containing Ponds A1 and A2W is on the western edge of the Alviso pond complex. The City of Mountain View lies immediately to the south, and the Charleston Slough and the Palo Alto Flood Control Basin lie to the west.

The Ravenswood pond complex consists of seven ponds on the Bay side of the Peninsula, both north and south of SR 84, west of the Dumbarton Bridge, and on the Bay side of the developed areas of the City of Menlo Park in San Mateo County. Bayfront Park in Menlo Park is directly west of the Ravenswood pond complex, and SR 84 is along its southern border. The Phase 2 project actions in the Ravenswood pond complex are focused on the western half of the pond complex, which contains Ponds R3, R4, R5, and S5, here referred to as the Ravenswood Ponds.

Table 1 lists each pond, the cluster it is part of, and its area, centroid, and latitude and longitude coordinates in decimal degrees. Pond areas in the following table are sourced from the 2007 SBSP Program FEIS/R and provide general estimates for each pond. Areas calculated for Phase 2 operations have been updated and may slightly differ from those estimated in the programmatic FEIS/R.

Table 1. SBSP Phase 2 Approximate Pond Area and Location

POND CLUSTER	POND	*AREA (ACRES)	LATITUDE	LONGITUDE
ALVISO-ISLAND PONDS	A19	265	37.467092	-121.957692
	A20	65	37.464876	-121.970986
	A21	150	37.465142	-121.979427
ALVISO - A8 PONDS	A8	410	37.428778	-121.991558
	A8S	160	37.420860	-121.989553
ALVISO - MOUTAIN VIEW PONDS	A1	275	37.442525	-122.086577
	A2W	435	37.441989	-122.074607
RAVENSWOOD PONDS	R3	270	37.486675	-122.155291
	R4	295	37.493048	-122.161933
	R5	30	37.488054	-122.170371
	S5	30	37.485913	-122.170712
Note: Pond areas excerpted from the 2007 SBSP FEIR/S				

AECOM 2016

3. PROJECT HISTORY

The SBSP Restoration Project is intended to tier from the analysis conducted for the 2007 EIS/R by advancing additional restoration activities within the SBSP project area. 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, which would eventually convert up to 90 percent of the former salt ponds to tidal marsh, while at least 10 percent would remain as enhanced managed ponds. Phase 2, as the second project component of this long term restoration project, would incrementally advance the project toward achieving the 90/10 goal.

The 2007 EIS/R was not just a planning document but also included project-level analysis of several restoration, enhancement, recreation, and flood protection projects that would help fulfill the SBSP Restoration Project's goals and objectives. The selection of the Phase 1 projects considered a variety of factors. The criteria, as listed in the 2007 EIS/R, were available funding, likelihood of success, ease of implementation, visibility and accessibility, opportunities for adaptive management and applied studies, value in building support for the project, and certainty of investment.

Phase 1's restoration actions were successfully completed in December 2010; the last of the public access and recreation features were completed in April 2016. At the end of Phase 1, 1,600 acres of tidal habitats and 1,440 acres of muted tidal habitats were opened to tidal inundation. The tidal areas already show signs of estuarine sedimentation and natural vegetative colonization. These tidal habitats will contribute to the recovery of endangered, threatened, and other special-status species; tidal-marsh-dependent species; and the recovery of South Bay fisheries and water quality. Also, 710 acres of managed ponds were constructed for use by migratory birds at a range of water depths to create a variety of depth, hydrology, and salinity regimes through the use of flow control structures, grading, and other means. In addition, approximately 7 miles of new trail were built, providing new recreational opportunities. Small habitat transition zones were constructed in Eden Landing Pond E14 and vegetated with native upland species by volunteers. Islands were constructed in Ponds SF2, A16, and E12 and E13.

Phase 2 of the SBSP Restoration Project is a direct outgrowth of the acquisition of the Alviso and Ravenswood pond complexes (either in fee ownership or the salt-making rights) from Cargill in 2003 and the continued implementation of the larger SBSP Restoration Project laid out in the 2007 EIS/R. The project has focused on how best to manage and restore these lands.

In 2010, the Phase 2 planning was initiated. The initial project elements included restoration, public access, and flood protection[1] actions in all three pond complexes: Alviso, Ravenswood, and Eden Landing. In April 2016 the FEIS/R for Phase 2 at the Refuge (i.e., Alviso and Ravenswood) was completed. Phase 2 at Eden Landing is proceeding separately.

[1] The terminology used by the SBSP Restoration Project to describe its goals has since changed from "flood protection" to "flood risk management". This document generally uses the latter term for forward-looking documents.

4. ENVIRONMENTAL SETTING

4.1 Climate and Topography

The South Bay is defined as the portion of San Francisco Bay south of Coyote Point on the western shore and San Leandro Marina on the eastern shore. The South Bay is both a geographically and hydrodynamically complex system, with freshwater tributary inflows, tidal currents, and wind interacting with complex bathymetry (i.e., bed surface elevation below water).

4.2 Climate and Precipitation

The South Bay, like much of California's Central Coast, experiences a Mediterranean climate characterized by mild, wet winters and dry, warm summers. Air temperatures are mild due to proximity to the ocean. Winter weather is dominated by storms from the northern Pacific Ocean that produce nearly all the annual rainfall, while summer weather is dominated by sea breezes caused by differential heating between the hot interior valleys and the cooler coast. The South Bay typically receives about 90 percent of its precipitation in the fall and winter months (October through April), with the greatest average rainfall occurring in January. The average annual rainfall in the counties surrounding the South Bay is approximately 20 inches, although the actual rainfall can be highly variable due to the influence of local topography.

4.3 Hydrology

4.3.1 Hydrodynamics

The South Bay can be characterized as a large shallow basin, with a relatively deep main channel surrounded by broad shoals and mudflats. Tidal currents, wind, and freshwater tributary inflows interact with bathymetry to define the residual circulation patterns and residence time, and determine the level of vertical mixing and stratification. The most obvious hydrodynamic response is the daily rise and fall of the tides, although much slower residual circulation patterns also influence mixing and flushing processes within the South Bay.

The tides in San Francisco Bay are mixed semidiurnal tides (i.e., two high and two low tides of unequal heights each day). The tides exhibit strong spring-neap variability with the spring tides, which have a larger tidal range, occurring approximately every 2 weeks during the full and new moon. Neap tides, which have a smaller tidal range, occur approximately every 2 weeks during the moon's quarter phases. The tides also vary on an annual cycle, in which the strongest spring tides occur in late spring/early summer and late fall/early winter, and the weakest neap tides occur in spring and fall. The enclosed nature of the South Bay creates a mix of progressive and standing wave behavior, which causes tidal amplification as waves move southward (i.e., the tidal amplitude is increased by the harmonic addition of original waves plus reflected waves).

One of the most important factors influencing circulation patterns in the South Bay is bathymetry. Bathymetric variations create different flow patterns between the San Mateo Bridge and Dumbarton Bridge and in areas south of the Dumbarton Bridge. Circulation patterns also differ between the deep main channel and the expansive shoals. Currents in the South Bay are driven predominantly by tidally and wind-forced flows and their interaction with the bathymetry. Typically, winds drive a surface flow, which then induces a return flow in the deeper channels (Walters et al. 1985). In terms of circulation, the most significant winds are onshore breezes that create a horizontal, clockwise circulation pattern during the spring and summer. Density-driven currents occur when adjacent water bodies have differing densities, such as differences in temperature and/or salinity. Although density-driven currents are generally uncommon in the South Bay, in years of heavy rainfall, fresh water can flow from the Delta through the Central Bay and into the South Bay (Walters et al. 1985). In such events, the freshwater flows southward along the surface, while the more saline South Bay water flows northward along the bottom.

Currents and circulation affect the tidal excursion – the horizontal distance a water particle travels during a single flood or ebb tide. The tidal excursion varies between 6.2 and 12.4 miles within the main channels, and it ranges between 1.9 and 4.8 miles within the subtidal shoals; much smaller excursions occur on the intertidal mudflats (Cheng et al. 1993; Fischer and Lawrence 1983; Walters et al. 1985). Tidal dispersion is the dominant form of transport in the South Bay and the primary mechanism that controls residence times. Residence time is usually characterized as the average length of time a water parcel spends in a given waterbody or region of interest (Monsen et al. 2002). It is typically shorter during the winter and early spring during wet years and considerably longer during summer and/or drought years (Powell and Huzzey 1989; Walters et al. 1985). Residence time also varies with seasonal freshwater inflow and wind conditions.

The volume of water in the South Bay between mean low water and mean high water is the “tidal prism” of the South Bay. Tidal prism, in combination with bathymetry, determines the patterns and speed of tidal currents and subsequent sediment transport. The tidal prism for the South Bay is approximately 666,000 acre-feet, the majority of which is contained between the San Francisco-Oakland Bay Bridge and San Mateo Bridge (Schemel 1995). At mean lower low water, the volume of water in the far South Bay (south of the Dumbarton Bridge) is less than half the volume present at mean higher high water (MHHW). In addition, surface water area coverage at mean lower low water is less than half that at MHHW, indicating that over half of the far South Bay consists of shallow mudflats exposed at low tides (Schemel 1995).

4.3.2 Sea-Level Rise

Sea level rise refers to an increase in mean sea level with respect to a land benchmark. Global sea-level rise can be a result of global warming from the expansion of sea water as the oceans warm or from the melting of ice over land. Local sea-level rise is affected by global sea-level rise plus tectonic land movements and subsidence, which can be of the same order as global sea-level rise. Atmospheric pressure, ocean currents, and local ocean temperatures also affect local rates of sea-level rise.

4.3.3 Salinity

Salinity in the South Bay is governed by salinity in the Central Bay, exchange between the South Bay and Central Bay, freshwater tributary inflows to the South Bay, and evaporation. In general, the South Bay is vertically well mixed (i.e., there is little tidally averaged vertical salinity variation) with near oceanic salinities (33 parts per thousand [ppt]). Exceptions include areas within the far South Bay below the Dumbarton Bridge, which can remain brackish year-round due to wastewater treatment plant discharges.

Seasonal variations in salinity are driven by variability in freshwater inflows. High freshwater inflows typically occur in winter and early spring in wet years when fresh water from the San Francisco Bay Delta (Delta) intrudes into the South Bay. For example, during wet years when Delta outflow exceeds approximately 200,000 cubic feet per second (cfs), fresh water from the Delta intrudes into the South Bay during the winter and spring months, pushing surface salinities below 10 ppt. During dry years when

Delta outflows are small, near surface salinity in the South Bay remains high (> 20 ppt) (PWA et al. 2005a). As Delta and tributary inflows decrease in late spring, salinity increases to near oceanic salinities. High freshwater inflows can result in circulation patterns driven by density gradients between the South Bay and Central Bay (Walters et al. 1985).

4.4 Sediment Characteristics

Bay habitats such as subtidal shoals, intertidal mudflats, and wetlands are directly influenced by sediment availability, transport and fate, specifically the long-term patterns of deposition and erosion. The main losses of sediment from the South Bay are exports to the Central Bay and sediment capture within marsh areas and restored ponds. Sediments carried on flood tides into a marsh or restored ponds are typically deposited, causing the marsh or mudflat area to increase in elevation. Sediments can also be carried out with ebb tides if cohesive sediment deposition is inhibited. The rate of sedimentation in a marsh or restored pond depends on the suspended sediment concentration (SSC) near the marsh or restored pond location, the elevation of the pond bottom surface, and the degree of tidal exchange.

The capacity of many sloughs and channels in the South Bay has been gradually reduced by sediment deposition. Under natural conditions, channels adjacent to marsh lands experienced daily scouring from tidal flows. When these areas were diked off to create salt ponds, the scouring flows were reduced.

Subsequent sedimentation has constricted channels, reducing cross-sectional areas and decreasing channel conveyance. Although the South Bay as a whole has undergone periods of net deposition and net erosion, the far South Bay below the Dumbarton Bridge has remained largely depositional since bathymetric data collection began in 1857 (Foxgrover et al. 2004; Foxgrover et al. 2007; Krone 1996; Shellenbarger et al. 2013).

Suspended sediment concentrations in the South Bay exhibit short-term variability, primarily in response to variations in tidally driven resuspension, wind-driven resuspension, and riverine input from local tributaries and sloughs (Schoellhamer 1996). In the winter and early spring, the main sources of suspended sediments are local tributaries and the Central Bay. There is typically little direct input of suspended sediment in the dryer summer months; however, SSCs are often high due to increased wind-wave resuspension and reworking of previously deposited sediments. In recent, years, Shellenbarger et al (2014) have collected sediment flux data in the Alviso Slough. Their results show that winter storms and associated runoff have the greatest influence on sediment flux. Strong spring tides promote upstream sediment flux, and the weaker neap tides have a smaller net flux. During these neap tides, sediment transport during their weaker flood and ebb tides is suppressed by stratification of the water column, which dampens turbulence and limits sediment resuspension.

The transport and fate of suspended sediment has the potential to affect the transport and fate of contaminants, such as metals and pesticides, and the distribution of nutrients. Increasing SSCs are also directly correlated with increasing turbidity and decreasing light availability, thus affecting photosynthesis, primary productivity, and phytoplankton bloom dynamics.

4.5 Biological Conditions

The San Francisco Bay Estuary is the largest estuary on the west coast of North America and is an extremely productive and diverse ecosystem (Trulio et al. 2004). The South Bay includes some of the most important habitat remaining in the Bay Area for a number of wildlife species (Goals Project 1999). The term “South Bay” refers to the portion of San Francisco Bay south of Coyote Point on the western shore and San Leandro Marina on the eastern shore (Goals Project 1999). The habitats included in the South Bay are open waters and subtidal habitats to the upper reaches of tidal action, tidal and non-tidal wetlands, former salt evaporation ponds adjacent to the Bay, and the upland areas immediately adjacent to these features. The diversity of habitat types is largely responsible for the diversity of wildlife species that occur in the South Bay. Although the high productivity of these habitats allows those species that are not habitat-limited to achieve substantial numbers, the tidal salt marshes and open waters that sustain aquatic plants and phytoplankton and the ponds that sustain high biomass of invertebrates are the basis of the estuary's complex and productive food web. The San Francisco Estuary supports more than 250 species of birds, 120 species of fish, 81 species of mammals, 30 species of reptiles, and 14 species of amphibians (Siegel and Bachand 2002). Equally important, the San Francisco Estuary supports populations of species that are of regional, hemispheric, or even global importance. A number of special-status wildlife species—including endemic, endangered, threatened, and rare wildlife species or subspecies—reside in the San Francisco Bay Area.

4.5.1 Tidal Salt Marsh

Tidal salt marsh vegetation consists of halophytic (salt-tolerant) species adapted to occasional to regular (tidal) saltwater inundation. Tidal salt marsh occurs on the Bay's outboard portions of salt pond levees; these are often referred to as fringing marshes.

In tidal salt marsh, cordgrass (*Spartina* sp.) dominates low marsh areas. Pacific cordgrass (*Spartina foliosa*) has hybridized extensively with smooth cordgrass (*Spartina alterniflora*), a non-native species from the east and gulf coasts of North America. One or both of these species and/or their hybrids may be present at any one location.

The pickleweed and cordgrass salt marsh habitats are generally separated by elevation; cordgrass typically occurs below the Mean High Water (MHW) mark and pickleweed occurs above this mark and often extends into higher elevations. However, the hybridized cordgrass can extend into the pickleweed elevation in some marshes. Pickleweed (*Sarcocornia depressa* and *S. pacifica*) dominates middle marsh areas, and high marsh areas feature a mixture of pickleweed and other moderately halophytic species, including alkali heath (*Frankenia salina*), saltgrass (*Distichlis spicata*), saltmarsh dodder (*Cuscuta salina*), small flowered iceplant (*Mesembryanthemum nodiflorum*), fleshy jaumea (*Jaumea carnosa*), spearscale (*Atriplex prostrate*), perennial pepperweed (*Lepidium latifolium*), New Zealand spinach (*Tetragonia tetragonioides*), and marsh gumplant (*Grindelia stricta* var. *angustifolia*). High marsh species frequently occur above the high tide line, which is indicated by wrack material (water-transported organic and synthetic detritus). The outboard areas from pond levees and lower reaches of sloughs surrounding Ponds A1, A2W, and R4 typify tidal salt marsh in the project area.

In addition to the endangered salt marsh harvest mouse and the California Ridgway's rail, the Alameda song sparrow (*Melospiza melodia pusillula*), endemic to the Central and South San Francisco Bay, nests in dense herbaceous vegetation in salt and brackish marshes. The savannah sparrow (*Passerculus sandwichensis*) nests in pickleweed and peripheral halophytes in the upper marsh and upland transitional zones. The saltmarsh common yellowthroat (*Geothlypis trichas sinuosa*) nests in tidal and nontidal brackish and freshwater marshes and possibly also in low densities in salt marsh habitat (Shuford and Gardali 2008) in the South Bay. A wide variety of birds nest in the tidal marshes of the South Bay, including several species of ducks, Virginia rails (*Rallus limicola*), soras (*Porzana carolina*), black-necked stilts (*Himantopus mexicanus*), northern harriers (*Circus cyaneus*), and in a few locations herons and egrets (Gill 1977). Also, California black rails (*Laterallus jamaicensis coturniculus*) breed in small numbers in these marshes (Liu et al. 2005). In addition, non-breeding birds, including larger shorebirds, swallows, blackbirds, and other species, roost, occasionally in large numbers, in the tidal marsh. Tidal marshes (and mudflats) in several South Bay locations are also used as haul-out and pupping sites by harbor seals (*Phoca vitulina*).

4.5.2 Brackish Marsh

Brackish marsh occurs along the intertidal reaches of the creeks and sloughs that drain to the Bay, where salinities are lower due to freshwater input. Brackish marsh is found where intermediate interstitial soil salinities occur along creeks and sloughs; where freshwater channels experience periodic tidal inundation, and where groundwater emerges into tidal marshlands. Vegetative diversity and richness increase with greater freshwater influence. Where sediment deposits form terraced floodplains along low-flow channels, short bulrushes such as seacoast bulrush (*Bolboschoenus robustus*) and saltmarsh bulrush (*Bolboschoenus maritimus* ssp. *paludosus*) dominate the brackish habitat. These terraced areas may also support dense populations of the invasive perennial pepperweed, which can quickly develop into monotypic stands with increasing levels of disturbance. Other moderately halophytic plants such as brass buttons (*Cotula coronopifolia*) and taller bulrushes, including California bulrush (*Schoenoplectus californicus*) and hard stemmed tule (*Schoenoplectus acutus* var. *occidentalis*), occur in areas of lower soil salinity (e.g., toward the upland edges of brackish marsh). Tidal salt marsh species, including pickleweed, alkali heath, saltgrass, and spearscale, may also colonize brackish habitat. The periphery of Pond A19 and the adjacent Mud Slough are exemplary of brackish marsh in the project area.

Brackish marshes support many of the wildlife species that use salt marsh and freshwater marsh habitats. Species composition and the relative abundance of different species may vary spatially within brackish marshes depending on water salinity, vegetation type, and habitat structure. Variability in salinity within brackish marshes is likely most important for aquatic species, which are directly subject to variation in salinity. Brackish marshes are particularly important for anadromous fish (migrating from saline to fresh water to spawn), catadromous fish (migrating from fresh to saline water to spawn), and invertebrates such as shrimp, which use brackish marshes while physiologically acclimating to changing salinity on their migrations between saline and freshwater habitats.

The often taller and more dense vegetation in brackish marshes supports large densities of breeding song sparrows, saltmarsh common yellowthroats, and marsh wrens (*Cistothorus palustris*) and large numbers of Virginia rails and soras during migration and winter.

4.5.3 Freshwater Marsh

Freshwater marsh vegetation in and around the project area exists along the upper reaches of sloughs and creeks and primarily consists of emergent vegetation adapted to freshwater wetland conditions. Though some freshwater marshes may experience tidal influence and periodic saltwater inundation, soil salinity remains relatively low due to freshwater flowing through these areas on a regular basis. The upper reach of Ravenswood Slough (along the eastern edge of Pond R3) demonstrates the vegetation transition that occurs as freshwater influence increases. Dense stands of California bulrush and hard-stemmed tule interspersed with perennial pepperweed (*Lepidium latifolium*) or curly dock (*Rumex crispus*) compose the majority of emergent vegetation in freshwater marsh habitat. Areas less frequently exposed to freshwater flow but still exposed to occasional saltwater inundation may also host halophytic species such as marsh gumplant and pickleweed. The Guadalupe River side of Pond A8 is a location where freshwater species colonize the entire floodplain terrace.

Relatively limited areas of freshwater marsh occur in the South Bay, and the wildlife communities of these marshes (versus those of brackish and salt marshes) in the South Bay have been little studied. Where freshwater occurs along the inland margins of the project area, the Pacific treefrog (*Pseudacris regilla*), bullfrog (*Rana catesbeiana*), and western toad (*Bufo boreas*) are present. California tiger salamanders (*Ambystoma californiense*) (a species listed as Threatened under the Federal and California Endangered Species Acts) occur in vernal pool habitats in the Warm Springs Unit area, primarily on lands of the Refuge, adjacent to the SBSP Restoration Project area and the Newark salt ponds managed by Cargill.

Most wetland-associated birds respond more to food availability and habitat structure than to salinity and therefore may occur in abundance in freshwater, brackish, or salt marsh habitats with suitable habitat structure. Some birds that are typically associated with fresh (versus more saline) marshes during the breeding season, such as bitterns, Virginia rails, and soras, breed sparingly in the South Bay, likely due to the limited extent of freshwater marshes. In contrast, red-winged blackbirds (*Agelaius phoeniceus*), American coots (*Fulica americana*), common moorhens (*Gallinula chloropus*), pied-billed grebes (*Podilymbus podiceps*), song sparrows, saltmarsh common yellowthroats, and marsh wrens breed commonly in freshwater marsh habitats in the South Bay. A variety of mammals occur in these freshwater habitats as well, although with the exception of the muskrat (*Ondatra zibethica*), none are associated primarily with this habitat type. Rather, mammals associated more with adjacent upland habitats use freshwater marsh for cover or foraging habitat.

4.5.4 Upland/Levees

The primary upland habitat existing in the Alviso-Island, Alviso-Mountain View, Alviso-A8, and Ravenswood pond clusters exists along the tops of levees and along the landward sides of the project area. Levees were constructed from native tidal salt marsh soils (silty clay) in the immediate vicinity and may occasionally be reinforced with concrete debris. Due to the high salinity of these soils and their inherent disturbed nature, many levees feature areas of bare soil or are otherwise populated by non-native halophytic species, including small flowered iceplant, New Zealand spinach, sea fig (*Carpobrotus chilensis* – FACU), Russian thistle (*Salsola soda*), and Australian saltbush (*Atriplex semibaccata*).

On levees and portions of levees where freshwater (groundwater or rain) has reduced soil salinity over time, other common ruderal species (non-native species that thrive in areas of disturbance) of forbs and grasses dominate; including black mustard (*Brassica nigra*), Italian thistle (*Carduus pycnocephalus*), yellow star thistle (*Centaurea solstitialis*), sweet fennel (*Foeniculum vulgare*), perennial pepperweed, common mallow (*Malva neglecta*), bird's foot trefoil (*Lotus corniculatus*), wild oats (*Avena fatua*), ripgut brome (*Bromus diandrus*), crabgrass (*Digitaria sanguinalis*), Italian rye grass (*Lolium multiflorum*), tall wheat grass (*Elymus ponticus*), and Mediterranean barley (*Hordeum marinum* ssp. *gussoneanum*). Native shrubs may colonize more substantial levees (for instance, the coyote bush [*Baccharis pilularis]* found on the Pond A19 levees).

Due to the intense disturbance of much of uplands areas adjacent to the ponds, with most areas lacking an obvious transitional zone between the aquatic bayland habitats and adjacent habitats, most of the wildlife species found in these peripheral areas are common species adapted to urban or ruderal habitats. Reptiles such as the western fence lizard (*Sceloporus occidentalis*), gopher snake (*Pituophis melanoleucus*), and southern alligator lizard (*Elgaria multicaranata*) and mammals such as the house mouse (*Mus musculus*), California vole (*Microtus californicus*), western harvest mouse (*Reithrodontomys megalotis*), California ground squirrel (*Spermophilus beecheyi*), black-tailed jack rabbit (*Lepus californicus*), cottontail

(*Sylvilagus audubonii*), brush rabbit *(S. bachmani*), valley pocket gopher (*Thomomys bottae*), and striped skunk (*Mephitis mephitis*) all occur in the upland transitional areas along the edge of the Bay.

In most areas, the bird species that occur in the peripheral upland habitats are also common, widespread species. These include permanent residents such as the Anna's hummingbird (*Calypte anna*), mourning dove (*Zenaida macroura*), black phoebe (*Sayornis nigricans*), northern mockingbird (*Mimus polyglottos*), bushtit (*Psaltriparus minimus*), California towhee (*Pipilo crissalis*), red-winged blackbird (*Agelaius phoeniceus*), Brewer's blackbird (*Euphagus cyanocephalus*), house finch (*Carpodacus mexicanus*), lesser goldfinch (*Carduelis psaltria*); summer residents such as the barn swallow (*Hirundo rustica*) and cliff swallow (*Petrochelidon pyrrhonota*); transients (some of which breed at higher elevations in the Bay Area), including the Swainson's thrush (*Catharus ustulatus*); and winter residents such as the hermit thrush (*Catharus guttatus*), white-crowned sparrow (*Zonotrichia leucophrys*), golden-crowned sparrow (*Zonotrichia atricapilla*), yellow-rumped warbler (*Dendroica coronata*), and American pipit (*Anthus rubescens*).

In remote areas (e.g., levees between salt ponds far from the upland edge), South Bay levees are heavily used for nesting by birds such as double-crested cormorants (*Phalacrocorax auritus*), California gulls (*Larus californicus*), black-necked stilts, and American avocets (*Recurvirostra Americana*). Western snowy plovers have been identified nesting in relatively large numbers on some South Bay levees relatively recently, in the years since their construction. Before the development of the levees, western snowy plover primarily nested in natural dunes, many of which have been lost to development. Large numbers of shorebirds use salt pond levees for roosting, particularly when intertidal foraging habitats are inundated during high tide (Warnock 2004). Some species, including western snowy plovers, black-necked stilts, and least sandpipers (*Calidris minutilla*), also forage frequently along the margins of levees. Gulls, Forster's terns (*Sterna forsteri*), Caspian terns (*Hydroprogne caspia*), cormorants, pelicans, and other waterbirds also frequently roost on levees.

The California least tern uses levees in the South Bay as post-breeding roosting sites. After breeding (primarily at Central Bay sites), adult California least terns bring their juvenile offspring to the South Bay to forage before migration. Mammals use levees for dispersal and to obtain access to foraging areas. Red foxes (*Vulpes vulpes*) and California ground squirrels often excavate dens within levees (usually near the upland edge). Levees with riprap or concrete debris provide some cover for other small mammals, including predators or nuisance species such as the Norway rat (*Rattus norvegicus*), roof rat (*Rattus rattus*), and feral cat (*Felis catus*), and peripheral halophytes along the lower edges of the levee provide high-tide refugia for species such as the salt marsh harvest mouse, California Ridgway's rail, and California black rail. These high-tide refugia may be quite important to the survival of individual rails and mice during extreme high-tide events. However, levees also provide corridors for mammalian predators to access marsh areas, which can lead to high levels of predation on marsh wildlife.

4.5.5 Mudflats

Naturally occurring mudflats on the outboard sides of many South Bay salt ponds begin at low tidal salt marsh areas and extend into the Bay. They form the overwhelming majority of intertidal habitat in the South Bay, with exceptions being only a narrow and deep channel near the center of the Bay and the fringing marshes and former salt ponds around the edges. Covered by shallow water during high tide, these mudflats are exposed during low tide. These intertidal habitats are inhospitable to most vascular emergent vegetation; typically supporting 0 to 10 percent cover of cordgrass or pickleweed. Narrow stretches of mudflat occur within slough and creek channels and at the mouths of major sloughs. Mudflats also exist in the basins of former salt ponds, such as Charleston Slough (adjacent to the Mountain View Ponds), and in portions of the Island Ponds (Ponds A19, A20, and A21) where the levees have been breached and the pond re-exposed to Bay waters and tides. Eventually, as sediment accretes, tidal marsh habitat is expected to replace mudflat habitat within the former salt ponds.

These mudflats are a key reason for the importance of the San Francisco Bay Area to west coast shorebird populations, with an average of 67 percent of all the shorebirds on the west coast of the United States using San Francisco Bay wetlands (Page et al. 1999). Gulls and some dabbling ducks forage on the exposed mudflats as well. Because benthic invertebrates often recede deeper into the mud as the tidal elevation drops, especially large concentrations of foraging birds usually occur along the edge of the receding or rising tideline. Although the largest numbers of shorebirds forage on the broad flats along the edge of the Bay at low tide, some shorebirds, gulls, and large waders (e.g., herons and egrets) feed on the exposed flats along sloughs and channels, and the smaller channels in the brackish and salt marshes are the favored foraging areas for the state and federally endangered California Ridgway's rail.

Shorebirds, gulls, terns, American white pelicans (*Pelecanus erythrorynchos*), and ducks often use exposed mudflats as roosting or loafing areas when available, as do Pacific harbor seals (*Phoca vitulina richardsi*). When the tides rise, most of these birds return to roosting areas in salt ponds or other alternate habitats, and the seals move to open waters.

4.5.6 Former Salt Production Ponds

Salt ponds were previously managed for the purpose of commercial salt production. The margins and basins of some former salt ponds that are seasonally ponded but dry much of the year (e.g., Ponds R3 and R4 at the Ravenswood pond cluster) consist of bare ground and salt flat or salt panne (non-mudflat soils) areas. Historically, these basins were subject to regular tidal inundation, but following installation of levees and their use as salt ponds, the salinity has increased beyond the tolerance of most halophytic vegetation. Few vascular plant species surviving in this environment, such as are pickleweed, alkali heath, and the non-native small flowered iceplant (*Carpobrotus* spp.), which occur sparsely along the margins of the basins and on top of the soil terrace of the salt flats. Due to the paucity of vegetation, these ponds provide little to no cover for small mammals or reptiles and provide nesting habitat only for species that ground-nest on the levees and the occasional islands that have been created (by deposition of material dredged) within the ponds.

Many of the remaining ponds provide valuable roosting and foraging habitat for shorebirds and waterfowl. Higher-salinity ponds support high densities of brine shrimp and brine flies (especially *Ephydra millbrae*), which in turn serve as prey for eared grebes and other high-salinity specialists.

The ponds within the project area are, collectively, highly productive systems supporting large quantities of vertebrate and invertebrate biomass. However, much of the biomass produced by these ponds is unavailable to birds or fish due to water depths (for shorebirds) and salinities (for fish) that preclude these vertebrates' use of much of the invertebrates as food in the deeper, higher-salinity ponds.

4.5.7 Open Water and Subtidal Habitats

The open water category includes a variety of habitat types, including subtidal Bay waters, tidal sloughs and channels, and areas of standing or flowing waters within the salt ponds and tidal marshes. Deep water does not support emergent vegetation. Deep bays and channels are important for aquatic invertebrates, fishes, waterbirds, and harbor seals. The open waters of South San Francisco Bay support a high diversity of benthic and pelagic macroinvertebrates. Though most of the dominant invertebrates are non-native species, they nonetheless support native oyster populations, large fish populations representing several different trophic levels, including Pacific herring (*Clupea pallasi*), northern anchovy (*Engraulis mordax*), Pacific sardine (*Sardinops sagax caeruleus*), staghorn sculpin (*Leptocottus armatus*), several species of perch (Embiotocidae family), English sole (*Parophrys vetulus*), and California halibut (*Paralichthys californicus*). Many of these fish species in turn support harbor seals and piscivorous (fish-eating) birds such as the Forster's tern, California least tern, American white pelican, brown pelican (*Pelecanus occidentalis*), and double-crested cormorant.

Waterfowl such as greater scaup (*Aythya marila*), lesser scaup (*Aythya affinis*), canvasbacks (*Aythya valisineria*), and surf scoters (*Melanitta perspicillata*) dive for bivalves, crustaceans, and other invertebrates in shallower subtidal areas. Bird diversity in the open Bay waters is fairly low, as the species of birds that can exploit the subtidal areas are limited to those that can forage from the air (e.g., terns) or under water (e.g., scoters) and those that can swim. However, large densities of diving ducks (e.g., bufflehead [*Bucephala albeola*], greater scaup) occur in some areas where appropriate depths and concentrations of benthic invertebrates, particularly bivalves, provide a rich food source. Some species, such as gulls, also roost on the open waters of the Bay, especially at night.

The tidal sloughs and channels that circulate water around and in between salt ponds and marsh remnants and through the marshes provide important habitat for large numbers of benthic and pelagic invertebrates and fish. These detritus-rich channels serve as important nurseries and feeding areas for estuarine fish, including leopard sharks (*Triakis semisasciata*). California bay shrimp (*Crangon franciscorum*) spawn in the open ocean but spend much of their lives feeding in the brackish waters of South Bay sloughs (Baxter et al. 1999). Diving ducks generally avoid the smaller tidal channels but can be found in abundance, particularly during their nonbreeding season, near the mouths of the larger tidal sloughs, in open waters, and in deeper ponds.

Thousands of diving ducks also roost and forage in the artificial lagoons in Foster City and Redwood Shores, north of the Ravenswood pond cluster, and in the Sunnyvale water treatment plant, southeast of the Alviso-Mountain View pond cluster, in winter. Dabbling ducks such as the gadwall (*Anas strepera*), green winged teal (*Anas crecca*), northern shoveler (*Anas clypeata*), and mallard (*Anas platyrhynchos*) reach high densities in the shallower ponds and in smaller and shallower channels, where they feed on aquatic plants (including algae, submerged aquatic vegetation, and plankton) and invertebrates. Terns often forage in the larger and mid-sized channels and ponds, and several species of herons and egrets forage in the shallows for fish. Many shorebirds feed along the exposed flats along tidal channels at low tide, as do rails and other tidal marsh birds.

4.6 Phase 2 Pond Clusters

4.6.1 Alviso-Island Ponds

As part of the Initial Stewardship Plan (ISP), the Island Ponds were breached to Coyote Creek and tidal action in March 2006. Once breached, these ponds provided intertidal foraging habitat for shorebirds and other waterbirds at low tide and tidal foraging habitat for waterfowl at high tide. As sediment has accumulated, tidal marsh vegetation is becoming established, providing breeding and foraging habitat for the California Ridgway's rail (recently noted in Pond A21) and other marsh species. Though ruderal in their vegetation species composition, upland portions of the levees may provide suitable habitat for a range of species that need high-tide refugia. The outboard margins of the pond levees (on Mud Slough and Coyote Creek) are characterized by seasonally brackish marsh.

4.6.2 Alviso-A8 Ponds

These ponds provide forage habitat for terns, waterfowl, and shorebirds and the levees provide nesting habitat. Sediment has been accreting in these ponds since they were opened to muted tidal flows through culverts and a variable-size, reversible armored notch in 2011. Though they are muted tidal, the ponds provide habitat for fish and benthic invertebrates that provide food for a variety of species.

4.6.3 Alviso-Mountain View Ponds

The outboard areas of the pond levees and the lower reaches of the surrounding sloughs are characterized by tidal salt marsh and the interior of these ponds are primarily open water or mudflat with little to no visible vegetation. Suitable nesting bird habitat (for California gulls, Forster's terns, American avocets, black-necked stilts, and the occasional black skimmer) exists on a few small, isolated islands found within the interior waters of Ponds A1 and A2W.

4.6.4 Ravenswood Ponds

Ponds R3 and R4 are seasonally wet ponds that collect rainwater during winter but dry out to become salt panne in summer. The upland and remnant slough channels and borrow ditches within the ponds have extremely high salinity, which inhibits most plant life but the salt flats do provide nesting habitat for special-status species including the threatened western snowy plover. Vegetation growing on the pond bottom is limited to extremely salt-tolerant vegetation, notably small flowered iceplant, which are an invasive species requiring active and regular control efforts.

Ponds R5 and S5 are seasonally wet ponds that collect rainwater during winter but dry out to become salt pannes in summer. They contain little to no vegetation. A drainage outlet for stormwater runoff from the Bayfront Canal and Atherton Channel in portions of Redwood City, Atherton, and Menlo Park carries water into Flood Slough next to the southern exterior of Pond S5, creating freshwater to brackish marsh habitat on the water's way to the Bay.

4.7 Regional Species and Habitats of Concern

The SBSP Restoration Project has determined that there are several occurrences of special-status species within the Phase 2 area using data from the California Natural Diversity Database (CNDDB). These rare San Francisco Bay area endemics include the California Ridgway's rail (*Rallus obsoletus obsoletus*; formerly California clapper rail), salt marsh harvest mouse (*Reithrodontomys raviventris raviventris*) and salt marsh wandering shrew (*Sorex vagrans halicoetes*) in remnant tidal marsh habitat and other species such as California least tern (*Sterna antillarum browni*), western snowy plover (*Charadrius nivosus* ssp. *nivosus*), and steelhead (*Oncorhynchus mykiss*; Central California Coast Distinct Population Segment).

The most prominent wildlife resources and patterns of wildlife distribution within the general South Bay area are as follows:

- Steelhead use estuarine habitats as rearing habitat for juveniles and move through the project area on their migrations to and from upstream spawning areas in the designated critical habitat in Stevens Creek, Coyote Creek, and Guadalupe River.

- Green sturgeon have been found throughout San Francisco Bay (the designated critical habitat for this species), though its population and its freshwater spawning tend to be concentrated in the northern portions of the Bay and the Sacramento-San Joaquin River Delta.
- Large numbers of shorebirds forage on the intertidal mudflats ringing the South Bay during low tide and roost (and, variably, forage) in ponds and other alternate habitats at high tide.
- Large numbers of waterfowl forage and roost on open bay and pond waters and other available habitats.
- The largest harbor seal haul-out site in the South Bay occurs along lower Mowry Slough. Other areas frequently used as haul-out sites are near Calaveras Point, at Dumbarton Point, on Greco and Bair Islands, and along Corkscrew Slough.
- California Ridgway's rail and salt marsh harvest mouse habitat in many areas are somewhat limited in extent and connectivity.

4.7.1 Special-Status Wildlife Species

There are three threatened or endangered species that are a focus of particular management efforts by the Refuge: salt marsh harvest mouse, California Ridgway's rail, and western snowy plover.

A number of special-status species occur in the Phase 2 project area as visitors, migrants, or foragers but are not known or expected to breed in the immediate project area. Animals that occasionally occur within the project area and breed in upland habitats in the greater South Bay area, but occur only in the Phase 2 project area as uncommon to rare foragers, include the bald eagle (*Haliaeetus leucocephalus*), golden eagle (*Aquila chrysaetos*), Vaux's swift (*Chaetura vauxi*), California yellow warbler (*Dendroica petechia brewsteri*), bank swallow (*Riparia riparia*), and pallid bat (*Antrozous pallidus*). Species that occur in the project area regularly as foragers but have "special status" only at nesting sites elsewhere in California include the common loon (*Gavia immer*), American white pelican, Cooper's hawk (*Accipiter cooperii*), sharp-shinned hawk (*Accipiter striatus*), osprey (*Pandion haliaetus*), Barrow's goldeneye (*Bucephala islandica*), long-billed curlew (*Numenius americanus*), and elegant tern (*Sterna elegans*).

5. PROJECT PURPOSE AND OBJECTIVES

The overall SBSP Restoration Project purpose is to:

1. Restore and enhance a mix of wetland habitats.
2. Provide wildlife-oriented public access and recreation.
3. Provide for flood management in the South Bay.

The purpose of Phase 2 of the SBSP Restoration Project is to meet the needs described above through implementing the proposed work to restore tidal marsh habitat, reconfigure managed pond habitat, maintain current levels of flood protection, and provide recreation opportunities and public access.

Phase 2 addresses multiple needs that include:

- Historic losses of tidal marsh ecosystems and habitats in San Francisco Bay and concomitant declines in populations of endangered species (e.g., California Ridgway's rail –formerly California clapper rail- [*Rallus obsoletus obsoletus*], and salt marsh harvest mouse [*Reithrodontomys raviventris*]);
- Increasing salinity and declining ecological value in several of the ponds within the project area;
- Long-term deterioration of non-certifiable levees (for Federal Emergency Management Agency [FEMA] purposes) within the project area, which could lead to levee breaches and flooding;
- Long-term tidal flood risk management and sea level rise adaptation; and
- Limited opportunities in South San Francisco Bay for wildlife-oriented recreation.

Phase 2 objectives are:

- Create, restore, or enhance habitats of sufficient size, function, and appropriate structure to:
  - Promote restoration of native special-status plants and animals that depend on South San Francisco Bay habitat for all or part of their life cycles.
  - Maintain current migratory bird species that utilize existing salt ponds and associated structures such as levees.
  - Support increased abundance and diversity of native species in various South San Francisco Bay aquatic and terrestrial ecosystem components, including plants, invertebrates, fish, mammals, birds, reptiles, and amphibians.
- Maintain or improve existing levels of flood risk management in the South Bay.
- Provide public access and recreational opportunities compatible with wildlife and habitat goals.
- Protect or improve existing levels of water and sediment quality in the South Bay and take into account ecological risks caused by restoration.

- Implement design and management measures to maintain or improve current levels of vector management, control predation on special-status species, and manage the spread of non-native invasive species.
- Protect the services provided by existing infrastructure (e.g., power lines, railroads).

6. PERMITTING BACKGROUND

A number of permits and regulatory agreements and approvals were acquired for the SBSP Restoration Project at the program level, the Phase 1 level, and for ongoing Operations and Maintenance. They are available for review at the SBSP Restoration Project website (www.southbayrestoration.org/documents/permit-related). These permits and other documents cover Endangered Species Act Section 7 consultation; Clean Water Act Sections 401, 404, and 404 (b)(1); and BCDC permits. In addition, where they were necessary, permits were obtained from the relevant cities, counties, other federal or State agencies (e.g., California Department of Transportation; California State Lands Commission, U.S. Coast Guard), and special districts (e.g., flood control districts) for Phase 1 actions. Similar approaches are being taken for the Phase 2 work.

7. GENERAL SITE RESTORATION COMPONENTS

The Phase 2 sites include several common restoration features and operations that are proposed to meet project objectives. Detailed information for operations at each site is provided in subsequent sections. A general summary of these operations and features follows.

7.1 Habitat Transition Zones:

As an adaptation to future sea level rise, the project is proposing the creation of habitat transition zones as part of Phase 2 actions. Habitat transition zones involve the beneficial reuse of material to create transitional habitats from the pond or marsh bottom to the adjacent upland habitat along portions of the upland edge. These habitat transition zones, are sometimes referred to elsewhere as “upland transition zones,” “transition zone habitats,” “ecotones,” or “horizontal levees”; this document uses the term “habitat transition zones” for these constructed features. Habitat transition zones are specifically called out in documents such as the U.S. Fish and Wildlife Service’s Tidal Marsh Recovery Plan (USFWS 2013) and the recent Science Update to the Baylands Ecosystem Habitat Goals Project Report (Goals Project 2010). A gradual transition from submerged Baylands, ponds, or open waters to uplands is largely missing in the current landscape of the South Bay, where there is often an abrupt boundary between the bay or ponds and the built environment. The SBSP Restoration Project’s intention in including habitat transition zones in the Phase 2 alternatives is to restore this missing habitat feature. Doing so would:

- Establish areas in which terrestrial marsh species can take refuge during high tides and storm events, thereby reducing their vulnerability.
- Expand habitat for a variety of special status plant species that occupy this specific elevation zone.
- Provide space for marshes to migrate upslope over time as sea-level rise occurs.

Before proposing these features, the SBSP Restoration Project examined the landscape to see if there were 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. In these instances, it is necessary that the project place material inside the former salt ponds to create the desired slope (generally 15:1 to 30:1 but potentially larger). 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, the only area remaining to build the transition zones is in the former 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 businesses that have been built adjacent to the ponds.

For these reasons, the project plans to construct the 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.

7.2 Ditch Blocks

To create the existing salt production evaporation ponds, earth was piled in a mound around each pond's perimeter to establish a levee that separated the pond from communicating with the waters of the Bay. The material for these levees was sourced from digging ditches around the inside perimeter of the pond, leaving a borrow ditch around the raised levees. Operations and maintenance of the levee maintained this process during salt production. Phase 2 proposes the use of ditch blocks within the borrow ditches as a means of enhancing tidal flow as select ponds are restored to tidal marshes.

Ditch blocks would be built by placing fill material inside of the historic borrow ditches to direct tidal flows into the center of the ponds instead of allowing them to flow around the interior perimeter. Fill material would be sourced from levee lowering, removal and breaching operations at each pond as well as from off-site sources.

7.3 Levee Modifications

Modifications to existing pond levees are proposed at multiple locations to establish hydraulic connection with adjacent sloughs and the Bay, establish a mosaic of wildlife habitat to meet restoration goals, and provide the necessary flood risk management. Modifications proposed for Phase 2 include breaching levees, lowering levees, removing levees and improving levees. A brief summary of these proposed restoration operations follow.

7.3.1 Levee Breaching

Levee breaches are proposed at specific pond locations to open the ponds to full tidal flows and/or to establish hydraulic connections between ponds. Levees would be breached after all internal pond activities are completed. Levees would be breached mechanically using earth moving equipment. Most breaches would not be reinforced and would be allowed to scour and widen naturally. Select locations would have armored breaches to support bridges where access by levee roads would be maintained. Material from breaches would be used for levee enhancements, placed into the ponds and used to create ditch blocks or pond bottom to speed the return to marsh plain elevation.

7.3.2 Levee Lowering

At select locations, levees would be lowered by scraping their tops down to the local mean higher high water (MHHW) elevation. Levee lowering would enhance habitat connectivity and provide transition of some locations to tidal marsh. Levee material would be used for levee enhancements, placed into the ponds and used to create ditch blocks or pond bottom to speed the return to marsh plain elevation.

7.3.3 Levee Removal

Levee removal is proposed at specific ponds to restore managed ponds to tidal wetland and to enhance hydraulic connections between ponds. Levee removal would bring certain sections of levees down to the elevation of the adjoining marsh plain and would thereby help connect aquatic habitat at high tides and speed the overall restoration of tidal marsh. Levee material would be used for levee enhancement, placed into the ponds and used to create ditch blocks or pond bottom to speed the return to marsh plain elevation.

7.3.4 Levee Enhancement

Levee enhancements are proposed at some locations to maintain or improve flood control, improve levee conditions for public access features and promote the establishment of wildlife habitat and native plant composition. These activities involve raising, widening, compacting, and otherwise improving existing levees where it is necessary to do.

7.4 Habitat Islands

Within specific ponds, habitat islands would be constructed from fill and existing levees to provide isolated nesting areas for birds. These islands would increase the quality, complexity, and availability of bird habitat in the Phase 2 areas and in the Refuge in general. As the ponds transition to marsh, the island habitat would eventually become marsh mounds (possibly requiring active vegetation management), which have various ecological benefits as high-tide refugia and as focal points for further sediment aggregation and vegetation formation.

7.5 Water Control Structures

Within the Ravenswood Ponds at four locations, water control structures would be installed. Water control structures are proposed to allow management of water levels and quality in managed ponds. They would give Refuge staff more ability to avoid water quality problems, algal blooms, or other adverse impacts. The water control structures would be pipe culverts with gates at each end to provide directional control.

7.6 Initial Overbuild

To achieve final design goals, many fill operations would require that construction elevations are built at a higher elevation than the final design. This planned overbuild is to allow for compaction, address wind and water erosion, and compensate for settling that will occur after fill is placed. Constructions elevations for levee improvements, habitat transition zones, and habitat islands would typically be constructed 2 to 4 feet above design goals.

8. SITE DESCRIPTIONS

8.1 Alviso-Island Pond Cluster

As shown in Figure 3, 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 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.

All three of these ponds were breached on their southern sides in 2006 as part of the SBSP Restoration Project's ISP, which preceded the 2007 Programmatic EIS/R for the project and the subsequent Phase 1 actions. Two breaches were made into Pond A19, the easternmost of the three, and into Pond A21, the westernmost. Pond A20 is smaller and was only breached at one location. These breaches connected these ponds with Coyote Creek and began their transition to tidal marsh.

Breaches allowed sediment to accrete and vegetation to establish in Pond A21 and, to a somewhat lesser extent, in Pond A20. However, Pond A19 has been slower in its transition, and most of its accretion and vegetation has been limited in its spatial distribution to the areas nearest to the breaches.

8.2 Alviso-A8 Pond Cluster

As shown in Figure 4, the A8 Ponds include Ponds A8 and A8S and the levees surrounding them. 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, Calabazas Creek, 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 current levels of flood risk management, 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 Refuge to vary the size of the notched opening.

Ambient levels of mercury are elevated in Pond A8 due to sediment inputs from the upstream, long-closed New Almaden Quicksilver Mine. Therefore, there are concerns about mercury exposure in the A8 pond complex. Prior to any restoration actions, bioavailability and bioaccumulation of mercury were found to be greater in Pond A8 than in either Alviso Slough or its fringing tidal marsh. Methylmercury concentrations in water and sediment were greater in Pond A8 than in Alviso Slough or its fringing tidal marsh channels, and biosentinels representing benthic and shoreline habitats indicated more mercury bioaccumulation in Pond A8 than in the tidal marshes along Alviso Slough (Grenier et al. 2010).

As a result, a Phase 1 action was undertaken to better understand the level of the risk and any implications of taking actions to restore tidal flows to the pond. A variable crest weir with numerous gates (also referred to as the 'notch') was installed to incrementally allow tidal waters and to study the resulting effects. Adaptive management measures have been and will continue to be used to monitor effects from the A8 Ponds. Adaptive management monitoring has included methylmercury concentrations in water and sediments; special studies of sediment scour and transport; and changes in food web indicators and sentinel species. Adaptive management actions would be triggered when mercury concentrations of sentinel species increase substantially, compared to the reference site, regardless of whether they are over or under desirable levels. If triggers are exceeded, then adaptive management actions would be implemented. Examples of such actions include changing hydraulic residence times or manipulating other factors.

Findings to date include that the initial Phase 1 construction activities temporarily increased mercury levels that were observed in Forster's tern (a piscavore) eggs in this pond immediately following Phase 1 construction activities and opening of the notch at A8. However, these levels reduced and stabilized to those found at nearby reference sites by the next nesting season (Ackerman et al. 2014). A similar trend was observed in fish, but the return to ambient levels was much quicker (~3 months) and has been consistent with reference sites ever since (Bourgeois, pers. comm.). Construction at this location for Phase 2 will not include excavation of pond bottom, only the addition of clean fill material on top of existing pond bottom, therefore re-suspension of existing mercury at this location is believed to be a minimal risk. Additionally, the approved QAPP for upland fill material will ensure that any fill used in the creation of habitat transition zones or habitat islands is free of contaminants that may enter the water.

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 hunter-use small boat launch area along the northwestern edge of A8S.

8.3 Alviso-Mountain View Pond Cluster

The Mountain View Ponds are in the western portion of the Alviso pond complex, between Charleston Slough and the Palo Alto Flood Basin to the west; City of Mountain View's Shoreline Park, Mountain View Mitigation Marsh, and Stevens Creek Mitigation Marsh to the south; Stevens Creek and Whisman Slough to the east; and the open Bay to the north. 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. As shown in Figure 5, for the purposes of this document, 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 is not part of the Refuge, is not included in the proposed project itself, but one of the levees around it – the Coast Casey Forebay levee – is included because it also borders Pond A1. The improvements proposed for the Coast Casey Forebay levee extend beyond the border of Pond A1 and would provide a greater level of increased flood risk management than the improvements to other levees. These differences are discussed in more detail below.

Unlike the Island Ponds or the A8 Ponds, the Mountain View Ponds have not been subject to previous restoration actions under the SBSP Restoration Project. The ponds themselves are somewhat subsided and have water depths of approximately 2 to 4 feet above pond bottom elevations that are at approximately 0-1 feet elevation North American Vertical Datum of 1988 (NAVD88). The ponds have limited hydrologic exchange with the Bay, as there is one small culverted inlet into Pond A1, a siphon to connect it to Pond A2W, and an outflow connection from Pond A2W back to the Bay.

8.4 Ravenswood Pond Cluster

As shown in Figure 6, 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, 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 refers to it as the Pond S5 forebay.

There are a number of complicated easements as well as several different landowners in the area where Flood Slough, the Pond S5 forebay, SR 84, Marsh Road, Bedwell Bayfront Park, and the driveway into the park, all come together. This area includes 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 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.

9. PROPOSED ACTION

The SBSP Restoration Project's proposed actions for Phase 2 provide a variety of habitat enhancements at all four pond clusters and include maintained or increased flood risk management, and additional public access and recreation features at two of the pond clusters. Figures 3 through Figure 6 illustrate the proposed construction as it would be implemented at each of the Phase 2 pond clusters. The pond-cluster specific operations are discussed in detail in the following sections.

9.1 Alviso-Island Pond Cluster

The proposed project would increase habitat connectivity, tidal flow and expedite the transition of these ponds to tidal marsh.

Proposed project activities at the Island Ponds include the following actions, all of which are illustrated in Figure 3.

9.1.1 Lower Portions of Pond A19 Northern Levee

Lower much of Pond A19's northern levee to MHHW elevation (approximately 7 feet NAVD88), but leave portions of that levee at existing elevations to provide more high-tide refugia and roosting or nesting areas. Levee lowering locations would be grubbed and cleared before construction and would be hydroseeded with native plan seed mix after lowering is complete. The levee lowering would further increase habitat complexity and connectivity, while unchanged sections of this levee would become island-like high-tide refugia. Cut volumes and areas for levee lowering at Island Ponds are provided in Table 2.

9.1.2 Widen the Westernmost of the Two Existing Breaches on the Southern Levee of Pond A19

Widening the existing western breach along Pond A19's southern levee would improve the circulation and flow of sediment into the pond, speed the breakdown of the remaining levee, and increase the rate of transition to marsh habitat. Following the widening, the breach would have a bottom width of approximately 150 feet, an invert elevation near 3.5 feet NAVD88 and 3:1 (h:v) side slopes. The length of the cut would be approximately 90 feet. Cut volumes and areas for breach widening are provided in Table 2.

9.1.3 Remove Most of the Western Levee of Pond A19 and the Eastern Levee of Pond A20

Removing most of the levees between Ponds A19 and A20 would add more habitat connectivity by connecting the two former ponds. Removal of these levees would be to the elevation of the strip of existing marsh between the two ponds, to an approximate elevation of 6.6 feet NAVD88. Sections of these two levees would be left at their existing elevations to provide high-tide refugia for birds and other wildlife species. Their removal would create a larger area of connected marsh and aquatic habitat. Cut volumes and areas for levee removal are provided in Table 2.

9.1.4 Construct Two Breaches on the North Side Levee of Pond A19 to Connect the Pond with Mud Slough

By adding north side breaches, the habitat connectivity at the Island Ponds would increase, and the distribution of sediment and vegetation would improve. This action would include excavating a channel through the adjacent fringing tidal marsh. Both breaches would be roughly 50 feet wide at the bottom with an invert elevation of 3.5 feet NAVD88 with 3:1 (horizontal to vertical [h:v]) side slopes. The length of channels cut to connect Pond A19 with Mud Slough through the levees would be approximately 150 feet at the Pond A19 northwest breach and approximately 90 feet at the Pond A19 northeast breach. Cut volumes and areas for levee breaches and associated channels are provided in Table 2.

9.1.5 Install Ditch Blocks and Fill Existing Borrow Ditches

Placement of material from levee breaching and other modifications would be used to establish ditch blocks or placed into the ponds' borrow ditches. Placing fill into borrow ditches and constructing ditch blocks would speed the transition to tidal marsh. Phase 2 operations would build approximately 6 ditch blocks in Pond A19. Ditch blocks would be established in the existing borrow ditches to direct tidal flows into the interior of the ponds. The material for the ditch blocks would be sourced on-site from levee lowering or breaches. All fill for ditch blocks and material placed oin ponds would be below MHHW elevation. Estimated fill volumes for ditch blocks and placed material is provided in Table 3.

9.1.6 Island Ponds Summary Tables

All proposed fill at the Island Ponds would be sourced from the beneficial re-use of material from the Island pond levee breaches and lowerings. Therefore, there would be no imported fill at the Island Ponds.

Table 2. Island Ponds - Estimated cut Volumes and Areas

Cut Location	Cut Purpose	Cut (cubic yards)	Cut Below HTL/MHHW (cubic yards)	Footprint Area (acres)	Area Below HTL/MHHW (acres)
Pond A19	Northwest Levee Lowering	5,000	1,000	1.4	0.4
Pond A19	North Levee Lowering (Middle)	1,800	450	0.5	0.1
Pond A19	Northeast Levee Lowering	2,600	520	0.6	0.2
Pond A19	Southwest Levee Lowering	1,400	280	0.5	0.2
Pond A19	Southeast Levee Lowering	1,900	380	0.5	0.2
Subtotal	***Levee Lowering***	***12,700***	***2,630***	***3.3***	***1***
Pond A19	Southwest Levee Removal	1,400	467	0.4	0.2
Pond A19	Northwest Levee Removal	3,200	1,067	0.8	0.2
Pond A20	Northeast Levee Removal	1,400	467	0.4	0.2
Pond A20	Southeast Levee Removal	2,900	967	0.9	0.4
Subtotal	***Levee Removal***	***8,900***	***2,967***	***2.5***	***1***
Pond A19	Northwest Breach	1,400	800	0.2	0.2
Pond A19	Northeast Breach	1,000	230	0.1	0.1
Pond A19	South Breach Widening	1,500	560	0.2	0.2
Subtotal	***Levee Breaches***	***3,900***	***1,590***	***0.6***	***0.4***
Totals	**Existing Levee Fill Removed**	**25,500**	**7,187**	**6.4**	**2.4**

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Table 3. Island Ponds - Estimated Fill Volumes and Areas

Fill Purpose	Volume (cubic yards)	Volume Below MHHW /HTL (cubic yards)	Total Footprint Area (acres)	Footprint Area Below HTL/MHHW (acres)
Pond A19 - Northwest Breach - Ditch Block 1	1,800	1,800	0.3	0.3
Pond A19 - Northwest Breach - Ditch Block 2	1,900	1,900	0.3	0.3
Pond A19 - Northeast Breach - Ditch Block 1	1,500	1,500	0.3	0.3
Pond A19 - Northeast Breach - Ditch Block 2	1,400	1,400	0.3	0.3
Pond A19 - South Breach Widening - Ditch Block 1	2,200	2,200	0.3	0.3
Pond A19 - South Breach Widening - Ditch Block 2	2,200	2,200	0.4	0.4
Other placed Levee Material	14,500	14,500	4.7	4.7
Total	**25,500**	**25,500**	**6.6**	**6.6**

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9.2 Alviso-A8 Pond Cluster

Proposed project activities at the A8 Ponds, illustrated in Figure 4, would build habitat transition zones at the southwest and southeast corners of Pond A8S to provide a range of benefits. The benefits of this operation include establishment of habitat complexity and diversity, erosion protection for the landfill and adjacent levees, and preparation for long-term sea-level rise adaptation. These benefits would provide critical components to the potential long-term restoration plan for the A8 Ponds – to restore them to full tidal action. The operations would include building the tops of the proposed habitat transition zones to approximately 9 feet elevation NAVD88. The lengths of the transition zones along the MHHW line at the southwest and southeast corners would be approximately 2,075 feet each. The habitat transition zones would be separated in the middle so that potential future connections with San Tomas Aquino Creek to the south are not be precluded.

Establishing these habitat transition zones would require import and placement of submerged fill above and below MHHW elevation as shown in Table 4. The habitat transition zones would be constructed of fill material from upland construction projects and would extend into the center of the pond at a typical slope of 30:1 (h:v). Fill placed to build transition zones below MHHW tidal elevation would convert ponds to tidal wetlands, but fill placed above that elevation would convert waters to uplands.

Table 4. A8 - Estimated Fill Volumes and Areas

FILL PURPOSE	TOTAL VOLUME (CUBIC YARDS)	VOLUME BELOW MHHW /HTL (CUBIC YARDS)	TOTAL AREA (ACRES)	FOOTPRINT AREA BELOW HTL/MHHW (ACRES)
A8S West HTZ	94,100	91,500	12.1	11.7
A8S East HTZ	84,900	82,500	12.5	12.2
Total	**179,000**	**174,000**	**24.6**	**23.9**

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9.3 Alviso-Mountain View Pond Cluster

The restoration goals for the Mountain View Ponds are to restore them to tidal marsh by connecting them to the Bay, adjacent streams, and sloughs through proposed breaches. After breaching, the ponds would accrete sediment until they reached marsh plain elevation and then begin to develop marsh vegetation. The proposed project includes those breaches as well as a number of other habitat enhancements, flood risk management components, and additional public access and recreation features.

Proposed project activities at the Mountain View Ponds include the following, all of which are illustrated in Figure 5.

9.3.1 Raise and Improve the Western Levee of Pond A1

Most of the western levee of Pond A1 would be raised to provide flood risk management to inland areas west and south of the Mountain View pond cluster. The levee breaches in Pond A1 would remove some of the de facto flood protection currently provided by the outboard levees of Pond A1, but raising the western levee of Pond A1 would offset that loss and maintain the current levels of flood risk management 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 4,400 feet. The improved levee would have a 12-foot wide crest north of the proposed viewing platform where no trail would be present and a 14-foot wide crest from the viewing platform southward where a trail would be added. Levee side slopes would be 3.5:1 (h:v). The crest of the levee north of the proposed viewing platform would be constructed to an elevation of 11 feet NAVD88 along its length north of the viewing platform. The crest of the Pond A1 western levee at the viewing platform and southward would be raised to an elevation of approximately 14.7 NAVD88 to match that of the raised Coast Casey Forebay levee (described in the next bullet) that it connects to on its southern terminus. Estimated fill volumes and areas for A1 levee improvements are provided in Table 8.

9.3.2 Raise and Improve the Coast Casey Forebay Levee and Associated Structures

Improvements to the Coast Casey Forebay are shown in Figure 5. To offset the loss of de facto protection provided by Pond A1, the Coast Casey Forebay levee that is along the western end of the southern border of Pond A1 would be improved between the Palo Alto Flood Control Basin levee and the high ground in Shoreline Park. In accordance with that necessity, the City of Mountain View, which owns that levee, seeks to raise the entire length of that levee even beyond its intersection with the Pond A1 levee. 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-foot NAVD88 cross section but to a crest elevation of 14.7 feet NAVD88. This design levee height satisfies the 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. Further, the Santa Clara Valley Water District (SCVWD), which is the flood protection agency in Santa Clara County, has recommended that a levee-top elevation of 14.7 feet NAVD88 be used for long-term sea-level rise planning. This design levee height would also improve flood risk management along the southern end of Charleston Slough and the communities and infrastructure behind it. The length of the levee improvements would be approximately 1,440 feet. The top width of the improved levee would be approximately 24 feet. In and around this levee are a pump station, a valve vault, and several utility access ports, and all would remain as existing. An existing pump station control building to the southwest would remain in place and the raised levee would be built around it. The existing wooden platform and viewing station that extend into the slough from the trail near the water intake would remain in place, and an ADA-compliant sloped path would be installed to connect it to the raised Coast Casey Forebay levee. A similar path would connect the top of the Coast Casey Forebay levee to the existing trail from the parking area to the south. Estimated fill volumes and areas for all of these levee improvements and associated structural improvements at the Coast Casey Forebay are provided in Table 8.

Finally, an excavation is required to place the shear key that is necessary to complete the improvements on the Coast Casey Forebay levee. A shear key is a volume of strengthened material that extends into the existing material to increase the stability and resistance to sliding for the improved levee. The volume and area for this ground excavation-and-replacement activity are included as part of the Coast Casey Forebay improvement estimates in Table 8. The cut volume and area for this portion of work are shown in Table 7. All cut and fill work for the shear key excavation would occur below MHHW, though the forebay itself is not tidally connected. The shear key excavation would remove and replace an equal volume of fill over the same area and would improve material and stability to existing conditions.

9.3.3 Add Recreation and Public Access

Three recreation and public access features would be added. Estimated dimensions for these features are provided in Tables 5 and 6.

- In the first, a viewing area including a platform, informational signage, and benches would be constructed within the City of Mountain View’s Shoreline Park or near the existing trail on the southern border of Pond A1 near the eastern end of the pond. The viewing platform area would be graded and its surface would be improved, but no elevated structures would be built.

- In the second, a spur trail would be constructed along the improved western levee of Pond A1 to a viewing platform similar to the one described above. It would be placed near the point where the habitat transition zone meets the Pond A1 west levee. The viewing platform would be established on a somewhat widened section of the existing levee where the benches and interpretive panels can be placed. The height of the levee-top trail from its split with the Bay Trail atop the Coast Casey Forebay levee would be at 14.7 feet elevation NAVD88 to match the elevation of the Bay Trail spine. (Beyond the viewing platform area, the levee top elevation would be at approximately 11 feet NAVD88, as discussed above.) This would provide viewing access to Charleston Slough and Pond A1. Benches and interpretive signage are proposed on both sides of the trail at the A1 western levee viewing platform.

- In the third, a trail along the levee on the eastern and northeastern side of Pond A2W. The trail on the eastern and north-eastern levees of Pond A2W would be approximately 6,440 feet (1.2 miles) long. The surfaces and side slopes of those levees would be maintained for PG&E access and would also open that route for public recreational access, add signage, and include more-frequent maintenance for safety. A viewing platform, similar to the ones described above, would be added at the end of the trail. This area would provide access to views of Pond A2W and the Bay.

9.3.4 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 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). Construction details for PG&E operations can be found in Appendix A.

9.3.5 PG&E Boardwalk Improvement and Addition

Phase 2 would elevate the existing PG&E access boardwalks in Pond A2W and 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 would be 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 84 cubic yards would be below MHHW (12 feet of each pile would be below mudline). 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.

9.3.6 Construct Habitat Transition Zones in Ponds A1 and A2W

Habitat transition zones would be constructed in Ponds A1 and A2W inside the southern edges of Ponds A1 and A2W to create transitional habitat between the lower elevation of the pond bottoms and the uplands and levees behind them. Once vegetated, the habitat transition zones would provide habitat for salt marsh harvest mouse (*Reithrodontomys raviventris*) and other terrestrial species. They would also provide a gentle slope for dissipation of wave energy and reduction of erosion potential, thereby protecting the closed landfill below Shoreline Park. The transition zone in Pond A1 would extend all the way across the southern border of the pond. In Pond A2W the transition zone would only cross the central portion of the pond's southern border, so that potential future connections with the existing mitigation marshes to the south (the Mountain View mitigation marsh and the Stevens Creek mitigation marsh) would not be precluded. The habitat transition zones would be constructed primarily of upland fill material from off-site projects. Roughly 3,700 linear feet and 3,200 linear feet of transition zone would be established along the inside slope of Ponds A1 and A2W, respectively. The habitat transition zones would have a top elevation of approximately 9 feet NAVD88. The slope of these features in Pond A1 would be varied to provide a range of different slopes including slopes at 10:1, 20:1, 30:1 and 40:1 (h:v). The intent of this variation is to execute a pilot project that would provide observational data about the habitat values, erosion protection, and sea-level rise adaptation that would result from these varying slopes. This approach is proposed as part of the SBSP Restoration Project's commitment to developing and sharing scientific insights to inform not only future phases of this project, but also to develop insights and test hypotheses that have broader application to other projects. In Pond A2W, the slope would be 30:1 (h:v). Estimated fill volumes, and areas for the habitat transition zones at the Mountain View Ponds are provided in Table 8.

9.3.7 Construct Habitat Islands in Ponds A1 and A2W for Birds

Nesting and roosting habitat for shorebirds, terns, and dabbling ducks would be created through the construction of islands in Ponds A1 and A2W. This would include building up to ten islands, with 3 to 5 islands per pond. The islands would be constructed largely of upland fill material from off-site projects. Each island would have a top area of roughly 10,100 square feet, a top elevation of 12.5 feet NAVD88 (roughly 3 feet above MHHW) and side slopes would be approximately 3:1 (h:v). As the ponds transition to marsh, the island habitat would eventually become marsh mounds, which have various ecological benefits as high-tide refugia and as focal points for further sediment aggregation and vegetation formation. Estimated fill volumes, and areas for habitat islands at Mountain View Ponds are provided in Table 8.

9.3.8 Breach Pond A1 at Two Locations and Pond A2W at Four Locations

These breaches and the associated channels that would be excavated to connect them to the surrounding sloughs would allow tidal flows to enter, sediment to accrete, and vegetation to become established. The two Pond A1 breaches would be at the northwest corner of the pond on the western levee and along the eastern levee into Permanente Creek/Mountain View Slough. Two of the four Pond A2W breaches would be on the western levee into Permanente Creek/Mountain View Slough. The other two breaches would be on the eastern levee into Stevens Creek/Whisman Slough. 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 and are also being chosen to minimize the amount of existing fringing marsh through which the channel to connect the breaches to the sloughs must be excavated. The breaches would all have an invert elevation of approximately 2 feet NAVD88 and have approximately 2:1 (h:v) side slopes. The bottom widths would be approximately 60 feet. The length of the channel cut connecting Pond A1 to adjacent Mountain View Slough would be approximately 110 feet. At Pond A2W's western levee, the channel cut through the south breach connecting Pond A2W to Permanente Creek/Mountain View Slough would be approximately 230 feet and through the north breach the channel cut would be approximately 200 feet. On Pond A2W's east levee, the channel cut through the south breach connecting A2W to Stevens Creek/Whisman Slough would be approximately 210 feet long and through the north breach it would be approximately 200 feet long. The two breaches on the eastern levee would be designed such that the top width would be wide enough to span access 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. Estimated Cut volumes and areas of breaches and the associated channels are provided in Table 7.

9.3.9 Armor the Two Eastern Breaches of Pond A2W and Add Bridges over the Two Breaches

Two single-span precast/prestressed I-girder bridges would be installed to extend over the armored breaches on the eastern levee of Pond A2W and would provide access to existing PG&E utilities. To accommodate the load of maintenance vehicles, bridges would be designed to accommodate a vehicle load of 4,000 pounds. The bridges would consist of pile supported abutments and wing walls at each end that would provide a foundation for the superstructure and would also serve to armor the breaches and prevent further scour and widening. Foundations and wing walls would be cast in place concrete footings supported on top of piles driven into the existing levee and its edges, where it meets the fringing marsh and the pond interior. Each foundation's abutment is estimated to require 8 supporting piles. The total pile count for both bridges is estimated to be 32 piles. The superstructure would be cast-in-place concrete bridge deck on precast/prestressed 2.5 feet deep I-girders. Concrete barriers (Type 732 or similar) would be placed on each side of the bridge. Each bridge would be approximately 60 feet long and 19 feet wide. This length would allow for a minimum of 40 feet channel bottom width through the bridge opening. The bridge deck elevation would be 12.25 feet NAVD88 and the soffit would be at 9 feet NAVD 88 elevation. The dimensions of the fill for abutments and piles are presented in Table 9. A trail approximately 15 feet wide with 2-foot wide shoulders on each side with would traverse the top of the bridges.

9.3.10 Mountain View Ponds Summary Tables

Table 5. Mountain View Ponds - Recreational Features: Viewing Platform Footprints

FEATURE	AREA (SQUARE FEET)
A1 West Levee Viewing platform	830
Shoreline Park Viewing platform	440
Pond A2W NorthEast Viewing platform	1,900
Total	**3,170**

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Table 6. Mountain View Ponds - Recreational Features: Trail Lengths and Areas

FEATURE	LENGTH (FEET)	WIDTH (FEET)	AREA (SQUARE FEET)
Pond A1 West Levee Trail	480	14	6,720
Pond A2W East Trail	6,440	16	103,040
New Trails: Subtotal	***6,920***	***NA***	***109,760***
Coast Casey Levee Trail Replacement	1,460	16	23,360
Total	**8,380**	**NA**	**133,120**

Notes: All trail widths include 2 feet of shoulder space on each side of the trail.

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Table 7. Mountain View Ponds - Estimated Cut Volumes and Areas

CUT LOCATION	CUT PURPOSE	CUT (CUBIC YARDS)	CUT BELOW HTL/MHHW (CUBIC YARDS)	FOOTPRINT AREA (ACRES)	AREA BELOW HTL/MHHW (ACRES)
Pond A1	Northwest Breach	1,700	990	0.2	0.1
Pond A1	Southeast Breach	1,700	660	0.2	0.1
Pond A2W	Northwest Breach	2,400	660	0.3	0.1
Pond A2W	Southwest Breach	3,000	880	0.4	0.1
Pond A2W	Northeast Breach	1,100	330	0.1	< 0.1
Pond A2W	Southeast Breach	2,200	1,650	0.3	0.2
Subtotal	*Mountain View Pond Breaches*	*12,100*	*5,170*	*1.5*	*0.7*
Pond A1 (Coast Casey Forebay)	Shear Key Excavation	3,100	3,100	0.7	0.7
Totals		**15,200**	**8,270**	**2.2**	**1.3**

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Table 8. Mountain View Ponds - Estimated Fill Volumes and Areas by Purpose

FILL PURPOSE	VOLUME (CUBIC YARDS)	VOLUME BELOW MHHW /HTL (CUBIC YARDS)	TOTAL FOOTPRINT AREA (ACRES)	FOOTPRINT AREA BELOW HTL/MHHW (ACRES)
Coast Casey Forebay Levee Improvement	27,400	12,050	2.3	1.5
Pond A1 West Levee Improvement	89,100	40,320	12.7	8.3
10 Habitat Islands	53,500	40,600	5.1	5.1
Bridge Piles, Abutments	540	100	0.1	0.0
Pond A1 Habitat Transition Zone	77,100	73,480	16.9	15.9
Pond A2W Habitat Transition Zone	80,000	77,120	15.7	15.7
Totals	**327,640**	**243,670**	**52.8**	**46.4**

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Table 9 Mountain View Ponds - A2W Bridge Details

LOCATION	BRIDGE SUPERSTRUCTURE FOOTPRINT (SQARE FEET)	PILE QUANITITY	PILE LENGTH (FEET)	PILE DIAMETER (INCHES)
Pond A2W Northeast Breach	1,131	16	45	14
Pond A2W Southeast Breach	1,131	16	45	14

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9.4 Ravenswood Pond Cluster

The restoration goals for the Ravenswood Ponds are to restore Pond R4 to tidal marsh by connecting it to the Bay through a breach into Ravenswood Slough, to improve Pond R3 as an enhanced managed pond for small shorebirds, including western snowy plover (*Charadrius alexandrines*), and to convert Ponds R5 and S5 to enhanced managed ponds for dabbling ducks and other bird guilds. The proposed project includes the breach, four water control structures, a number of other habitat enhancements and flood risk management components, and additional public access and recreation features.

Proposed project activities at the Ravenswood Ponds include the following, all of which are illustrated in Figure 6. Estimated cut volumesand areas are summarized in Table 12, Estimated fill volumes and areas are summarized in Table 11.

9.4.1 Convert Ponds R3, R5 and S5 to Enhanced Managed Ponds and Install Water Control Structures

There would be four water control structures installed within and between these ponds to allow them to be managed to achieve different habitat goals. First, a water control structure would be installed into 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 better water quality, better control over water levels, and improvement of the existing western snowy plover forage habitat in Pond R3. There would also be a channel excavated through the external fringing marsh to connect the water control structure with Ravenswood Slough.

Ponds R5 and S5, which are currently seasonal ponds, would be converted into a single enhanced managed pond through removal or modification of levees within and between the ponds. There would be four water control structures (pipe culverts through levees) installed. One would be installed at the levee between Ponds R4 and R5. Another would be installed between Pond S5 and Flood Slough. A third would be installed between Ponds S5 and R3. The fourth would be installed between Pond R3 and Ravenswood Slough. By providing the means for year-round control of water levels and some control of the salinities and other aspects of water quality in the ponds, these structures would allow for separate control of different types of managed pond habitat for various guilds of birds by allowing different bottom depths and elevations.

The water control structures would be circular high density polyethylene (HDPE) pipes (culverts). The number of pipes, pipe size, and invert elevations of the water control structures that would be installed at proposed locations around the project site, are listed in Table 10. The water control structures would be gated at both ends to allow two-way control over flows in or out of each pond.

To support loads from the control structure gates and access to gate controls by Refuge personnel, bridges would be constructed above each pipe culvert from the proposed or existing levee grade to the end of each pipe. The bridge decks would be pre-cast/pre-stressed concrete voided slab decks on pile caps supported by driven concrete piles. Bridge decks would include cable railing on each side of the deck for safety. Areas for water control structures are provided in Table 10.

9.4.2 Improve Levees and Fill in the All-American Canal

Approximately 4,700 feet of improved levee would be constructed on existing levees and would fill in the AAC. The berm-like levees along both sides of the AAC would be raised and strengthened, and the AAC would be filled in, creating a single levee. Constructing this improved levee would replace the de facto flood risk protection currently provided by the outboard levees on Pond R4. Improvements at the western end of the AAC would extend north along the Ponds R4/R5 border and south along the R3/S5 border to isolate Ponds R5 and S5 from the others so that they can be managed separately. Most of the material for the improvements would come from off-site sources, though some may be from local cut activities. The improved levee would consist of a 60-foot-wide crest with side slopes at approximately 3.5:1 (h:v) on the north side and 4.5:1 (h:v) on the south side. The crest of the levee would be at elevation 11 feet NAVD88. The improved levee would become wider as it transitions to meet the sections of improved levee that would form the eastern borders of Ponds R5 and S5 and would also be the basis of a public access trail and viewing platform. The AAC would not have a trail on top, but would allow access by vehicles for maintenance and monitoring activities. A gate would be placed at the viewing platform area to restrict access.

9.4.3 Construct Two Habitat Transition Zones in Pond R4

Construct and vegetate one habitat transition zone in the western side of Pond R4, up against the Bedwell Bayfront Park (a closed landfill) border as shown in Figure 6. This habitat transition zone would be approximately 2,500 feet long. Construct and vegetate a second habitat transition zone to extend northward into Pond R4 from the improved AAC levees. This second habitat transition zone would be approximately 5,100 linear feet long. The habitat transition zones would be at an elevation of 9 feet NAVD88 along the levees or the high ground of the park and have side slopes of 30:1 (h:v) with varying steeper slopes at end transitions. The transition zones would be constructed primarily of upland fill material brought in from off-site locations.

9.4.4 Remove Internal Levees in Ponds R5 and S5

As part of converting Ponds R5 and S5 to managed ponds, four water control structures (discussed above) would be installed within and between these ponds. To further enhance the habitat, most of the levee between Ponds R5 and S5 would be removed, 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. This would increase the area available for aquatic habitat within the ponds. As discussed below, a portion of the existing internal levee between Ponds R5 and S5 would be left in place and resurfaced to improve its suitability for use as a habitat island for bird roosting and nesting.

9.4.5 Establish 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 surface would be approximately 1.77 acres with a relatively flat top at elevation 9 feet NAVD88 (above the MHHW elevation) with side slopes of 2:1 (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.

9.4.6 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 from portions of former slough traces. The proposed pilot channels would together be roughly 2,890 feet long and would be excavated through the existing pond bed. The invert elevation would be at 2 feet NAVD88 to roughly match the invert elevation of the existing channels within Pond R4. The bottom width of the channel cut would be roughly 50 feet wide with side slopes of 2:1 (h:v). The moved material would be used to enhance levees, and construct habitat transition zones and ditch blocks.

9.4.7 Build Ditch Blocks in Pond R4

Build ditch blocks in the existing borrow ditches west of the R4 breach to direct tidal flows into the interior of the ponds. The material for the ditch blocks would be from a combination of imported fill material and local material from levee lowering or breaches.

9.4.8 Add Recreation and Public Access Features

A trail along the improved eastern levees of Ponds R5 and S5 would be constructed and linked to the existing trails outside of these ponds. As shown in Figure 6, the northern end would connect to the existing trail in Bedwell Bayfront Park; the southern end would connect to the Bay Trail spine. This trail would be approximately 2,750 feet long and 10 feet wide with 2 feet of shoulder on each side. 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 over them. This trail would necessitate a break in the new fence that borders the northern side of the Bay Trail, 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. The trail would be bordered on both sides with low symbolic deterrent fencing (2- or 3-foot high posts connected by chains, cables, or rails) to provide a visual reminder to trail users to stay on the trail and not enter the restoration areas. Total length of fencing to be installed would be approximately 5,160 feet.

A viewing platform would be constructed near the central point of this trail, at the junction with the improved AAC levee. The viewing platform would have benches and interpretive signage on pedestals and/or information panels. This would improve public access and supplement the visual benefits the trail and the restoration project would make available. As shown in Figure 6, benches 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 and providing a view of all three of the Refuge’s restoration pond types at these ponds.

9.4.9 Lower the levee in the northwest corner of Pond R4

Approximately 960 linear feet of the northwestern levee on the edge of Pond R4 would be lowered to MHHW. This modification would improve habitat connectivity between Pond R4 and Greco Island/West Point Slough, and it would also provide high-tide refugia for salt marsh harvest mouse and other species. The new top elevation would be at approximately 8 feet NAVD88 and side slopes would be approximately 2:1 (h:v). Material from the lowered levee would be used to raise levees or construct habitat transition zones.

9.4.10 Breach Pond R4

Breach the northeastern corner of Pond R4 to open the pond to tidal flows from Ravenswood Slough. Material from the breached levee would be used to build ditch blocks to direct flows through the borrow ditch to the historic slough trace and into the pond's center; material could also be used to improve levees or construct habitat transition zones. The bottom width of this breach would be approximately 200 feet, with an invert elevation of 2 feet NAVD88 and with side slopes of 3:1 (h:v). The length of the excavated channel to connect the breach to Ravenswood Slough through the existing fringe tidal marsh would be approximately 470 feet.

9.4.11 Fence the Southern Border of Ponds R3 and S5

A low (3-foot-high) chain-link fence approximately 8,000 feet in length 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.

9.4.12 Ravenswood Ponds Summary Tables

Table 10. Ravenswood Ponds - Water Control Structures

LOCATION	PIPE QUANTITY	INSIDE DIAMETER (INCHES)	PIPE LENGTH (FEET)	INVERT ELEVATION NAVD88 (FEET)	PILE QUANTITY*	TOTAL AREA** (SQUARE FEET)
Pond R5/S5 to Flood Slough	2	48	183	2	8	3,790
Pond R5/S5 to Pond R4	2	48	78	3.5	8	1,650
Pond R5/S5 to Pond R3	1	48	67	4.5	8	690
Pond R3 to Ravenswood Slough	1	48	62	2	8	640
Total	**6**	**N/a**	**390**	**n/a**	**32**	**6,770**

Notes:

*All piles are 16-inch diameter and approximately 20 feet long.

**Total Area includes pipe-culvert, gates and bridges at each control structure

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Table 11. Ravenswood Ponds - Estimated Fill Volumes and Areas by Purpose

FILL PURPOSE	VOLUME (CUBIC YARDS)	VOLUME BELOW MHHW /HTL (CUBIC YARDS)	TOTAL FOOTPRINT AREA (ACRES)	FOOTPRINT AREA BELOW HTL/MHHW (ACRES)
R5/S5 East Levee and All American Canal Levee Improvement	182,400	46,090	17.5	7.0
All American Canal HTZ	76,300	69,460	14.9	12.0
Bedwell Bayfront Park HTZ	50,200	47,240	9.1	8.3
Ditch Block west of R4 Breach	1,000	1,000	0.3	0.3
Water Control Structures	400	400	0.2	0.2
Total	**310,300**	**164,190**	**41.9**	**27.8**

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Table 12 Ravenswood Ponds - Estimated Cut Volumes and Areas

CUT LOCATION	CUT PURPOSE	CUT (CUBIC YARDS)	CUT BELOW HTL/MHHW (CUBIC YARDS)	AREA (ACRES)	AREA BELOW HTL/MHHW (ACRES)
Pond S5	Internal Levee Removal	2,500	1,000	0.5	0.2
Ponds R5/S5	north internal levee removal	4,100	3,900	1.5	0.9
Ponds R5/S5	South Internal Levee Removal	4,100	2,800	1.2	0.6
Subtotal	*Levee Removal*	*10,700*	7,700	*3.2*	*1.7*
Pond R4	Northwest Levee lowering	2,100	0	0.9	0.3
Pond R4	Northeast Breach	13,300	10,600	2.1	2.0
Pond R4	Pilot Channel	16,000	16,000	4.1	4.1
Pond R3	Water Control Structure	1,000	1,000	0.2	0.2
Totals		**43,100**	**35,300**	**10.4**	**8.2**

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9.5 South Bay Salt Pond Restoration Project Phase 2 Summary Tables

Tables 13 to 16 summarize the lengths, areas, and volumes of the proposed actions for the SBSP Phase 2 project. For ease of reference, the fill and cut estimates are provided by location (i.e., pond cluster) in one set of tables and by purpose in another set of tables. The cut information in Table 15 and Table 16 represent the same volumes and areas presented two different ways, likewise for the fill volumes and areas summarized in Tables 13 and 14. Additionally, each of these tables contains the total areas and volumes at each location, or for each purpose, and then parses those areas or volumes into the amounts above and below MHHW. This split of the totals is intended to help the regulatory agencies understand the portion of these totals that would be placed into waters versus that placed into uplands.

Estimates for PG&E operations are not included in the summary tables as they are being developed separately.

In addition Tables 17 and 18 present the lengths and areas of new public access features by pond cluster location. As all of these features would be placed onto existing ground or onto levees that would be enhanced regardless; these features add negligible amounts of new cut or fill areas or volumes.

Table 13. SBSP Phase 2 - Total Fill Volumes and Areas by Location

POND CLUSTER	NET FILL (CUBIC YARDS)	VOLUME BELOW MHHW /HTL (CUBIC YARDS)	AREA (ACRES)	FOOTPRINT AREA BELOW HTL/MHHW (ACRES)
Island Ponds	25,500	25,500	6.6	6.6
A8 Ponds	179,000	174,000	24.6	23.9
Mountain View Ponds	327,640	243,670	52.8	46.4
Ravenswood Ponds	310,300	164,190	41.9	27.8
Totals	**842,440**	**607,360**	**125.9**	**104.8**

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Table 14. SBSP Phase 2 - Total Fill Volumes and Areas by Purpose

FILL PURPOSE	NET FILL (CUBIC YARDS)	VOLUME BELOW MHHW /HTL (CUBIC YARDS)	AREA (ACRES)	FOOTPRINT AREA BELOW HTL/MHHW (ACRES)
Levee Improvement	298,900	98,460	32.5	16.8
Habitat Island	53,500	40,600	5.1	5.1
Habitat Transition Zone	462,600	441,300	81.1	75.9
Ditch Blocks & Placement of Re-used Levee Material	26,500	26,500	6.9	6.9
Structures (Water Control and Bridges)	940	500	0.2	0.2
Totals	**842,440**	**607,360**	**125.9**	**104.9**

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Table 15. SBSP Phase 2 - Total Cut Volumes and Areas by Location

POND CLUSTER	CUT (CUBIC YARDS)	CUT BELOW HTL/MHHW (CUBIC YARDS)	AREA (ACRES)	AREA BELOW HTL/MHHW (ACRES)
Island Ponds	25,500	7,187	6.4	2.4
A8 Ponds	0	0	0	0
Mountain View Ponds	15,200	8,270	2.2	1.3
Ravenswood Ponds	43,100	35,300	10.4	8.2
Totals	83,800	50,757	19.0	12.0

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Table 16. SBSP Phase 2 - Total Cut Volumes and Areas by Purpose

PURPOSE	CUT (CUBIC YARDS)	CUT BELOW HTL/MHHW (CUBIC YARDS)	AREA (ACRES)	AREA BELOW HTL/MHHW (ACRES)
Levee Removal	19,600	10,667	5.7	2.7
Levee Lowering	14,800	2,630	4.2	1.3
Levee Breaches, Excavations and Pilot Channels	49,400	37,460	9.1	8.0
Totals	**83,800**	**50,757**	19.0	**12.0**

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Table 17. SBSP Phase 2 - Recreational Features: Trails

LOCATION	LENGTH (FEET)	AREA (SQUARE FEET)
Island Ponds	NA	NA
A8 Ponds	NA	NA
Mountain View Ponds*	8,380	133,120
Ravenswood Ponds	2,750	38,500
Total	**11,130**	**171,620**
*Note: Mountain View Pond totals include installing new trails and replacing existing trails		

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Table 18. SBSP Phase 2 - Recreational Features: Viewing Platform Footprints

LOCATION	AREA (SQUARE FEET)
Island Ponds	NA
A8 Ponds	NA
Mountain View Ponds	3,170
Ravenswood Ponds	9,960
Totals	**13,130**

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Table 19. SBSP Phase 2 Structure Areas by Type

STRUCTURE	AREA (SQUARE FEET)
Water Control Structures	6,770
Bridges	2,270
Total	**9,040**

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10. MEANS, METHODS, AND EQUIPMENT

This section discusses the construction approach at each of the Phase 2 locations. It describes the means and methods of how each component listed above would be implemented, and lists the equipment that would be used to do so. Subsequent sections address details of construction schedules and of the planned operations and maintenance.

A San Francisco Regional Water Quality Control Board (RWQCB) accepted Storm Water Pollution Prevention Plan for the project would be implemented for all project-related activities; appropriate Best Management Practices (BMPs) would be used for all activities with potential impact on water quality. Water quality monitoring would be undertaken in compliance with a SBSP Restoration Project 401 Certification and Waste Discharge Requirements, once issued by the RWQCB, and the San Francisco Bay RWQCB Basin Plan.

Prior to performing construction activities, areas to be disturbed by construction equipment would be cleared of existing vegetation and disposed off-site.

10.1 Alviso-Island Pond Cluster

At the Island Ponds, the construction approach would include the following details.

10.1.1 Construction Access

Primary land access to the 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. 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 Coyote Creek Lagoon Trail that connects to the northeast corner of Pond A19 via a small footbridge. Construction crews would typically consist of fewer than a dozen people.

10.1.2 Construction Staging Areas

No staging areas are necessary for stockpiling at the Island Ponds. Most equipment used for construction would stay within the project footprint, and no fill material would be brought into the Island Ponds. However, a small staging area northeast of Pond A19 would be provided during construction for vehicles and equipment.

10.1.3 Levee Breach and Channel Excavation

All levee modifications – including adding new breaches, widening an existing breach, and lowering and removing levees – would be accomplished by using amphibious excavators, and other conventional construction equipment. Movement of the excavator between the perimeter levees of Ponds A19 and A20 would occur at low tide utilizing mats. The excavators would work from the existing levees.

10.1.4 Ditch Blocks

Ditch blocks would be formed by placing material from other onsite activities into the existing internal borrow ditches and compacting it. Excavators would be used for placement and initial compaction, and a vibratory hand tamper or a roller would be used for compaction.

10.1.5 Construction Equipment

Construction equipment would include excavators (amphibious and/or terrestrial, fitted with long-reach attachments), a barge (for fueling and possibly for 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.

10.2 Alviso-A8 Pond Cluster

At the A8 Ponds, the construction approach would include the following details.

10.2.1 Construction Access

Access to the A8 Ponds 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 internal pond levees. Construction crews would typically consist of fewer than a dozen people. The existing levees are known to be capable of handling heavy construction equipment and trucks carrying dirt because the SCVWD uses these access roads to import material dredged from creek channels in Santa Clara County.

10.2.2 Construction Staging Areas

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

10.2.3 Habitat Transition Zones

The habitat transition zones would be constructed by placing fill material along the slopes and into the pond bottom. The work would proceed from the existing levee roads outward into the pond. Material would be placed and compacted to approximately 70 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.

10.2.4 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.

10.3 Alviso-Mountain View Pond Cluster

At the Mountain View Ponds, the construction approach would include the following details.

10.3.1 Construction Access

Primary access to the project site would be from U.S. 101 via exits for major arterials. The first of those would be to the Pond A1 portion of the project using the North San Antonio Road exit, continuing north to Terminal Boulevard and then heading east onto the levee road between the Shoreline Park sailing lake and the Coast Casey Forebay. From there, the work areas along the Coast Casey Forebay, Charleston

Slough, and Pond A1 would be accessible. A secondary route is available along the levee road that forms the western boundary of the Coast Casey Forebay. To reach the work areas at Pond A2W, the Rengstorff Avenue North exit would be used to leave U.S. 101 and head north, after which, Amphitheater Parkway, North Shoreline Boulevard, and Crittenden Lane would be used to reach the large levees and existing access roads around west of Stevens Creek and the northeastern corner of Shoreline Park.

The exact route(s) and timing used for material delivery are subject to modification due to City of Mountain View requirements for traffic control, Shoreline Park activities, and 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.

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.

10.3.2 Construction Staging Areas

Construction staging areas will be established within Mountain View Shoreline Park in coordination with City of Mountain View. The staging areas will be adjacent to the southern border of Pond A1 north of the sailing lake and east of the Coast Casey Forebay and adjacent to the southern border of Pond A2W west of Stevens Creek Marsh in upland areas alongside existing roads and trails, as shown on project plan sheets (Appendix A).

10.3.3 Levee Improvement

Levee improvements along the western side of Pond A1, the eastern side of Pond A2W, and the Coast Casey Forebay levee would require clearing of vegetation, debris, and grooving. Fill would be placed in approximately 6-inch-thick lifts and compacted either through a vibratory hand tamper or a roller to achieve approximately 90 percent compaction for the A1 west levee and 95 percent compaction for the Coast Casey Forebay levee. Some material would be largely sourced from off-site excavation projects. On-site sources would include excavated material from levee lowering, channel excavation, and breaching activities. After levee improvement operations, the A1 levee north of the viewing platform would be hydroseeded with a native plant mix.

Levee crests destined for trail access would be finished with an approximately 12-inch-thick layer of aggregate base 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.

10.3.4 PG&E Boardwalk and Tower Footing Improvements and Additions

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 approximately 4 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. 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 would require adding additional concrete to existing concrete foundations to a greater height of up to 4 feet above existing structure footing. Construction details for this work are provided in Appendix A.

10.3.5 Habitat Islands

The material for the habitat islands would be placed by long-reach excavators working from the existing levees or by using an excavator and small barges in the pond to move and place material. Material would be delivered by haul trucks to the working locations. A water truck will be used for dust control of delivered material, if necessary. An excavator would place and moderately compact material in the pond. The material would be piled in layers and compacted by a vibratory 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, or similar appropriate material, to provide a barren land sight that is typically preferred by some nesting birds.

10.3.6 Habitat Transition Zones

Pond A1’s habitat transition zone would be constructed by placing fill material along the existing levee side slopes and into the pond bottoms at a range of different side slopes including 10:1, 20:1, 30:1 and 40:1 (h:v). Pond A2W habitat transition zone would be constructed with 30:1 (h:v) a side slope. The work would proceed from the existing levee roads outward into the pond. These features would be compacted to approximately 70 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.

10.3.7 Levee Breach and Channel Excavation

Breaching would be accomplished from the levee crests using excavators and hauling material to locations receiving fill for beneficial re-use in the project area. The breach at the northwest corner of Pond A1 would be at the location of the current water intake gate, which would be removed as part of this breach activity.

10.3.8 Levee Bridges

The two breaches in the east levee of Pond A2W would be bridged to provide continued PG&E maintenance access and to support a public access trail. Existing levees at connection points would be raised from approximately 10 feet NAVD88 to approximately 12.5 feet NAVD88. These bridges would include prefabricated I-girder superstructure with a cast in place concrete bridge deck on precast 2.5 feet deep concrete I-girders set on seat-type abutments with wing walls that would be cast on top of driven concrete piles. Installation of the abutment foundations would require vibratory and/or impact driving to install concrete piles, installing and dewatering cofferdams at each abutment location, setting foundation forms, and pouring concrete. Support piles at each abutment would be 14 inch pre-cast concrete piles approximately 45 feet in length. Eight piles at each of four abutment footings would be driven. The total count for piles driven to support both bridges would be 32. Piles would be driven using a vibratory and/or impact hammer.

10.3.9 Dewatering

Armoring and bridging of breaches on the east levee of Pond A2W would require dry conditions. Therefore, installation of cofferdams at the breach and bridge locations would facilitate the construction of concrete abutments and wing walls. During cofferdam dewatering, pumped water would be managed in accordance with the 2007 SBSP Program FEIS/R and 2016 SBSP Phase 2 Mitigation Measure 3.4-5a. The language from this Mitigation Measure follows.

SBSP Mitigation Measure 3.4-5a: Stormwater Pollution Prevention Plan.

This mitigates potential impacts due to construction related-activities and maintenance activities. The Project sponsors will obtain authorization from the RWQCB prior to beginning construction. As part of this application, the Project sponsors will prepare a Stormwater Pollution Prevention Plan (SWPPP) and require all construction contractors to implement BMPs identified in the SWPPP for controlling soil erosion and discharges of other construction-related contaminants. Routine monitoring and inspection of BMPs will be conducted to ensure that the quality of stormwater discharges is in compliance with the permit.

BMPs that will appear in the SWPPP include:

- Soil stabilization measures, such as preservation of existing vegetation and use of mulch or temporary plantings to minimize soil disturbance;
- Sediment control measures to prevent disturbed soils from entering waterways;
- Tracking control measures to reduce sediments that leave the construction site on vehicle or equipment tires;
- Non-stormwater discharge control measures, such as monitoring water quality of dewatering operations and hazardous material delivery, storage, and emergency spill response requirements, and measures by the Project sponsors to ensure that soil-excavation and movement activities are conducted in accordance with standard BMPs regarding excavation and dredging of bay muds as outlined in San Francisco Bay Conservation and Development Commission’s bay dredge guidance documents. These include excavating channels during low tide; using dredge equipment, such as sealing clamshell buckets, designed to minimize escape of the fine grained materials; and testing dredge materials for contaminants.

The contractor will select specific BMPs from each area, with Project sponsor approval, on a site-specific basis. The construction general contractor will ensure that the BMPs are implemented as appropriate throughout the duration of construction and will be responsible for subcontractor compliance with the SWPPP requirements.

Other impacts due to construction-related and maintenance activities can be mitigated by appropriate additions to stormwater pollution prevention plans, including a plan for safe refueling of vehicles and spill containment plans. An appropriate hazardous materials management plan will be developed for any activity that involves handling, transport or removal of hazardous materials.

10.3.10 Trails, Viewing Platforms, Signs, and Benches

All rebuilt trails on existing levees that would be raised or modified as part of this project would be resurfaced with decomposed granite.

A new trail would be built on a portion of the raised and improved Pond A1 west levee. A new trail would also be built on the eastern levee of Pond A2W, which would not be raised but which would be graded and filled in places as needed to make the levee top suitable for a trail. Eroded or uneven surfaces on these 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 not be elevated above the levees or existing land on which they would be placed, though the A1 west levee platform would involve local levee widening to accommodate the added space required. The viewing platforms would be graded and surfaced to meet ABD and ADA standards and would have a visual appearance matching nearby conditions. The main features at the platforms would be benches and signs or panels that provide site information to the public. These features would be constructed of metal and wood and placed on cast-in-place concrete footings. 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. The signage at the platforms would be mounted on pedestals, and one or more benches would be located near each sign or panel.

10.3.11 Construction Equipment

Construction would be accomplished using conventional construction equipment including excavators, bulldozers, dump trucks, compaction rollers, water tankers, refueling tanks, pile-driving equipment, pumps, sheet piles, cranes, barges, skiffs, paving equipment, and pickup vehicles for transportation in and out of the project site. Helicopters may be needed in areas where new PG&E boardwalks are constructed. Temporary fill would also be used at staging locations if required. Fill material would be transported to the project area by haul trucks.

10.4 Ravenswood Pond Cluster

At the Ravenswood Ponds, the construction approach would include the following details.

10.4.1 Construction Access

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 details of this access would be developed in coordination with the City of Menlo Park.

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.

10.4.2 Construction Staging Areas

Staging areas would be established for equipment and material storage within the Refuge boundaries. These areas may be on existing levees or in areas that would be filled as part of the Phase 2 actions later in the project. The Pond S5 forebay would be used for stockpiling before Pond S5 is hydraulically connected to Flood Slough. Material staging areas would not be located within the City of Menlo Park's Bedwell Bayfront Park.

10.4.3 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 per the 2007 SBSP Program FEIS/R and 2016 SBSP Phase 2 FEIS/R Mitigation Measure 3.4-5a.

10.4.4 Demolition of Existing Water Control Structures

Six existing water control structures in the Ravenswood Ponds would be removed. These remnant features of the former salt production infrastructure would be removed during construction. All associated support structures would be demolished and disposed off-site or recycled as appropriate.

10.4.5 Water Control Structures

The four water control structures would be placed into trenches cut by excavators and/or backhoes. To reduce the corrosion concerns typically expected in brackish water and to allow for management of pond habitat, solid-wall HDPE pipes would be used. Pipe bridges would be built over both ends of each structure to allow maintenance and operations access. The pipe bridges would be built pre-cast/pre-stressed concrete voided slab decks on pile caps, supported on concrete driven piles. Pile installation methods would include auguring, casting in place, and vibratory or impact driving, depending on seasonality of sensitive wildlife species nearby.

The water control structure connecting Flood Slough to the Pond S5 forebay would be the most involved installment because a portion of the existing roadway entrance into Bedwell Bayfront Park would have to be removed to allow access to the ground below it.

10.4.6 Habitat Transition Zones

The habitat transition zones would be constructed by placing fill material along the existing levee side slopes and into the pond bottoms. The work would proceed from the existing levees outward into the pond. These features would be compacted to approximately 70 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.

10.4.7 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 approximately 6-inch-thick lifts and compacted either through a vibratory hand tamper or a roller to achieve approximately 90 percent compaction. Borrow material would be sourced on-site from levee lowering at Pond R4, internal levee removal at Ponds R5 and S5, and pilot channel excavation, but most would be from off-site upland excavation projects.

10.4.8 Levee Removal

Earth moving machinery including an excavator and loader would be used to remove most of the levees within and between Ponds R5 and S5. Removed material would be re-used on site to improve levees, fill borrow ditches, construct ditch blocks, or to construct habitat transition zones.

Portions of the internal levees between and within Ponds R5 and S5, with lengths of approximately 880 feet at the northern segment of the levee separating R5 from S5, 530 feet at the southern segment of that same levee, and at the S5 internal levee approximately 370 feet, would be removed (i.e., lowered to match the existing pond bottom elevation of about 4.5 feet NAVD88). This activity would also use an excavator and loader. Removed material would be re-used to on site to improve levees, fill borrow ditches in Pond R4, or to construct habitat transition zones.

10.4.9 Pilot Channel Excavation

Existing soil conditions at the R4 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.

10.4.10 Ditch Blocks

Ditch blocks would be formed by placing material from other onsite activities into the existing internal borrow ditches and compacting it. Excavators would be used for placement and initial compaction of material, and a vibratory hand tamper or a roller would be used for compaction.

10.4.11 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. After construction operations within the ponds are complete, these levees would be lowered to approximately 8 feet NAVD88. This would cause levee overtopping, levee erosion and allow for improved hydraulic and habitat connectivity.

10.4.12 Habitat Island

Habitat islands would be cleared, grubbed and fine greade before surface enhancements are installed. 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, or similar appropriate material, 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.

10.4.13 Trail, Viewing Platform, Signs, and Benches

The 2,750-foot trail on the eastern border of Ponds R5 and S5 would be at least 10 feet wide with 2-foot shoulders on each side and would be built on the improved levees described above. 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.

The new viewing platform would not be elevated above the levee or existing land on which it would be placed. There would be local levee widening to accommodate the added space required. The viewing platforms would be graded and surfaced to meet ABD and ADA standards and would have a visual appearance matching nearby conditions. The main features at the platforms would be benches and signs or panels that provide site information to the public. These features would be constructed of metal and wood and placed on cast-in-place concrete footings. 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. The signage at the platforms would be mounted on pedestals, and one or more benches would be located near each sign or panel.

10.4.14 Levee Breach and Channel Excavation

The levee breaching and associated excavation of a channel to connect to Ravenswood Slough would be accomplished from levee crests using long-reach excavators and hauling material using trucks to on-site locations receiving fill for beneficial re-use.

10.4.15 Construction 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.

11. CONSTRUCTION SCHEDULE AND SEQUENCE

The following section describes the general sequence, timing, and duration of activities at each of the pond clusters. First, however, it is useful to provide a brief discussion of the construction timing as it would be affected by species-specific work windows.

11.1 Species-specific Construction Timing Considerations

At all four pond clusters, there are certain special-status species regulated by USFWS, NMFS, or CDFW that may be affected by construction activities. The presence of these species may limit construction activities or require certain avoidance and minimization measures. The pond-cluster-specific special-status species, as well as the limits and requirements for each species and their habitats, are addressed in the Conservation Measures of the SBSP Restoration Project's Programmatic and Phase 1 EIS/R and permitting documents. These include the Biological Opinions from the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) , the Clean Water Act Section 404 and 401 permits from the U.S. Army Corps of Engineers (USACE) and the San Francisco Bay Regional Water Quality Control Board (RWQCB) respectively, the San Francisco Bay Conservation and Development Commission (BCDC) permit, and others (Appendix B). This overview information is provided here as part of the project designs to help frame the construction sequences that follow. 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 occurring within this window would implement approved avoidance and minimization measures including the presence of an approved biological monitor and preconstruction surveys.
- Steelhead migration: Activities that may potentially affect upstream migration of adults or downstream migration of juveniles would be avoided. This means avoiding work from December through February (adult upstream migration period) and from April through June (juvenile downstream migration period). If applicable, the NMFS acceptable work windows for steelhead are June through November; avoidance and minimization measures including the presence of an approved biological monitor may be required during this period.
- Longfin smelt and green sturgeon: There is potential for these species to be present year-round in the San Francisco Bay, therefore seasonal avoidance is not possible.

11.2 Alviso-Island Pond Cluster

11.2.1 Construction Sequence

In each pond, the construction scenario would likely initiate levee removal from the farthest end of the construction access point along the perimeter levees and proceed toward the starting point of the access. The likely order of construction at the Island Ponds would be as follows:

1. Site preparation including clearing and grubbing of debris and vegetation from construction areas.
2. Lower Pond A19 south perimeter levee and widen the existing western breach.

3. Remove Pond A20 east perimeter levee, leaving some high portions.
4. Remove Pond A19 west perimeter levee, leaving some high portions.
5. Lower and make two breaches in Pond A19's north perimeter levee, leaving some high portions.

11.2.2 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 second half of 2017. A preliminary estimate shows that construction would likely be completed in approximately 4 months over single construction season. This estimate assumes that USFWS would permit heavy construction activities to occur during the bird-nesting window using avoidance and minimization measures including the presence and direction of a biological monitor.

11.3 Alviso-A8 Pond Cluster

11.3.1 Construction Sequence

This part of the project would include:

1. Site preparation including clearing and grubbing of debris and vegetation from construction areas.
2. Placement of imported fill material into the southern corners of the A8 Ponds (**Figure 4**). This placement may involve brief stockpiling of material along the existing levee roads and bare ground prior to placement and subsequent compaction.
3. Hydroseeding habitat transition zones to establish native vegetation.

11.3.2 Construction Schedule

The project is anticipated to begin in the second half 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 12 months in 2 construction seasons.

11.4 Alviso-Mountain View Pond Cluster

11.4.1 Construction Sequence

Construction operations would occur either simultaneously at both ponds, or would proceed in tandem. Earthwork activities would be sequenced such that operations which are more efficient and feasible to perform during 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 habitat islands and habitat transition zones would be performed prior to breaching the perimeter levees. Breaching would not occur until all necessary flood control components and in-water habitat enhancement features are completed.

The likely order of construction at the Mountain View Ponds would be as follows, though availability of upland material for various actions could alter the sequence:

1. Site preparation including clearing and grubbing of debris and vegetation from construction areas.
2. Raise and improve Pond A1 western levee.
3. Construct trail on Pond A1 western levee to viewing platform.
4. Raise the Coast Casey Forebay levee to 17 feet; make other required improvements to existing Mountain View infrastructure (pump station access, etc.).
5. Rebuild the portion of trail (part of the Bay Trail spine) that is currently on top of the Coast Casey Forebay levee.
6. Modify the access to the existing viewing platform at the southern end of Charleston Slough.
7. Construct PG&E tower and boardwalk improvements around Pond A2W (must be completed prior to levee breaching).
8. Construct habitat transition zones and habitat islands (must be completed prior to levee breaching).
9. Breach perimeter levees at Ponds A1 and A2W.
10. Install cofferdams and construct bridges on eastern levee of Pond A2W.
11. Construct public access trail and viewing platform on eastern levee of Pond A2W.
12. Install viewing platform in Mountain View Shoreline Park and viewing platform on Pond A1 west levee.
13. Install gates at necessary locations along levees.

11.4.2 Construction Schedule

The construction schedule would be affected by seasonal work restrictions to avoid impacts to protected species, weather conditions, earthwork quantities, and land disturbance. Construction is expected to begin in the summer or fall of 2017.

Construction would likely be completed in approximately 29 months over 4 construction seasons. This estimate is based on the assumption that some heavy construction activities would be permitted to occur during the restricted work window for nesting bird habitat under implemented avoidance and minimization measures including the presence of a biological monitor.

11.5 Ravenswood Pond Cluster

11.5.1 Construction Sequence

Earthwork activities would be sequenced such that activities which would be efficient to perform in dry conditions would be completed first. These activities include levee improvements, installation of hydraulic controls, pilot channel excavation, and internal levee lowering. Levee lowering and breaching along the outer bounds of the ponds designed to establish hydraulic connection with adjacent sloughs would be performed after the internal pond activities are completed. 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 to raise or improve flood risk management further. Breaching would not occur until all necessary flood control components and in-water habitat enhancement features are completed.

The likely order of construction at the Ravenswood Ponds would be as follows, though availability of upland material for various actions could alter the sequence:

1. Mobilize to site, conduct clearing and grubbing (vegetation removal), and demolish existing derelict water control structure.
2. Import material and improve levees along the All-American Canal and along the eastern levees of Ponds R5 and S5.
3. Construct habitat transition zones along (1) the western edge of Pond R4 levee; and (2) the northern side of the All-American Canal.
4. Modify central portion of levee between Ponds R5 and S5 with gravel, sand, and shells in preparation for its use as a habitat island.
5. Remove unmodified parts of internal levees between Ponds R5 and S5 and within Pond S5, as described above.
6. Install external water control structures (i.e., between R3 and Ravenswood Slough; between S5 forebay and Flood Slough).
7. Excavate pilot channels in Pond R4.
8. Build ditch blocks in Pond R4's borrow ditches
9. Install internal water control structures (i.e., between Pond R3 and Pond S5; between Pond R4 and Pond R5).
10. Build public access trail along improved R5/S5 eastern levees.
11. Install viewing platform on new public access trail.
12. Lower Pond R4 levee near Greco Island.
13. Breach Pond R4 levee at its northeastern corner.
14. Install fencing along southern border of pond cluster and gates at necessary locations.

11.5.2 Construction Schedule

The construction schedule would be affected by seasonal work restrictions to avoid impacts to protected species, weather conditions, and volume of earthwork quantities to be moved. Several hundred thousand cubic yards of material would need to be imported and either placed immediately or stockpiled at the site.

Although, it is assumed that the ponds would be sufficiently dry during 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 would 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 take place concurrently or in tandem, with multiple crews to achieve project goals. A preliminary estimate shows that construction would be completed over approximately a 16-month period over 2 construction seasons, assuming all upland fill material would be available. This estimate is based on the assumption that some heavy construction activities would be permitted to occur during the restricted work window for nesting bird habitat under implemented avoidance and minimization measures including the presence of a biological monitor.

12. OPERATIONS AND MAINTENANCE

12.1 Alviso-Island Pond Cluster

Aside from the monitoring and management activities of the SBSP Restoration Project Adaptive Management Plan (AMP) (available as Appendix D of the 2007 FEIS/R) and continued maintenance of the existing UPRR track, no other O&M activities would occur at the Island Ponds. The existing and newly proposed breaches would scour from hydraulic action and would gradually widen until equilibrium with the tidal flux is reached. Most levees would be allowed to degrade naturally; however, the levee containing the existing railroad track would be maintained by the UPRR 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.

12.2 Alviso-A8 Pond Cluster

The USFWS would continue to operate and maintain the ponds in accordance with various Refuge O&M permits, the AMP and other ongoing management practices that have been in place since the implementation of Phase 1 actions. Phase 2 would not involve changing these ongoing management practices during or after the construction activities described above. The habitat transition zones that would be placed in Phase 2 may occasionally need maintenance such as removing invasive plant species, which would be performed in accordance with existing Refuge policies and practices for doing so.

12.3 Alviso-Mountain View Pond Cluster

Operations and maintenance activities would continue to follow and be determined by various Refuge O&M permits, 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).

The improved western levee of Pond A1 would require ongoing levee maintenance because it would provide flood risk management, and the north and east levees of Pond A2W would be maintained for PG&E and trail access. This ongoing levee maintenance would continue in consistency with USACE permit #2008-00103S. These levee maintenance activities could include occasional placement of additional earth on top of, or on the sides of, the levees as the levees erode or subside, with the level of settlement dependent on geotechnical considerations. In general, pond levees that are improved to provide flood risk management 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, 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. The eastern levee of Pond A2W would also be maintained for recreational public access on the trail atop it.

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 habitat 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. Habitat 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 areas 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.

Access 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. Because there would be a public access trail along the eastern levee of Pond A2W, the two bridges over the breaches there would need to be visually inspected and reported on as described.

The proposed bridges and the concrete abutments with wing walls 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 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 the April 2016 SBSP Restoration Project Phase 2 FEIS/R, 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.

12.4 Ravenswood Pond Cluster

Operations and maintenance activities for the components of the pond clusters within the Refuge would continue and be determined by various Refuge O&M permits, 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.

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 risk management (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 risk management 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.

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. Inspection would be required every month through the first year and semi-annually thereafter. Maintenance would be required on an annual basis. O&M activities would be conducted 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 zones as habitat.

Maintenance of public access and recreation features would address both viewing platforms and trail maintenance. The viewing areas 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 be checked periodically for defacement of interpretive boards and other forms of vandalism. The eastern levees of Ponds R5 and S5 would also be maintained for recreational public access on the trail atop it. Trash removal would take place as needed along trails and at staging areas and trailheads.

Operations and maintenance of water levels in Ponds R3, R5, and S5 would be managed as follows:

- 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

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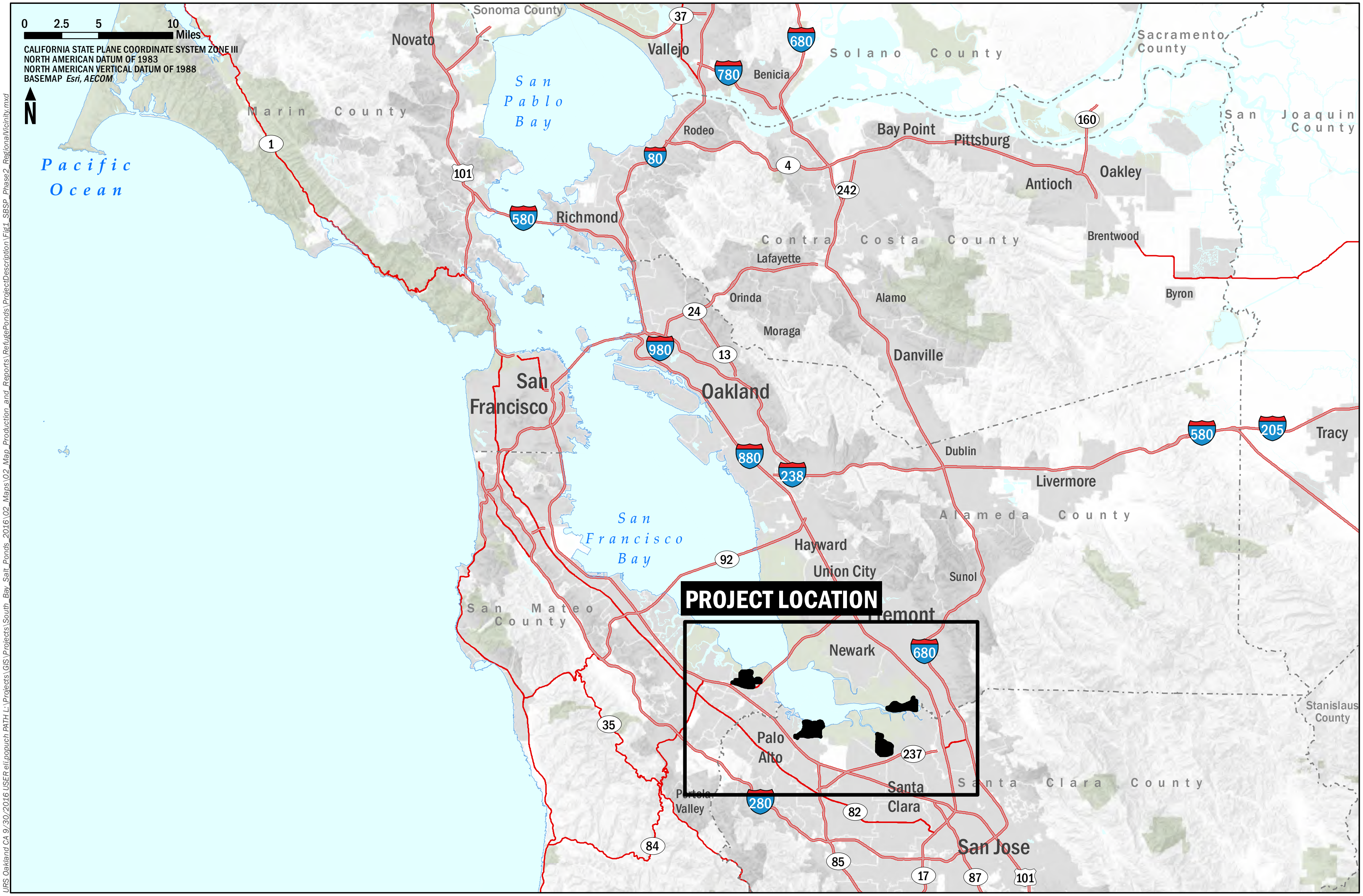
Figures



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South Bay Salt Pond Restoration Project

Figure 1
SBSP Phase 2 Regional Location

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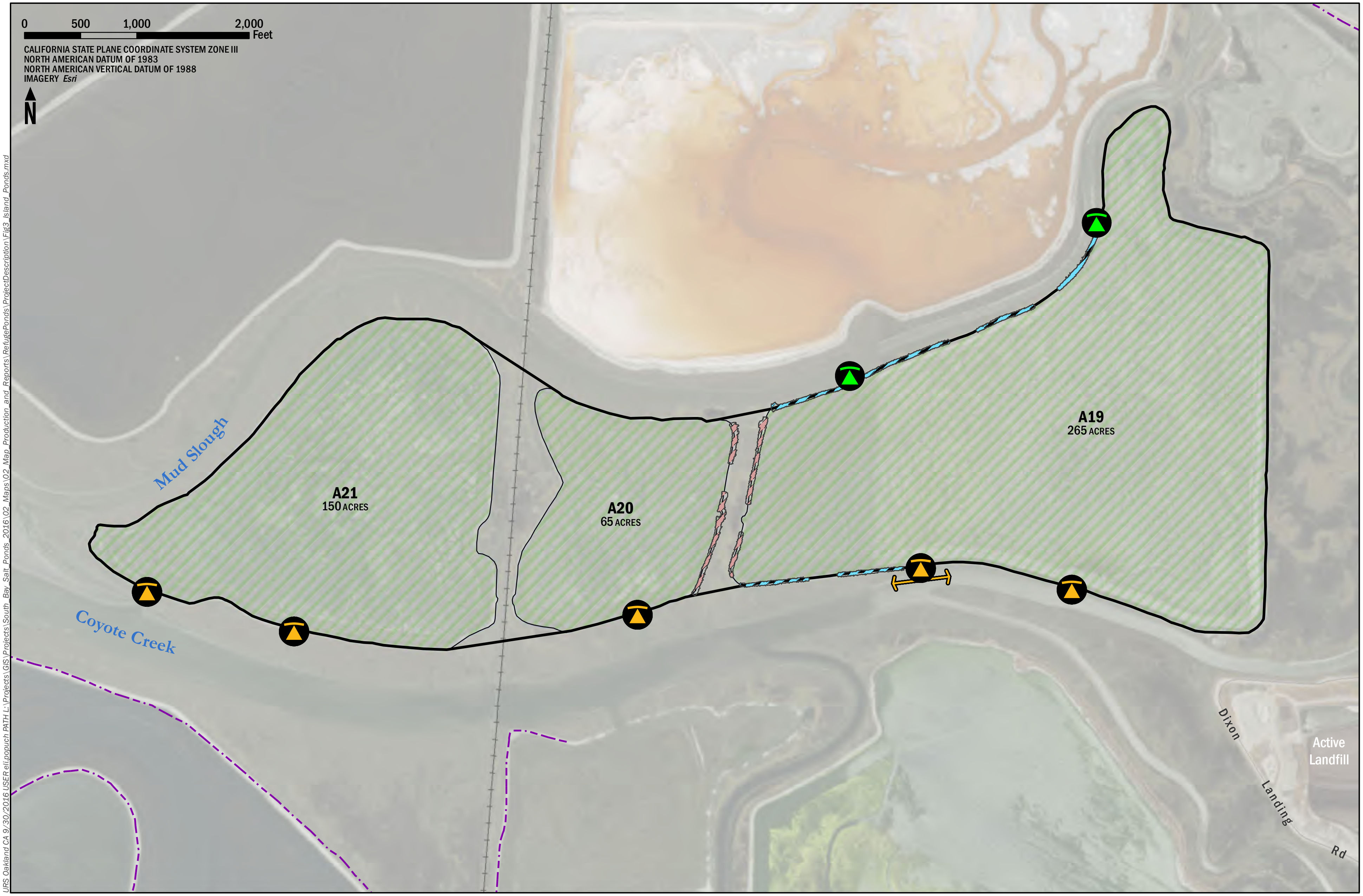
AECOM
South Bay Salt Pond Restoration Project

Figure 2
SBSP Phase 2 Project Sites



LEGEND

Proposed breach
Existing breach
Expand existing breach
Railroad
Existing trail
Removed levee
Lowered levee
Tidal marsh
Pond boundary

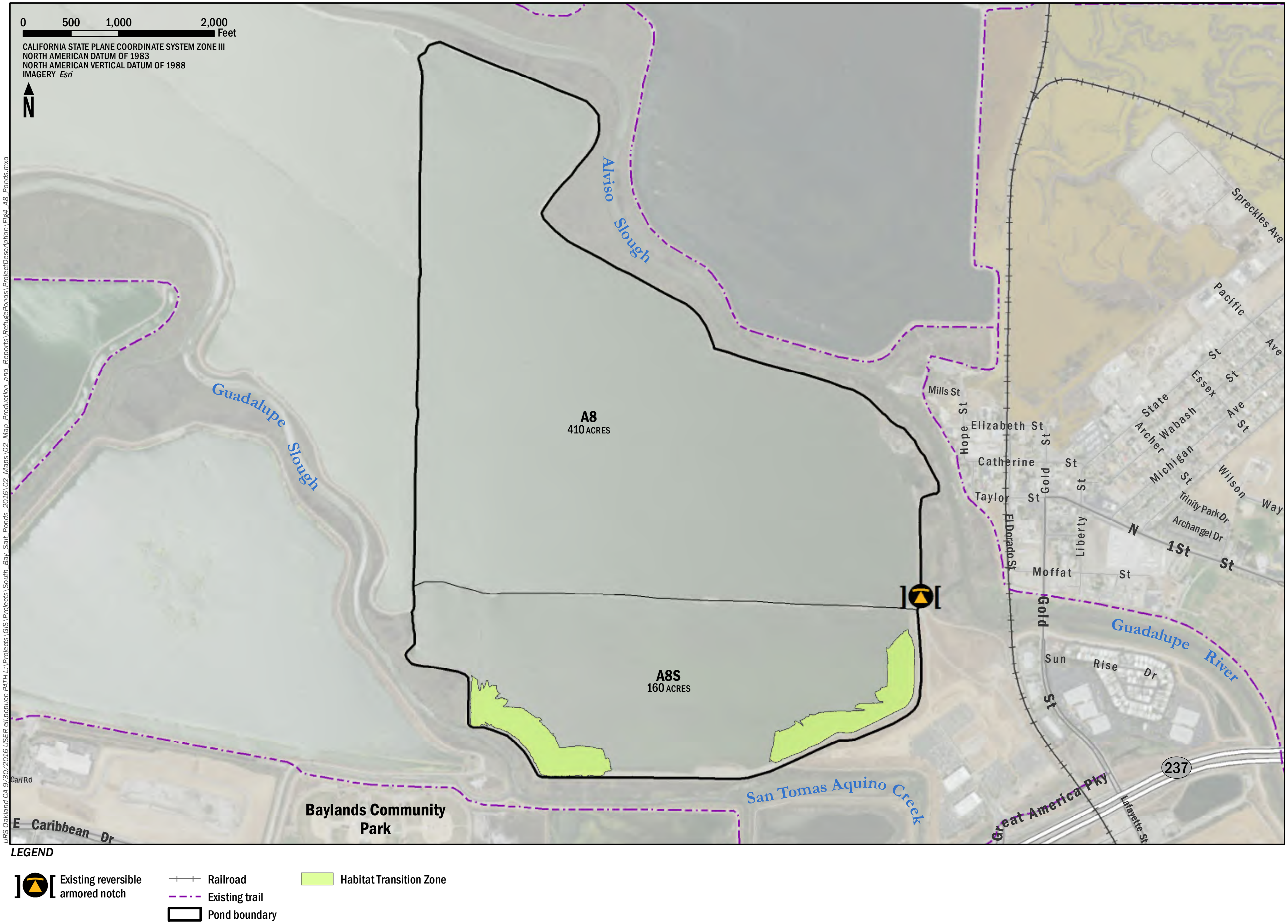
URS Oakland CA 9/30/2016 USER eli.popuch PATH L:\Projects\GIS\Projects\South_Bay_Salt_Ponds_2016\02_Maps\02_Map_Production_and_Reports\RefugePonds\ProjectDescription\Fig3_Island_Ponds.mxd

AECOM

South Bay Salt Pond Restoration Project

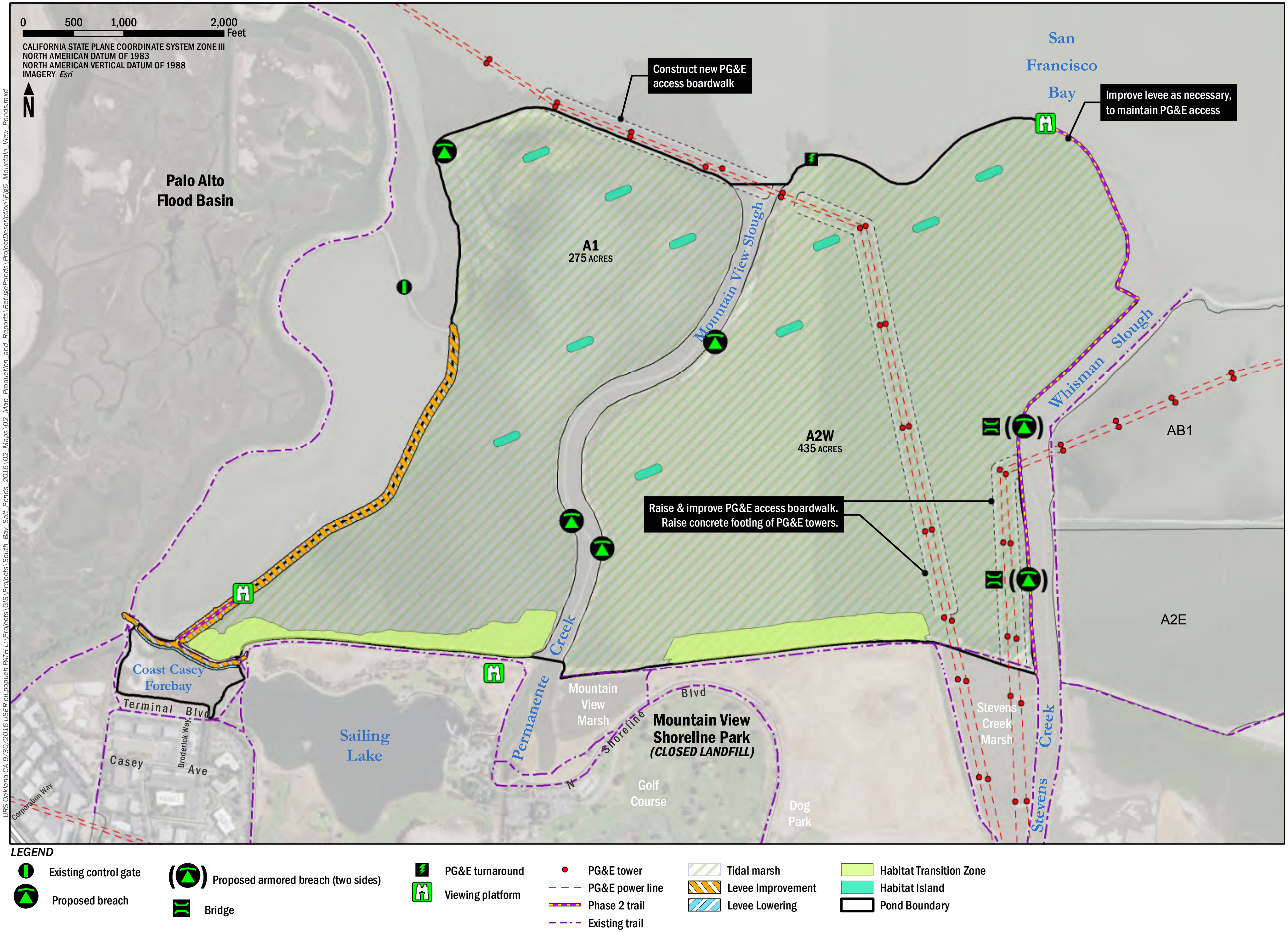
Figure 3

Alviso Island Ponds



AECOM
South Bay Salt Pond Restoration Project

Figure 4
Alviso A8 Ponds



AECOM

South Bay Salt Pond Restoration Project

Figure 5

Alviso-Mountain View Ponds

LEGEND

- Proposed breach
- Proposed water control structure
- Viewing platform
- Existing viewing platform
- Railroad
- Existing trail
- Phase 2 trail
- Cargill pipeline
- Fence
- Levee Improvement
- Levee Lowering
- Levee Removal
- Pilot Channel
- Habitat Transition Zone
- Habitat Island
- Ditchblock
- Tidal marsh
- Managed pond
- Pond boundary

*Pending property rights/easements

URS Oakland CA 9/30/2016 USER eli.popuch PATH L:\Projects\GIS\Projects\South_Bay_Salt_Ponds_2016\02_Maps\02_Map_Production_and_Reports\RefugePonds\ProjectDescription\Fig6_Ravenswood_Ponds.mxd

AECOM
South Bay Salt Pond Restoration Project

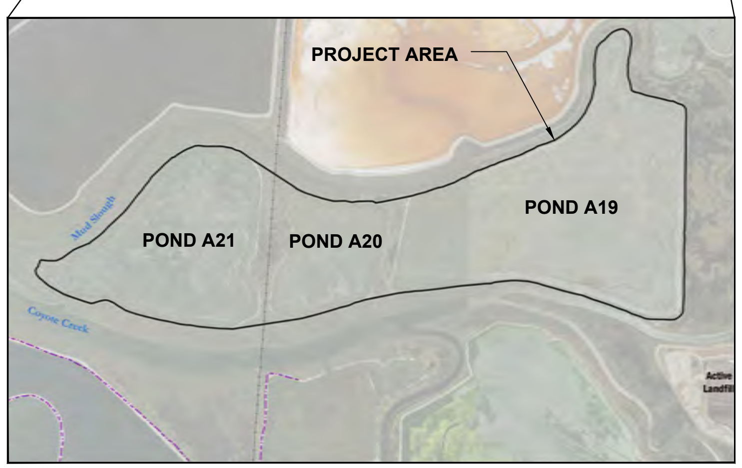
Figure 6
Ravenswood Ponds

Appendix B: Phase 2 South Bay Salt Pond Project Engineering Designs

SOUTH BAY SALT POND RESTORATION PROJECT

ISLAND PONDS
NEAR ALVISO, CALIFORNIA

VICINITY MAP
NTS



LOCATION MAP
NTS

PROJECT AREA PHOTO

SHEETS

Dec 14, 2016 - 4:37pm
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PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

PREPARED BY
AECOM
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Oakland, CA 94612
Tel: (510) 893-3600
aecom.com

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DRAWN	L. DIFUNTORUM
CHECKED	G. OROZCO / I. ZARCHI
PEER REVIEWED	S. GENTZLER
APPROVED	S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372 DATE 11-30-2016

PROJECT: SOUTH BAY SALT POND RESTORATION PROJECT
SHEET TITLE: ISLAND PONDS TITLE SHEET

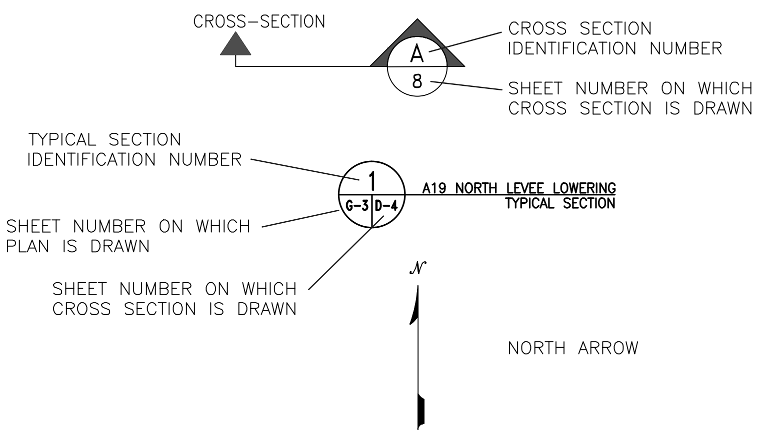
SHEET NO. SHT. 1 OF 23 SHTS.
REV
DWG NO. T-1

LEGEND

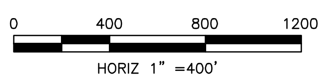
LINETYPES

	ALIGNMENT CENTERLINE
8	EXISTING MAJOR CONTOUR
	EXISTING MINOR CONTOUR
8	PROPOSED MAJOR CONTOUR
8	PROPOSED MINOR CONTOUR
	PROPOSED DAYLIGHT LINE
	CREW VEHICLE ACCESS ROUTE
	CONSTRUCTION EQUIPMENT ACCESS ROUTE
	PROPOSED EARTHWORK CUT
	STAGING AREA

SYMBOLS



NORTH ARROW



SCALE BAR

ABBREVIATIONS

℄	CENTERLINE
EL	ELEVATION
FT	FEET
HORIZ.	HORIZONTAL
NTS	NOT TO SCALE
STA	STATION
TYP	TYPICAL
VERT.	VERTICAL

GENERAL NOTES

1. PROJECT COORDINATE SYSTEM AND VERTICAL DATUM ARE AS FOLLOWS:
   COORDINATE SYSTEM: NAD83, CALIFORNIA STATE PLANE ZONE 3
   VERTICAL DATUM: NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88)
2. PROJECT SITE TOPOGRAPHY IS BASED ON LIDAR DATA OBTAINED FROM AIRBORNE1 IN U.S. SURVEY FEET, DATED JUNE–NOVEMBER 2010. BATHYMETRY DATA FOR COYOTE CREEK AND MUD SLOUGH IS FROM THE 2005 HYDROGRAPHIC STUDY OF SOUTH SAN FRANCISCO BAY.
3. PROPOSED TOPOGRAPHIC CONTOUR INFORMATION IS SHOWN AT 1–FOOT CONTOUR INTERVALS, UNLESS OTHERWISE STATED.
4. ALL CONSTRUCTION AND CONSTRUCTION MATERIAL SHALL BE IN ACCORDANCE WITH THESE PLANS.
5. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO BE KNOWLEDGEABLE ABOUT AND OBEY ALL PERMIT REQUIREMENTS WHILE PERFORMING THE WORK ON THESE PLANS.
6. THE CONTRACTOR SHALL PRACTICE SAFETY AT ALL TIMES AND SHALL FURNISH, ERECT, AND MAINTAIN SUCH FENCES, BARRICADES, LIGHTS, AND SIGNS NECESSARY TO GIVE ADEQUATE PROTECTION TO THE PUBLIC AT ALL TIMES.
7. THE CONTRACTOR SHALL HAVE COPIES OF THE APPROVED PLANS AND SPECIFICATIONS FOR THIS PROJECT AT ALL TIMES AND SHALL BE FAMILIAR WITH ALL APPLICABLE STANDARDS AND SPECIFICATIONS.
8. THE CONTRACTOR IS RESPONSIBLE FOR SETTING ONSITE SURVEY CONTROL FOR CONSTRUCTION STAKING IN PROJECT COORDINATE SYSTEM AND VERTICAL DATUM.
9. UNDERGROUND FACILITIES AND SUB–STRUCTURES SHOWN IN THESE PLANS WERE OBTAINED FROM THE BEST AVAILABLE SOURCES. HOWEVER, SINCE SOME INFORMATION WAS OBTAINED FROM OTHERS, AECOM CANNOT GUARANTEE SAID INFORMATION AS BEING ACCURATE. PRIOR TO BEGINNING CONSTRUCTION, THE CONTRACTOR SHALL VERIFY THE DEPTH AND LOCATION OF ALL EXISTING UTILITIES, EQUIPMENT, AND SUB–STRUCTURES. IN THE EVENT OF DAMAGE TO EXISTING UTILITIES, EQUIPMENT, OR SUB–STRUCTURES, THE CONTRACTOR SHALL PERFORM ALL REPAIRS AT THEIR EXPENSE.
10. THE CONTRACTOR IS RESPONSIBLE FOR STABILITY OF ALL EXCAVATIONS.

EARTHWORK SUMMARY

LEVEE REMOVAL	8,900 CY (CUT, BANK–MEASURE)
LEVEE LOWERING	12,700 CY (CUT, BANK–MEASURE)
BREACH EXCAVATION	3,900 CY (CUT, BANK–MEASURE)
DITCH BLOCKS	11,000 CY (FILL, ASSUMING NO SHRINKAGE)
DITCH FILL	14,500 CY (FILL, ASSUMING NO SHRINKAGE)

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
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PEER REVIEWED	S. GENTZLER
APPROVED	S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372 DATE 11-30-2016

PROJECT **SOUTH BAY SALT POND RESTORATION PROJECT**

SHEET TITLE ISLAND PONDS NOTES AND LEGEND

SHEET NO. SHT. 2 OF 23 SHTS.

REV

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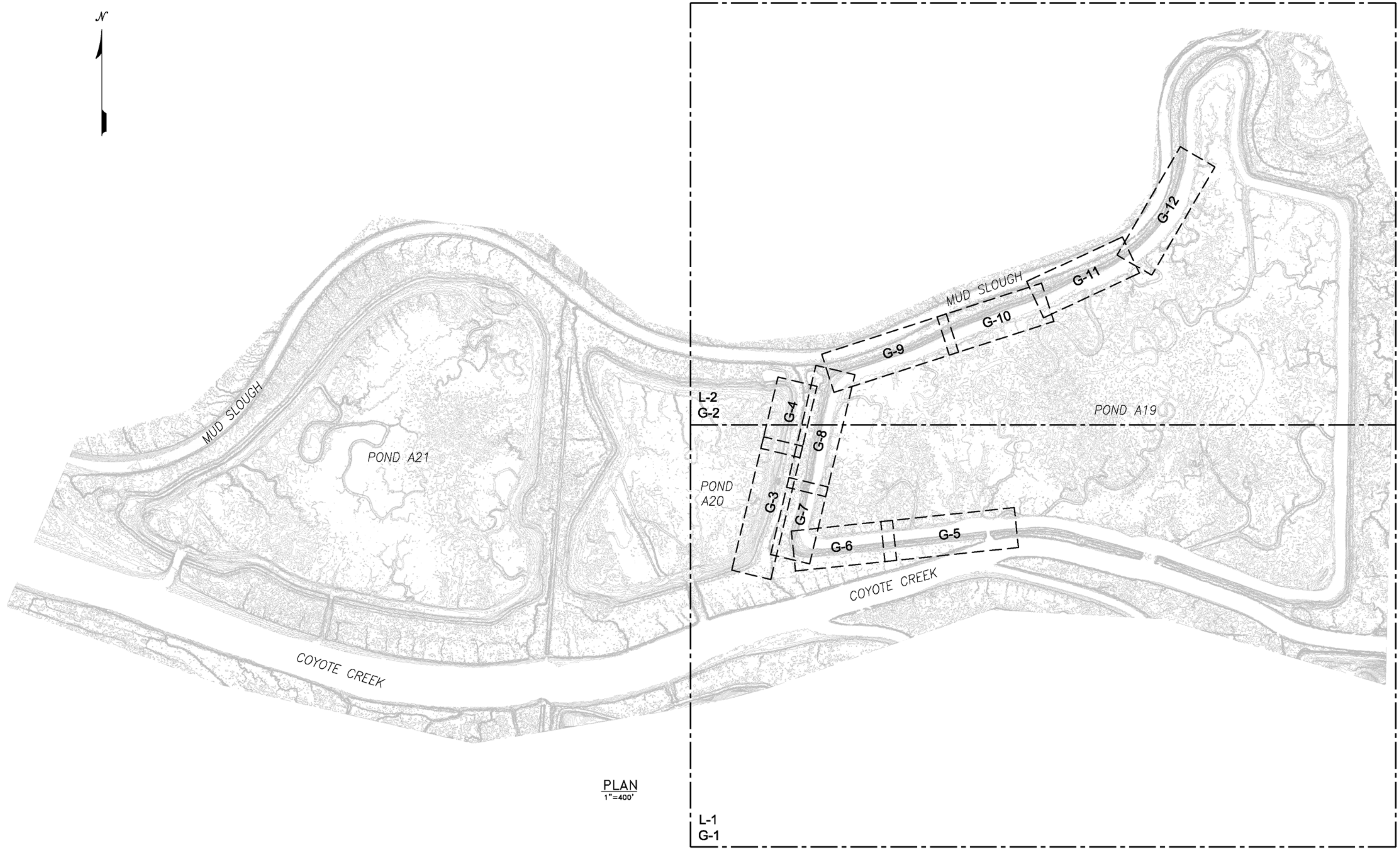

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APPROVED S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

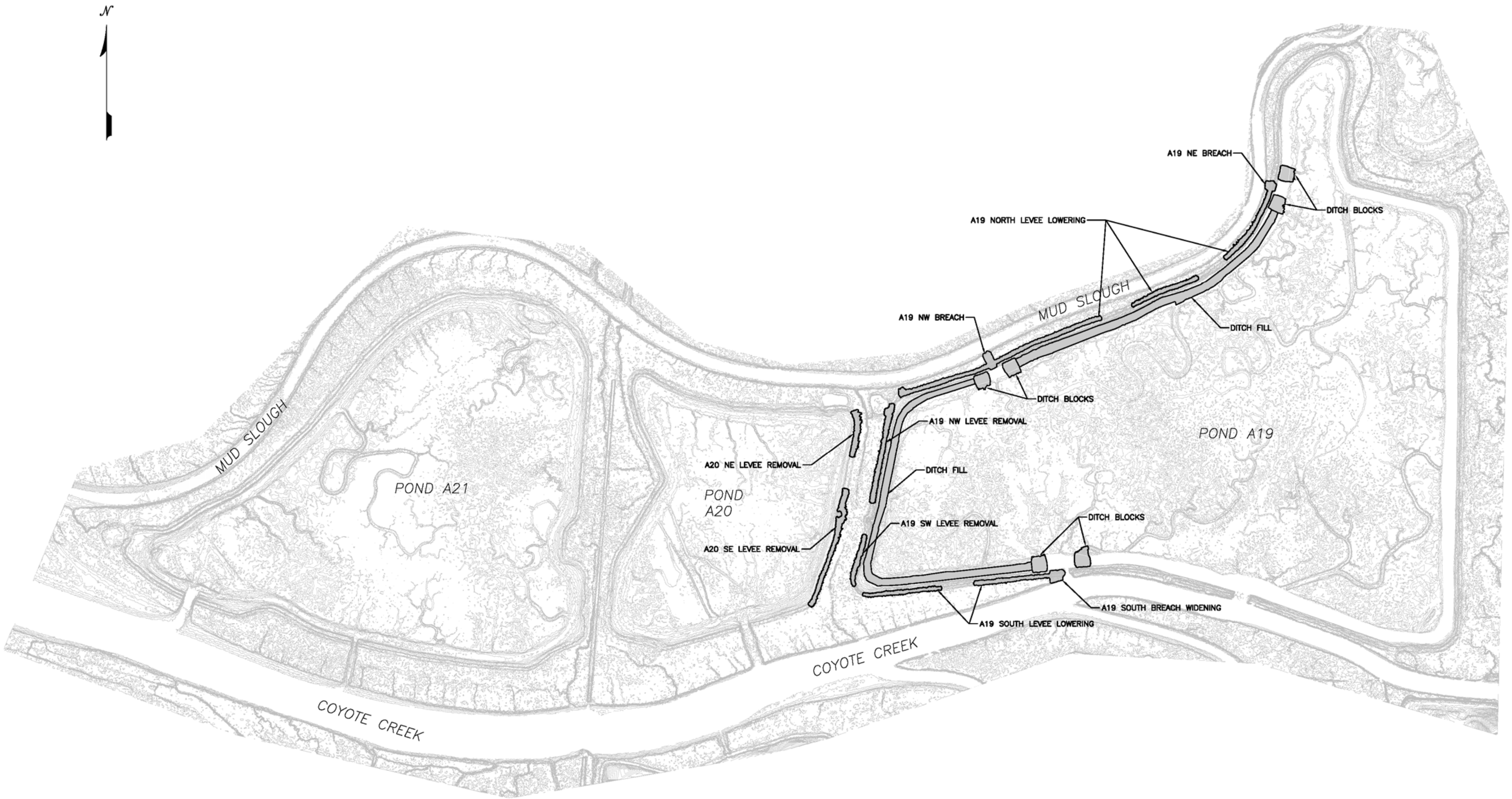
PROJECT No. 60422372
DATE 11-30-2016

PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

SHEET TITLE
ISLAND PONDS
KEY MAP

SHEET NO. SHT. 3 OF 23 SHTS.
REV

DWG NO.
T-3



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HORIZ 1" = 400'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
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STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372
DATE 11-30-2016

PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

SHEET TITLE
ISLAND PONDS
GENERAL ARRANGEMENT PLAN

SHEET NO. SHT. 4 OF 23 SHTS.
REV
DWG NO. T-4

NOTES

1. THE CREW VEHICLE ACCESS ROUTE FROM THE FREMONT BOULEVARD EXIT OFF OF INTERSTATE 88 IS NOT SUITABLE FOR HEAVY CONSTRUCTION EQUIPMENT AND IS TO BE USED ONLY FOR CREW VEHICLES.
2. CONSTRUCTION EQUIPMENT WOULD BE OFFLOADED INTO MUD SLOUGH AT CUSHING PARKWAY AND FLOATED ACROSS THE SLOUGH, PER THE INDICATED CONSTRUCTION EQUIPMENT ACCESS ROUTE.
3. THE CONTRACTOR MAY LOCATE VEHICLES AND CONSTRUCTION EQUIPMENT WITHIN THE INDICATED STAGING AREA. EXTENT OF STAGING AREA TO BE NEGOTIATED.

PLAN
1"=500'

0 500 1000 1500
HORIZ 1" = 500'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
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APPROVED S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy
PROJECT No. 60422372
DATE 11-30-2016

PROJECT **SOUTH BAY SALT POND RESTORATION PROJECT**
SHEET TITLE ISLAND PONDS ACCESS ROUTE & STAGING PLAN

SHEET NO. SHT. 5 OF 23 SHTS.
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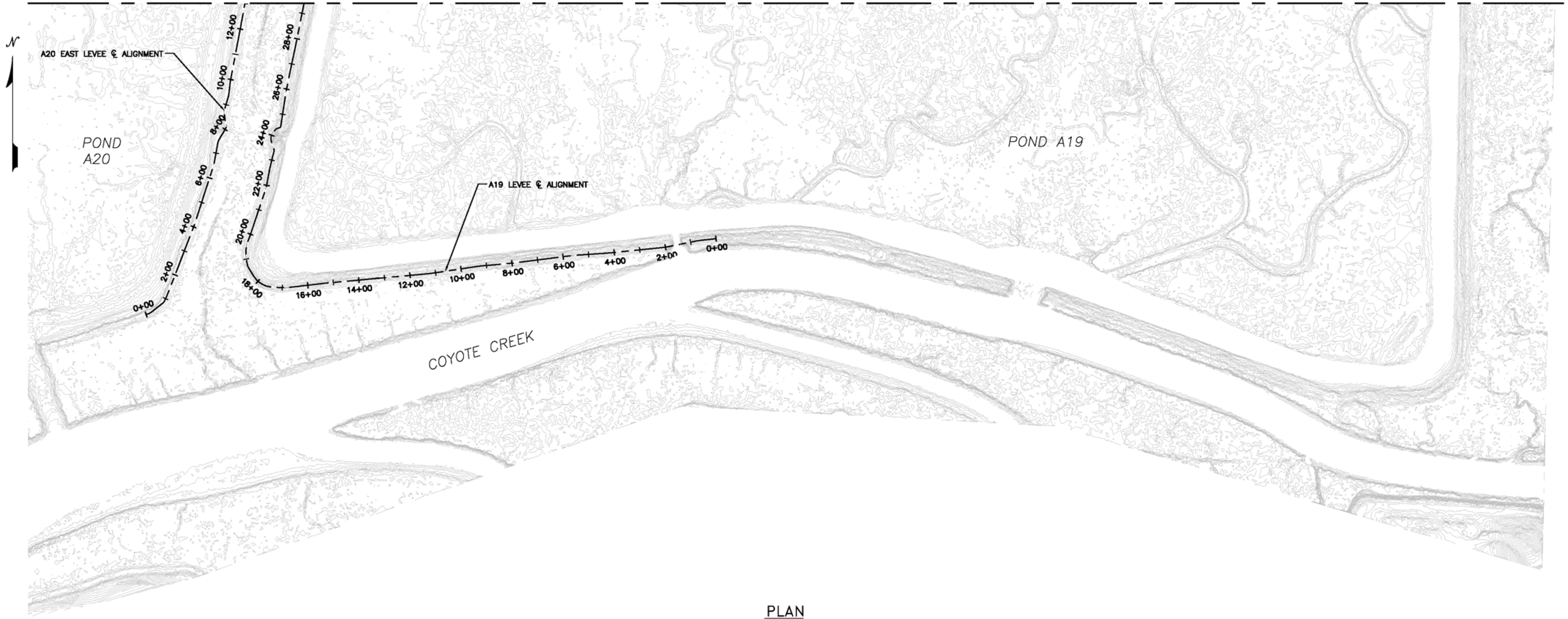

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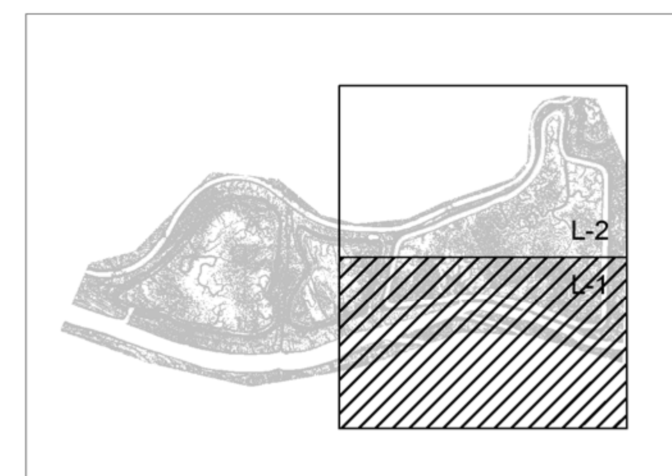

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WARNING
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APPROVED S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372
DATE 11-30-2016

PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

SHEET TITLE
ISLAND PONDS
LAYOUT PLAN
SHEET 1 OF 2

SHEET NO. SHT. 6 OF 23 SHTS.
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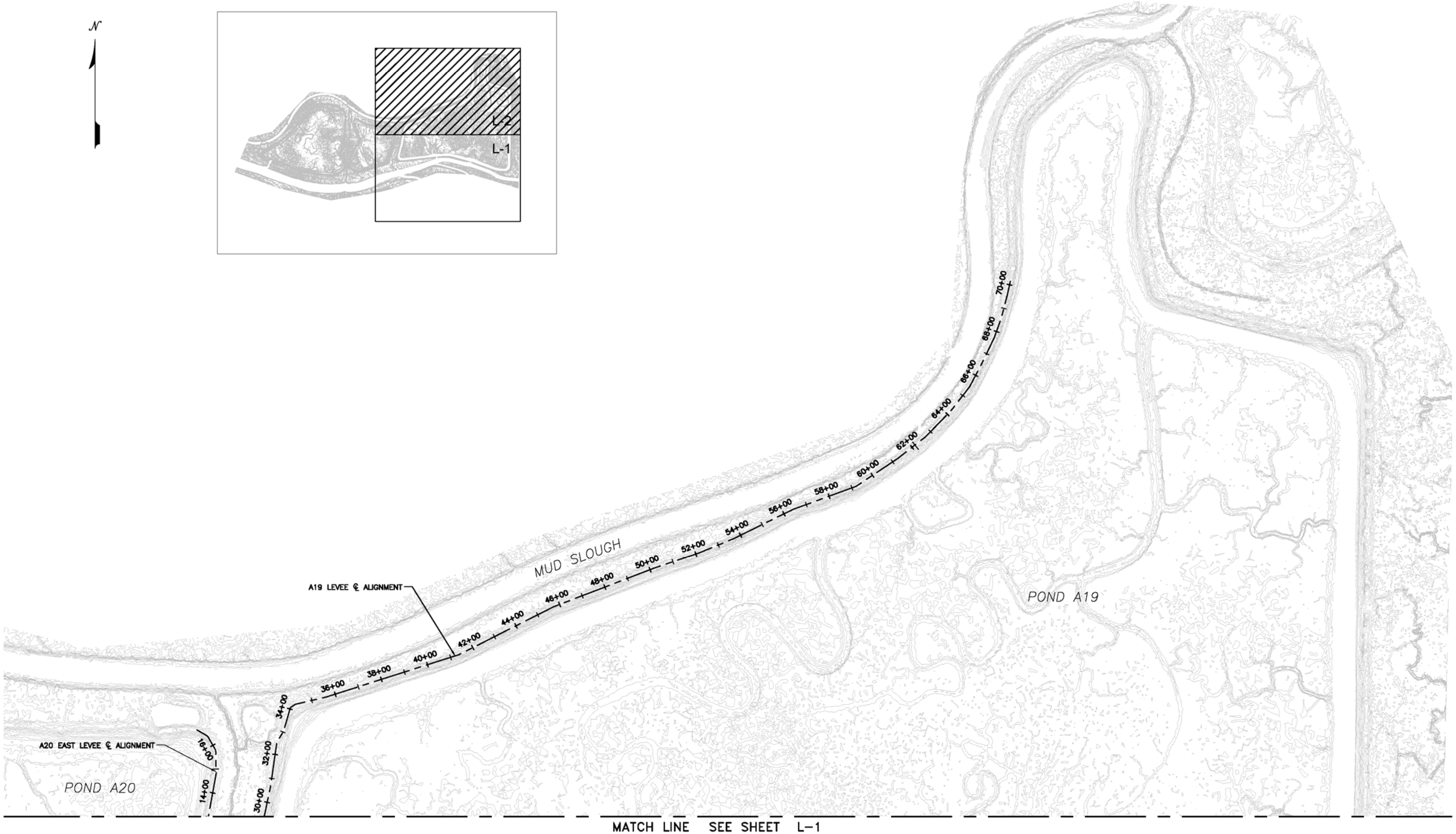

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REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
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APPROVED	S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

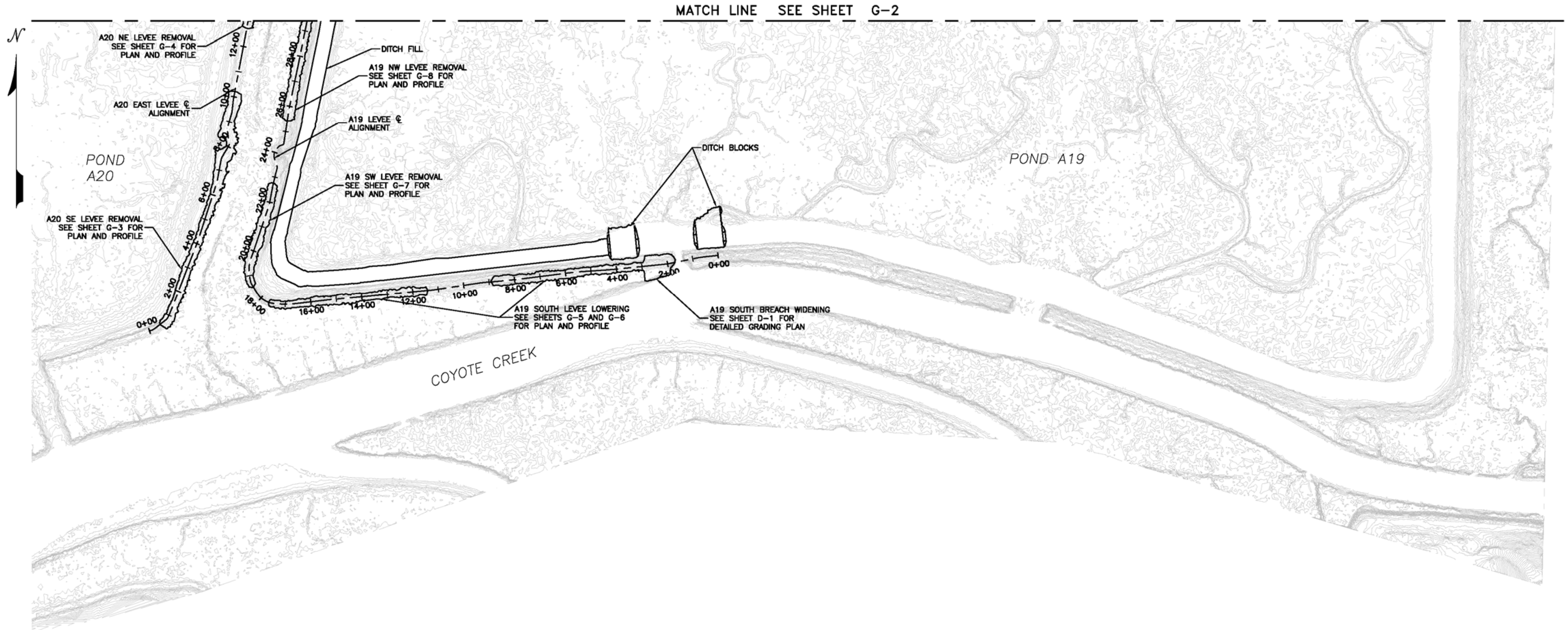
PROJECT No. 60422372
DATE 11-30-2016

PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

SHEET TITLE
ISLAND PONDS
LAYOUT PLAN
SHEET 2 OF 2

SHEET NO.
SHT. 7 OF 23 SHTS.
REV

DWG NO.
L-2



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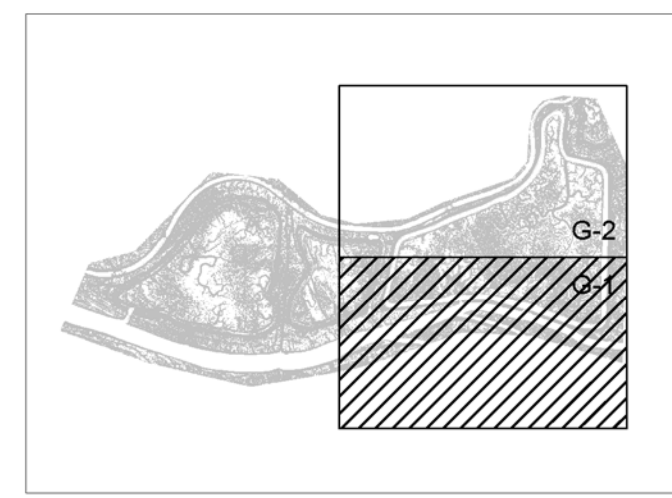

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PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
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Coastal Conservancy
PROJECT No. 60422372
DATE 11-30-2016

PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT
SHEET TITLE
ISLAND PONDS
GRADING PLAN
SHEET 1 OF 2

SHEET NO. SHT. 8 OF 23 SHTS.
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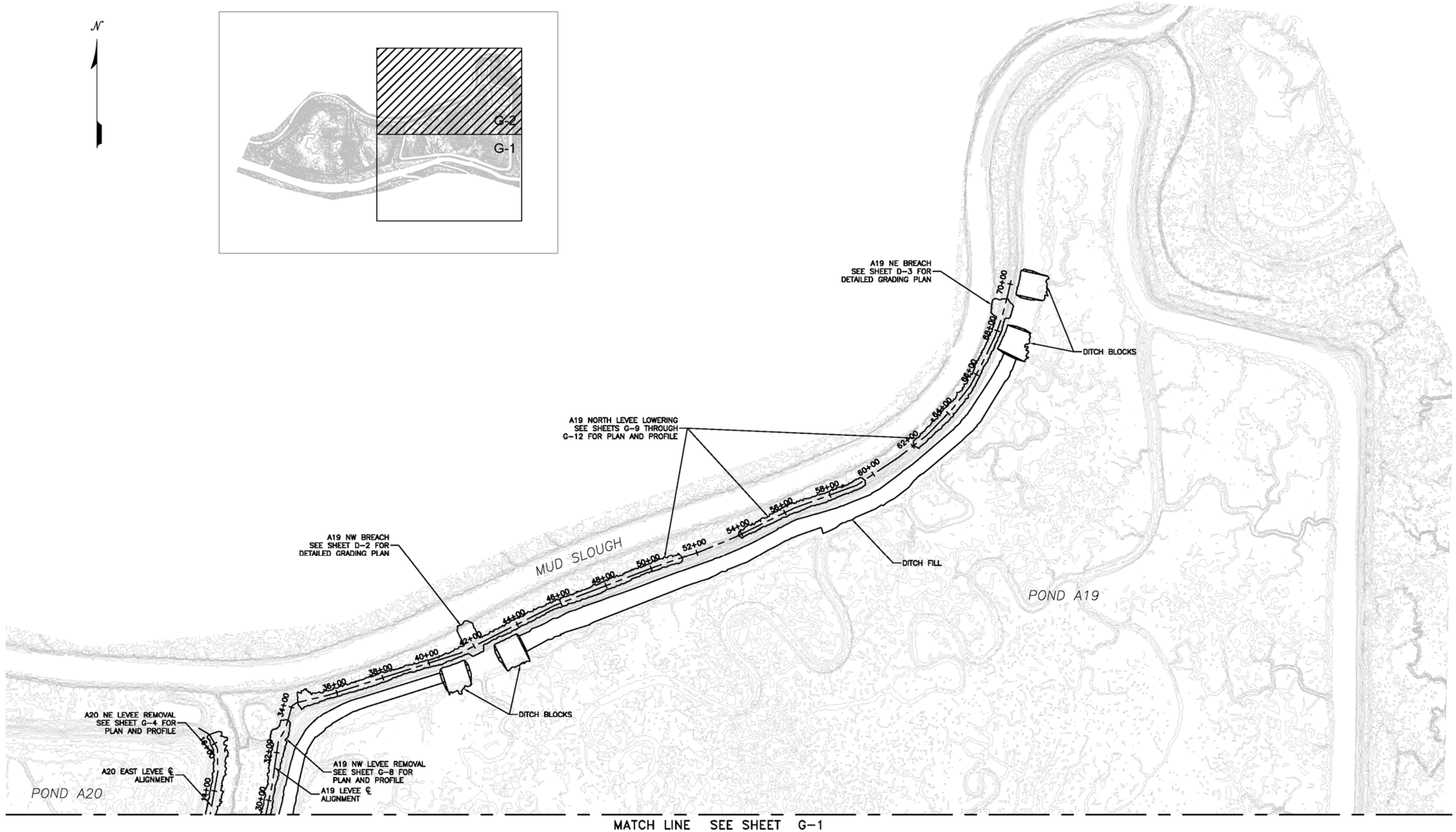

PLAN
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HORIZ 1" = 200'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
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APPROVED S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372
DATE 11-30-2016

PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

SHEET TITLE
ISLAND PONDS
GRADING PLAN
SHEET 2 OF 2

SHEET NO. SHT. 9 OF 23 SHTS.
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Dec 02, 2016 - 2:56pm
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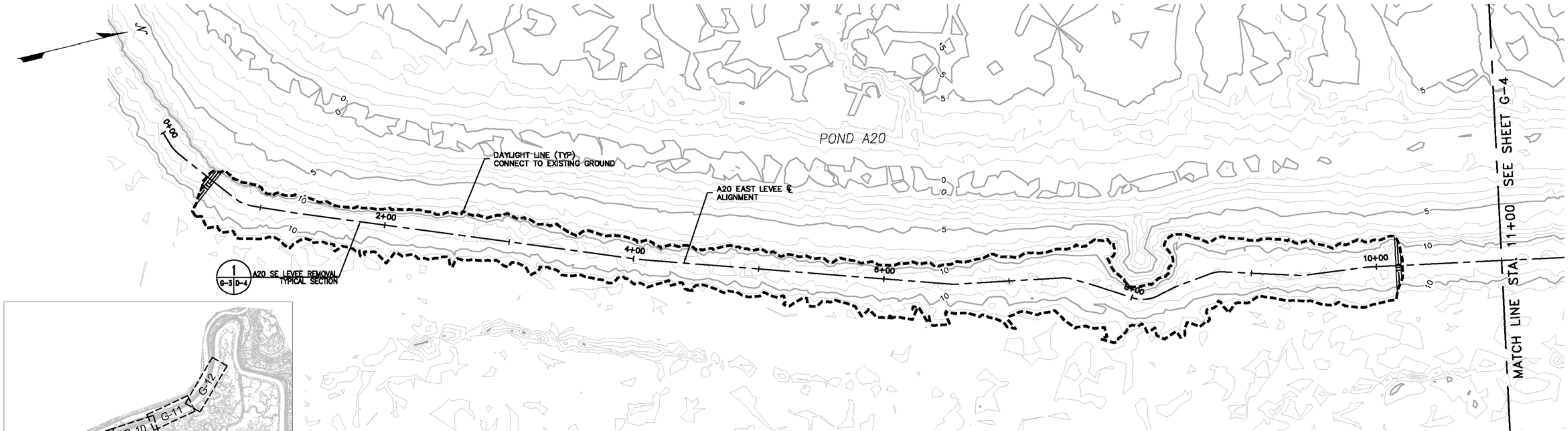

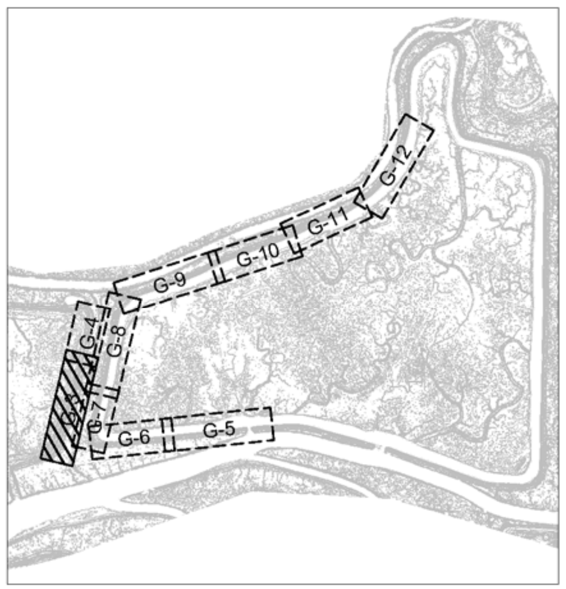

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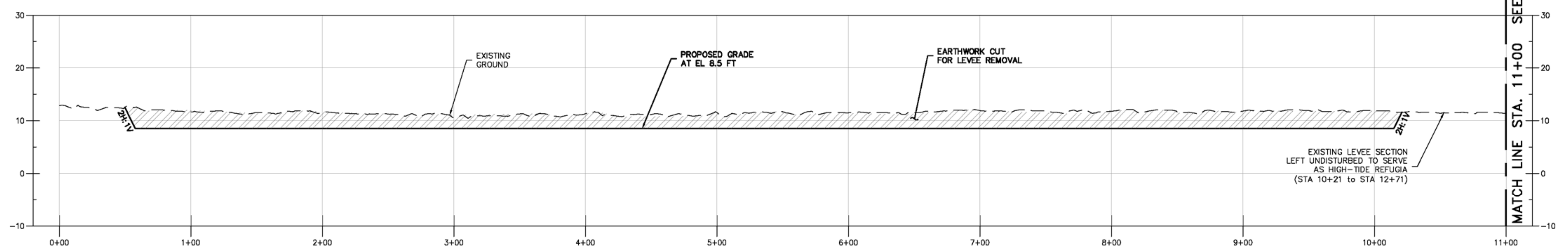

A20 EAST LEVEE ℄ ALIGNMENT PROFILE
HORIZ 1"=40', VERT 1"=10'

0 40 80 120 HORIZ 1" = 40'

0 10 20 30 VERT 1" = 10'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

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DESIGNED: L. CHANDRASEKARAN
DRAWN: L. DIFUNTORUM
CHECKED: G. OROZCO / I. ZARCHI
PEER REVIEWED: S. GENTZLER
APPROVED: S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372
DATE 11-30-2016

PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

SHEET TITLE
ISLAND PONDS
POND A20 SOUTHEAST LEVEE REMOVAL
PLAN AND PROFILE

SHEET NO. SHT. 10 OF 23 SHTS.
DWG NO. G-3

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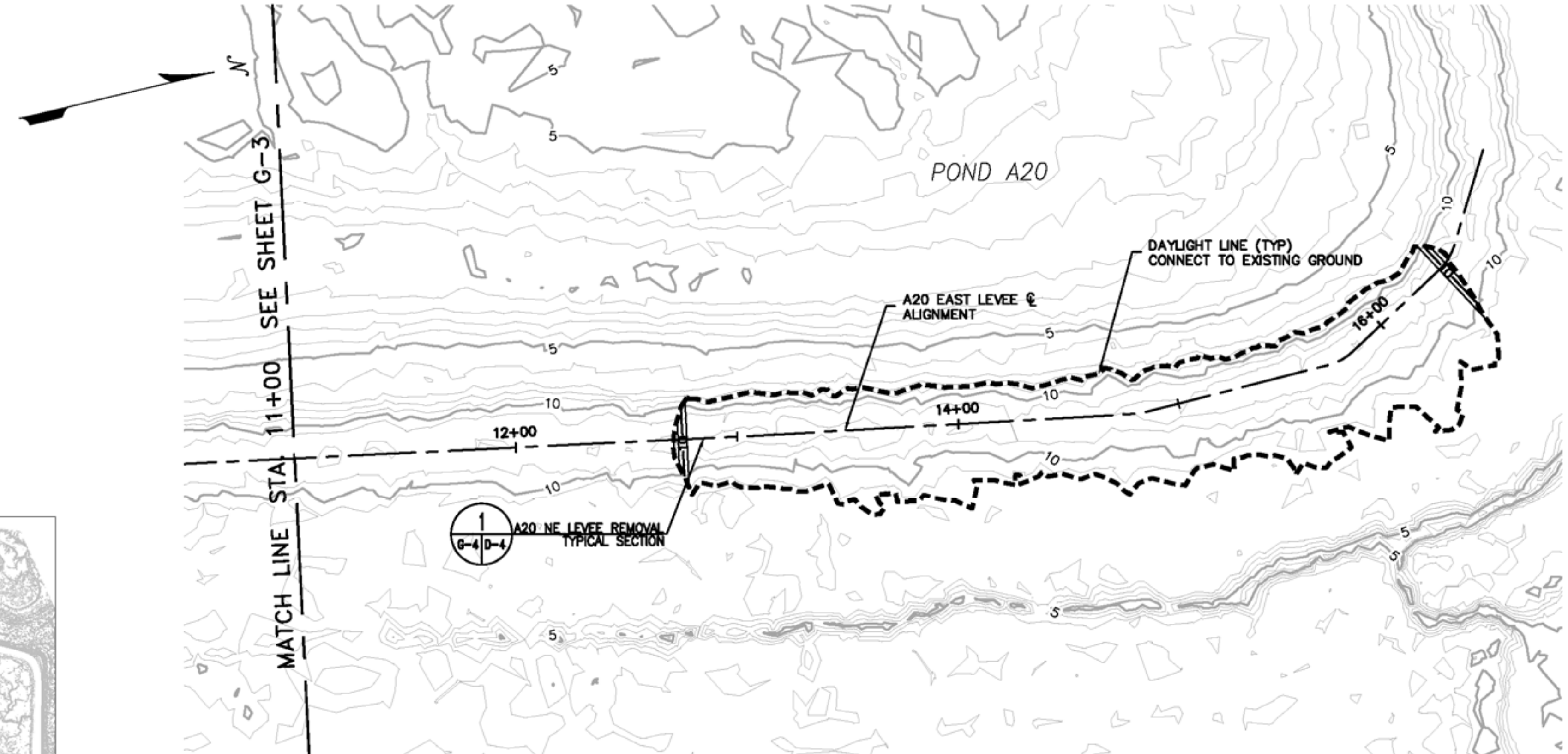

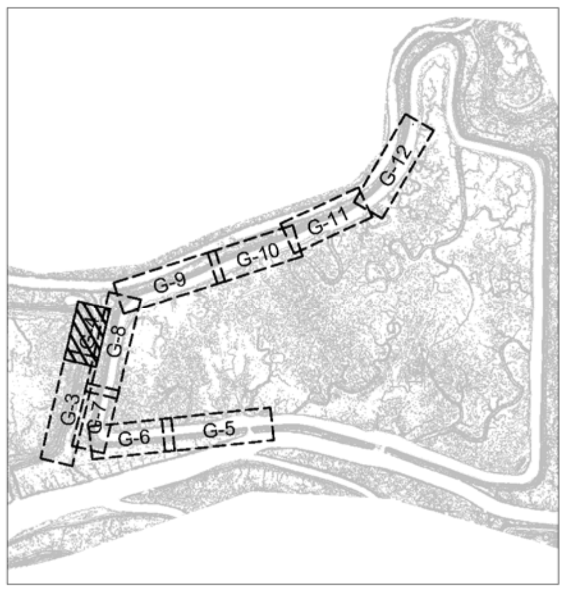

PLAN
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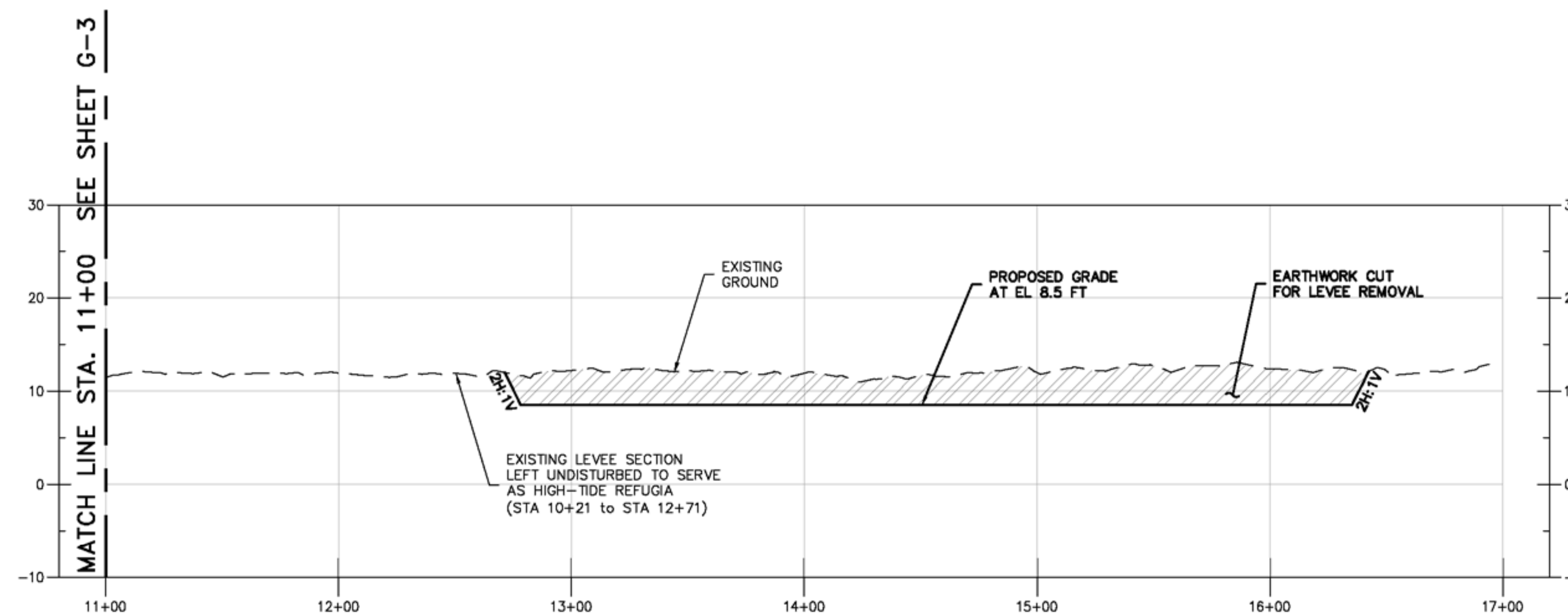

A20 EAST LEVEE ℄ ALIGNMENT PROFILE
HORIZ 1"=40', VERT 1"=10'

0 40 80 120
HORIZ 1" = 40'

0 10 20 30
VERT 1" = 10'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
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DATE 11-30-2016

PROJECT
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SHEET TITLE
ISLAND PONDS
POND A20 NORTHEAST LEVEE REMOVAL
PLAN AND PROFILE

SHEET NO. SHT. 11 OF 23 SHTS.
REV
DWG NO. G-4

Dec 02, 2016 - 3:13pm
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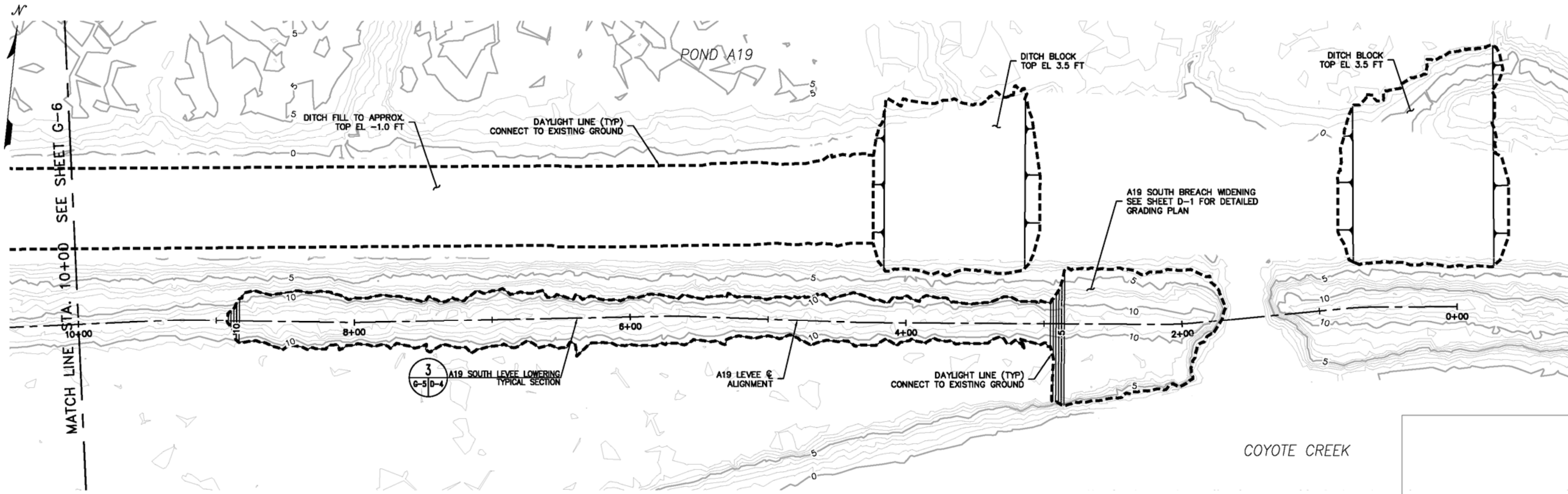
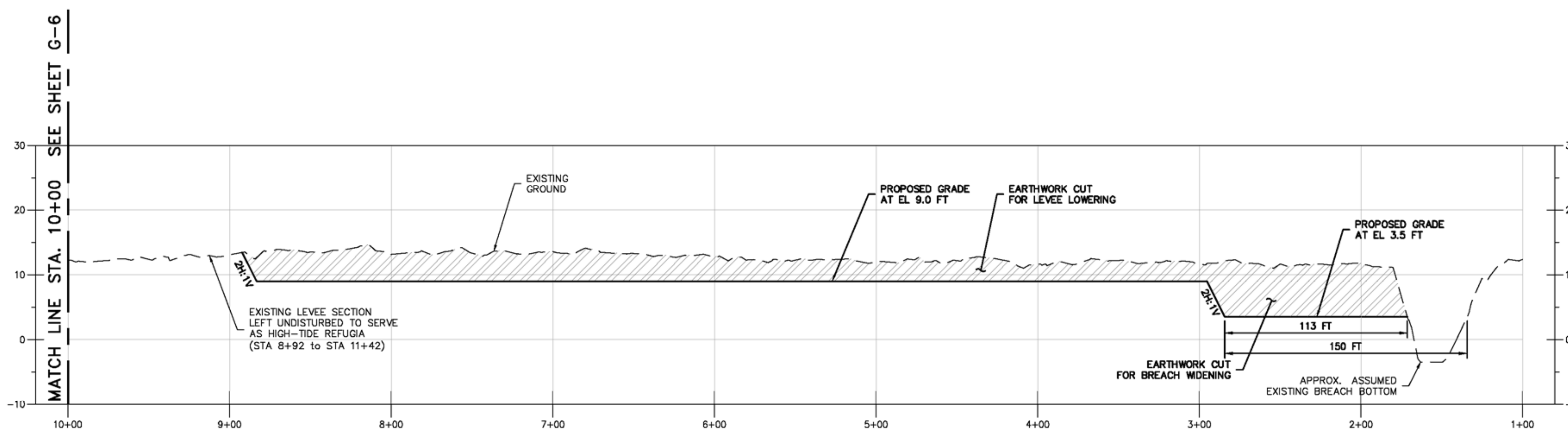
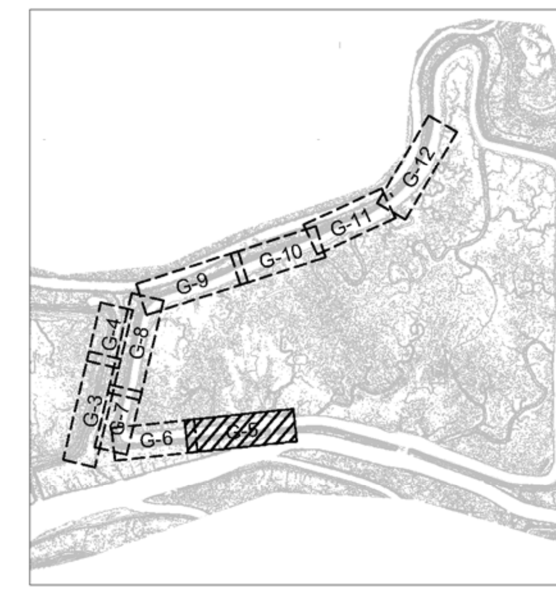


PLAN
1"=40'



A19 LEVEE ℄ ALIGNMENT PROFILE
HORIZ 1"=40', VERT 1"=10'



HORIZ 1" = 40'

VERT 1" = 10'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

PREPARED BY
AECOM
300 Lakeside Drive, Suite 400
Oakland, CA 94612
Tel: (510) 893-3600
aecom.com

DESIGNED	L. CHANDRASEKARAN
DRAWN	L. DIFUNTORUM
CHECKED	G. OROZCO / I. ZARCHI
PEER REVIEWED	S. GENTZLER
APPROVED	S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372 DATE 11-30-2016

PROJECT: SOUTH BAY SALT POND RESTORATION PROJECT

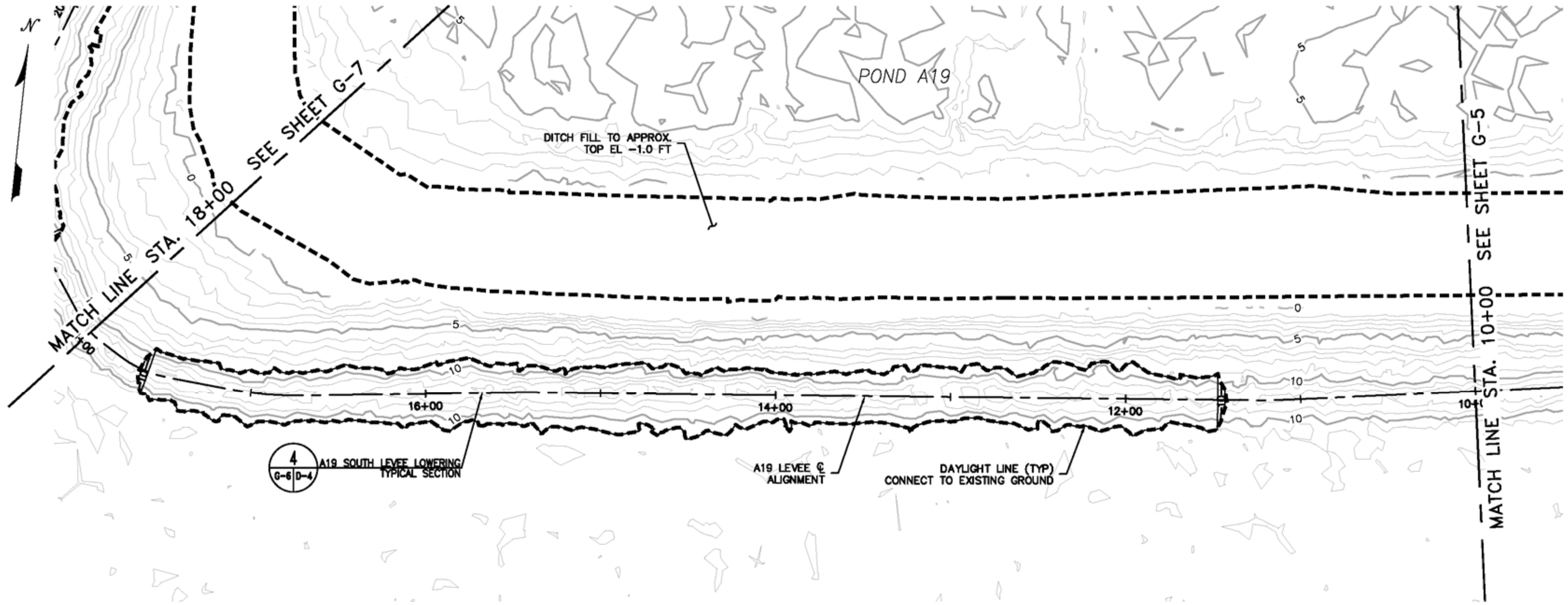
SHEET TITLE: ISLAND PONDS
POND A19 SOUTH LEVEE LOWERING
PLAN AND PROFILE - SHEET 1 OF 2

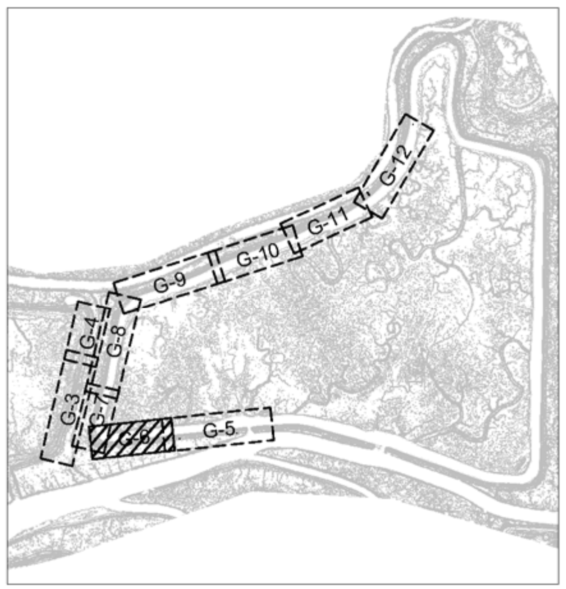
SHEET NO. SHT. 12 OF 23 SHTS.

DWG NO. G-5

REV

Dec 09, 2016 - 10:05am





PLAN
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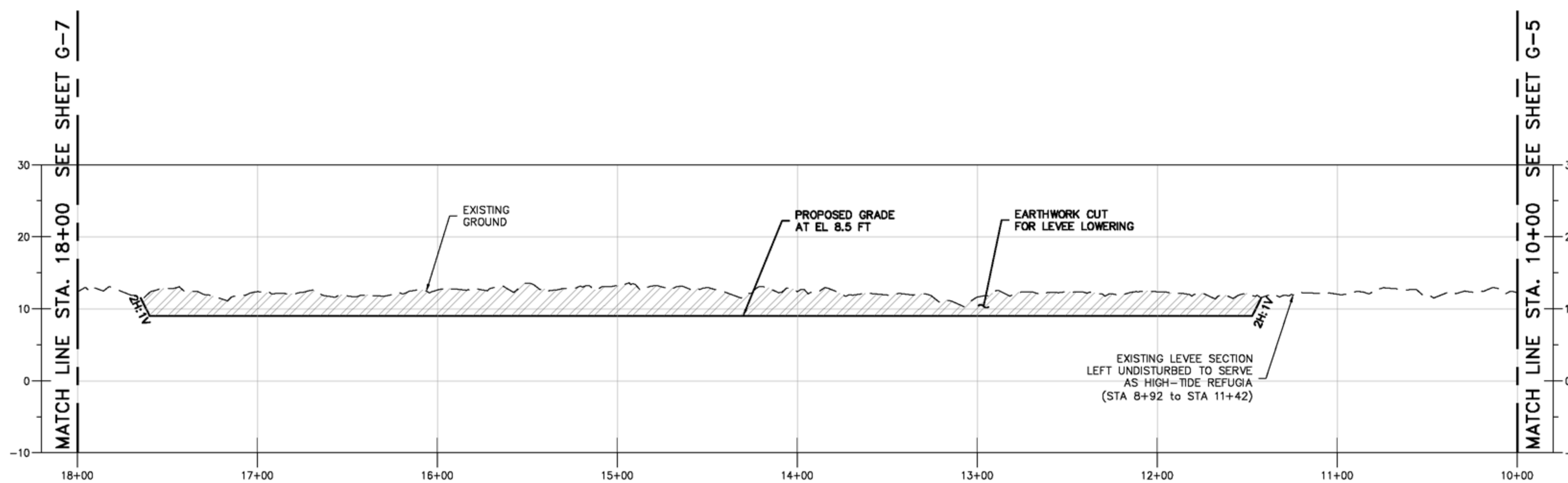

A19 LEVEE ℄ ALIGNMENT PROFILE
HORIZ 1"=40', VERT 1"=10'

0 40 80 120
HORIZ 1" = 40'

0 10 20 30
VERT 1" = 10'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

PREPARED BY
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DESIGNED L. CHANDRASEKARAN
DRAWN L. DIFUNTORUM
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PEER REVIEWED S. GENTZLER
APPROVED S. GENTZLER

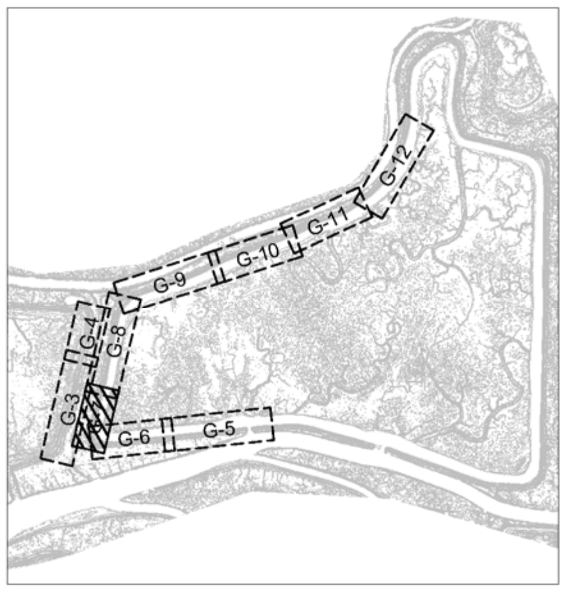
STATE OF CALIFORNIA
Coastal Conservancy

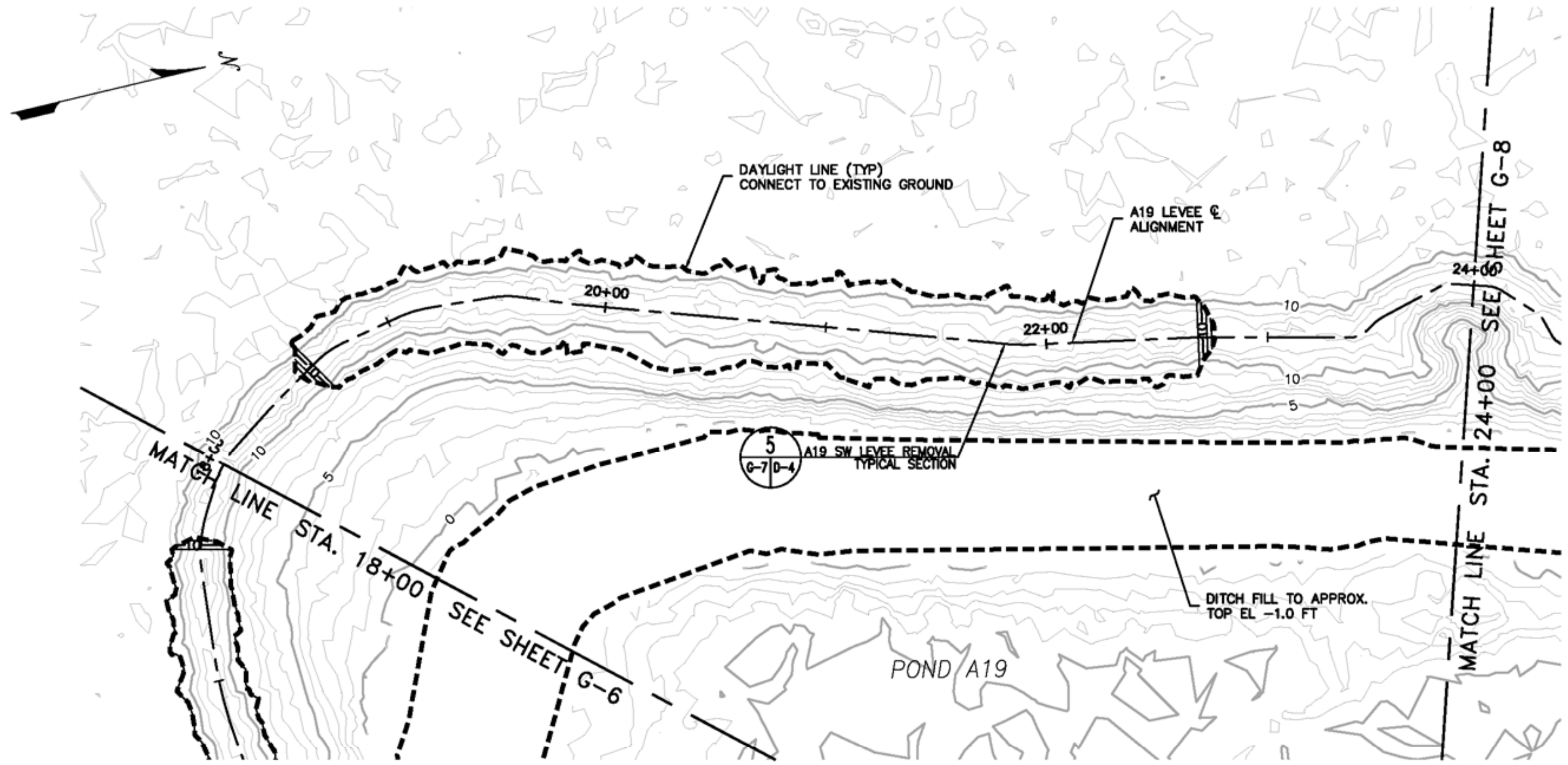
PROJECT No. 60422372
DATE 11-30-2016

PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

SHEET TITLE
ISLAND PONDS
POND A19 SOUTH LEVEE LOWERING
PLAN AND PROFILE - SHEET 2 OF 2

SHEET NO. SHT. 13 OF 23 SHTS.
REV
DWG NO. G-6





PLAN
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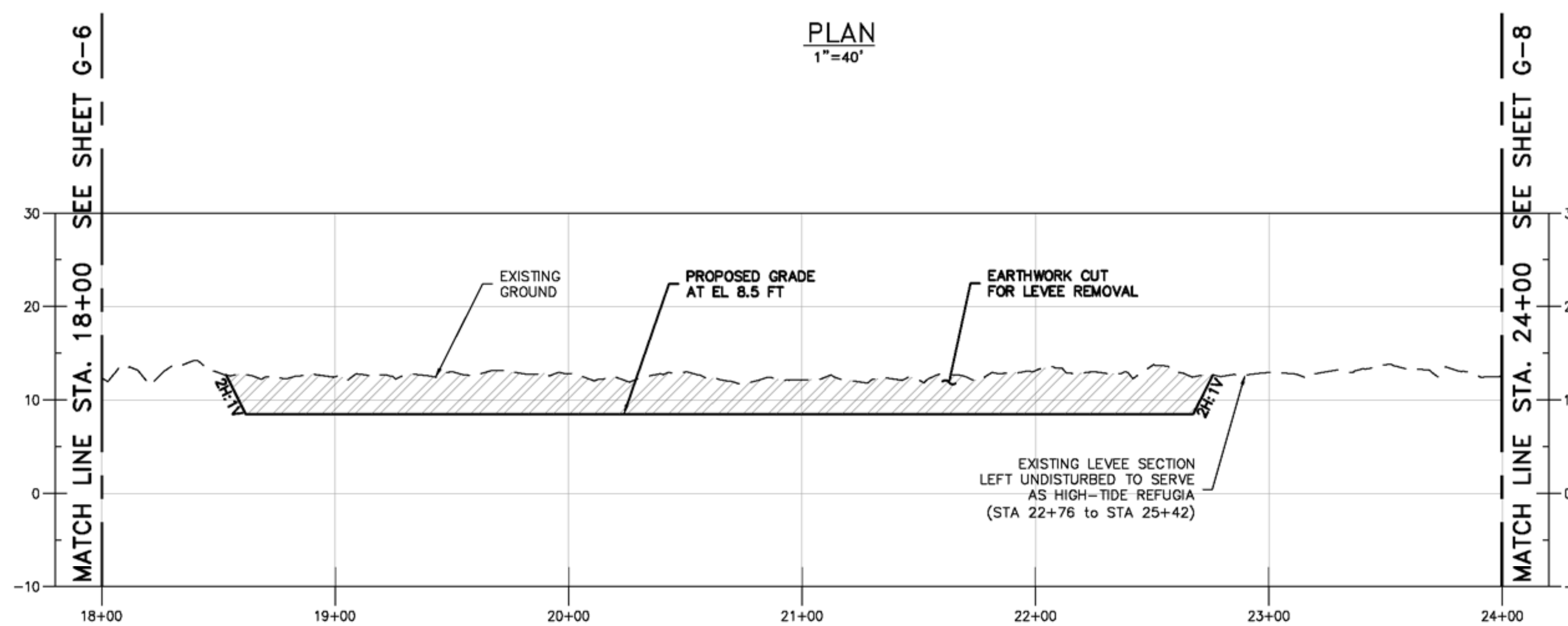

A19 LEVEE ℄ ALIGNMENT PROFILE
HORIZ 1"=40', VERT 1"=10'

0 40 80 120
HORIZ 1" = 40'

0 10 20 30
VERT 1" = 10'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

PREPARED BY
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DESIGNED: L. CHANDRASEKARAN
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PEER REVIEWED: S. GENTZLER
APPROVED: S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy
PROJECT No. 60422372
DATE 11-30-2016

PROJECT: **SOUTH BAY SALT POND RESTORATION PROJECT**
SHEET TITLE: ISLAND PONDS
POND A19 SOUTHWEST LEVEE REMOVAL
PLAN AND PROFILE

SHEET NO. SHT. 14 OF 23 SHTS.
DWG NO. G-7
REV

Dec 02, 2016 - 3:51pm
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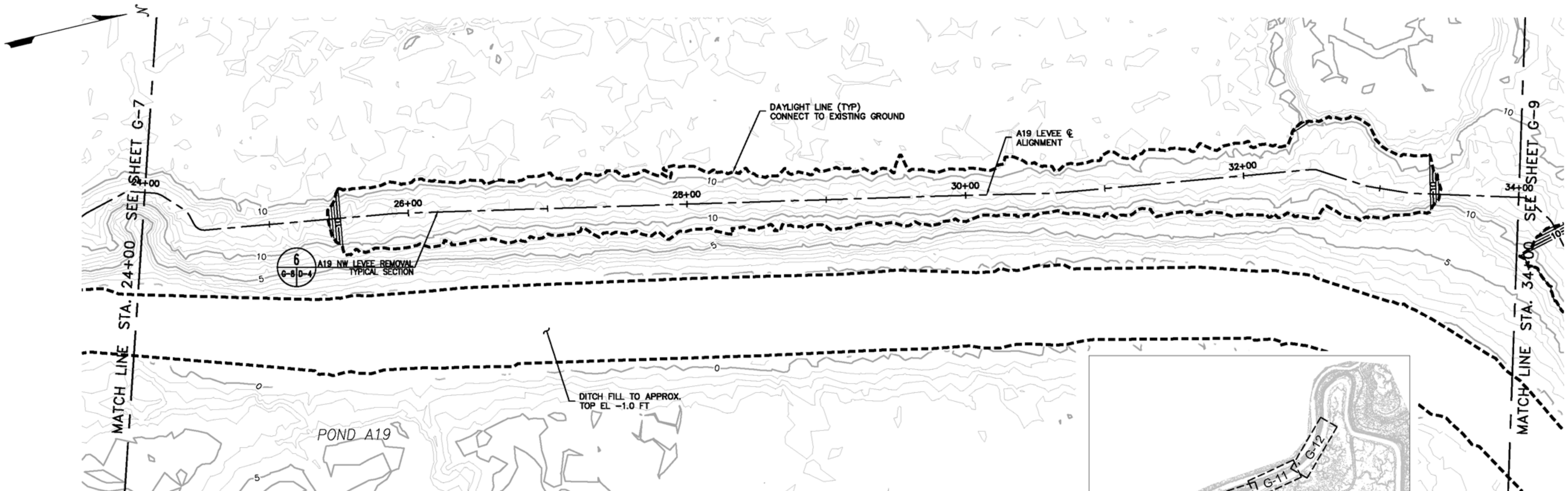

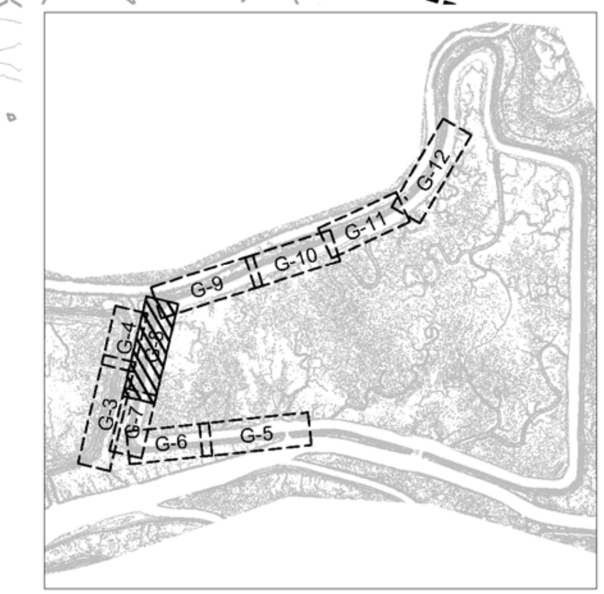

PLAN
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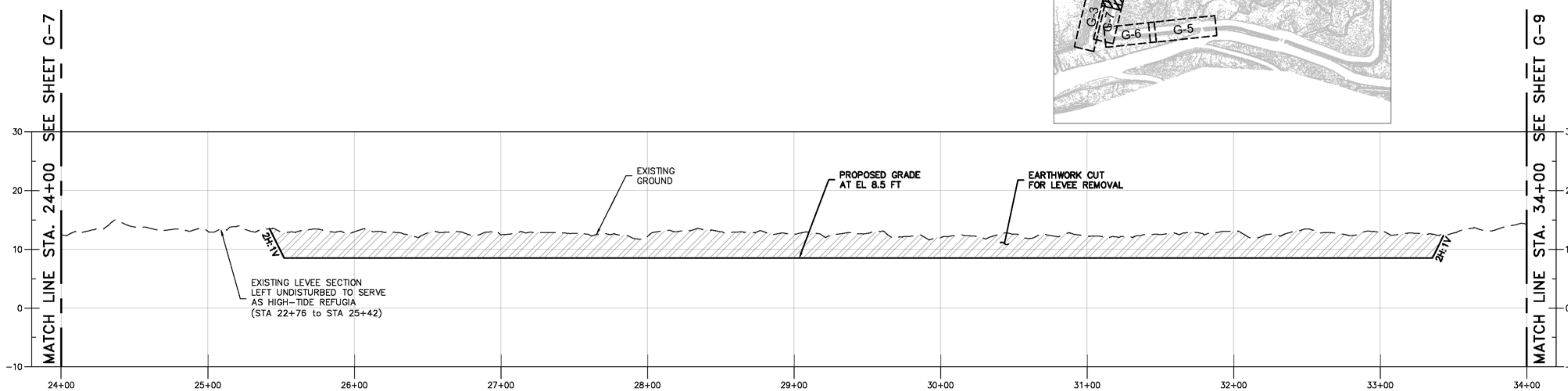

A19 LEVEE ℄ ALIGNMENT PROFILE
HORIZ 1"=40', VERT 1"=10'

0 40 80 120 HORIZ 1" = 40'

0 10 20 30 VERT 1" = 10'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

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DESIGNED	L. CHANDRASEKARAN
DRAWN	L. DIFUNTORUM
CHECKED	G. OROZCO / I. ZARCHI
PEER REVIEWED	S. GENTZLER
APPROVED	S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372 DATE 11-30-2016

PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

SHEET TITLE
ISLAND PONDS
POND A19 NORTHWEST LEVEE REMOVAL
PLAN AND PROFILE

SHEET NO. SHT. 15 OF 23 SHTS.
REV
DWG NO. G-8

Dec 04, 2016 - 5:34pm
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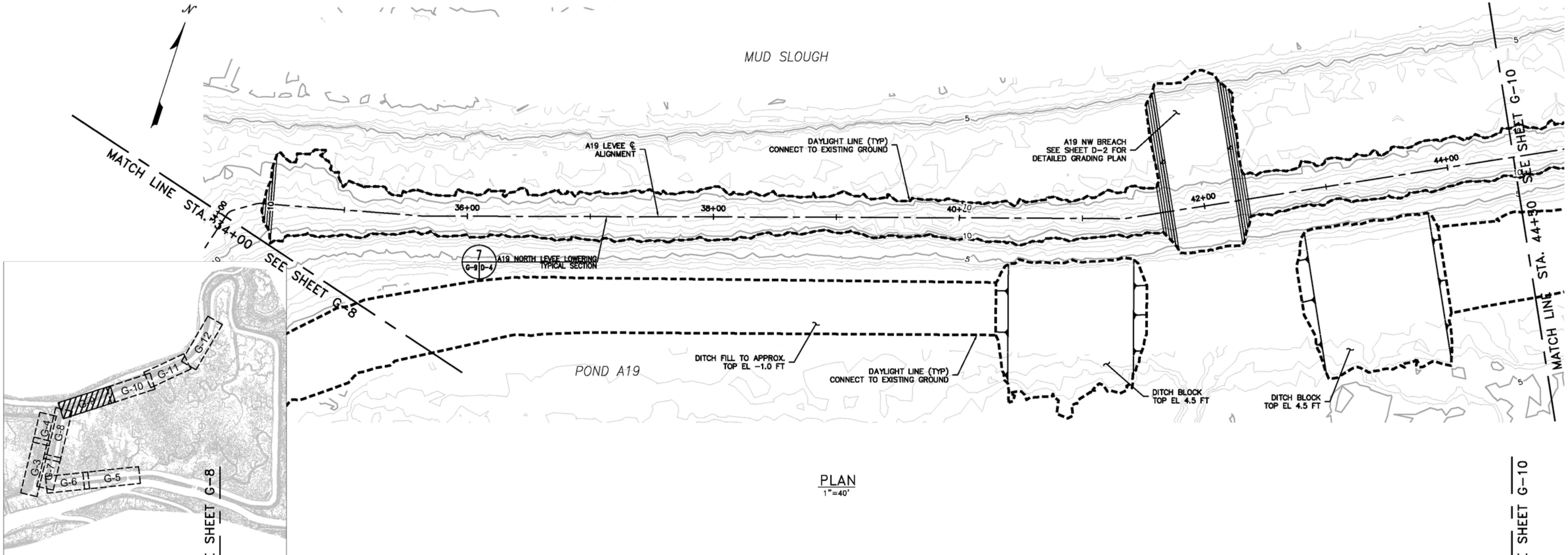
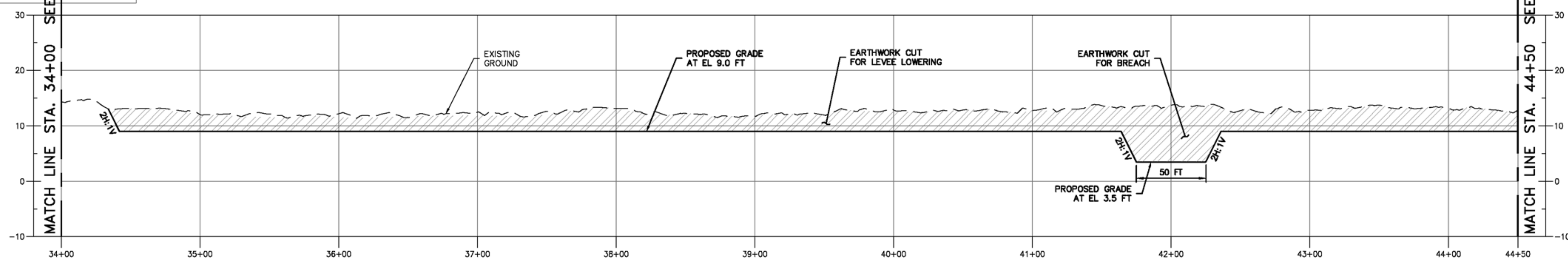


PLAN
1"=40'



A19 LEVEE ℄ ALIGNMENT PROFILE
HORIZ 1"=40', VERT 1"=10'

0 40 80 120 HORIZ 1" = 40'

0 10 20 30 VERT 1" = 10'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
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PEER REVIEWED S. GENTZLER
APPROVED S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372 DATE 11-30-2016

PROJECT **SOUTH BAY SALT POND RESTORATION PROJECT**

SHEET TITLE ISLAND PONDS
POND A19 NORTH LEVEE LOWERING
PLAN AND PROFILE - SHEET 1 OF 4

SHEET NO. SHT. 16 OF 23 SHTS.
REV
DWG NO. G-9

Dec 02, 2016 - 5:25pm
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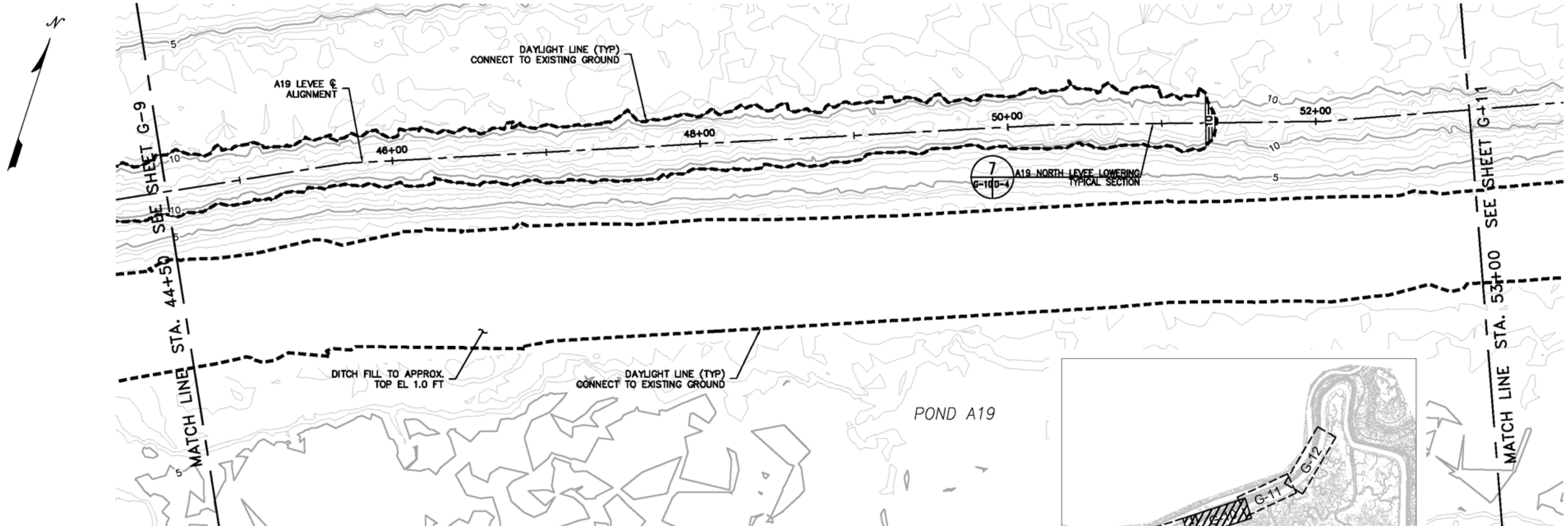

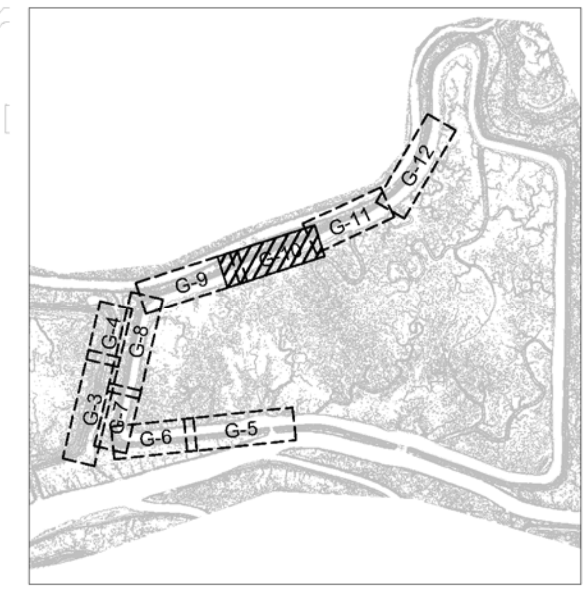

PLAN
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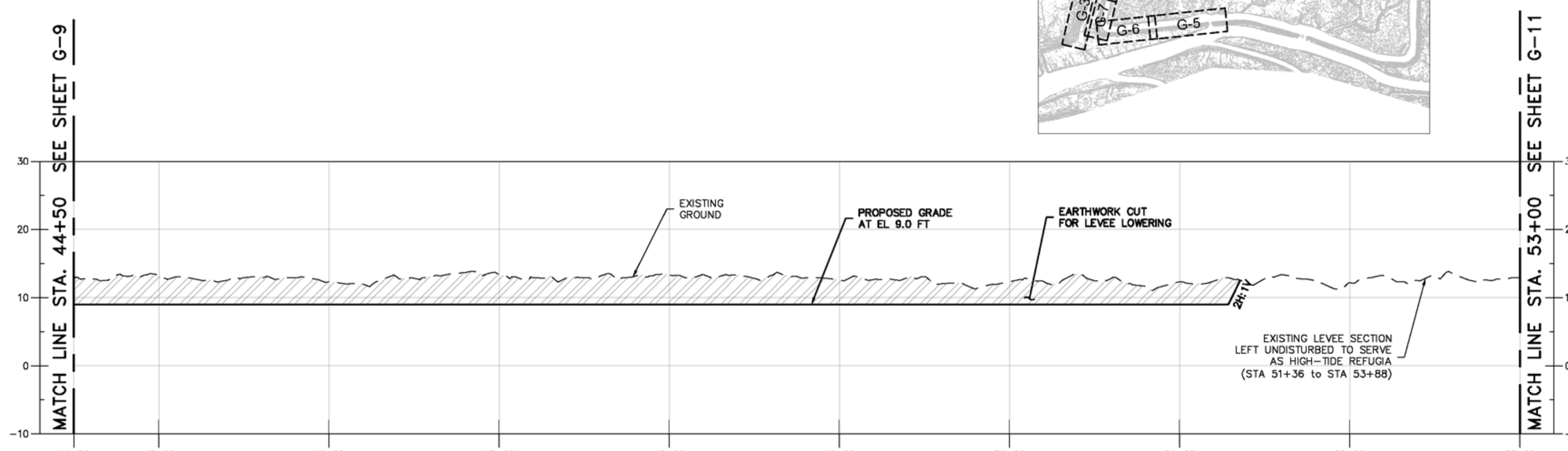

A19 LEVEE ℄ ALIGNMENT PROFILE
HORIZ 1"=40', VERT 1"=10'

0 40 80 120
HORIZ 1" = 40'

0 10 20 30
VERT 1" = 10'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
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DRAWN	L. DIFUNTORUM
CHECKED	G. OROZCO / I. ZARCHI
PEER REVIEWED	S. GENTZLER
APPROVED	S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

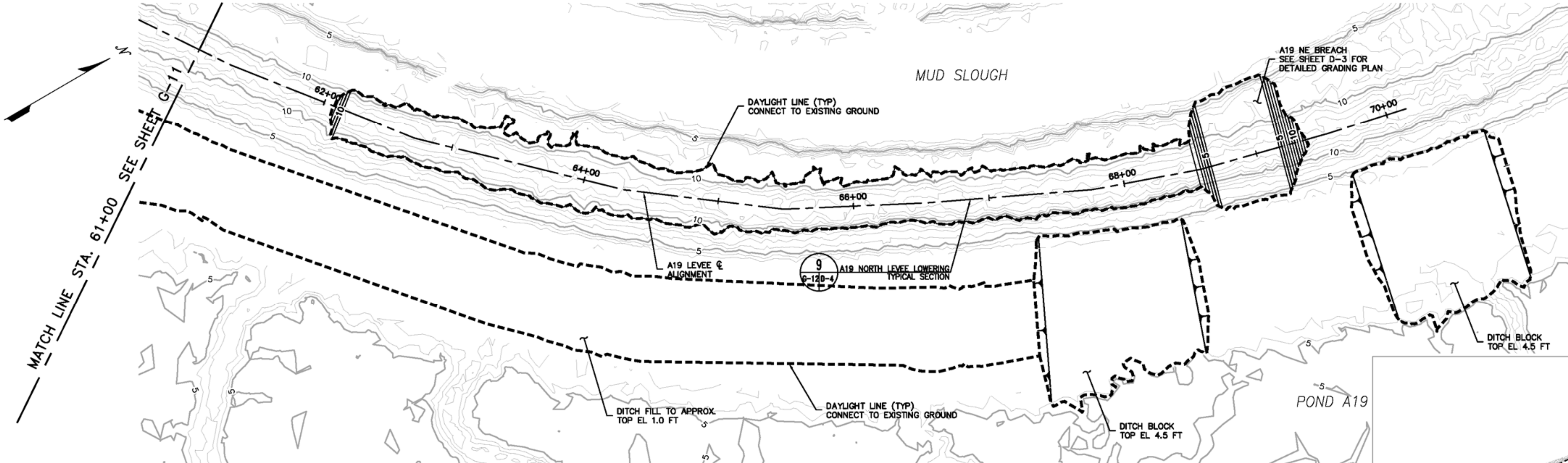
PROJECT No. 60422372
DATE 11-30-2016

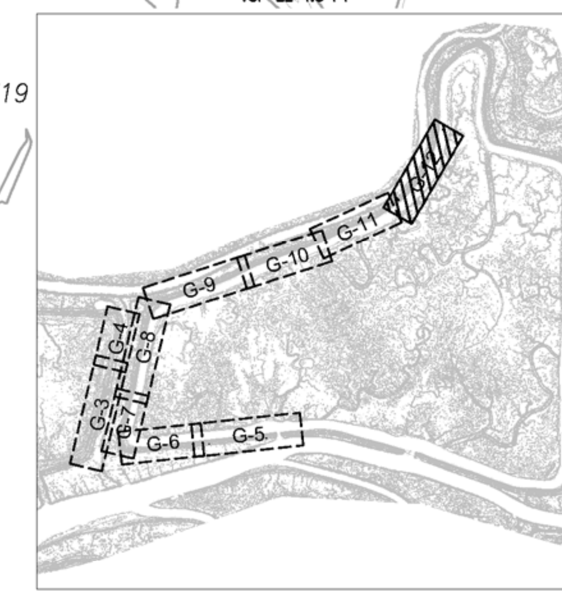
PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

SHEET TITLE
ISLAND PONDS
POND A19 NORTH LEVEE LOWERING
PLAN AND PROFILE - SHEET 2 OF 4

SHEET NO.
SHT. 17 OF 23 SHTS.
REV

DWG NO.
G-10





PLAN
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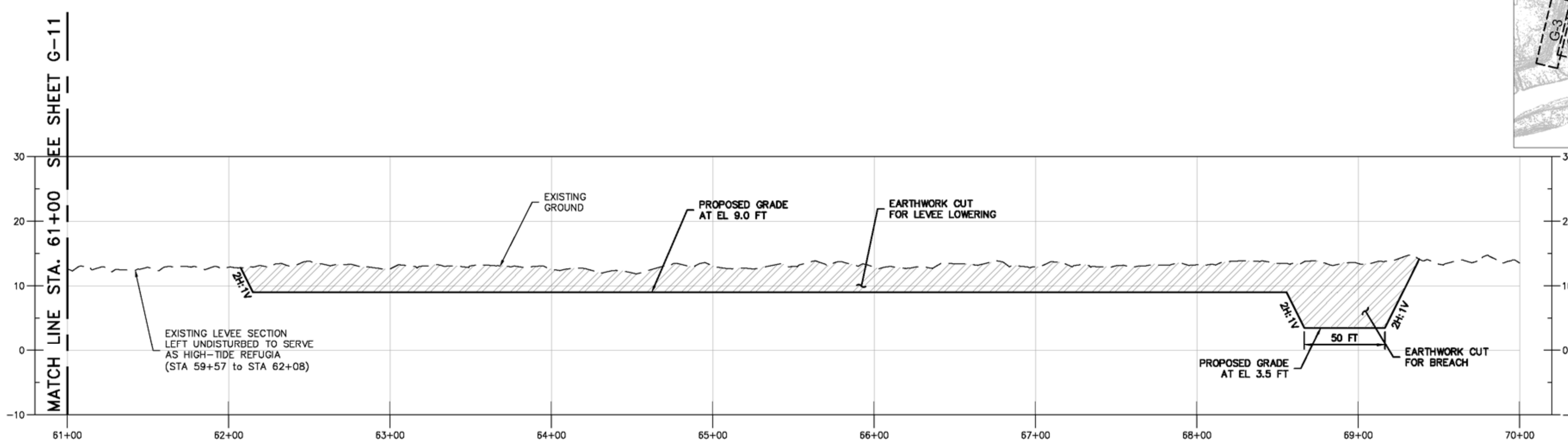

A19 LEVEE ℄ ALIGNMENT PROFILE
HORIZ 1"=40', VERT 1"=10'

0 40 80 120
HORIZ 1" = 40'

0 10 20 30
VERT 1" = 10'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
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AECOM
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DESIGNED L. CHANDRASEKARAN
DRAWN L. DIFUNTORUM
CHECKED G. OROZCO / I. ZARCHI
PEER REVIEWED S. GENTZLER
APPROVED S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy
PROJECT No. 60422372
DATE 11-30-2016

PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT
SHEET TITLE
ISLAND PONDS
POND A19 NORTH LEVEE LOWERING
PLAN AND PROFILE - SHEET 4 OF 4

SHEET NO. SHT 19 OF 23 SHTS
REV
DWG NO. G-12

Dec 02, 2016 - 5:50pm
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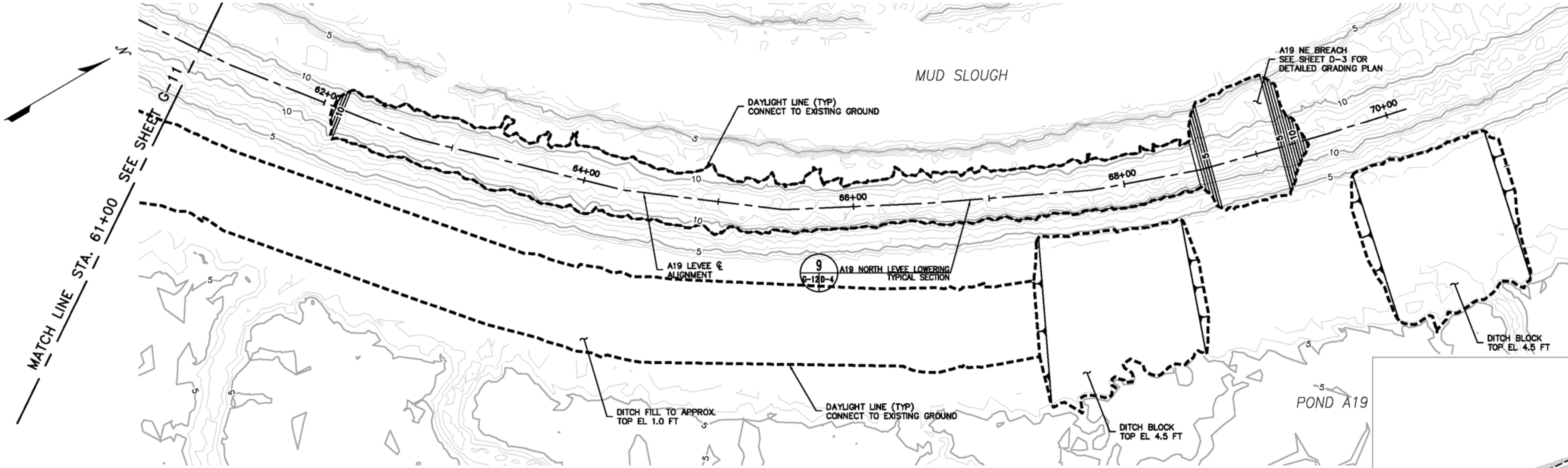

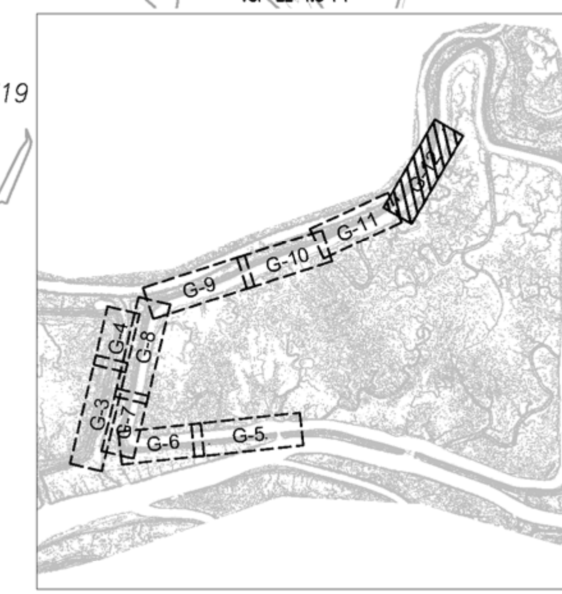

PLAN
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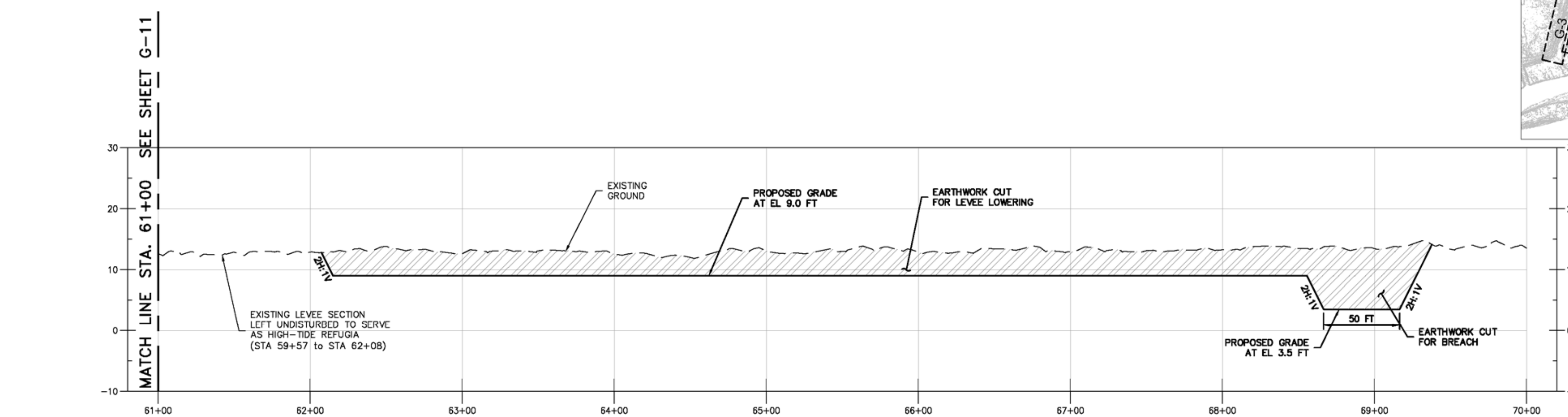

A19 LEVEE ℄ ALIGNMENT PROFILE
HORIZ 1"=40', VERT 1"=10'

HORIZ 1" = 40'   VERT 1" = 10'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING 0 1/2 1 — IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

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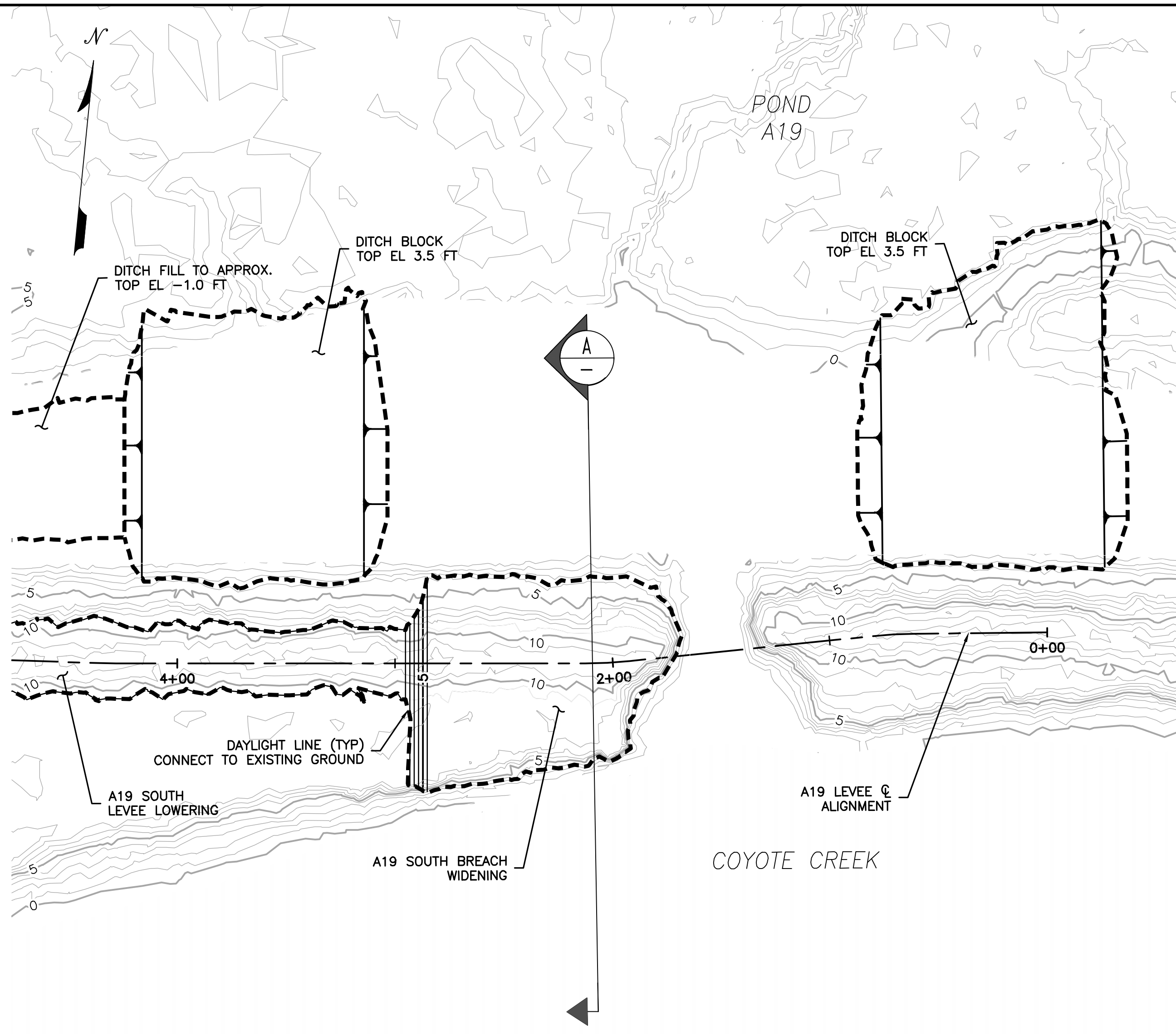
DESIGNED L. CHANDRASEKARAN
DRAWN L. DIFUNTORUM
CHECKED G. OROZCO / I. ZARCHI
PEER REVIEWED S. GENTZLER
APPROVED S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy
PROJECT No. 60422372 DATE 11-30-2016

PROJECT: **SOUTH BAY SALT POND RESTORATION PROJECT**
SHEET TITLE: ISLAND PONDS POND A19 NORTH LEVEE LOWERING PLAN AND PROFILE - SHEET 4 OF 4

SHEET NO. SHT 19 OF 23 SHTS
DWG NO. G-12

Dec 02, 2016 - 5:50pm



PLAN
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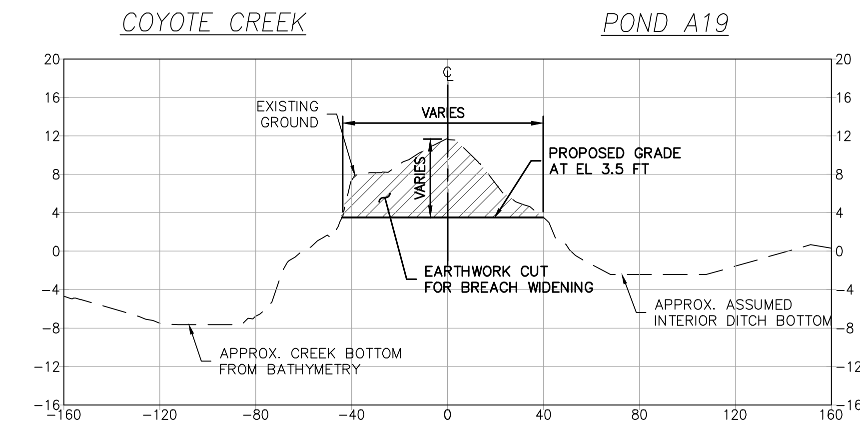
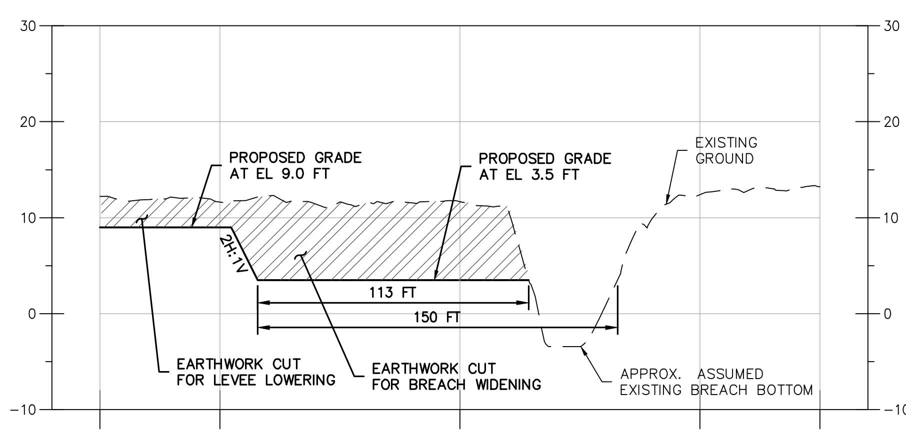
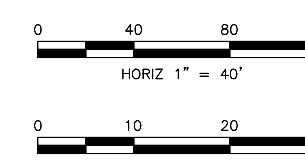


A A19 SOUTH BREACH WIDENING – TYPICAL SECTION
HORIZ 1"=40', VERT 1"=10'



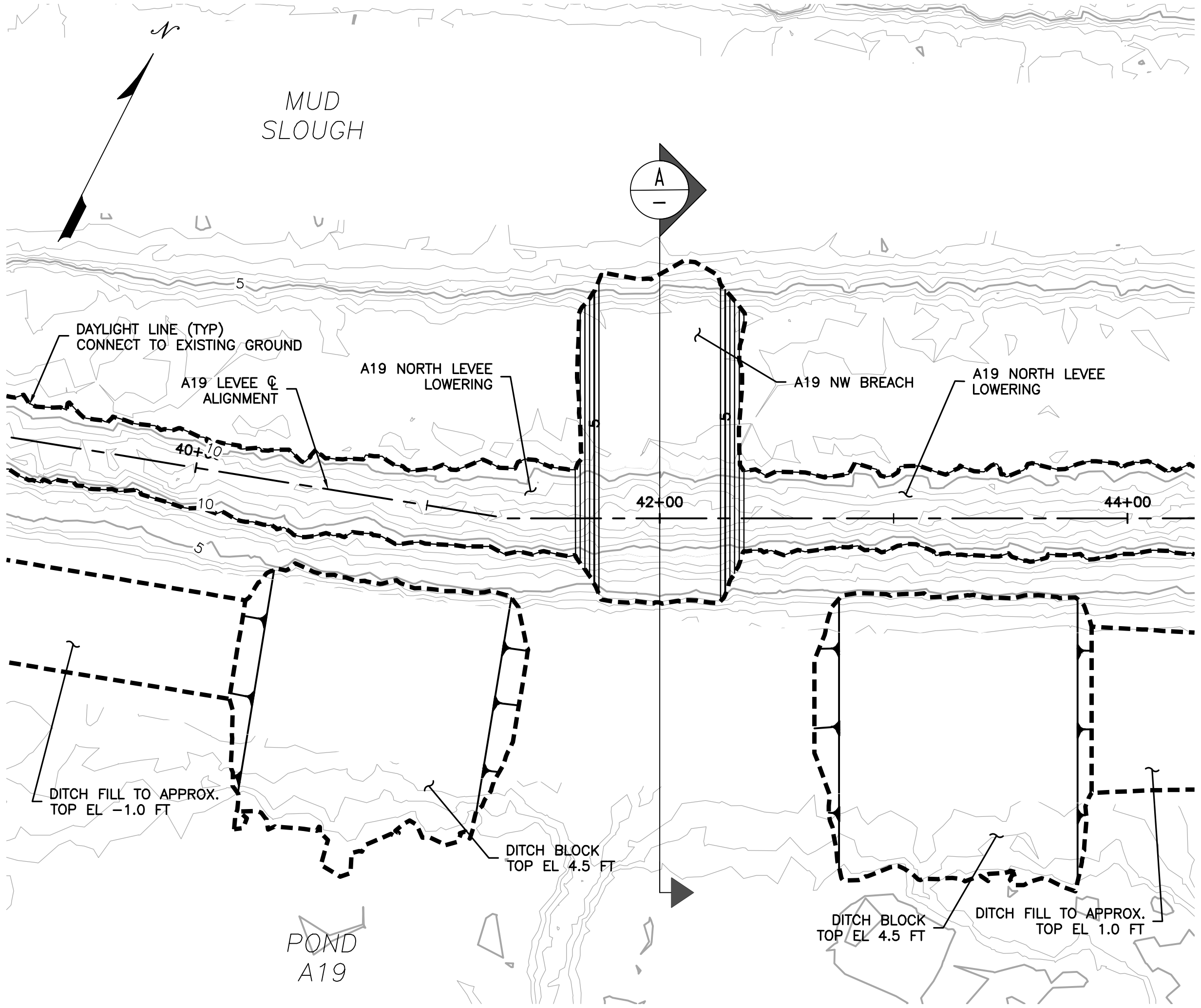
A19 SOUTH BREACH WIDENING – PROFILE
HORIZ 1"=40', VERT 1"=10'



PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV / DESCRIPTION / BY / CHK / APP / DATE	
WARNING	0 1/2 1 — IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE
PREPARED BY	AECOM, 300 Lakeside Drive, Suite 400, Oakland, CA 94612, Tel: (510) 893-3600, aecom.com
DESIGNED	L. CHANDRASEKARAN
DRAWN	L. DIFUNTORUM
CHECKED	G. OROZCO / I. ZARCHI
PEER REVIEWED	S. GENTZLER
APPROVED	S. GENTZLER
	STATE OF CALIFORNIA **Coastal Conservancy**
PROJECT No.	60422372
DATE	11-30-2016
PROJECT	**SOUTH BAY SALT POND RESTORATION PROJECT**
SHEET TITLE	ISLAND PONDS POND A19 SOUTH BREACH WIDENING DETAILED GRADING PLAN
SHEET NO.	SHT. 20 OF 23 SHTS.
DWG NO.	D-1
REV	

Dec 09, 2016 - 10:01am
C:\pwworking\aecom_na\chandrasekaranl\dms75825\P_D-1.dwg



PLAN
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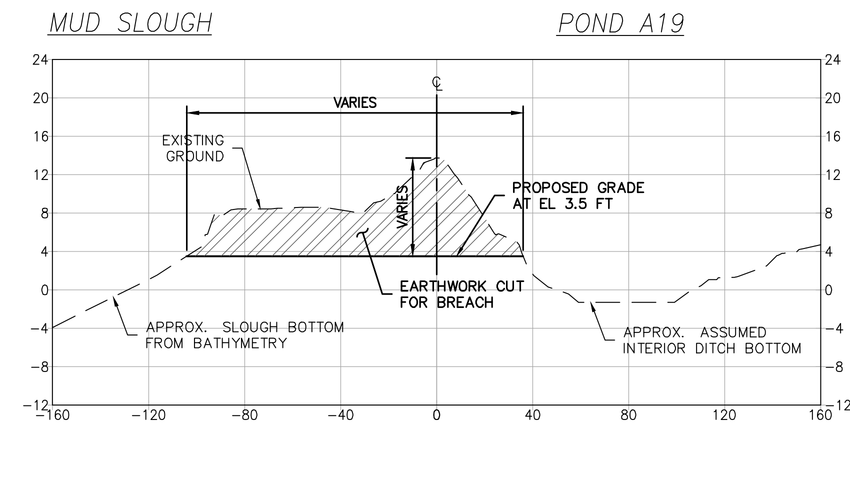
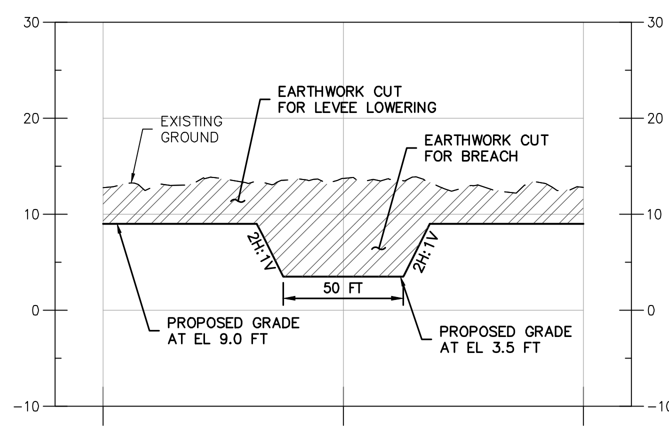
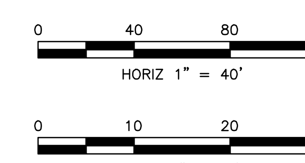


A A19 NW BREACH – TYPICAL SECTION
HORIZ 1"=40', VERT 1"=10'



A19 NW BREACH – PROFILE
HORIZ 1"=40', VERT 1"=10'



PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
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PREPARED BY
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DRAWN	L. DIFUNTORUM
CHECKED	G. OROZCO / I. ZARCHI
PEER REVIEWED	S. GENTZLER
APPROVED	S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

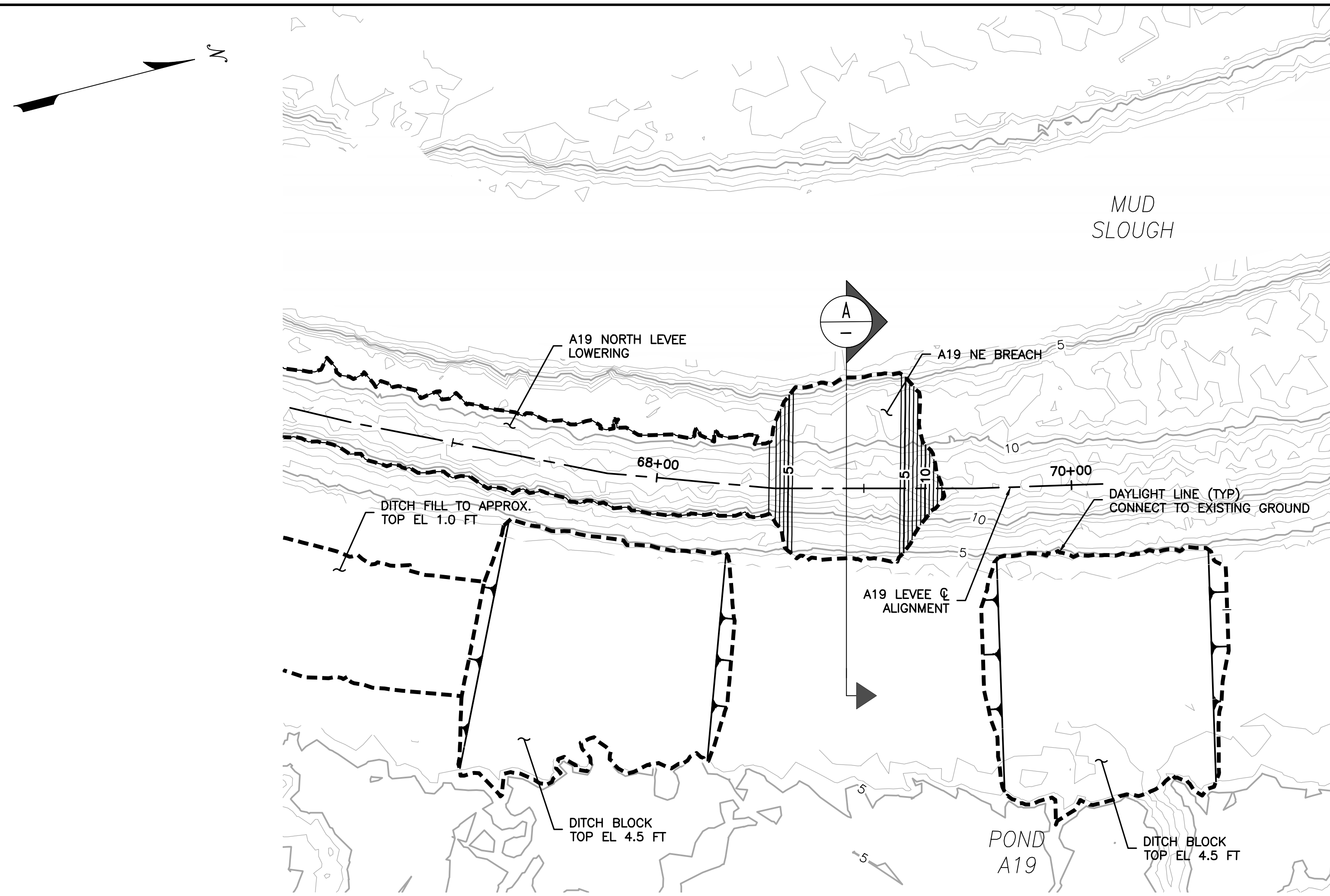
PROJECT No. 60422372
DATE 11-30-2016

PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

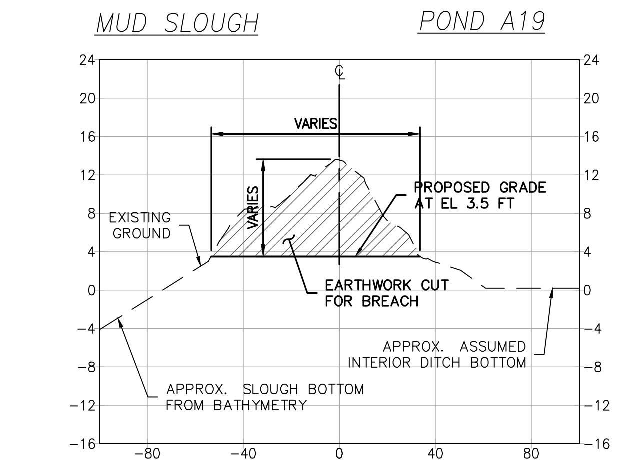
SHEET TITLE
ISLAND PONDS
POND A19 NORTHWEST BREACH
DETAILED GRADING PLAN

SHEET NO. SHT. 21 OF 23 SHTS.
REV
DWG NO. D-2

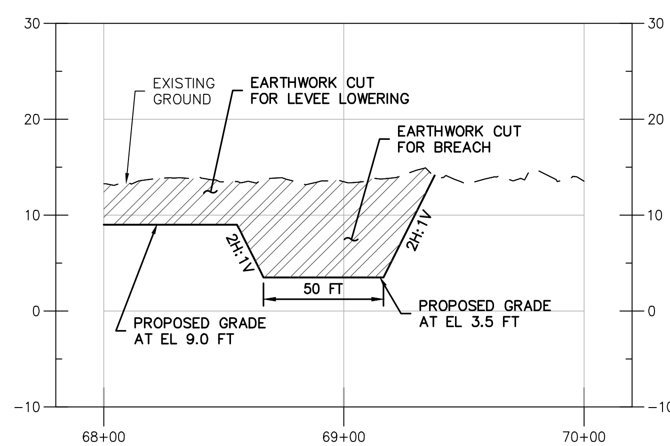
Dec 02, 2016 - 6:25pm
C:\pwworking\aecom_na\chandrasekaranl\dms75825\P_D-2.dwg



PLAN
1"=40'



A19 NE BREACH – TYPICAL SECTION
HORIZ 1"=40', VERT 1"=10'



A19 NE BREACH – PROFILE
HORIZ 1"=40', VERT 1"=10'

0 40 80 120
HORIZ 1" = 40'

0 10 20 30
VERT 1" = 10'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
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DRAWN L. DIFUNTORUM
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PEER REVIEWED S. GENTZLER
APPROVED S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372
DATE 11-30-2016

PROJECT **SOUTH BAY SALT POND RESTORATION PROJECT**
SHEET TITLE ISLAND PONDS
POND A19 NORTHEAST BREACH
DETAILED GRADING PLAN

SHEET NO. SHT. 22 OF 23 SHTS.
REV
DWG NO. D-3

Dec 02, 2016 - 6:42pm
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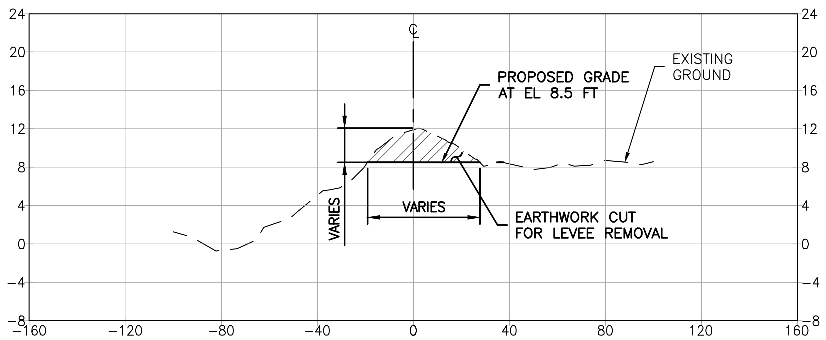
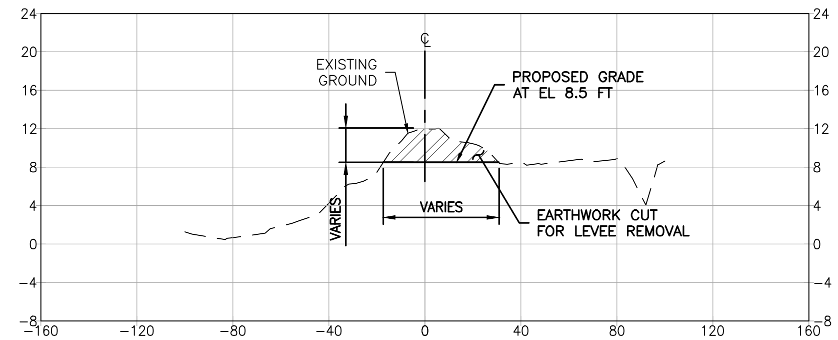
POND A20



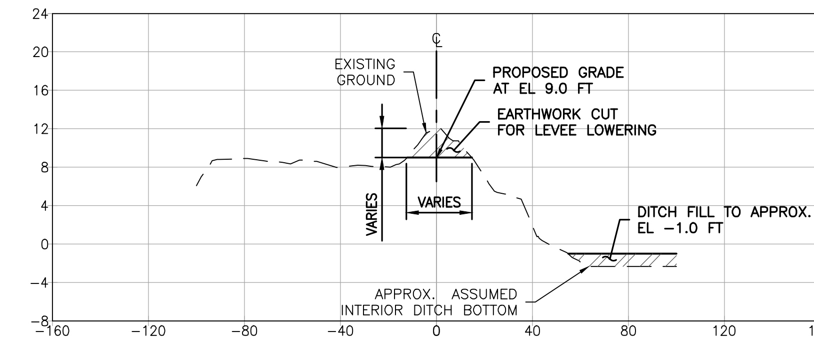
1 (G-3, D-4) A20 SOUTHEAST LEVEE REMOVAL – TYPICAL SECTION
STA 0+50 TO 10+21
HORIZ 1"=40', VERT 1"=10'

POND A20



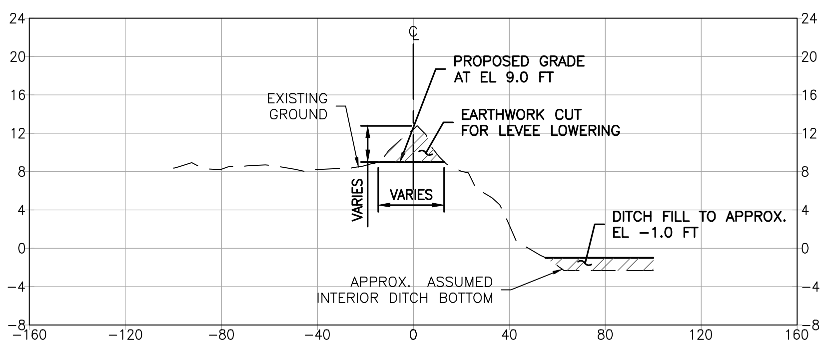
2 (G-4, D-4) A20 NORTHEAST LEVEE REMOVAL – TYPICAL SECTION
STA 12+71 TO 16+42
HORIZ 1"=40', VERT 1"=10'

POND A19



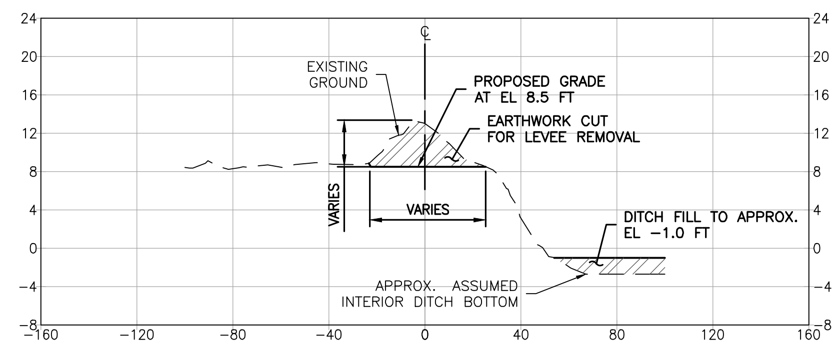
3 (G-5, D-4) A19 SOUTH LEVEE LOWERING – TYPICAL SECTION
STA 2+95 TO 8+92
HORIZ 1"=40', VERT 1"=10'

POND A19



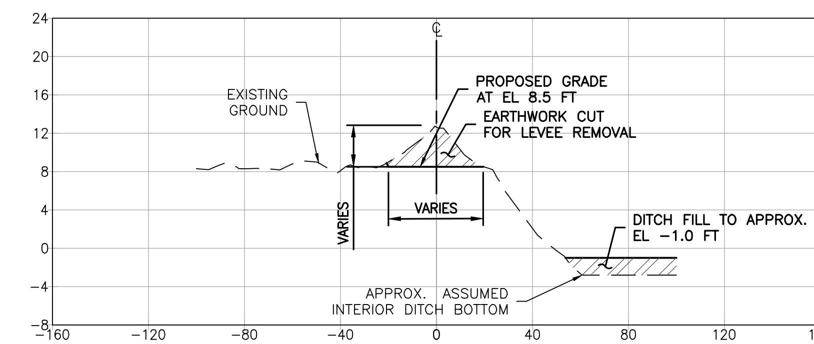
4 (G-6, D-4) A19 SOUTH LEVEE LOWERING – TYPICAL SECTION
STA 11+42 TO 17+65
HORIZ 1"=40', VERT 1"=10'

POND A19



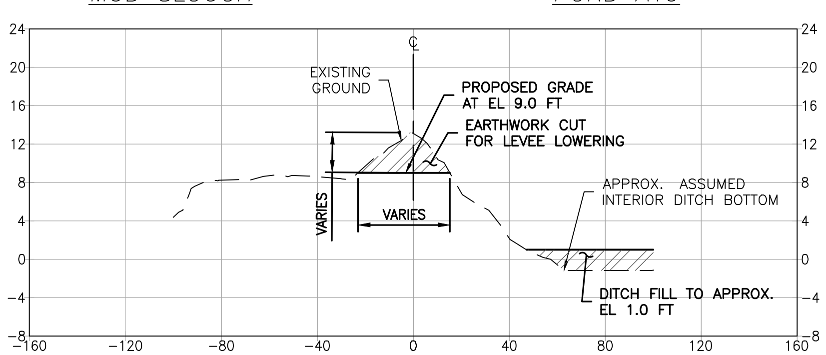
5 (G-7, D-4) A19 SOUTHWEST LEVEE REMOVAL – TYPICAL SECTION
STA 18+53 TO 22+76
HORIZ 1"=40', VERT 1"=10'

POND A19



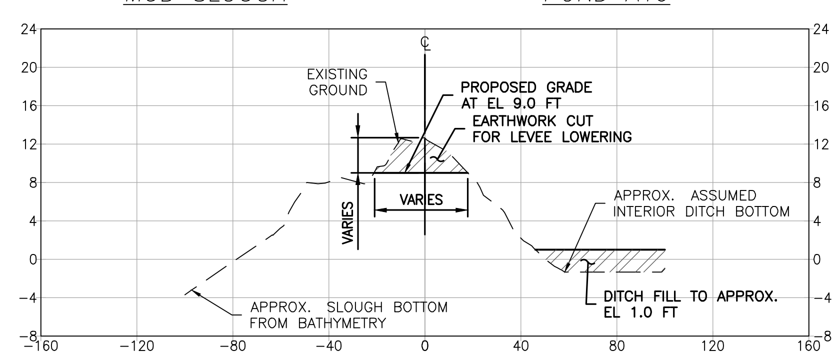
6 (G-8, D-4) A19 NORTHWEST LEVEE REMOVAL – TYPICAL SECTION
STA 25+42 TO 33+43
HORIZ 1"=40', VERT 1"=10'

MUD SLOUGH POND A19



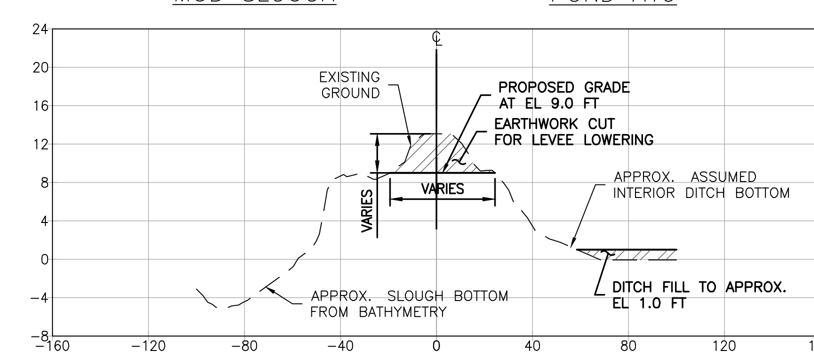
7 (G-10, G-9, D-4) A19 NORTH LEVEE LOWERING – TYPICAL SECTION
STA 34+34 TO 41+64, STA 42+36 TO 51+36
HORIZ 1"=40', VERT 1"=10'

MUD SLOUGH POND A19



8 (G-11, D-4) A19 NORTH LEVEE LOWERING – TYPICAL SECTION
STA 53+88 TO 59+57
HORIZ 1"=40', VERT 1"=10'

MUD SLOUGH POND A19



9 (G-12, D-4) A19 NORTH LEVEE LOWERING – TYPICAL SECTION
STA 62+07 TO 68+55
HORIZ 1"=40', VERT 1"=10'

0 40 80 120
HORIZ 1" = 40'

0 10 20 30
VERT 1" = 10'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

PREPARED BY
AECOM
300 Lakeside Drive, Suite 400
Oakland, CA 94612
Tel: (510) 893-3600
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DESIGNED L. CHANDRASEKARAN
DRAWN L. DIFUNTORUM
CHECKED G. OROZCO / I. ZARCHI
PEER REVIEWED S. GENTZLER
APPROVED S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372
DATE 11-30-2016

PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

SHEET TITLE
ISLAND PONDS
TYPICAL GRADING SECTIONS

SHEET NO. SHT. 23 OF 23 SHTS.
REV
DWG NO. D-4

Dec 04, 2016 - 6:07pm
C:\pwworking\aecom_na\chandrasekaranl\dms75825\P_D-4.dwg

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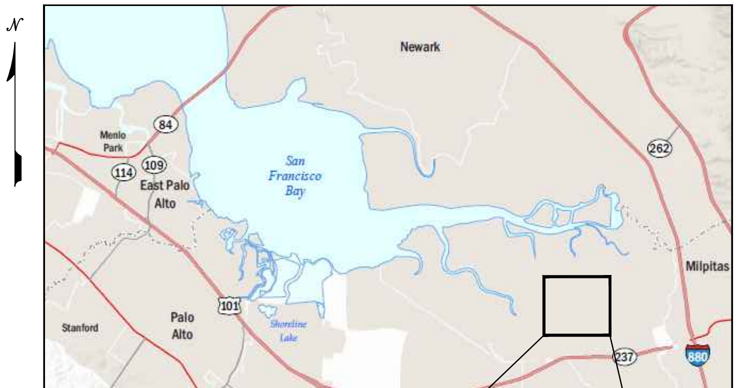
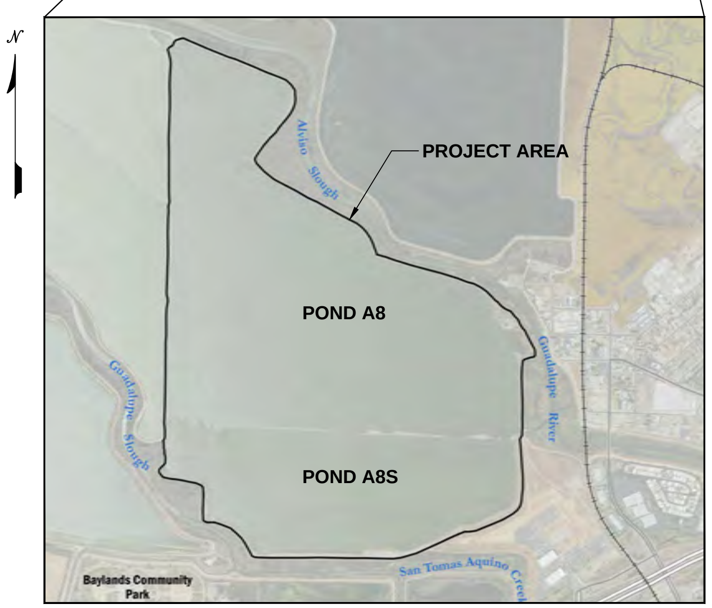
SOUTH BAY SALT POND RESTORATION PROJECT

A8 PONDS
NEAR ALVISO, CALIFORNIA



VICINITY MAP
NTS



LOCATION MAP
NTS

PROJECT AREA PHOTO

SHEETS

- T-1 TITLE SHEET
- T-2 NOTES AND LEGEND
- T-3 KEY MAP
- T-4 GENERAL ARRANGEMENT PLAN
- T-5 ACCESS ROUTE AND STAGING PLAN

LAYOUT PLAN SHEETS

- L-1 LAYOUT PLAN – SHEET 1 OF 2
- L-2 LAYOUT PLAN – SHEET 2 OF 2

GRADING PLAN SHEETS

- G-1 POND A8S WEST HTZ GRADING PLAN
- G-2 POND A8S EAST HTZ GRADING PLAN

Nov 30, 2016 - 12:12pm
C:\pwworking\aecom_na\lchandrasekaran\dms75826\A8_T-1.dwg

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
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APPROVED S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372
DATE 11-30-2016

PROJECT: SOUTH BAY SALT POND RESTORATION PROJECT
SHEET TITLE: A8 PONDS TITLE SHEET

SHEET NO. SHT. 1 OF 9 SHTS.
REV
DWG NO. T-1

LEGEND

LINETYPES

ALIGNMENT CENTERLINE

EXISTING CONTOUR

PROPOSED MAJOR CONTOUR

PROPOSED MINOR CONTOUR

PROPOSED DAYLIGHT LINE

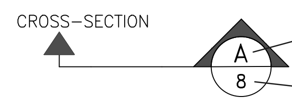
CONSTRUCTION ACCESS ROUTE

EXISTING TRAIL

PROPOSED EARTHWORK FILL

STAGING AREA

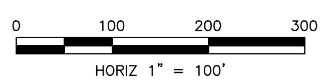
SYMBOLS



CROSS SECTION IDENTIFICATION NUMBER

SHEET NUMBER ON WHICH CROSS SECTION IS DRAWN

NORTH ARROW



SCALE BAR

ABBREVIATIONS

℄	CENTERLINE
EL	ELEVATION
FT	FEET
HORIZ.	HORIZONTAL
HTZ	HABITAT TRANSITION ZONE
NTS	NOT TO SCALE
STA	STATION
TYP	TYPICAL
VERT.	VERTICAL

GENERAL NOTES

1. PROJECT COORDINATE SYSTEM AND VERTICAL DATUM ARE AS FOLLOWS:
   COORDINATE SYSTEM: NAD83, CALIFORNIA STATE PLANE ZONE 3
   VERTICAL DATUM: NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88)
2. TOPOGRAPHY FROM LIDAR DATA OBTAINED FROM AIRBORNE1 IN U.S. SURVEY FEET, DATED JUNE-NOVEMBER 2010.
3. PROPOSED TOPOGRAPHIC CONTOUR INFORMATION IS SHOWN AT 1-FOOT CONTOUR INTERVALS, UNLESS OTHERWISE STATED.
4. ALL CONSTRUCTION AND CONSTRUCTION MATERIAL SHALL BE IN ACCORDANCE WITH THESE PLANS.
5. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO BE KNOWLEDGEABLE ABOUT AND OBEY ALL PERMIT REQUIREMENTS WHILE PERFORMING THE WORK ON THESE PLANS.
6. THE CONTRACTOR SHALL PRACTICE SAFETY AT ALL TIMES AND SHALL FURNISH, ERECT, AND MAINTAIN SUCH FENCES, BARRICADES, LIGHTS, AND SIGNS NECESSARY TO GIVE ADEQUATE PROTECTION TO THE PUBLIC AT ALL TIMES.
7. THE CONTRACTOR SHALL HAVE COPIES OF THE APPROVED PLANS AND SPECIFICATIONS FOR THIS PROJECT AT ALL TIMES AND SHALL BE FAMILIAR WITH ALL APPLICABLE STANDARDS AND SPECIFICATIONS.
8. THE CONTRACTOR IS RESPONSIBLE FOR SETTING ONSITE SURVEY CONTROL FOR CONSTRUCTION STAKING IN PROJECT COORDINATE SYSTEM AND VERTICAL DATUM.
9. UNDERGROUND FACILITIES AND SUB-STRUCTURES SHOWN IN THESE PLANS WERE OBTAINED FROM THE BEST AVAILABLE SOURCES. HOWEVER, SINCE SOME INFORMATION WAS OBTAINED FROM OTHERS, AECOM CANNOT GUARANTEE SAID INFORMATION AS BEING ACCURATE. PRIOR TO BEGINNING CONSTRUCTION, THE CONTRACTOR SHALL VERIFY THE DEPTH AND LOCATION OF ALL EXISTING UTILITIES, EQUIPMENT, AND SUB-STRUCTURES. IN THE EVENT OF DAMAGE TO EXISTING UTILITIES, EQUIPMENT, OR SUB-STRUCTURES, THE CONTRACTOR SHALL PERFORM ALL REPAIRS AT THEIR EXPENSE.

EARTHWORK SUMMARY

HABITAT TRANSITON ZONES	184,300 CY (FILL, INCLUDES 3% FOR SHRINKAGE)

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

PREPARED BY

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DESIGNED	L. CHANDRASEKARAN
DRAWN	L. DIFUNTORUM
CHECKED	G. OROZCO / I. ZARCHI
PEER REVIEWED	S. GENTZLER
APPROVED	S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372 DATE 11-30-2016

PROJECT: **SOUTH BAY SALT POND RESTORATION PROJECT**

SHEET TITLE: A8 PONDS NOTES AND LEGEND

SHEET NO. SHT. 2 OF 9 SHTS.

REV

DWG NO. T-2

Dec 08, 2016 - 12:00pm
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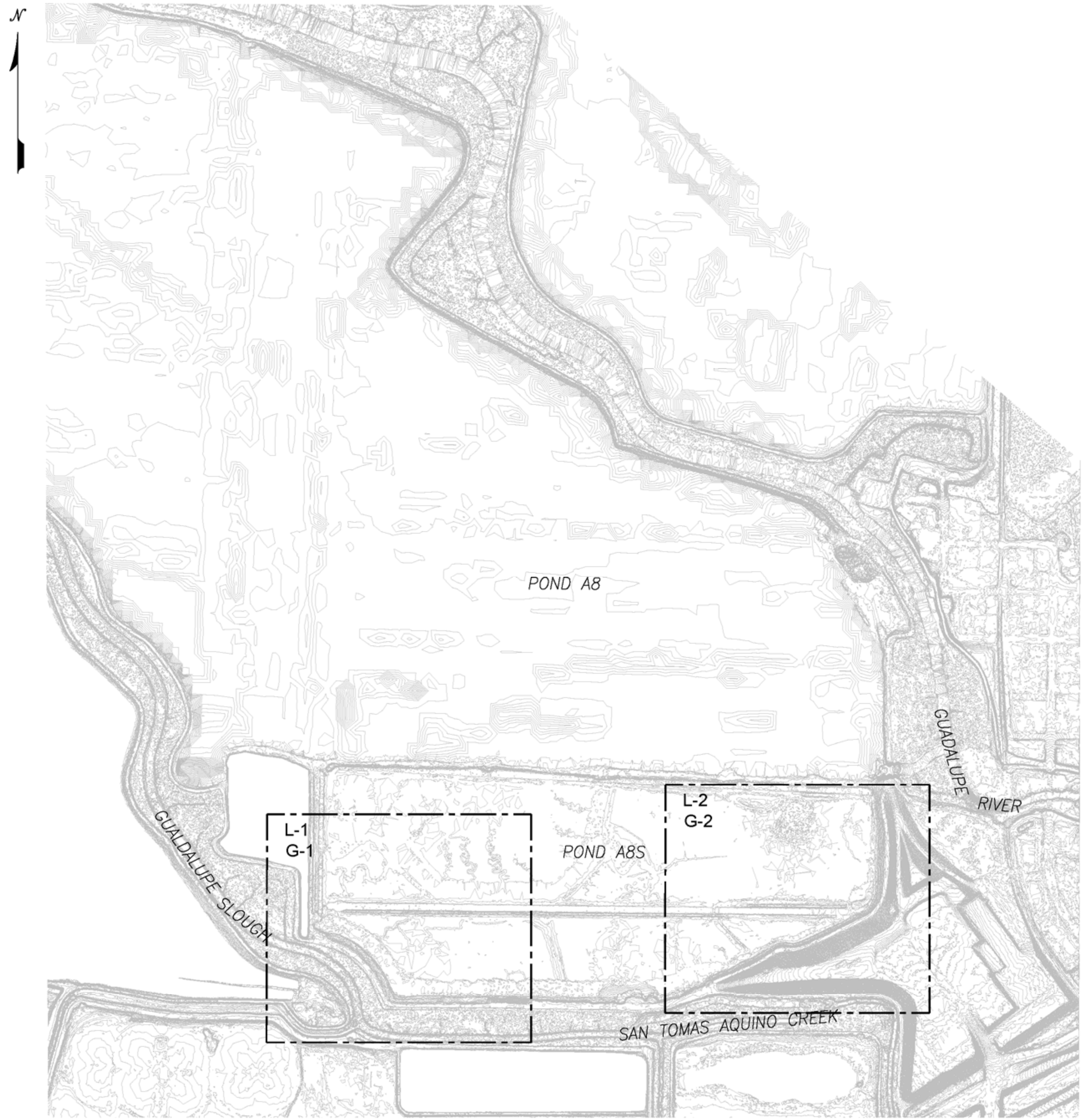

PLAN
1"=500'

0 500 1000 1500
HORIZ 1" = 500'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
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PEER REVIEWED	S. GENTZLER
APPROVED	S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

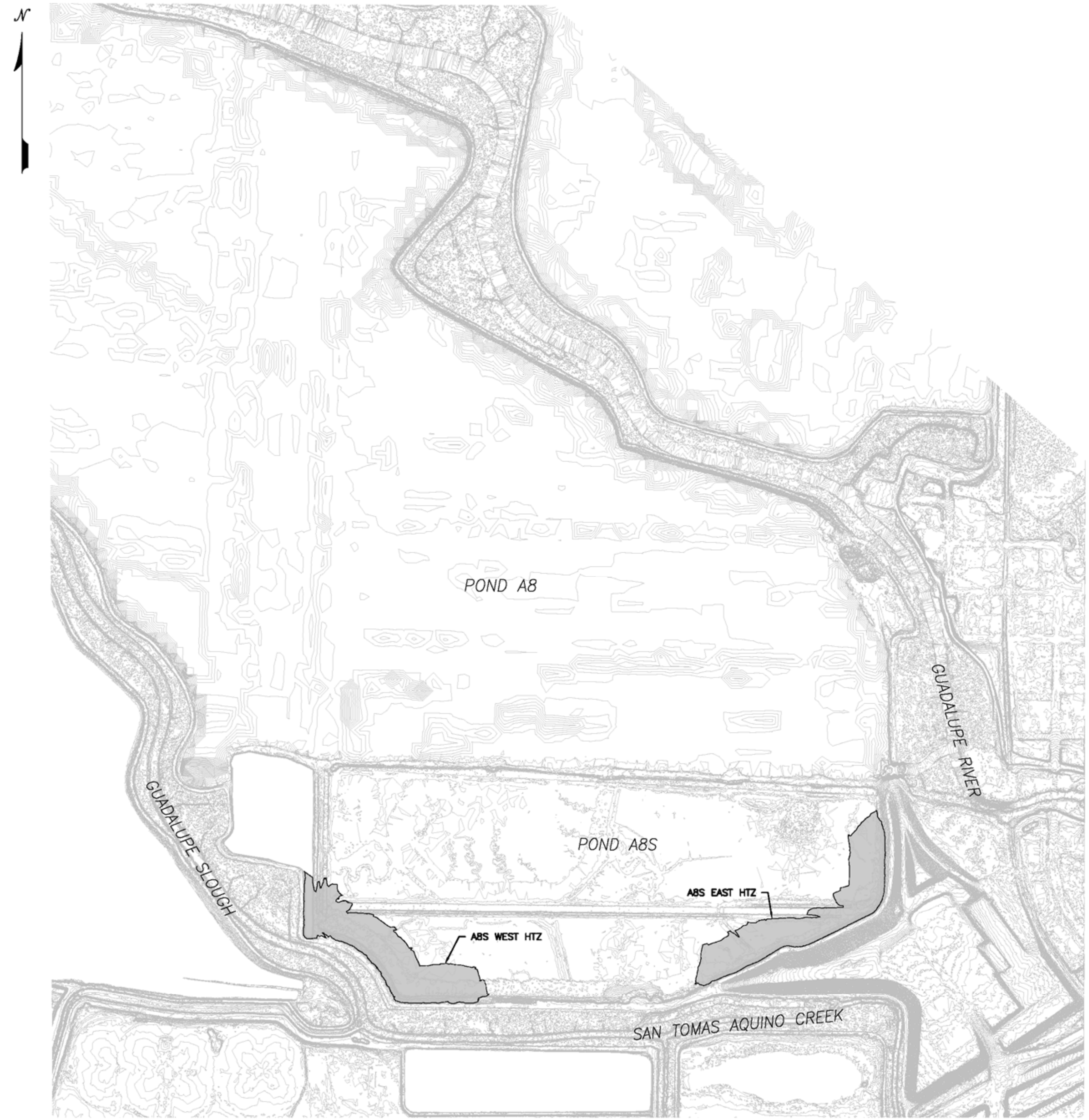
PROJECT No. 60422372
DATE 11-30-2016

PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

SHEET TITLE
A8 PONDS
KEY MAP

SHEET NO. SHT. 3 OF 9 SHTS.
REV
DWG NO. T-3

Nov 30, 2016 - 2:59pm



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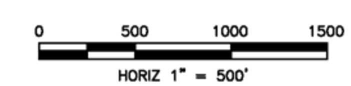

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

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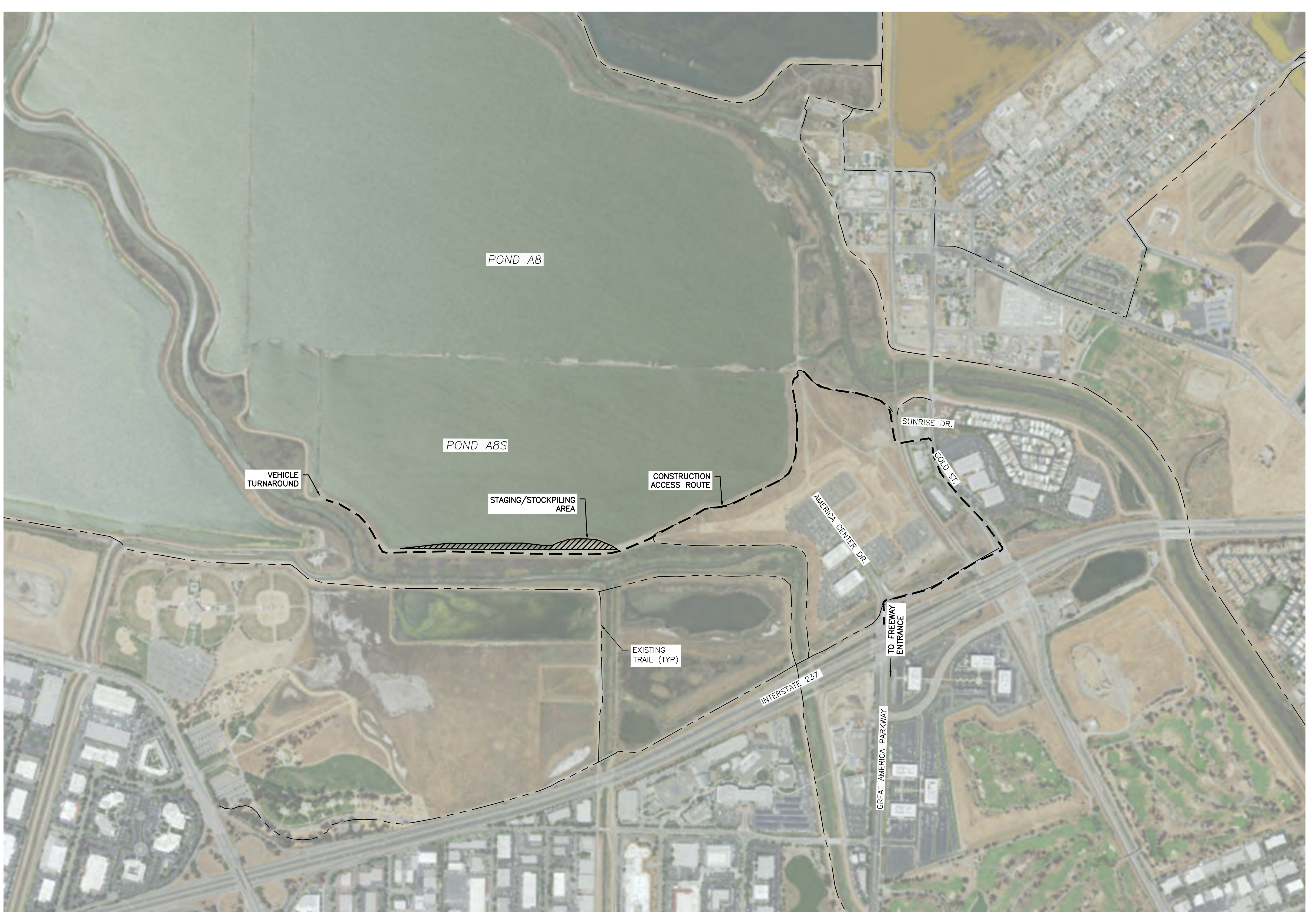
STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372
DATE 11-30-2016

PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

SHEET TITLE
A8 PONDS
GENERAL ARRANGEMENT PLAN

SHEET NO. SHT. 4 OF 9 SHTS.
REV
DWG NO. T-4



NOTES

1. THE ACCESS ROUTES ARE PRELIMINARY AND INTENDED FOR PLANNING AND IMPACT ANALYSIS PURPOSES ONLY.
2. THE CONTRACTOR MAY LOCATE FILL MATERIAL WITHIN THE INDICATED STOCKPILING AREA.

PLAN
1"=500'

0 500 1000 1500
HORIZ 1" = 500'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
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APPROVED S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372
DATE 11-30-2016

PROJECT **SOUTH BAY SALT POND RESTORATION PROJECT**
SHEET TITLE A8 PONDS ACCESS ROUTE & STAGING PLAN

SHEET NO. SHT. 5 OF 9 SHTS.
REV
DWG NO. T-5

Dec 08, 2016 - 11:44am
C:\pwworking\aecom_na\chandrasekaranl\dms75826\A8_T-5.dwg

PLAN
1"=100'

0 100 200 300
HORIZ 1" = 100'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
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DRAWN L. DIFUNTORUM
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PEER REVIEWED S. GENTZLER
APPROVED S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372
DATE 11-30-2016

PROJECT **SOUTH BAY SALT POND RESTORATION PROJECT**

SHEET TITLE A8 PONDS
LAYOUT PLAN - SHEET 1 OF 2

SHEET NO. SHT. 6 OF 9 SHTS.
REV
DWG NO. L-1

Dec 01, 2016 - 9:32am
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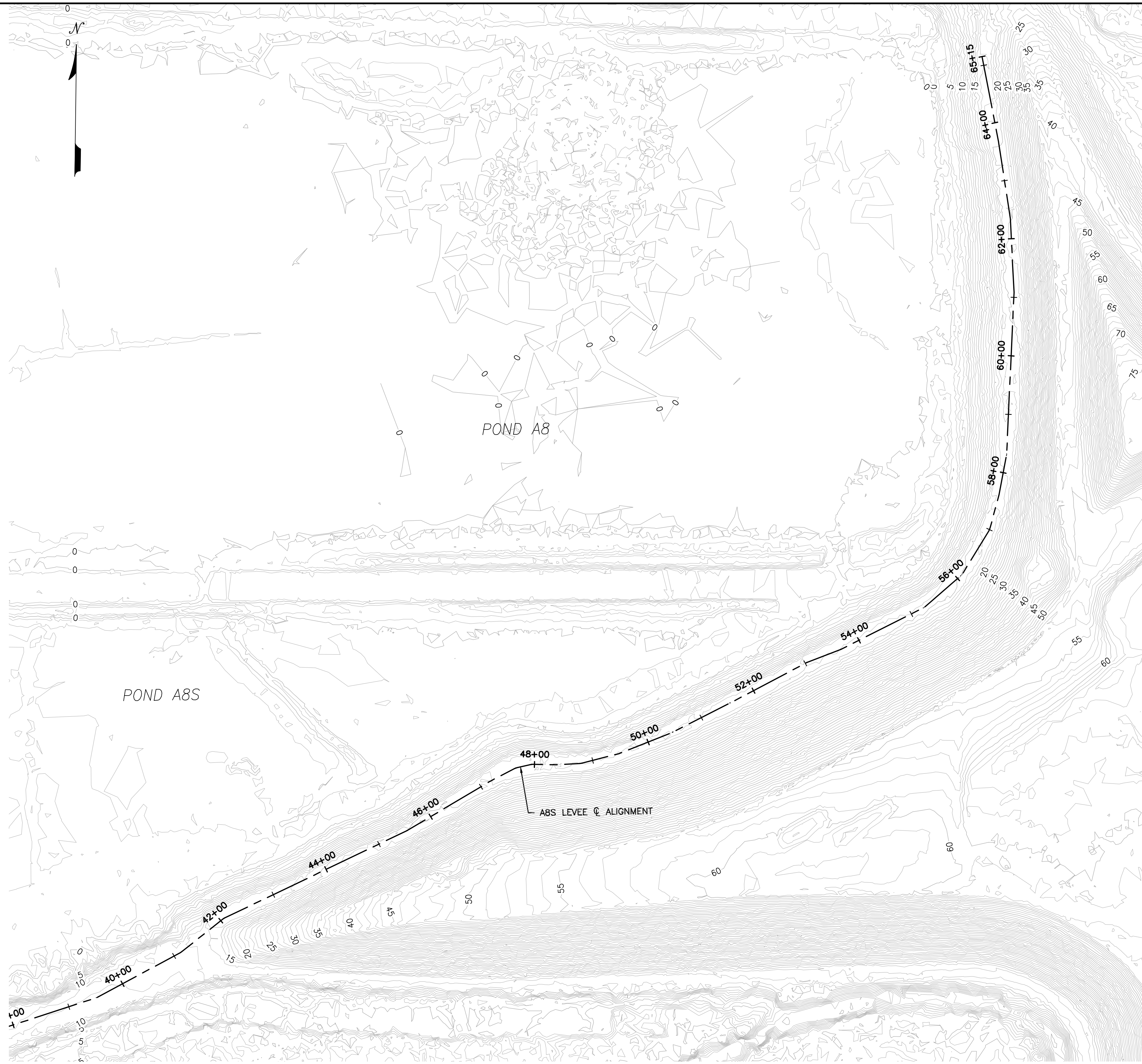

PLAN
1"=100'

0 100 200 300
HORIZ 1" = 100'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
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Tel: (510) 893-3600
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DESIGNED L. CHANDRASEKARAN
DRAWN L. DIFUNTORUM
CHECKED G. OROZCO / I. ZARCHI
PEER REVIEWED S. GENTZLER
APPROVED S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372
DATE 11-30-2016

PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

SHEET TITLE
A8 PONDS
LAYOUT PLAN - SHEET 2 OF 2

SHEET NO. SHT. 7 OF 9 SHTS.
REV
DWG NO. L-2

Dec 01, 2016 - 8:53am
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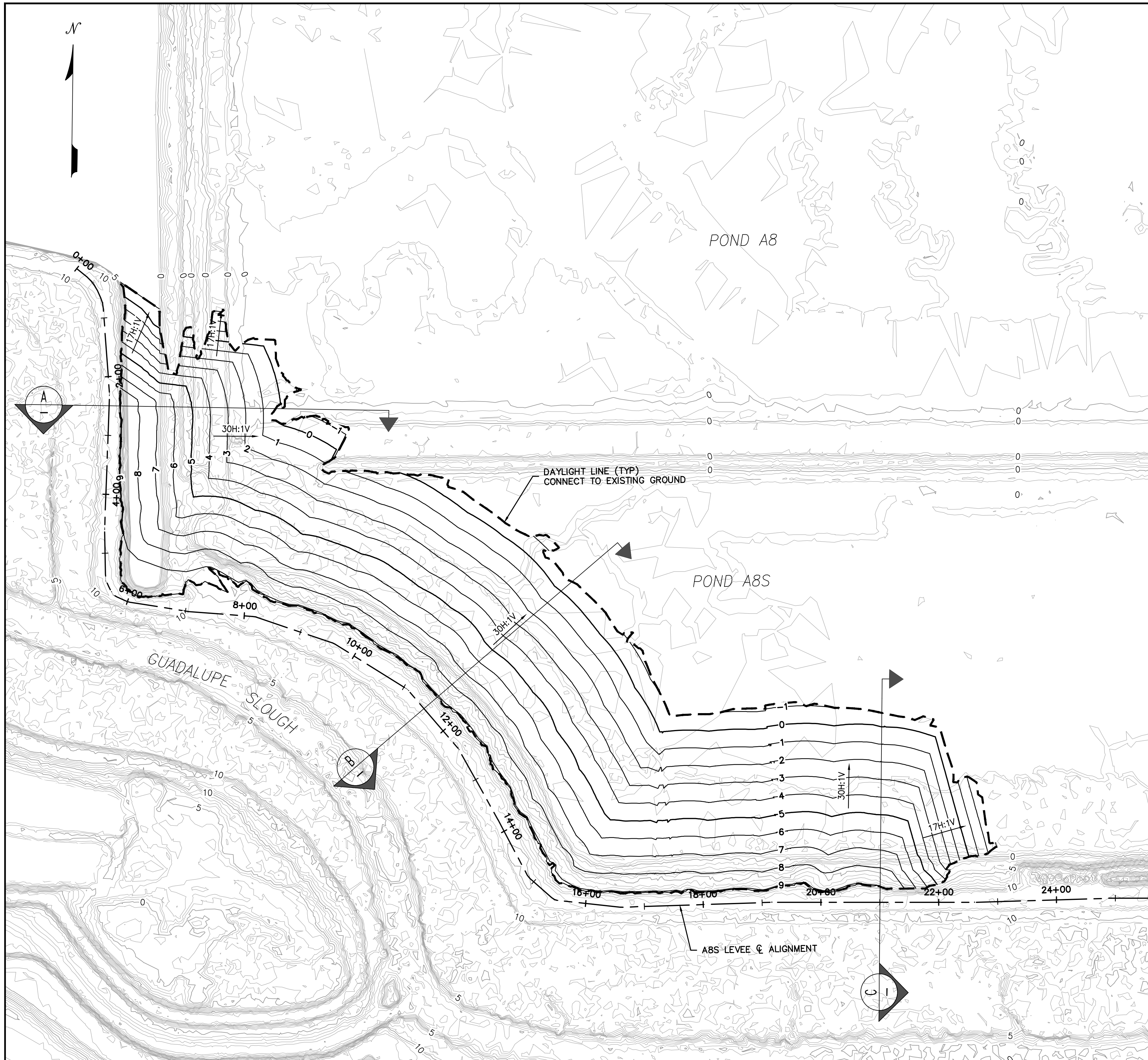
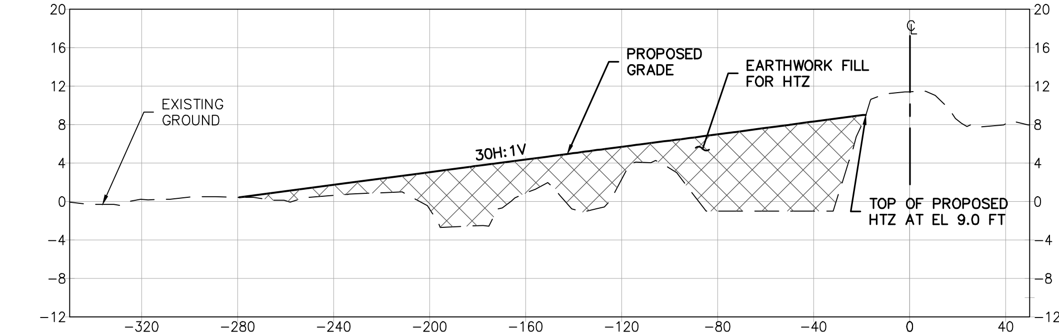


PLAN
1"=100'

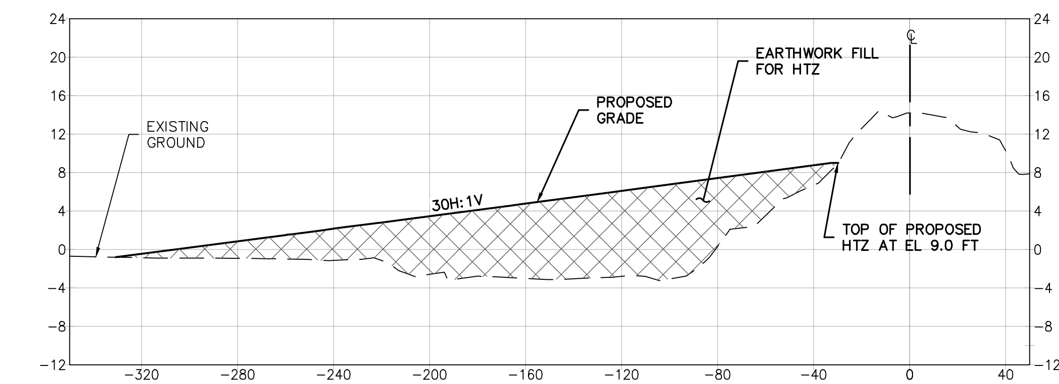
0 100 200 300
HORIZ 1" = 100'

STA 2+50



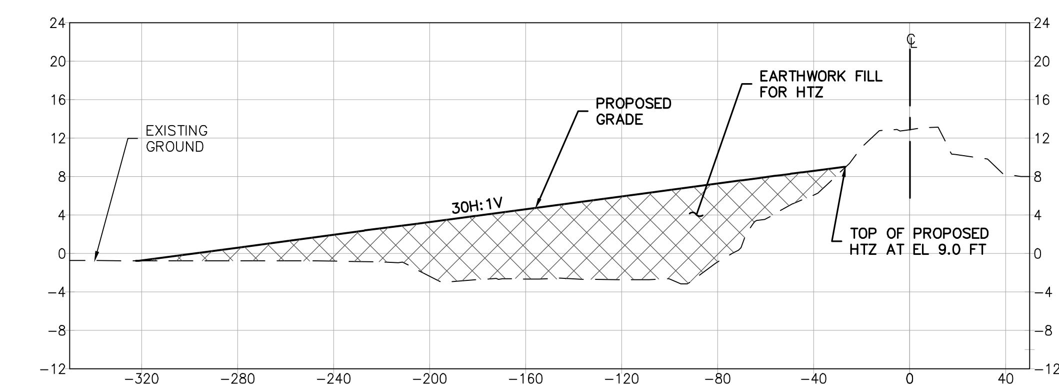
A — A8S WEST HTZ – TYPICAL SECTION
HORIZ 1"=40', VERT 1"=10

STA 11+50



B — A8S WEST HTZ – TYPICAL SECTION
HORIZ 1"=40', VERT 1"=10

STA 21+00



C — A8S WEST HTZ – TYPICAL SECTION
HORIZ 1"=40', VERT 1"=10

0 40 80 120
HORIZ 1" = 40'

0 10 20 30
VERT 1" = 10'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
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DRAWN: L. DIFUNTORUM
CHECKED: G. OROZCO / I. ZARCHI
PEER REVIEWED: S. GENTZLER
APPROVED: S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372
DATE 11-30-2016

PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

SHEET TITLE
A8 PONDS
POND A8S WEST HTZ
GRADING PLAN

SHEET NO.
SHT. 8 OF 9 SHTS.
REV

DWG NO.
G-1

Dec 01, 2016 - 9:56am
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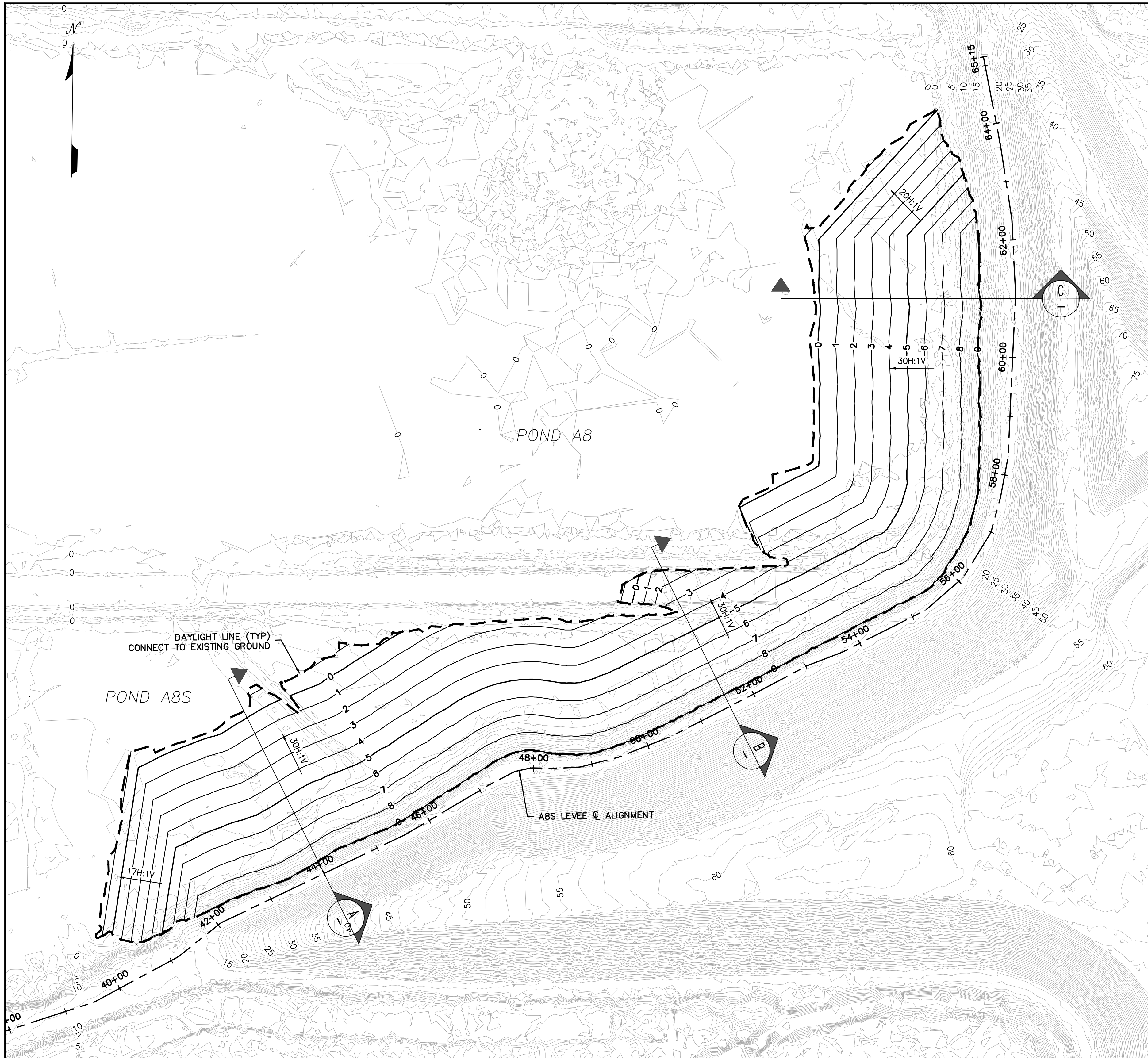
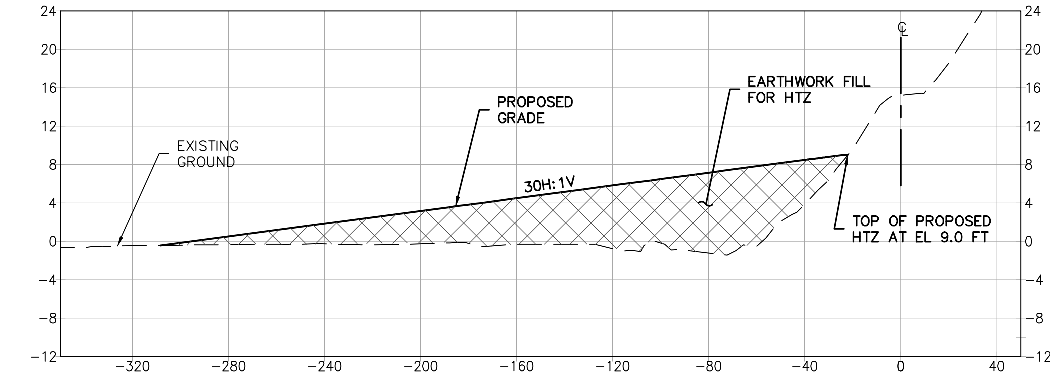


PLAN
1"=100'

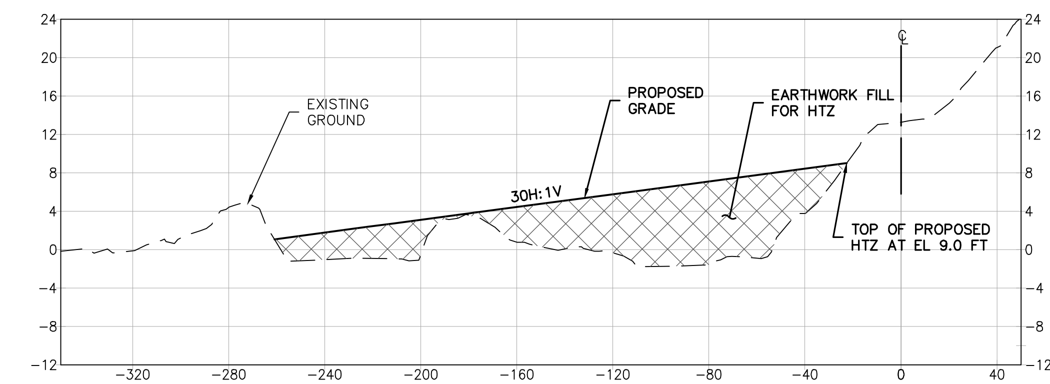
0 100 200 300
HORIZ 1" = 100'

STA 44+00



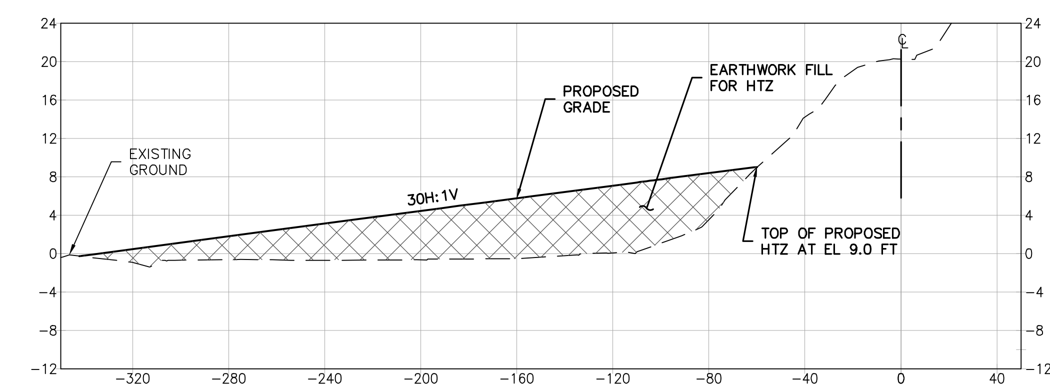
A A8S EAST HTZ – TYPICAL SECTION
HORIZ 1"=40', VERT 1"=10

STA 51+50



B A8S EAST HTZ – TYPICAL SECTION
HORIZ 1"=40', VERT 1"=10

STA 61+00



C A8S EAST HTZ – TYPICAL SECTION
HORIZ 1"=40', VERT 1"=10

0 40 80 120
HORIZ 1" = 40'

0 10 20 30
VERT 1" = 10'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
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PEER REVIEWED S. GENTZLER
APPROVED S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372
DATE 11-30-2016

PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

SHEET TITLE
A8 PONDS
POND A8S EAST HTZ
GRADING PLAN

SHEET NO. SHT. 9 OF 9 SHTS.
REV
DWG NO. G-2

Dec 01, 2016 - 9:06am
C:\pwworking\aecom_na\lchandrasekaranl\dms75826\A8_G-2.dwg

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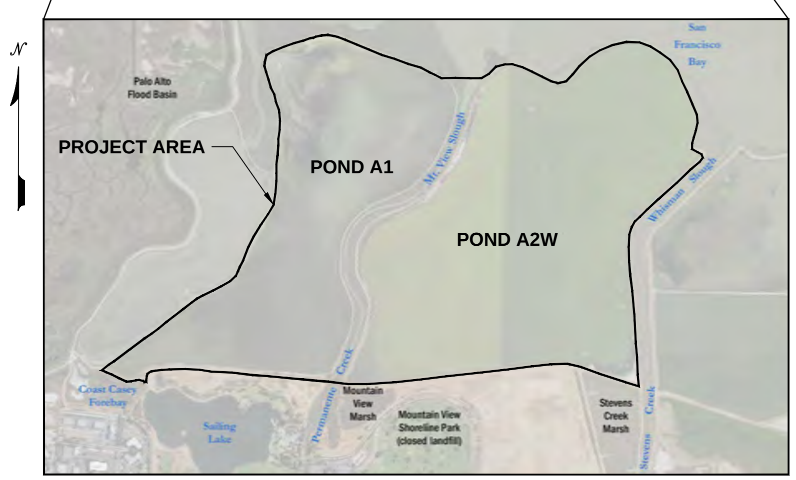
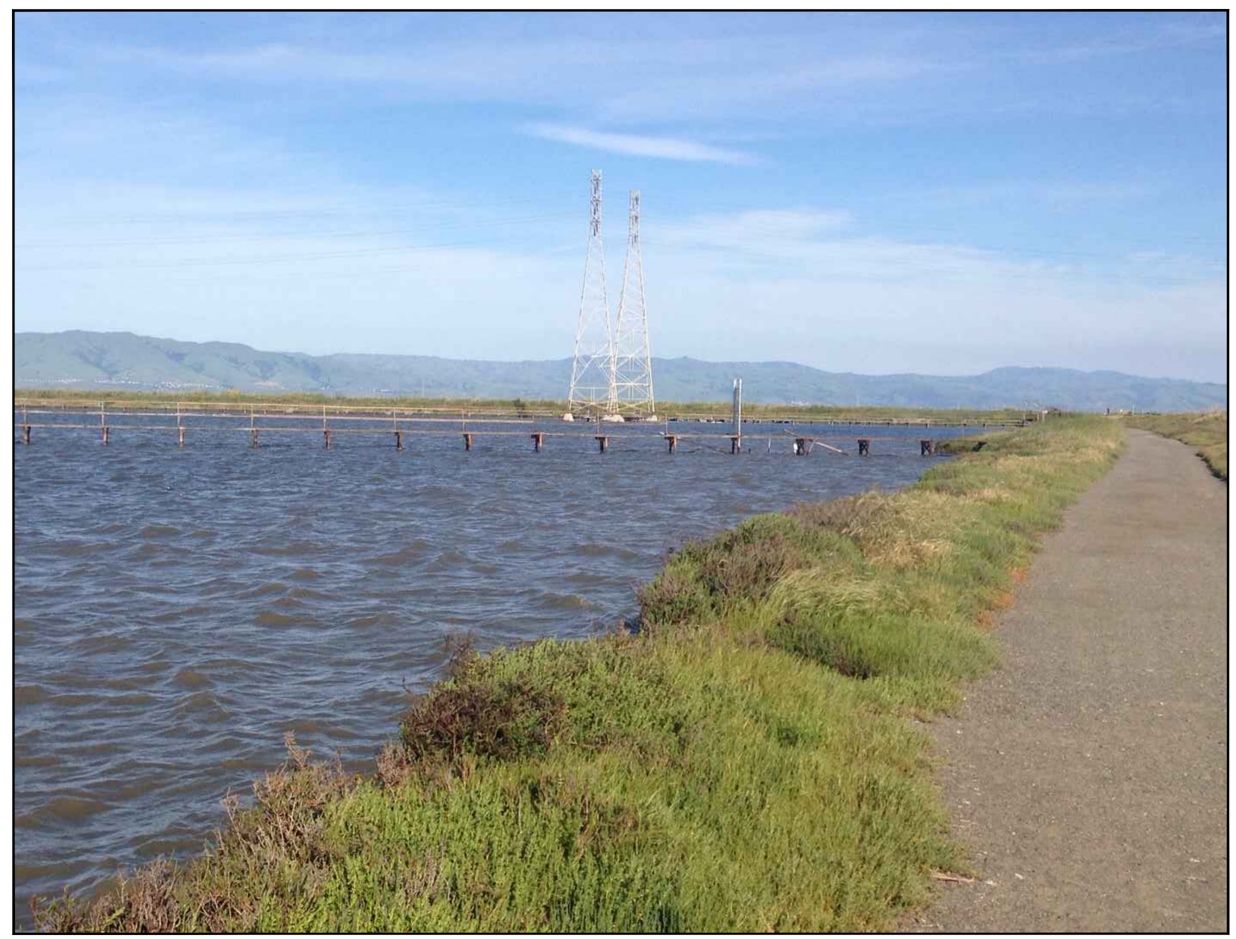
SOUTH BAY SALT POND RESTORATION PROJECT

MOUNTAIN VIEW PONDS
NEAR MOUNTAIN VIEW, CALIFORNIA

VICINITY MAP
NTS



LOCATION MAP
NTS



PROJECT AREA PHOTO

SHEETS

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

PREPARED BY
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aecom.com

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DRAWN	L. DIFUNTORUM
CHECKED	G. OROZCO / I. ZARCHI
PEER REVIEWED	S. GENTZLER
APPROVED	S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372 DATE 12-09-2016

PROJECT: SOUTH BAY SALT POND RESTORATION PROJECT
SHEET TITLE: MOUNTAIN VIEW PONDS TITLE SHEET

SHEET NO. SHT. 1 OF 33 SHTS.
REV
DWG NO. T-1

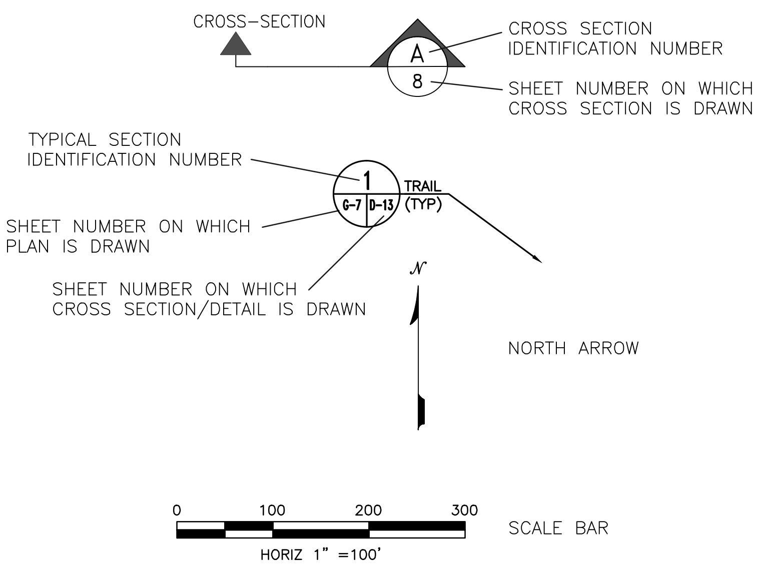
LEGEND

LINETYPES

- ALIGNMENT CENTERLINE
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- PROPOSED DAYLIGHT LINE
- CONSTRUCTION ACCESS ROUTE
- EXISTING TRAIL
- PROPOSED TRAIL
- PG&E POWER LINE
- RAILING
- CHAIN LINK FENCE WITH GATE

- PROPOSED EARTHWORK FILL
- PROPOSED EARTHWORK CUT
- PROPOSED EXCAVATION/BACKFILL FOR SHEAR KEY
- TRAIL/IMPROVED SURFACE
- STAGING AREA

SYMBOLS



ABBREVIATIONS

BB	BEGIN BRIDGE
℄	CENTERLINE
CCF	COAST CASEY FOREBAY
EB	END BRIDGE
EL	ELEVATION
FT	FEET
HDPE	HIGH DENSITY POLYETHYLENE
HORIZ.	HORIZONTAL
HTZ	HABITAT TRANSITION ZONE
NTS	NOT TO SCALE
PG&E	PACIFIC GAS AND ELECTRIC COMPANY
STA	STATION
TYP	TYPICAL
VERT.	VERTICAL

GENERAL NOTES

1. PROJECT COORDINATE SYSTEM AND VERTICAL DATUM ARE AS FOLLOWS:
   COORDINATE SYSTEM: NAD83, CALIFORNIA STATE PLANE ZONE 3
   VERTICAL DATUM: NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88)
2. TOPOGRAPHY FROM LIDAR DATA OBTAINED FROM AIRBORNE1 IN U.S. SURVEY FEET, DATED JUNE–NOVEMBER 2010. THE TOPOGRAPHY FOR THE BOTTOMS OF PONDS A1 AND A2W IS BASED ON 2005 USGS BATHYMETRY FOR THE SOUTH BAY SALT POND PROJECT.
3. PROPOSED TOPOGRAPHIC CONTOUR INFORMATION IS SHOWN AT 1–FOOT CONTOUR INTERVALS, UNLESS OTHERWISE STATED.
4. ALL CONSTRUCTION AND CONSTRUCTION MATERIAL SHALL BE IN ACCORDANCE WITH THESE PLANS.
5. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO BE KNOWLEDGEABLE ABOUT AND OBEY ALL PERMIT REQUIREMENTS WHILE PERFORMING THE WORK ON THESE PLANS.
6. THE CONTRACTOR SHALL PRACTICE SAFETY AT ALL TIMES AND SHALL FURNISH, ERECT, AND MAINTAIN SUCH FENCES, BARRICADES, LIGHTS, AND SIGNS NECESSARY TO GIVE ADEQUATE PROTECTION TO THE PUBLIC AT ALL TIMES.
7. THE CONTRACTOR SHALL HAVE COPIES OF THE APPROVED PLANS AND SPECIFICATIONS FOR THIS PROJECT AT ALL TIMES AND SHALL BE FAMILIAR WITH ALL APPLICABLE STANDARDS AND SPECIFICATIONS.
8. THE CONTRACTOR IS RESPONSIBLE FOR SETTING ONSITE SURVEY CONTROL FOR CONSTRUCTION STAKING IN PROJECT COORDINATE SYSTEM AND VERTICAL DATUM.
9. UNDERGROUND FACILITIES AND SUB–STRUCTURES SHOWN IN THESE PLANS WERE OBTAINED FROM THE BEST AVAILABLE SOURCES. HOWEVER, SINCE SOME INFORMATION WAS OBTAINED FROM OTHERS, AECOM CANNOT GUARANTEE SAID INFORMATION AS BEING ACCURATE. PRIOR TO BEGINNING CONSTRUCTION, THE CONTRACTOR SHALL VERIFY THE DEPTH AND LOCATION OF ALL EXISTING UTILITIES, EQUIPMENT, AND SUB–STRUCTURES. IN THE EVENT OF DAMAGE TO EXISTING UTILITIES, EQUIPMENT, OR SUB–STRUCTURES, THE CONTRACTOR SHALL PERFORM ALL REPAIRS AT THEIR EXPENSE.
10. THE CONTRACTOR IS RESPONSIBLE FOR STABILITY OF ALL EXCAVATIONS.

EARTHWORK SUMMARY

LEVEE IMPROVEMENTS (INCLUDING TRAIL CONNECTIONS)	144,300 CY (FILL, INCLUDES SHRINKAGE OF 24% FOR A1 WEST LEVEE AND 28% FOR COAST CASEY FOREABY LEVEE)
HABITAT TRANSITION ZONES	161,900 CY (FILL, INCLUDES 3% FOR SHRINKAGE)
HABITAT ISLANDS	58,400 CY (FILL, INCLUDES 9% FOR SHRINKAGE)
BREACH EXCAVATION	12,100 CY (CUT, BANK–MEASURE)
SHEAR KEY EXCAVATION	3,100 CY (CUT, BANK–MEASURE)
SHEAR KEY BACKFILL	4,000 CY (FILL, INCLUDES 28% FOR SHRINKAGE)

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

PREPARED BY
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DRAWN L. DIFUNTORUM
CHECKED G. OROZCO / I. ZARCHI
PEER REVIEWED S. GENTZLER
APPROVED S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy
PROJECT No. 60422372
DATE 12-09-2016

PROJECT SOUTH BAY SALT POND RESTORATION PROJECT
SHEET TITLE MOUNTAIN VIEW PONDS NOTES AND LEGEND
SHEET NO. SHT. 2 OF 33 SHTS.
DWG NO. T-2
REV

Dec 10, 2016 - 3:52pm
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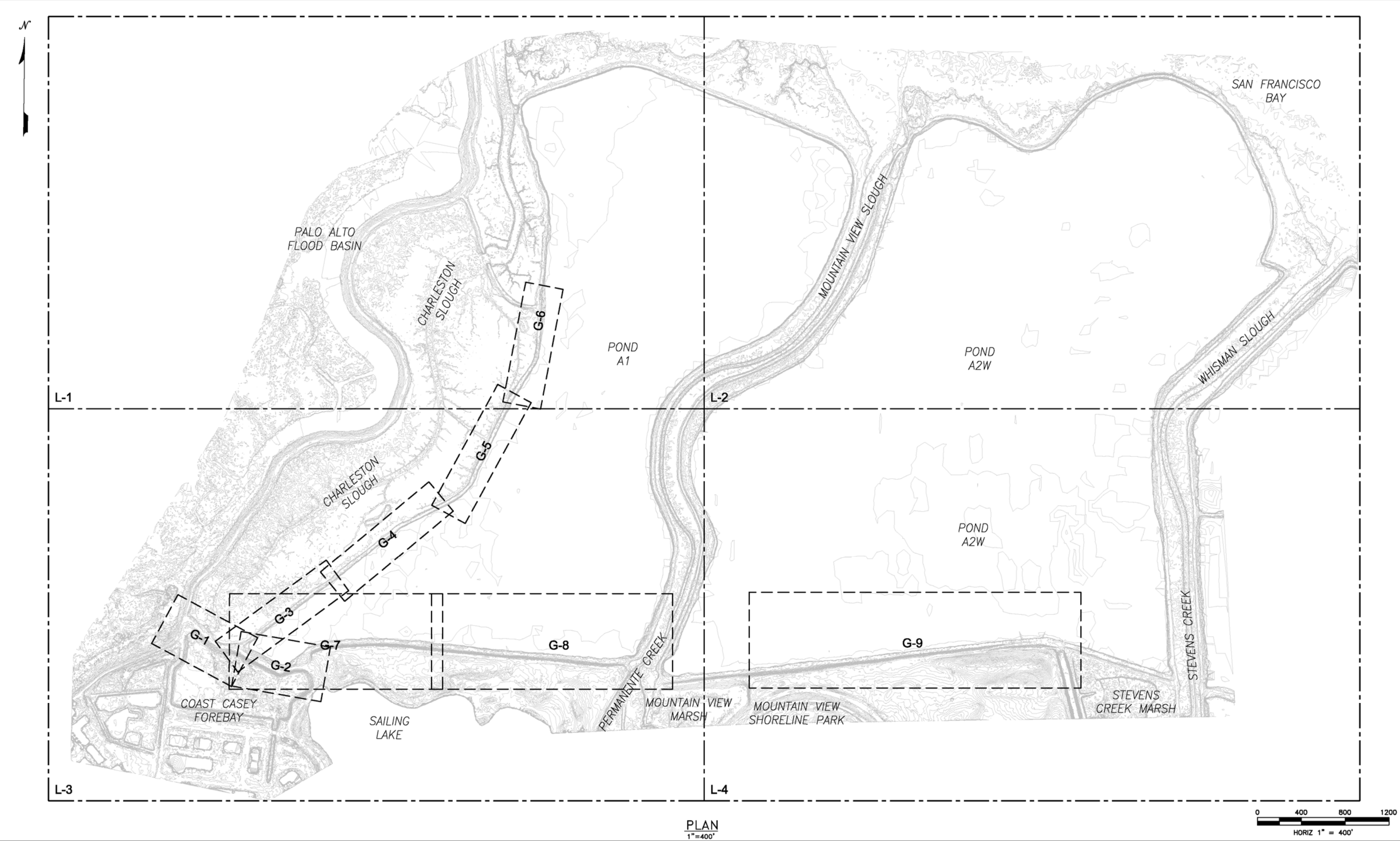

PLAN
1"=400'

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
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APPROVED: S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372
DATE 12-09-2016

PROJECT: **SOUTH BAY SALT POND RESTORATION PROJECT**
SHEET TITLE: MOUNTAIN VIEW PONDS KEY MAP

SHEET NO. SHT. 3 OF 33 SHTS.
DWG NO. T-3
REV

PLAN
1"=400'

REV	DESCRIPTION	BY	CHK	APP	DATE

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Coastal Conservancy

PROJECT No. 60422372
DATE 12-09-2016

PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

SHEET TITLE
MOUNTAIN VIEW PONDS
GENERAL ARRANGEMENT PLAN

SHEET NO. SHT. 4 OF 33 SHTS.
REV
DWG NO.
T-4

Dec 09, 2016 - 12:05pm

NOTES

1. THE ACCESS ROUTES SHOWN ARE PRELIMINARY AND INTENDED FOR PLANNING AND IMPACT ANALYSIS PURPOSES. THE EXACT ROUTES WILL BE FINALIZED BY THE CITY OF MOUNTAIN VIEW BASED ON REQUIREMENTS FOR TRAFFIC CONTROL, SHORELINE PARK ACTIVITIES, AND BURROWING OWL PROTECTION.
2. THE CONTRACTOR MAY LOCATE FILL MATERIAL WITHIN THE INDICATED STOCKPILING AREA.

PLAN
1"=500'

0 500 1000 1500
HORIZ 1" = 500'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

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STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372
DATE 12-09-2016

PROJECT **SOUTH BAY SALT POND RESTORATION PROJECT**
SHEET TITLE MOUNTAIN VIEW PONDS ACCESS ROUTE & STAGING PLAN

SHEET NO. SHT. 5 OF 33 SHTS.
REV
DWG NO. T-5

Dec 09, 2016 - 8:05am
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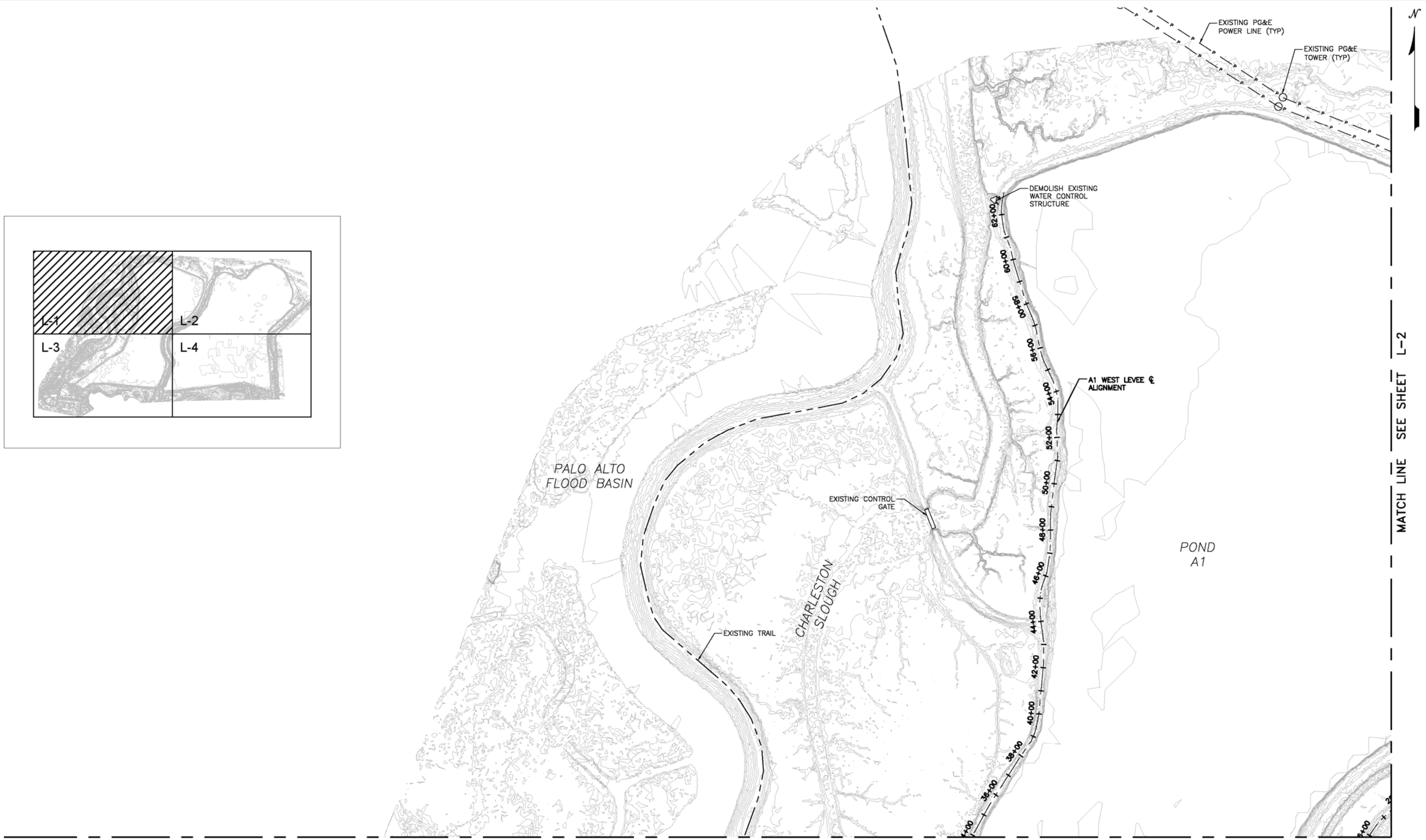

MATCH LINE SEE SHEET L-3

PLAN
1"=200'

0 200 400 600
HORIZ 1" = 200'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

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STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372 DATE 12-09-2016

PROJECT **SOUTH BAY SALT POND RESTORATION PROJECT**

SHEET TITLE MOUNTAIN VIEW PONDS LAYOUT PLAN SHEET 1 OF 4

SHEET NO. SHT. 6 OF 33 SHTS.
REV
DWG NO. L-1

Dec 09, 2016 - 8:11am
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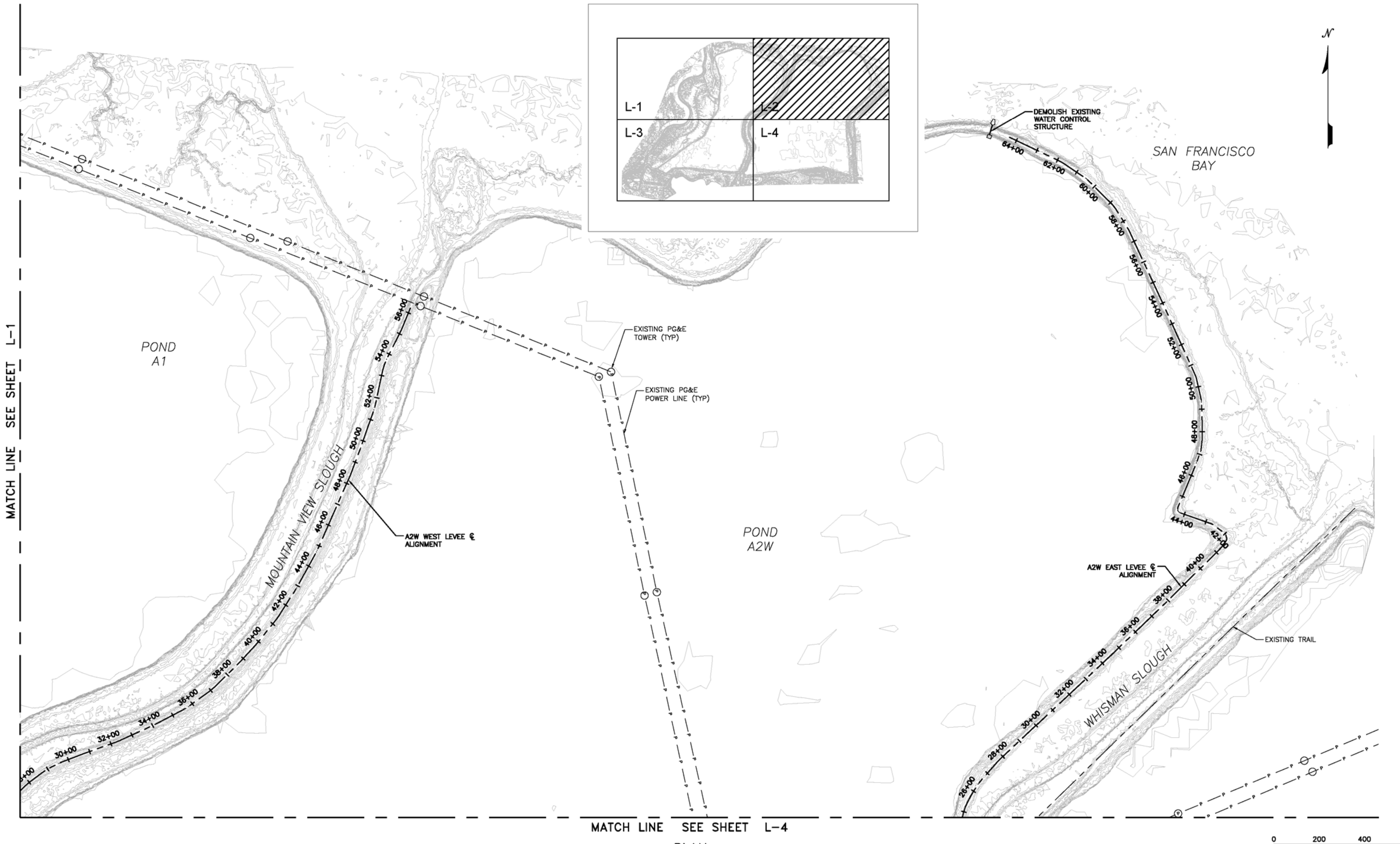

PLAN
1"=200'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
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STATE OF CALIFORNIA
Coastal Conservancy

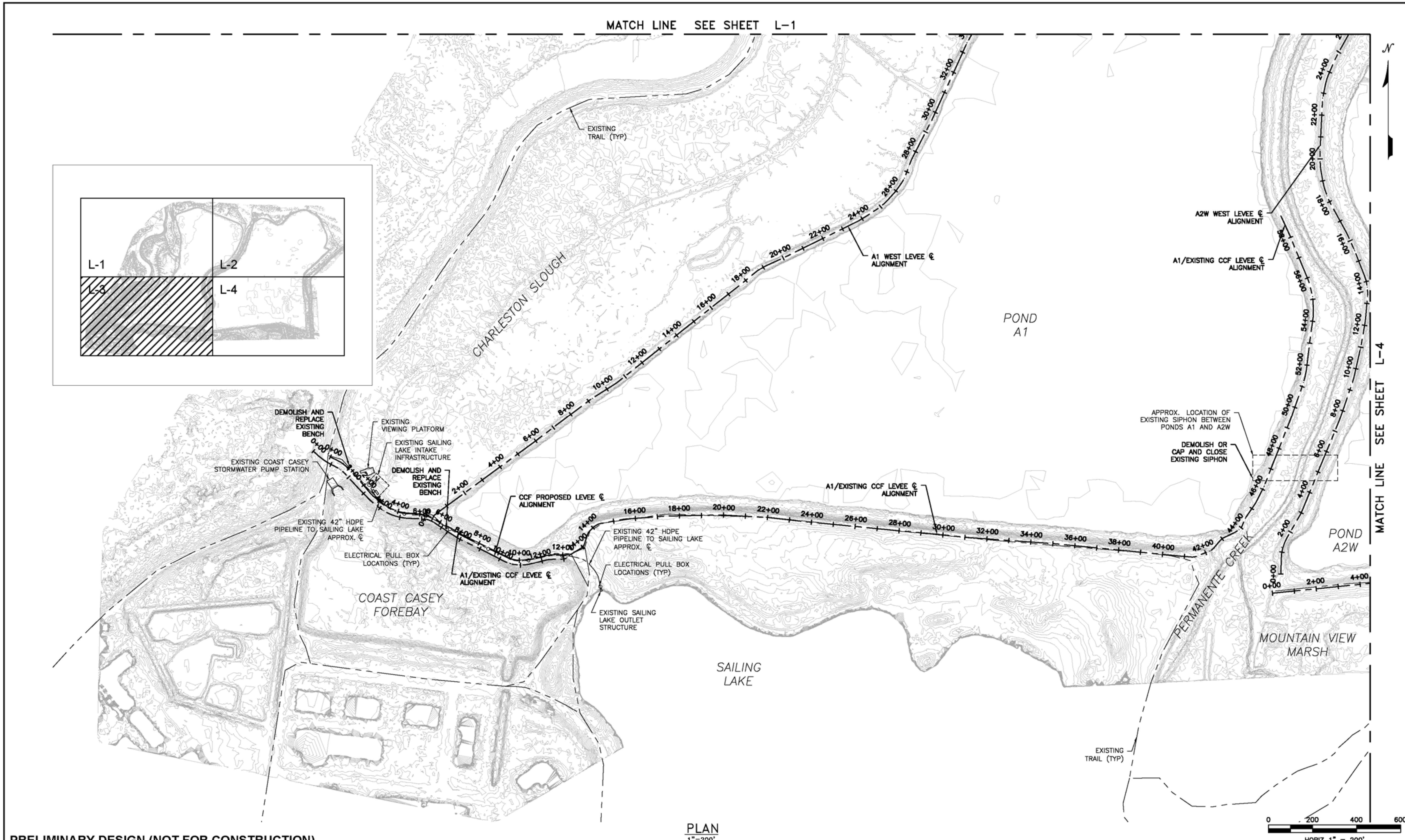
PROJECT No. 60422372
DATE 12-09-2016

PROJECT: **SOUTH BAY SALT POND RESTORATION PROJECT**

SHEET TITLE: MOUNTAIN VIEW PONDS LAYOUT PLAN SHEET 2 OF 4

SHEET NO. SHT. 7 OF 33 SHTS.
REV
DWG NO. L-2

Dec 09, 2016 - 8:16am



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REV	DESCRIPTION	BY	CHK	APP	DATE

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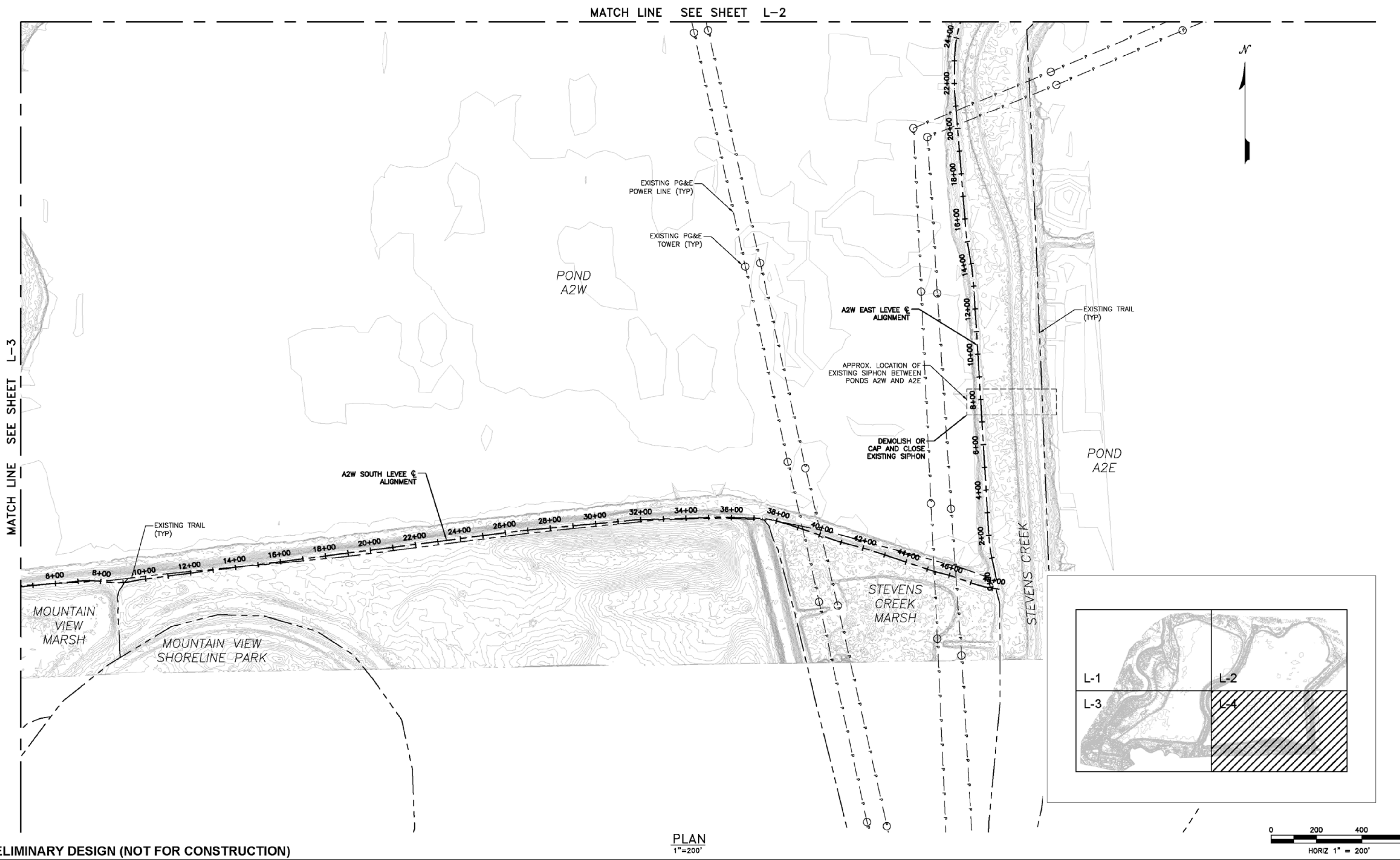
Coastal Conservancy

PROJECT No. 60422372
DATE 12-09-2016

PROJECT: **SOUTH BAY SALT POND RESTORATION PROJECT**
SHEET TITLE: MOUNTAIN VIEW PONDS LAYOUT PLAN SHEET 3 OF 4

SHEET NO. SHT 8 OF 33 SHTS
DWG NO. L-3
REV



PLAN
1"=200'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

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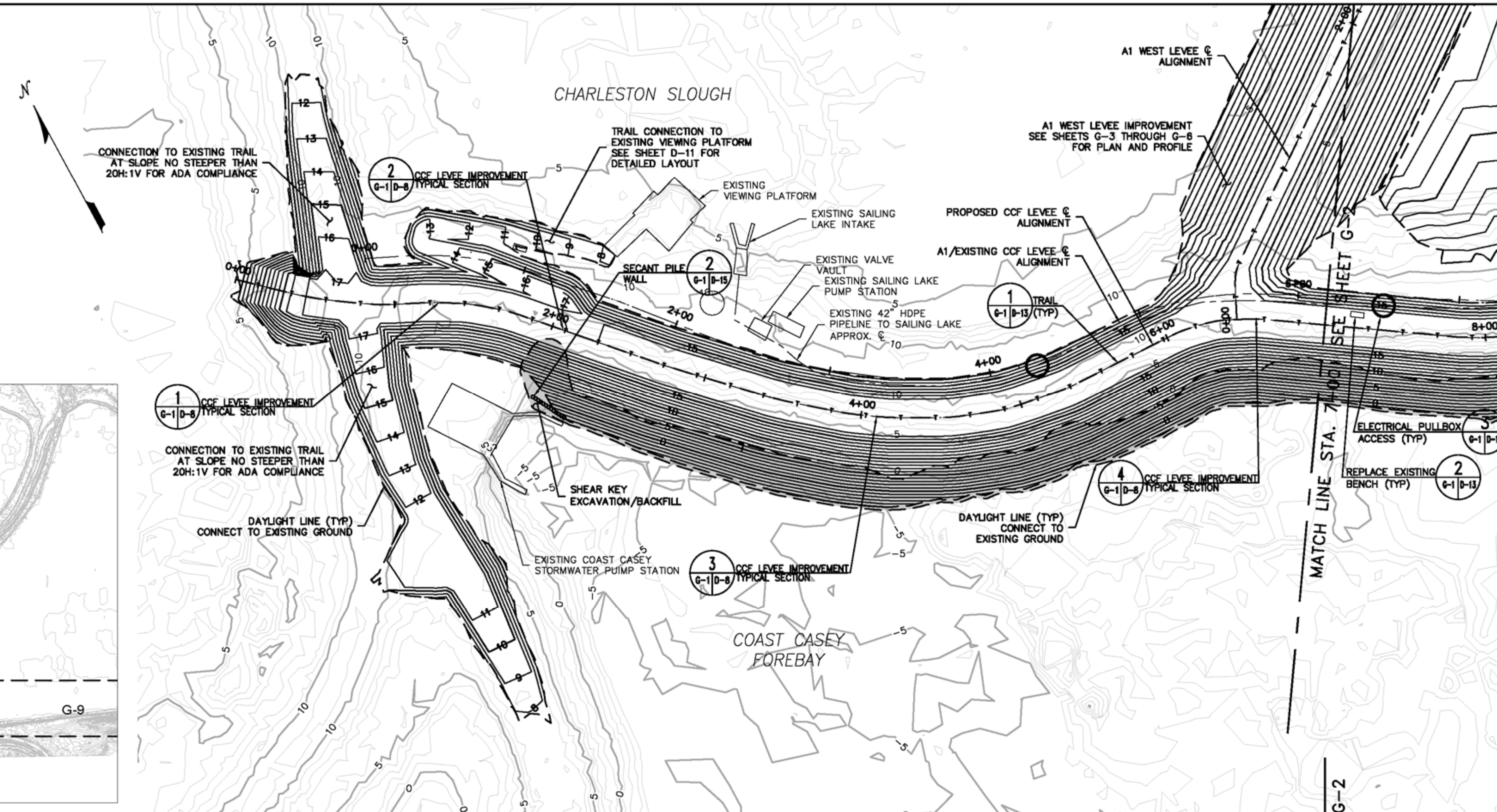
STATE OF CALIFORNIA
Coastal Conservancy

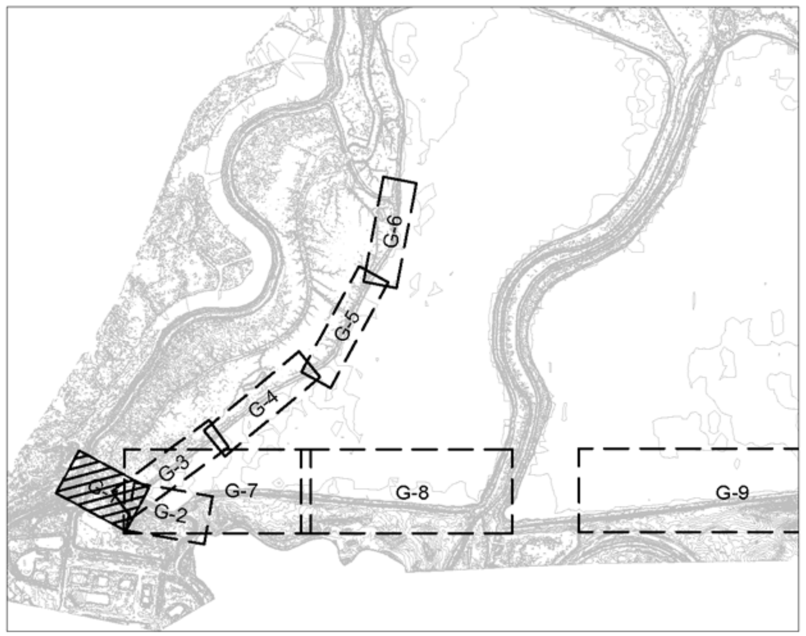
PROJECT No. 60422372
DATE 12-09-2016

PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

SHEET TITLE
MOUNTAIN VIEW PONDS
LAYOUT PLAN
SHEET 4 OF 4

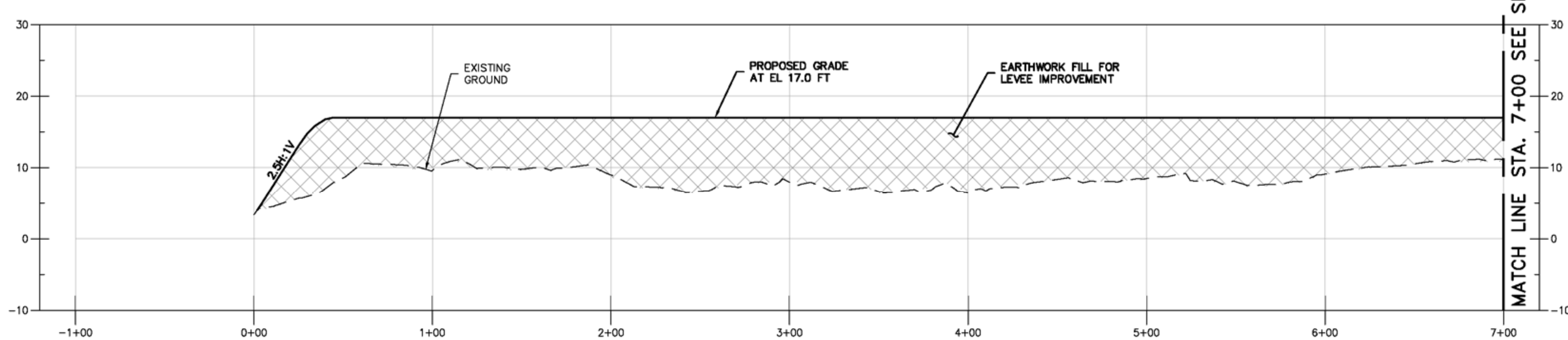
SHEET NO. SHT. 9 OF 33 SHTS.
REV
DWG NO. L-4





PLAN

1"=40'



PROPOSED CCF LEVEE ℄ ALIGNMENT PROFILE

HORIZ 1"=40', VERT 1"=10'

0 40 80 120 HORIZ 1" = 40'

0 10 20 30 VERT 1" = 10'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

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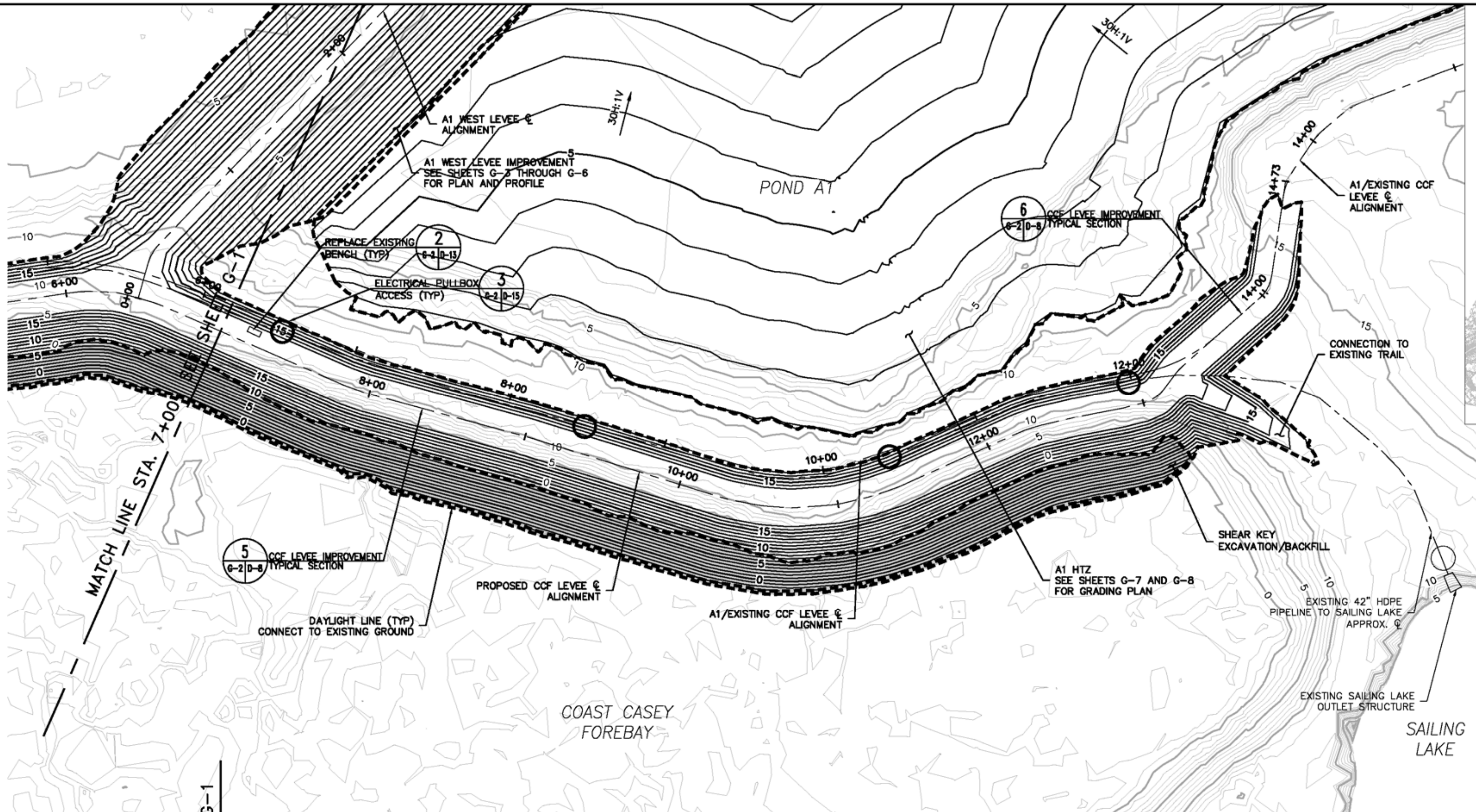
STATE OF CALIFORNIA
Coastal Conservancy

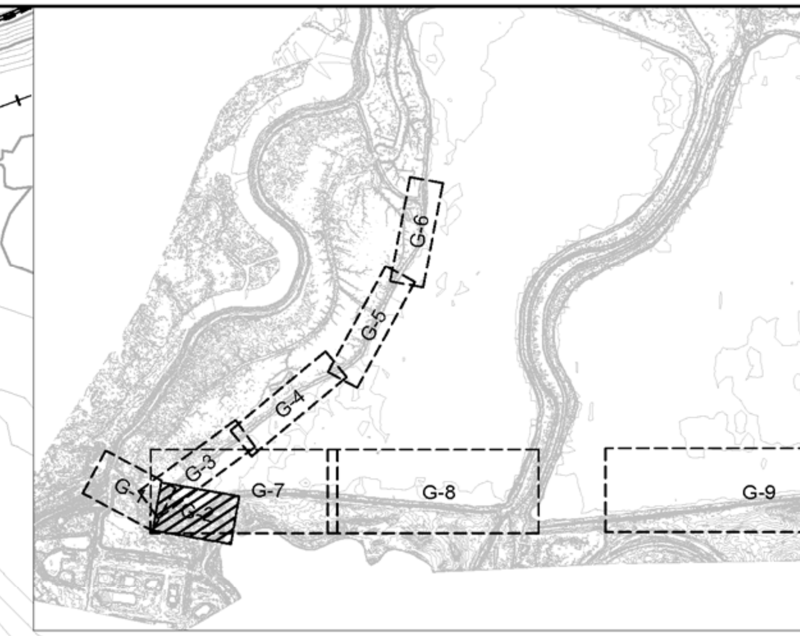
PROJECT No. 60422372
DATE 12-09-2016

PROJECT **SOUTH BAY SALT POND RESTORATION PROJECT**

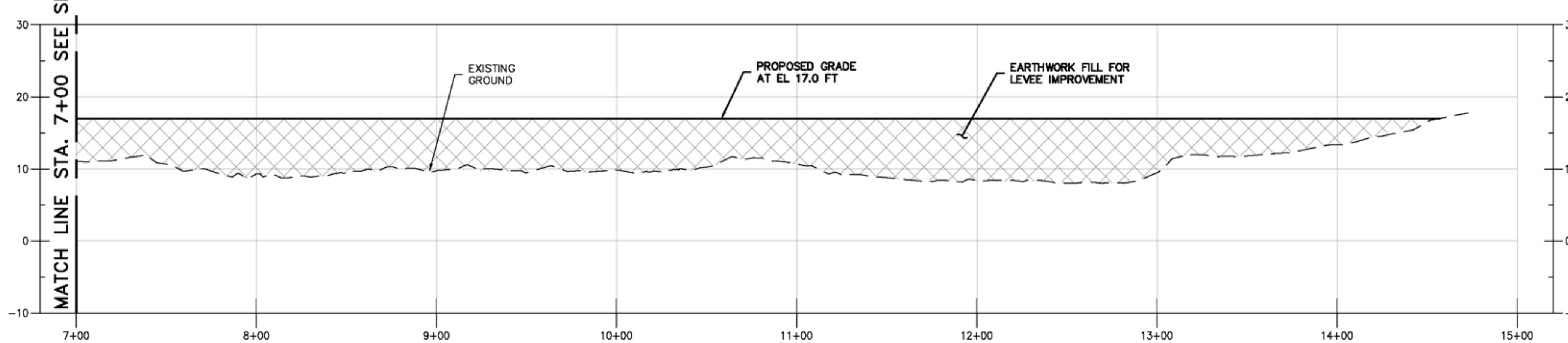
SHEET TITLE MOUNTAIN VIEW PONDS CCF LEVEE IMPROVEMENT PLAN AND PROFILE - SHEET 1 OF 2

SHEET NO. SHT. 10 OF 33 SHTS.
REV
DWG NO. G-1





PLAN
1"=40'



PROPOSED CCF LEVEE ℄ ALIGNMENT PROFILE
HORIZ 1"=40', VERT 1"=10'

0 40 80 120 HORIZ 1" = 40'

0 10 20 30 VERT 1" = 10'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

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APPROVED S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

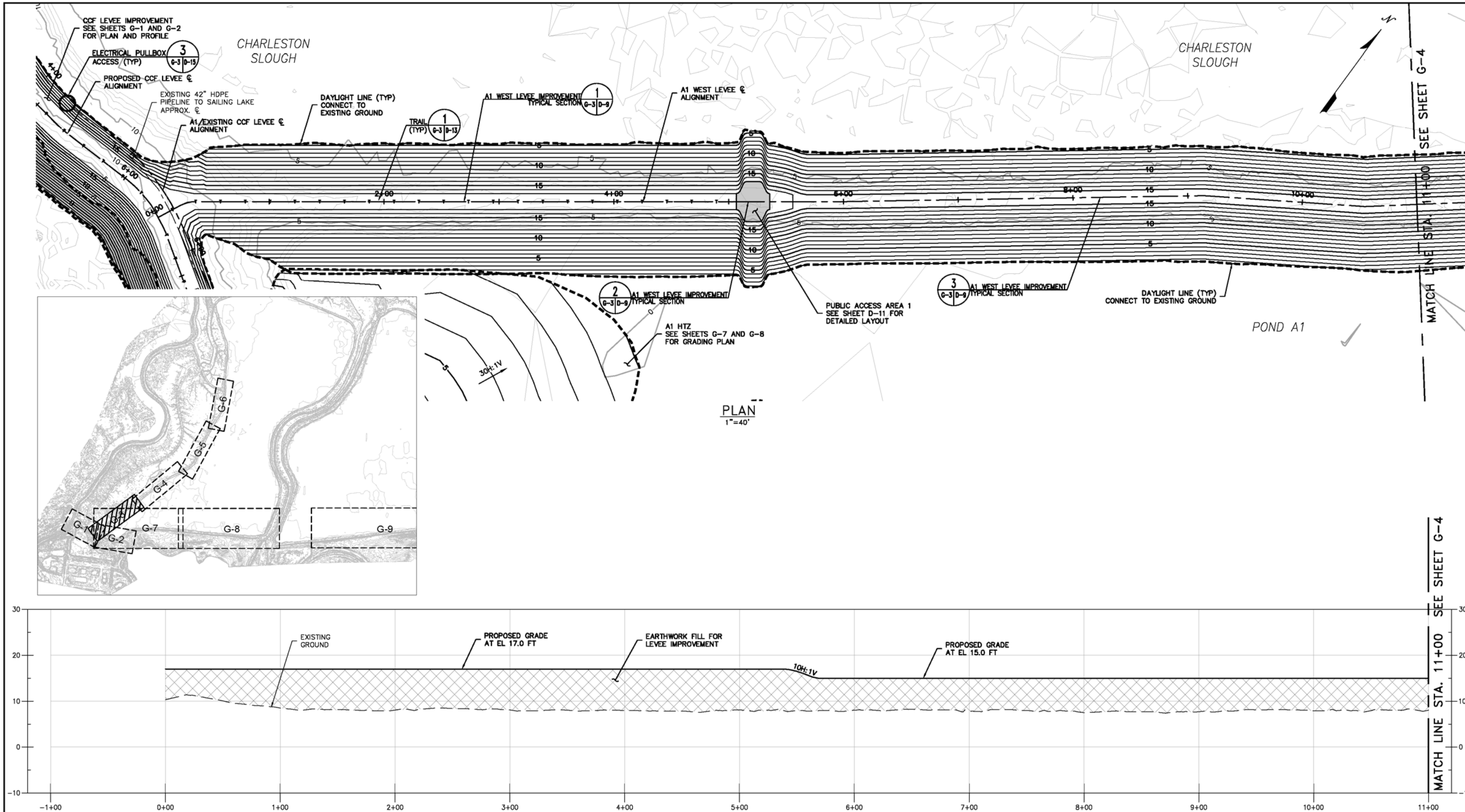
PROJECT No. 60422372
DATE 12-09-2016

PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

SHEET TITLE
MOUNTAIN VIEW PONDS
CCF LEVEE IMPROVEMENT
PLAN AND PROFILE - SHEET 2 OF 2

SHEET NO. SHT. 11 OF 33 SHTS.
REV
DWG NO. G-2

Dec 09, 2016 - 8:32am



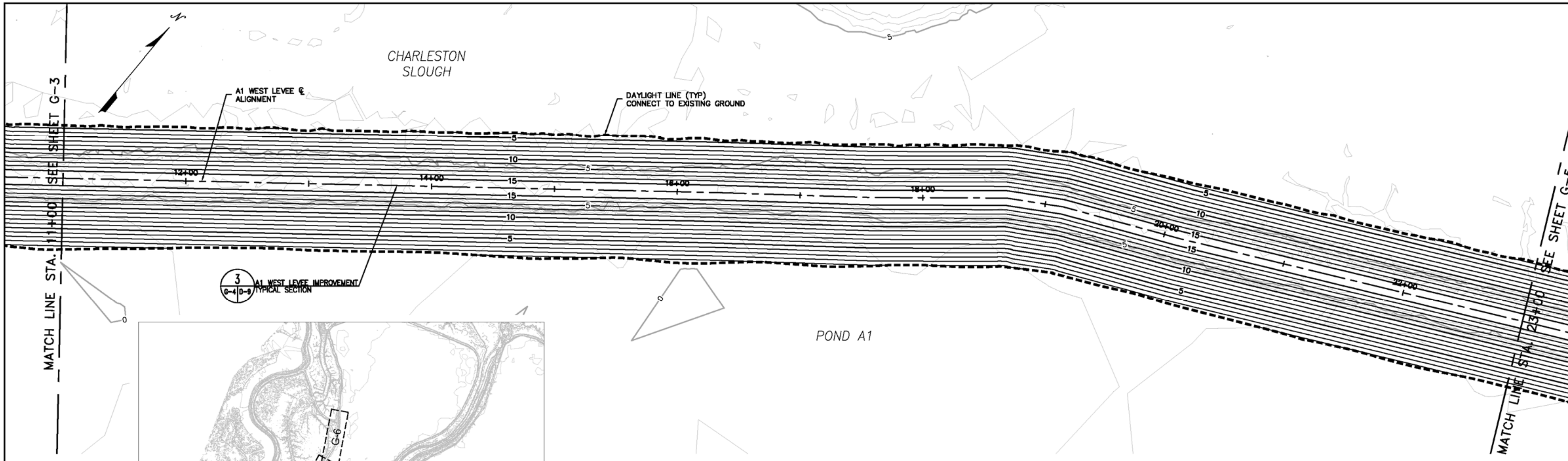
A1 WEST LEVEE ℄ ALIGNMENT PROFILE

HORIZ 1"=40', VERT 1"=10'

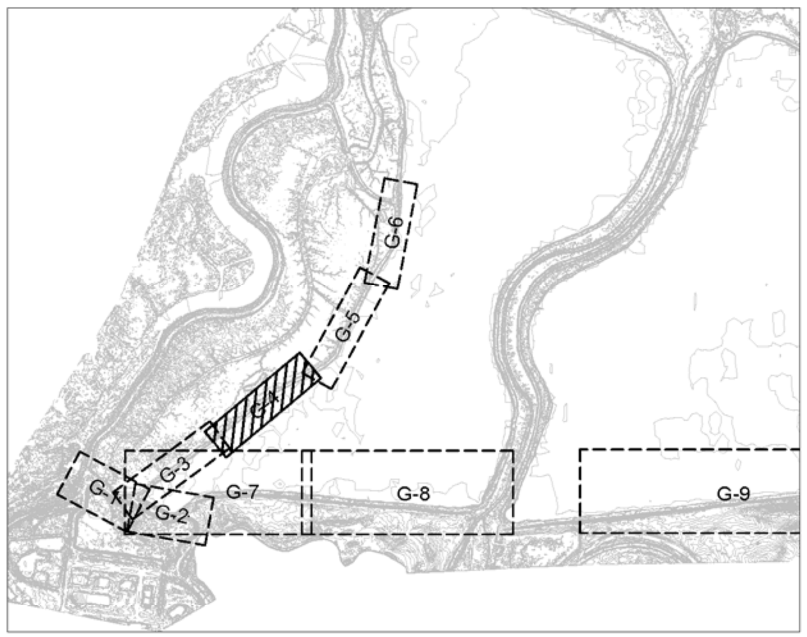
PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

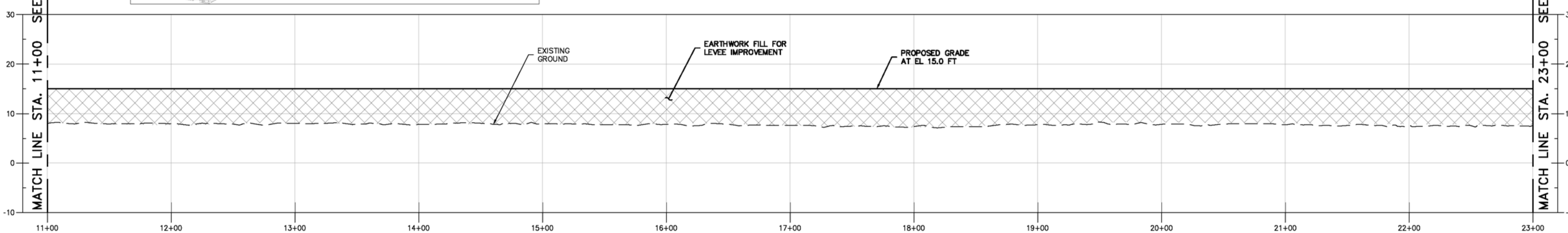
WARNING	0 1/2 1 — IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE
PREPARED BY	AECOM, 300 Lakeside Drive, Suite 400, Oakland, CA 94612, Tel: (510) 893-3600, aecom.com
DESIGNED	L. CHANDRASEKARAN
DRAWN	L. DIFUNTORUM
CHECKED	G. OROZCO / I. ZARCHI
PEER REVIEWED	S. GENTZLER
APPROVED	S. GENTZLER
	STATE OF CALIFORNIA Coastal Conservancy
PROJECT No.	60422372
DATE	12-09-2016
PROJECT	SOUTH BAY SALT POND RESTORATION PROJECT
SHEET TITLE	MOUNTAIN VIEW PONDS POND A1 WEST LEVEE IMPROVEMENT PLAN AND PROFILE - SHEET 1 OF 4
SHEET NO.	SHT. 12 OF 33 SHTS.
DWG NO.	G-3

REV	DESCRIPTION	BY	CHK	APP	DATE



PLAN
1"=40'





A1 WEST LEVEE ℄ ALIGNMENT PROFILE
HORIZ 1"=40', VERT 1"=10'

HORIZ 1" = 40' (0 40 80 120)
VERT 1" = 10' (0 10 20 30)

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

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0 1/2 1
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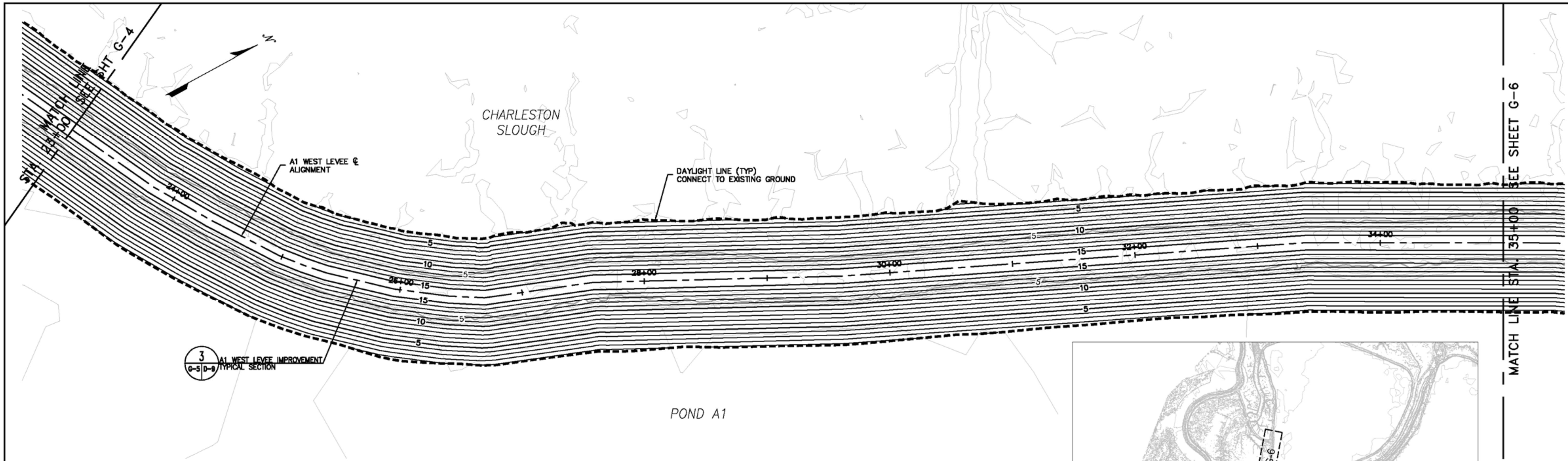
STATE OF CALIFORNIA
Coastal Conservancy

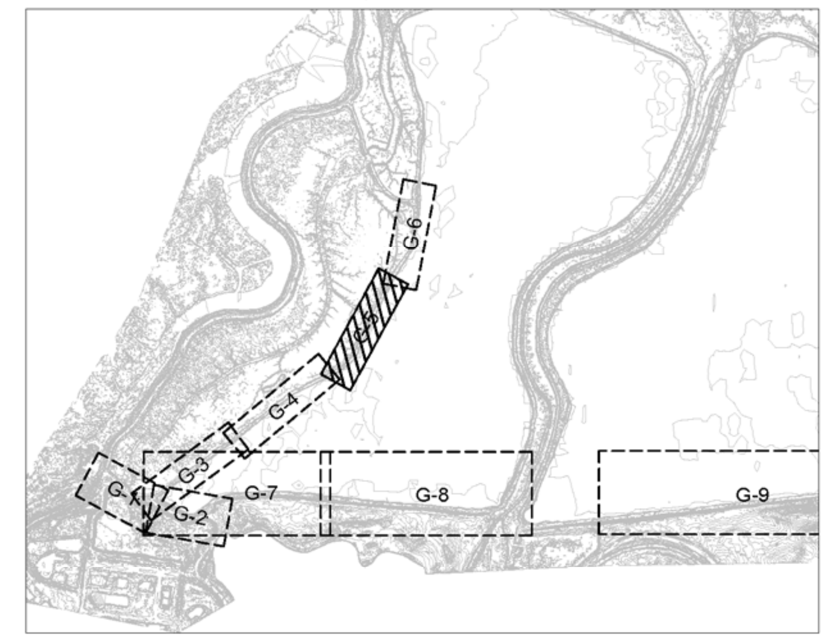
PROJECT No. 60422372
DATE 12-09-2016

PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

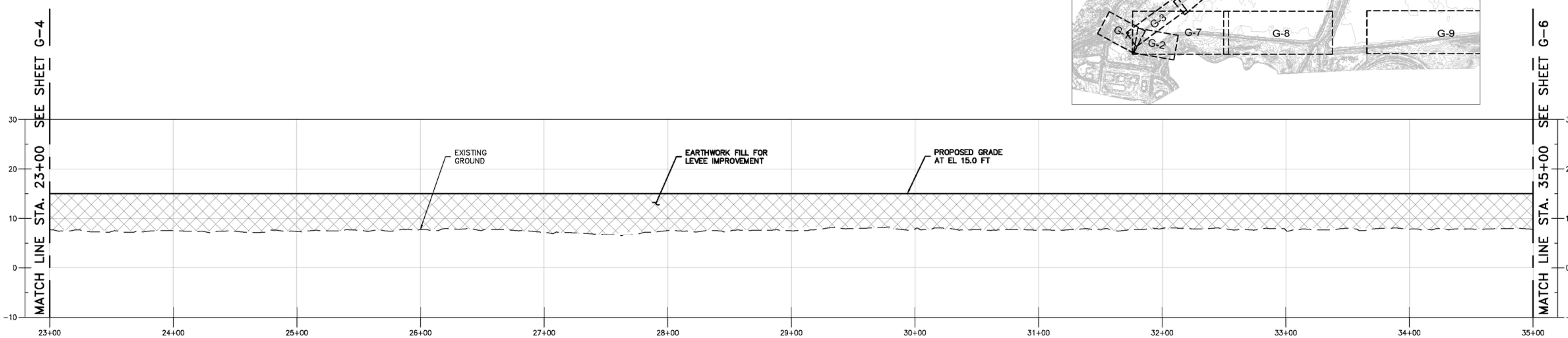
SHEET TITLE
MOUNTAIN VIEW PONDS
POND A1 WEST LEVEE IMPROVEMENT
PLAN AND PROFILE - SHEET 2 OF 4

SHEET NO. SHT. 13 OF 33 SHTS.
REV
DWG NO. G-4





PLAN
1"=40'



A1 WEST LEVEE ℄ ALIGNMENT PROFILE
HORIZ 1"=40', VERT 1"=10'

0 40 80 120
HORIZ 1" = 40'

0 10 20 30
VERT 1" = 10'

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REV	DESCRIPTION	BY	CHK	APP	DATE

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APPROVED S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

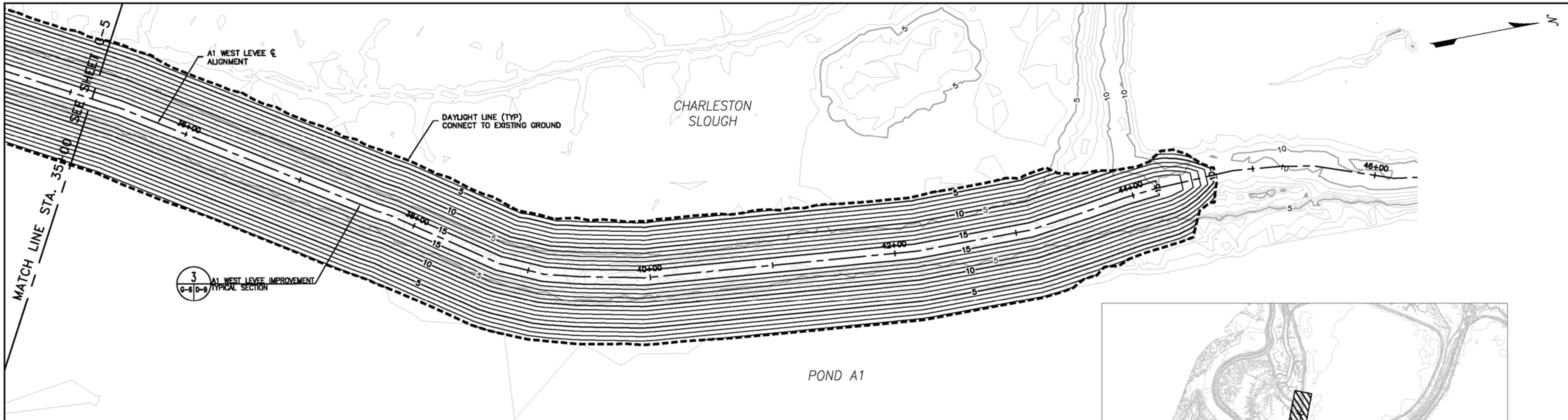
PROJECT No. 60422372
DATE 12-09-2016

PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

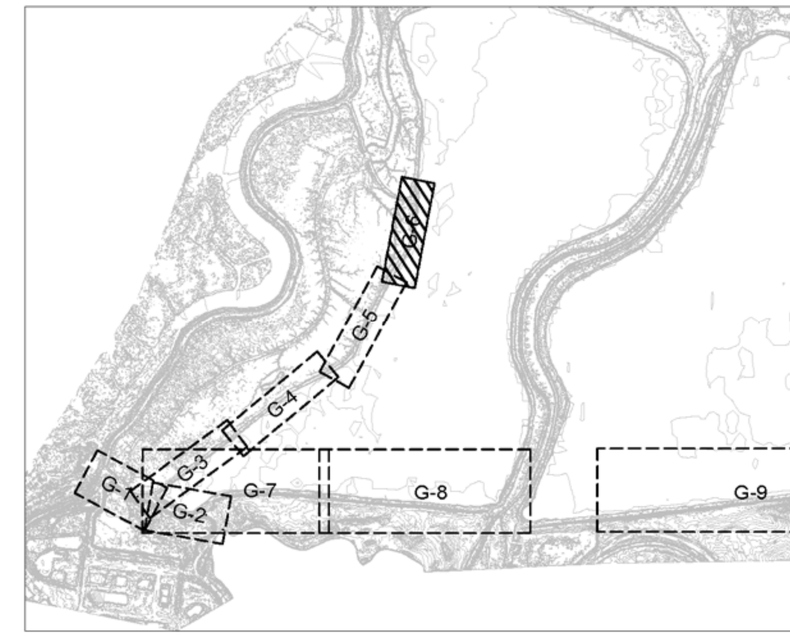
SHEET TITLE
MOUNTAIN VIEW PONDS
POND A1 WEST LEVEE IMPROVEMENT
PLAN AND PROFILE - SHEET 3 OF 4

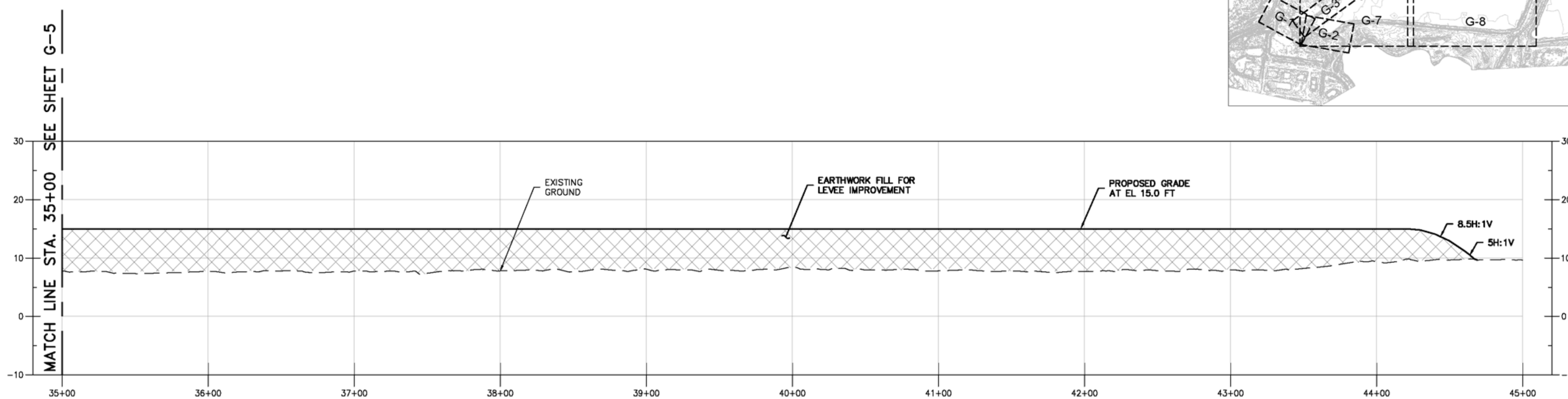
SHEET NO. SHT 14 OF 33 SHTS.
REV
DWG NO. G-5

Dec 09, 2016 - 8:39am



PLAN
1"=40'





A1 WEST LEVEE ℄ ALIGNMENT PROFILE
HORIZ 1"=40', VERT 1"=10'

HORIZ 1" = 40'

VERT 1" = 10'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

PREPARED BY
AECOM
300 Lakeside Drive, Suite 400
Oakland, CA 94612
Tel: (510) 893-3600
aecom.com

DESIGNED: L. CHANDRASEKARAN
DRAWN: L. DIFUNTORUM
CHECKED: G. OROZCO / I. ZARCHI
PEER REVIEWED: S. GENTZLER
APPROVED: S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

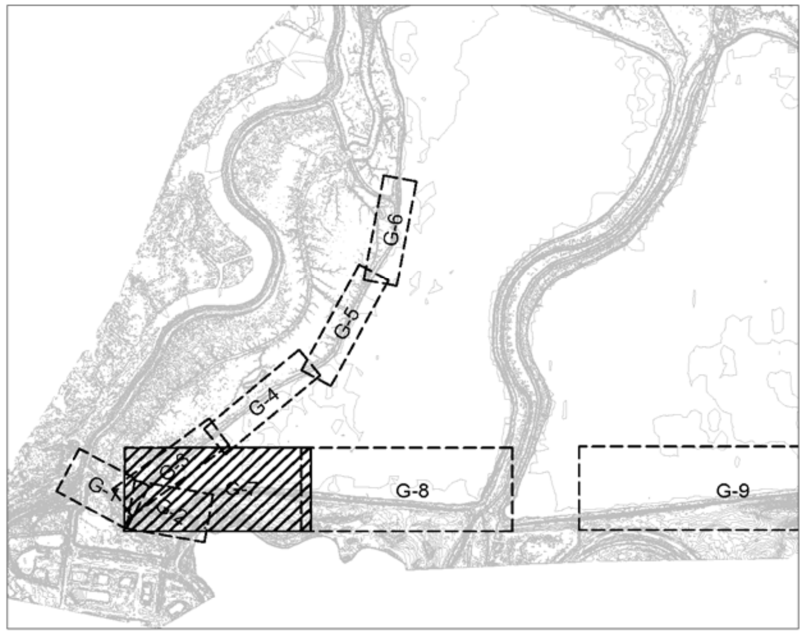
PROJECT No. 60422372
DATE 12-09-2016

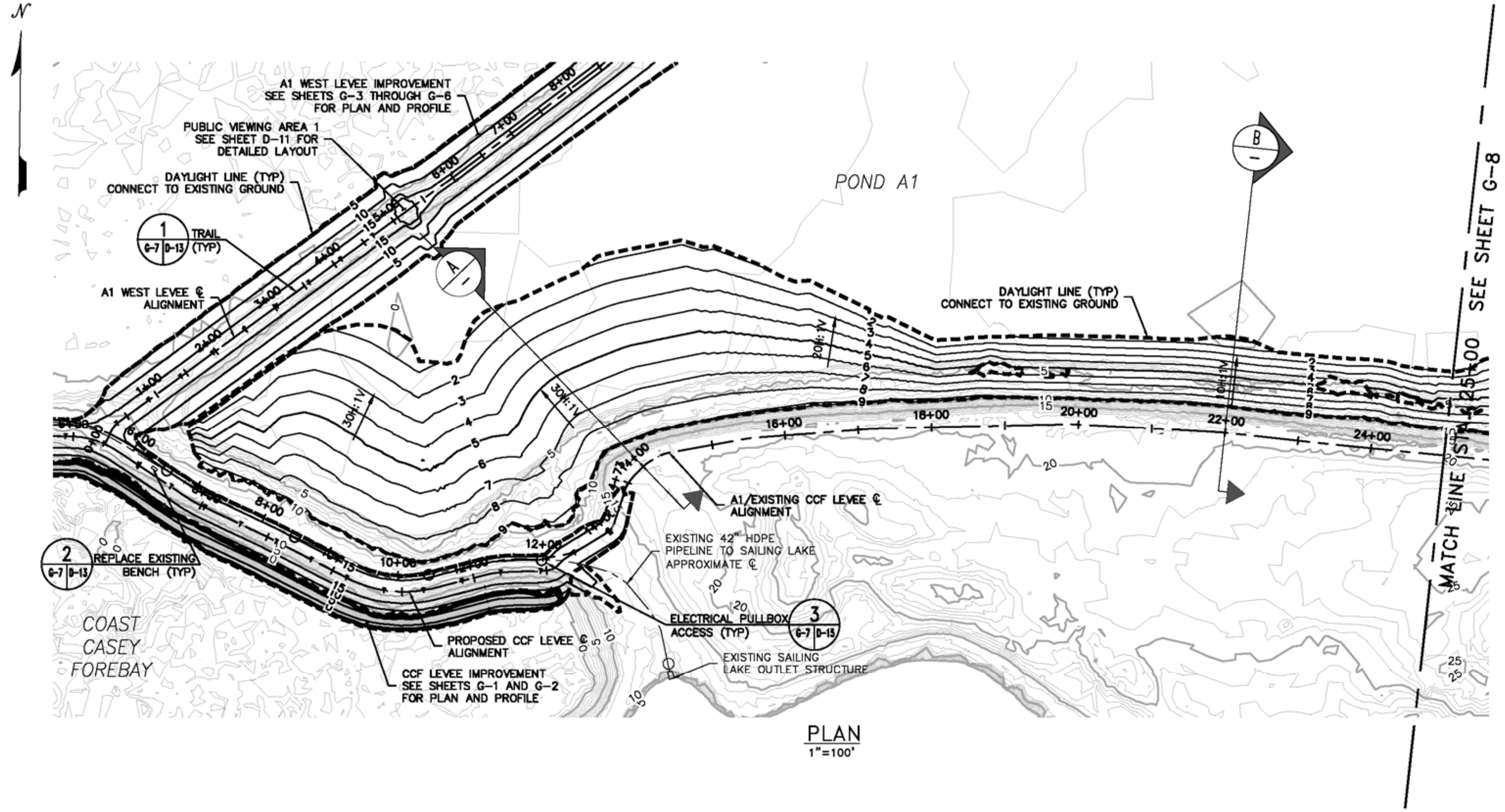
PROJECT: **SOUTH BAY SALT POND RESTORATION PROJECT**

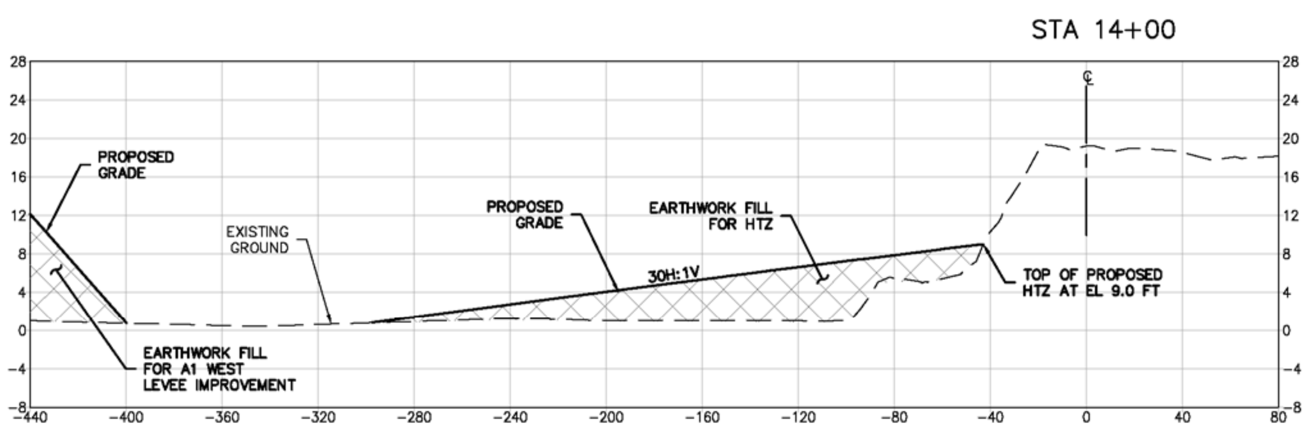
SHEET TITLE: MOUNTAIN VIEW PONDS
POND A1 WEST LEVEE IMPROVEMENT
PLAN AND PROFILE - SHEET 4 OF 4

SHEET NO. SHT. 15 OF 33 SHTS.
DWG NO. G-6

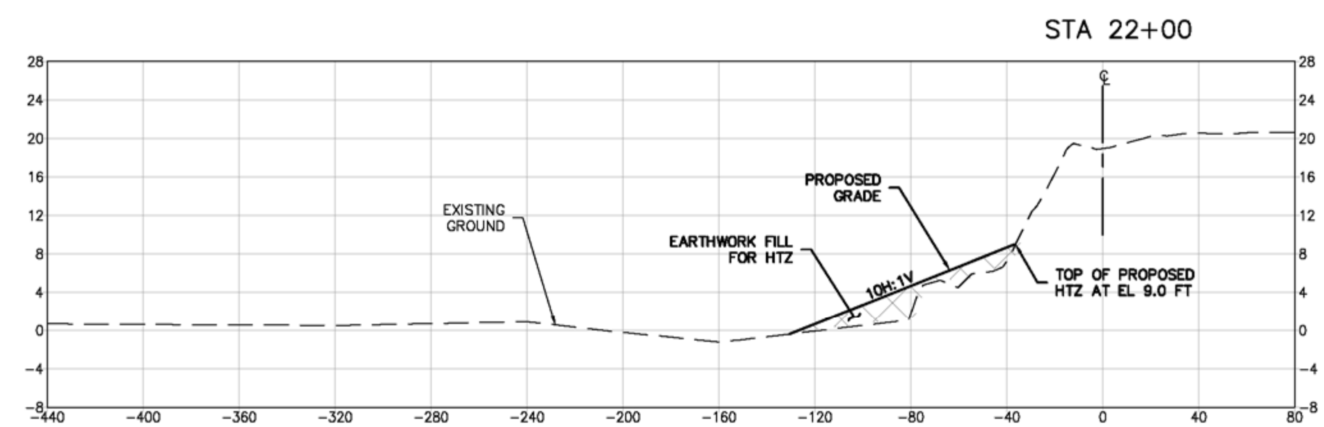
Dec 09, 2016 - 8:46am



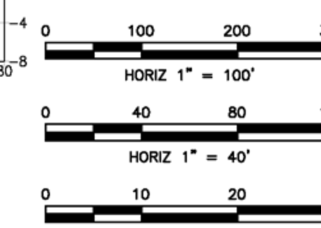




A A1 HTZ – TYPICAL SECTION
HORIZ 1"=40', VERT 1"=10



B A1 HTZ – TYPICAL SECTION
HORIZ 1"=40', VERT 1"=10



PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
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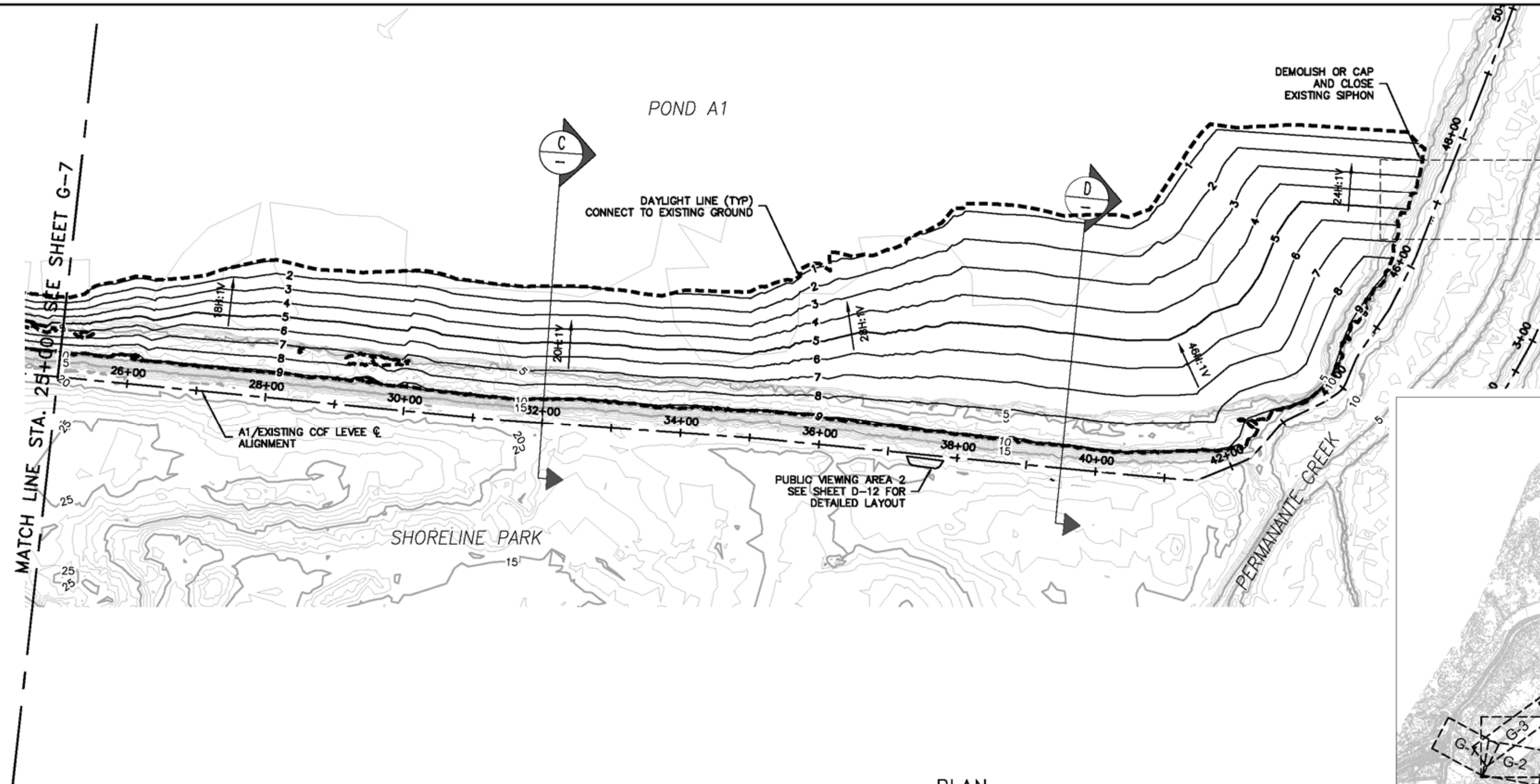
PEER REVIEWED: S. GENTZLER
APPROVED: S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

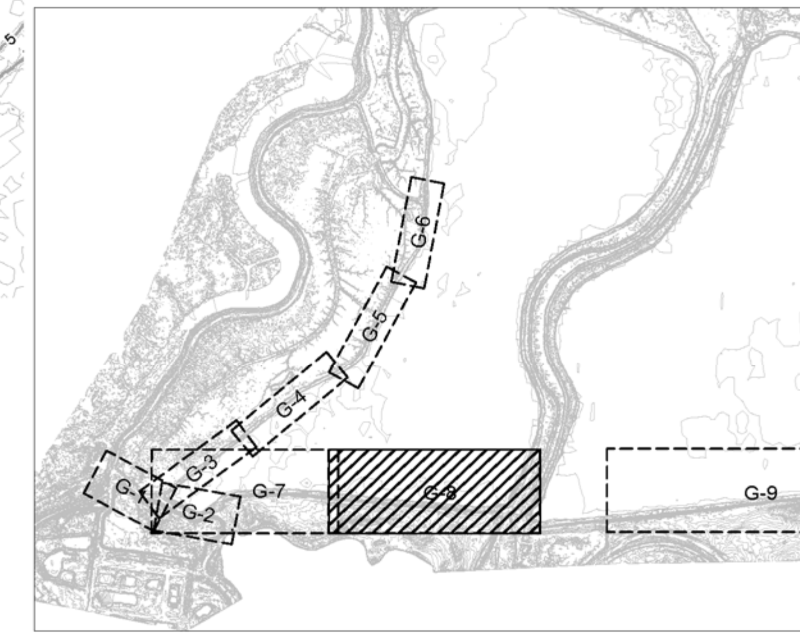
PROJECT No. 60422372 DATE 12-09-2016

PROJECT: SOUTH BAY SALT POND RESTORATION PROJECT
SHEET TITLE: MOUNTAIN VIEW PONDS POND A1 HTZ GRADING PLAN - SHEET 1 OF 2

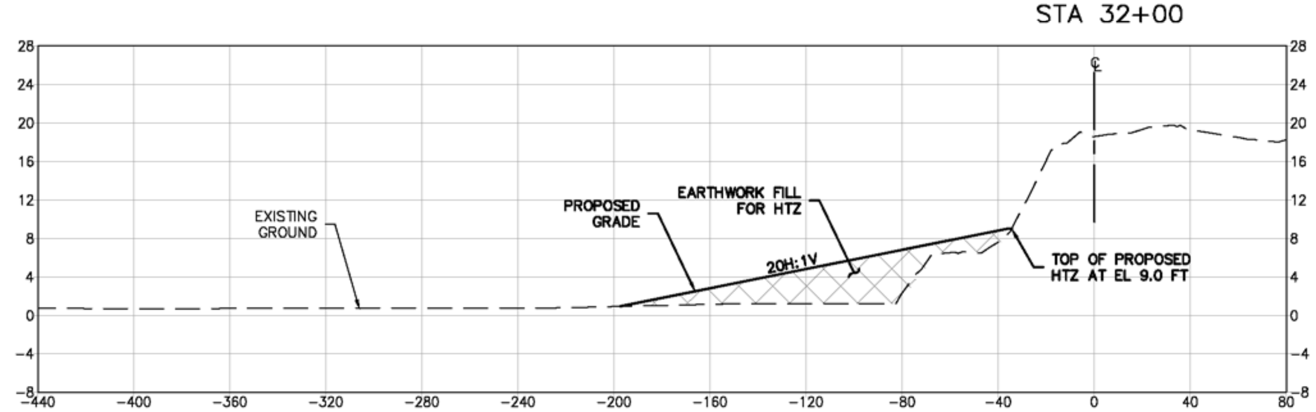
SHEET NO. SHT. 16 OF 33 SHTS.
DWG NO. G-7



PLAN
1"=100'

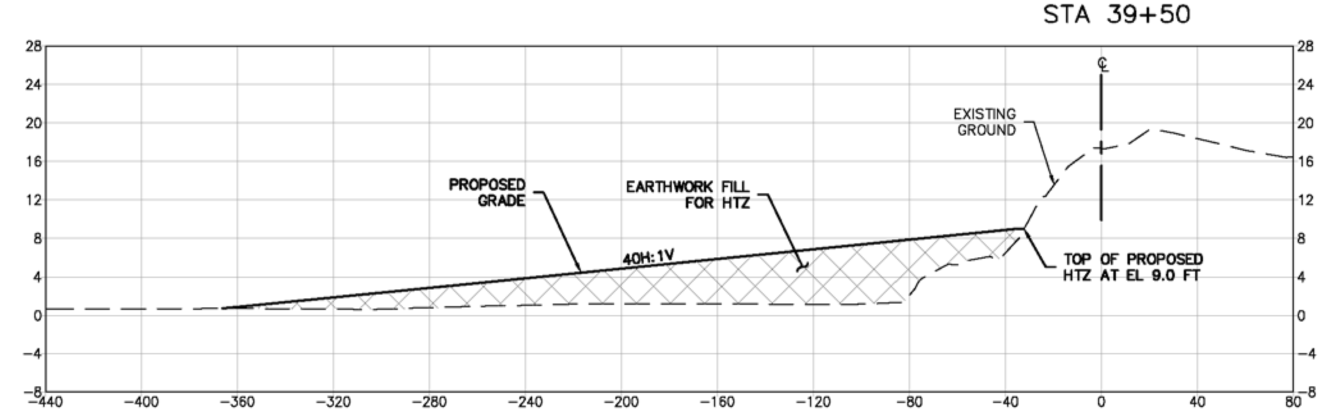


STA 32+00



C A1 HTZ – TYPICAL SECTION
HORIZ 1"=40', VERT 1"=10

STA 39+50



D A1 HTZ – TYPICAL SECTION
HORIZ 1"=40', VERT 1"=10

0 40 80 120 HORIZ 1" = 40'

0 100 200 300 HORIZ 1" = 100'

0 10 20 30 VERT 1" = 10'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
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STATE OF CALIFORNIA
Coastal Conservancy

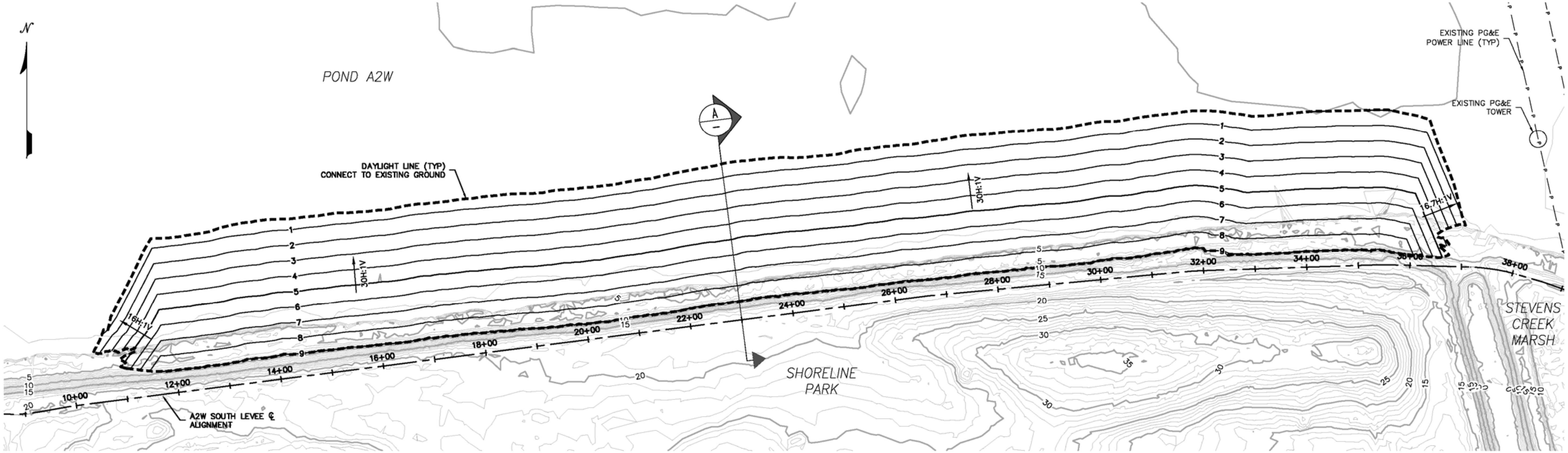
PROJECT No. 60422372
DATE 12-09-2016

PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

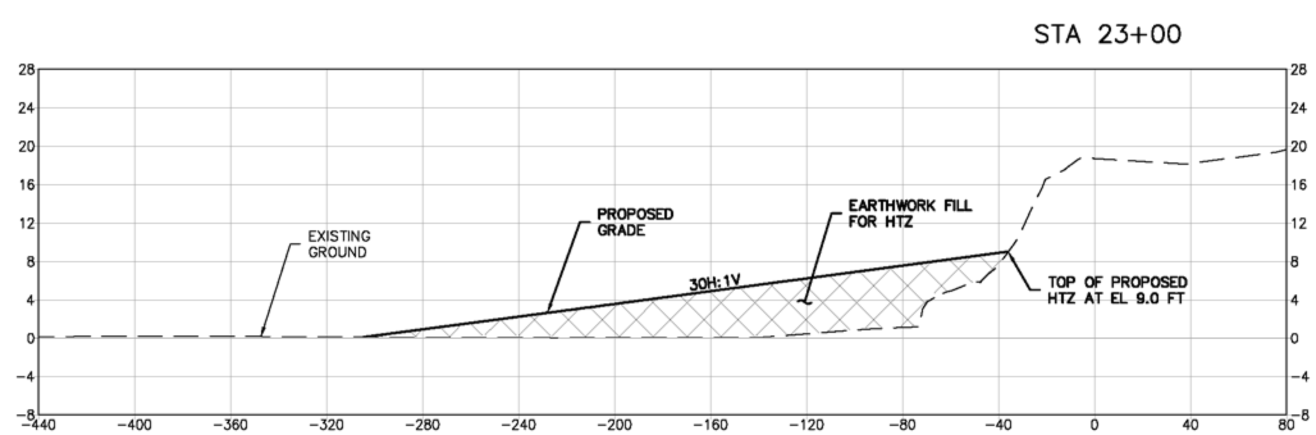
SHEET TITLE
MOUNTAIN VIEW PONDS
POND A1 HTZ
GRADING PLAN - SHEET 2 OF 2

SHEET NO. SHT. 17 OF 33 SHTS.
REV
DWG NO. G-8

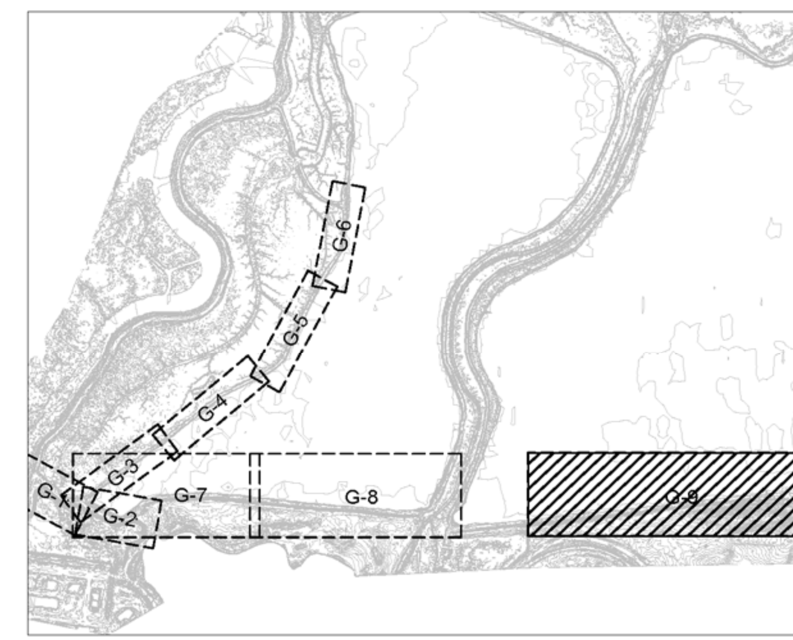
Dec 09, 2016 - 8:58am



PLAN
1"=100'



A2W HTZ – TYPICAL SECTION
HORIZ 1"=40', VERT 1"=10



0 100 200 300
HORIZ 1" = 100'

0 40 80 120
HORIZ 1" = 40'

0 10 20 30
VERT 1" = 10'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
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DESIGNED: L. CHANDRASEKARAN
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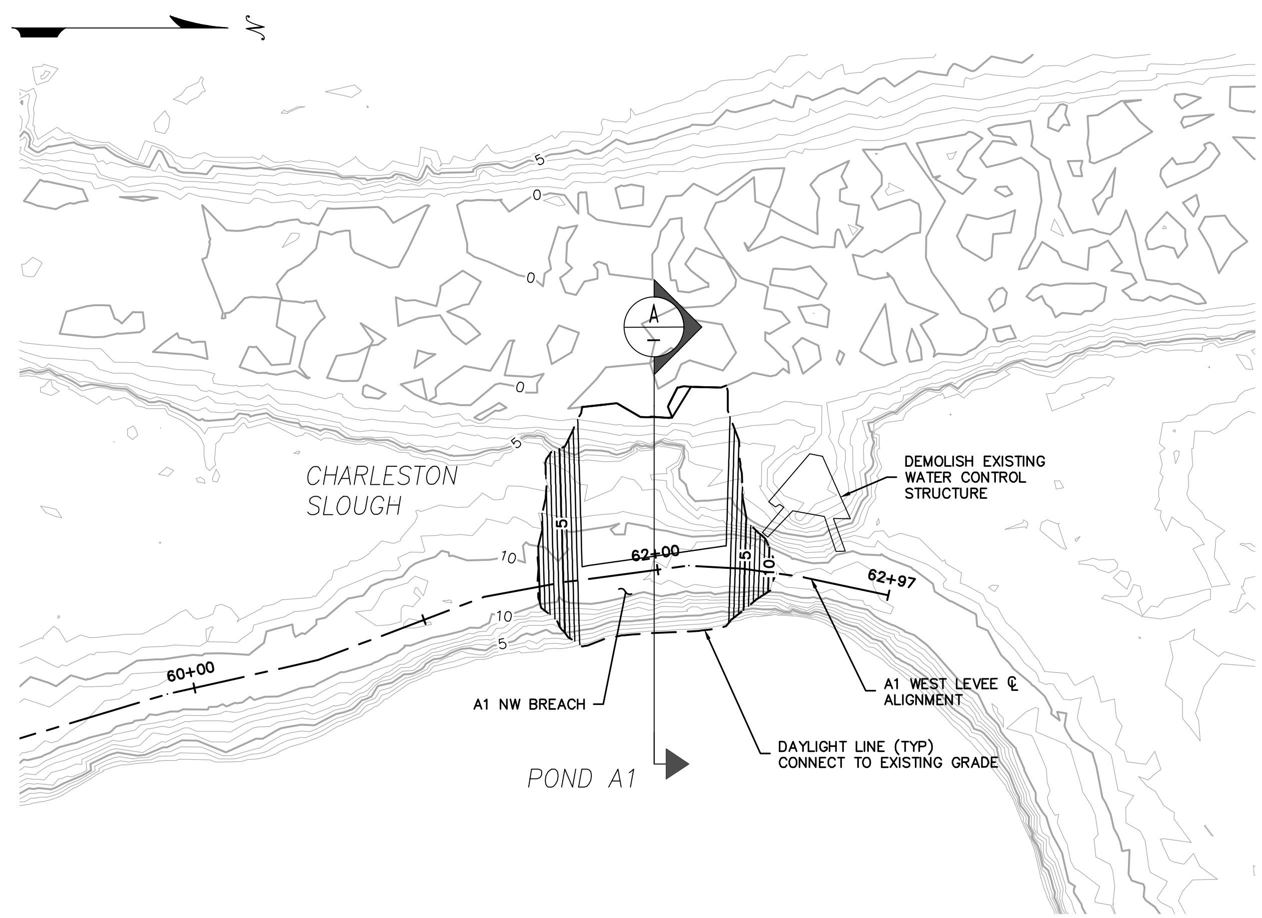
APPROVED: S. GENTZLER

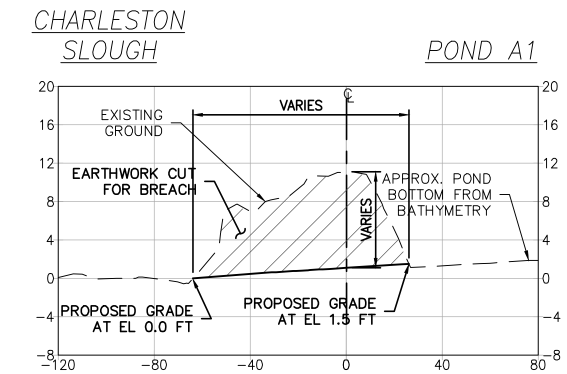
STATE OF CALIFORNIA
Coastal Conservancy
PROJECT No. 60422372
DATE 12-09-2016

PROJECT: **SOUTH BAY SALT POND RESTORATION PROJECT**
SHEET TITLE: MOUNTAIN VIEW PONDS
POND A2W HTZ
GRADING PLAN

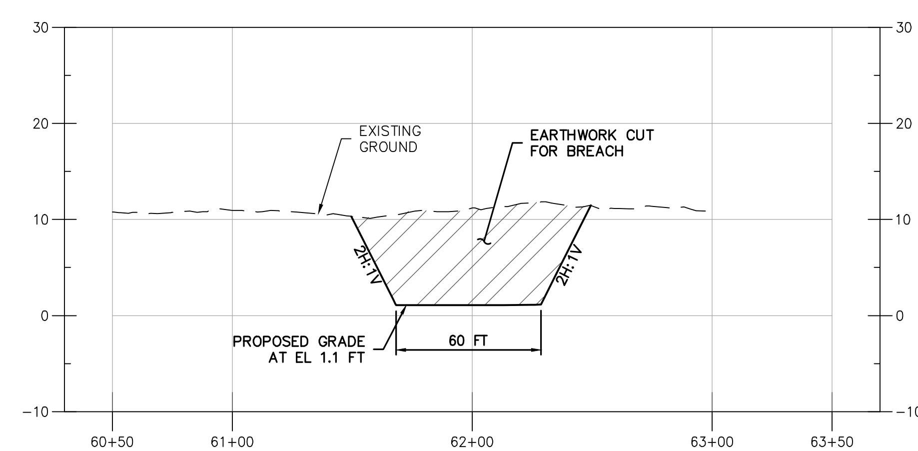
SHEET NO. SHT 18 OF 33 SHTS
REV
DWG NO. G-9



PLAN
1"=40'



A A1 NW BREACH – TYPICAL SECTION
HORIZ 1"=40', VERT 1"=10'



A1 NW BREACH – PROFILE
HORIZ 1"=40', VERT 1"=10'

0 40 80 120
HORIZ 1" = 40'

0 10 20 30
VERT 1" = 10'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
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APPROVED S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

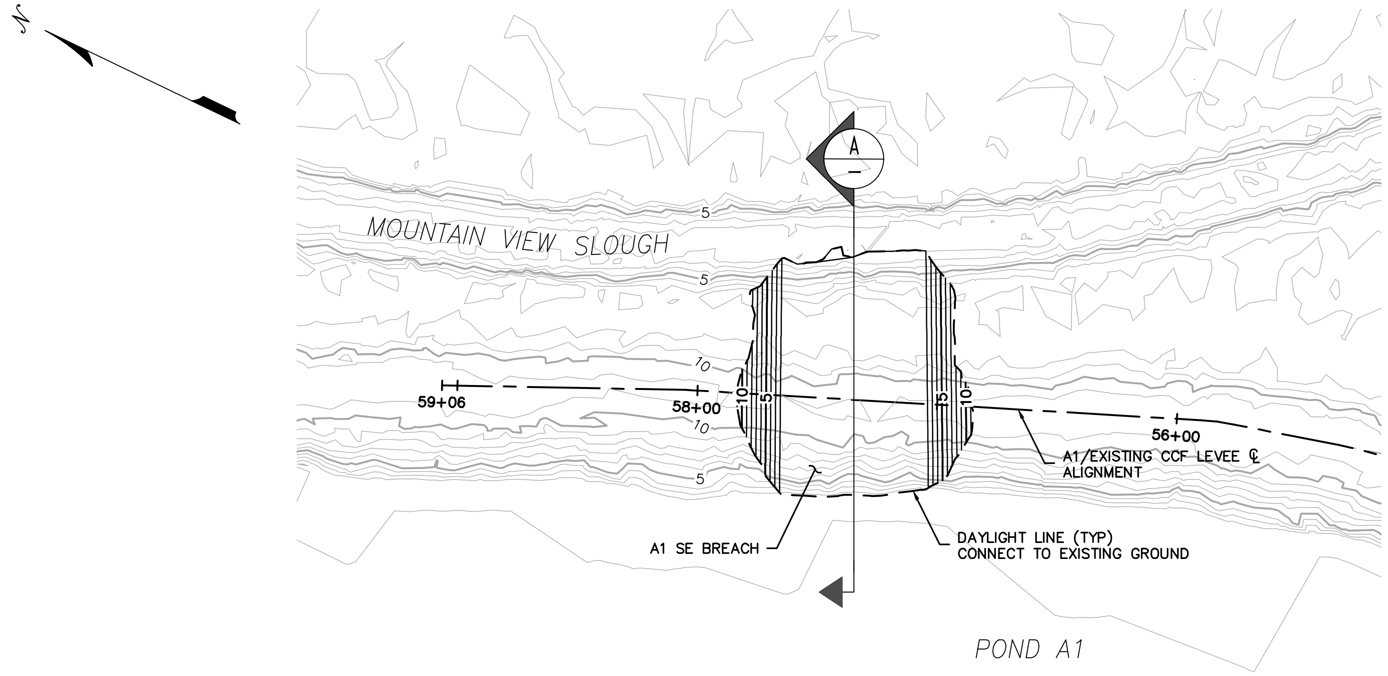
PROJECT No. 60422372
DATE 12-09-2016

PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

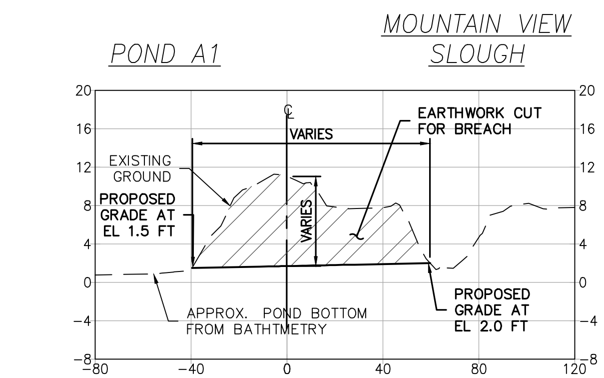
SHEET TITLE
MOUNTAIN VIEW PONDS
POND A1 NORTHWEST BREACH
DETAILED GRADING PLAN

SHEET NO. SHT. 19 OF 33 SHTS.
REV
DWG NO. D-1

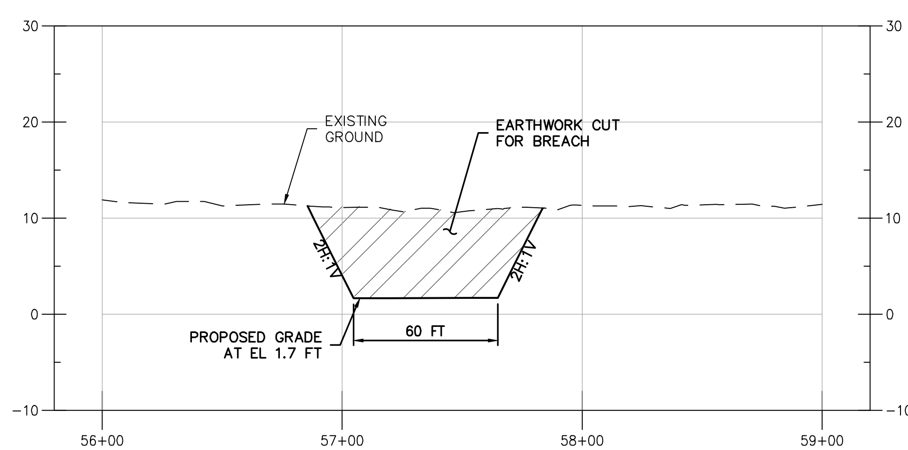
Dec 09, 2016 - 9:02am
C:\pwworking\aecom_na\chandrasekaranl\dms75827\MV_D-1.dwg



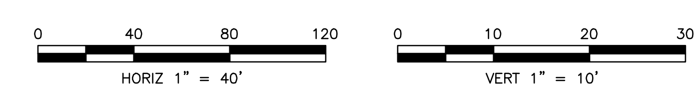
PLAN
1"=40'



A A1 SE BREACH – TYPICAL SECTION
HORIZ 1"=40', VERT 1"=10'



A1 SE BREACH – PROFILE
HORIZ 1"=40', VERT 1"=10'



REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
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APPROVED S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372
DATE 12-09-2016

PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

SHEET TITLE
MOUNTAIN VIEW PONDS
POND A1 SOUTHEAST BREACH
DETAILED GRADING PLAN

SHEET NO. SHT. 20 OF 33 SHTS.
REV
DWG NO. D-2

Dec 09, 2016 - 9:05am
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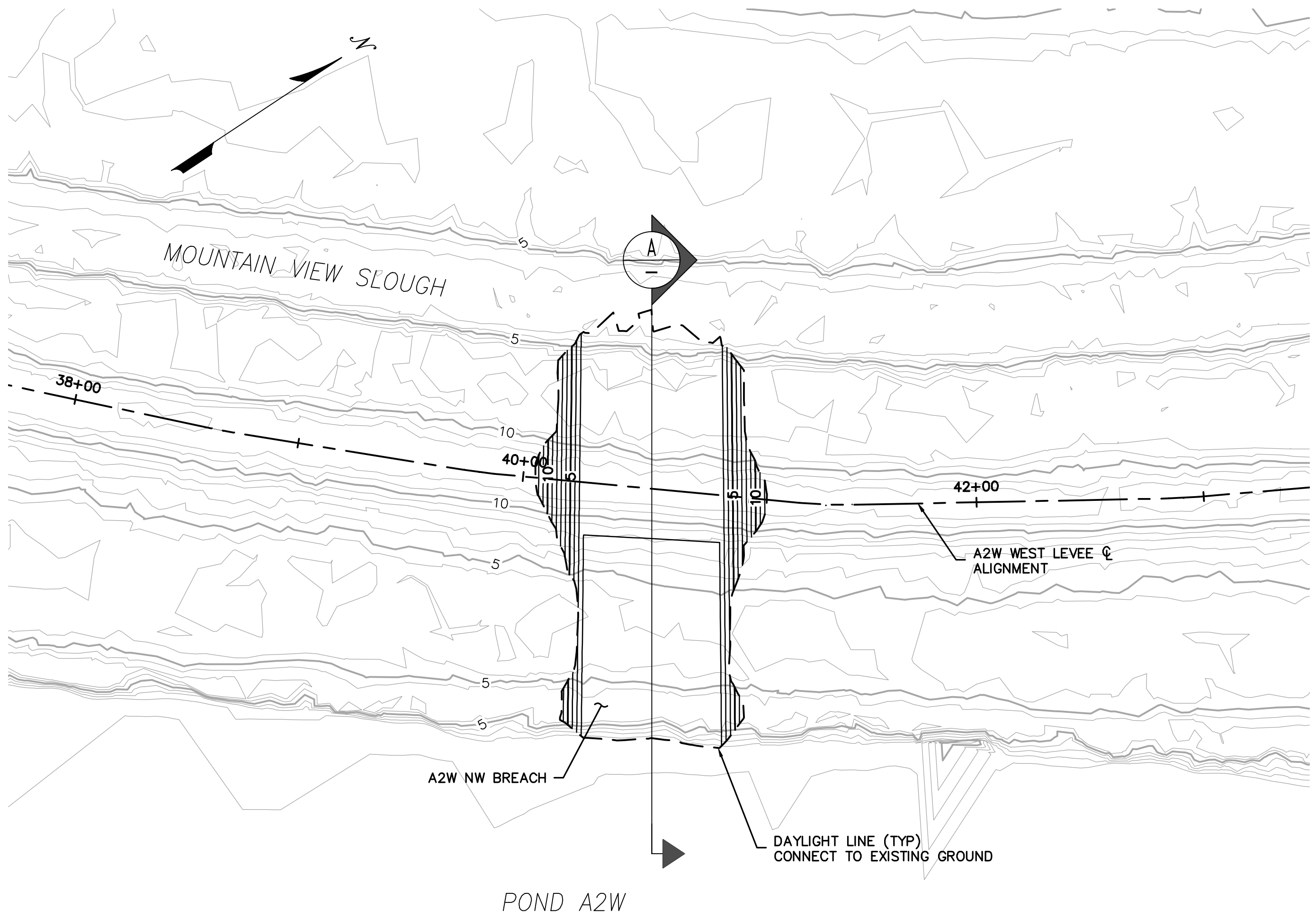
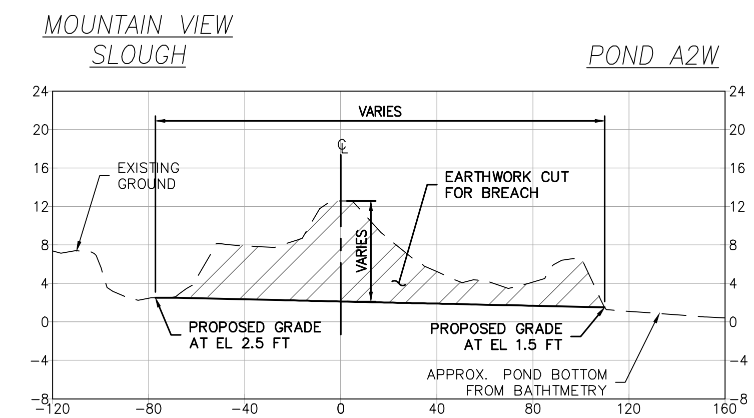
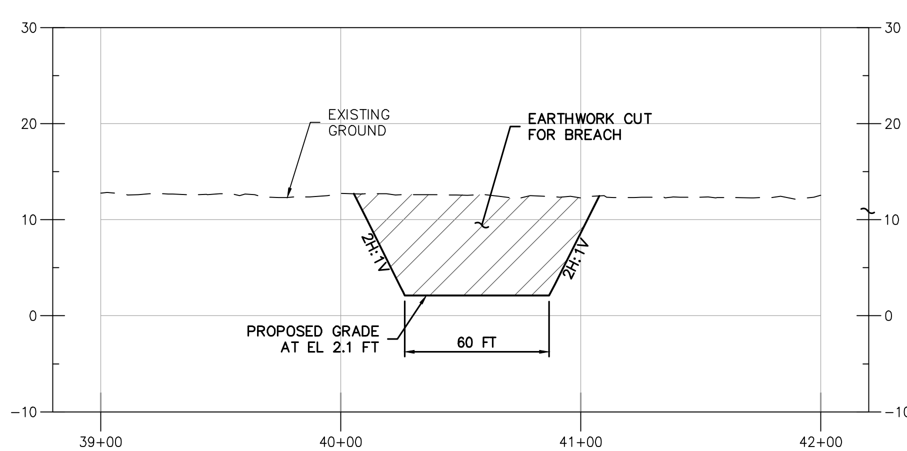


PLAN
1"=40'



A2W NW BREACH – TYPICAL SECTION
HORIZ 1"=40', VERT 1"=10'



A2W NW BREACH – PROFILE
HORIZ 1"=40', VERT 1"=10'

0 40 80 120
HORIZ 1" = 40'

0 10 20 30
VERT 1" = 10'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

PREPARED BY
AECOM
300 Lakeside Drive, Suite 400
Oakland, CA 94612
Tel: (510) 893-3600
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DESIGNED L. CHANDRASEKARAN
DRAWN L. DIFUNTORUM
CHECKED G. OROZCO / I. ZARCHI
PEER REVIEWED S. GENTZLER
APPROVED S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372
DATE 12-09-2016

PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

SHEET TITLE
MOUNTAIN VIEW PONDS
POND A2W NORTHWEST BREACH
DETAILED GRADING PLAN

SHEET NO. SHT. 21 OF 33 SHTS.
REV
DWG NO. D-3

Dec 09, 2016 - 9:07am
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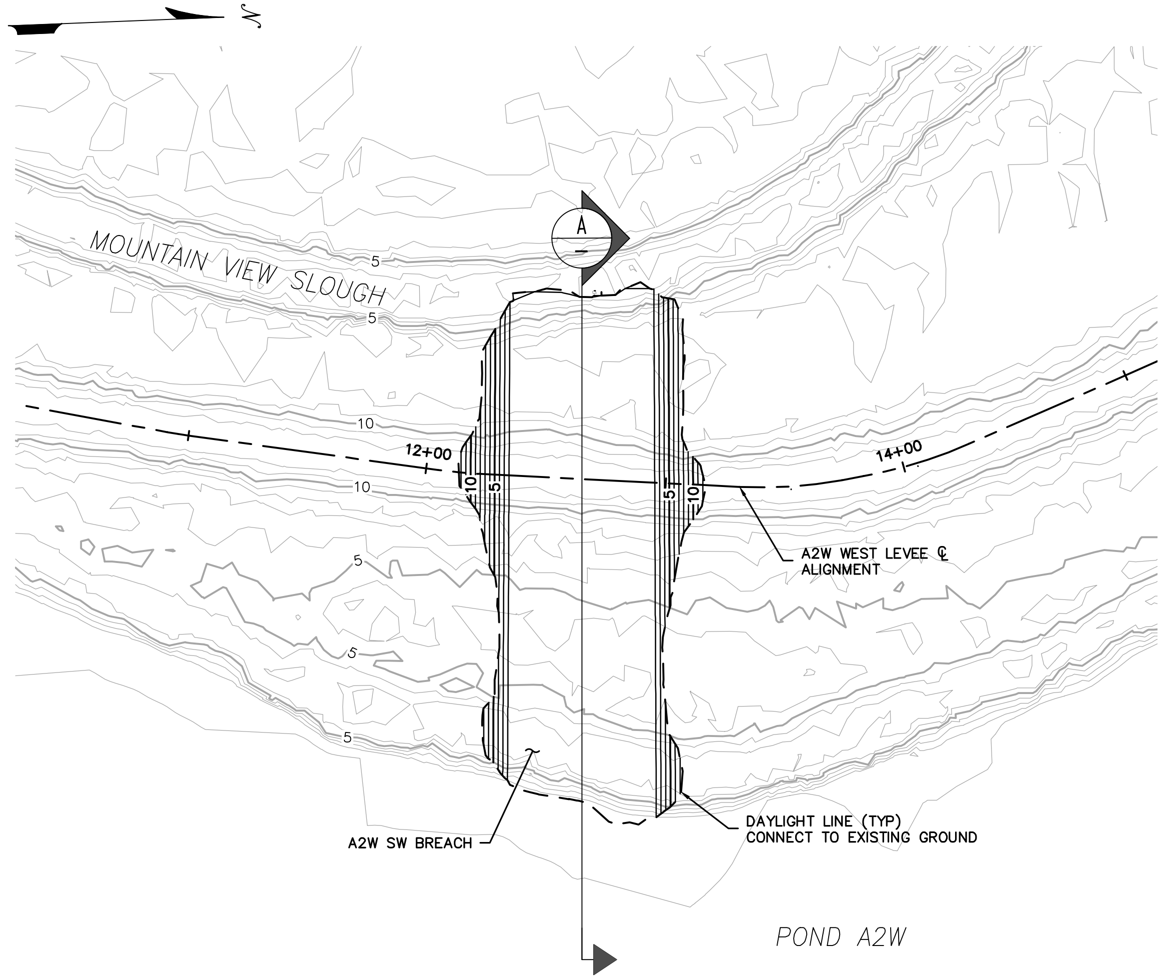
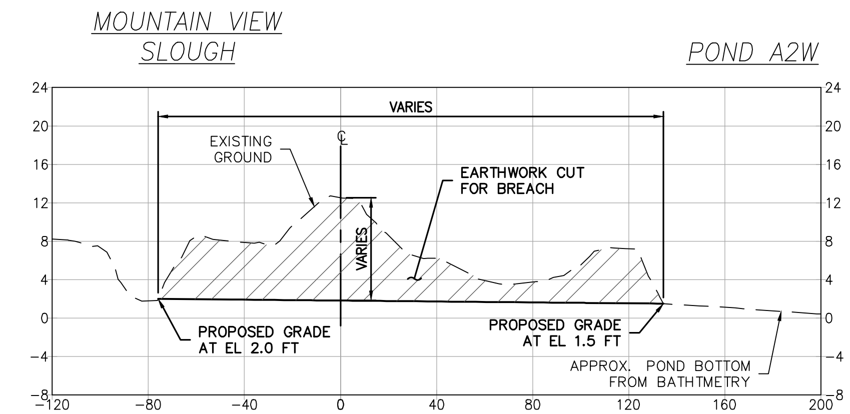
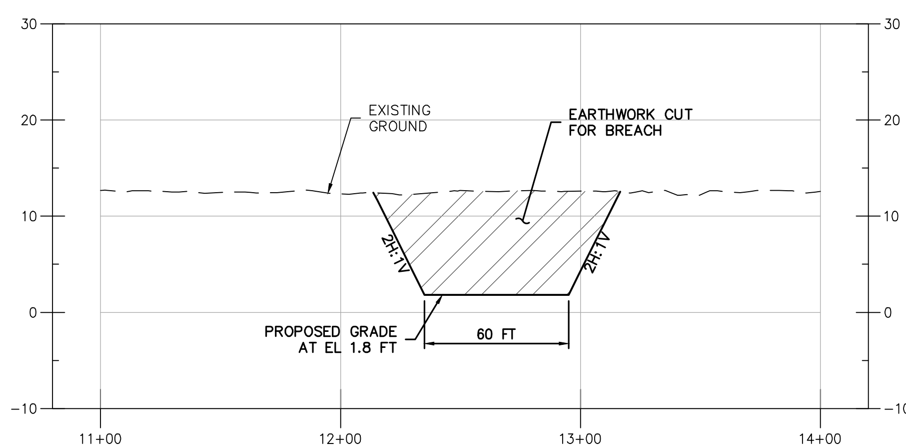


PLAN
1"=40'



A — A2W SW BREACH – TYPICAL SECTION
HORIZ 1"=40', VERT 1"=10'



A2W SW BREACH – PROFILE
HORIZ 1"=40', VERT 1"=10'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
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300 Lakeside Drive, Suite 400
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DESIGNED L. CHANDRASEKARAN
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APPROVED S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

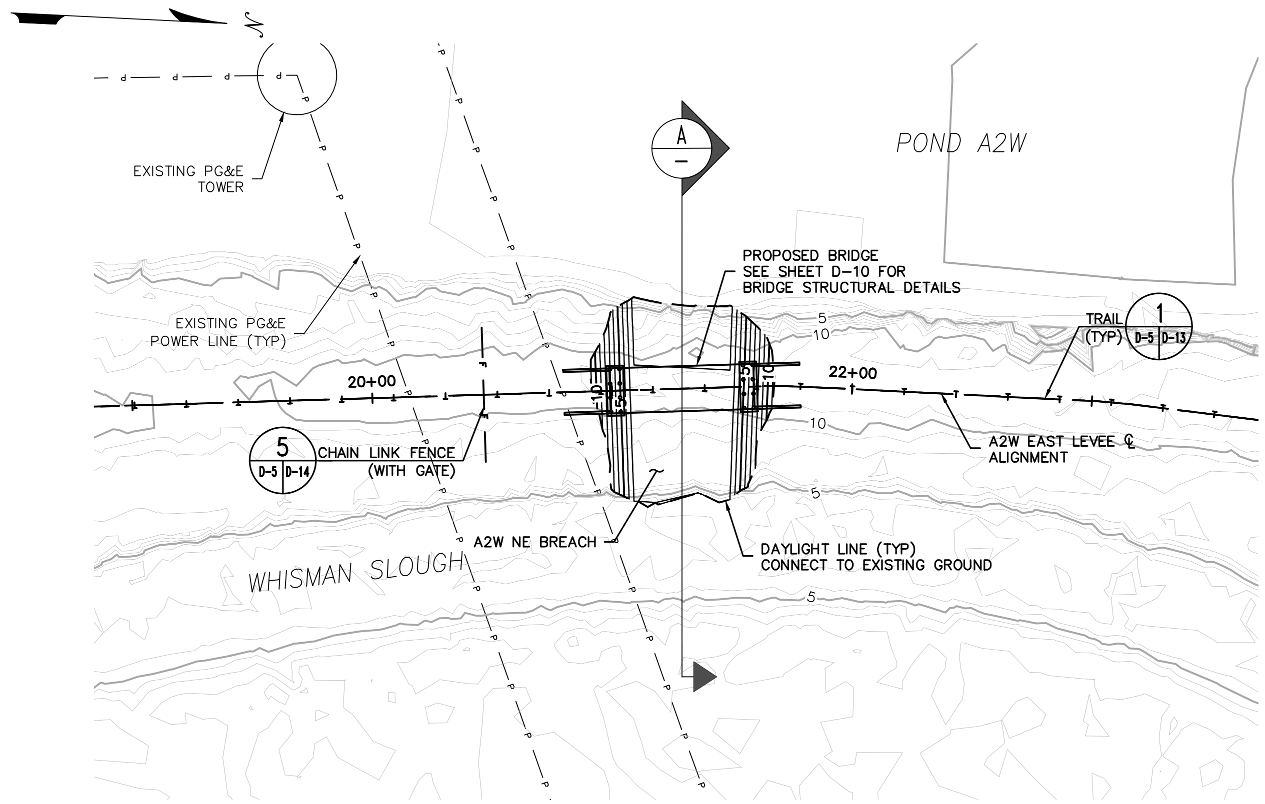
PROJECT No. 60422372
DATE 12-09-2016

PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

SHEET TITLE
MOUNTAIN VIEW PONDS
POND A2W SOUTHWEST BREACH
DETAILED GRADING PLAN

SHEET NO. SHT. 22 OF 33 SHTS.
REV
DWG NO. D-4

Dec 09, 2016 - 9:10am
C:\pwworking\aecom_na\chandrasekaranl\dms75827\MV_D-4.dwg



PLAN
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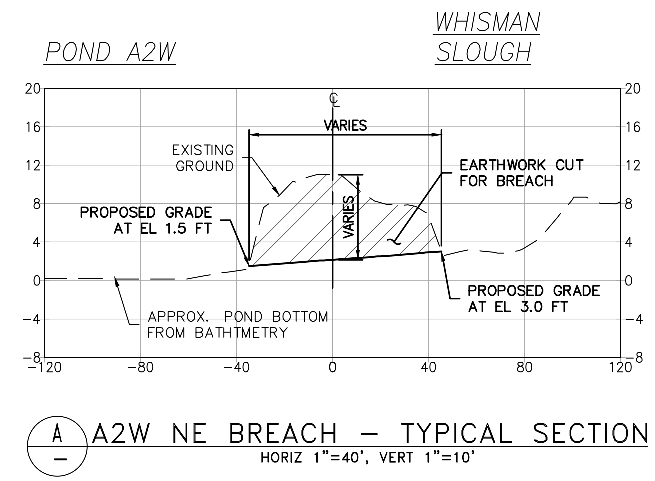
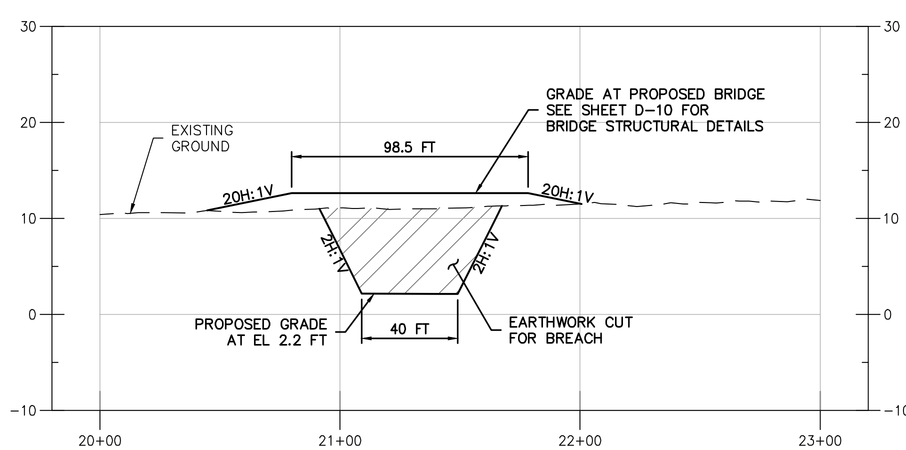


A A2W NE BREACH – TYPICAL SECTION
HORIZ 1"=40', VERT 1"=10'



A2W NE BREACH – PROFILE
HORIZ 1"=40', VERT 1"=10'

0 40 80 120
HORIZ 1" = 40'

0 10 20 30
VERT 1" = 10'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
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DESIGNED L. CHANDRASEKARAN
DRAWN L. DIFUNTORUM
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PEER REVIEWED S. GENTZLER
APPROVED S. GENTZLER

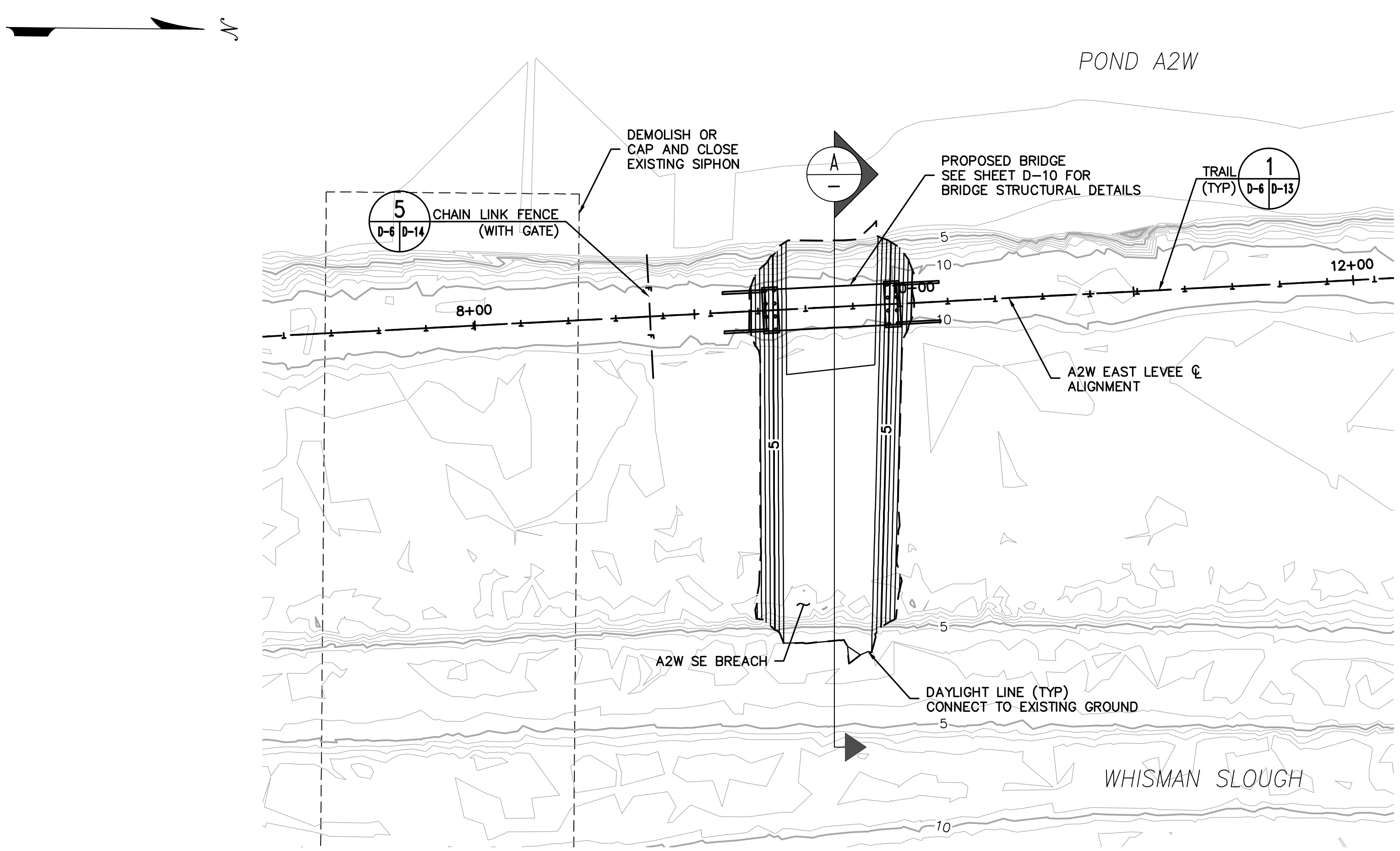
STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372
DATE 12-09-2016

PROJECT **SOUTH BAY SALT POND RESTORATION PROJECT**
SHEET TITLE MOUNTAIN VIEW PONDS
POND A2W NORTHEAST BREACH
DETAILED GRADING PLAN

SHEET NO. SHT. 23 OF 33 SHTS.
REV
DWG NO. D-5

Dec 09, 2016 - 9:13am
C:\pwworking\aecom_na\lchandrasekaran\dms75827\MV_D-5.dwg



PLAN
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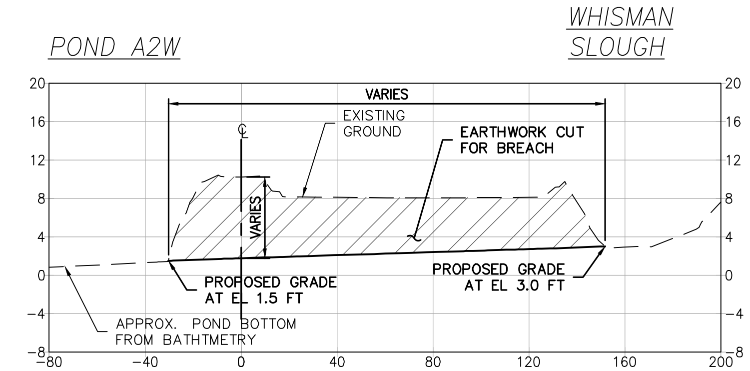
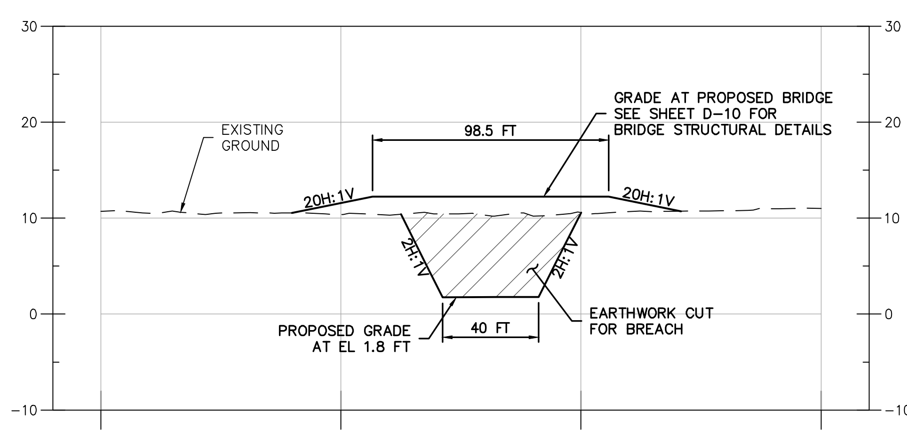


A D-9 A2W SE BREACH – TYPICAL SECTION
HORIZ 1"=40', VERT 1"=10'



A2W SE BREACH – PROFILE
HORIZ 1"=40', VERT 1"=10'

0 40 80 120 HORIZ 1" = 40'

0 10 20 30 VERT 1" = 10'

Dec 09, 2016 - 9:18am C:\pwworking\aecom_na\chandrasekarank\dms75827\MV_D-6.dwg

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
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300 Lakeside Drive, Suite 400
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DESIGNED L. CHANDRASEKARAN
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CHECKED G. OROZCO / I. ZARCHI
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APPROVED S. GENTZLER

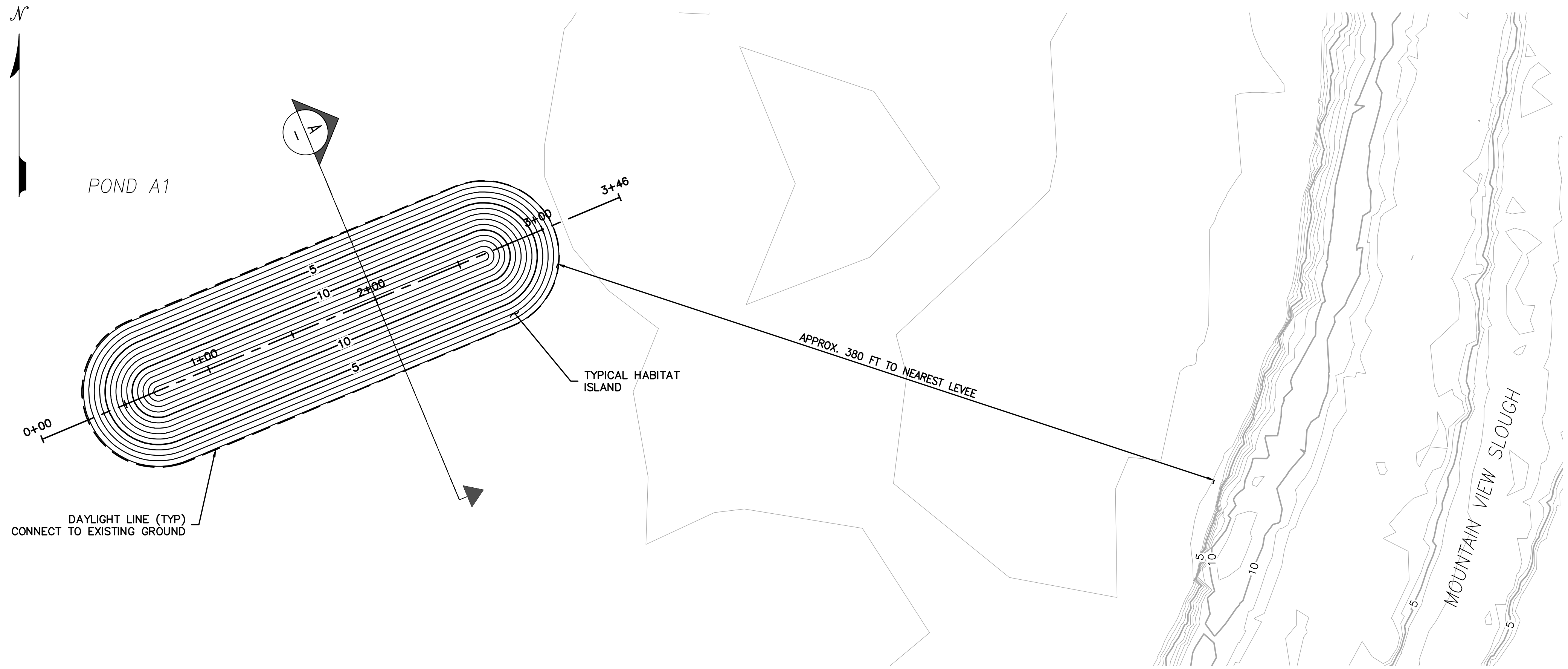
STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372
DATE 12-09-2016

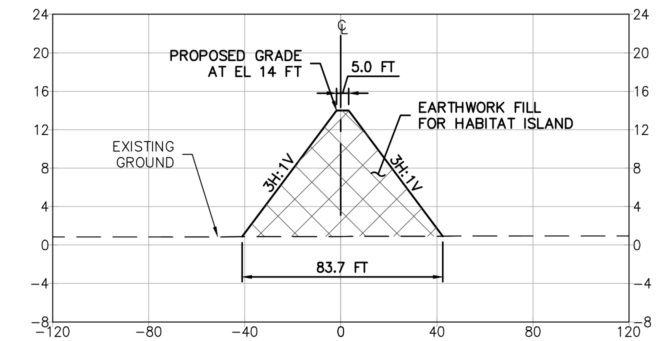
PROJECT **SOUTH BAY SALT POND RESTORATION PROJECT**

SHEET TITLE MOUNTAIN VIEW PONDS
POND A2W SOUTHEAST BREACH
DETAILED GRADING PLAN

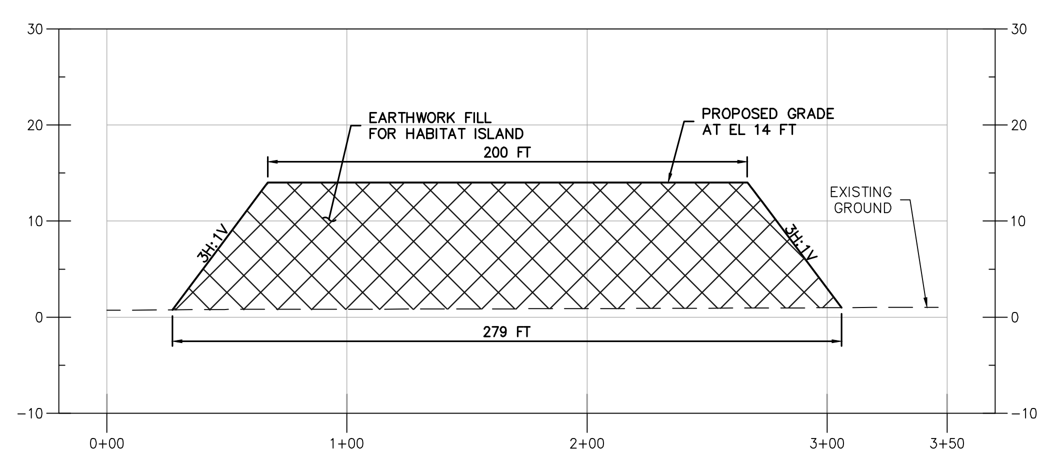
SHEET NO. SHT. 24 OF 33 SHTS.
REV
DWG NO. D-6



PLAN
1"=40'



A HABITAT ISLAND – TYPICAL SECTION
HORIZ 1"=40', VERT 1"=10'



HABITAT ISLAND – PROFILE
HORIZ 1"=40', VERT 1"=10'

HORIZ 1" = 40'

VERT 1" = 10'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
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PREPARED BY
AECOM
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DESIGNED L. CHANDRASEKARAN
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CHECKED G. OROZCO / I. ZARCHI
PEER REVIEWED S. GENTZLER
APPROVED S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372
DATE 12-09-2016

PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

SHEET TITLE
MOUNTAIN VIEW PONDS
TYPICAL HABITAT ISLAND
DETAILED GRADING PLAN

SHEET NO. SHT. 25 OF 33 SHTS.
REV
DWG NO. D-7

Dec 09, 2016 - 9:20am
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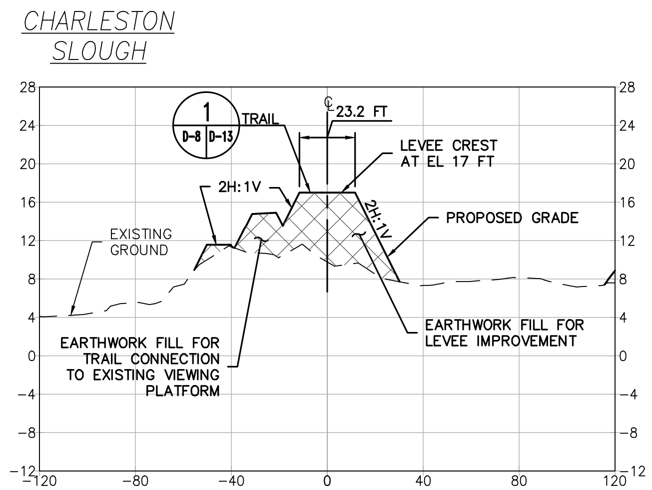
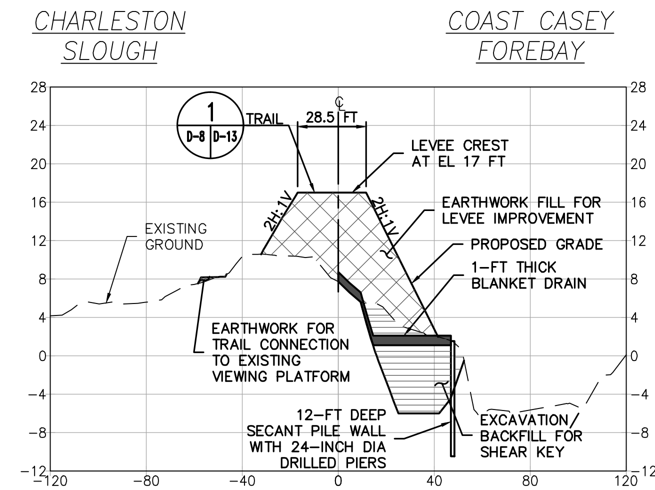
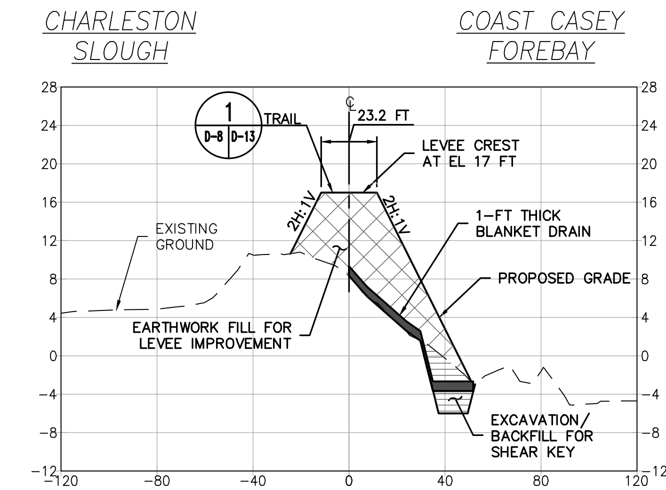


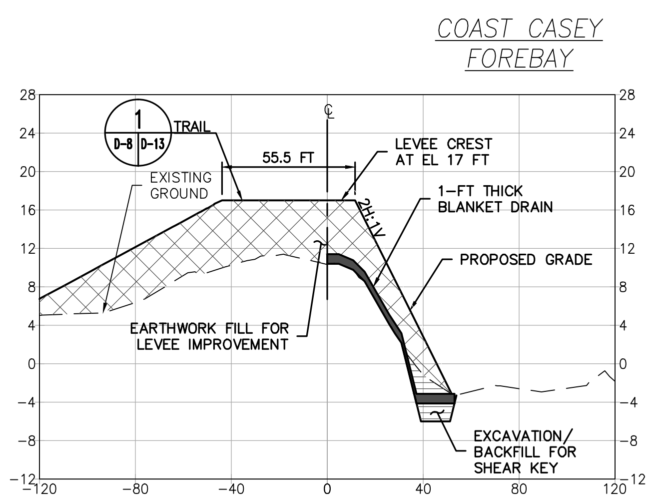
1 G-1 D-8 CCF LEVEE IMPROVEMENT – TYPICAL SECTION
STA 0+00 TO 2+02
HORIZ 1"=40', VERT 1"=10'



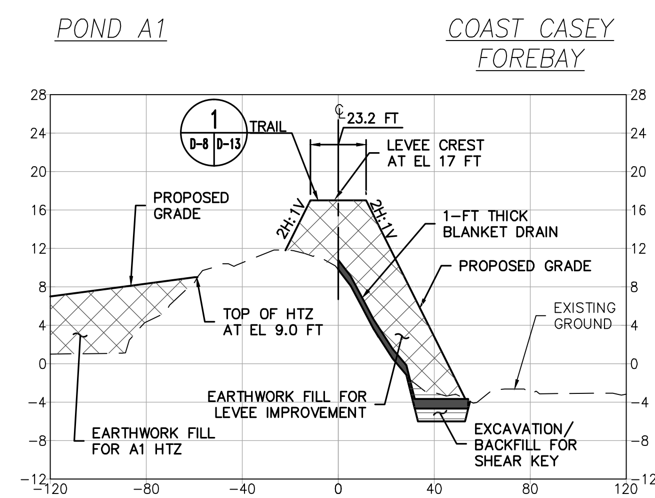
2 G-1 D-8 CCF LEVEE IMPROVEMENT – TYPICAL SECTION
STA 2+02 TO 2+27
HORIZ 1"=40', VERT 1"=10'



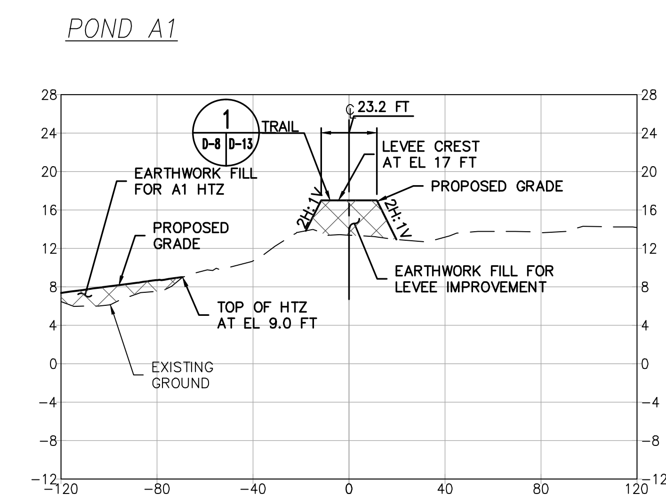
3 G-1 D-8 CCF LEVEE IMPROVEMENT – TYPICAL SECTION
STA 2+27 TO 6+11
HORIZ 1"=40', VERT 1"=10'



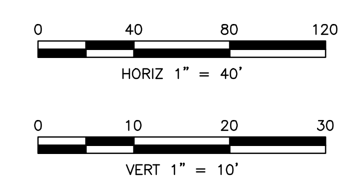
4 G-1 D-8 CCF LEVEE IMPROVEMENT – TYPICAL SECTION
STA 6+11 TO 6+61
HORIZ 1"=40', VERT 1"=10'



5 G-2 D-8 CCF LEVEE IMPROVEMENT – TYPICAL SECTION
STA 6+61 TO 13+07
HORIZ 1"=40', VERT 1"=10'



6 G-2 D-8 CCF LEVEE IMPROVEMENT – TYPICAL SECTION
STA 13+07 TO 14+57
HORIZ 1"=40', VERT 1"=10'



PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

PREPARED BY
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PEER REVIEWED S. GENTZLER
APPROVED S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372
DATE 12-09-2016

PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

SHEET TITLE
MOUNTAIN VIEW PONDS
TYPICAL GRADING SECTIONS
SHEET 1 OF 2

SHEET NO. SHT. 26 OF 33 SHTS.
REV
DWG NO. D-8

Dec 09, 2016 - 9:22am
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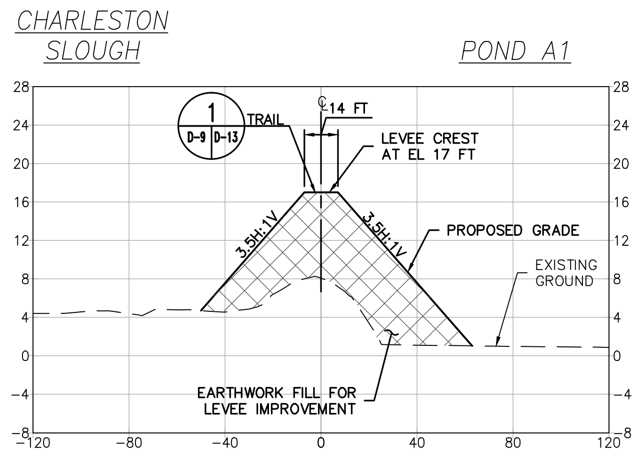
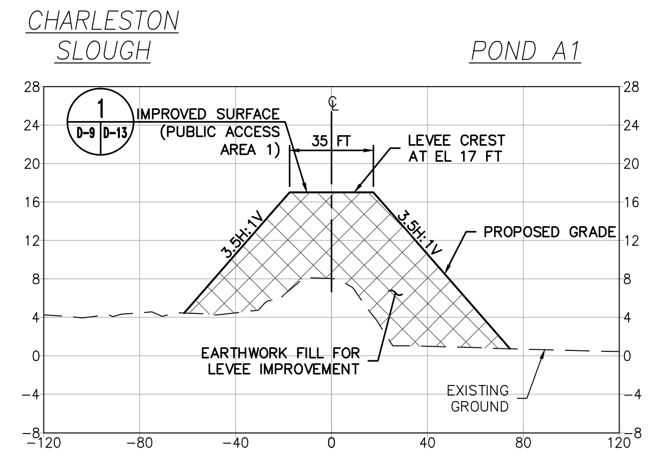
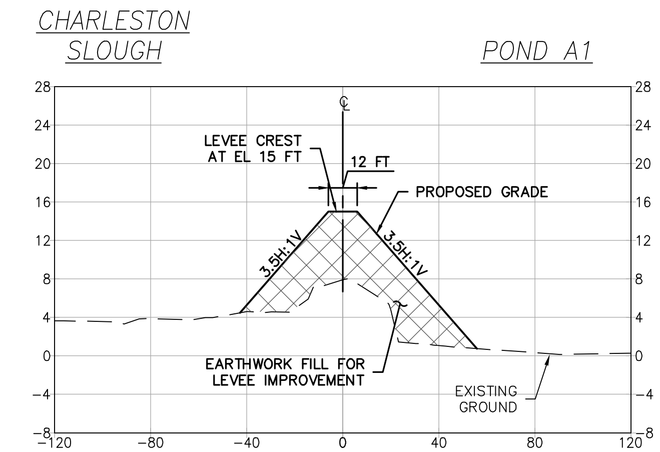


1 (G-3 / D-9) A1 WEST LEVEE IMPROVEMENT – TYPICAL SECTION
STA 0+00 TO 5+07
HORIZ 1"=40', VERT 1"=10'



2 (G-3 / D-9) A1 WEST LEVEE IMPROVEMENT – TYPICAL SECTION
STA 5+07 TO 5+36
HORIZ 1"=40', VERT 1"=10'



3 (G-3, G-4, G-5, G-6 / D-9) A1 WEST LEVEE IMPROVEMENT – TYPICAL SECTION
STA 5+36 TO 44+69
HORIZ 1"=40', VERT 1"=10'

0 40 80 120
HORIZ 1" = 40'

0 10 20 30
VERT 1" = 10'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
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APPROVED S. GENTZLER

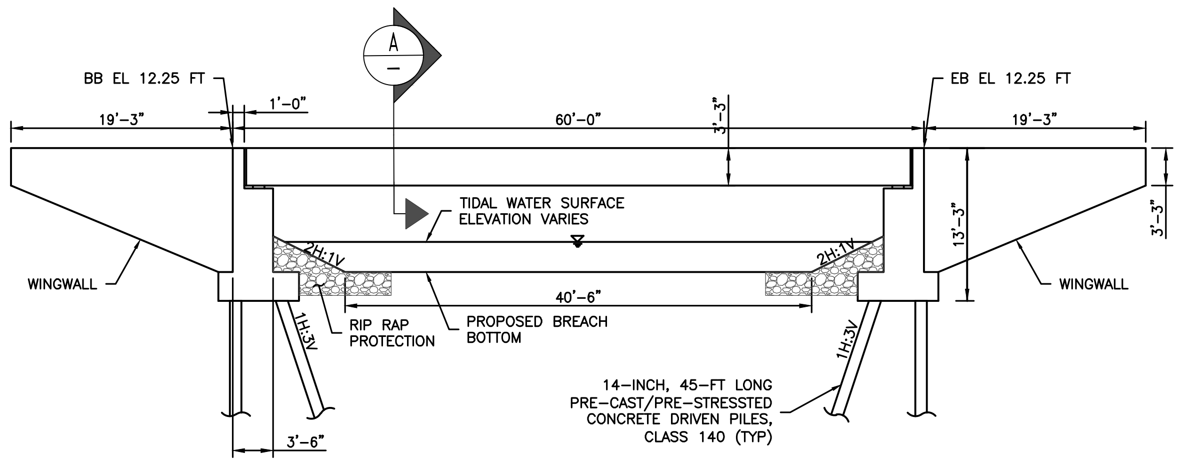
STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372
DATE 12-09-2016

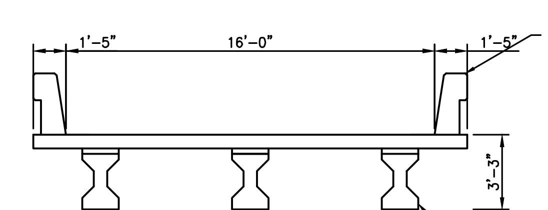
PROJECT **SOUTH BAY SALT POND RESTORATION PROJECT**
SHEET TITLE MOUNTAIN VIEW PONDS TYPICAL GRADING SECTIONS SHEET 2 OF 2

SHEET NO. SHT. 27 OF 33 SHTS.
REV
DWG NO. D-9

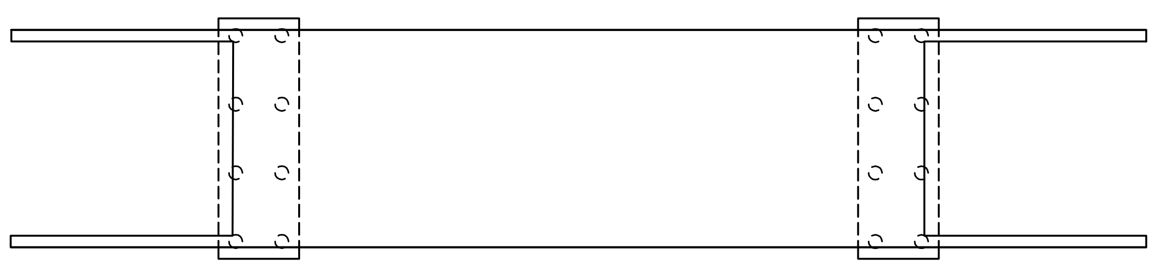
Dec 09, 2016 - 9:24am
C:\pwworking\aecom_na\chandrasekaranl\dms75827\MV_D-9.dwg



BRIDGE ELEVATION
NTS



A BRIDGE TYPICAL SECTION
NTS



BRIDGE PLAN
NTS

NOTES

1. THE TWO BRIDGES ARE LOCATED AT THE NORTHEAST AND SOUTHEAST BREACHES, RESPECTIVELY, ALONG THE EAST LEVEE OF POND A2W.
2. SEE SHEETS D-5 AND D-6 FOR DETAILED GRADING PLANS OF THE NORTHEAST AND SOUTHEAST BREACHES IN POND A2W, RESPECTIVELY, WITH EXISTING AND PROPOSED TOPOGRAPHY.

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

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STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372
DATE 12-09-2016

PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

SHEET TITLE
MOUNTAIN VIEW PONDS
POND A2W EAST LEVEE BRIDGES
TYPICAL STRUCTURAL DETAILS

SHEET NO.
SHT. 28 OF 33 SHTS.
REV

DWG NO.
D-10

Dec 09, 2016 - 11:03am
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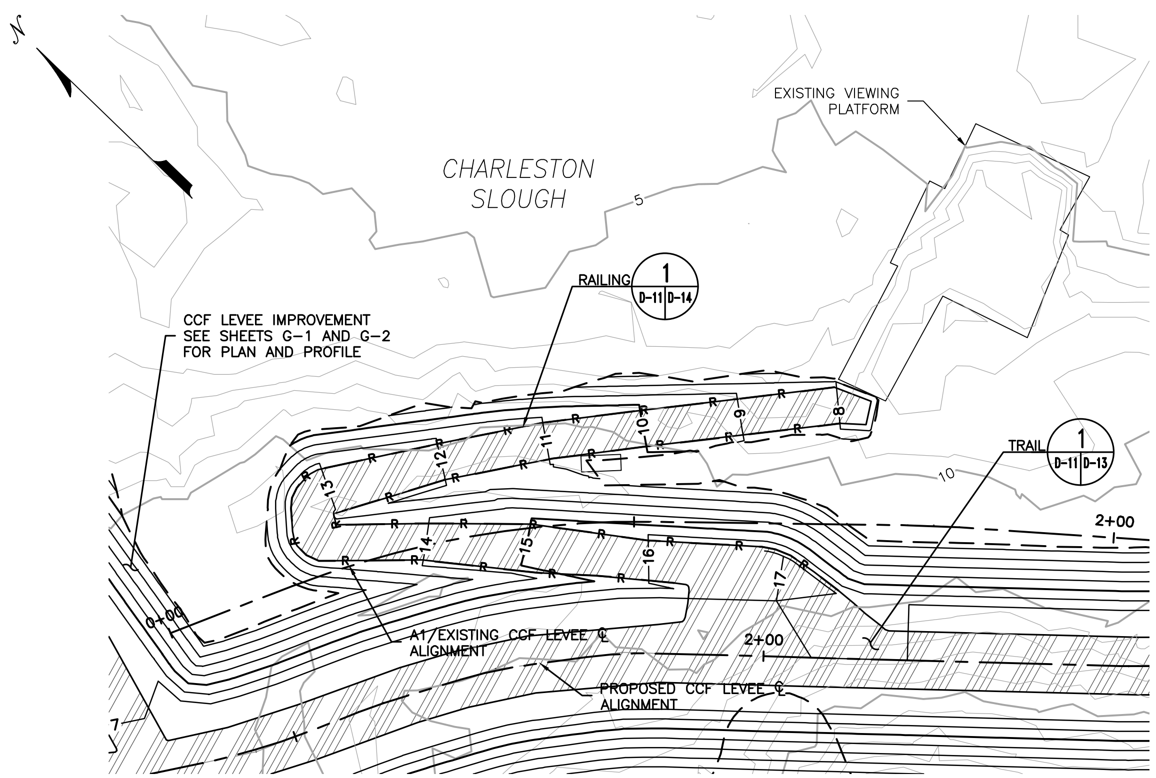
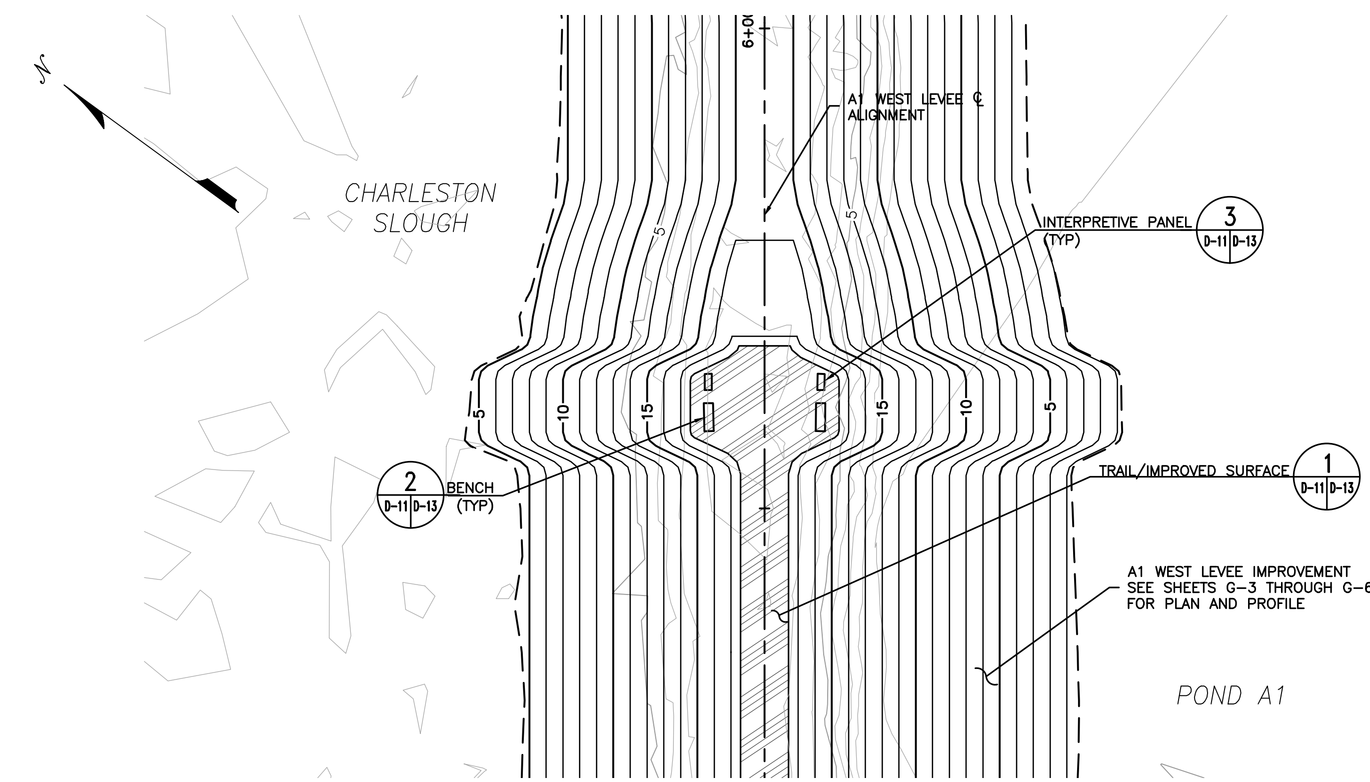


1 - TRAIL CONNECTION TO EXISTING VIEWING PLATFORM – PLAN
1" = 20'



2 - PUBLIC ACCESS AREA 1 – PLAN
1" = 20'

0 20 40 60
HORIZ 1" = 20'

QUESTA ENGINEERING CORP.
Civil Environmental & Water Resources
(510) 236-6114 FAX (510) 236-2423 questa@questaec.com
P.O. Box 70356 1220 Brickyard Cove Road Point Richmond, CA 94807

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
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DESIGNED M. HENDERSON
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APPROVED S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372
DATE 12-09-2016

PROJECT **SOUTH BAY SALT POND RESTORATION PROJECT**
SHEET TITLE MOUNTAIN VIEW PONDS PUBLIC ACCESS FEATURES DETAILED LAYOUTS - SHEET 1 OF 2

SHEET NO. SHT. 29 OF 33 SHTS.
REV
DWG NO. D-11

Dec 14, 2016 - 4:49pm
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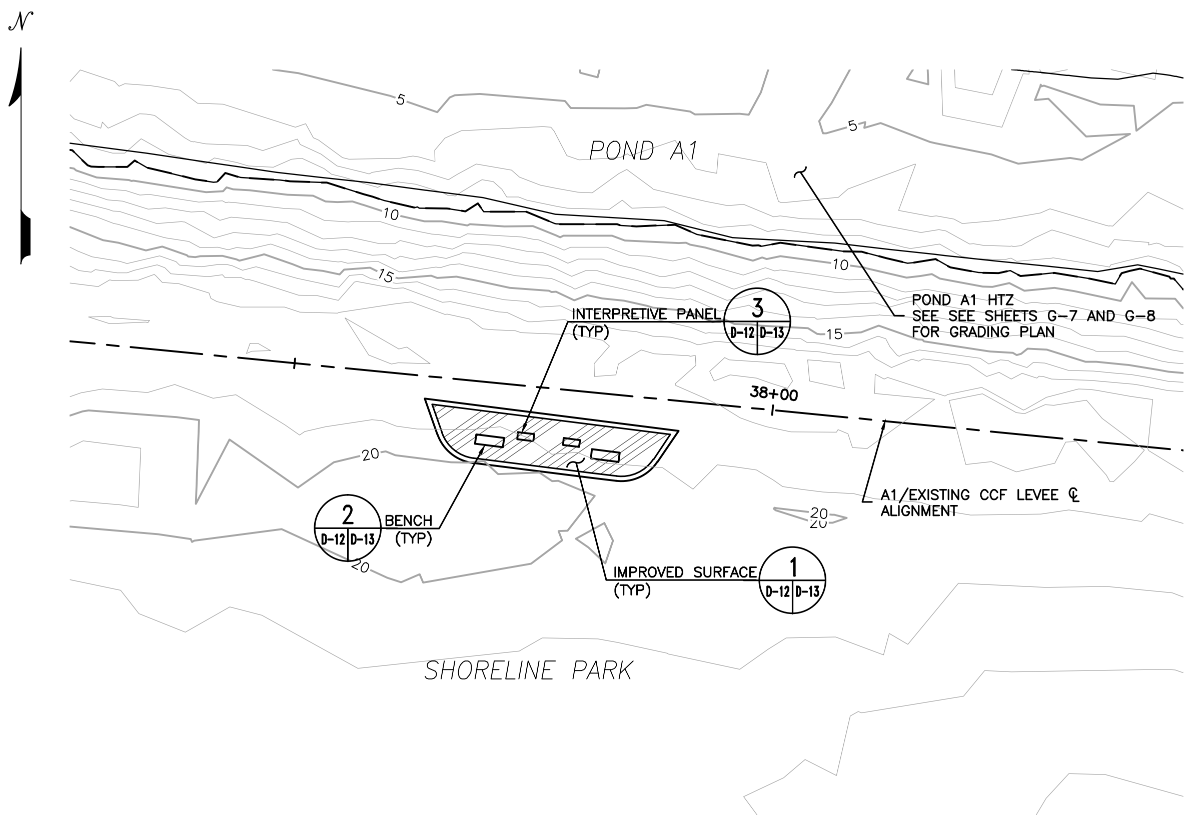
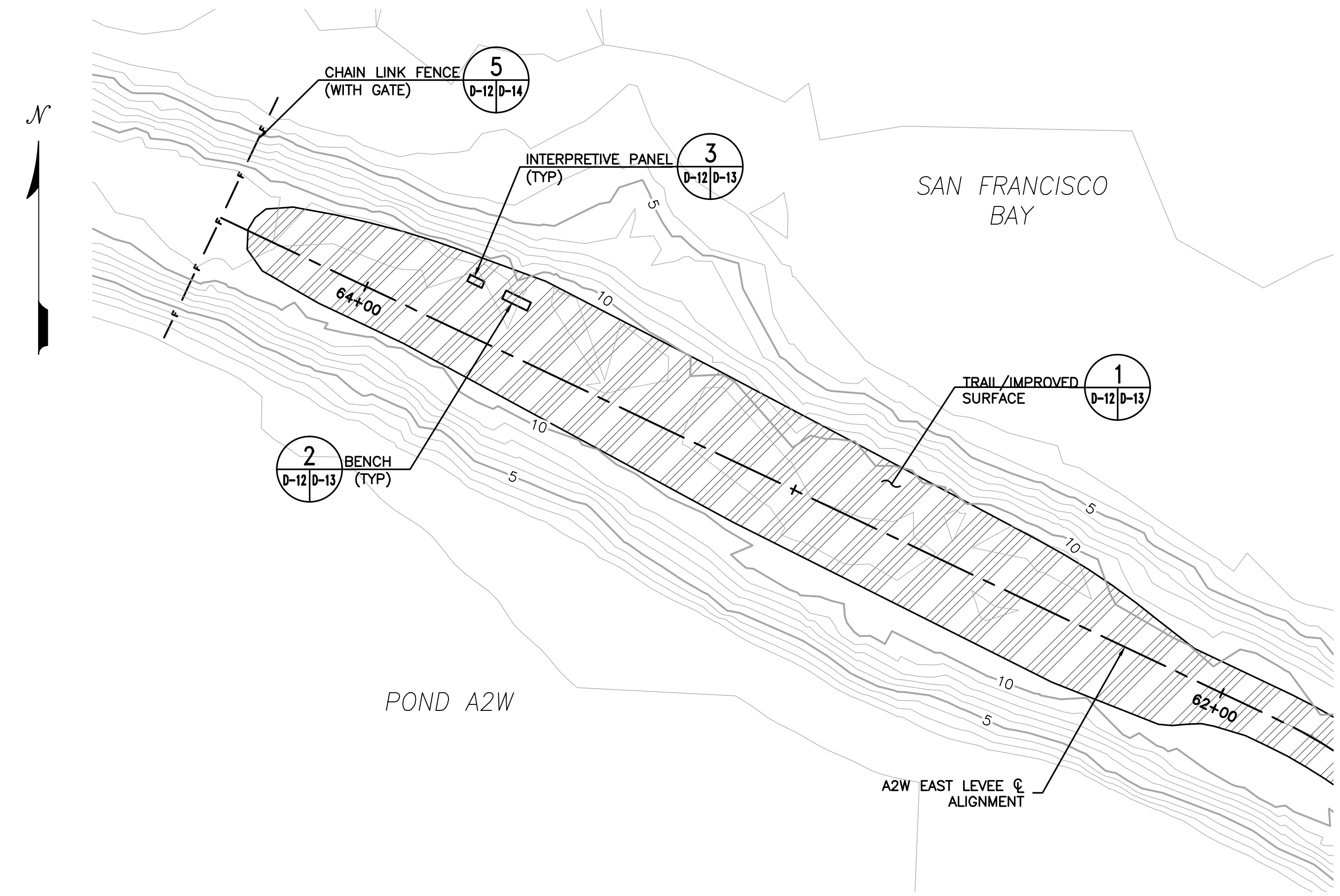


3 PUBLIC ACCESS AREA 2 – PLAN
- 1" = 20'



4 PUBLIC ACCESS AREA 3 – PLAN
- 1" = 20'

0 20 40 60
HORIZ 1" = 20'

QUESTA ENGINEERING CORP.
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& Water Resources
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questa@questaec.com
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PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
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PREPARED BY
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Tel: (510) 893-3600
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DESIGNED	M. HENDERSON
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PEER REVIEWED	S. GENTZLER
APPROVED	S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372
DATE 12-09-2016

PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

SHEET TITLE
MOUNTAIN VIEW PONDS
PUBLIC ACCESS FEATURES
DETAILED LAYOUTS - SHEET 2 OF 2

SHEET NO.
SHT. 30 OF 33 SHTS.
REV

DWG NO.
D-12

Dec 14, 2016 - 4:55pm
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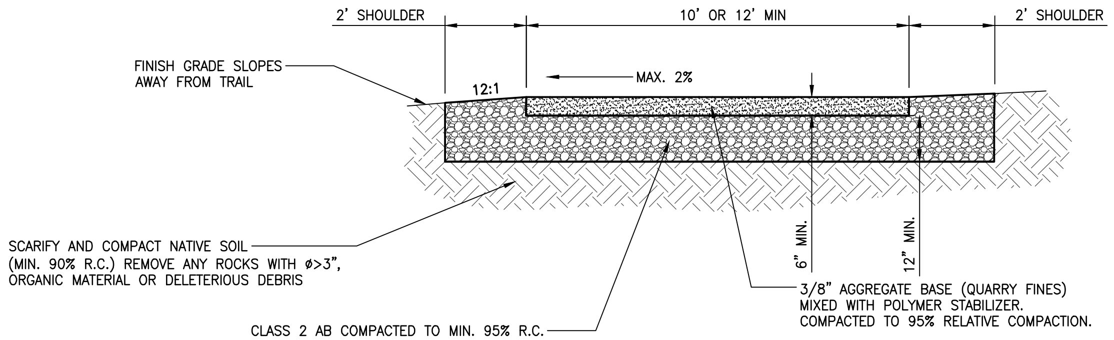
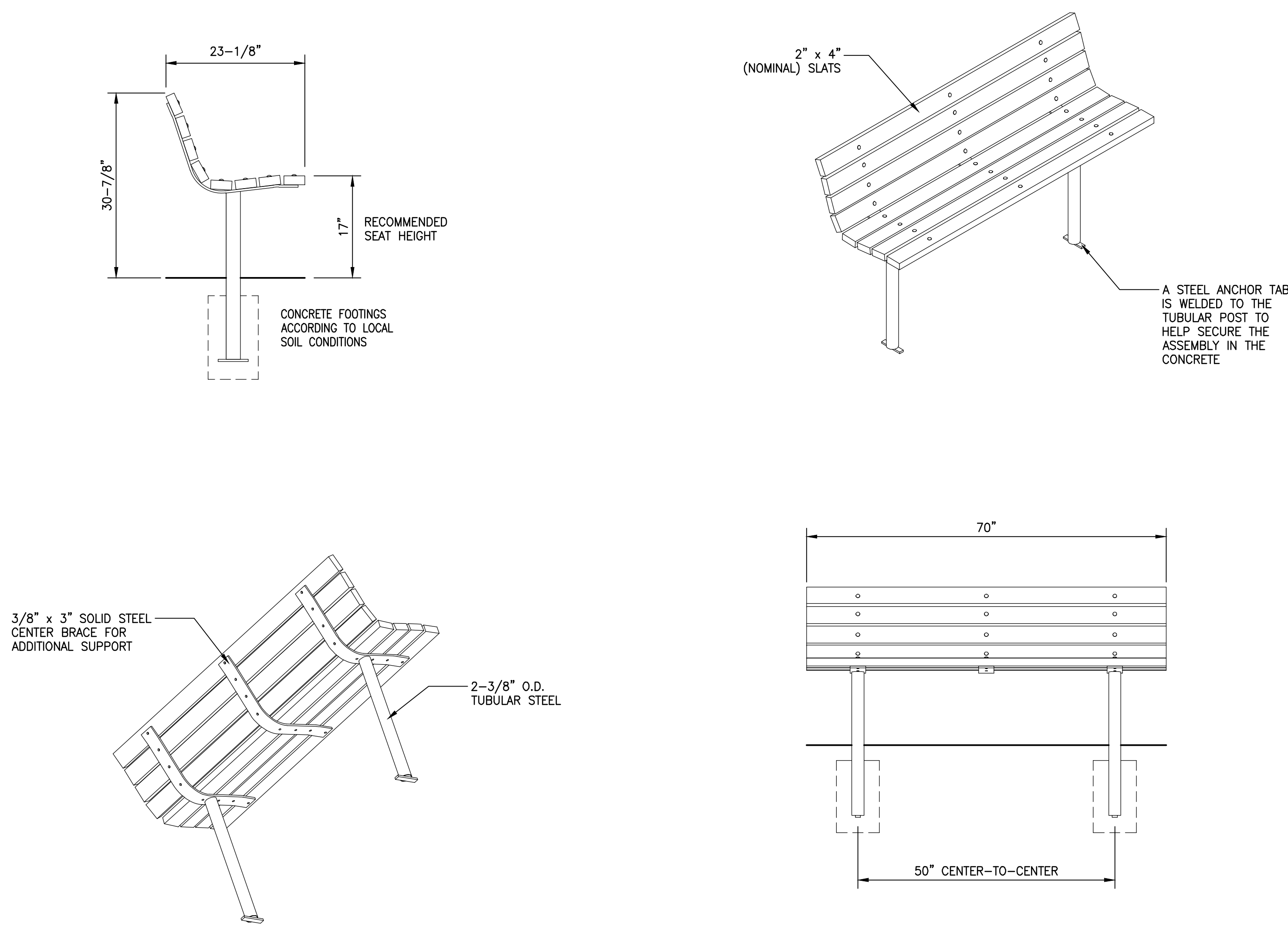
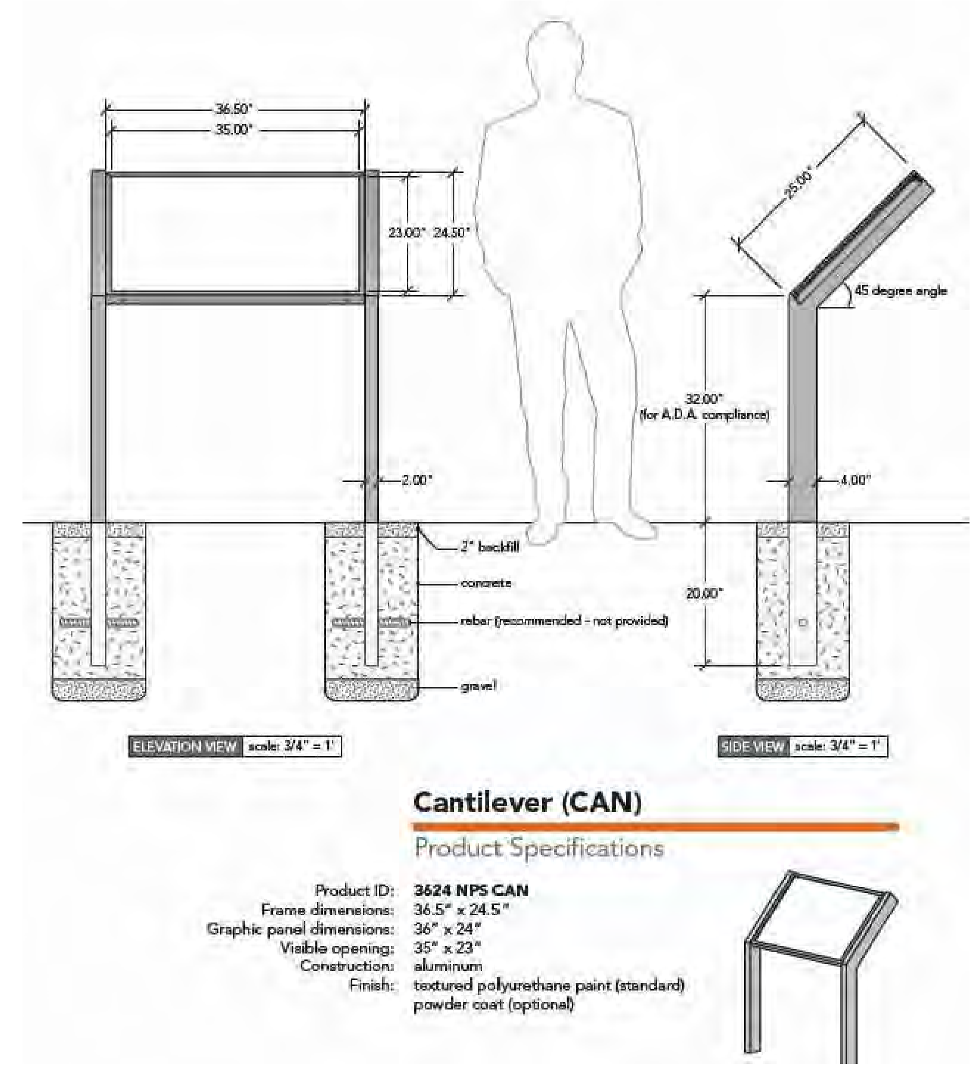


1 – TRAIL/IMPROVED SURFACE
NTS



2 – BENCH
NTS



3 – INTERPRETIVE PANEL
NTS

QUESTA ENGINEERING CORP.
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& Water Resources
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questa@questaec.com
P.O. Box 70356 1220 Brickyard Cove Road Point Richmond, CA 94807

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
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STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372
DATE 12-09-2016

PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

SHEET TITLE
MOUNTAIN VIEW PONDS
PUBLIC ACCESS FEATURES
DETAILS - SHEET 1 OF 2

SHEET NO.
SHT. 31 OF 33 SHTS.
REV
DWG NO.
D-13

Dec 15, 2016 - 5:18pm
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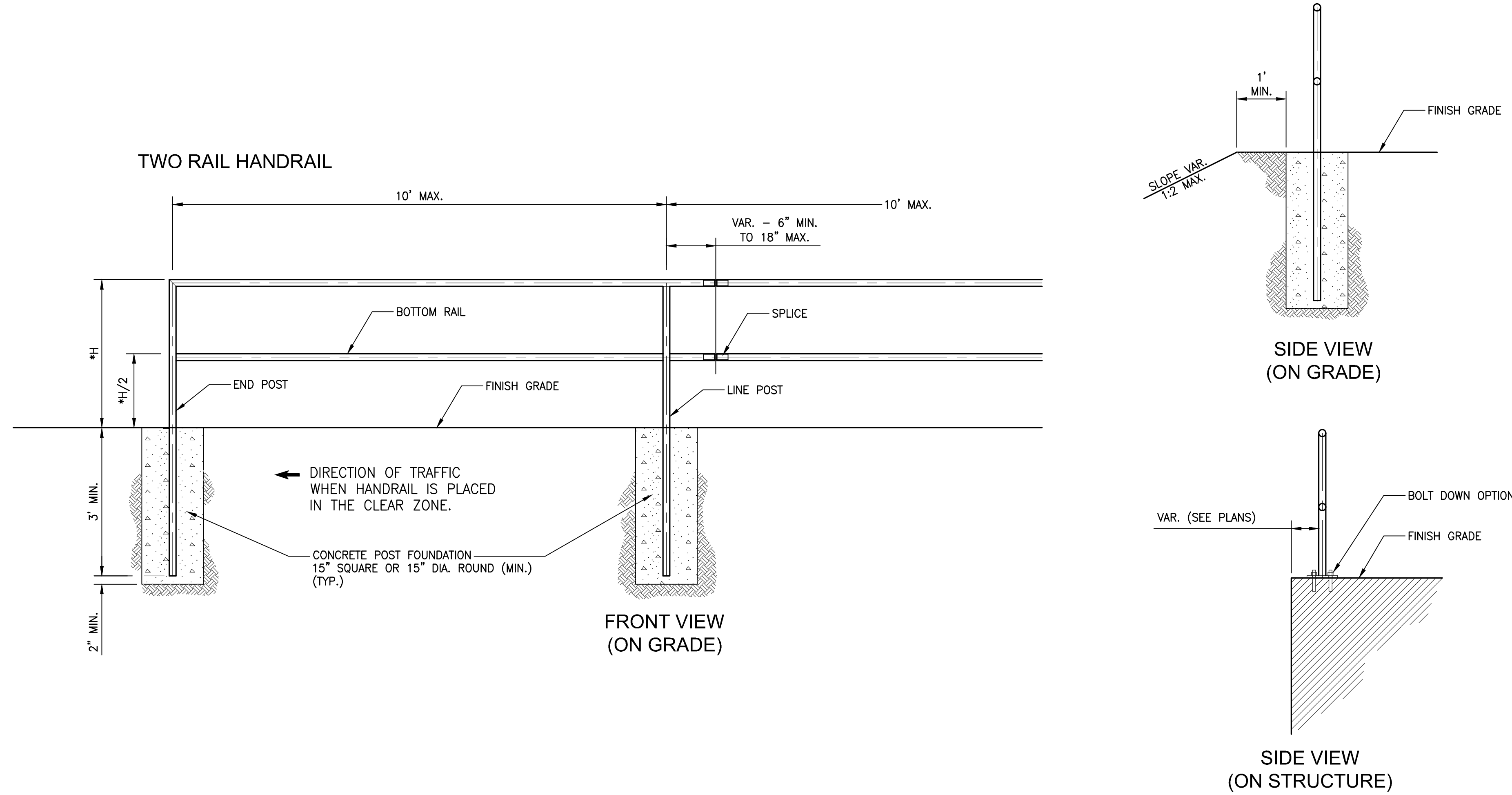
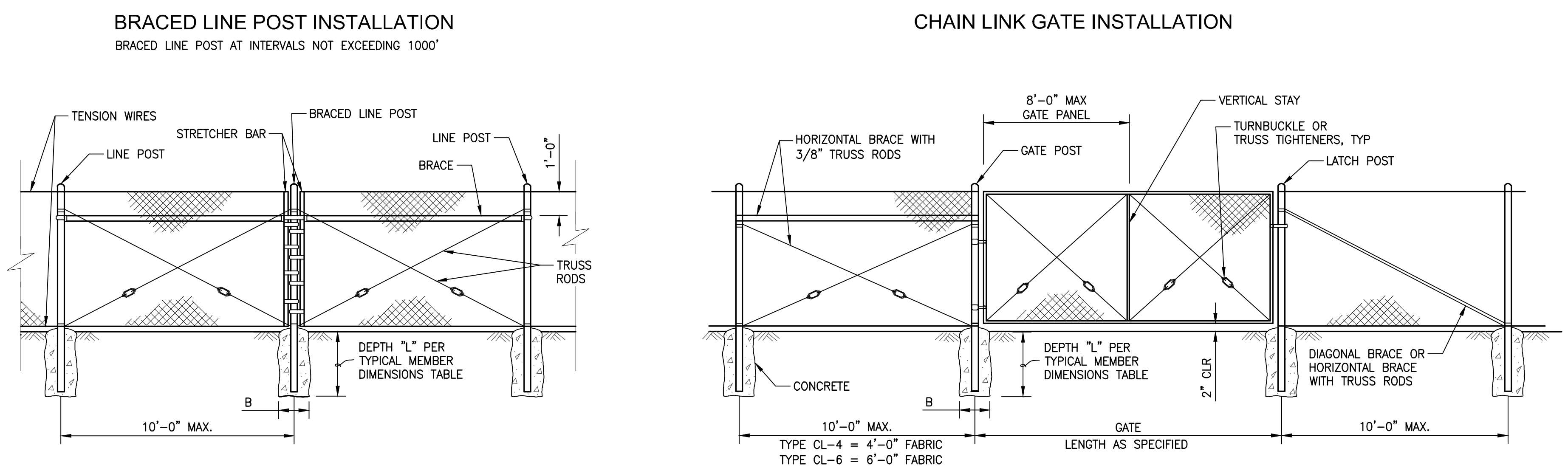


4 - RAILING DETAILS
NTS



TYPICAL MEMBER DIMENSIONS

FENCE HEIGHT (Max)	SLATTED	B (in)	L (ft)	ROUND PIPE GATE/LINE POST SECTION	ROUND OD PIPE	WEIGHT (lb/ft)
5'-0"	NO	12"	2'-6"	3 Std	3.50"	7.58
6'-0"	NO	12"	2'-6"	3 Std	3.50"	7.58
8'-0"	NO	12"	3'-0"	3 Std	3.50"	7.58
10'-0"	NO	14"	3'-6"	3 Std	3.50"	7.58
5'-0"	YES	12"	3'-0"	31/2 Std	4.00"	9.12
6'-0"	YES	14"	3'-6"	4 Std	4.50"	10.80
8'-0"	YES	18"	3'-6"	5 Std	5.56"	14.60
10'-0"	YES	20"	4'-0"	6 Std	6.63"	19.00

Above post dimensions and weights are minimums.
Larger sizes may be used upon approval.
Maximum Gate Width is 24'-0".

5 - CHAIN LINK FENCE WITH GATE
NTS

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PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
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PEER REVIEWED	S. GENTZLER
APPROVED	S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

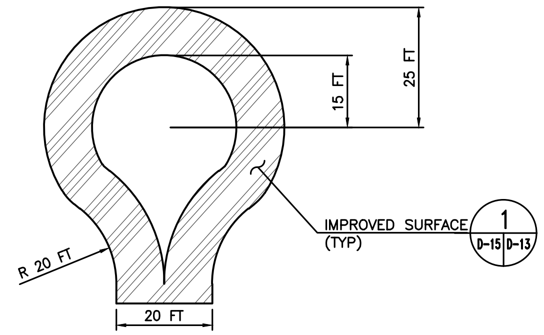
PROJECT No. 60422372 DATE 12-09-2016

PROJECT: **SOUTH BAY SALT POND RESTORATION PROJECT**

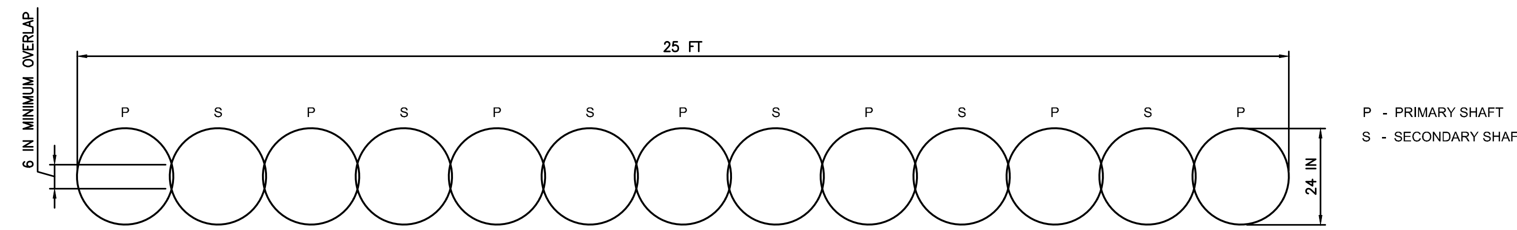
SHEET TITLE: MOUNTAIN VIEW PONDS PUBLIC ACCESS FEATURES DETAILS - SHEET 2 OF 2

SHEET NO. SHT. 32 OF 33 SHTS. REV

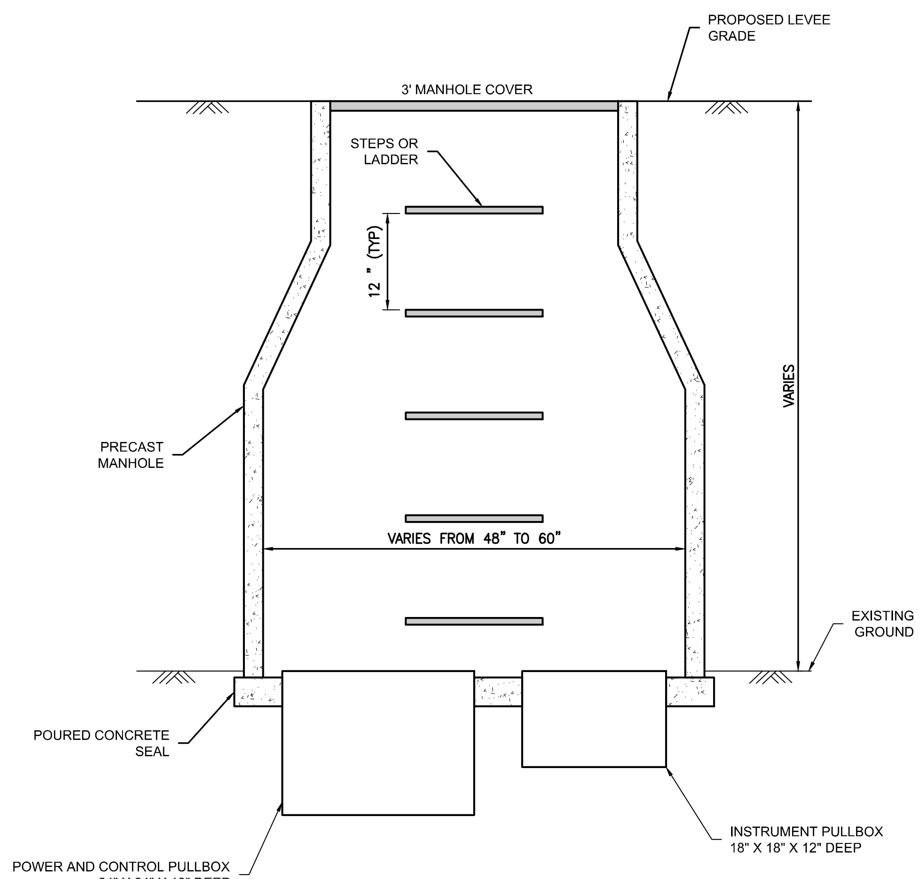
DWG NO. D-14



1 VEHICLE TURNAROUND
NTS



2 SECANT PILE WALL
NTS



3 ELECTRICAL PULL BOX ACCESS
NTS

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
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APPROVED S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy
PROJECT No. 60422372
DATE 12-09-2016

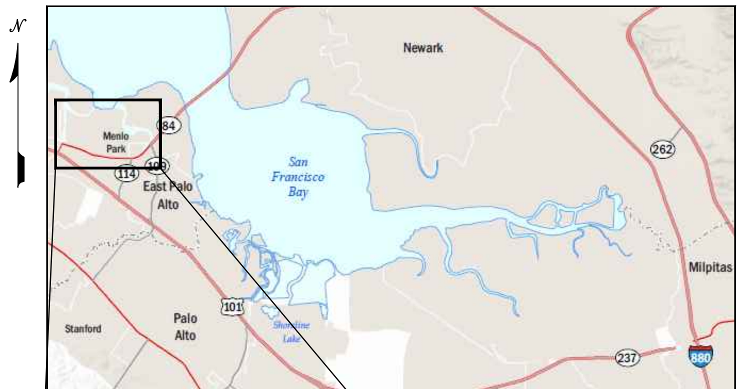
PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT
SHEET TITLE
MOUNTAIN VIEW PONDS
MISCELLANEOUS DETAILS

SHEET NO. SHT. 33 OF 33 SHTS.
REV
DWG NO. D-15

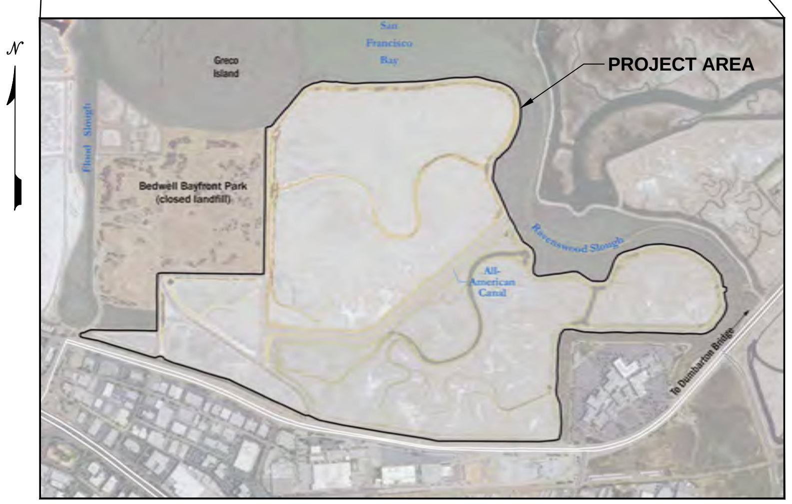
Dec 09, 2016 - 9:37am
C:\pwworking\aecom_na\chandrasekaranl\dms75827\MV_D-15.dwg

SOUTH BAY SALT POND RESTORATION PROJECT

RAVENSWOOD PONDS
NEAR MENLO PARK, CALIFORNIA



VICINITY MAP
NTS



LOCATION MAP
NTS

PROJECT AREA PHOTO

SHEETS

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
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APPROVED S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372
DATE 12-13-2016

PROJECT SOUTH BAY SALT POND RESTORATION PROJECT
SHEET TITLE RAVENSWOOD PONDS TITLE SHEET

SHEET NO. SHT. 1 OF 40 SHTS.
REV
DWG NO. T-1

Dec 14, 2016 - 3:12pm
C:\pwworking\aecom_na\chandrasekaranl\dms75824\RW_T-1.dwg

LEGEND

LINETYPES

- ALIGNMENT CENTERLINE
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- PROPOSED DAYLIGHT LINE
- CONSTRUCTION ACCESS ROUTE
- EXISTING TRAIL
- PROPOSED TRAIL
- WOOD POST AND CABLE FENCE
- VINYL CLAD CHAIN LINK FENCE
- CHAIN LINK FENCE WITH GATE
- EXISTING CARGILL PIPELINE

- PROPOSED EARTHWORK FILL
- PROPOSED EARTHWORK CUT
- STAGING/STOKCPILING AREA
- TRAIL/IMPROVED SURFACE

SYMBOLS

CROSS–SECTION

CROSS SECTION IDENTIFICATION NUMBER

SHEET NUMBER ON WHICH CROSS SECTION IS DRAWN

TYPICAL SECTION IDENTIFICATION NUMBER

SHEET NUMBER ON WHICH PLAN IS DRAWN

SHEET NUMBER ON WHICH CROSS SECTION IS DRAWN

TRAIL (TYP)

TYPICAL DETAIL IDENTIFICATION NUMBER

SHEET NUMBER ON WHICH DETAIL IS DRAWN

INTERPRETIVE PANEL (TYP)

0 100 200 300

HORIZ 1" =100'

SCALE BAR

NORTH ARROW

ABBREVIATIONS

AAC	ALL AMERICAN CANAL
℄	CENTERLINE
DIA	DIAMETER
EL	ELEVATION
FT	FEET
HDPE	HIGH DENSITY POLYETHYLENE
HORIZ.	HORIZONTAL
HTZ	HABITAT TRANSITION ZONE
NTS	NOT TO SCALE
STA	STATION
TYP	TYPICAL
VERT.	VERTICAL
WCS	WATER CONTROL STRUCTURE

GENERAL NOTES

1. PROJECT COORDINATE SYSTEM AND VERTICAL DATUM ARE AS FOLLOWS:
   COORDINATE SYSTEM: NAD83, CALIFORNIA STATE PLANE ZONE 3
   VERTICAL DATUM: NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88)
2. TOPOGRAPHY FROM LIDAR DATA OBTAINED FROM AIRBORNE1 IN U.S. SURVEY FEET, DATED JUNE–NOVEMBER 2010.
3. PROPOSED TOPOGRAPHIC CONTOUR INFORMATION IS SHOWN AT 1–FOOT CONTOUR INTERVALS, UNLESS OTHERWISE STATED.
4. ALL CONSTRUCTION AND CONSTRUCTION MATERIAL SHALL BE IN ACCORDANCE WITH THESE PLANS.
5. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO BE KNOWLEDGEABLE ABOUT AND OBEY ALL PERMIT REQUIREMENTS WHILE PERFORMING THE WORK ON THESE PLANS.
6. THE CONTRACTOR SHALL PRACTICE SAFETY AT ALL TIMES AND SHALL FURNISH, ERECT, AND MAINTAIN SUCH FENCES, BARRICADES, LIGHTS, AND SIGNS NECESSARY TO GIVE ADEQUATE PROTECTION TO THE PUBLIC AT ALL TIMES.
7. THE CONTRACTOR SHALL HAVE COPIES OF THE APPROVED PLANS AND SPECIFICATIONS FOR THIS PROJECT AT ALL TIMES AND SHALL BE FAMILIAR WITH ALL APPLICABLE STANDARDS AND SPECIFICATIONS.
8. THE CONTRACTOR IS RESPONSIBLE FOR SETTING ONSITE SURVEY CONTROL FOR CONSTRUCTION STAKING IN PROJECT COORDINATE SYSTEM AND VERTICAL DATUM.
9. UNDERGROUND FACILITIES AND SUB–STRUCTURES SHOWN IN THESE PLANS WERE OBTAINED FROM THE BEST AVAILABLE SOURCES. HOWEVER, SINCE SOME INFORMATION WAS OBTAINED FROM OTHERS, AECOM CANNOT GUARANTEE SAID INFORMATION AS BEING ACCURATE. PRIOR TO BEGINNING CONSTRUCTION, THE CONTRACTOR SHALL VERIFY THE DEPTH AND LOCATION OF ALL EXISTING UTILITIES, EQUIPMENT, AND SUB–STRUCTURES. IN THE EVENT OF DAMAGE TO EXISTING UTILITIES, EQUIPMENT, OR SUB–STRUCTURES, THE CONTRACTOR SHALL PERFORM ALL REPAIRS AT THEIR EXPENSE.
10. THE CONTRACTOR IS RESPONSIBLE FOR STABILITY OF ALL EXCAVATIONS.

EARTHWORK SUMMARY

LEVEE IMPROVEMENTS	226,300 CY (FILL, INCLUDE 24% FOR SHRINKAGE)
HABITAT TRANSITION ZONES	130,400 CY (FILL, INCLUDES 3% FOR SHRINKAGE)
LEVEE REMOVAL	10,700 CY (CUT, BANK–MEASURE)
LEVEE LOWERING	2,100 CY (CUT, BANK–MEASURE)
BREACH EXCAVATION	13,300 CY (CUT, BANK–MEASURE)
PILOT CHANNEL	16,000 CY (CUT, BANK–MEASURE)
DITCH BLOCK	1,000 CY (FILL, ASSUMES NO SHRINKAGE)
CHANNEL (WCS–4 TO RAVENSWOOD SLOUGH)	1,000 CY (CUT, BANK–MEASURE)

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

PREPARED BY
AECOM
300 Lakeside Drive, Suite 400
Oakland, CA 94612
Tel: (510) 893-3600
aecom.com

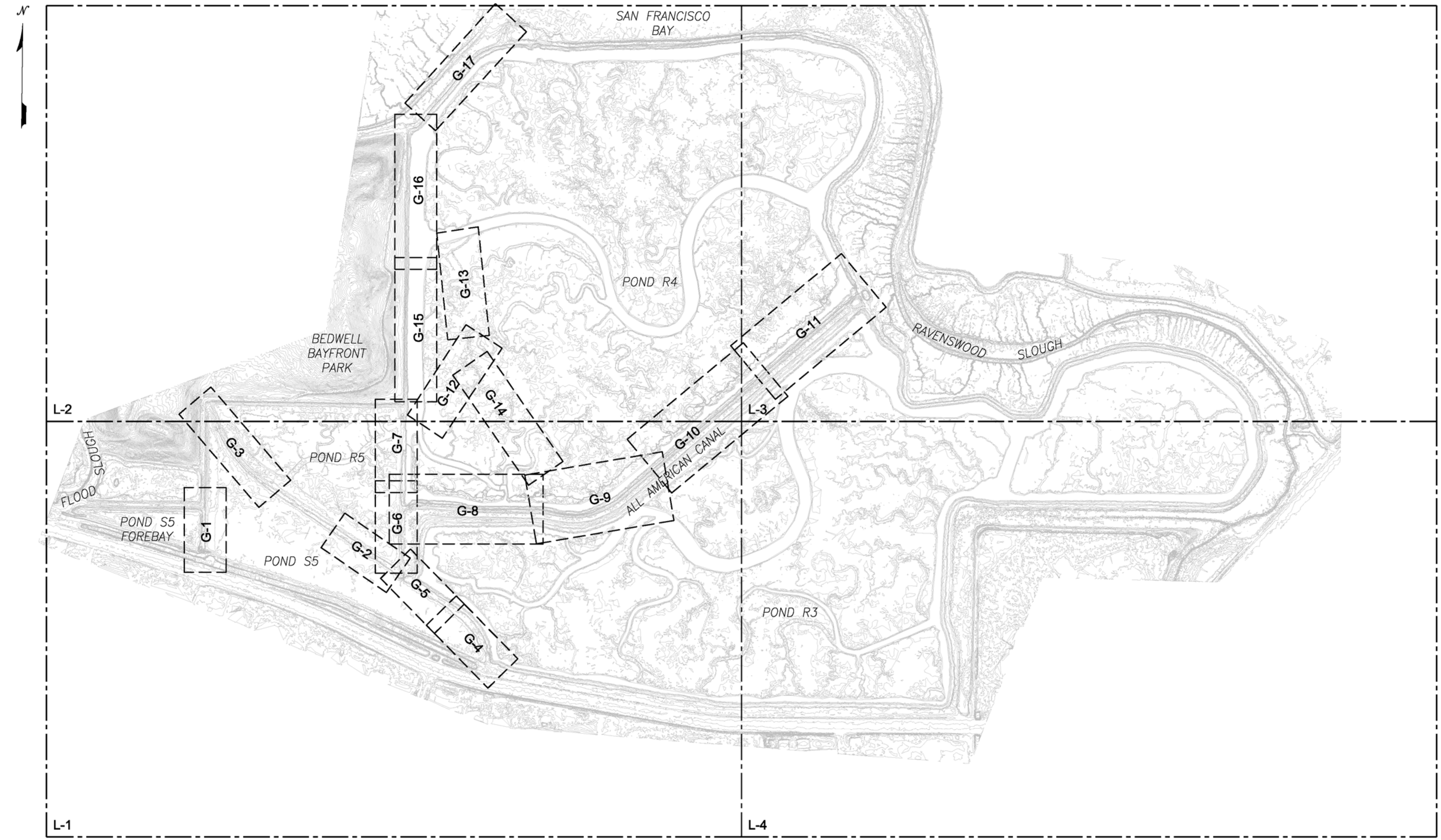
DESIGNED L. CHANDRASEKARAN
DRAWN L. DIFUNTORUM
CHECKED G. OROZCO / I. ZARCHI
PEER REVIEWED S. GENTZLER
APPROVED S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372
DATE 12-13-2016

PROJECT SOUTH BAY SALT POND RESTORATION PROJECT
SHEET TITLE RAVENSWOOD PONDS NOTES AND LEGEND

SHEET NO. SHT. 2 OF 40 SHTS.
REV
DWG NO. T-2



PLAN
1"=400'

0 400 800 1200
HORIZ 1" = 400'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
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DESIGNED	L. CHANDRASEKARAN
DRAWN	L. DIFUNTORUM
CHECKED	G. OROZCO / I. ZARCHI
PEER REVIEWED	S. GENTZLER
APPROVED	S. GENTZLER

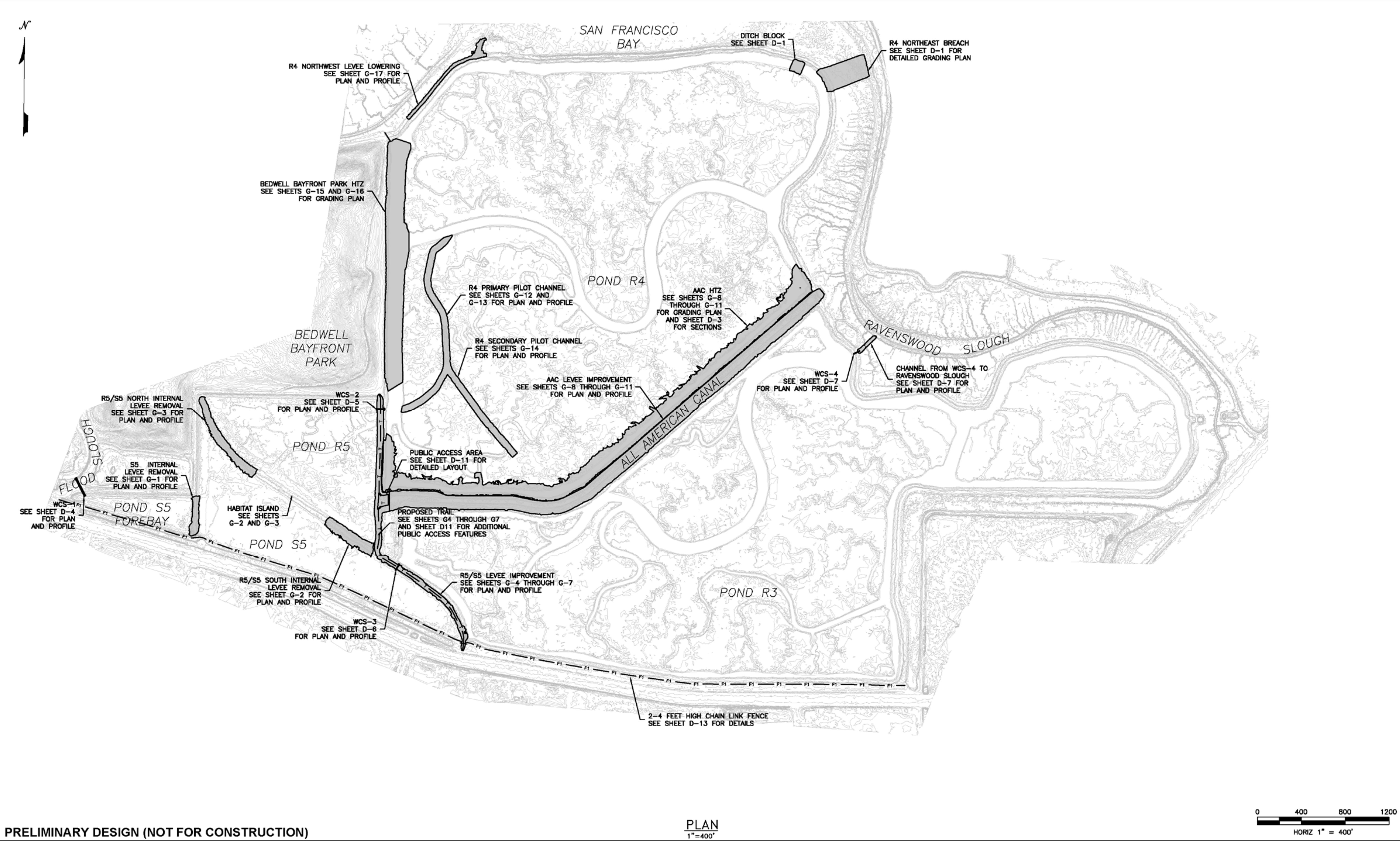
STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372 DATE 12-13-2016

PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

SHEET TITLE
RAVENSWOOD PONDS
KEY MAP

SHEET NO. SHT. 3 OF 40 SHTS.
REV
DWG NO. T-3



PLAN
1"=400'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
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PEER REVIEWED S. GENTZLER
APPROVED S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372
DATE 12-13-2016

PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

SHEET TITLE
RAVENSWOOD PONDS GENERAL ARRANGEMENT PLAN

SHEET NO. SHT 4 OF 40 SHTS
REV
DWG NO. T-4

NOTES

1. THE ACCESS ROUTES SHOWN ARE PRELIMINARY AND INTENDED FOR PLANNING AND IMPACT ANALYSIS PURPOSES. THE EXACT ROUTES WILL BE FINALIZED IN COORDINATION WITH THE CITY OF MENLO PARK.
2. THE CONTRACTOR MAY LOCATE FILL MATERIAL WITHIN THE INDICATED STOCKPILING AREA.

PLAN
1"=500'

0 500 1000 1500
HORIZ 1" = 500'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
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STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372
DATE 12-13-2016

PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

SHEET TITLE
RAVENSWOOD PONDS ACCESS ROUTE & STAGING PLAN

SHEET NO. SHT. 5 OF 40 SHTS.
REV
DWG NO. T-5

Dec 12, 2016 - 7:47pm
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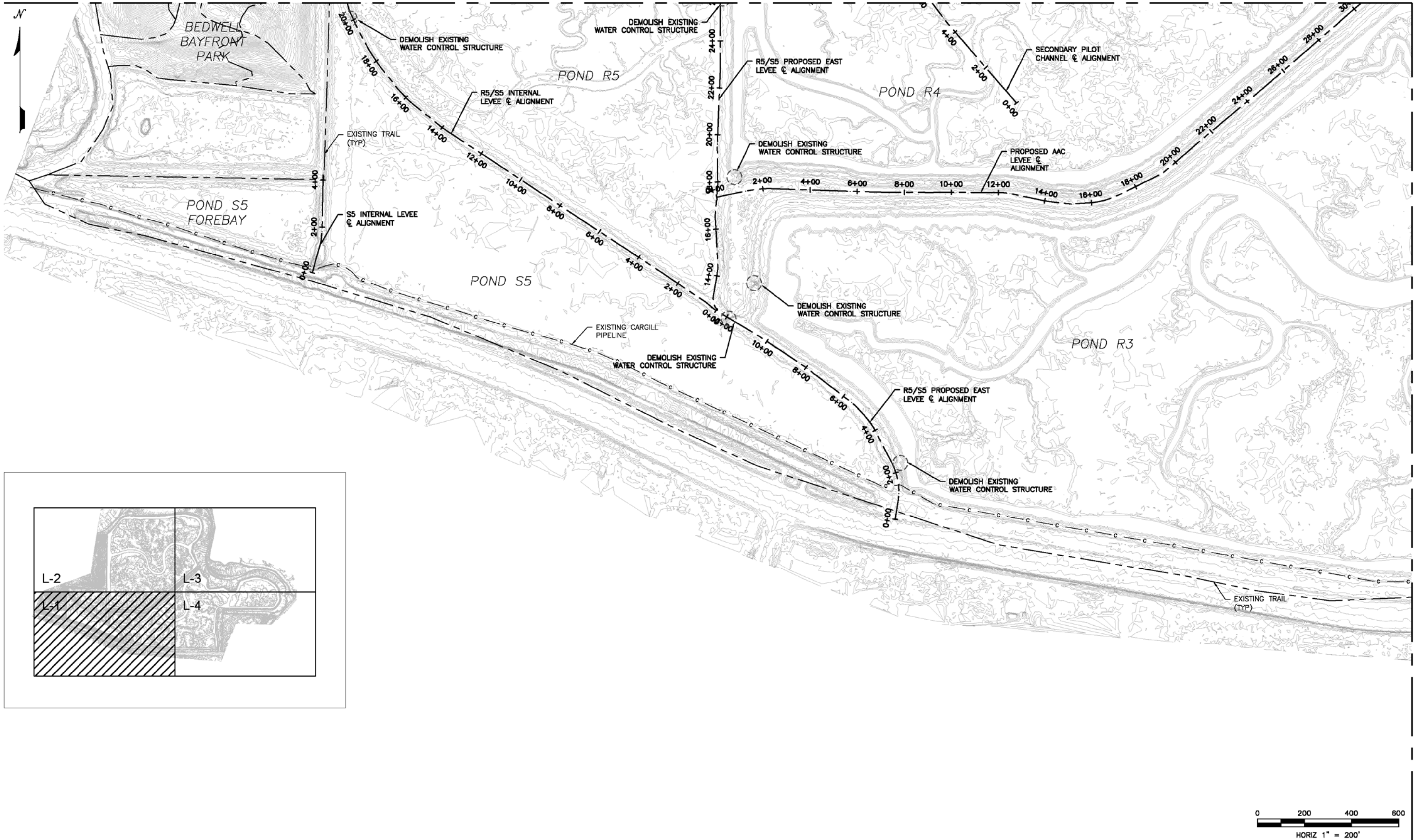

PLAN
1"=200'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
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PEER REVIEWED S. GENTZLER
APPROVED S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372 DATE 12-13-2016

PROJECT **SOUTH BAY SALT POND RESTORATION PROJECT**

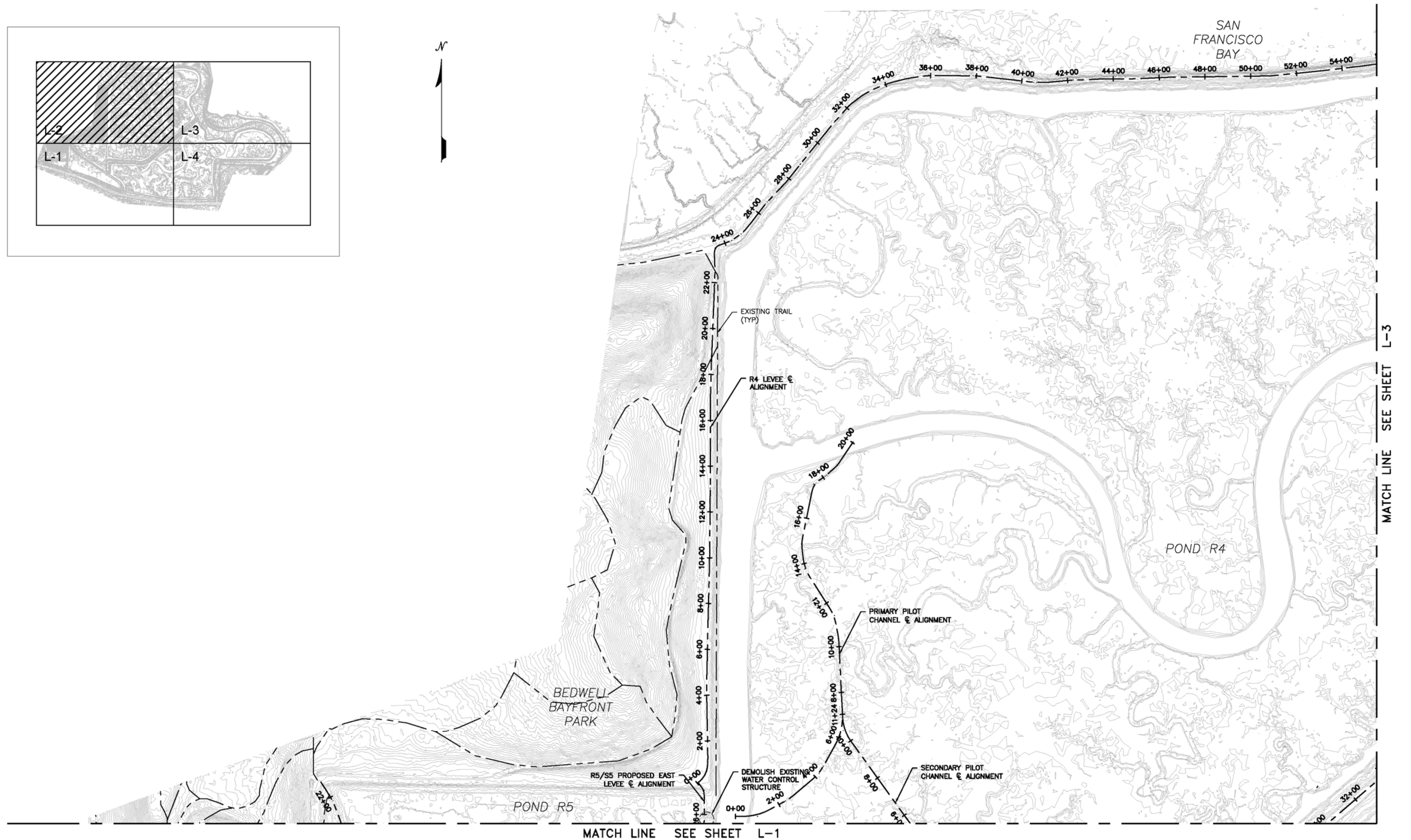
SHEET TITLE RAVENSWOOD PONDS LAYOUT PLAN SHEET 1 OF 4

SHEET NO. SHT. 6 OF 40 SHTS.

REV

DWG NO. L-1

Dec 15, 2016 - 1:41pm



PLAN
1"=200'

0 200 400 600
HORIZ 1" = 200'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
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PEER REVIEWED	S. GENTZLER
APPROVED	S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372 DATE 12-13-2016

PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

SHEET TITLE
RAVENSWOOD PONDS
LAYOUT PLAN
SHEET 2 OF 4

SHEET NO. SHT. 7 OF 40 SHTS.
REV
DWG NO. L-2

PLAN
1"=200'

0 200 400 600
HORIZ 1" = 200'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
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PEER REVIEWED	S. GENTZLER
APPROVED	S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

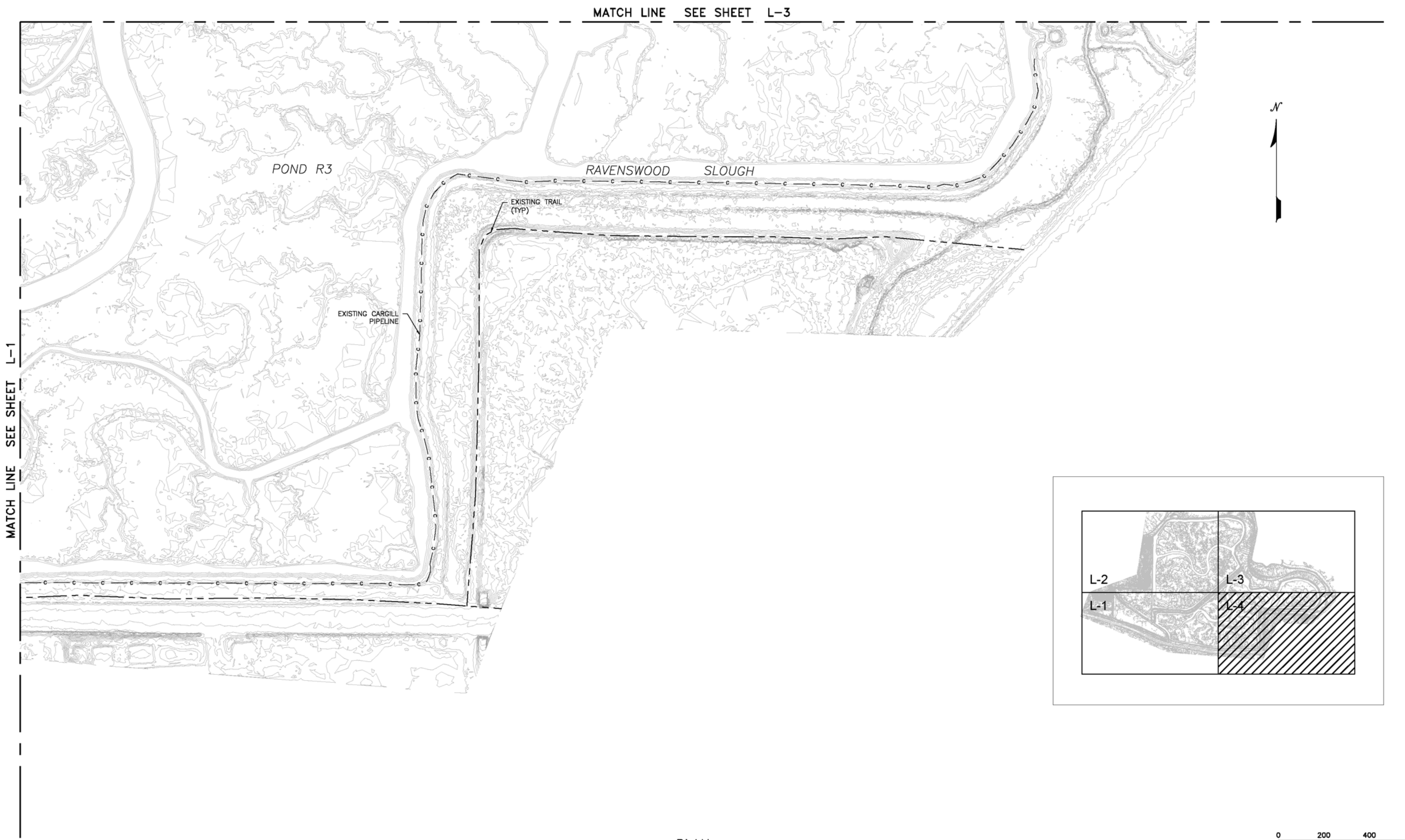
PROJECT No. 60422372
DATE 12-13-2016

PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

SHEET TITLE
RAVENSWOOD PONDS
LAYOUT PLAN
SHEET 3 OF 4

SHEET NO.
SHT. 8 OF 40 SHTS.
REV

DWG NO.
L-3



PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

PLAN
1"=200'

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
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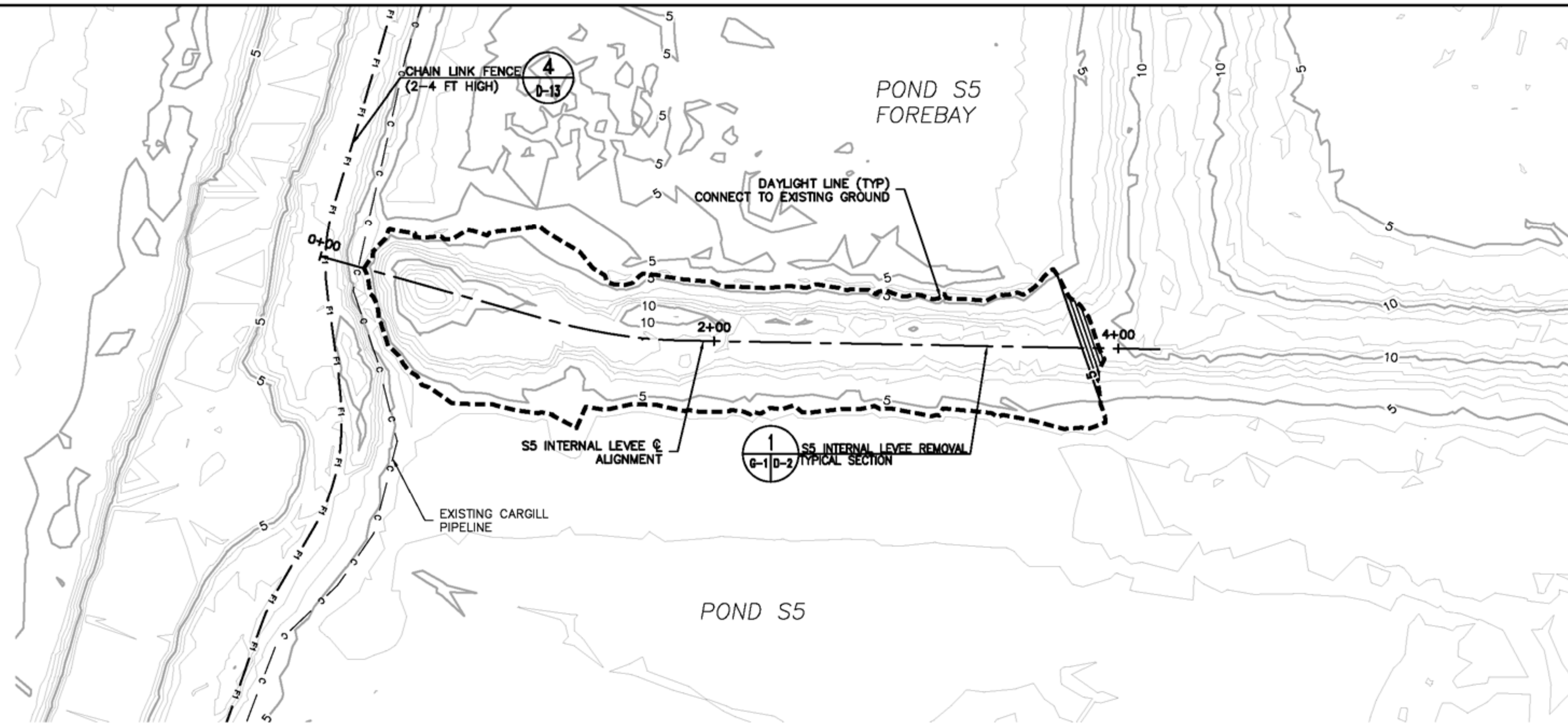
STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372
DATE 12-13-2016

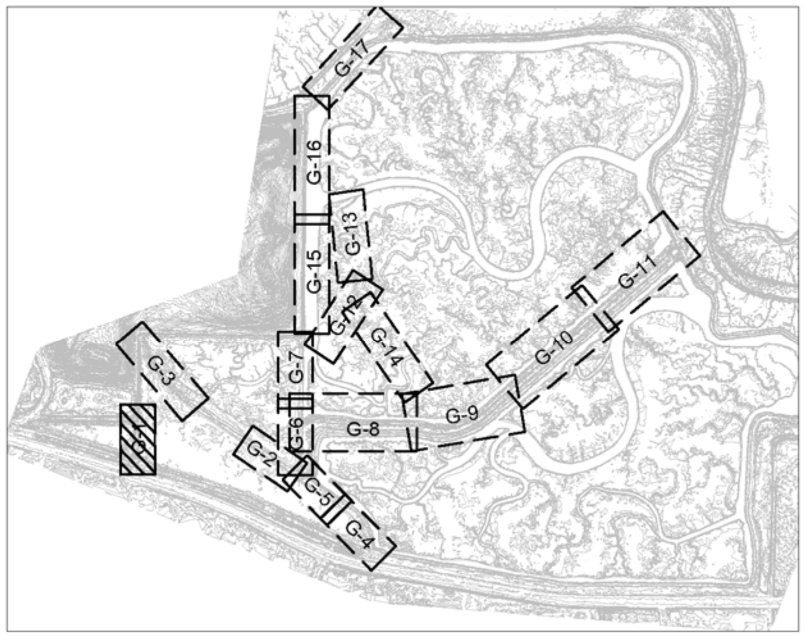
PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

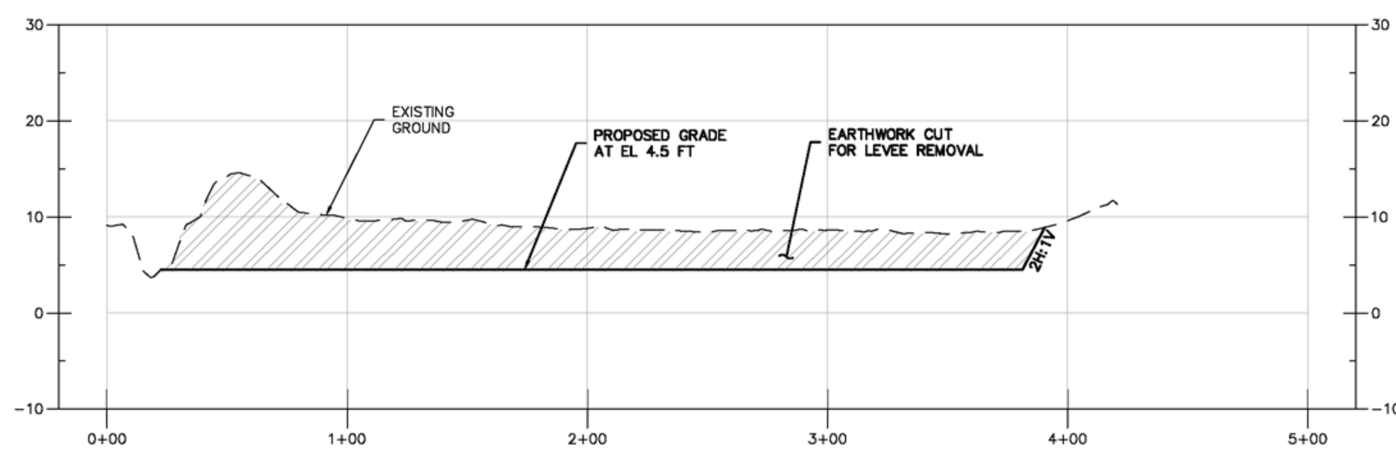
SHEET TITLE
RAVENSWOOD PONDS
LAYOUT PLAN
SHEET 4 OF 4

SHEET NO. SHT. 9 OF 40 SHTS.
REV
DWG NO. L-4



PLAN
1"=40'





S5 INTERNAL LEVEE ℄ ALIGNMENT PROFILE
HORIZ 1"=40', VERT 1"=10'

0 40 80 120
HORIZ 1" = 40'

0 10 20 30
VERT 1" = 10'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
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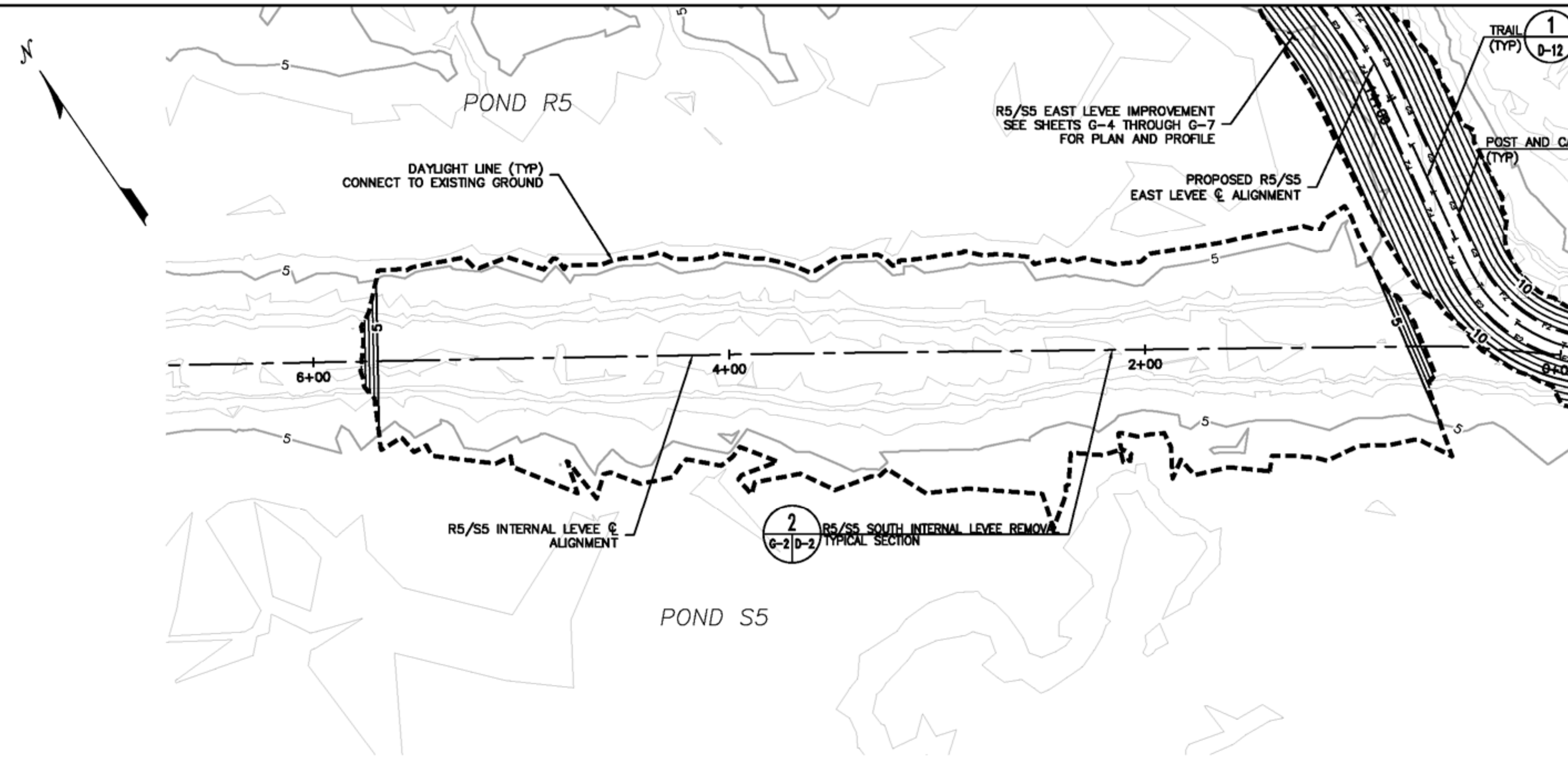
STATE OF CALIFORNIA
Coastal Conservancy
PROJECT No. 60422372
DATE 12-13-2016

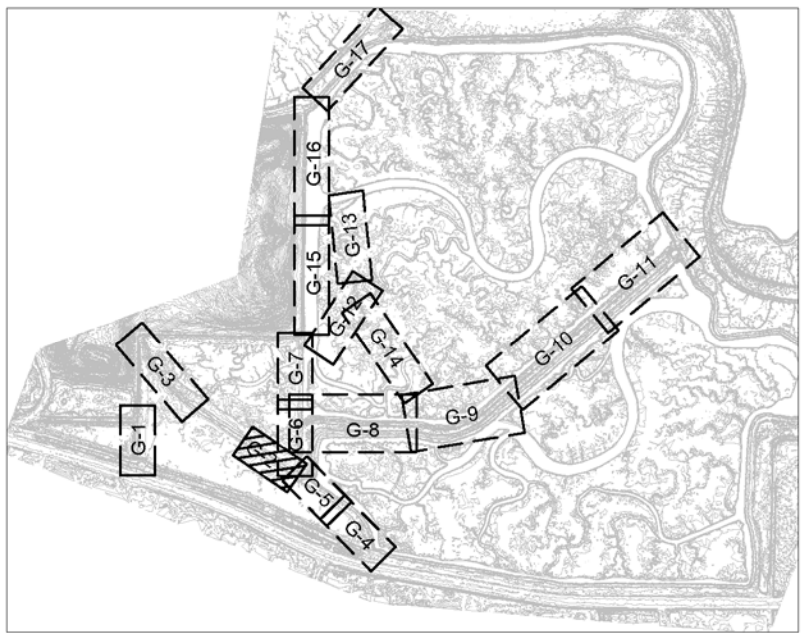
PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT
SHEET TITLE
RAVENSWOOD PONDS
POND S5 INTERNAL LEVEE REMOVAL
PLAN AND PROFILE

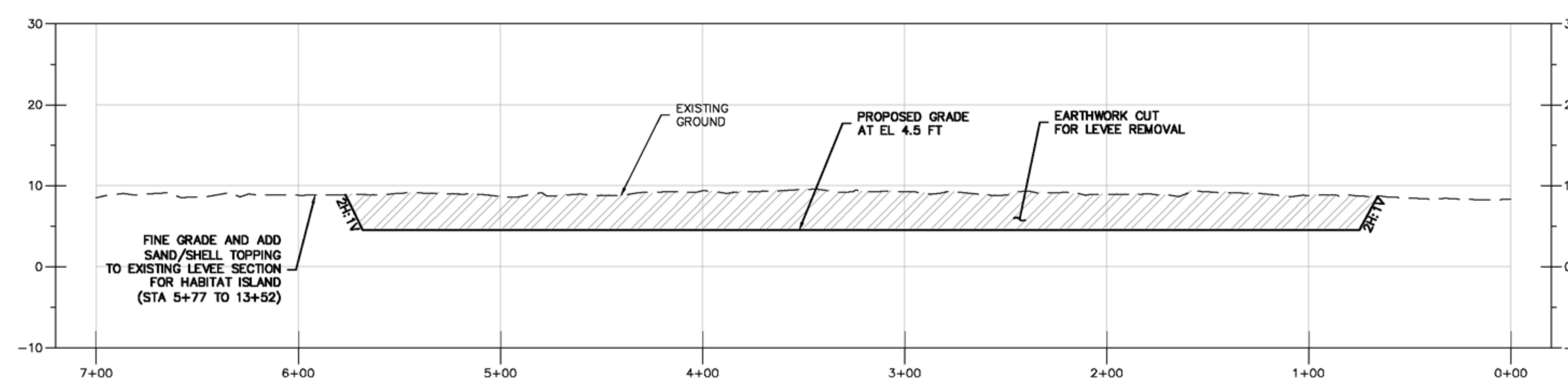
SHEET NO. SHT. 10 OF 40 SHTS.
REV
DWG NO. G-1

Dec 14, 2016 - 10:57am
C:\pwwork\aecom_na\chandrasekaranl\dms75824\RW_G-1.dwg



PLAN
1"=40'





R5/S5 INTERNAL LEVEE ℄ ALIGNMENT PROFILE
HORIZ 1"=40', VERT 1"=10'

0 40 80 120
HORIZ 1" = 40'

0 10 20 30
VERT 1" = 10'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

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DRAWN: L. DIFUNTORUM
CHECKED: G. OROZCO / I. ZARCHI
PEER REVIEWED: S. GENTZLER
APPROVED: S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

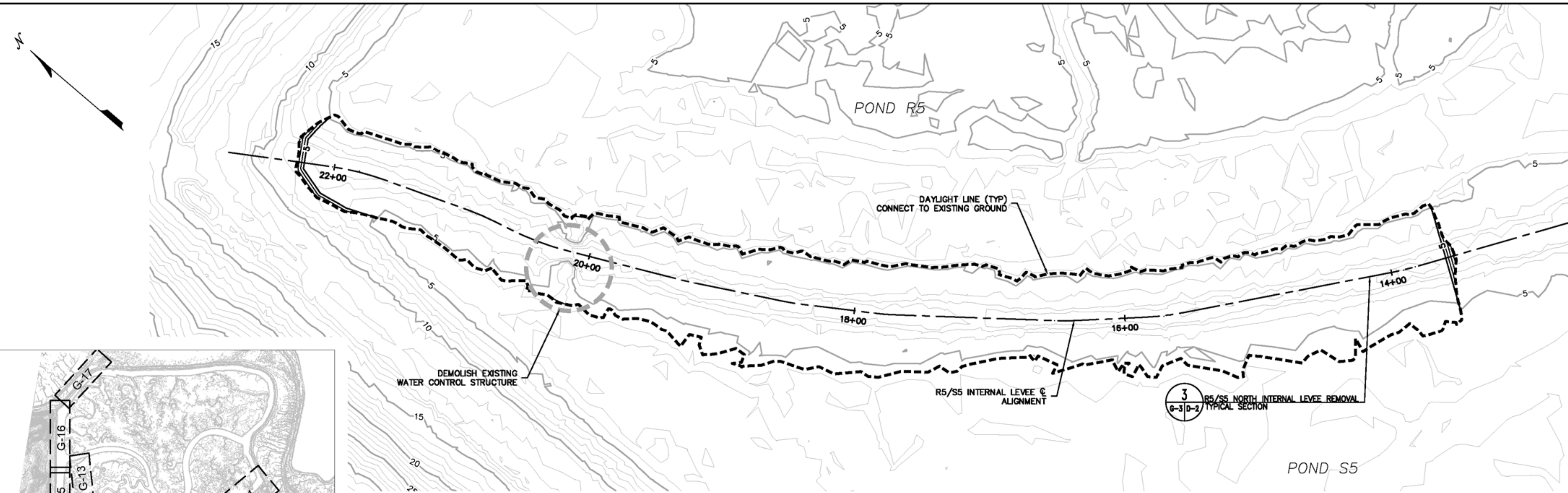
PROJECT No. 60422372
DATE 12-13-2016

PROJECT: **SOUTH BAY SALT POND RESTORATION PROJECT**

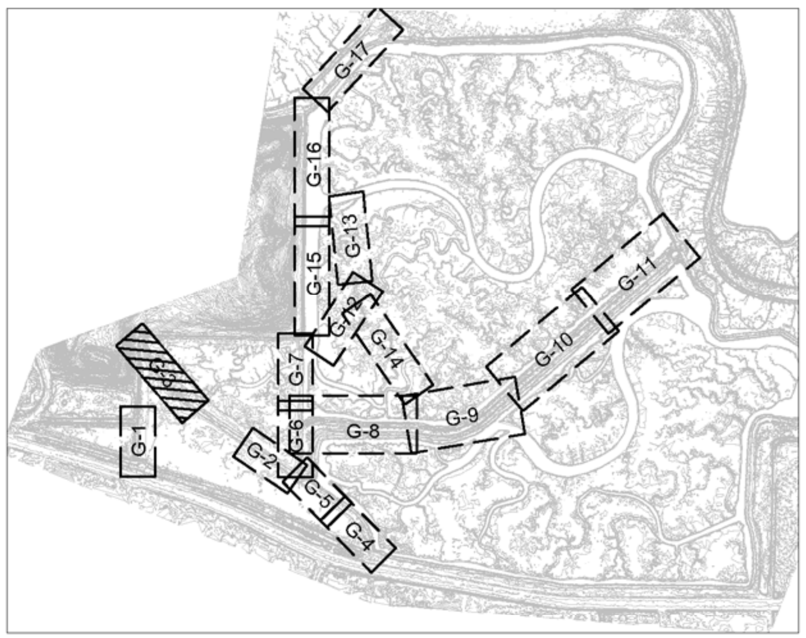
SHEET TITLE: RAVENSWOOD PONDS
POND R5/S5 INTERNAL LEVEE REMOVAL
PLAN AND PROFILE - SHEET 1 OF 2

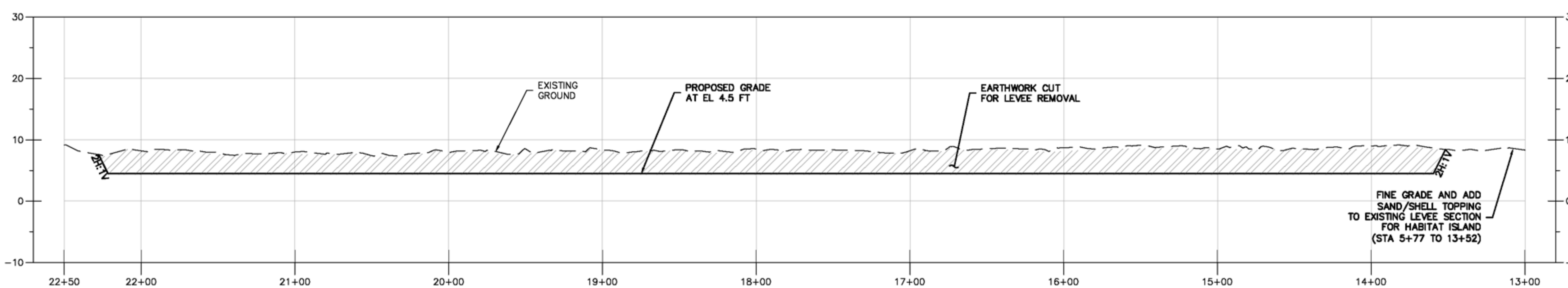
SHEET NO. SHT. 11 OF 40 SHTS.
REV
DWG NO. G-2

Dec 15, 2016 - 9:53am



PLAN
1"=40'





R5/S5 INTERNAL LEVEE ℄ ALIGNMENT PROFILE
HORIZ 1"=40', VERT 1"=10'

0 40 80 120
HORIZ 1" = 40'

0 10 20 30
VERT 1" = 10'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
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DESIGNED L. CHANDRASEKARAN
DRAWN L. DIFUNTORUM
CHECKED G. OROZCO / I. ZARCHI
PEER REVIEWED S. GENTZLER
APPROVED S. GENTZLER

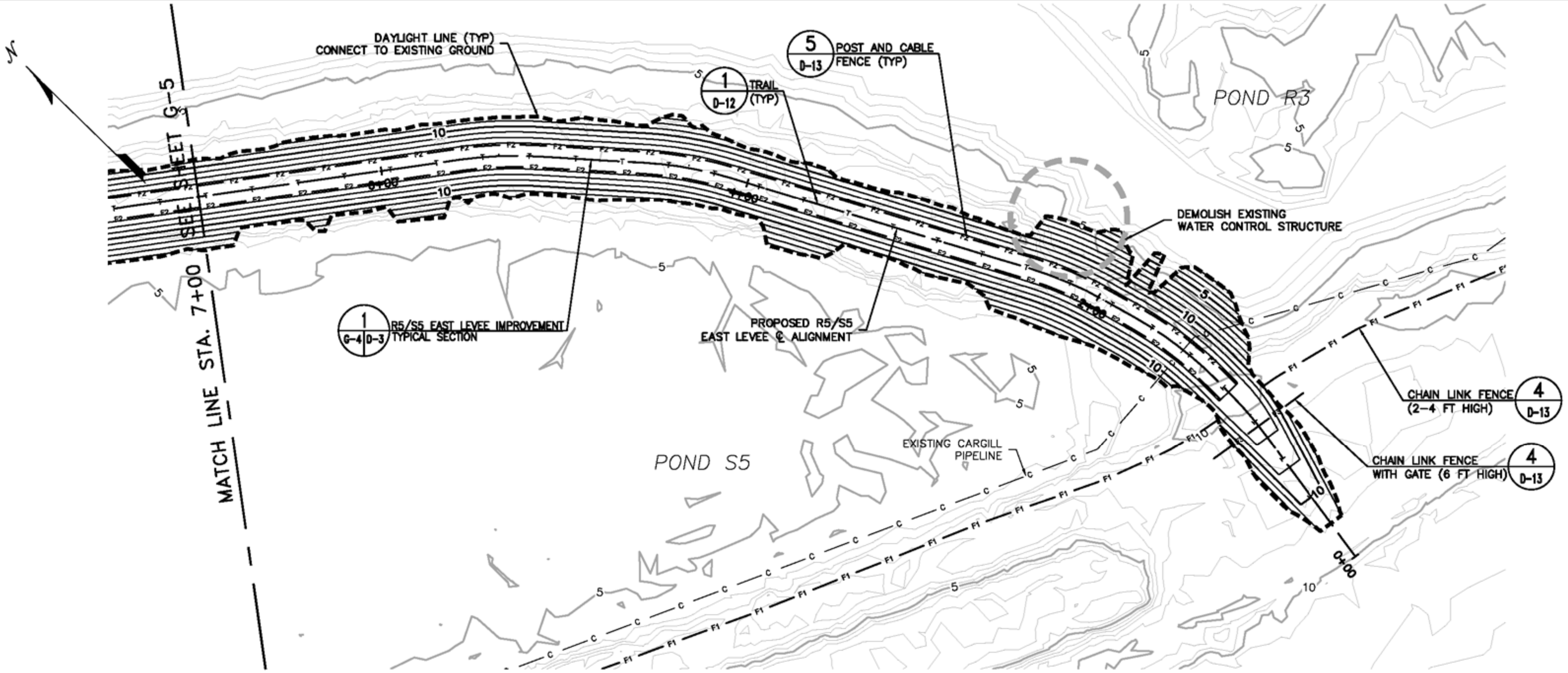
STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372
DATE 12-13-2016

PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

SHEET TITLE
RAVENSWOOD PONDS
POND R5/S5 INTERNAL LEVEE REMOVAL
PLAN AND PROFILE - SHEET 2 OF 2

SHEET NO. SHT. 12 OF 40 SHTS.
REV
DWG NO. G-3



PLAN
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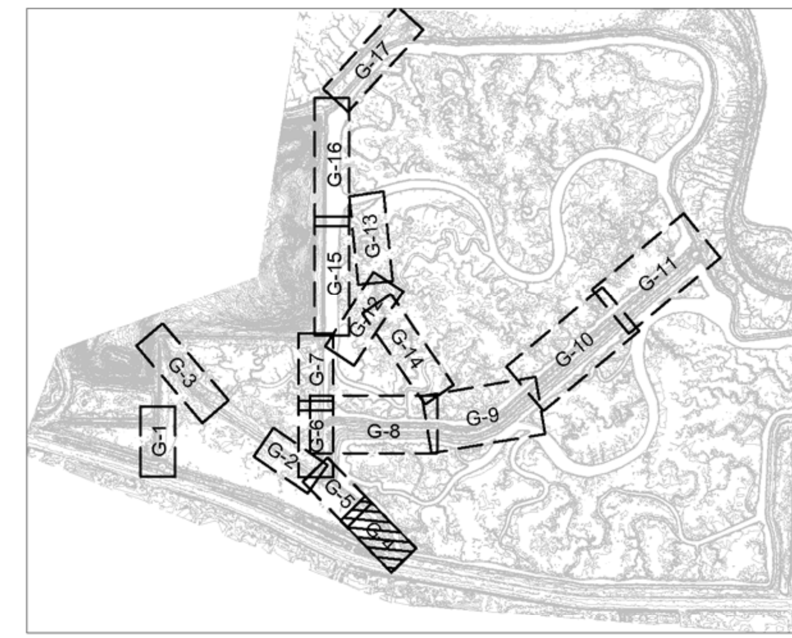

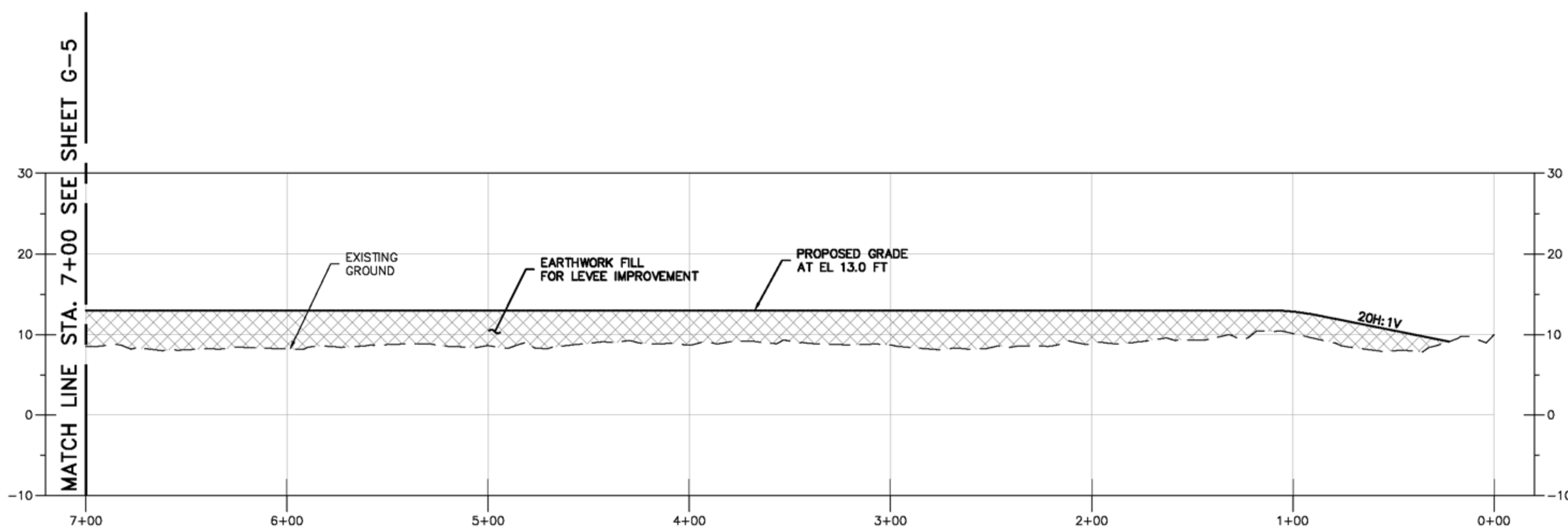

PROPOSED R5/S5 EAST LEVEE ℄ ALIGNMENT PROFILE
HORIZ 1"=40', VERT 1"=10'

0 40 80 120
HORIZ 1" = 40'

0 10 20 30
VERT 1" = 10'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
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DRAWN L. DIFUNTORUM
CHECKED G. OROZCO / I. ZARCHI
PEER REVIEWED S. GENTZLER
APPROVED S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

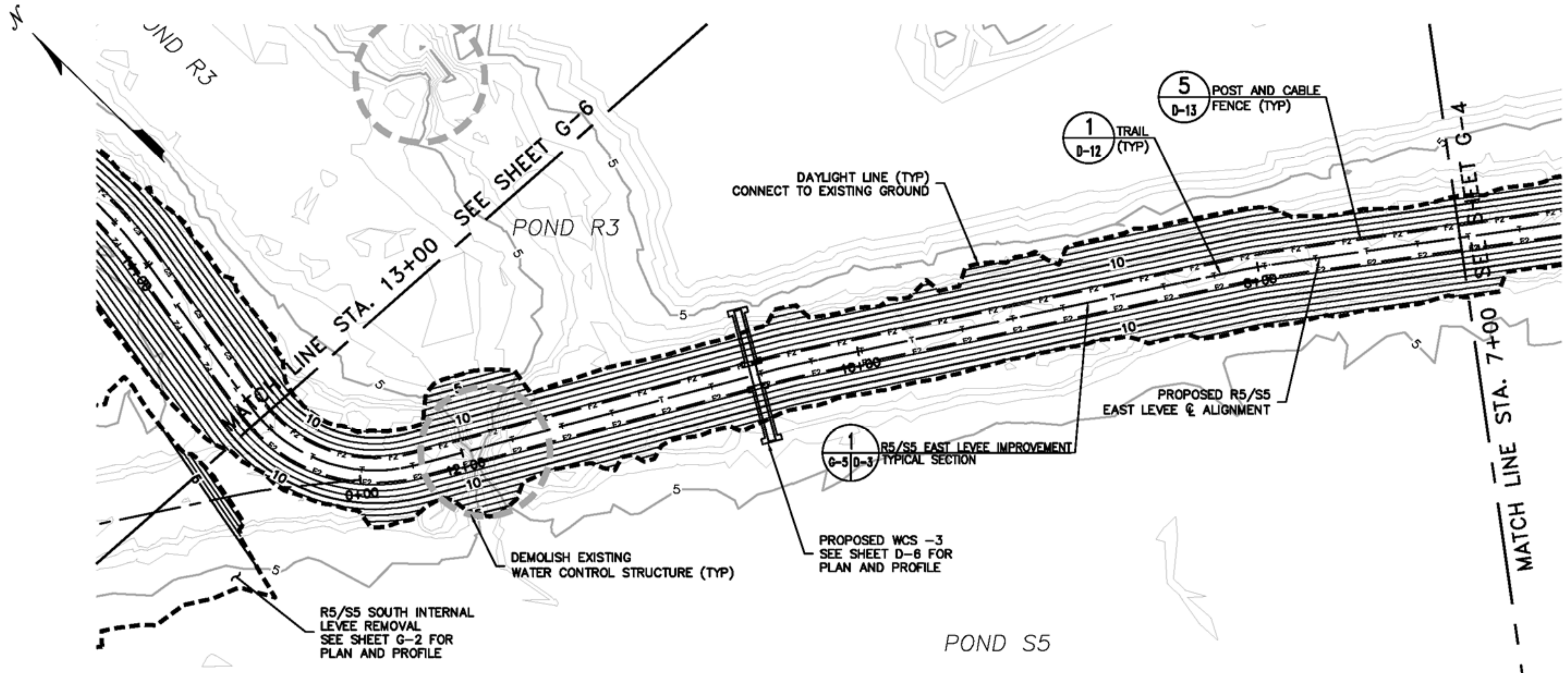
PROJECT No. 60422372
DATE 12-13-2016

PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

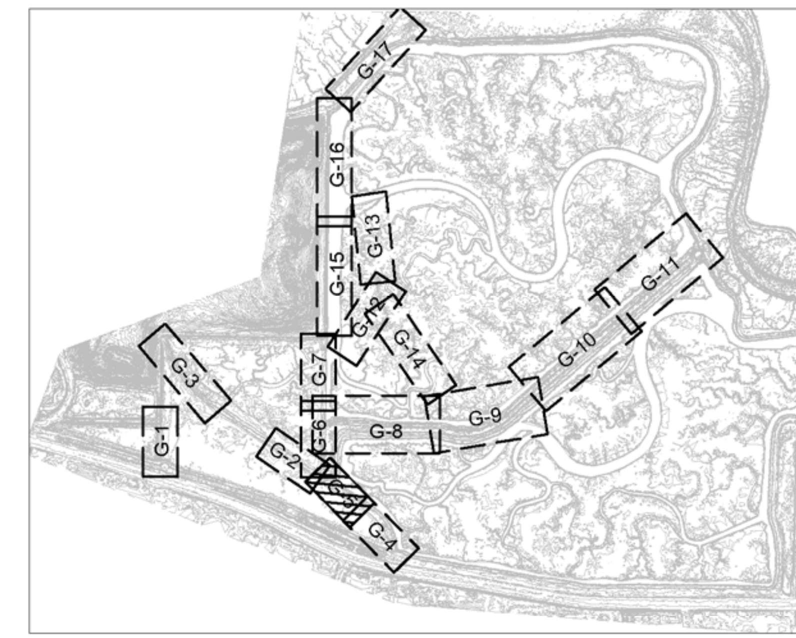
SHEET TITLE
RAVENSWOOD PONDS
POND R5/S5 EAST LEVEE IMPROVEMENT
PLAN AND PROFILE - SHEET 1 OF 4

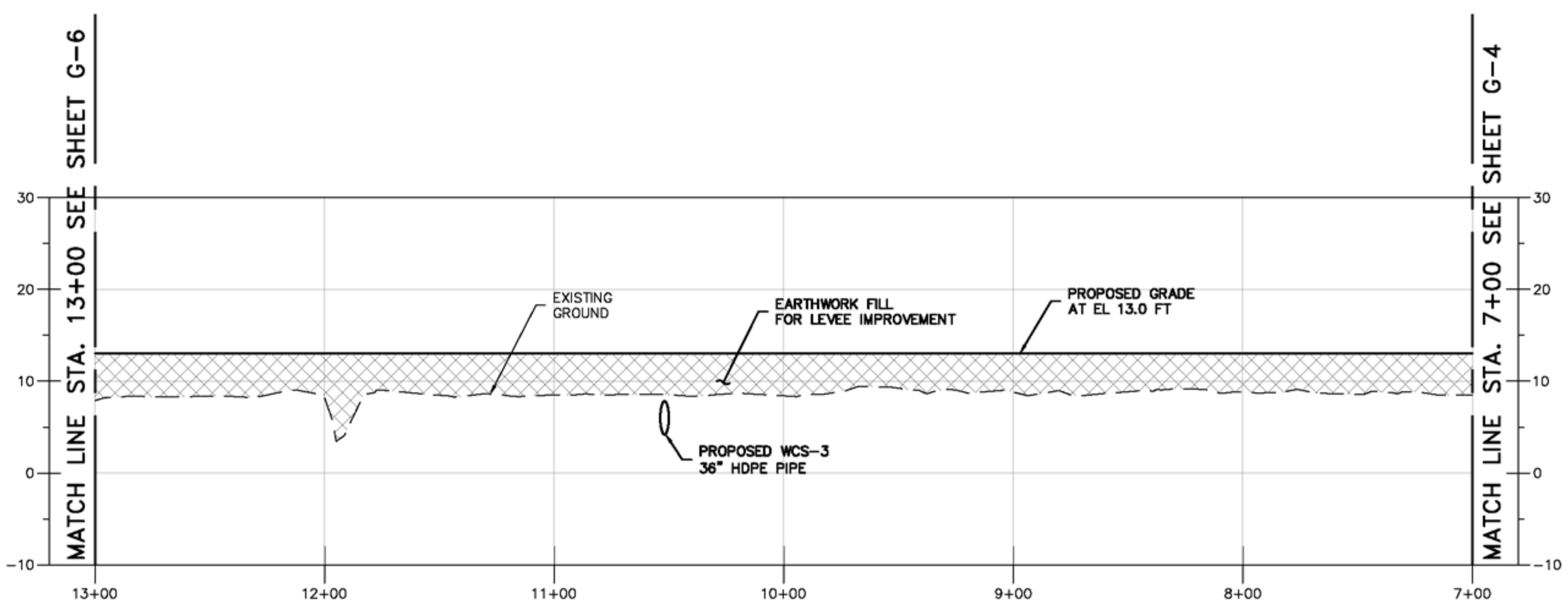
SHEET NO. SHT 13 OF 40 SHTS
REV
DWG NO. G-4

Dec 14, 2016 - 11:10am
C:\pwworking\aecom_na\chandrasekarand\ms75824\RW_G-4.dwg



PLAN
1"=40'





PROPOSED R5/S5 EAST LEVEE ℄ ALIGNMENT PROFILE
HORIZ 1"=40', VERT 1"=10'

0 40 80 120 HORIZ 1" = 40'

0 10 20 30 VERT 1" = 10'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
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CHECKED G. OROZCO / I. ZARCHI
PEER REVIEWED S. GENTZLER
APPROVED S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

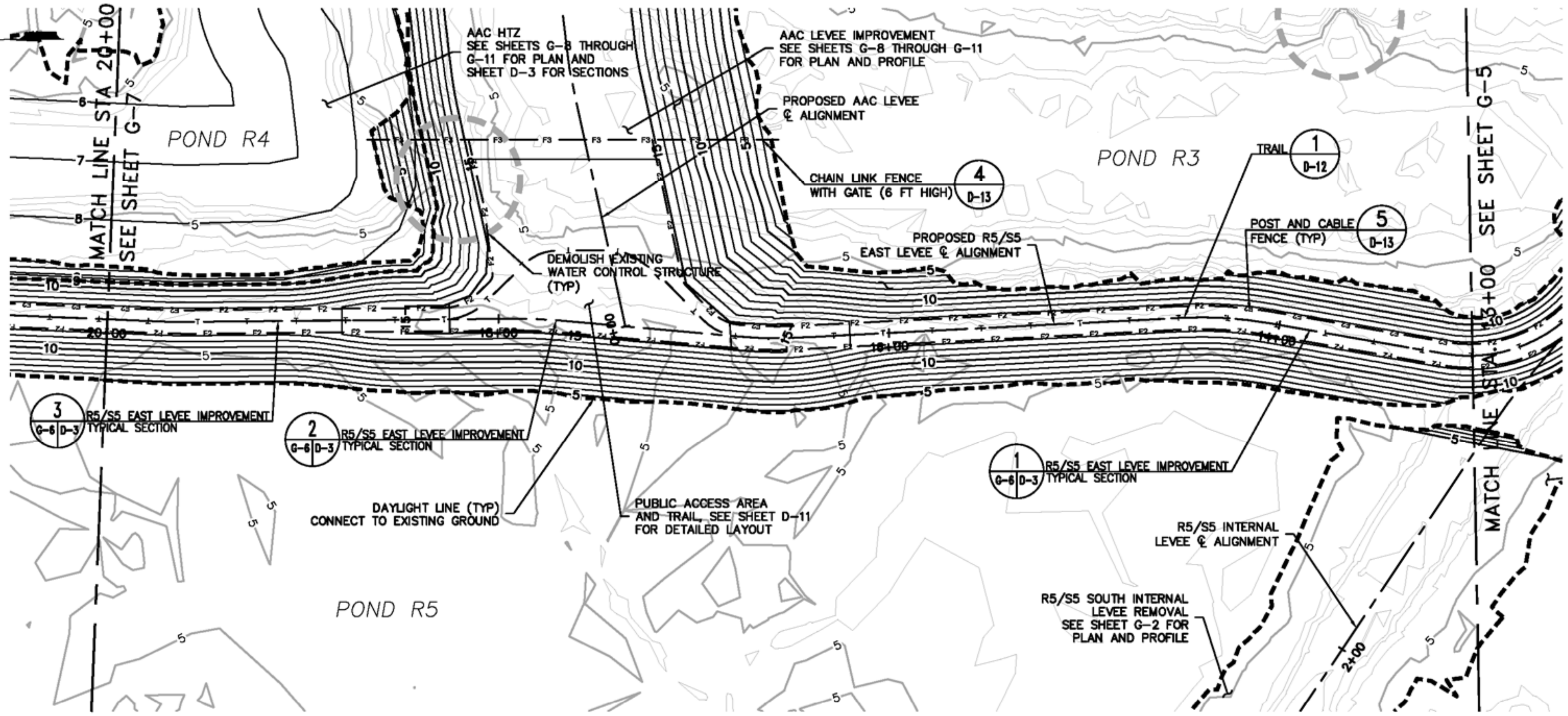
PROJECT No. 60422372
DATE 12-13-2016

PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

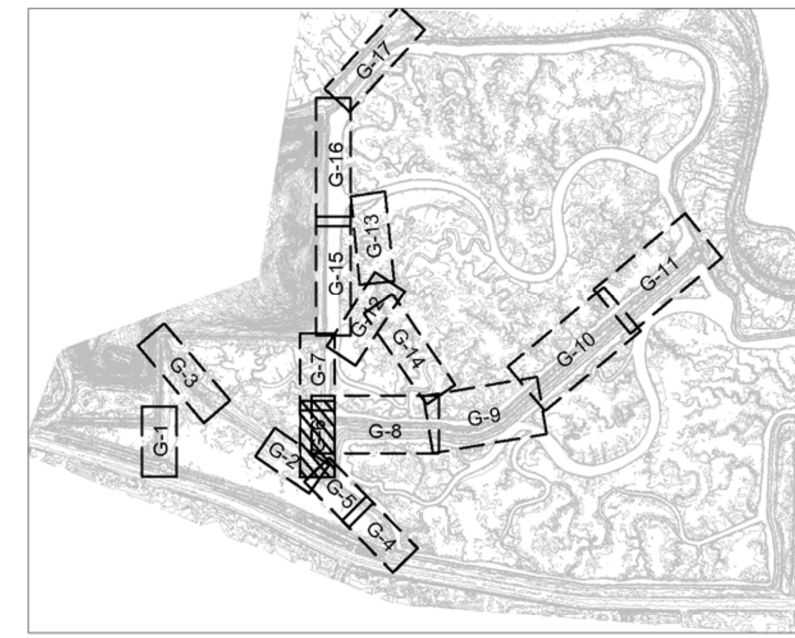
SHEET TITLE
RAVENSWOOD PONDS
POND R5/S5 EAST LEVEE IMPROVEMENT
PLAN AND PROFILE - SHEET 2 OF 4

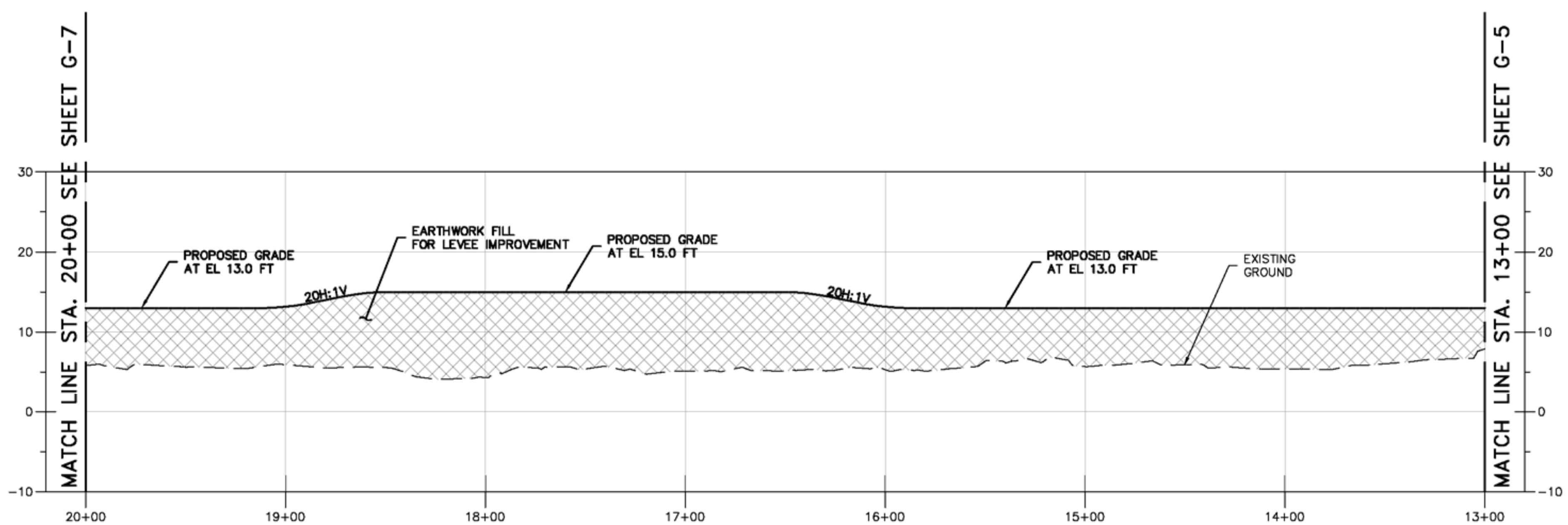
SHEET NO. SHT. 14 OF 40 SHTS.
REV
DWG NO. G-5

Dec 14, 2016 - 11:56am



PLAN
1"=40'





PROPOSED R5/S5 EAST LEVEE ℄ ALIGNMENT PROFILE
HORIZ 1"=40', VERT 1"=10'

0 40 80 120
HORIZ 1" = 40'

0 10 20 30
VERT 1" = 10'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

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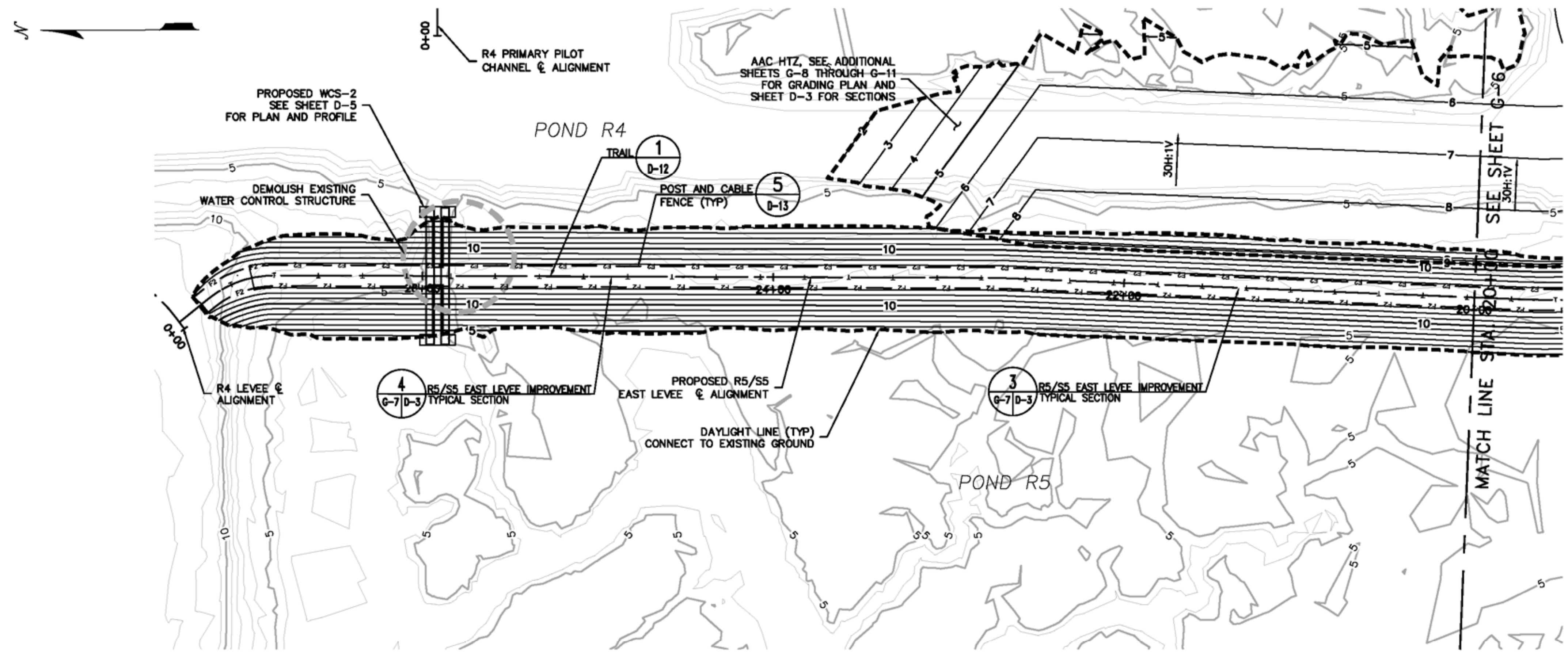
STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372
DATE 12-13-2016

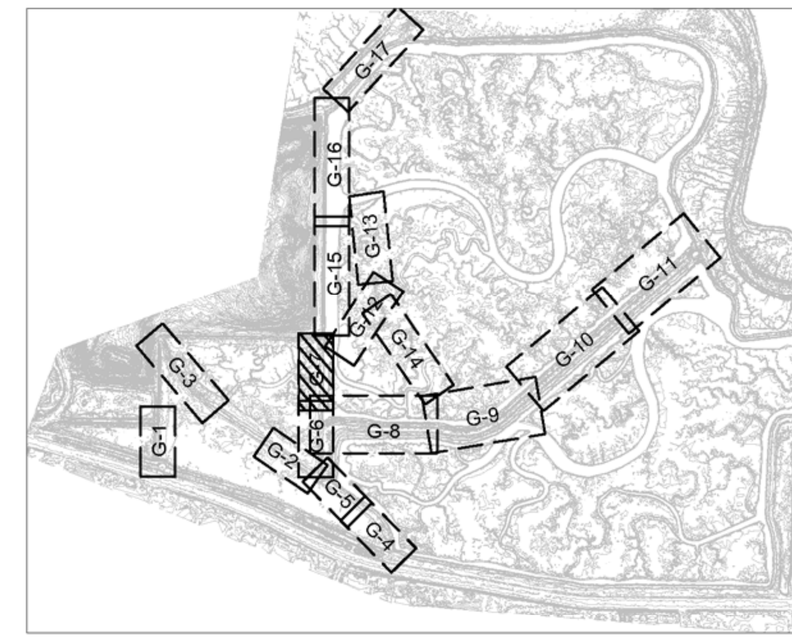
PROJECT: **SOUTH BAY SALT POND RESTORATION PROJECT**
SHEET TITLE: RAVENSWOOD PONDS
POND R5/S5 EAST LEVEE IMPROVEMENT
PLAN AND PROFILE - SHEET 3 OF 4

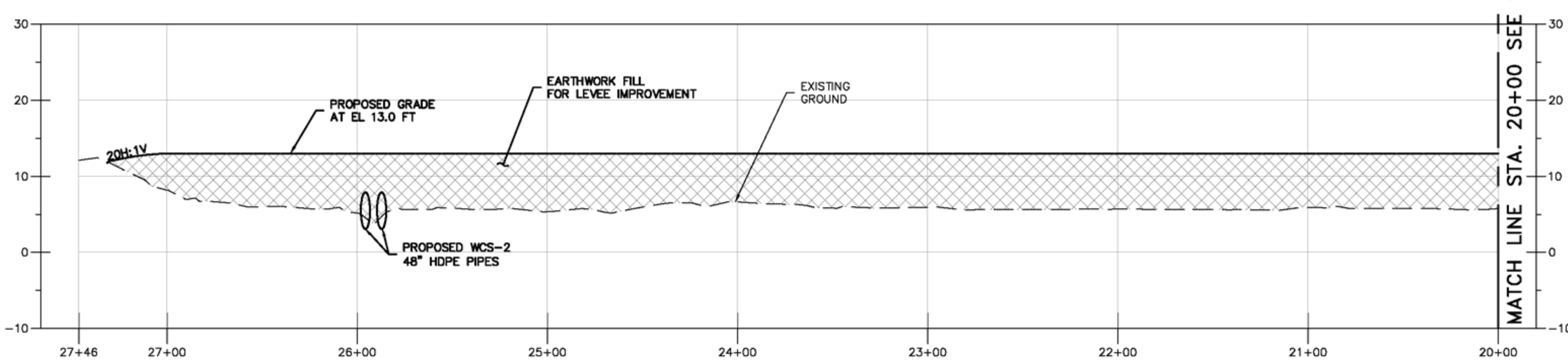
SHEET NO. SHT 15 OF 40 SHTS
DWG NO. G-6
REV

Dec 15, 2016 - 11:35am
C:\pwworking\aecom_na\chandrasekaranl\dms75824\RW_G-6.dwg



PLAN
1"=40'





PROPOSED R5/S5 EAST LEVEE ℄ ALIGNMENT PROFILE
HORIZ 1"=40', VERT 1"=10'

0 40 80 120
HORIZ 1" = 40'

0 10 20 30
VERT 1" = 10'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

PREPARED BY
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DESIGNED L. CHANDRASEKARAN
DRAWN L. DIFUNTORUM
CHECKED G. OROZCO / I. ZARCHI
PEER REVIEWED S. GENTZLER
APPROVED S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

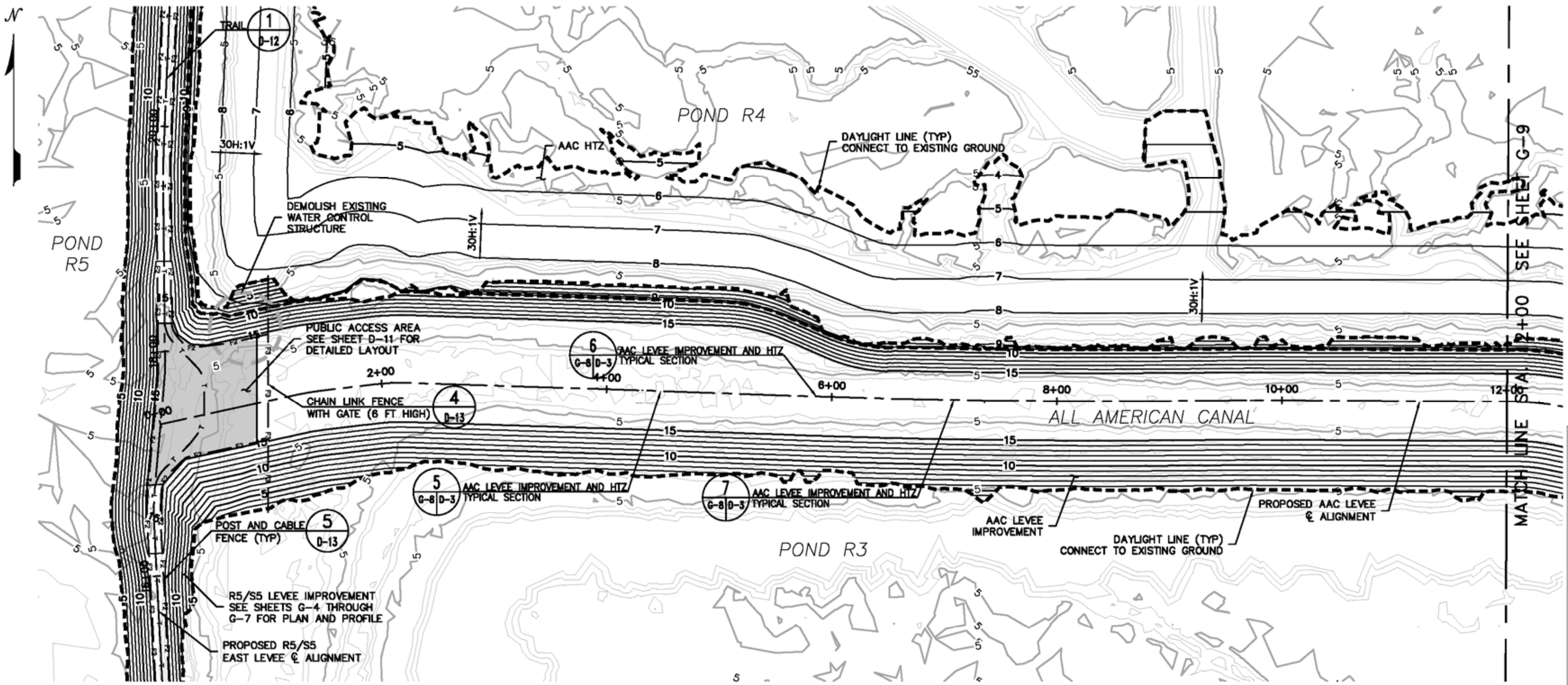
PROJECT No. 60422372
DATE 12-13-2016

PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

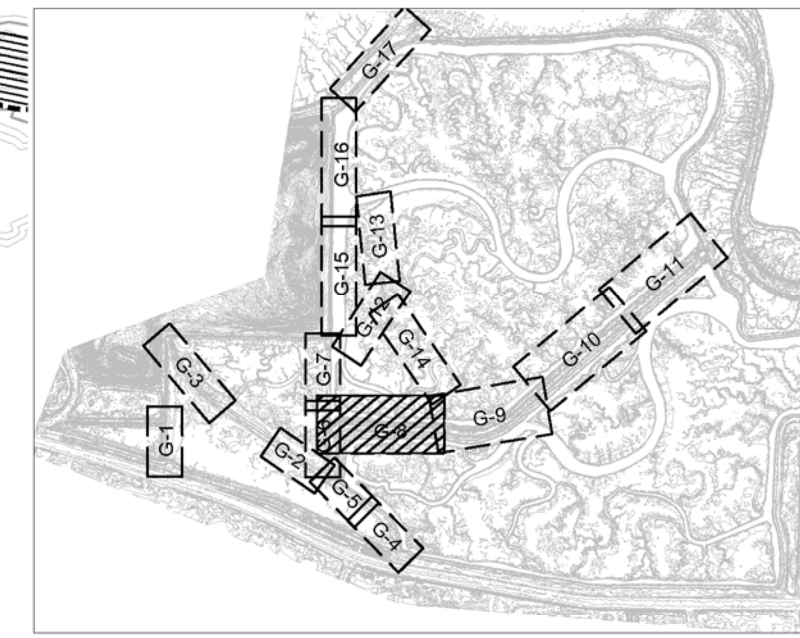
SHEET TITLE
RAVENSWOOD PONDS
POND R5/S5 EAST LEVEE IMPROVEMENT
PLAN AND PROFILE - SHEET 4 OF 4

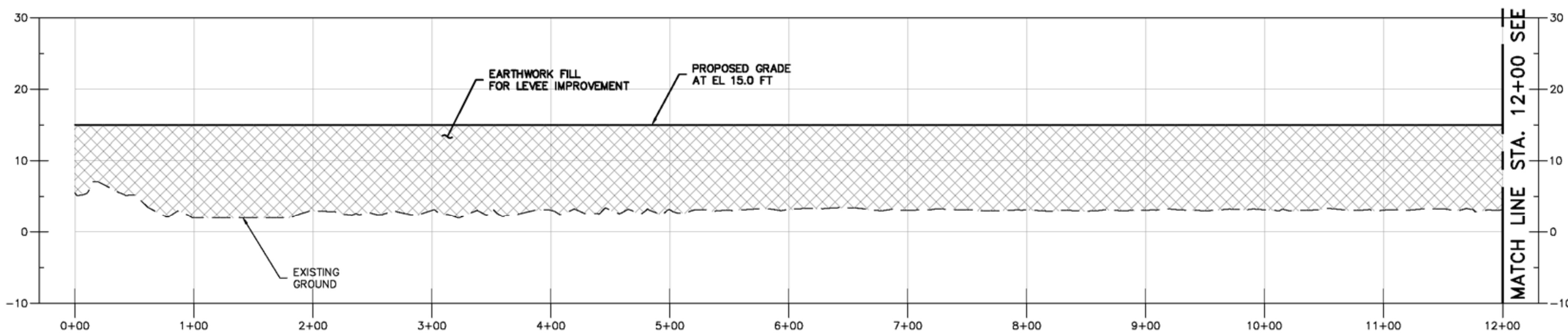
SHEET NO. SHT 16 OF 40 SHTS
REV
DWG NO. G-7

Dec 15, 2016 - 11:45am



PLAN
1"=60'





PROPOSED AAC LEVEE ℄ ALIGNMENT PROFILE
HORIZ 1"=60', VERT 1"=10'

HORIZ 1" = 60' (0, 60, 120, 180)

VERT 1" = 10' (0, 10, 20, 30)

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

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STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372
DATE 12-13-2016

PROJECT **SOUTH BAY SALT POND RESTORATION PROJECT**

SHEET TITLE RAVENSWOOD PONDS
AAC LEVEE IMPROVEMENT AND HTZ
PLAN AND PROFILE - SHEET 1 OF 4

SHEET NO. SHT 17 OF 40 SHTS.
REV
DWG NO. G-8

Dec 15, 2016 - 9:10am
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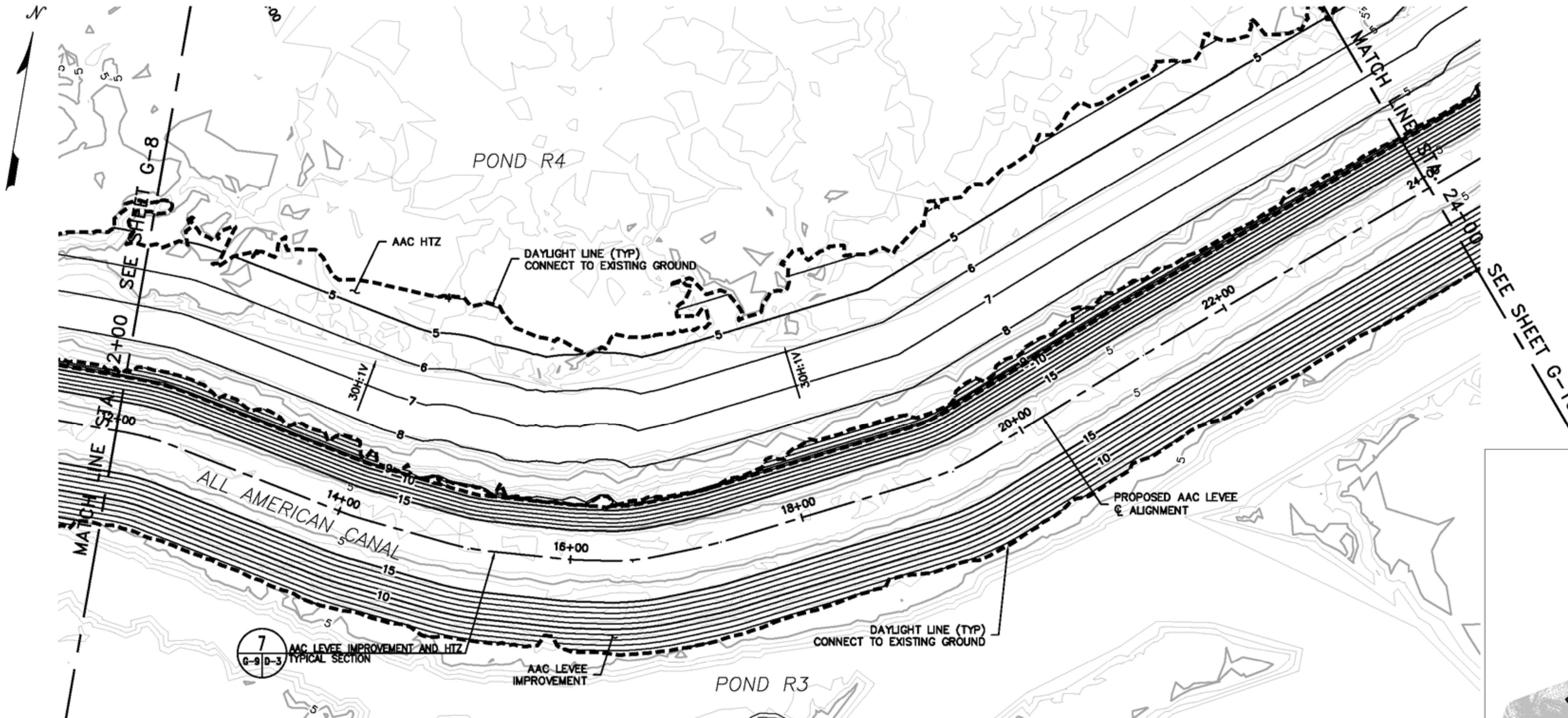
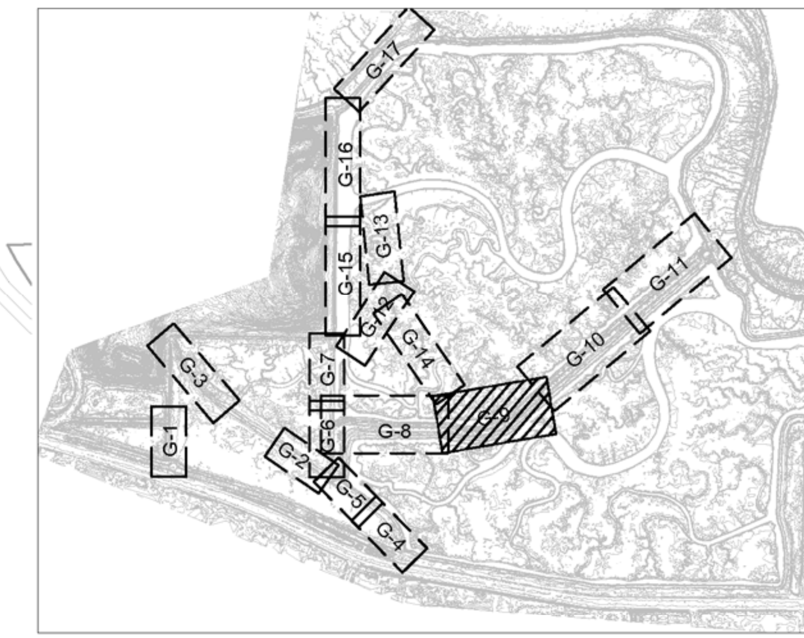
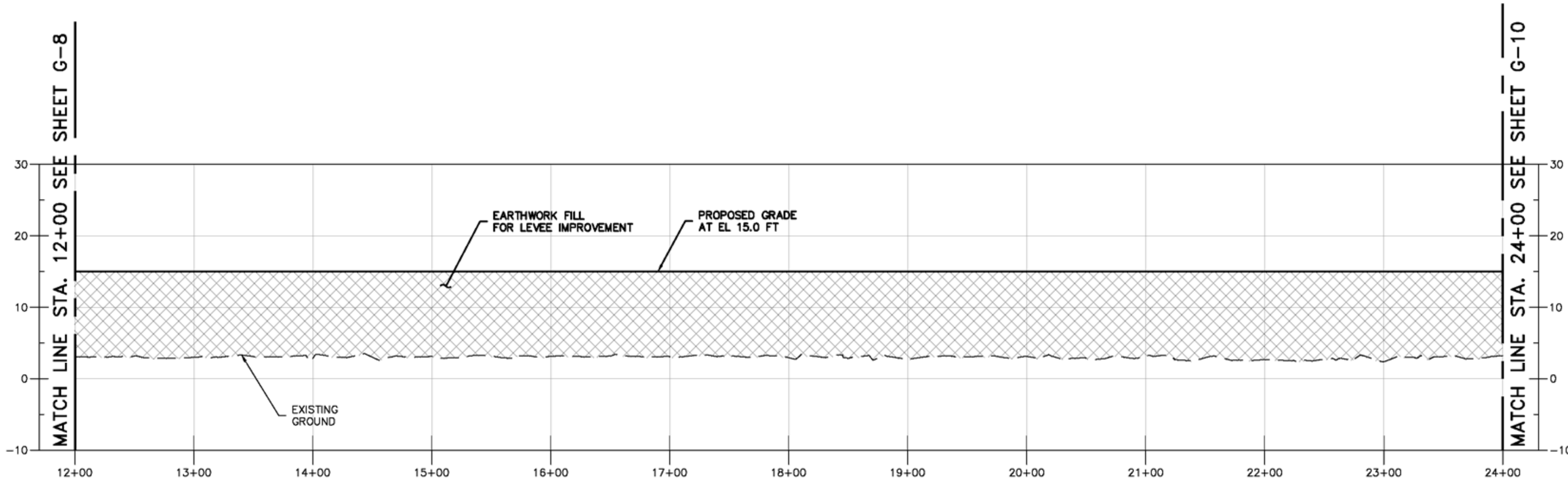


PLAN
1"=60'





PROPOSED AAC LEVEE ℄ ALIGNMENT PROFILE
HORIZ 1"=60', VERT 1"=10'

0 60 120 180
HORIZ 1" = 60'

0 10 20 30
VERT 1" = 10'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

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APPROVED S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

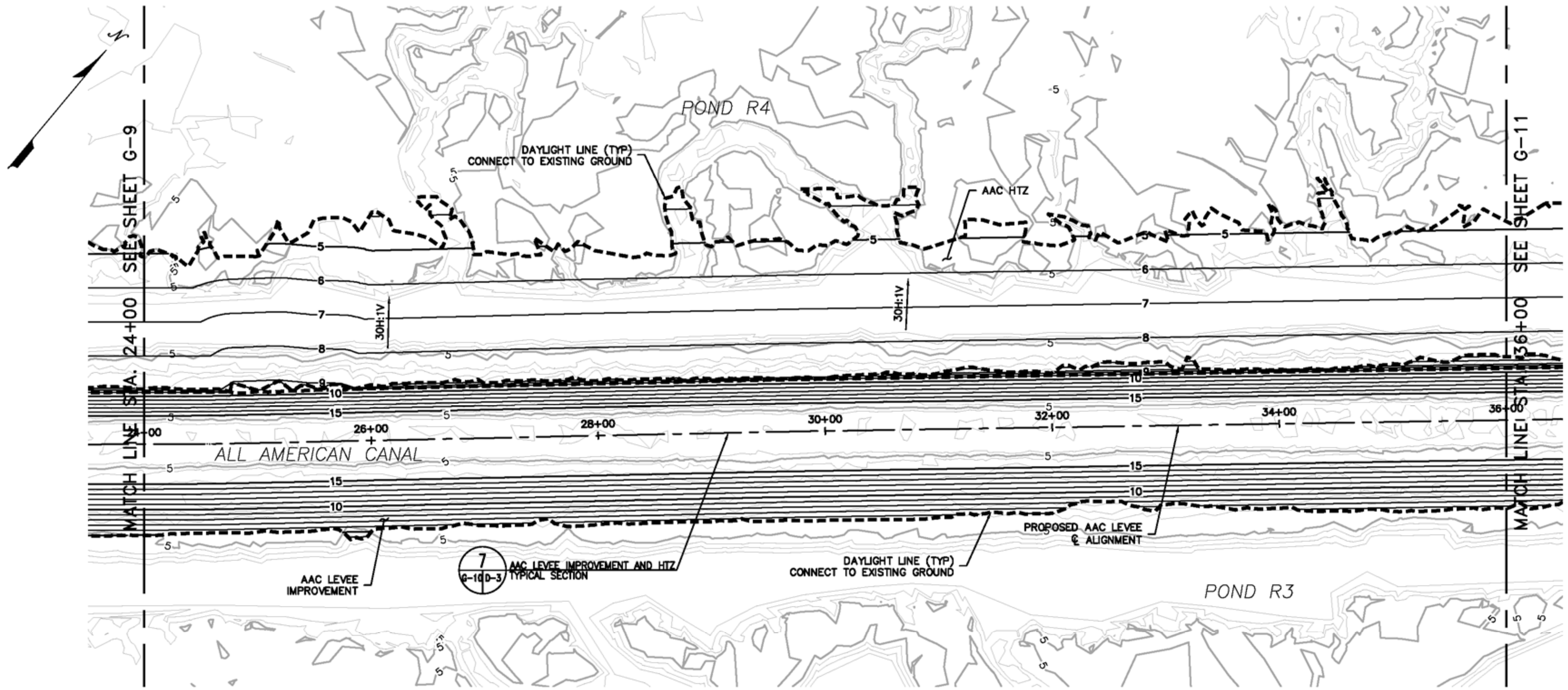
PROJECT No. 60422372
DATE 12-13-2016

PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

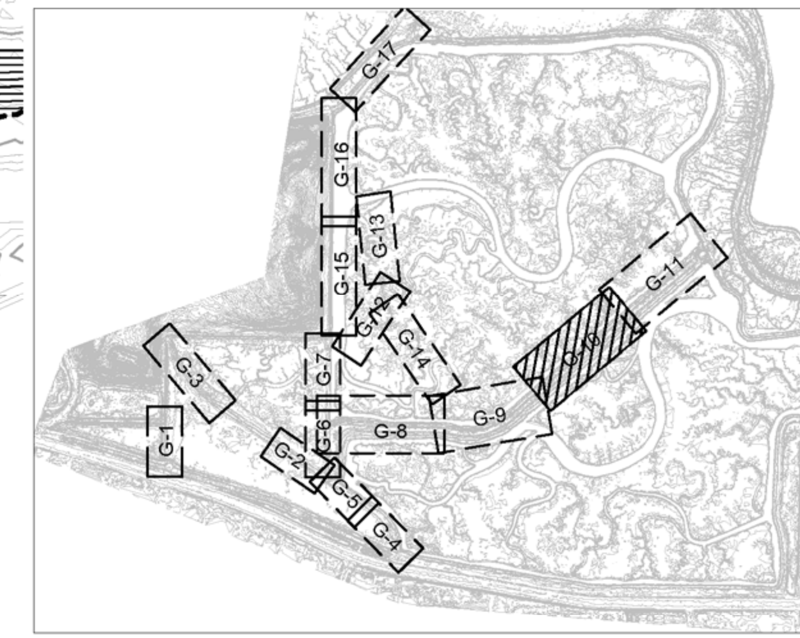
SHEET TITLE
RAVENSWOOD PONDS
AAC LEVEE IMPROVEMENT AND HTZ
PLAN AND PROFILE - SHEET 2 OF 4

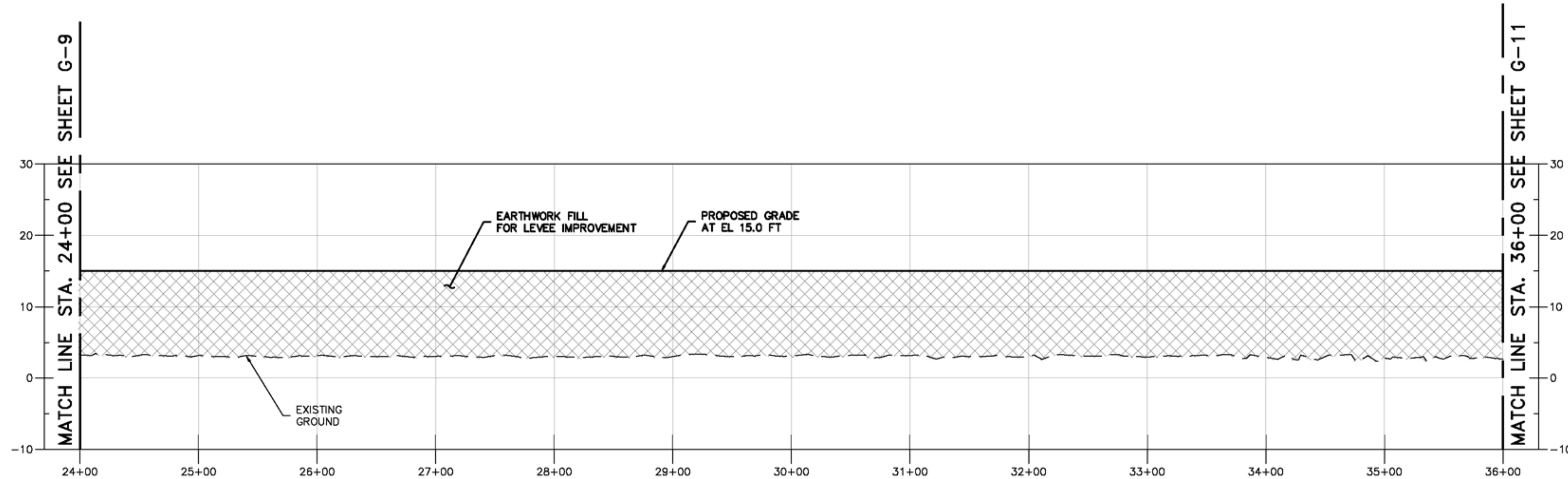
SHEET NO.
SHT. 18 OF 40 SHTS.
REV
DWG NO.
G-9

Dec 15, 2016 - 11:52am
C:\pwworking\aecom_na\chandrasekaranl\dms75824\RW_G-9.dwg



PLAN
1"=60'





PROPOSED AAC LEVEE ℄ ALIGNMENT PROFILE
HORIZ 1"=60', VERT 1"=10'

0 60 120 180
HORIZ 1" = 60'

0 10 20 30
VERT 1" = 10'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

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APPROVED S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

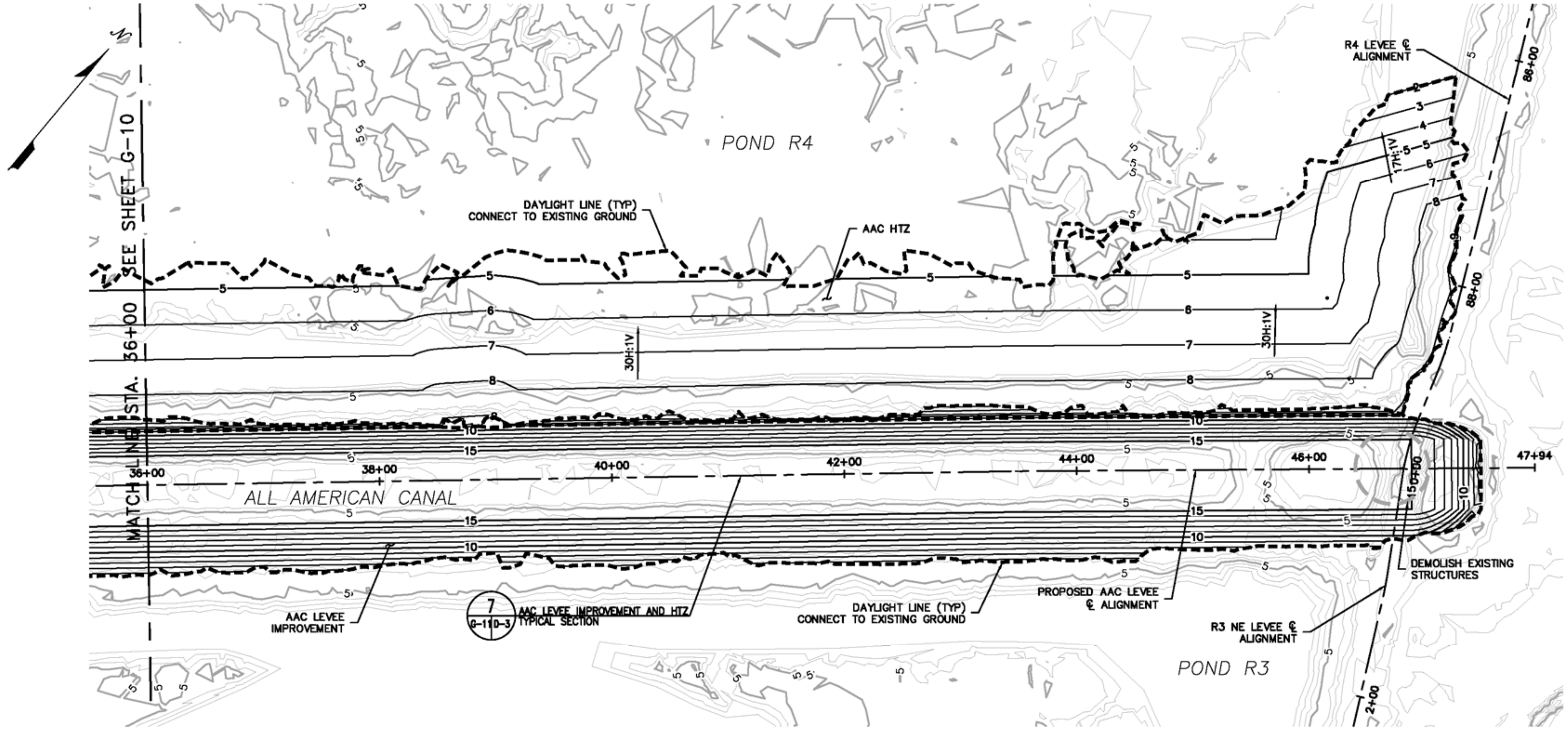
PROJECT No. 60422372
DATE 12-13-2016

PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

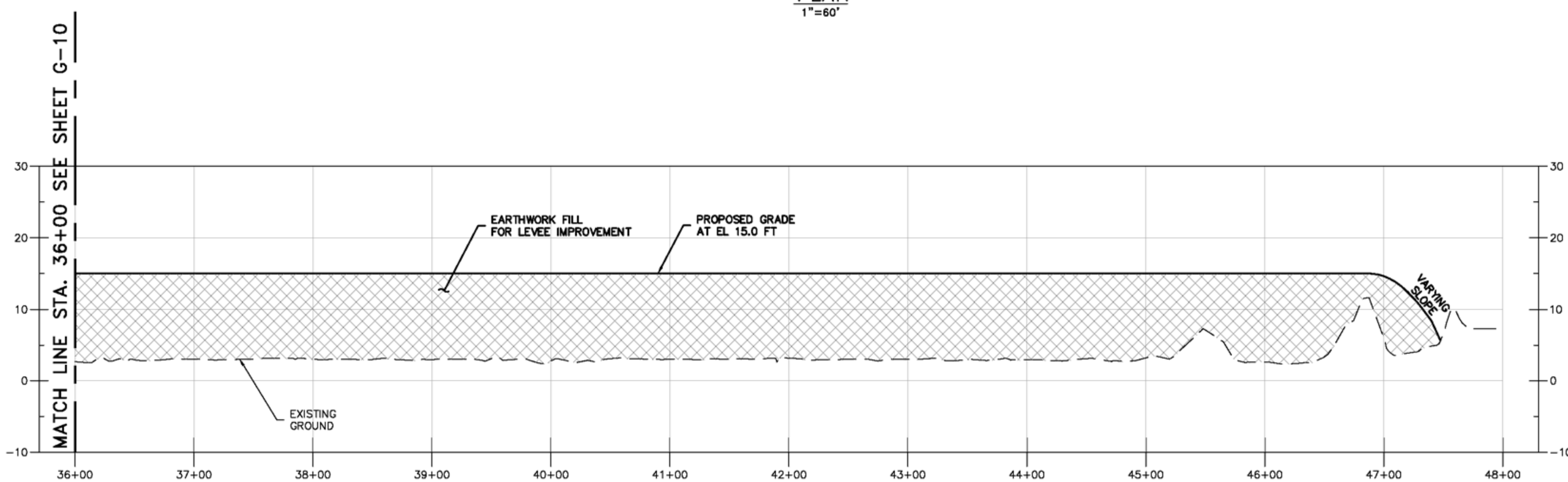
SHEET TITLE
RAVENSWOOD PONDS
AAC LEVEE IMPROVEMENT AND HTZ
PLAN AND PROFILE - SHEET 3 OF 4

SHEET NO. SHT. 19 OF 40 SHTS.
REV
DWG NO. G-10

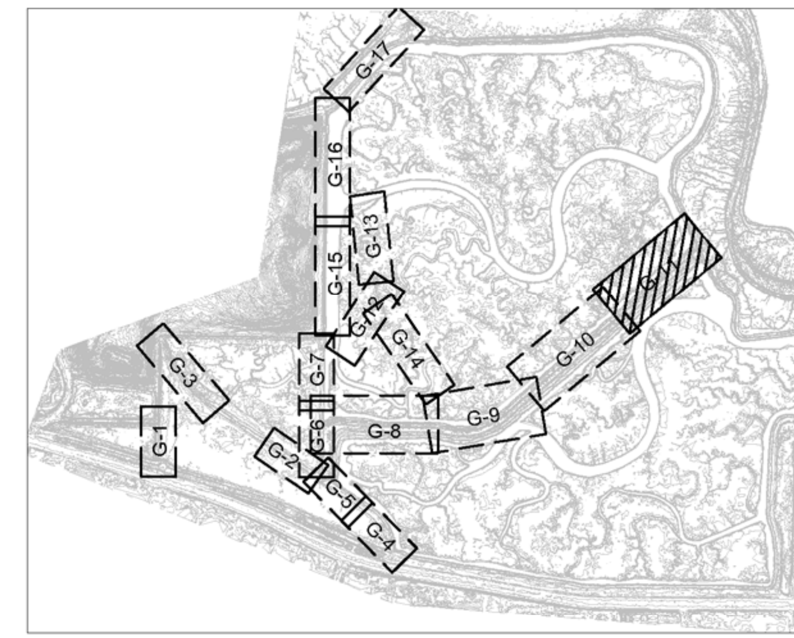
Dec 15, 2016 - 9:23am
C:\pwworking\aecom_na\chandrasekaranl\dms75824\RW_G-10.dwg



PLAN
1"=60'



PROPOSED AAC LEVEE ℄ ALIGNMENT PROFILE
HORIZ 1"=60', VERT 1"=10'



0 60 120 180
HORIZ 1" = 60'

0 10 20 30
VERT 1" = 10'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
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APPROVED S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

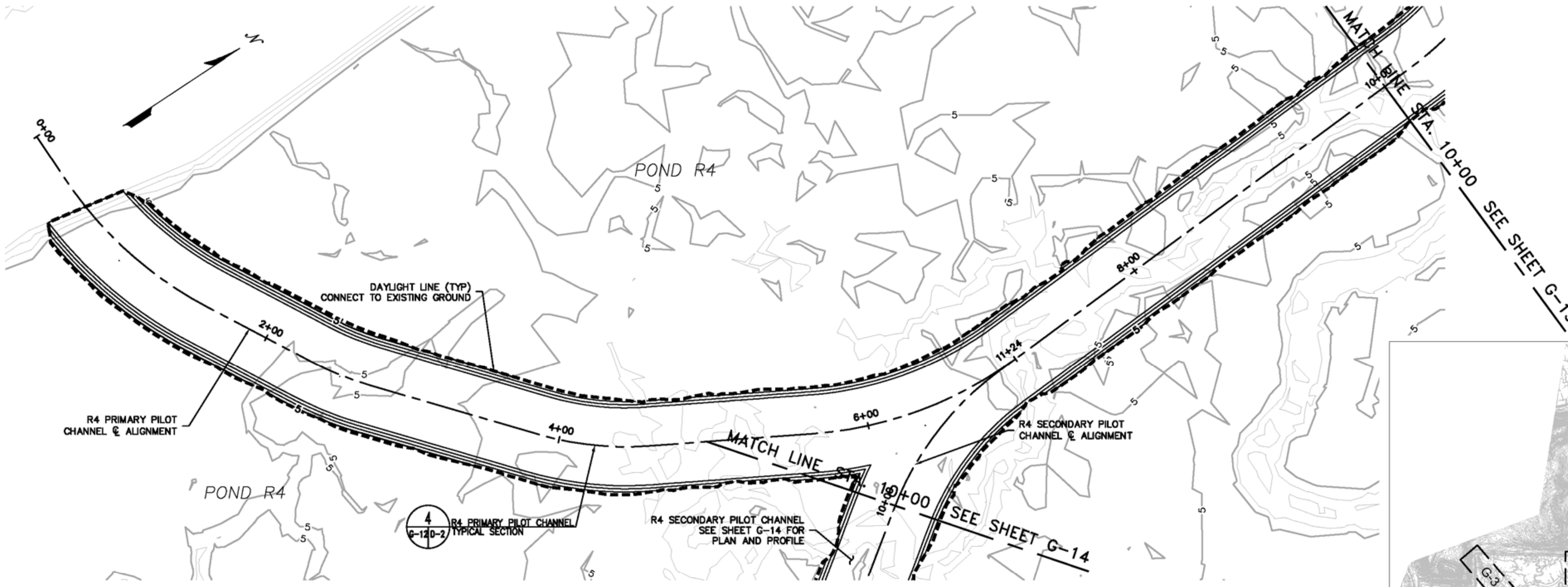
PROJECT No. 60422372
DATE 12-13-2016

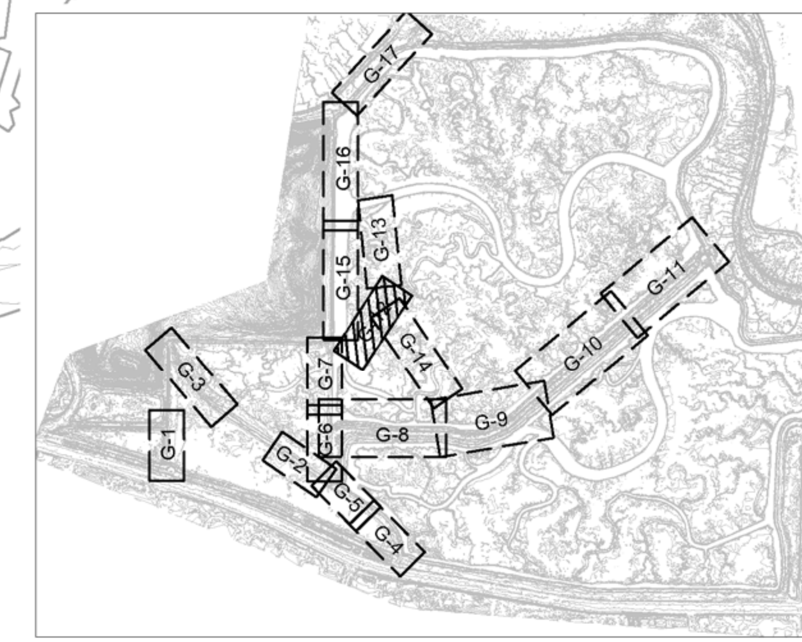
PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

SHEET TITLE
RAVENSWOOD PONDS
AAC LEVEE IMPROVEMENT AND HTZ
PLAN AND PROFILE - SHEET 4 OF 4

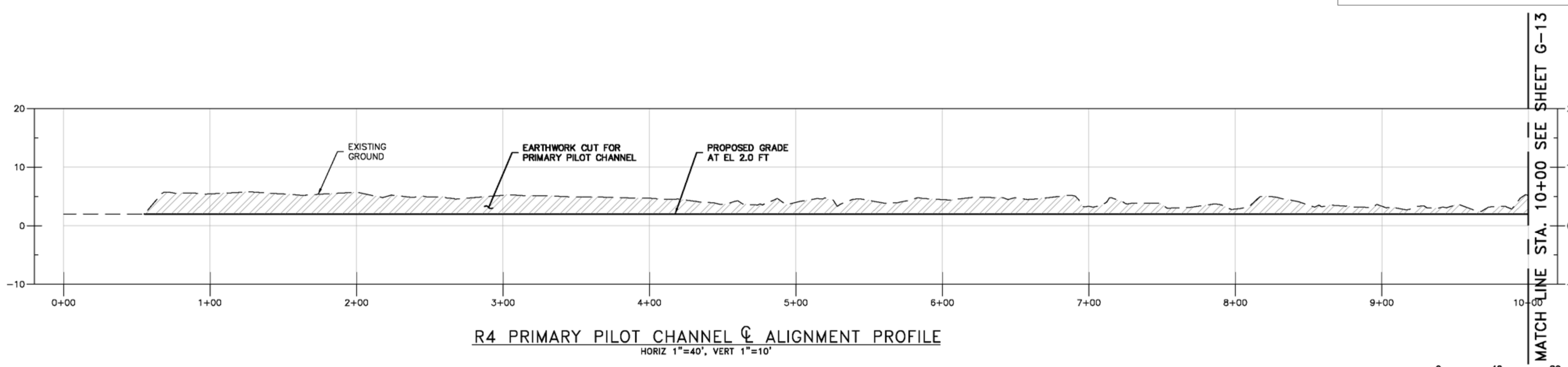
SHEET NO. SHT. 20 OF 40 SHTS.
REV
DWG NO.
G-11

Dec 15, 2016 - 1:50pm





PLAN
1"=40'



R4 PRIMARY PILOT CHANNEL ℄ ALIGNMENT PROFILE
HORIZ 1"=40', VERT 1"=10'

0 40 80 120
HORIZ 1" = 40'

0 10 20 30
VERT 1" = 10'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
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DRAWN: L. DIFUNTORUM
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PEER REVIEWED: S. GENTZLER
APPROVED: S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372
DATE 12-13-2016

PROJECT: **SOUTH BAY SALT POND RESTORATION PROJECT**

SHEET TITLE: RAVENSWOOD PONDS
POND R4 PRIMARY PILOT CHANNEL
PLAN AND PROFILE - SHEET 1 OF 2

SHEET NO. SHT. 21 OF 40 SHTS.
REV
DWG NO. G-12

Dec 19, 2016 - 8:54am
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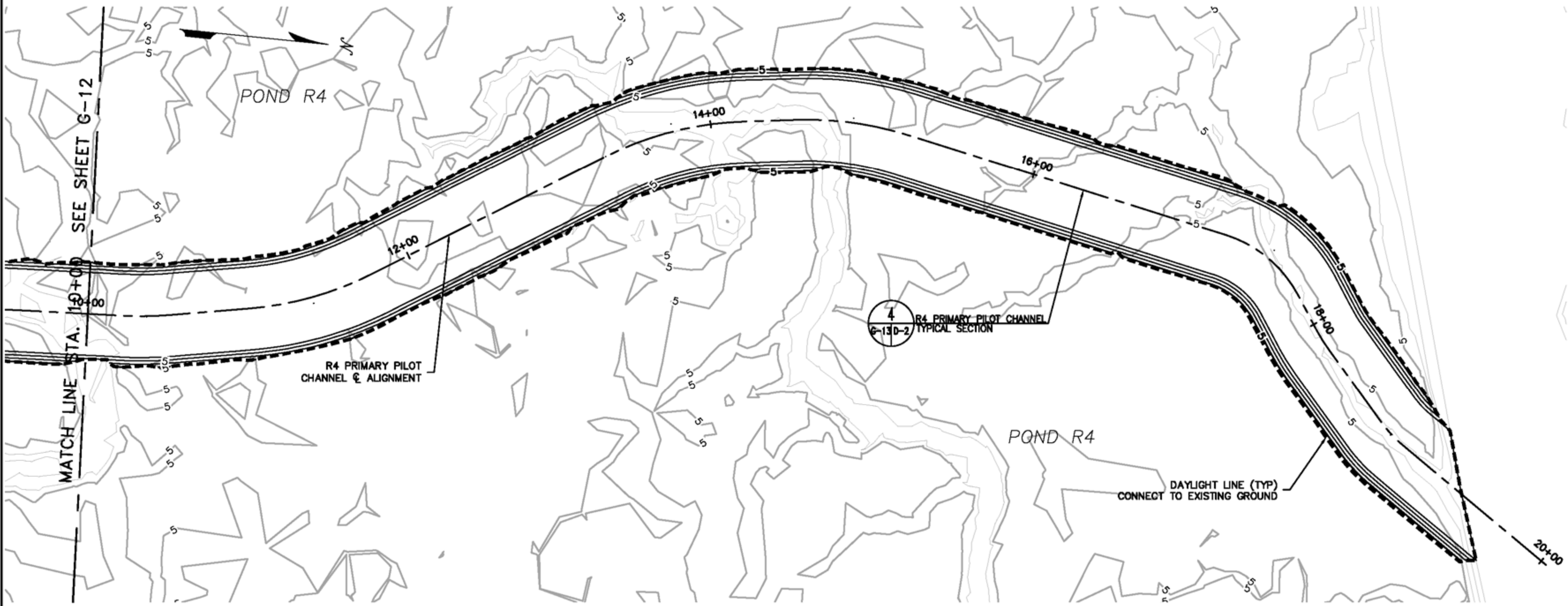
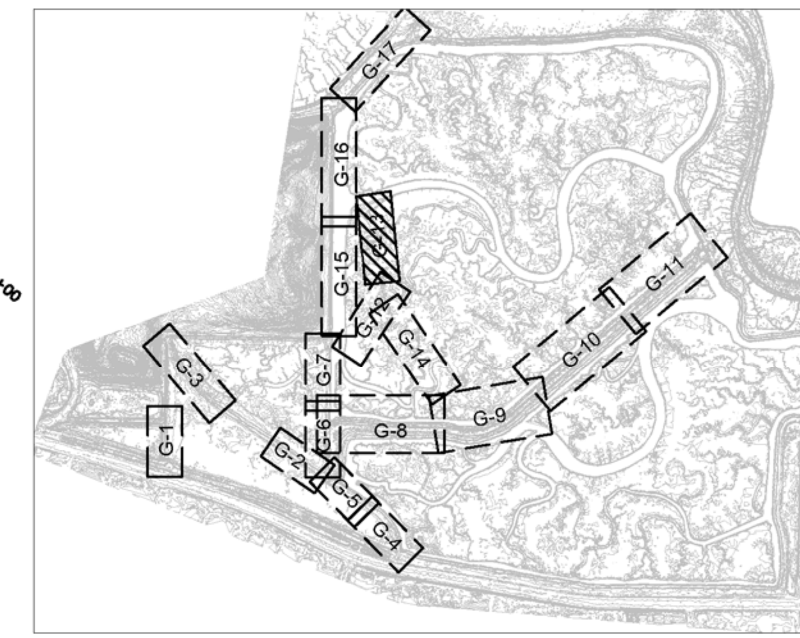
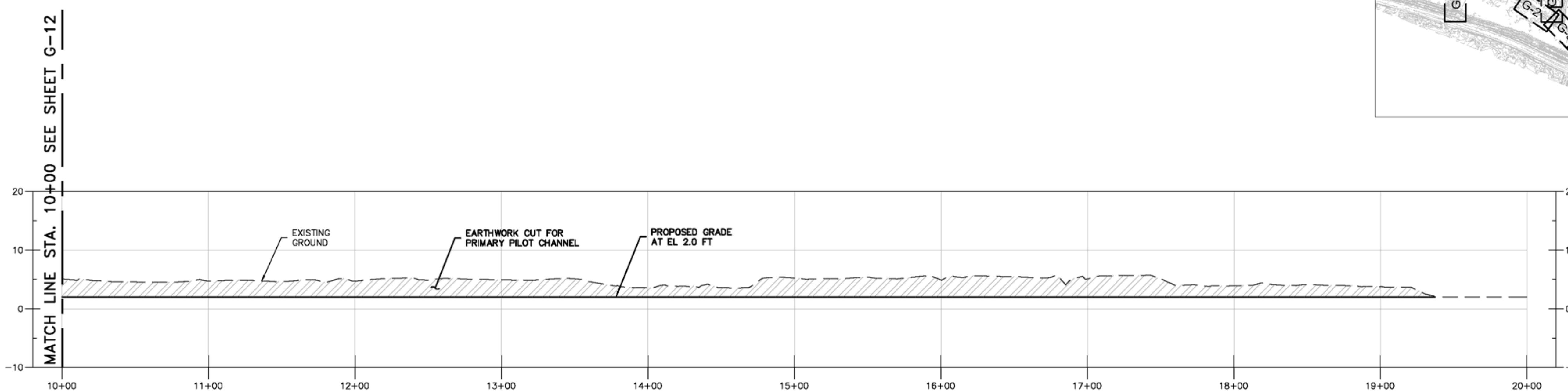


PLAN
1"=40'





R4 PRIMARY PILOT CHANNEL ℄ ALIGNMENT PROFILE
HORIZ 1"=40', VERT 1"=10'

0 40 80 120
HORIZ 1" = 40'

0 10 20 30
VERT 1" = 10'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

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APPROVED S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

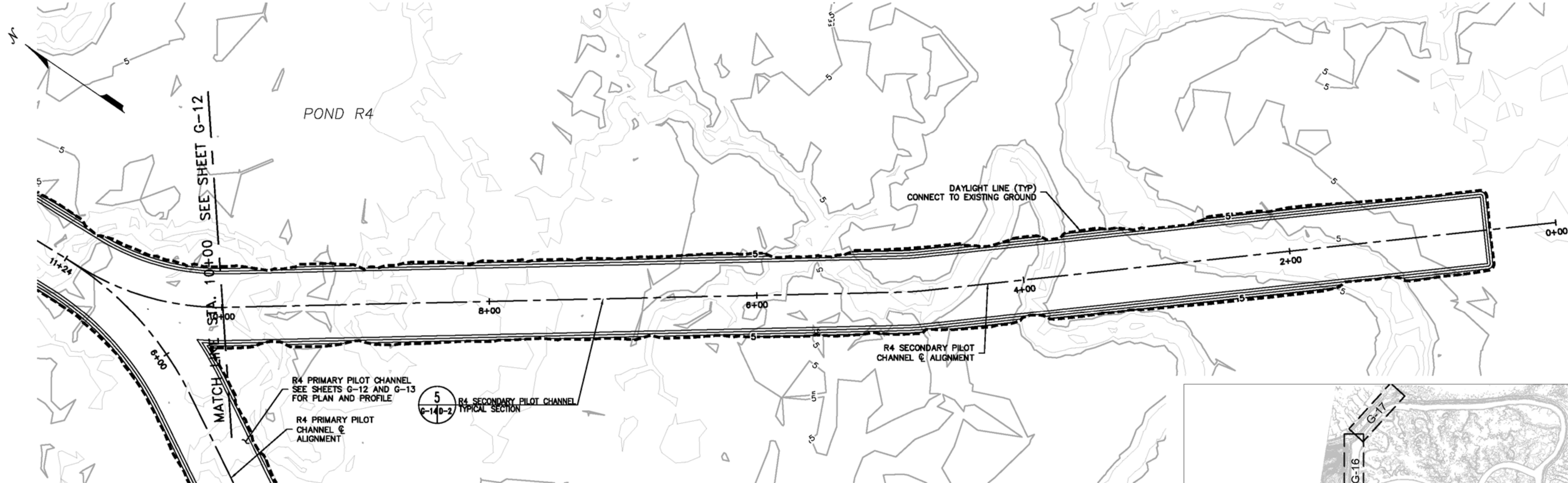
PROJECT No. 60422372
DATE 12-13-2016

PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

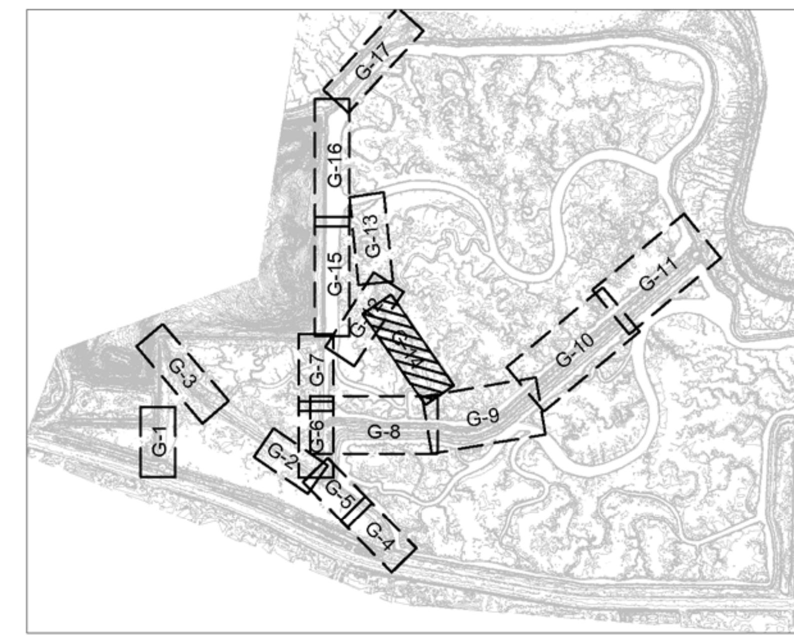
SHEET TITLE
RAVENSWOOD PONDS
POND R4 PRIMARY PILOT CHANNEL
PLAN AND PROFILE - SHEET 2 OF 2

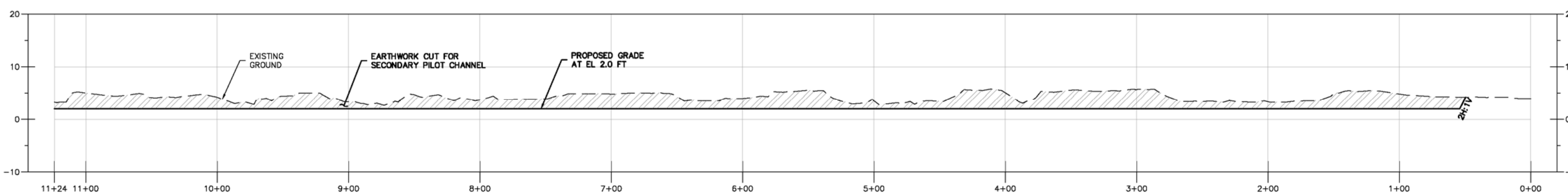
SHEET NO. SHT 22 OF 40 SHTS.
REV
DWG NO. G-13

Dec 15, 2016 - 12:40pm
C:\pwworking\aecom_na\chandrasekaranl\dms75824\RW_G-13.dwg



PLAN
1"=40'





R4 SECONDARY PILOT CHANNEL ℄ ALIGNMENT PROFILE
HORIZ 1"=40', VERT 1"=10'

0 40 80 120 HORIZ 1" = 40'

0 10 20 30 VERT 1" = 10'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

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PEER REVIEWED S. GENTZLER
APPROVED S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

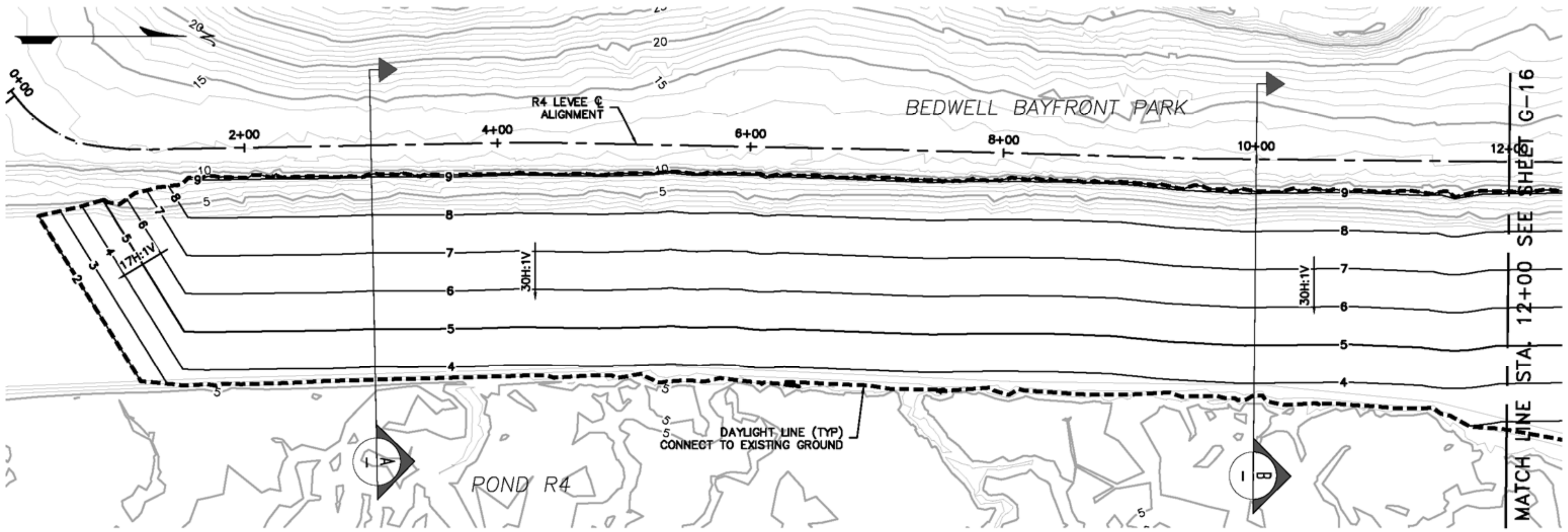
PROJECT No. 60422372
DATE 12-13-2016

PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

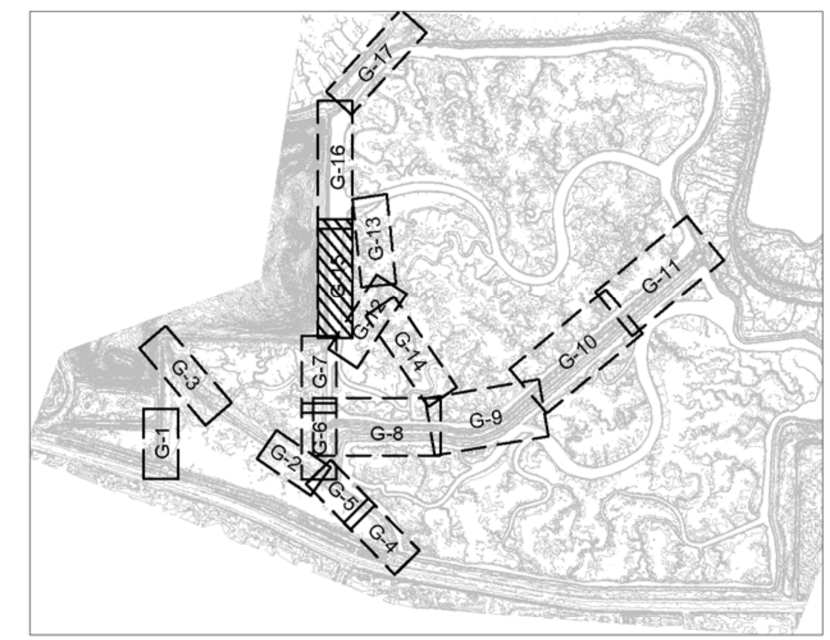
SHEET TITLE
RAVENSWOOD PONDS
POND R4 SECONDARY PILOT CHANNEL
PLAN AND PROFILE

SHEET NO. SHT 23 OF 40 SHTS
DWG NO. G-14
REV

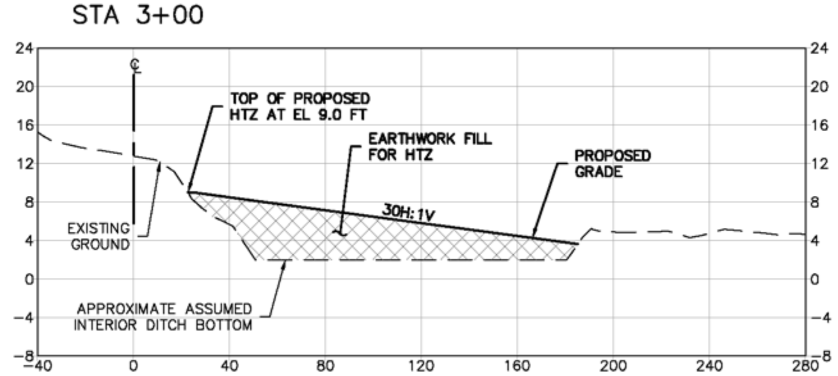
Dec 15, 2016 - 12:46pm



PLAN
1"=60'

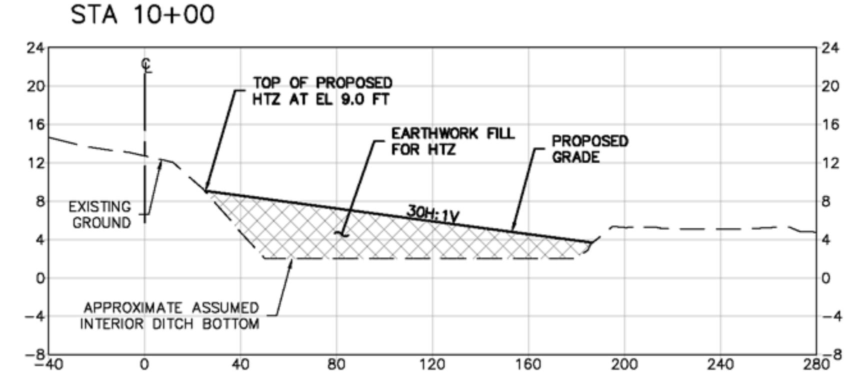


STA 3+00



(A) BEDWELL BAYFRONT PARK HTZ – TYPICAL SECTION
HORIZ 1"=40', VERT 1"=10

STA 10+00



(B) BEDWELL BAYFRONT PARK HTZ – TYPICAL SECTION
HORIZ 1"=40', VERT 1"=10

0 60 120 180 HORIZ 1" = 60'
0 40 80 120 HORIZ 1" = 40'
0 10 20 30 VERT 1" = 10'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

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STATE OF CALIFORNIA
Coastal Conservancy

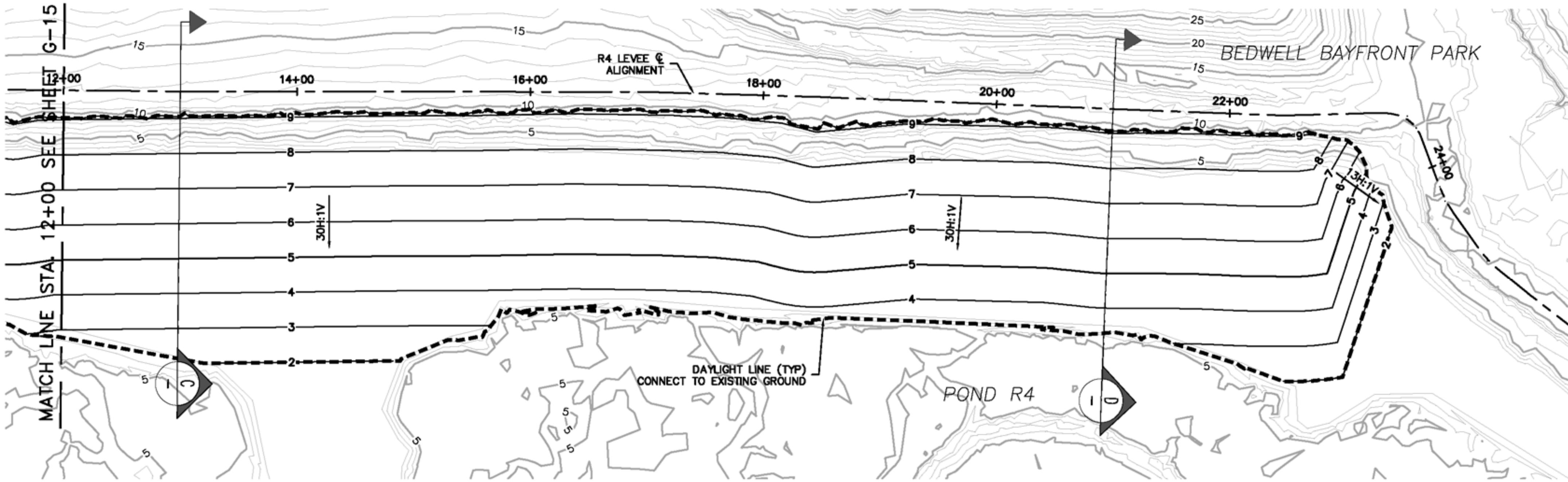
PROJECT No. 60422372
DATE 12-13-2016

PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

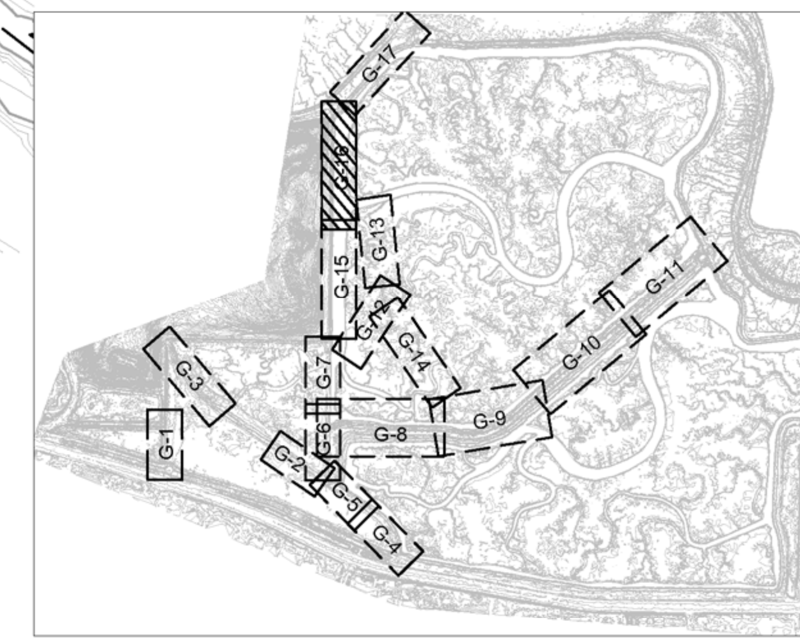
SHEET TITLE
RAVENSWOOD PONDS
BEDWELL BAYFRONT PARK HTZ
GRADING PLAN - SHEET 1 OF 2

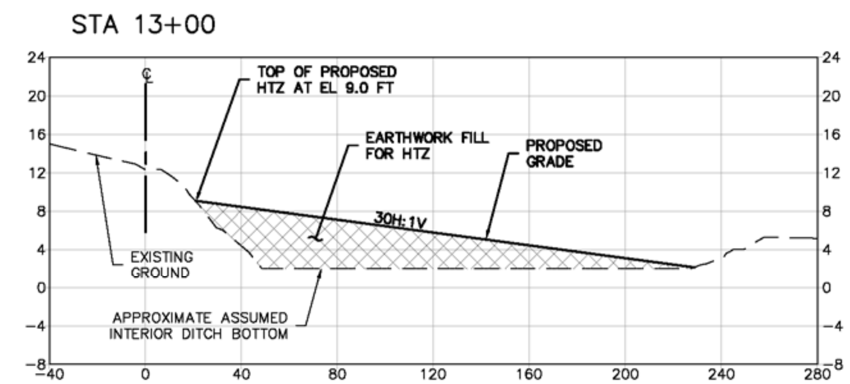
SHEET NO. SHT 24 OF 40 SHTS
REV
DWG NO. G-15

Dec 13, 2016 - 3:10pm
C:\pwworking\aecom_na\chandrasekaranl\dms75824\RW_G-15.dwg

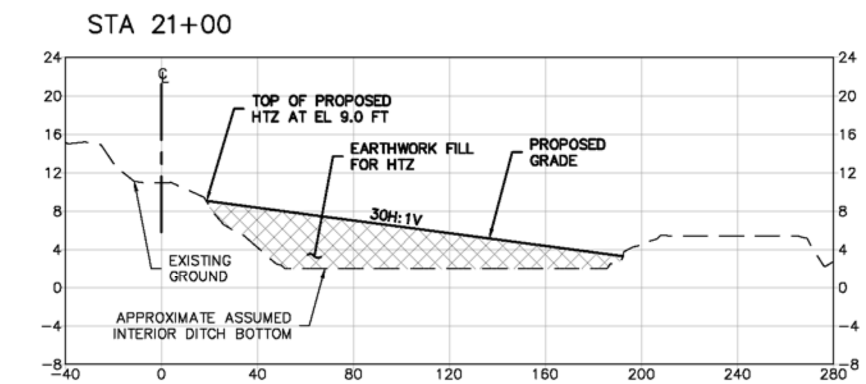


PLAN
1"=60'





C BEDWELL BAYFRONT PARK HTZ – TYPICAL SECTION
HORIZ 1"=40', VERT 1"=10



D BEDWELL BAYFRONT PARK HTZ – TYPICAL SECTION
HORIZ 1"=40', VERT 1"=10

0 60 120 180 HORIZ 1" = 60'
0 40 80 120 HORIZ 1" = 40'
0 10 20 30 VERT 1" = 10'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING 0 1/2 1 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

PREPARED BY AECOM 300 Lakeside Drive, Suite 400 Oakland, CA 94612 Tel: (510) 893-3600 aecom.com

DESIGNED L. CHANDRASEKARAN
DRAWN L. DIFUNTORUM
CHECKED G. OROZCO / I. ZARCHI
PEER REVIEWED S. GENTZLER
APPROVED S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372 DATE 12-13-2016

PROJECT **SOUTH BAY SALT POND RESTORATION PROJECT**

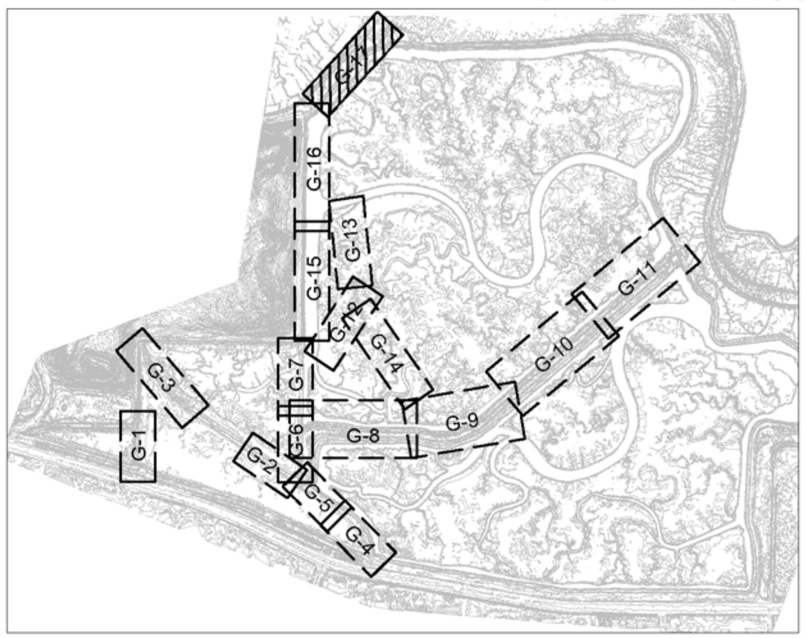
SHEET TITLE RAVENSWOOD PONDS BEDWELL BAYFRONT PARK HTZ GRADING PLAN - SHEET 2 OF 2

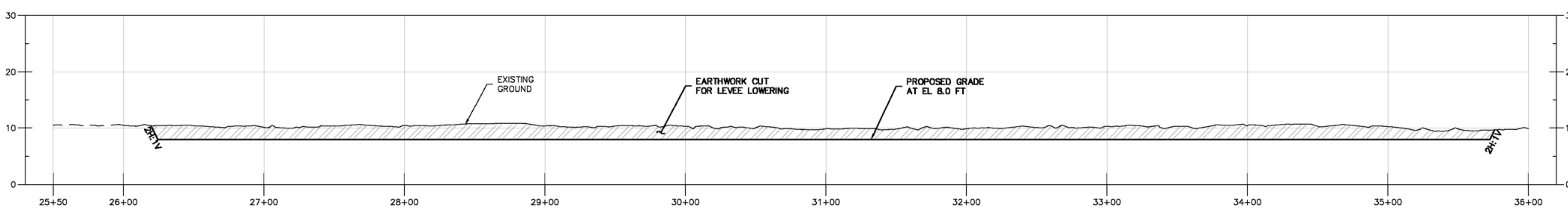
SHEET NO. SHT 25 OF 40 SHTS

DWG NO. G-16

REV

PLAN
1"=40'





R4 LEVEE ℄ ALIGNMENT PROFILE
HORIZ 1"=40', VERT 1"=10'

HORIZ 1" = 40' (0, 40, 80, 120)
VERT 1" = 10' (0, 10, 20, 30)

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
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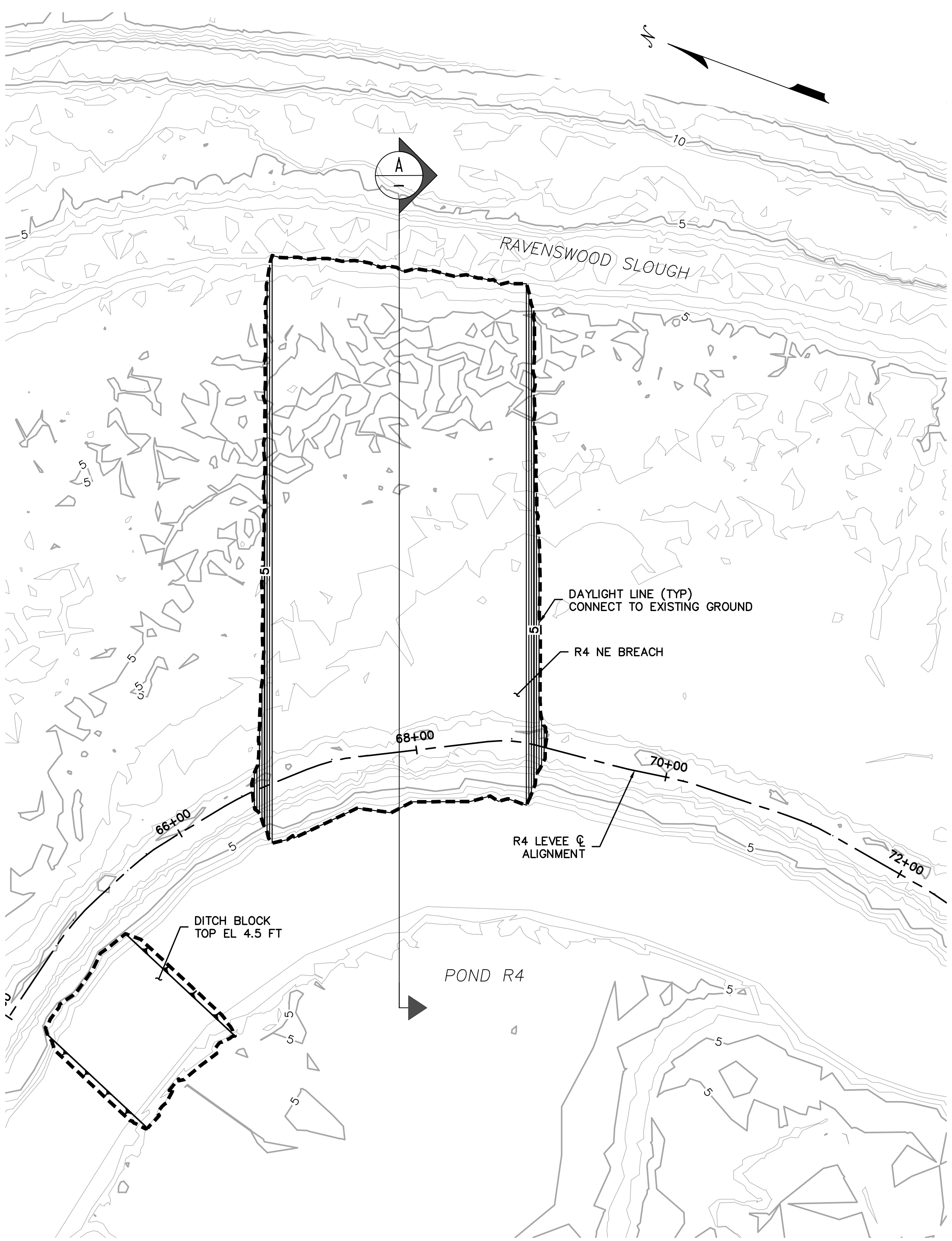
DRAWN: L. DIFUNTORUM
CHECKED: G. OROZCO / I. ZARCHI
PEER REVIEWED: S. GENTZLER
APPROVED: S. GENTZLER

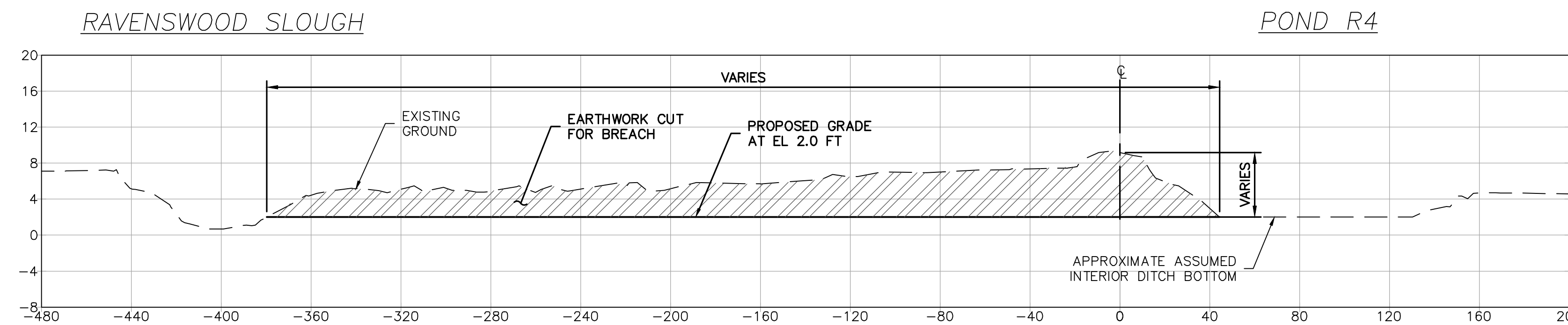
STATE OF CALIFORNIA
Coastal Conservancy
PROJECT No. 60422372
DATE 12-13-2016

PROJECT: **SOUTH BAY SALT POND RESTORATION PROJECT**
SHEET TITLE: RAVENSWOOD PONDS
POND R4 NORTHWEST LEVEE LOWERING
PLAN AND PROFILE

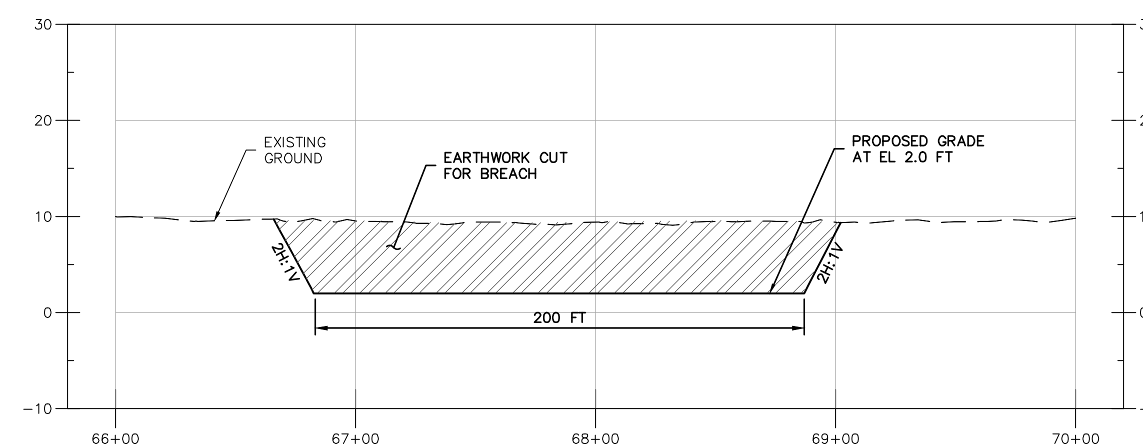
SHEET NO. SHT. 26 OF 40 SHTS.
DWG NO. G-17



PLAN
1"=60'



A R4 NORTHEAST BREACH – TYPICAL SECTION
HORIZ 1"=40', VERT 1"=10'



R4 NORTHEAST BREACH – PROFILE
HORIZ 1"=40', VERT 1"=10'

HORIZ 1" = 60'
HORIZ 1" = 40'
VERT 1" = 10'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

PREPARED BY
AECOM
300 Lakeside Drive, Suite 400
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Tel: (510) 893-3600
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DESIGNED L. CHANDRASEKARAN
DRAWN L. DIFUNTORUM
CHECKED G. OROZCO / I. ZARCHI
PEER REVIEWED S. GENTZLER
APPROVED S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

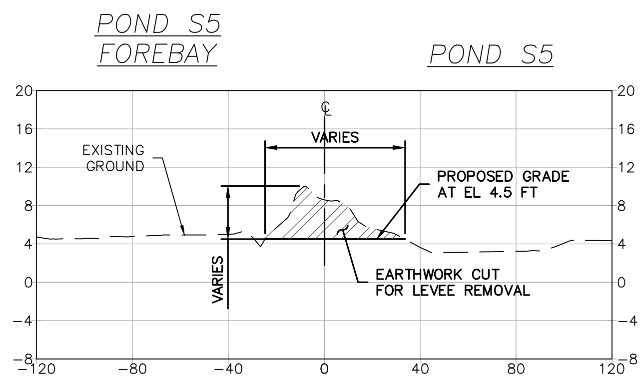
PROJECT No. 60422372
DATE 12-13-2016

PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

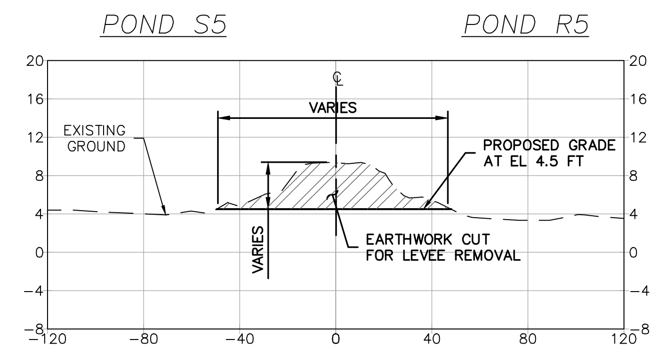
SHEET TITLE
RAVENSWOOD PONDS
POND R4 NORTHEAST BREACH
DETAILED GRADING PLAN

SHEET NO. SHT. 27 OF 40 SHTS.
REV
DWG NO. D-1

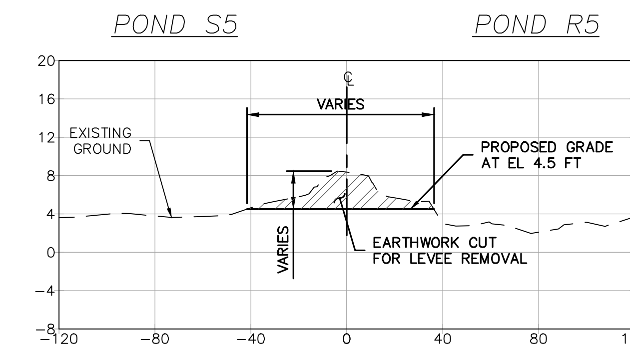
Dec 14, 2016 - 1:03pm
C:\pwworking\aecom_na\chandrasekaranl\dms75824\RW_D-1.dwg



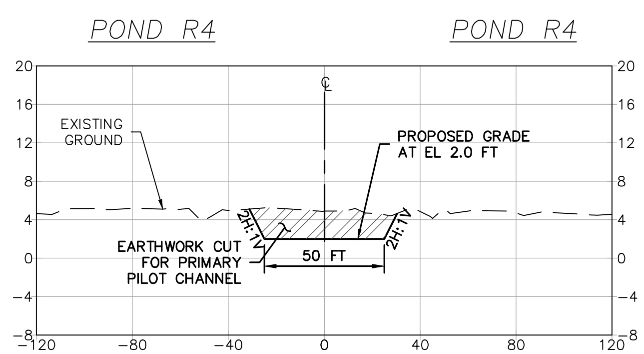
1 (G-1 | D-2) S5 INTERNAL LEVEE REMOVAL – TYPICAL SECTION
STA 0+22 TO 3+90
HORIZ 1"=40', VERT 1"=10'



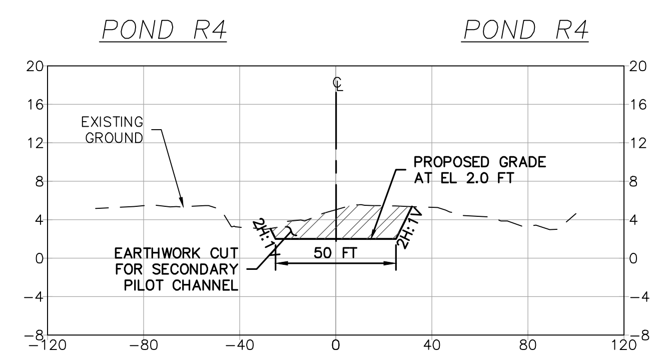
2 (G-2 | D-2) R5/S5 SOUTH INTERNAL LEVEE REMOVAL – TYPICAL SECTION
STA 0+66 TO 5+77
HORIZ 1"=40', VERT 1"=10'



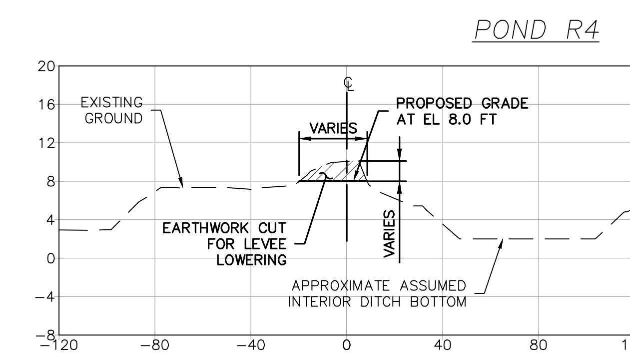
3 (G-3 | D-2) R5/S5 NORTH INTERNAL LEVEE REMOVAL – TYPICAL SECTION
STA 13+52 TO 22+28
HORIZ 1"=40', VERT 1"=10'



4 (G-12 | D-2, G-13) R4 PRIMARY PILOT CHANNEL – TYPICAL SECTION
STA 0+55 TO 19+37
HORIZ 1"=40', VERT 1"=10'



5 (G-14 | D-2) R4 SECONDARY PILOT CHANNEL – TYPICAL SECTION
STA 0+50 TO 11+24
HORIZ 1"=40', VERT 1"=10'



6 (G-17 | D-2) R4 NORTHWEST LEVEE LOWERING – TYPICAL SECTION
STA 26+20 TO 35+76
HORIZ 1"=40', VERT 1"=10'

0 40 80 120
HORIZ 1" = 40'

0 10 20 30
VERT 1" = 10'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
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PEER REVIEWED S. GENTZLER
APPROVED S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

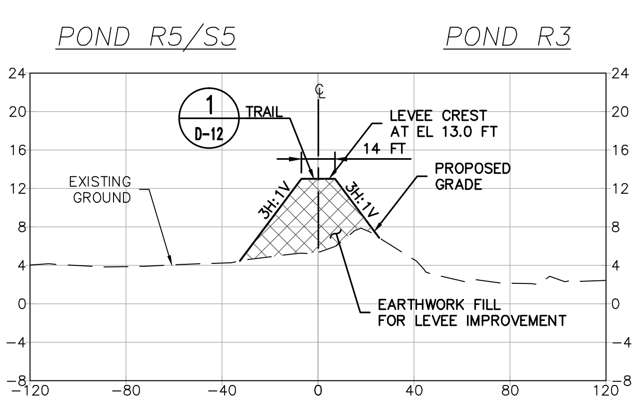
PROJECT No. 60422372
DATE 12-13-2016

PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

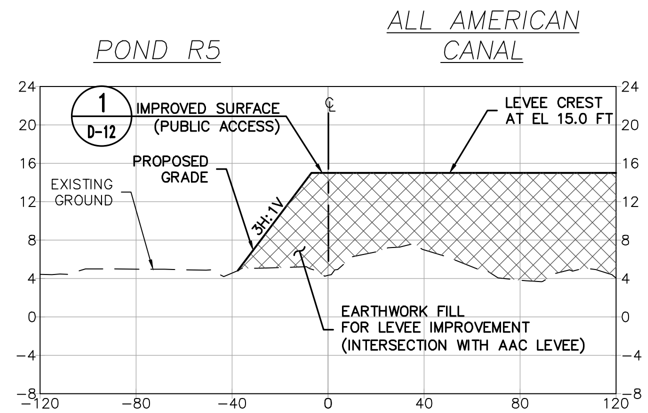
SHEET TITLE
RAVENSWOOD PONDS
TYPICAL GRADING SECTIONS
SHEET 1 OF 2

SHEET NO. SHT. 28 OF 40 SHTS.
REV
DWG NO. D-2

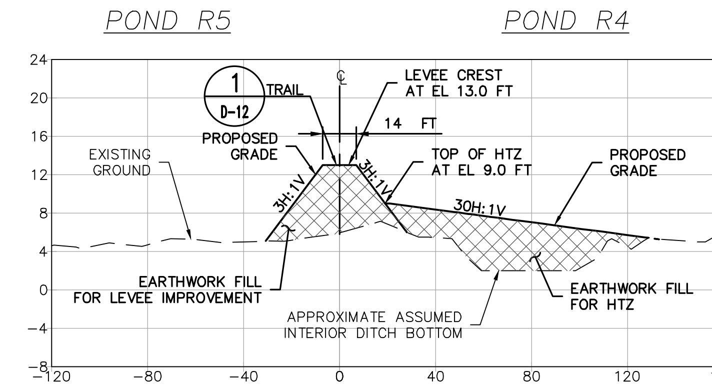
Dec 14, 2016 - 1:09pm
C:\pwworking\aecom_na\chandrasekaranl\ms75824\RW_D-2.dwg



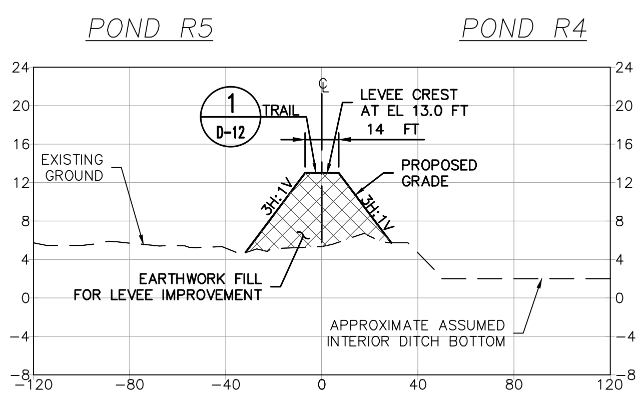
1 G-4 D-3 G-5 G-6 R5/S5 EAST LEVEE IMPROVEMENT – TYPICAL SECTION
STA 0+22 TO 16+49
HORIZ 1"=40', VERT 1"=10'



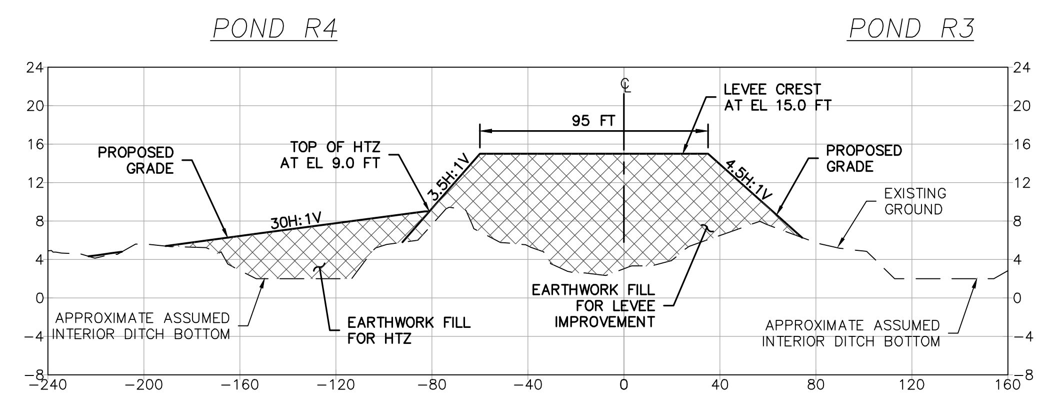
2 G-6 D-3 R5/S5 EAST LEVEE IMPROVEMENT – TYPICAL SECTION
STA 16+49 TO 18+48
HORIZ 1"=40', VERT 1"=10'



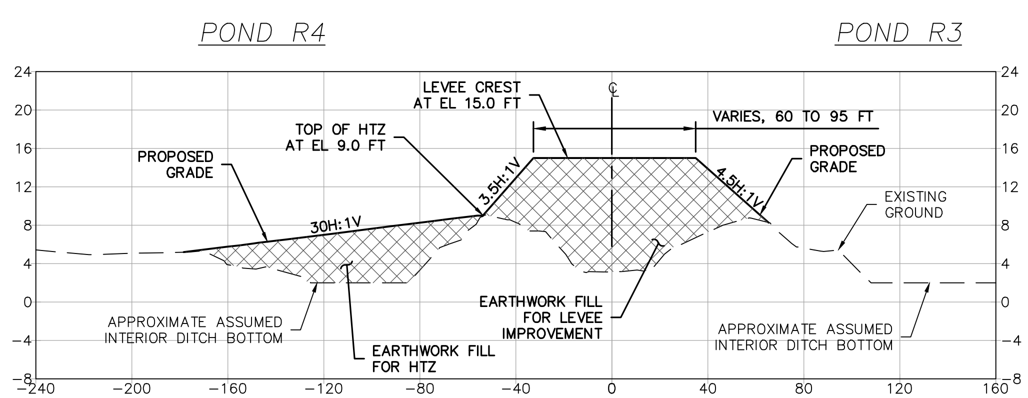
3 G-6 D-3 G-7 R5/S5 EAST LEVEE IMPROVEMENT – TYPICAL SECTION
STA 18+48 TO 23+69
HORIZ 1"=40', VERT 1"=10'



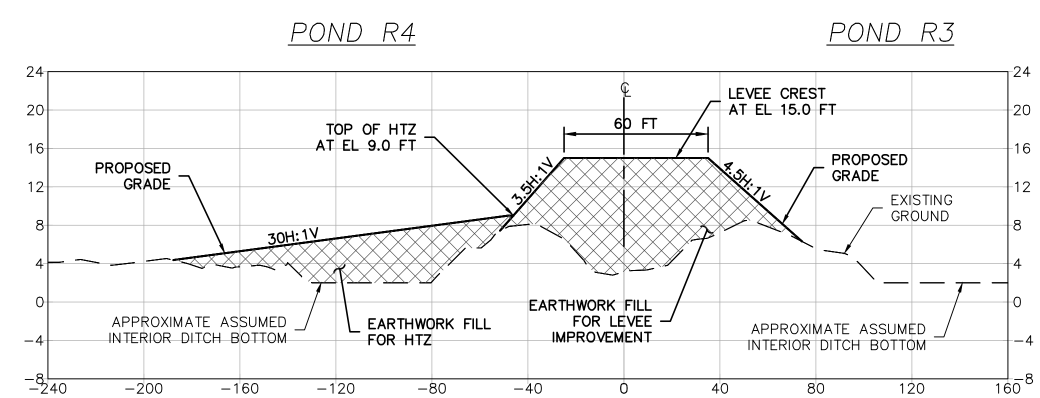
4 G-7 D-3 R5/S5 EAST LEVEE IMPROVEMENT – TYPICAL SECTION
STA 23+69 TO 27+31
HORIZ 1"=40', VERT 1"=10'



5 G-8 D-3 AAC LEVEE IMPROVEMENT – TYPICAL SECTION
STA 0+00 TO 5+00
HORIZ 1"=40', VERT 1"=10'



6 G-8 D-3 AAC LEVEE IMPROVEMENT – TYPICAL SECTION
STA 5+00 TO 6+36
HORIZ 1"=40', VERT 1"=10'



7 G-8 D-3 G-9 G-10 G-11 AAC LEVEE IMPROVEMENT – TYPICAL SECTION
STA 6+36 TO 47+48
HORIZ 1"=40', VERT 1"=10'

0 40 80 120
HORIZ 1" = 40'

0 10 20 30
VERT 1" = 10'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
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DRAWN L. DIFUNTORUM
CHECKED G. OROZCO / I. ZARCHI
PEER REVIEWED S. GENTZLER
APPROVED S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372
DATE 12-13-2016

PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

SHEET TITLE
RAVENSWOOD PONDS
TYPICAL GRADING SECTIONS
SHEET 2 OF 2

SHEET NO. SHT. 29 OF 40 SHTS.
REV
DWG NO. D-3

Dec 14, 2016 - 1:32pm
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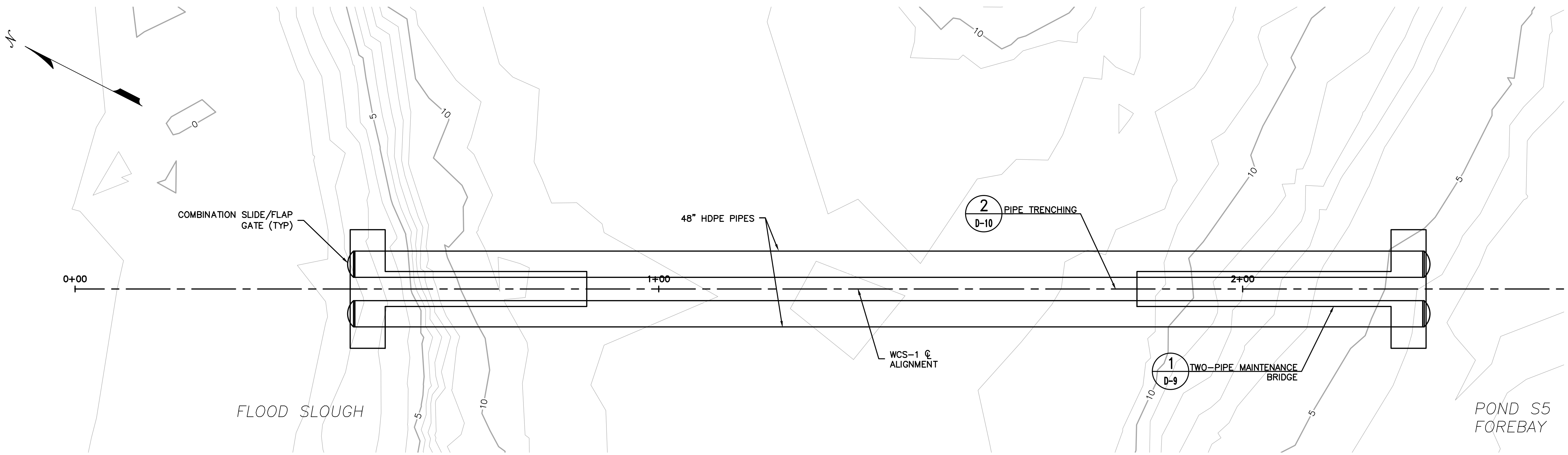
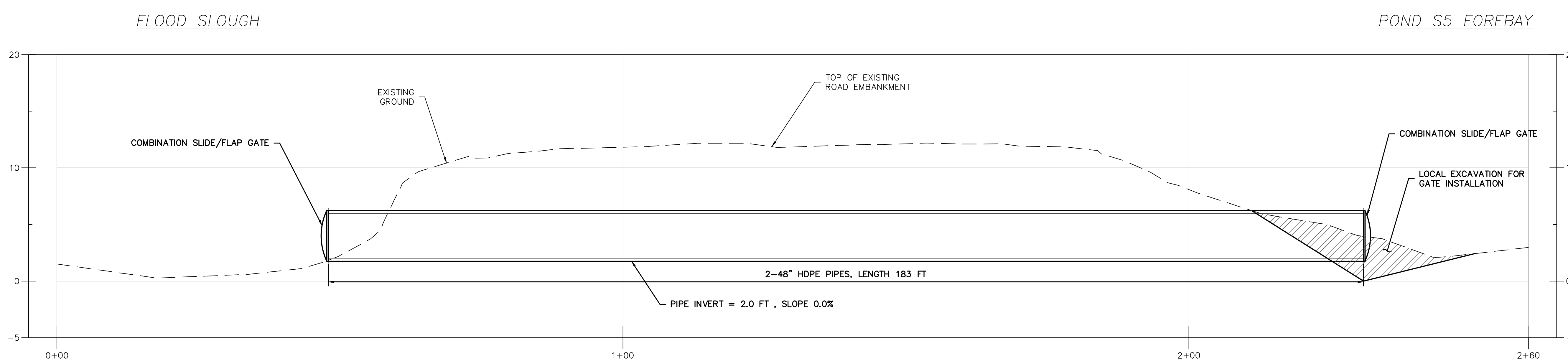


PLAN
1"=10'



WCS-1 ℄ ALIGNMENT PROFILE
HORIZ 1"=10', VERT 1"=5'

0 10 20 30
HORIZ 1" = 10'

0 5 10 15
VERT 1" = 5'

Dec 19, 2016 - 9:03am
C:\pwworking\aecom_na\chandrasekaranl\dms75824\RW_D-4.dwg

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

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0 1/2 1
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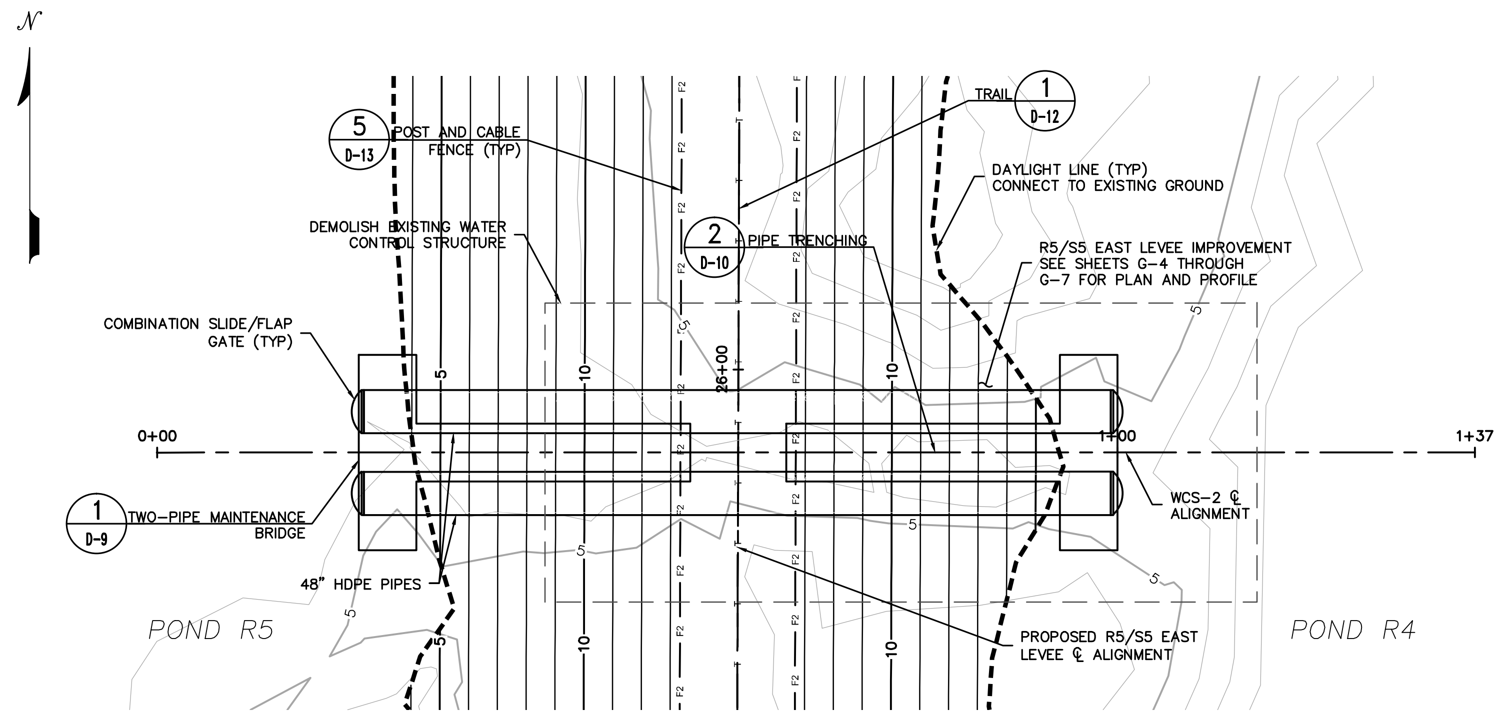
STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372
DATE 12-13-2016

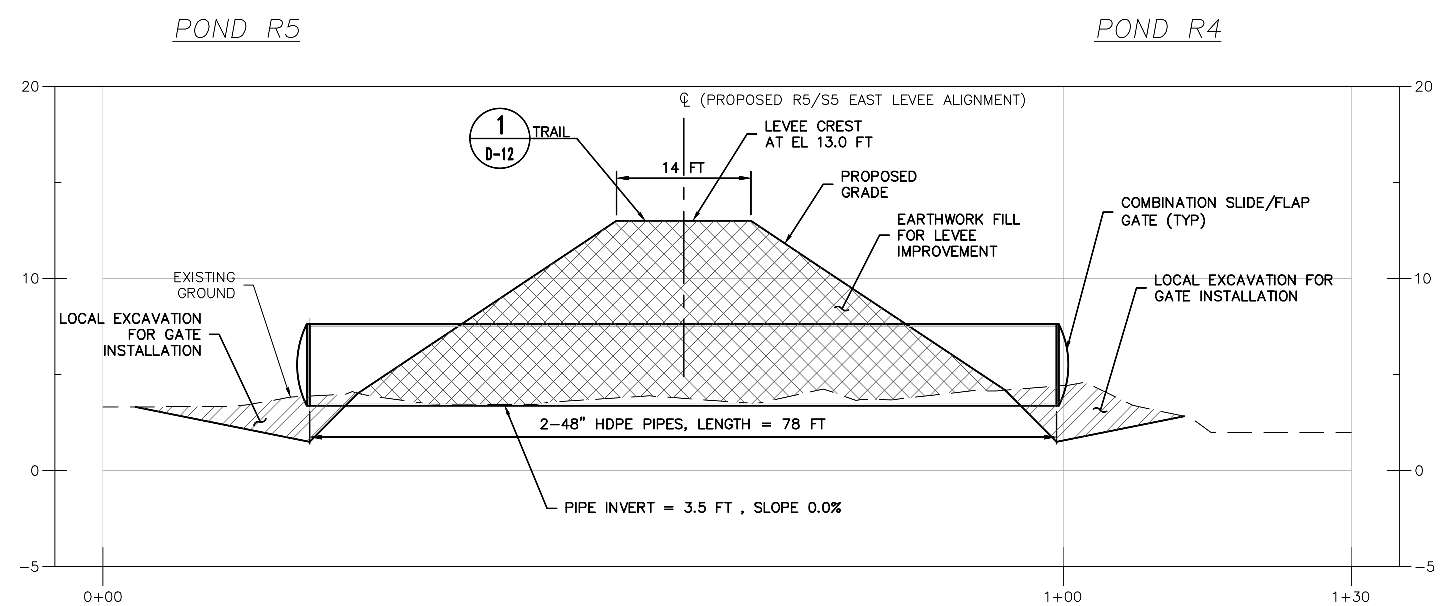
PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

SHEET TITLE
RAVENSWOOD PONDS
WATER CONTROL STRUCTURE - 1
PLAN AND PROFILE

SHEET NO.
SHT. 30 OF 40 SHTS.
REV
DWG NO.
D-4



PLAN
1"=10'



WCS-2 ℄ ALIGNMENT PROFILE
HORIZ 1"=10', VERT 1"=5'

0 10 20 30
HORIZ 1" = 10'

0 5 10 15
VERT 1" = 5'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
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CHECKED	G. OROZCO / I. ZARCHI
PEER REVIEWED	S. GENTZLER
APPROVED	S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372
DATE 12-13-2016

PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

SHEET TITLE
RAVENSWOOD PONDS
WATER CONTROL STRUCTURE - 2
PLAN AND PROFILE

SHEET NO. SHT. 31 OF 40 SHTS.
REV
DWG NO. D-5

Dec 19, 2016 - 9:06am
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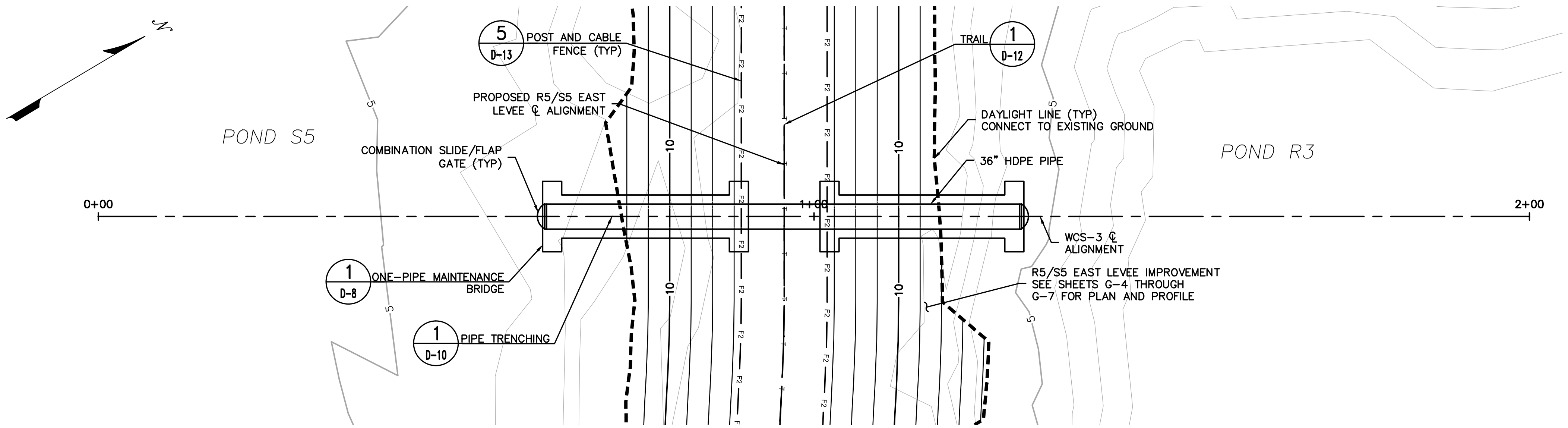
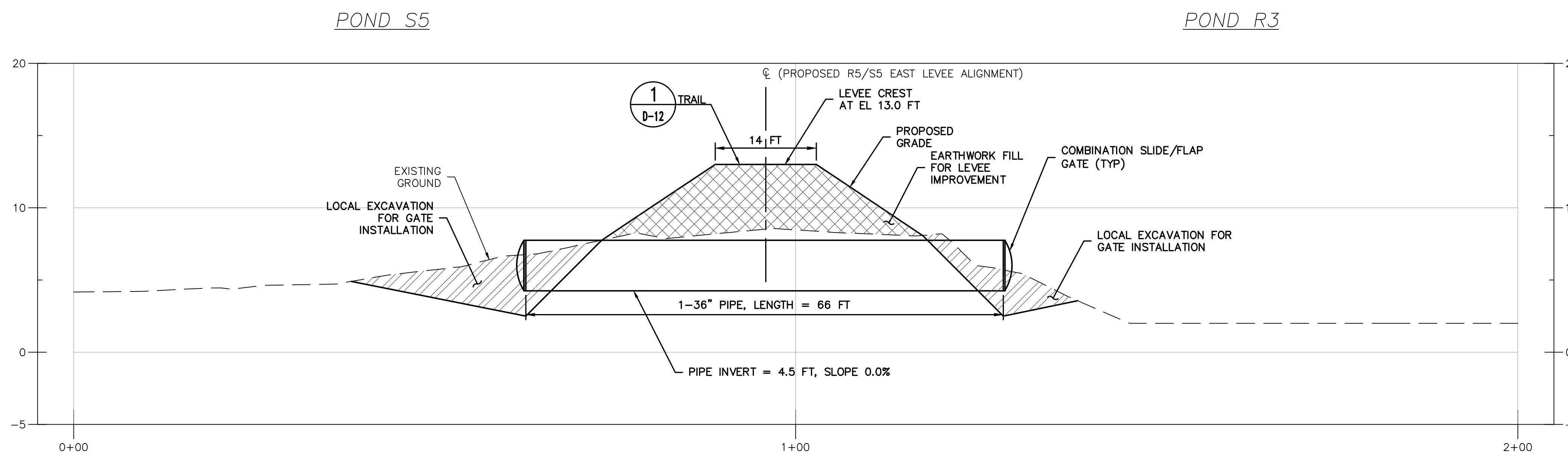


PLAN
1"=10'



WCS-3 ℄ ALIGNMENT PROFILE
HORIZ 1"=10', VERT 1"=5'

0 10 20 30
HORIZ 1" = 10'

0 5 10 15
VERT 1" = 5'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
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APPROVED S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372
DATE 12-13-2016

PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

SHEET TITLE
RAVENSWOOD PONDS
WATER CONTROL STRUCTURE - 3
PLAN AND PROFILE

SHEET NO. SHT. 32 OF 40 SHTS.
REV
DWG NO. D-6

Dec 19, 2016 - 9:10am
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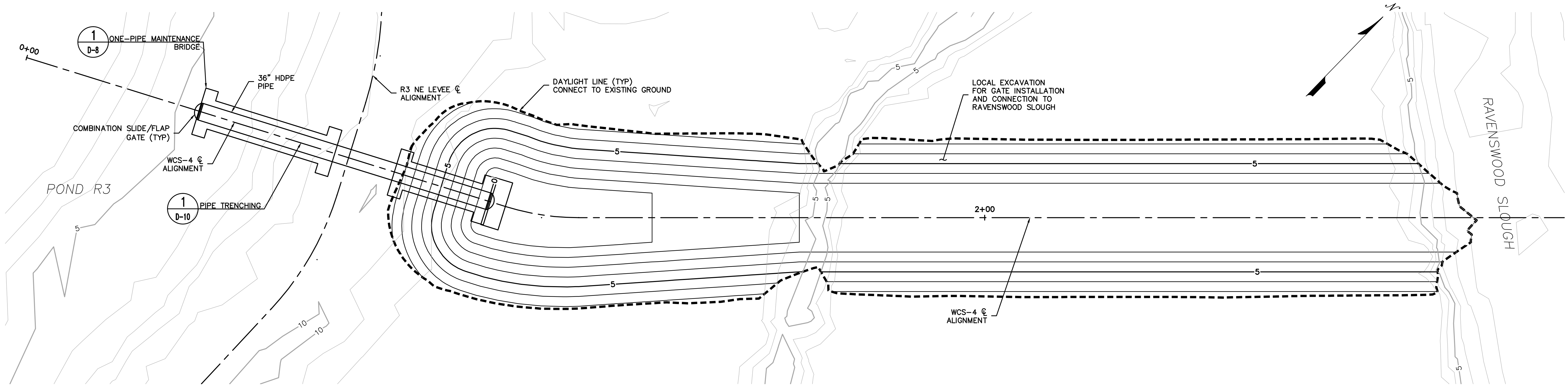

PLAN
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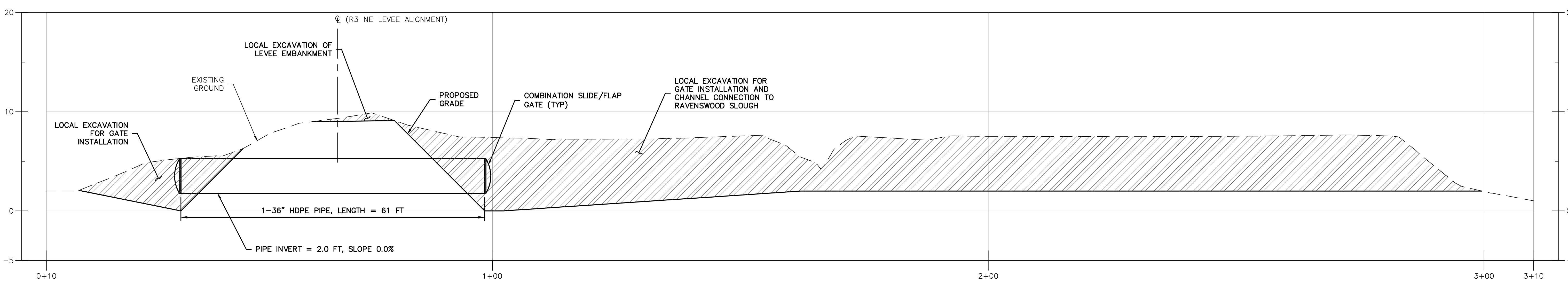

WCS-4 ℄ ALIGNMENT PROFILE
HORIZ 1"=10', VERT 1"=5'

0 10 20 30 HORIZ 1" = 10'

0 5 10 15 VERT 1" = 5'

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
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PEER REVIEWED S. GENTZLER
APPROVED S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372
DATE 12-13-2016

PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

SHEET TITLE
RAVENSWOOD PONDS
WATER CONTROL STRUCTURE - 4
PLAN AND PROFILE

SHEET NO. SHT. 33 OF 40 SHTS.
REV
DWG NO. D-7

Dec 19, 2016 - 9:12am
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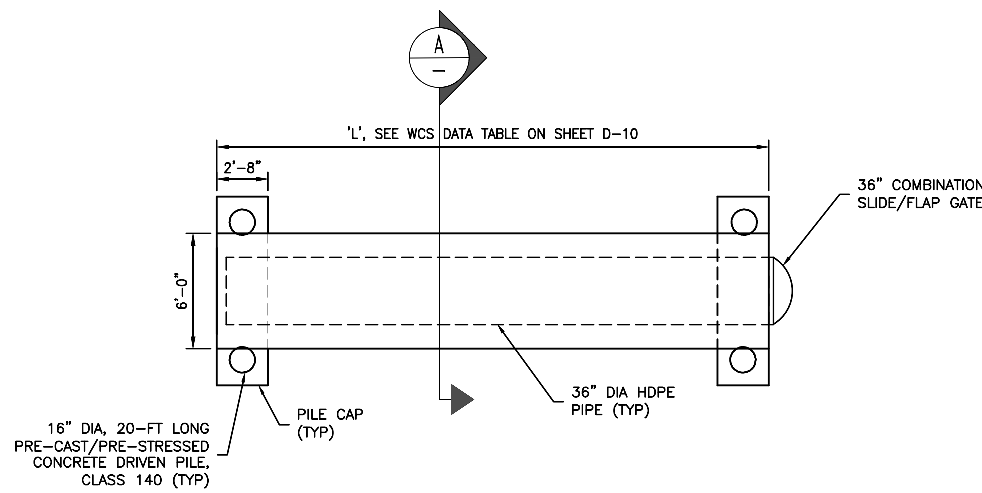
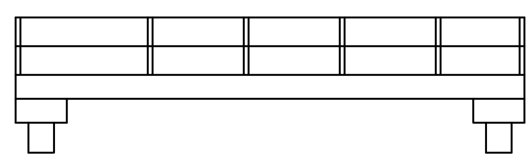
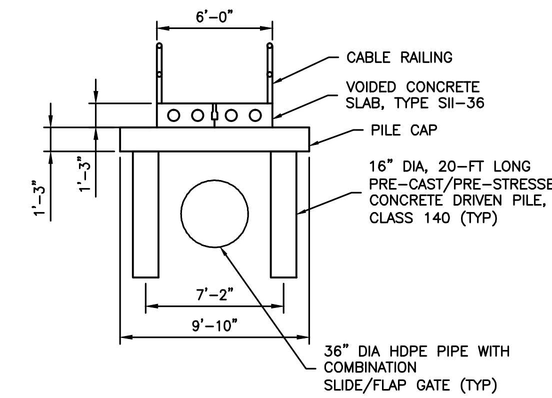


BRIDGE PLAN
NTS



BRIDGE ELEVATION
NTS



A BRIDGE TYPICAL SECTION
NTS

NOTES

1. SEE SHEETS D-6 AND D-7 FOR PLAN AND PROFILE OF THE ONE-PIPE MAINTENANCE BRIDGES OF WCS-3 AND WCS-4, RESPECTIVELY.
2. FOR BRIDGE LENGTH INFORMATION, SEE WATER CONTROL STRUCTURE DATA TABLE, DETAIL 3 ON SHEET D-10.

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

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CHECKED L. CHANDRASEKARAN
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APPROVED S. GENTZLER

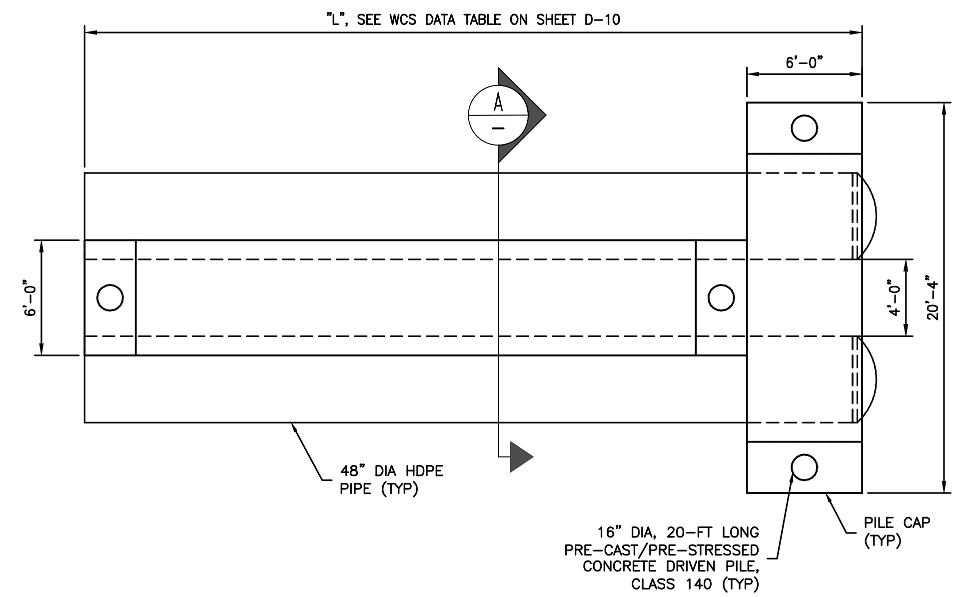
STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372
DATE 12-13-2016

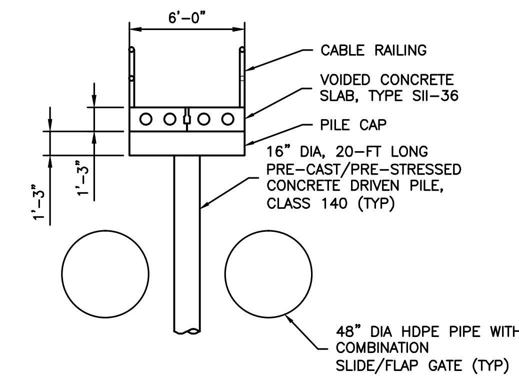
PROJECT **SOUTH BAY SALT POND RESTORATION PROJECT**
SHEET TITLE RAVENSWOOD PONDS ONE-PIPE MAINTENANCE BRIDGE TYPICAL STRUCTURAL DETAILS

SHEET NO. SHT. 34 OF 40 SHTS.
REV
DWG NO. D-8

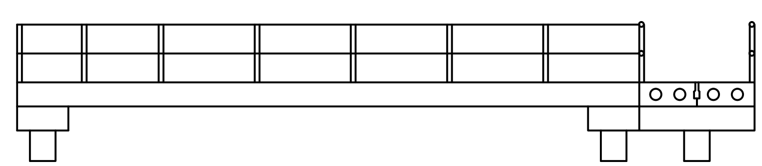
Dec 16, 2016 - 11:07am
C:\pwworking\aecom_na\chandrasekarandms75824\RW_D-8.dwg



BRIDGE PLAN
NTS



A BRIDGE TYPICAL SECTION
NTS



BRIDGE ELEVATION
NTS

NOTES

1. SEE SHEETS D-4 AND D-5 FOR PLAN AND PROFILE OF THE TWO-PIPE MAINTENANCE BRIDGES OF WCS-1 AND WCS-2, RESPECTIVELY.
2. FOR BRIDGE LENGTH INFORMATION, SEE WATER CONTROL STRUCTURE DATA TABLE, DETAIL 3 ON SHEET D-10.

Dec 14, 2016 - 2:30pm
C:\pwworking\aecom_na\chandrasekarandms75824\RW_D-9.dwg

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
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PEER REVIEWED S. KAZMI
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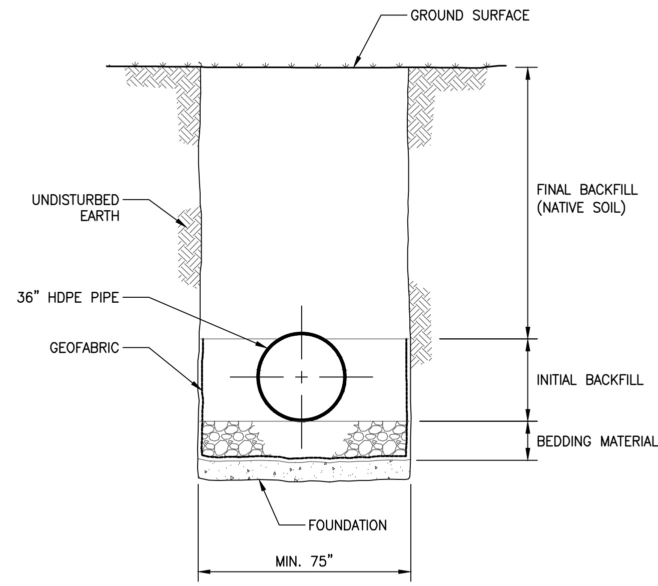
STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372
DATE 12-13-2016

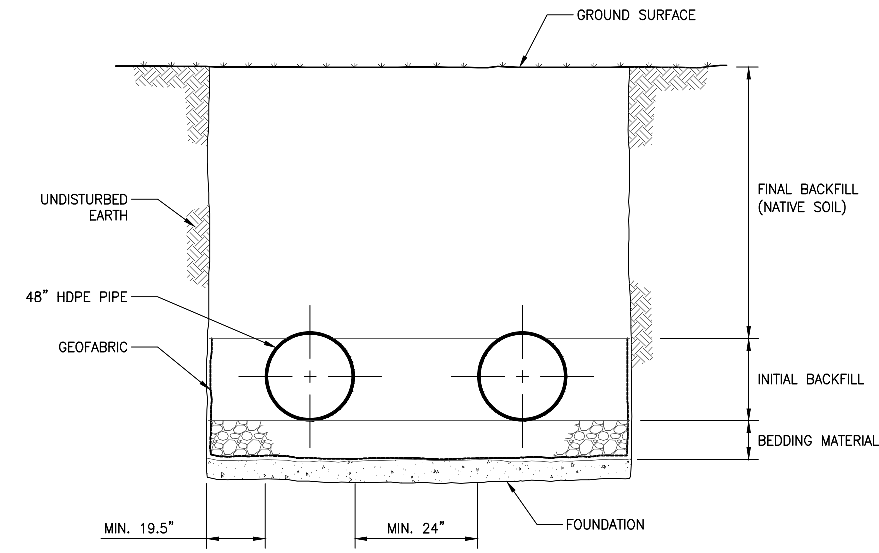
PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

SHEET TITLE
RAVENSWOOD PONDS
TWO-PIPE MAINTENANCE BRIDGE
TYPICAL STRUCTURAL DETAILS

SHEET NO.
SHT. 35 OF 40 SHTS.
REV
DWG NO.
D-9



TYPICAL TRENCH SECTION
1 ONE-PIPE INSTALLATION
– NTS



TYPICAL TRENCH SECTION
2 TWO-PIPE INSTALLATION
– NTS

NOTES FOR TRENCH EXCAVATION:

1. FOUNDATION: WHERE THE TRENCH BOTTOM IS UNSTABLE, THE CONTRACTOR SHALL EXCAVATE TO A DEPTH REQUIRED BY THE ENGINEER AND REPLACE WITH A FOUNDATION OF CLASS I OR II MATERIAL AS DEFINED IN ASTM* D2321. "STANDARD PRACTICE FOR INSTALLATION OF THERMOSPLASTIC PIPE FOR SEWERS AND OTHER GRAVITY-FLOW APPLICATIONS." LATEST EDITION; AS AN ALTERNATIVE AND AT THE DISCRETION OF THE ENGINEER. THE TRENCH BOTTOM MAY BE STABILIZED USING A WOVEN GEOTEXTILE FABRIC.

*ASTM AMERICAN SOCIETY OF TESTING AND MATERIALS
**AASHTO AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS

NOTES FOR PIPE INSTALLATION:

1. INSTALLATION PROCEDURES: PIPES SHALL BE INSTALLED PER LOCAL STANDARDS AND REGULATIONS IN LEIU OF LOCAL STANDARDS. REFER TO ASTM* D2321 OR AASHTO** SECTION 30 FOR INSTALLATION GUIDELINES.

WATER CONTROL STRUCTURE DATA TABLE

WATER CONTROL STRUCTURE	LOCATION	REFER TO SHEET	NO. OF PIPES	PIPE DIA	GATE, SEE NOTE 1	MAINTENANCE BRIDGE	L, SEE NOTE 2
WCS-1	CONNECTING POND R5/S5 AND FLOOD SLOUGH	D-4	2	48"	48" DIA COMBINATION GATE	WCS-1 NORTH	40'-6"
						WCS-1 SOUTH	49'-6"
WCS-2	CONNECTING POND R5/S5 AND POND R4	D-5	2	48"	48" DIA COMBINATION GATE	WCS-2 EAST	34'-5"
						WCS-2 WEST	34'-5"
WCS-3	CONNECTING POND R5/S5 AND POND R3	D-6	1	36"	36" DIA COMBINATION GATE	WCS-3 SOUTHEAST	28'-9"
						WCS-3 NORTHWEST	28'-6"
WCS-4	CONNECTING POND R3 TO RAVENSWOOD SLOUGH	D-7	1	36"	36" DIA COMBINATION GATE	WCS-4 EAST	29'-0"
						WCS-4 WEST	20'-6"

NOTES:

1. COMBINATION SLIDE/FLAP GATE, GATE FC-10 OR AFC-331 BY WATERMAN INC. OR EQUIVALENT
2. L = TOTAL STRUCTURAL LENGTH, SEE SHEETS D-8 AND D-9.

3 WATER CONTROL STRUCTURE DATA TABLE
– NTS

Dec 19, 2016 - 9:17am
C:\pwworking\aecom_na\chandrasekaranl\dms75824\RW_D-10.dwg

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

PREPARED BY
AECOM
300 Lakeside Drive, Suite 400
Oakland, CA 94612
Tel: (510) 893-3600
aecom.com

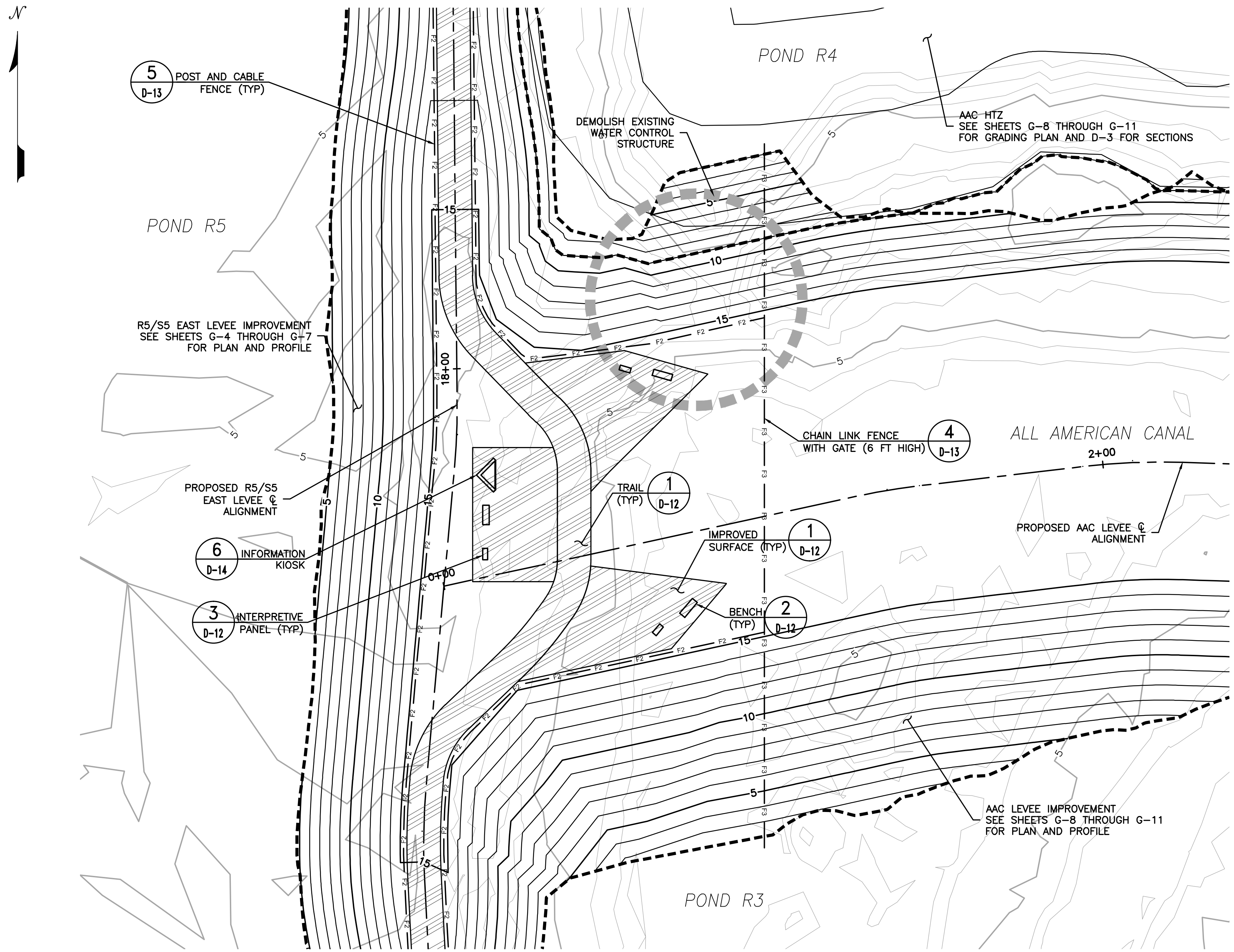
DESIGNED L. CHANDRASEKARAN
DRAWN L. DIFUNTORUM
CHECKED G. OROZCO / I. ZARCHI
PEER REVIEWED S. GENTZLER
APPROVED S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372
DATE 12-13-2016

PROJECT SOUTH BAY SALT POND RESTORATION PROJECT
SHEET TITLE RAVENSWOOD PONDS WATER CONTROL STRUCTURES INSTALLATION DETAILS

SHEET NO. SHT. 36 OF 40 SHTS.
REV
DWG NO. D-10



1 PUBLIC ACCESS AREA – PLAN
1" = 20'

0 20 40 60
HORIZ 1" = 20'

QUESTA ENGINEERING CORP.
Civil Environmental & Water Resources
(510) 236-6114 FAX (510) 236-2423 questa@questaec.com
P.O. Box 70356 1220 Brickyard Cove Road Point Richmond, CA 94807

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
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aecom.com

DESIGNED M. HENDERSON
DRAWN L. CHANDRASEKARAN
CHECKED G. OROZCO / I. ZARCHI
PEER REVIEWED S. GENTZLER
APPROVED S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy
PROJECT No. 60422372
DATE 12-13-2016

PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT
SHEET TITLE
RAVENSWOOD PONDS
PUBLIC ACCESS AREA
DETAILED LAYOUT

SHEET NO. SHT. 37 OF 40 SHTS.
REV
DWG NO. D-11

Dec 19, 2016 - 9:25am
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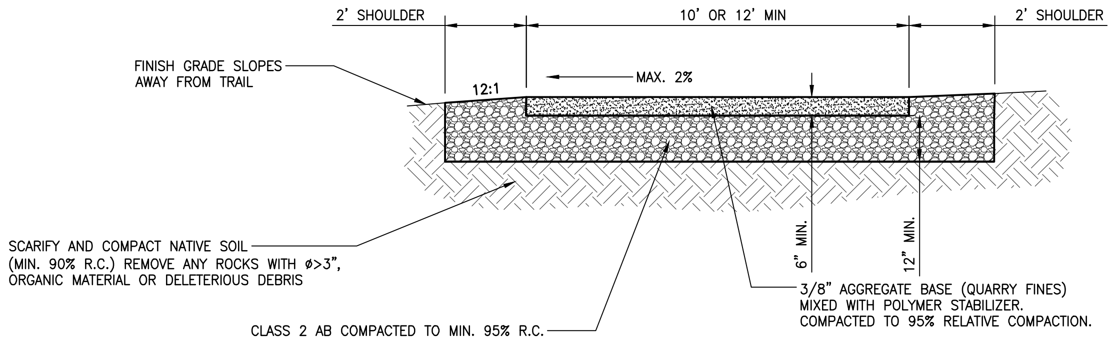
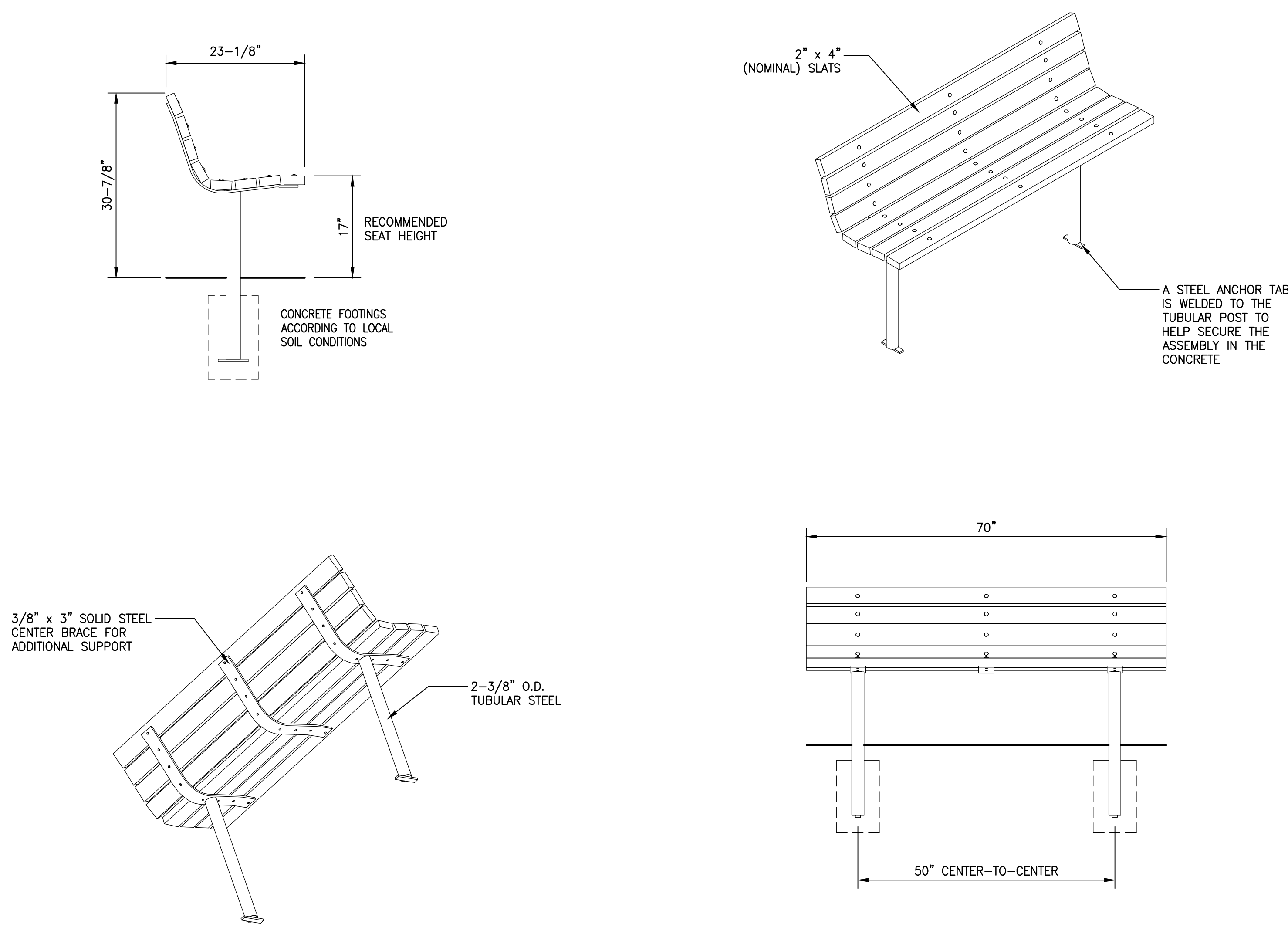


1 TRAIL/IMPROVED SURFACE
NTS



2 BENCH
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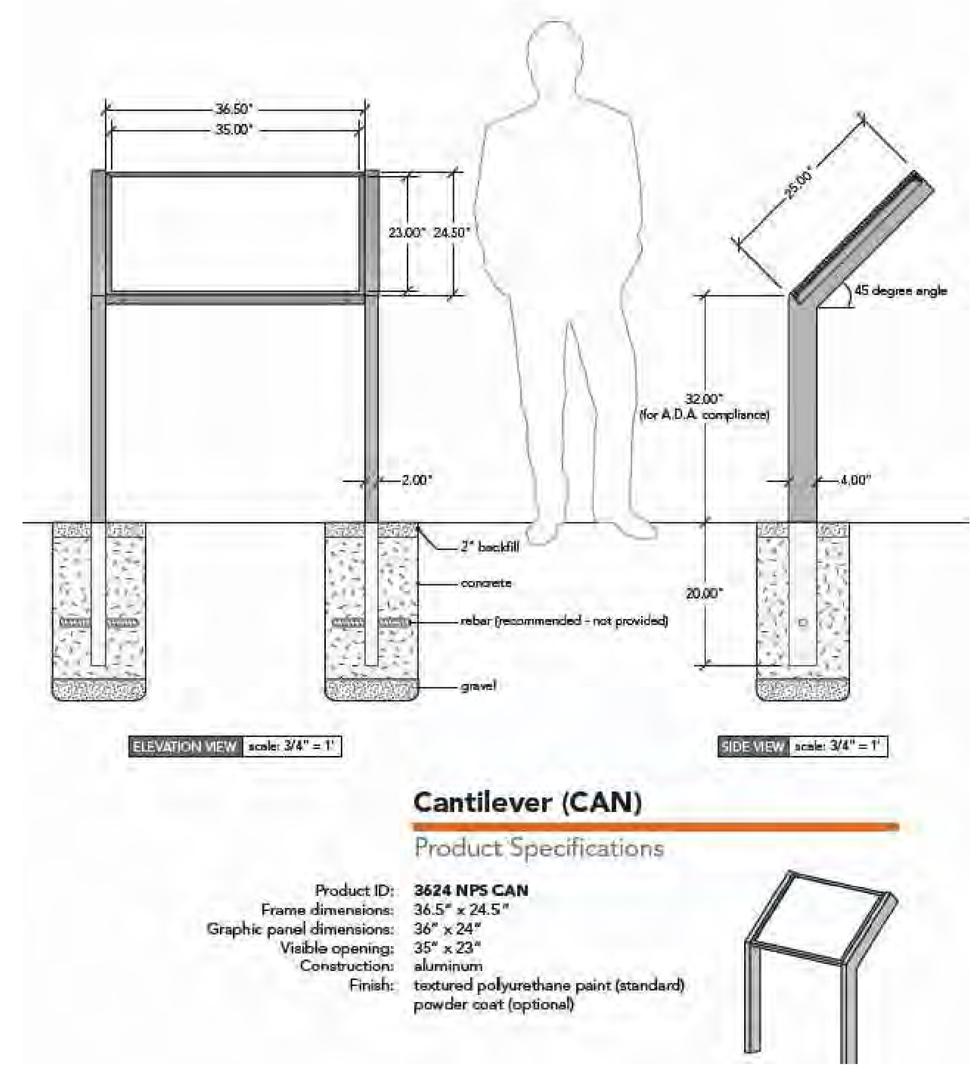

3 INTERPRETIVE PANEL
NTS

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Civil Environmental & Water Resources
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PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
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300 Lakeside Drive, Suite 400
Oakland, CA 94612
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DESIGNED M. HENDERSON
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CHECKED G. OROZCO / I. ZARCHI
PEER REVIEWED S. GENTZLER
APPROVED S. GENTZLER

STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372
DATE 12-13-2016

PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT

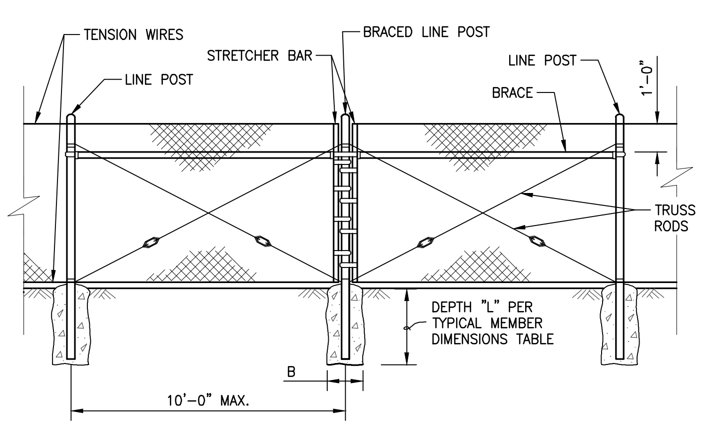
SHEET TITLE
RAVENSWOOD PONDS
PUBLIC ACCESS FEATURES
DETAILS - SHEET 1 OF 3

SHEET NO. SHT. 38 OF 40 SHTS.
REV
DWG NO. D-12

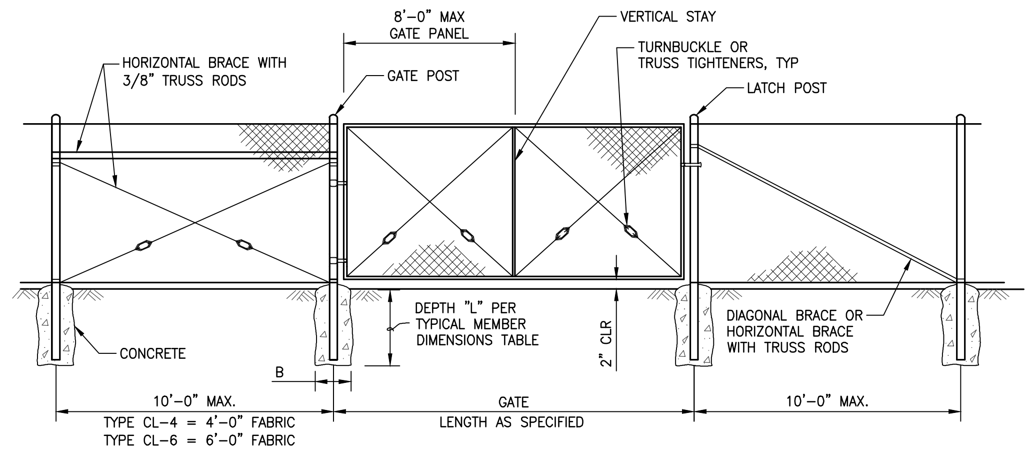
Dec 15, 2016 - 12:59pm
C:\pwworking\aecom_na\chandrasekarand\dms75824\RW_D-12.dwg

BRACED LINE POST INSTALLATION

BRACED LINE POST AT INTERVALS NOT EXCEEDING 1000'



CHAIN LINK GATE INSTALLATION

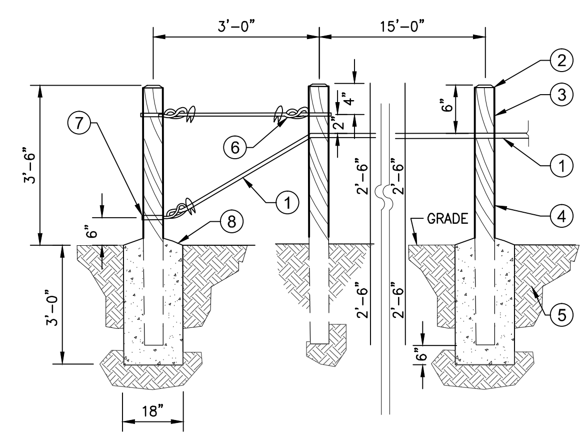


TYPICAL MEMBER DIMENSIONS

FENCE HEIGHT (Max)	SLATTED	B (in)	L (ft)	ROUND PIPE GATE/LINE POST		
				SECTION	ROUND OD PIPE	WEIGHT (lb/ft)
5'-0"	NO	12"	2'-6"	3 Std	3.50"	7.58
6'-0"	NO	12"	2'-6"	3 Std	3.50"	7.58
8'-0"	NO	12"	3'-0"	3 Std	3.50"	7.58
10'-0"	NO	14"	3'-6"	3 Std	3.50"	7.58
5'-0"	YES	12"	3'-0"	31/2 Std	4.00"	9.12
6'-0"	YES	14"	3'-6"	4 Std	4.50"	10.80
8'-0"	YES	18"	3'-6"	5 Std	5.56"	14.60
10'-0"	YES	20"	4'-0"	6 Std	6.63"	19.00

Above post dimensions and weights are minimums.
Larger sizes may be used upon approval.
Maximum Gate Width is 24'-0".

4 / – CHAIN LINK FENCE WITH GATE
NTS



TERMINAL POST ANCHOR DETAIL

NOTES:

(1) 3/8" DIA. 7 STRAND GALVANIZED WIRE ROPE

(2) 1" BEVEL 45°

(3) 1/2" DIA. DRILLED HOLE.
HOLE TO BE FILLED WITH GREASE FOR CORROSION PROTECTION.
GREASE SHALL NOT MELT OR RUN AT A TEMPERATURE OF 65°C.

(4) 6" X 6" X 5' – 0" REDWOOD POST ROUGH CONSTRUCTION GRADE
(FIELD TREAT POST WHERE EMBEDDED IN GROUND)

(5) SUBGRADE COMPACTED TO 90% RELATIVE DENSITY

LINE POST DETAIL

(6) USE 3/8" X 2" GALVANIZED WIRE ROPE CLIP FOR COMMECTION AND SPLICES.
ALL CLIPS TO BE PLACED WITH NUTS FACING DOWNWARD.

(7) RECESSED 3/8" X 8" GALV. EYE BOLT 1" I.D. EYE, PLUS GREASE.

(8) CONCRETE FOOTING, SLOPE TO DRAIN

*WIRE CLIP TO BE INSTALLED EVERY 8TH POST TO MAINTAIN CABLE TENSION

5 / – POST AND CABLE FENCE
NTS

QUESTA ENGINEERING CORP.
Civil
Environmental
& Water Resources
(510) 236-6114
FAX (510) 236-2423
questa@questaec.com
P.O. Box 70356 1220 Brickyard Cove Road Point Richmond, CA 94807

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

WARNING
0 1/2 1
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PREPARED BY
AECOM
300 Lakeside Drive, Suite 400
Oakland, CA 94612
Tel: (510) 893-3600
aecom.com

DESIGNED M. HENDERSON
DRAWN L. DIFUNTORUM
CHECKED G. OROZCO / I. ZARCHI
PEER REVIEWED S. GENTZLER
APPROVED S. GENTZLER

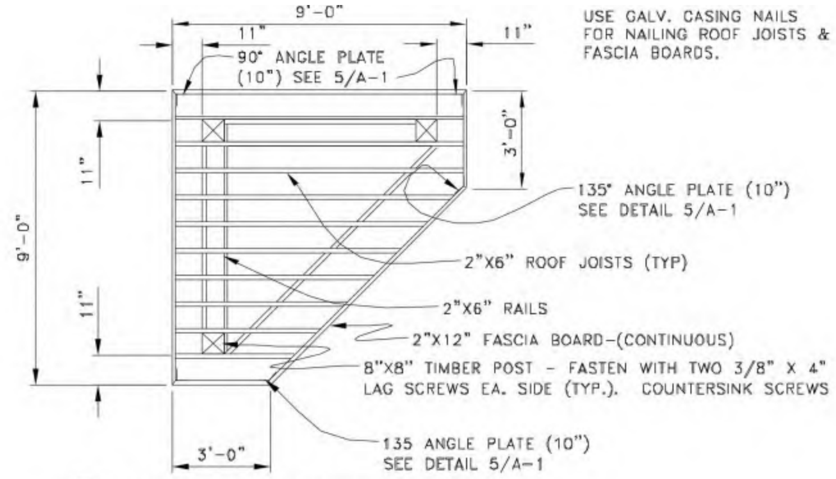
STATE OF CALIFORNIA
Coastal Conservancy

PROJECT No. 60422372
DATE 12-13-2016

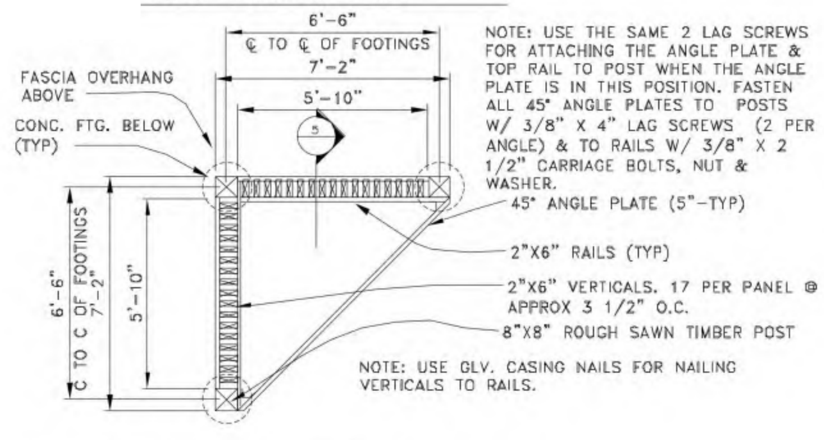
PROJECT SOUTH BAY SALT POND RESTORATION PROJECT
SHEET TITLE RAVENSWOOD PONDS PUBLIC ACCESS FEATURES DETAILS - SHEET 2 OF 3

SHEET NO. SHT. 39 OF 40 SHTS.
REV
DWG NO. D-13

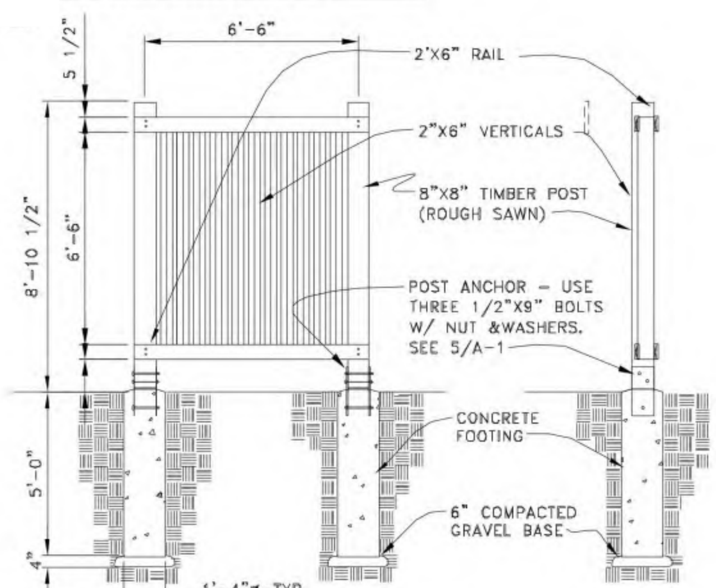
Dec 14, 2016 - 2:59pm
C:\pwworking\aecom_na\chandrasekarandms758249\RW_D-13.dwg



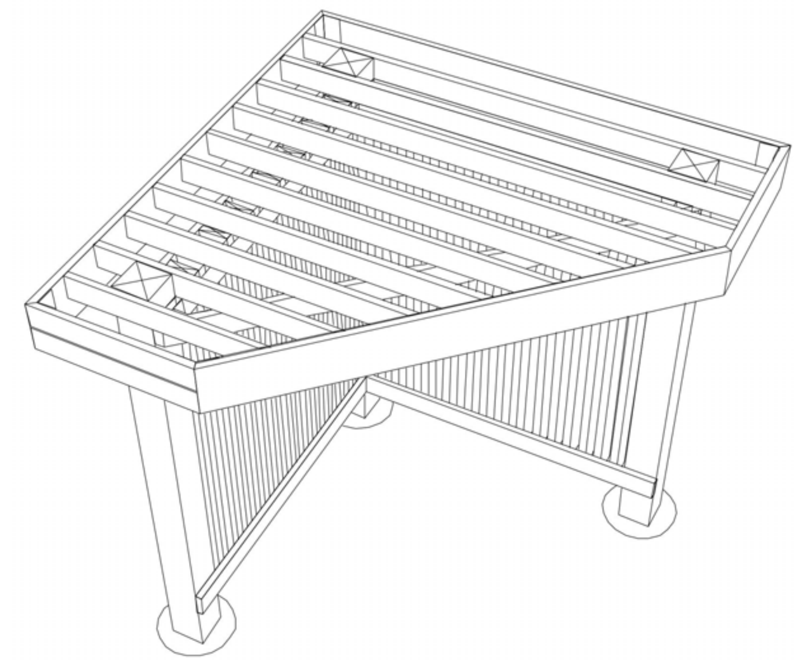
ROOF FRAMING PLAN



PANEL LAYOUT PLAN



PANEL SECTION AND ELEVATION



BIRDS EYE PERSPECTIVE

6 / - INFORMATION KIOSK (USFWS)
NTS

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

REV	DESCRIPTION	BY	CHK	APP	DATE

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STATE OF CALIFORNIA
Coastal Conservancy
PROJECT No. 60422372
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questa@questaec.com
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PROJECT
SOUTH BAY SALT POND RESTORATION PROJECT
SHEET TITLE
RAVENSWOOD PONDS
PUBLIC ACCESS FEATURES
DETAILS - SHEET 3 OF 3

SHEET NO.
SHT. 40 OF 40 SHTS.
REV
DWG NO.
D-14

Appendix C: 2016 Updated Jurisdictional Wetland Delineation

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, U.S. ARMY CORPS OF ENGINEERS
1455 MARKET STREET, 16TH FLOOR
SAN FRANCISCO, CALIFORNIA 94103-1398

FEB - 6 2017

Regulatory Division (1145b)

Subject: File No. SPN-277030S

Mr. John Bourgeois
Executive Project Manager, South Bay Salt Pond Restoration Project
California Coastal Conservancy
1330 Broadway, 13th Floor
Oakland, California 94612

Dear Mr. Bourgeois:

This correspondence is in reference to your submittal of 24 June 2016, requesting a preliminary jurisdictional determination of the extent of navigable waters of the United States (U.S.) and waters of the U.S. occurring on 9,600 acres within two complexes of salt ponds and adjacent habitats located on the edges of the South San Francisco Bay, in Alameda and Santa Clara counties, California, as shown in the enclosed Project Location map.

All proposed discharges of dredged or fill material occurring below the plane of ordinary high water in non-tidal waters of the U.S.; or below the high tide line in tidal waters of the U.S.; and within the lateral extent of wetlands adjacent to these waters, typically require Department of the Army authorization and the issuance of a permit under Section 404 of the Clean Water Act of 1972, as amended (33 U.S.C. § 1344 *et seq.*). Waters of the U.S. generally include the territorial seas; all traditional navigable waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including waters subject to the ebb and flow of the tide; wetlands adjacent to traditional navigable waters; non-navigable tributaries of traditional navigable waters that are relatively permanent, where the tributaries typically flow year-round or have continuous flow at least seasonally; and wetlands directly abutting such tributaries. Where a case-specific analysis determines the existence of a "significant nexus" effect with a traditional navigable water, waters of the U.S. may also include non-navigable tributaries that are not relatively permanent; wetlands adjacent to non-navigable tributaries that are not relatively permanent; wetlands adjacent to but not directly abutting a relatively permanent non-navigable tributary; and certain ephemeral streams in the arid West.

All proposed structures and work, including excavation, dredging, and discharges of dredged or fill material, occurring below the plane of mean high water in tidal waters of the U.S.; in former diked baylands currently below mean high water; outside the limits of mean high water but affecting the navigable capacity of tidal waters; or below the plane of ordinary high water in non-tidal waters designated as navigable waters of the U.S., typically require Department of the Army authorization and the issuance of a permit under Section 10 of the Rivers and Harbors Act of 1899, as amended (33 U.S.C. § 403 *et seq.*). Navigable waters of the U.S. generally include all waters subject to the ebb and flow of the tide; and/or all waters presently used, or have been used in the past, or may be susceptible for future use to transport interstate or foreign commerce.

The enclosed delineation map entitled, "South Bay Salt Pond Restoration Project Phase 2," in 9 sheets and date certified 15 December 2016, depicts the extent and location of wetlands, other waters of the U.S., and navigable waters of the U.S. within the boundary area of the site that **may be** subject to U.S. Army Corps of Engineers' regulatory authority under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act. This preliminary jurisdictional determination is based on the current conditions of the site, as verified during a field investigation of 11 August 2016, a review of available digital photographic imagery}, and a review of other data included in your submittal. While this preliminary jurisdictional determination was conducted pursuant to Regulatory Guidance Letter No. 16-01, *Jurisdictional Determinations*, it may be subject to future revision if new information or a change in field conditions becomes subsequently apparent. The basis for this preliminary jurisdictional determination is fully explained in the enclosed *Preliminary Jurisdictional Determination Form*. You are requested to sign and date this form and return it to this office within two weeks of receipt.

You are advised that the preliminary jurisdictional determination may **not** be appealed through the U.S. Army Corps of Engineers' *Administrative Appeal Process*, as described in 33 C.F.R. Part 331 (65 Fed. Reg. 16,486; Mar. 28, 2000). Under the provisions of 33 C.F.R § 331.5(b)(9), non-appealable actions include preliminary jurisdictional determinations since they are considered to be only advisory in nature and make no definitive conclusions on the jurisdictional status of the water bodies in question. However, you may request this office to provide an approved jurisdictional determination that precisely identifies the scope of jurisdictional waters on the site; an approved jurisdictional determination may be appealed through the *Administrative Appeal Process*. If you anticipate requesting an approved jurisdictional determination at some future date, you are advised not to engage in any on-site grading or other construction activity in the interim to avoid potential violations and penalties under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act. Finally, you may provide this office new information for further consideration and request a reevaluation of this preliminary jurisdictional determination.

You may refer any questions on this matter to Frances Malamud-Roam of my Regulatory staff by telephone at 415-503-6792 or by e-mail at Frances.P.Malamud-Roam@usace.army.mil. All correspondence should be addressed to the Regulatory Division, South Branch, referencing the file number at the head of this letter.

The San Francisco District is committed to improving service to our customers. My Regulatory staff seeks to achieve the goals of the Regulatory Program in an efficient and cooperative manner, while preserving and protecting our nation's aquatic resources. If you would like to provide comments on our Regulatory Program, please complete the Customer Service Survey Form available on our website: http://www.spn.usace.army.mil/Missions/Regulatory.aspx.

Sincerely,
ORIGINAL SIGNED
BY Katerina Galacatos
CHIEF, REG. DIV., SOUTH BR.
FOR

Rick M. Bottoms, Ph.D.
Chief, Regulatory Division

Enclosures

Copy Furnished (w/map only):

CA RWQCB, Oakland, CA

CF:
CESPN-R Rdg File
CESPN-R-S (MALAMUD-ROAM)

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Submitted by
AECOM
1333 Broadway
Suite 800
Oakland, CA 94612
September 2016

Wetland Delineation Report *Updated* South Bay Salt Pond Restoration Project – Phase 2

60423372

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Table of Contents

List of Appendices

List of Tables

List of Figures

List of Acronyms

BCDC	Bay Conservation and Development Commission
CDFW	California Department of Fish and Wildlife
CWA	Clean Water Act
EPA	Environmental Protection Agency
FEMA	Federal Emergency Management Agency
GPS	Global Positioning System
HTL	high tide line
MHW	mean high water
MSL	mean sea level
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resource Conservation Service
OHWM	ordinary high water mark
RWQCB	Regional Water Quality Control Board
SBSP	South Bay Salt Pond
SWANCC	Solid Waste Agency of Northern Cook County
TNW	Traditional navigable water
USACE	U.S. Army Corps of Engineers

1 Introduction

This report provides the results of a preliminary jurisdictional delineation of wetlands and other waters of the U.S. conducted as part of Phase 2 of the South Bay Salt Pond Restoration Project (project) located in the South San Francisco Bay (South Bay). The salt ponds within the Phase 2 Study Area discussed in this delineation are located within the Alviso Pond Complex in Alameda and Santa Clara Counties and the Ravenswood Complex in San Mateo County.

The objective of the delineation is to identify aquatic features that qualify as wetlands or other waters of the U.S. under federal jurisdiction, pursuant to Section 404 of the Clean Water Act (CWA) and Section 10 of the Rivers and Harbors Act.

This report is organized into three primary sections:

- Introduction
- Physical Setting and Methods
- Results and Discussion

Section 1 describes the project, the project purpose, and the need for a wetland delineation. Section 2 presents the jurisdictional delineation methods. Section 3 presents the results of the jurisdictional delineation, including a description of potentially jurisdictional wetlands and other waters of the U.S. present within the Study Area.

1.1 Project Description

The South Bay Salt Pond (SBSP) Restoration Project area, Phase 2 is located in South San Francisco Bay in northern California (see Figures 1 and 2). The SBSP Restoration Study Area, Phase 2 consists of parts of two complexes of salt ponds and adjacent habitats in South San Francisco Bay that USFWS acquired from Cargill in 2003. These two salt pond complexes consist of the 8,000-acre Alviso Pond Complex and the 1,600-acre Ravenswood Pond Complex, both of which are owned and managed by U.S. Fish and Wildlife Service (USFWS) as part of the Don Edwards San Francisco Bay National Wildlife Refuge (Refuge).The areas delineated in this report are identified in Figure 2 and collectively referred to as the Study Area.

Phase 2 project actions are also being planned to take place at ponds in the Eden Landing Ecological Reserve, near Hayward, which is owned by the California Department of Fish and Wildlife (CDFW). Actions at Eden Landing Ecological Reserve are part of a parallel planning process by the South Bay Salt Pond Restoration Project stakeholders, and the delineation of wetlands there will be covered in a separate environmental document.

The Alviso Pond Complex consists of 25 ponds on the shores of the South Bay in Fremont, San Jose, Sunnyvale and Mountain View, within Santa Clara and Alameda counties. The Pond Complex is bordered on the west by the Palo Alto Baylands Park and Nature Preserve and Charleston Slough, on the south by commercial and industrial land uses as well as NASA Ames Research Center and Sunnyvale Baylands Park, and on the east by Coyote Creek in San Jose and Cushing Parkway in Fremont.

The Phase 2 project actions in the Alviso Pond Complex focus on three clusters of ponds. Ponds A19, A20, and A21 are referred to as the Island Ponds and are located between Coyote Creek and Mud

Slough near the eastern end of the Alviso Pond Complex. The Island Ponds levees were breached in 2006 as part of tidal marsh restoration actions covered by the Initial Stewardship Plan (USFWS 2006).

Ponds A1 and A2W, referred to herein as the Mountain View Ponds, are on the western edge of the Complex. The City of Mountain View lies immediately to the south, and the Charleston Slough and the Palo Alto Flood Control Basin lie to the west. In 2106, the Coast Casey Forebay, a stormwater detention basis immediately south of Pond A1, was added to the project footprint. The north levee of the Coast Casey Forebay is part of the Southern levee of Pond A1. During proposed levee improvement, Coast Casey Forebay itself would be impacted, and is therefore included in this revised wetland delineation report.

Ponds A8 and A8S are located in the southern central portion of the Alviso Pond Complex. They are west of the town of Alviso, north of Sunnyvale and State Route (SR) 237, and east of other parts of the Pond Complex. Ponds A8 and A8S were included in the Phase 1 work; they were made reversibly tidal by installing two culverts and by notching one levee and installing a control structure with a variable opening so that the degree and the duration of tidal exchange can be controlled by the Refuge managers,.

The Ravenswood Pond Complex consists of seven ponds on the bay side of the Peninsula. The ponds are located both north and south of SR 84, west of the Dumbarton Bridge, and on the bayside of the developed areas of the City of Menlo Park in San Mateo County. Bayfront Park in the City of Menlo Park is directly west of the Pond Complex, and a portion of SR 84 and the Dumbarton Rail corridor run along its southern border. The Phase 2 project actions in the Ravenswood Pond Complex are focused on the pond cluster of Ponds R3, R4, R5, and S5.

1.1.1 Objectives

The overarching Goal and six Objectives developed for the SBSP Restoration Project, adopted by the SBSP Restoration Project Stakeholder Forum on February 18, 2004, apply to Phase 2 and are described below.

1.1.1.1 Goal

The Goal of the SBSP Restoration Project is the restoration and enhancement of wetlands in South San Francisco Bay while providing for flood management and wildlife-oriented public access and recreation.

1.1.1.2 Objectives

1. Create, restore, or enhance habitats of sufficient size, function, and appropriate structure to:

   - Promote restoration of native special-status plants and animals that depend on South San Francisco Bay habitat for all or part of their life cycles.
   - Maintain current native migratory and resident bird species that utilize existing salt ponds and associated structures such as levees.
   - Support increased abundance and diversity of native species in various South San Francisco Bay aquatic and terrestrial ecosystem components, including plants, invertebrates, fish, mammals, birds, reptiles and amphibians.

2. Maintain or improve existing levels of flood protection in the South Bay Area.

3. Provide public access and recreational opportunities compatible with wildlife and habitat goals.

4. Protect or improve existing levels of water and sediment quality in the South Bay, and take into account ecological risks caused by restoration.

5. Implement design and management measures to maintain or improve current levels of vector management, control predation on special status species, and manage the spread of non-native invasive species.

6. Protect the services provided by existing infrastructure (e.g., power lines, railroads).

1.1.2 Purpose and Need for Action

The SBSP Restoration Project is needed to address the following:

- Historic losses of tidal marsh ecosystems and habitats in San Francisco Bay and concomitant declines in populations of endangered species (e.g., clapper rail, salt marsh harvest mouse);
- Increasing salinity and declining ecological value in several of the ponds within the Study Area;
- Long-term deterioration of non-certifiable levees (for the purposes of the Federal Emergency Management Agency [FEMA]) within the Study Area, which could lead to levee breaches and flooding;
- Long-term tidal flood protection; and
- Limited opportunities in South San Francisco Bay for wildlife-oriented recreation.

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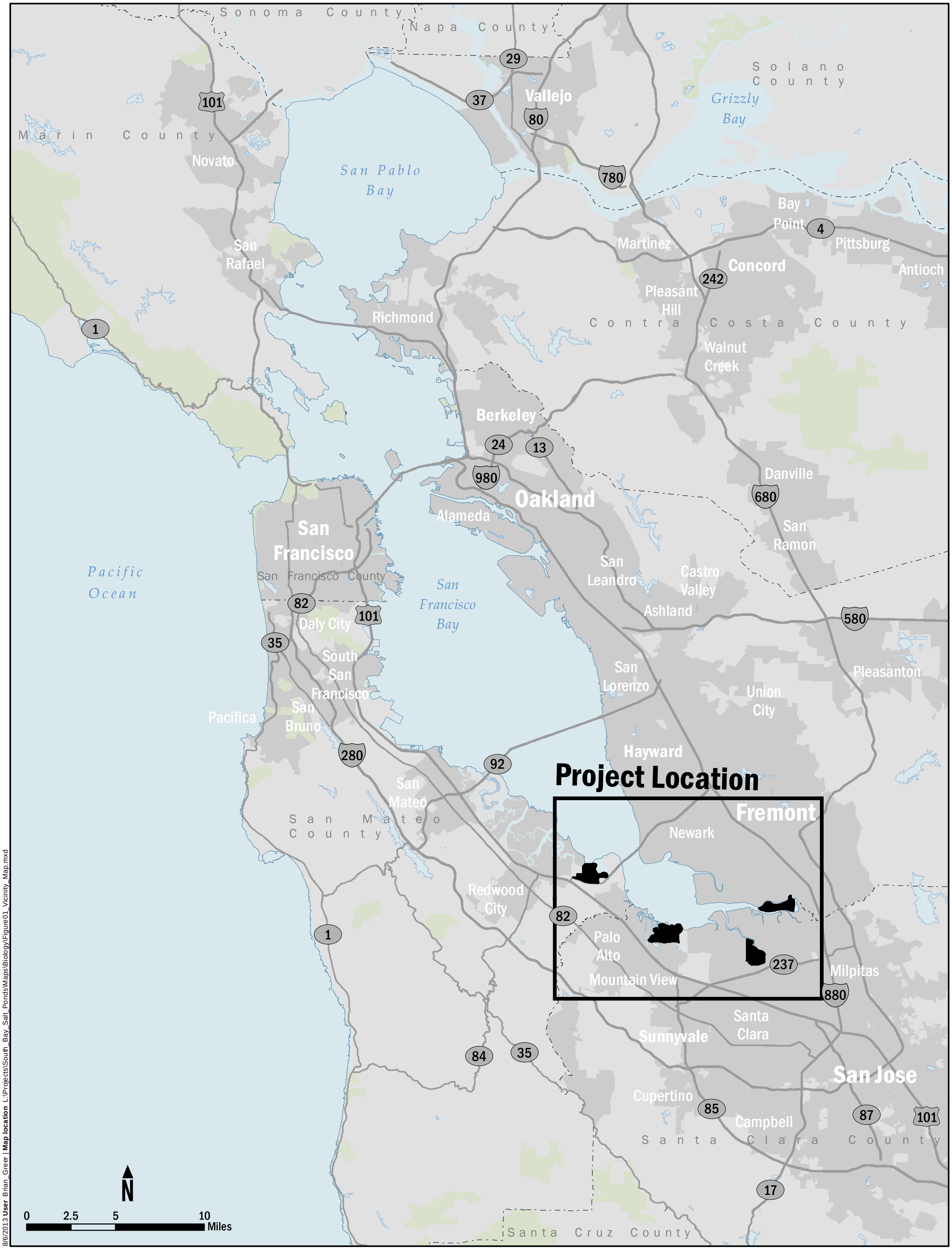

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South Bay Salt Pond Restoration Project

FIGURE 1

Vicinity Map

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FIGURE 2

Project Area

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1.2 Background Research

Background research was conducted in order to gather supporting information related to the environmental setting of the project. The following reference materials were used to inform the findings presented in the delineation:

- Aerial imagery of the project ponds and surrounding areas
- Palo Alto, Mountain View, and Milpitas U.S. Geological Survey 7.5-minute quadrangle maps
- Natural Resource Conservation Service (NRCS) online soil survey within the immediate project area (NRCS 2013)
- Existing biological references for the SBSP Restoration Project, including:
  - South Bay Salt Pond Restoration Project. Final Environmental Impact Statement/Report. U.S. Fish and Wildlife Service. 2007.
  - South Bay Salt Pond Restoration Project Phase 1: Submittal of Application Materials for a Section 404 Individual Permit. H.T. Harvey and Associates. October 2007.
  - Habitat Evolution Mapping Project. South Bay Salt Pond Restoration Project. Final Report (2009-2011). Brian Fulfrost and Associates. 2012
- Habitat Maps, GIS shapefiles, 2016. Don Edwards San Francisco Bay National Wildlife Reserve. August 2016. USACE Wetland Delineation Manual (Environmental Laboratory 1987)
- Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Supplement (USACE 2008)
- Historic Section 10 data from the Office of Coast Survey, US Coast Survey, digitized by the San Francisco Estuary Institute (USCS, US Coast Geodetic Survey 1939).

1.3 Regulatory Background

1.3.1 U.S. Army Corps of Engineers Statutory Jurisdiction

Under Section 404 of the Clean Water Act, the USACE regulates the discharge of dredged and fill materials into “waters of the United States.” These jurisdictional waters of the U.S. include intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, and wetlands adjacent to any water of the U.S. (33 CFR § 328). In areas subject to tidal influence, Section 404 jurisdiction extends to the high-tide line. Certain waters of the U.S. are considered “special aquatic sites” because they are generally recognized as having particular ecological value. Such sites include sanctuaries and refuges, mudflats, wetlands, vegetated shallows, coral reefs, and riffle and pool complexes. Special aquatic sites are defined by the U.S. Environmental Protection Agency (EPA) and may be afforded additional consideration in the permit process for a project.

The USACE also regulates navigable waters under Section 10 of the Rivers and Harbors Act which include “… those waters of the United States that are subject to the ebb and flow of the tide shoreward to the mean high water mark and/or are presently used, or have been used in the past, or may be susceptible to use to transport interstate or foreign commerce” (33 CFR § 322.2).

1.3.2 Solid Waste Agency of Northern Cook County v. United States Army Corps of Engineers

On January 9, 2001, the U.S. Supreme Court issued a decision in Solid Waste Agency of Northern Cook County (SWANCC) v. United States Army Corps of Engineers. The case involved the filling of hydrologically isolated waters that had formed from remnant excavation ditches on a parcel. In the decision, the Court denied USACE jurisdiction over isolated water bodies, which USACE had previously regulated using the “Migratory Bird Rule,” established in 1986. The Court defined isolated waters as any body of water that is non-navigable, intrastate, and lacking any significant nexus to navigable bodies of water (Pooley 2002).

As a result of the SWANCC decision, isolated seasonal wetlands (i.e. wetlands that are not hydrologically connected with other jurisdictional wetlands or non-wetland waters of the U.S.) are generally considered non-jurisdictional by the USACE.

1.3.3 Rapanos v. United States and Carabell v. Army Corps of Engineers

In 2006 Rapanos v. United States (No. 04 1034) and Carabell v. Army Corps of Engineers (No. 04-1384) (hereafter referred to as "Rapanos") challenged USACE interpretation of waters of the U.S. (USACE and EPA 2007). The USACE had interpreted the CWA 33 U.S.C. 1362(7) to regulate wetland areas that are separated from a tributary of a navigable water by a narrow, constructed berm, where there was evidence of an occasional hydrologic connection between the wetland and the tributary.

On June 19, 2006, the Court held 5 to 4 in favor of tightening the definition of "waters of the United States." According to the opinion, a water or wetland constitutes "navigable waters" under the CWA if it possesses a "significant nexus" to waters that are currently navigable or could feasibly be made navigable. The USACE and the EPA issued a joint memorandum on June 5, 2007 which included new guidelines for establishing whether or not wetlands or other waters of the U.S. fall within USACE jurisdiction (USACE and EPA 2007). Due to the court decision and resulting memorandum, the agencies now assert jurisdiction over traditional navigable waters (TNW), wetlands adjacent to traditional navigable waters, non-navigable tributaries to TNWs that are relatively permanent waters (RPW), and wetlands that abut RPWs. The agencies may take jurisdiction over non-navigable tributaries that are not RPWs, wetlands that are adjacent to non-RPWs, and wetlands adjacent to but not directly abutting a relatively permanent non-navigable tributary. The agencies will generally not assert jurisdiction over swales, erosional features or ditches excavated wholly in and draining only uplands and that do not carry a relatively permanent flow of water.

1.4 Wetland Delineation

The wetlands and other waters of the U.S. discussed in this report were delineated by consultants based on National Oceanic and Atmospheric Administration (NOAA) tidal data, LiDAR data, aerial photo interpretation, field data, and ground truthing.

2 Physical Setting and Methods

Section 2 provides a description of the physical setting of the project as well as the methods used to delineate the wetlands and other waters of the U.S. in the Study Area. The delineation was updated in September 2016 after an August 11, 2016, site visit with Corps personnel determined that (a) the Coast Casey Forebay should be added to the study area, and (b) that there were small patches of pickleweed-dominated marsh habitat on the interior faces of many pond levees that should be included in a modified delineation. These areas were previously classified as non-wetland waters of the United States but would be more appropriately classified as wetlands.

2.1 Physical Setting

The physical setting of the project is described below in terms of the climate, topography and hydrology of the South Bay Salt Ponds, and soils and vegetation communities found in the project footprint.

2.1.1 Climate, Topography, and Hydrology

The San Francisco Bay area has a temperate-marine climate with cool moist winters and warm dry summer. Mean annual temperature varies around the bay, and ranges from 55°F to 61°F, and mean monthly temperature ranging from 45°F in winter to 73°F in summer. Approximately 95% of the precipitation occurs between October and April. Average relative humidity ranges from 60% in summer to 75% in winter (Eicher 1988). Average annual precipitation for the region is 15.24 inches.

The SBSP Restoration Project sites are at the northern end of Santa Clara Valley, in a broad alluvial fan composed of material deposited from the local ranges. Topography of the site is primarily flat with elevations ranging from 1.5 feet below mean sea level (MSL) to 11 feet above MSL.

The entire Study Area is located within the San Francisco Bay hydrologic unit (Figure 3). San Francisco Bay estuary tidal marshes can be characterized as relatively flat plains which tend to increase slightly in elevation at the border of sloughs and at the shoreline. The elevation of these marsh plains is generally near the mean high tide level. Open water and subtidal habitats in the South Bay include tidal sloughs and channels, areas of standing water or flowing waters within the salt ponds and tidal marshes, and mudflats. The tidal sloughs and channels carry water through the marshes and between salt ponds and marsh remnants.

The tidal cycle in the San Francisco Bay estuary has a mixed semidiurnal pattern, characterized by two high tides of unequal magnitude and two low tides of unequal magnitude every day. Tidal exchange between the Pacific Ocean and the estuary occurs through the Golden Gate. Overall, about 24% of the bay's water is exchanged every 12.5 hours (Jones and Stokes, et. al. 1979). Circulation patterns within the bay are driven by tidal exchange and freshwater inflow. Sources of freshwater inflow to the Study Area are from Coyote Creek, Stevens Creek, Adobe Creek, and the Guadalupe River.

Each cluster of salt ponds has somewhat different internal hydrology. The Phase 2 Ravenswood Ponds are seasonal ponds that receive direct rainfall and some runoff. In addition, water is added to these ponds during the fall and winter to provide waterfowl habitat. The Alviso-Island Ponds were breached in 2006 to restore them to a tidal regime. The breaches were on their southern borders, and these ponds now receive daily tidal flows via Coyote Creek. The Alviso-A8 Ponds were converted to muted and reversible tidal flows as part of a Phase 1 project action. A notch with a variably sized opening was added on the southeastern side of A8 to expose it to muted tidal flows coming in from the Guadalupe River. Finally, the Alviso-Mountain View Ponds are deep ponds with subsided bottoms that receive bay water at an intake at Pond A1 and discharge at Pond A2W. These two ponds are connected to one another via underground culverts. They also receive seasonal rainfall.

2.1.2 Soils

The NRCS (2013) has identified and mapped 11 soil types occurring within the Ravenswood Ponds, Alviso-Mountain View Ponds, Alviso-A8 Ponds, and the Alviso-Island Ponds clusters (Figure 4).

The soils that occur within the Ravenswood Ponds include the following:

- **Novato clay, 0 to 1 percent slopes, ponded**: Novato clay, 0 to 1 percent slopes, ponded is a very deep, very poorly drained soil in saltwater marshes along the San Francisco Bay. It formed in alluvium derived from various kinds of rock, and the texture is clay. Permeability and runoff are slow and the soil is not subject to water erosion. The hydric soils list identifies two hydric inclusions occurring within this soil type: Novato occurring within salt marshes and Reyes occurring within salt marshes.
- **Novato clay, 0 to 1 percent slopes:** Novato clay, 0 to 1 percent slopes, is a very deep, very poorly drained soil in saltwater marshes along the edges of San Francisco Bay. It formed in alluvium derived from various kinds of rock, and the texture is clay. Permeability and runoff are slow. The soil is not subject to water erosion, and is subject to tidal flooding. The hydric soils list identifies three hydric inclusions occurring within this soil type: Novato occurring within salt marshes, an unnamed, drained inclusion occurring within salt marshes and an unnamed, stratified organic surface occurring within salt marshes.
- **Pits and Dumps**: Pits and dumps consist of gravel pits, refuse dumps, and rock quarries. The hydric soils list does not identify any hydric inclusions within this soil type within San Mateo County.

2.1.3 The soils that occur within the Alviso-Mountain View Ponds include the following:

- **Aquic Xerorthents, bay mud substratum, 2 to 5 percent slopes**: Aquic Xerorthents, bay mud substratum, 2 to 5 percent slopes are poorly drained soils located in marshes, formed from human transported material in basin floors. Permeability is moderately low to moderately high, and texture is gravelly sandy loam to silty clay. The hydric soils list does not identify any hydric inclusions within this soil type within Santa Clara County.
- **Novato clay, 0 to 1 percent slopes, tidally flooded**: Novato clay, 0 to 1 percent slopes, tidally flooded is a very deep, very poorly drained soil in saltwater marshes along the edges of San Francisco Bay. It formed in alluvium derived from metamorphic and sedimentary rock and/or alluvium derived from metavolcanics, and the texture is clay. Permeability and runoff are slow. The soil is not subject to water erosion, and is subject to tidal flooding. The hydric soils list does not identify any hydric inclusions within this soil type within Santa Clara County.
- **Novato clay, 0 to 1 percent slopes, protected**: Novato clay, 0 to 1 percent slopes, protected is a very deep, very poorly drained soil in salt marshes along the edges of San Francisco Bay. It formed in alluvium derived from metamorphic and sedimentary rock and/or alluvium derived from metavolcanics, and the texture is clay. Permeability and runoff are slow. The soil is not subject to water erosion. The hydric soils list does not identify any hydric inclusions within this soil type within Santa Clara County.

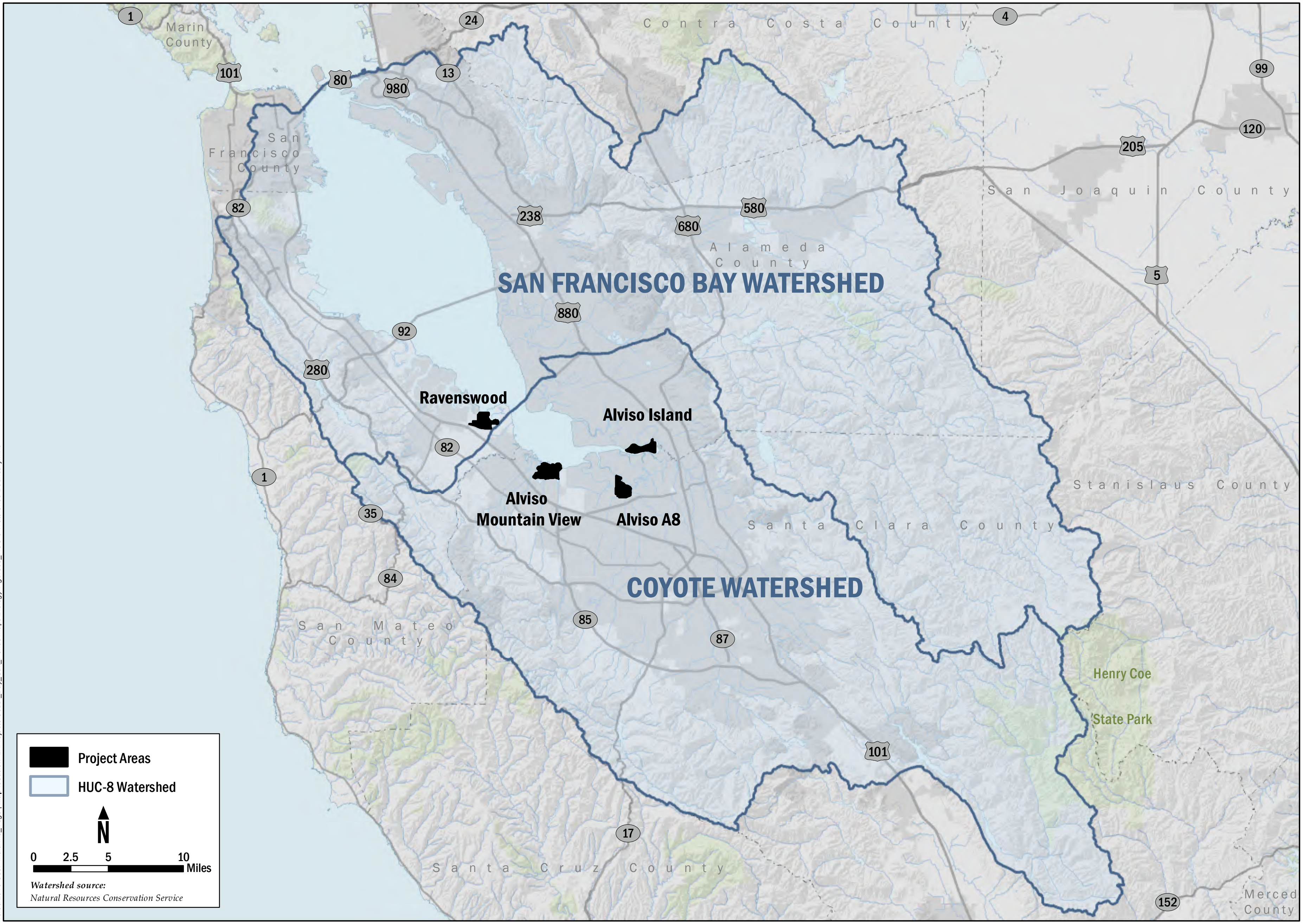

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FIGURE 3

HUC-8 Watershed Boundaries

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Soil Type

- **108_SM**, Botella-Urban land complex, 0 to 5 percent slopes
- **117_SM**, Novato clay, 0 to 1 percent slopes
- **118_SM**, Novato clay, 0 to 1 percent slopes ponded
- **121_SM**, Orthents, cut and fill, 0 to 15 percent slopes
- **125_SM**, Pits and Dumps
- **131_SM**, Urban land
- **132_SM**, Urban land-Orthents, cut and fill complex, 0 to 5 percent slopes
- **134_SM**, Urban land-Orthents, reclaimed complex, 0 to 2 percent slopes
- **W_SM**, Water

Soil codes are not globally unique, they are unique to each county. Each code has been appended with "_SM", "_SC," or "_AC" to indicate San Mateo, Santa Clara, and Alameda counties, respectively.
***Source** USDA-NRCS, SSURGO*

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FIGURE 4

Soils, *Ravenswood*

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- **Novato silty clay loam, excessive salinity, 0 to 1 percent slopes, protected**: Novato silty clay loam, excessive salinity, 0 to 1 percent slopes, protected is a very deep, very poorly drained soil in managed ponds along the edges of San Francisco Bay. It formed in alluvium derived from metamorphic and sedimentary rock and/or alluvium derived from metavolcanics, and the texture is silty clay loam. Permeability and runoff are slow. The soil is not subject to water erosion, and is subject to tidal flooding. The hydric soils list does not identify any hydric inclusions within this soil type within Santa Clara County.

The soils that occur within the Alviso-A8 Ponds include the following:

- **Xerorthents, trash substratum, 0 to 2 percent slopes**: Xerorthents, trash substratum, 0 to 2 percent slopes are well drained soils located in marshes, formed from human transported material in basin floors. Permeability is moderately low to moderately high, and texture is clay loam. The hydric soils list does not identify any hydric inclusions within this soil type within Santa Clara County.
- **Aquic Xerorthents, bay mud substratum, 0 to 2 percent slopes**: Aquic Xerorthents, bay mud substratum, 0 to 2 percent slopes are poorly drained soils located in marshes, formed from mixed human transported material over mixed silty and clayey fluviomarine deposits in basin floors. Permeability is moderately low to moderately high, and texture is gravely sandy loam to silty clay. This soil unit has low potential for erosion. The hydric soils list does not identify any hydric inclusions within this soil type within Santa Clara County.
- **Aquic Xerorthents, bay mud substratum, 2 to 5 percent slopes**: See description above.
- **Novato clay, 0 to 1 percent slopes, tidally flooded**: See description above.
- **Novato silty clay loam, excessive salinity, 0 to 1 percent slopes, protected**: See description above.

The soils that occur within the Alviso-Island Ponds include the following:

- **Reyes clay**: Reyes clay is a very deep, very poorly drained soil that formed in alluvium that derived from mixed sources. The soil is on tidal flats, with a slope of less than 2 percent. Texture is an alkaline clay or alkaline silty clay. Permeability is very slow, runoff is slow and most areas are subject to inundation. The soil has no hazard for erosion. The hydric soils list identifies three hydric inclusions occurring within this soil type: Reyes occurring in tidal flats, Pescadero in basin floors and unnamed, strongly saline inclusion occurring within salt marshes.
- **Reyes clay, ponded**: Reyes clay, ponded is a very deep, very poorly drained soil that formed in alluvium that derived from mixed sources. The soil is on tidal flats, with a slope of less than 2 percent. Texture is an alkaline clay or alkaline silty clay. Permeability is very slow, the soil is ponded and is protected from tidal inundation by levees. The soil is devoid of vegetation, and there is no hazard for erosion. The hydric soils list identifies three hydric inclusions occurring within this soil type: Reyes occurring in tidal flats, Pescadero in basin floors and unnamed, strongly saline inclusion occurring within marshes.

2.1.4 Natural Communities

Natural communities within the Study Area include several types of vegetation communities, mudflats, and unvegetated non-mudflats. Vegetation communities are assemblages of plant species that occur together in the same area that are defined by species composition and relative abundance. The San Francisco Bay and Coyote watersheds (Figure 3) are located in the San Francisco Bay Area subregion of the California Floristic Province (Baldwin, et.al., 2012) and support vegetation communities that are characteristic of the region. The habitats included in the South Bay region of the San Francisco Bay Area are open waters and subtidal habitats to the upper reaches of tidal action, tidal and nontidal wetlands, former salt evaporation ponds adjacent to the Bay, and the upland areas immediately adjacent to these features.

Within the project footprint, tidal salt marsh, freshwater marsh, upland/levees, mudflats, and unvegetated non-mudflats occur. These communities are presented in the South Bay Salt Pond Restoration Project Final EIS/EIR (USFWS 2007) and are described below. Photos of these vegetation communities are include in Appendix A, and a list of all observed plants is available in Appendix B,. A more comprehensive vegetation list has been produced for the Don Edwards San Francisco Bay National Wildlife Refuge Comprehensive Conservation Plan (USFWS, 2012)

The indicator statuses of all plants within the Study Area are included below in the community description. Plant indicator status categories include (Environmental Laboratory 1987):

- OBL - Plants that almost always occur in wetlands under natural conditions (estimated probability >99%), but which rarely occur in non-wetlands.
- FACW - Plants that occur usually (estimated probability >67% to 99%) in wetlands, but also occur in non-wetlands.
- FAC - Plants with a similar likelihood (estimated probability 33% to 67%) of occurring in both wetlands and non-wetlands.
- FACU - Plants that occur sometimes (estimated probability 1% to <33%) in wetlands, but occur more often in non-wetlands.
- UPL - Plants that occur rarely (estimated probability <1%) in wetlands, but occur almost always in non-wetlands.

2.1.4.1 Tidal Salt Marsh and Brackish Marsh

Tidal salt marsh and brackish marsh vegetation consists of halophytic (salt tolerant) species which receive occasional to regular (tidal) saltwater inundation. Tidal salt marsh occurs on the outboard (San Francisco Bay) portions of salt pond levees where salinities are higher. Brackish marsh occurs along the intertidal reaches of the creeks and sloughs that drain to the Bay, where salinities are lower due to freshwater input.

In tidal salt marsh, cordgrass (*Spartina* sp. – OBL) dominates low marsh areas and pickleweed (*Salicornia* sp. – OBL) dominates middle marsh areas. Both of these communities formed relatively monotypic stands. The outboard areas from pond levees and lower reaches of sloughs surrounding R4, A1, and A2W typify tidal salt marsh in the Study Area.

Brackish marsh is found where intermediate interstitial soil salinities occur along creeks and sloughs; where freshwater channels experience periodic tidal inundation and groundwater emerges into tidal marshlands. Vegetative diversity and richness increases with greater freshwater influence. Where sediment deposits form terraced floodplains along low flow channels, short bulrushes such as seacoast bulrush (*Bolboschoenus robustus* –OBL) and saltmarsh bulrush (*Bolboschoenus maritimus* ssp. *paludosus* – OBL) dominate the brackish habitat. These terraced areas may also support dense populations of the invasive perennial pepperweed, which can quickly develop into monotypic stands with increasing levels of disturbance. Other moderately halophytic plants such as brass buttons (*Cotula coronopifolia* –OBL), and taller bulrushes including California bulrush (*Schoenoplectus californicus* – OBL) and hard stemmed tule (*Schoenoplectus acutus* var. *occidentalis* –OBL) occur in areas of lower soil salinity, for example, towards the upland edges of brackish marsh (USFWS 2007). Tidal salt marsh species including pickleweed, alkali heath, saltgrass, and spearscale may also colonize brackish habitat. The periphery of Pond A19 and the adjacent Mud Slough are exemplary of brackish marsh in the Study Area.

2.1.4.2 Discontinuous Internal Marsh

Discontinuous internal marsh consists of a mix of halophytic (salt tolerant) species and brackish marsh species, occurring as intermittent bands of marsh on the internal edges of many of the salt pond levees. Halophytic species occur above the water line on portions of salt pond levees where salinities are higher. Brackish marsh species occur at and below the water line, where salinities are lower due to freshwater inputs.

Halophytic vegetation dominates the levee edge, where the levee soils are high saline. Vegetation is similar to that found in the high marsh areas, feature a mixture of pickleweed and other moderately halophytic species including alkali heath (*Frankenia salina* – FACW), saltgrass (*Distichlis spicata* – FAC), saltmarsh dodder (*Cuscuta salina* –NL), small flowered iceplant (*Mesembryanthemum nodiflorum* – FAC), fleshy jaumea (*Jaumea carnosa* – OBL), spearscale (*Atriplex prostrate* –FACW), perennial pepperweed (*Lepidium latifolium*). Moderately halophytic plants dominate the brackish habitat, including: short bulrushes, (seacoast bulrush (*Bolboschoenus robustus* –OBL) and saltmarsh bulrush (*Bolboschoenus maritimus* ssp. *paludosus* – OBL)), brass buttons (C*otula coronopifolia* –OBL), and taller bulrushes (*California bulrush* (Schoenoplectus californicus –OBL) and hard stemmed tule (*Schoenoplectus acutus* var. *occidentalis* –OBL)). The areas may also support dense populations of the invasive perennial pepperweed, which can quickly develop into monotypic stands with increasing levels of disturbance.

2.1.4.3 High Marsh

High marsh is considered an ecotone (transitional ecological community) between the tidal salt marsh and the upland communities with a distinct plant community and unique physicochemical characteristics (Traut, 2005). Many of the species present within this community occurred both above and below the high tide line, indicated by wrack material (water-transported organic and synthetic detritus). Vegetation found within the high marsh areas feature a mixture of pickleweed and other moderately halophytic species including alkali heath (*Frankenia salina* – FACW), saltgrass (*Distichlis spicata* – FAC), saltmarsh dodder (*Cuscuta salina* –NL), small flowered iceplant (*Mesembryanthemum nodiflorum* – FAC), fleshy jaumea (*Jaumea carnosa* – OBL), spearscale (*Atriplex prostrate* –FACW), perennial pepperweed (*Lepidium latifolium* – FAC), New Zealand spinach (*Tetragonia tetragonioides* – NL), and marsh gumplant (*Grindelia stricta* var. *angustifolia* – NL) (USFWS 2007). High marsh occurred in the same areas as tidal salt marsh.

2.1.4.4 Freshwater Marsh

Freshwater marsh vegetation in and around the Study Area exists along the upper reaches of sloughs and creeks and primarily consists of emergent vegetation adapted to freshwater wetland conditions. Though some freshwater marshes may experience tidal influence and periodic salt water inundation, soil salinity remains relatively low due to freshwater flowing through these areas on a regular basis. The upper reach of Ravenswood Slough (along the eastern edge of R3) demonstrates the vegetation transition that occurs as freshwater influence increases. Dense stands of California bulrush and hard stemmed tule interspersed with perennial pepperweed or curly dock (*Rumex crispus* –FAC) compose the majority of emergent vegetation in freshwater marsh habitat. Areas less frequently exposed to freshwater flow but still exposed to occasional salt water inundation may also host halophytic species such as marsh gumplant and pickleweed. The Guadalupe River side of A8 is a location where freshwater species colonize the majority of the floodplain terrace.

2.1.4.5 Upland/Levees

The primary upland habitat existing in the Ravenswood, Alviso-Mountain View, Alviso-A8, and Alviso-Island Ponds clusters exists along the tops of levees and along the landward sides of the Study Area. Levees were constructed from native tidal salt marsh soils (silty clay) in the immediate vicinity and may occasionally be reinforced with concrete debris. Due to the high salinity of these soils and their inherent disturbed nature, many levees feature areas of bare soil, or are otherwise populated by non-native halophytic species including small flowered iceplant, New Zealand spinach, sea fig (*Carpobrotus chilensis* –FACU), Russian thistle (*Salsola soda* –FACW), and Australian saltbush (*Atriplex semibaccata* –FAC) (USFWS 2007).

On levees and portions of levees where freshwater (groundwater or rain) has reduced soil salinity over time, other common ruderal species (non-native species that thrive in areas of disturbance) of forbs and grasses dominate; including black mustard (*Brassica nigra* –NL), Italian thistle (*Carduus pycnocephalus* –NL), yellow star thistle (*Centaurea solstitialis* –NL), sweet fennel (*Foeniculum vulgare* –NL), perennial pepperweed, common mallow (*Malva neglecta* -NL), bird's foot trefoil (*Lotus corniculatus* –FAC), wild oats (*Avena fatua* –NL), ripgut brome (*Bromus diandrus* –NL), crabgrass (*Digitaria sanguinalis* –FACU), Italian rye grass (*Lolium multiflorum* –NL), tall wheat grass (*Elymus ponticus* –NL), and Mediterranean barley (*Hordeum marinum* ssp. *gussoneanum* –FAC). Native shrubs may colonize more substantial levees, for instance the coyote bush (*Baccharis pilularis* –NL) found on the A19 levees.

2.1.4.6 Mudflat

Naturally occurring mudflats on the outboard sides of many South Bay managed ponds, including those in the Ravenswood Complex, begin at low tidal salt marsh areas and extend into the Bay. Covered by shallow water during high tide, these mudflats are exposed during low tide (Schoellhammer 2005). These intertidal habitats are inhospitable to most vascular emergent vegetation; typically supporting 0 to 10 percent cover of cordgrass or pickleweed. Narrow stretches of mudflat occur within slough and creek channels and at the mouths of major sloughs. Mudflats also exist in the basins of former salt evaporator ponds, such as Charleston Slough, adjacent to the Alviso-Mountain View Ponds, and in portions of the Alviso-Island Ponds Complex where the levees have been breached and the pond re-exposed to Bay waters and tides.

2.1.4.7 Unvegetated Non-Mudflat

The margins and basins of some former salt evaporator ponds, such as R3 and R4 at Ravenswood Pond Complex, that are seasonally ponded but dry much of the year, consist of bare ground and salt flat (non-mudflat soils) areas. Historically these basins were subject to regular tidal inundation, but following installation of levees and their use as salt evaporator ponds, the salinity has increased beyond the tolerance of most halophytic vegetation. The only vascular plant species surviving in this environment is the non-native small flowered iceplant; which occurs sparsely along the margins of the basins and on top of the soil terrace of the salt flats (USFWS 2007).

2.2 Methods

Prior to the commencement of field work, the approach URS (now AECOM) biologists took to delineate wetland and water features was verified and confirmed by the USACE (J. Hicks. San Francisco District Regulatory Division Chief. San Francisco, California. June 28, 2013. Personal Communication). The mean high water (MHW) elevations were established through desktop analysis and conversions of data from tide gauge stations and using the NAVD88 datum. The two tide gage stations that were used were the Coyote Creek gage (for the Mountain View Ponds, the A8 Ponds, and the Island Ponds) and Dumbarton gage (for the Ravenswood Ponds). The conversions were made using methods published by Amy Foxgrover and others (2007). Aerial image interpretation was also performed to map all wetlands, uplands, ponds, and open water features prior to ground-truthing in the field. The primary source is the maps of the United States Coast Survey (USCS; later U.S. Coast and Geodetic Survey), a federal agency renowned for the accuracy and detail of its 19th-century maps of America's shoreline. In most parts of the country, these maps provide the best historic pictures of coastal and estuarine habitats prior to substantial Euro-American modification. The MHW was used to delineate the current Section 10 Waters of the U.S. The High Tide Line (HTL) was delineated in the field.

To delineate the HTL in the field, teams collected Global Positioning System (GPS) points at the HTL around each pond at approximately every 300 to 500 feet. The HTL was identified in the field by shoreline indicators which in most cases included drift lines or wrack lines and in some cases, the uppermost limit of barnacles on rock rip rap along the Bay. This data was then combined using ArcGIS 10 with LiDAR overlay to create the HTL boundary for each pond. The HTL boundary was derived using the contour tool in the spatial analysis tools of ESRI's ArcGIS 10. Based on field collection, specific elevation contours, or isolines, representing the HTL, were derived from the LiDAR (elevation) surface. The contour tool was used to create a line representing a specific elevation across a defined area. The boundaries of the HTL were used to determine the extent of Section 404 jurisdiction of other waters

For non-tidally influenced ponds, the ordinary high water mark (OHWM) was used to determine the extent of the open water features. Paired upland and wetland data points were also collected in the field to verify the extent of all wetland and open water features. Within each pond complex the paired wetland and upland data points were taken using the methods described in the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (USACE 2008) and Wetland Determination Data Forms for the Arid West Region were completed (Appendix C). All wetland types (brackish marsh, freshwater marsh, and tidal marsh) were delineated collectively in the field and the total acreage of wetlands within each pond complex reflects all wetland feature types combined. Wetland and open water polygons were then revised based on GPS data collected in the field.

A plant list was compiled while in the field by URS (now AECOM) biologists based on what was identifiable at the time of the field effort within the Study Area (Appendix B).

In 2016, after the August 11 site visit with USACE regulatory staff, additional internal wetland features were identified in the ponds. Strips of discontinuous marsh vegetation have developed along the internal pond levees and should be manually added to the classification initially done by aerial image analysis. AECOM biologists verified a method for mapping these internal marsh vegetation features, which was confirmed by USACE (F. Malamud-Roam, San Francisco District Regulatory Project Manager, San Francisco, California. August 16, 2016. Personal Communication). The internal discontinuous fringing wetland features were mapped in a desktop study, using the following agency-approved rules. Wetland areas of internal marsh vegetation were then estimated using a conservative average width, specific to each pond cluster:

- Ravenswood Ponds = wetland strips 8 feet wide were applied all the way around all pond interiors.
- Mountain View Ponds = wetland strips 12 feet wide were added along the southern interior borders of each pond and 8 feet wide along the rest of the interior levees. The external western levee of Pond A1 (facing Charleston Slough) was treated as an interior border and used the same 8-foot border. There is a large section of marsh inside of Pond A2W, along the interior of its western levee. This marsh was mapped in the previous delineation, and so the averaging technique was not applied here. The previously developed polygon was overlain for this large internal marsh.
- A8 Ponds = wetland strips 6 feet wide were applied all the way around the interiors. The internal fringe wetland in these ponds is extremely patchy. Several wetland sections are 18-25 feet wide, but most of the southern interior of the southern border and the corners bending up toward Pond A8 are sparsely vegetated. There is a notable erosion scarp along the interior southeastern corner of Pond A8S adjacent to the closed landfill behind these ponds.. The exterior fringing marshes are well-characterized in the delineation and so were not changed.
- Island Ponds = AECOM acquired the GIS vegetation layer from the boat-enabled surveys done by the Refuge staff. The Refuge's GIS data was be applied to the Island Ponds to update the data and internal wetland areas.

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3 Results and Discussion

3.1 Delineation Results

A total of 3,052.7 acres of potentially jurisdictional wetlands and other (non-wetland) waters of the U.S. were identified within the study area (the footprint and immediate surroundings) for Phase 2 of the SBSP Restoration Project (Figure 5). Of the features identified in this report, 583.1 acres are freshwater marsh, tidal marsh, and seasonal wetland and 2,469.6 acres are other waters. A total of 477.0 acres of historic Section 10 water features were identified within the Study Area and 2,083.2 acres of current Section 10 waters are present within the Study Area boundaries. This section provides brief descriptions of these features, the delineations of which were based on NOAA tidal datum, photographic interpretation and data collected in the field.

3.2 Significant Nexus Determination

The San Francisco Bay is a TNW waterway under 33 CFR 328.3(a)(3)(i), based on its usage by ships for interstate commerce. It flows into the Pacific Ocean north of San Francisco underneath the Golden Gate Bridge (Figure 3). All ponds in Phase 2 of the SBSP Restoration Project have a significant nexus to San Francisco Bay, either directly by means of an existing levee breach or hydrologically connected through subterranean flow (flow of water below the levee). Therefore, all ponds within the Study Area are considered to be potentially jurisdictional under Section 404 of the Clean Water Act.

3.2.1 Section 404 Wetlands and Other Waters of the U.S.

Wetland features within the Study Area, as defined under Section 404 of the CWA, include brackish and freshwater marshes and a few seasonal wetlands. Other waters features as defined by Section 404 include open water, mudflats, natural sloughs, channels, and former salt ponds.

- **Ravenswood Pond Complex:** The Phase 2 ponds at the Ravenswood Pond Complex include R3, R4, R5, and S5 (Figure 5). These ponds are a subset of the larger Ravenswood Pond Complex. Section 404 wetlands occur on the outboard portions of Ravenswood: tidal salt marsh occurs on the northern portion of the R4 levee, and the eastern edge of R4. Wetlands near R3 are characterized by brackish marsh transitioning to freshwater marsh further upstream in Ravenswood Slough. Freshwater marsh also occurs along the southern edge of the S5 levee in two isolated patches. The interiors of these ponds are edged with discontinuous internal marsh vegetation and are unvegetated non-mudflat in the centers, which are considered other waters of the U.S.
- **Alviso Pond Complex – A8 Ponds:** This pond cluster is in the central part of the Alviso Pond Complex, and includes Pond A8 and Pond A8S. These ponds contain Section 404 wetlands as bands of internal discontinuous brackish and salt marsh. The outboard edge of A8, which borders the Guadalupe River, has large external fringing marshes, also Section 404 wetlands. The external fringing marsh wetlands are characterized by dense, exclusive stands of freshwater marsh. The Guadalupe River itself, and the interiors of the A8 and A8S ponds, are considered other waters of the U.S.
- **Alviso Pond Complex – Island Ponds:** The ponds in this part of the Alviso Pond Complex are referred to as the Island Ponds. This pond cluster includes A19, A20, and A21. The levees of all three ponds are breached and are subject to tidal influence; at low tide the interiors of A19, A20, and A21 drain to reveal mudflats, bordered by hydric vegetation. The vegetation at these ponds is entirely brackish due to the freshwater influence of Coyote Creek to the south and Mud Slough to the north. The brackish marshes and internal discontinuous marshes are Section 404 wetlands, and the interiors of the ponds and the creek and slough channels constitute other waters of the U.S.

- **Alviso Pond Complex – Mountain View Ponds:** The ponds in this part of the Alviso Pond Complex are referred to as the Alviso-Mountain View Ponds. For the purposes of this delineation, this pond cluster includes A1 and A2W, plus the adjacent Charleston Slough (C1) to the west, Permanente Creek which flows into Mountain View Slough between A1 and A2W, and Stevens Creek to the east of A2W. The outboard edges of A1 and A2W are host to tidal salt marsh, which transitions into brackish marsh travelling upstream into Charleston Slough, Mountain View Slough, and Stevens Creek. The portion of the western levee of C1 at the outlet of Adobe Creek (bordering Palo Alto Baylands Park) is host to freshwater marsh. Ponds A1 and A2W contain water at all times because their levees are not breached; however, C1 is exposed to tidal action and drains at low tide to reveal mudflats. The water/mudflat areas within the levees of these ponds are considered other waters of the U.S., and the marsh, internal discontinuous marsh, and outboard areas constitute Section 404 wetlands.

3.2.2 Section 10 Waters

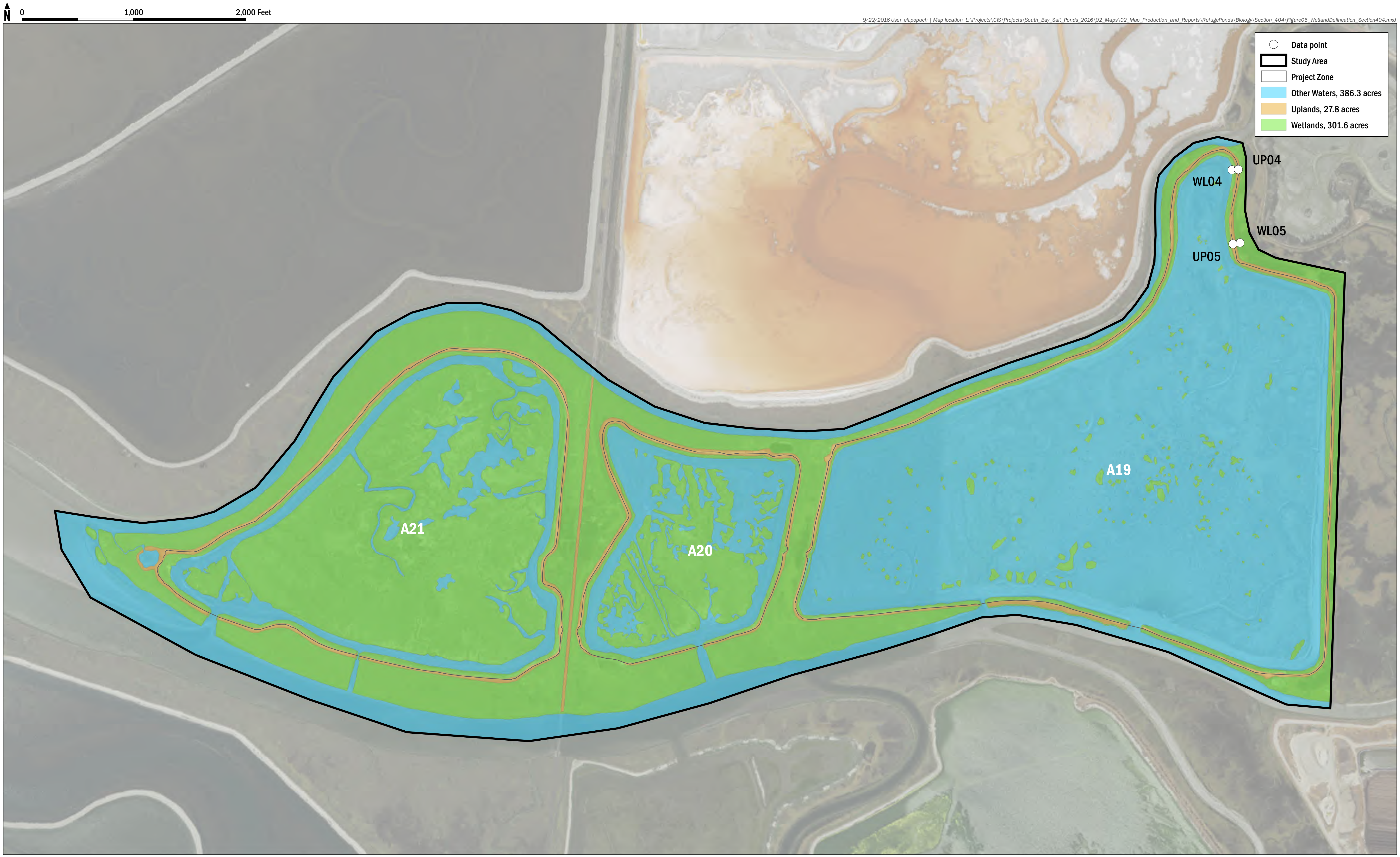
Waters of the U.S. subject to jurisdiction under Section 10 of the Rivers and Harbors Act are defined as those waters subject to the ebb and flow of the tide shoreward to the MHW mark and/or presently used, or have been used in the past, or are susceptible for use to transport interstate or foreign commerce. These waters were delineated based on the MHW (Figure 6). The MHW for each Pond Complex was determined using a dataset that integrated several sources of data describing the historical features of South Bay tidal marshes. The MHW, as interpreted through the NAVD88 datum, used for each pond cluster is listed below:

- Ravenswood – 6.79 feet elevation
- Alviso-A8 – 6.91 feet elevation
- Alviso-Island –6.91 feet elevation
- Alviso-Mountain View – 6.91 feet elevation

Current Section 10 waters within the Study Area include the San Francisco Bay present in the Ravenswood Complex and the Alviso-Mountain View Ponds, Ravenswood Slough in the Ravenswood Complex, Charleston Slough, Mountain View Slough and Stevens Creek in the Alviso-Mountain View Ponds, Mud Slough and Coyote Creek in the Alviso-Island Ponds, and the Alviso Slough in the Alviso-A8 Ponds. All current Section 10 waters overlap with and are also designated as Section 404 other waters. The features that are now ponds within the Study Area were present as tidally influenced areas before the construction of the levees and the flooding of the ponds. Some historical Section 10 waters also overlap current Section 404 jurisdiction (Figure 5).

AECOM
South Bay Salt Pond Restoration Project

FIGURE 5
Section 404 Waters of the U.S.
Alviso A8 Ponds



9/22/2016 User eli.popuch | Map location L:\Projects\GIS\Projects\South_Bay_Salt_Ponds_2016\02_Maps\02_Map_Production_and_Reports\RefugePonds\Biology\Section_404\Figure05_WetlandDelineation_Section404.mxd

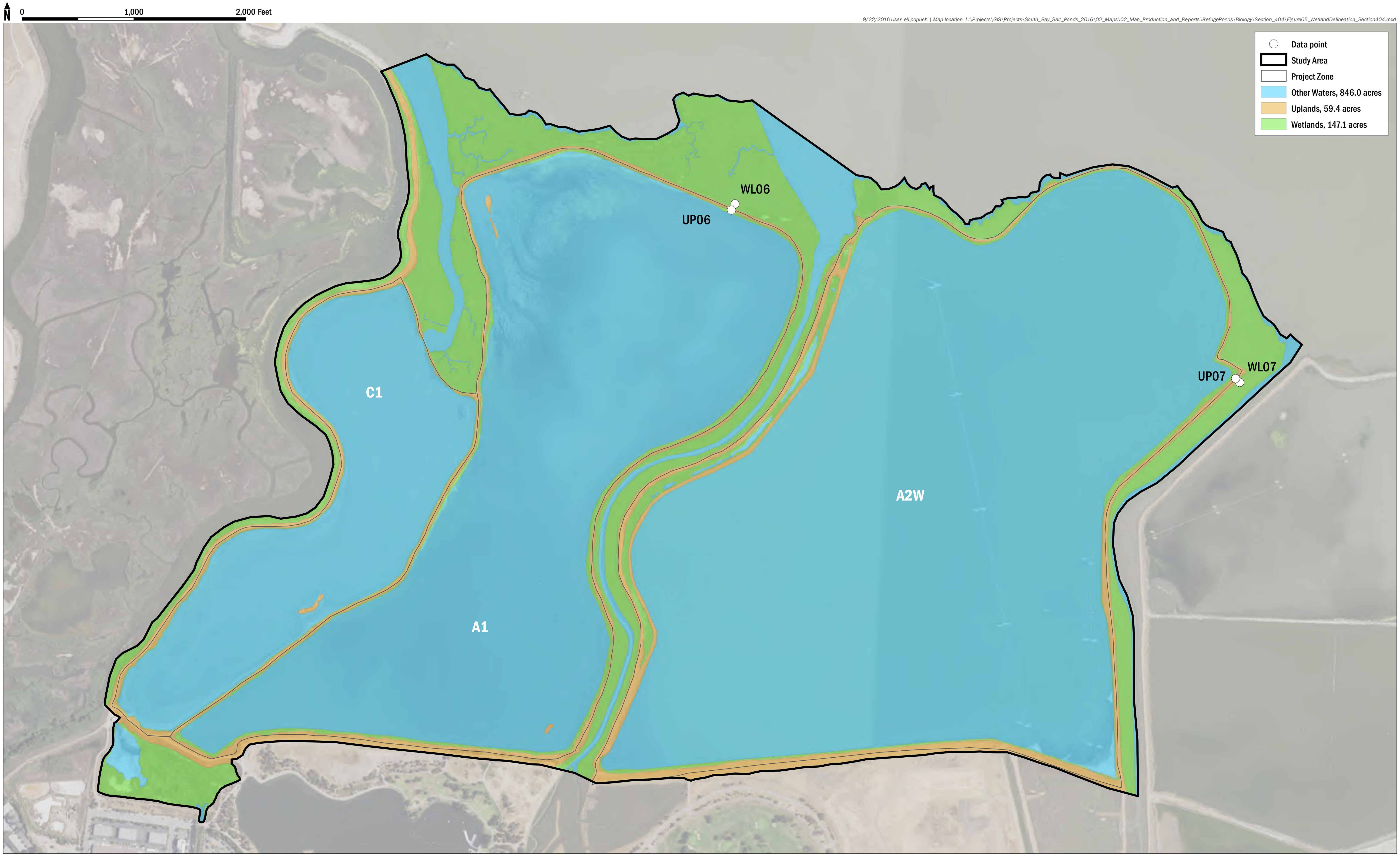
AECOM

South Bay Salt Pond Restoration Project

FIGURE 5

Section 404 Waters of the U.S.

Alviso Island Ponds



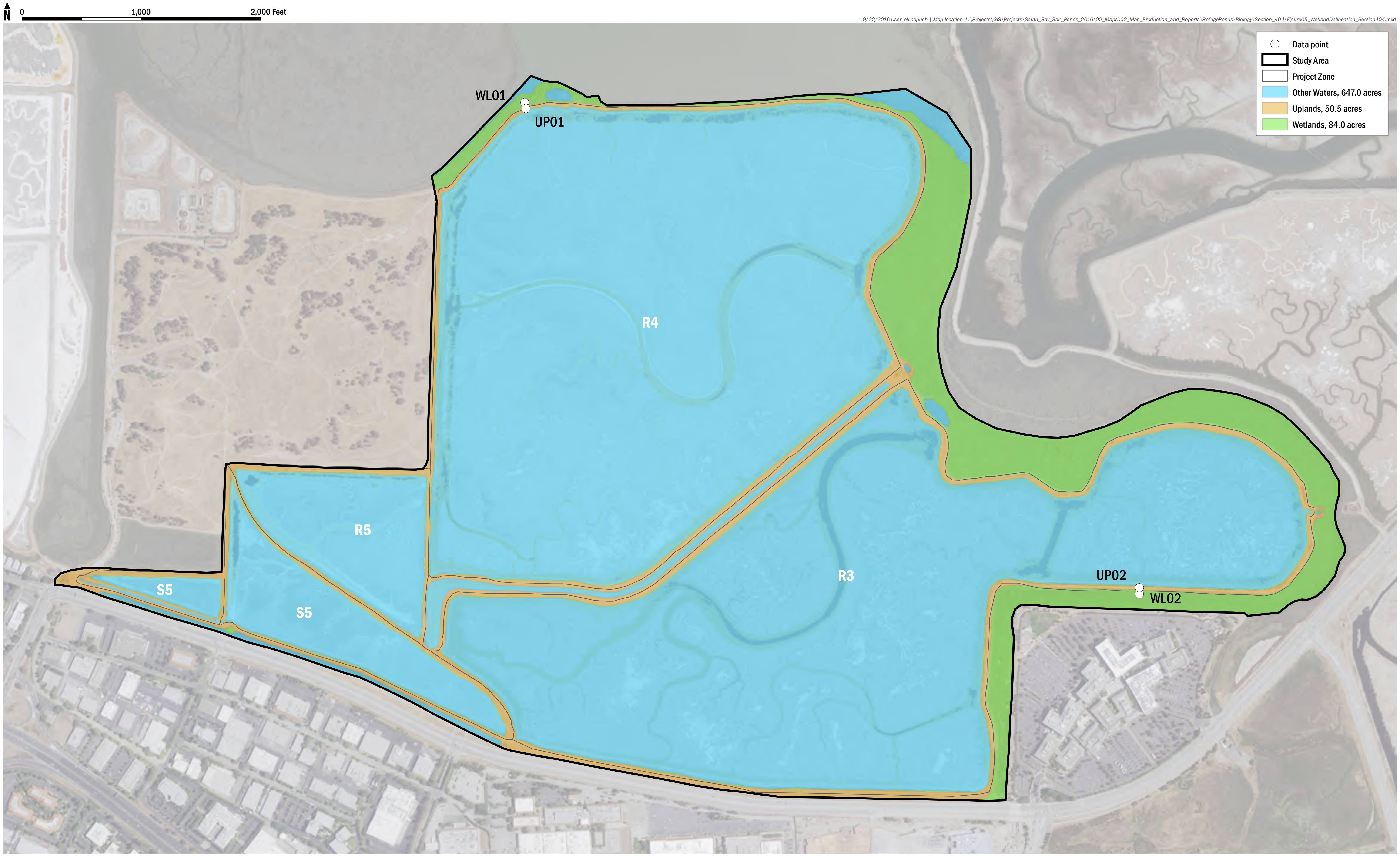
AECOM

South Bay Salt Pond Restoration Project

FIGURE 5

Section 404 Waters of the U.S.

Alviso Mt. View Ponds



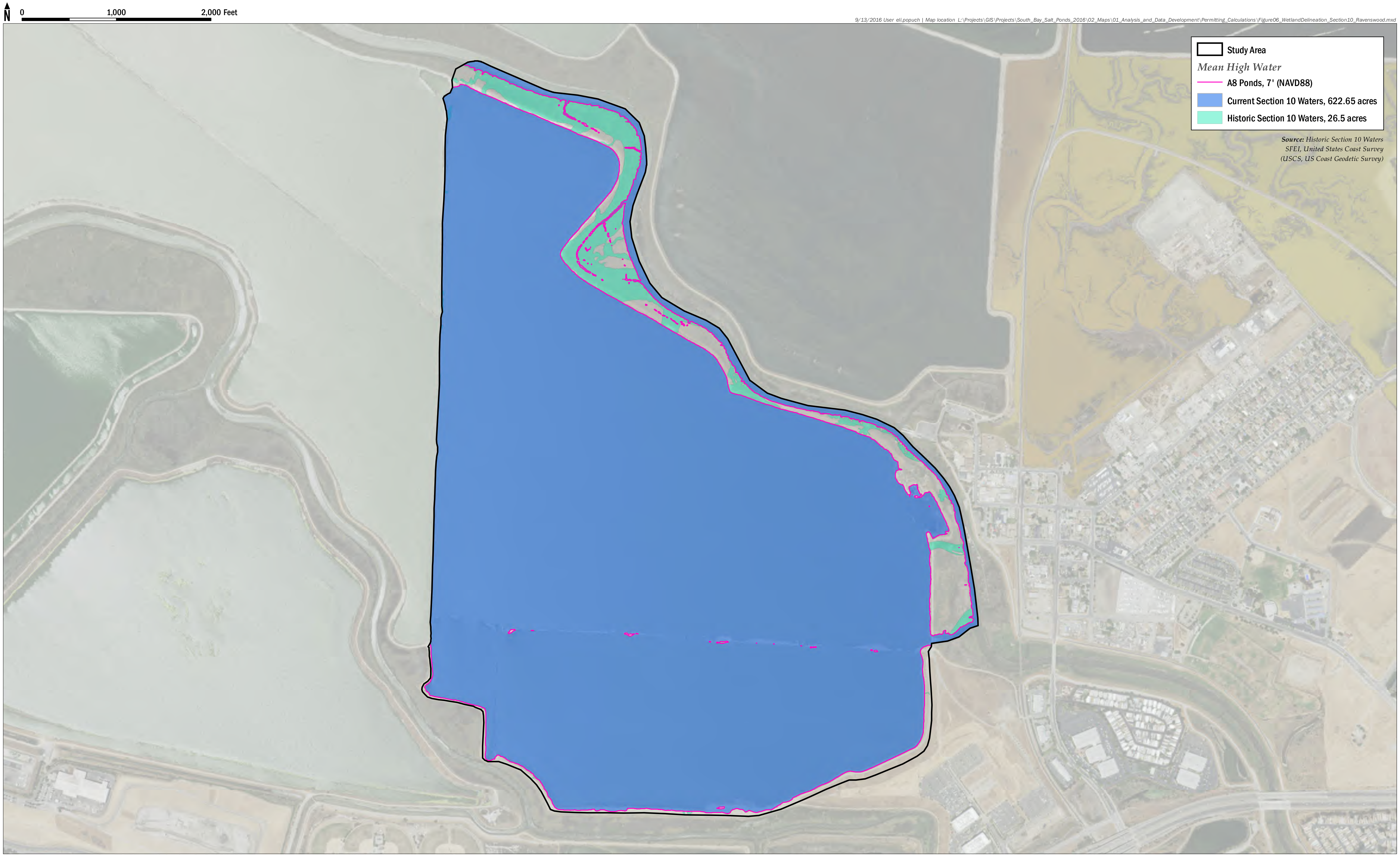
AECOM

South Bay Salt Pond Restoration Project

FIGURE 5

Section 404 Waters of the U.S.

Ravenswood Ponds



AECOM

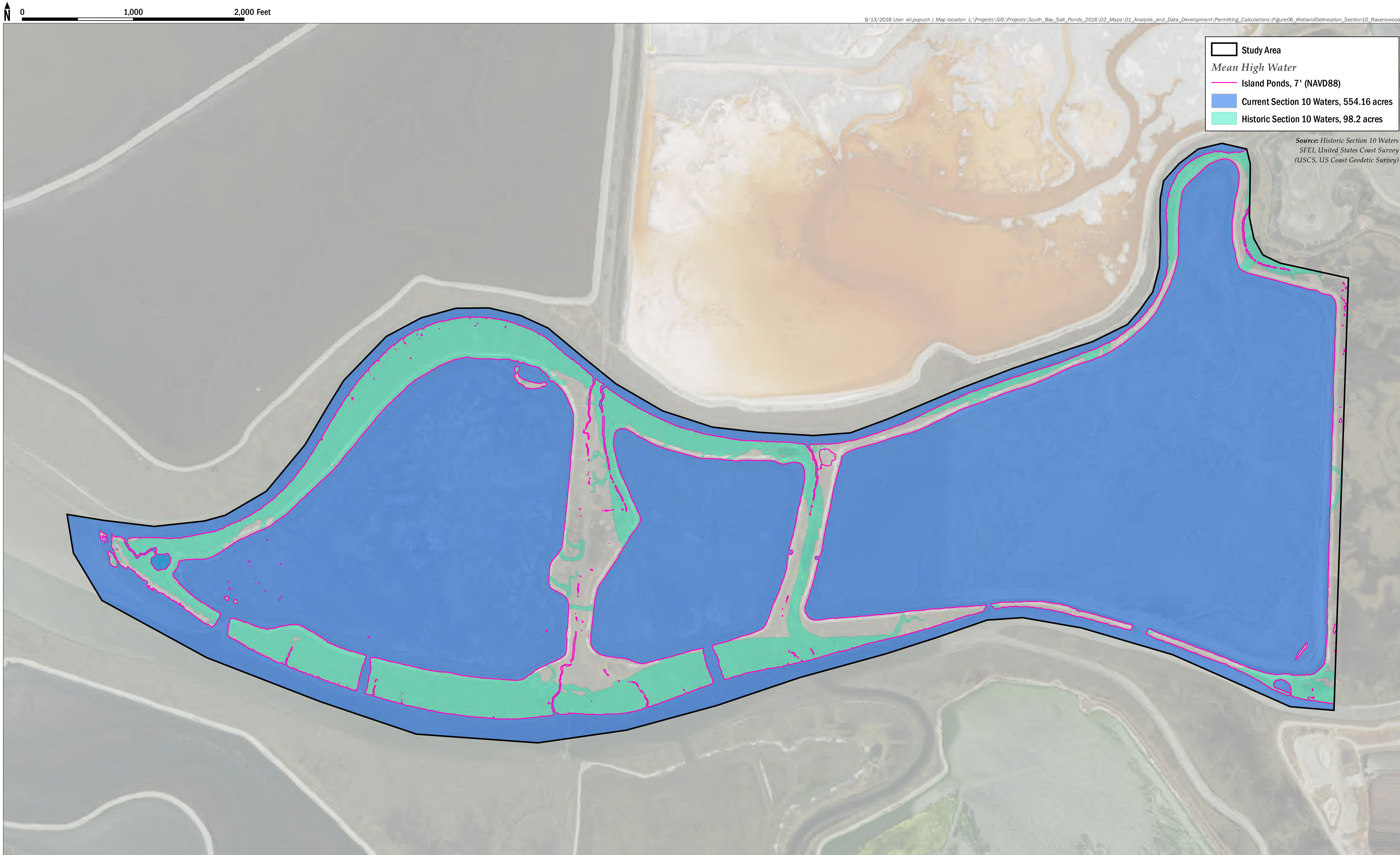
South Bay Salt Pond Restoration Project

FIGURE 6

Current & Historic Section 10

Based on 2016 Delineation & Aerial Interpretation

Alviso A8 Ponds



AECOM

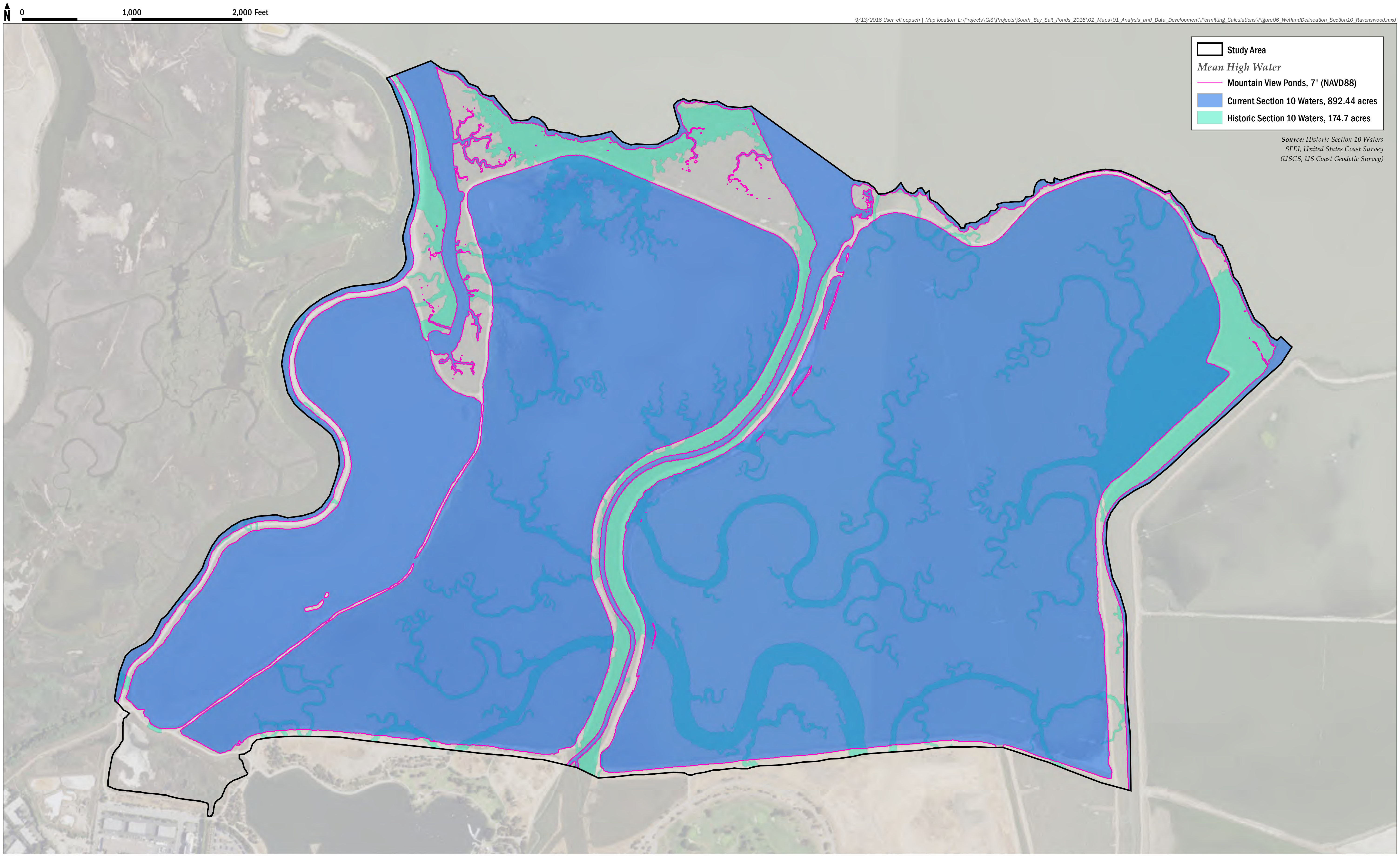
South Bay Salt Pond Restoration Project

FIGURE 6

Current & Historic Section 10

Based on 2016 Delineation & Aerial Interpretation

Alviso Island Ponds



AECOM

South Bay Salt Pond Restoration Project

FIGURE 6

Current & Historic Section 10

Based on 2016 Delineation & Aerial Interpretation

Alviso Mt. View Ponds

AECOM

South Bay Salt Pond Restoration Project

FIGURE 6

Current & Historic Section 10

Based on 2016 Delineation & Aerial Interpretation

Ravenswood Ponds

3.3 Summary of Findings

A total of 583.1 acres of potentially jurisdictional wetlands and 2,469.6 acres of other waters of the U.S. were identified within the Study Area. These features are summarized in Table 3-1. In addition, 477.0 acres of historic Section 10 waters and 2,083.2 acres of current Section 10 waters were identified within the Study Area. These features are summarized in Table 3-2.

Table 3-1. Summary of Section 404 Features Identified in the Study Area

	Section 404 Wetland Feature Name	
Pond Complex	**Wetlands**	**Acres**
Alviso A8	Alviso Slough East Fringing Marsh	44.7
Alviso A8	A8S Fringing Marsh	2.4
Alviso A8	A8 Fringing Marsh	3.2
	Subtotal Alviso A8 Wetlands	***50.3***
Alviso Island	A19/A20 Fringing Marsh	114.1
Alviso Island	A21 Fringing Marsh	72.0
Alviso Island	A19 Interior Marsh	5.6
Alviso Island	A21 Interior Marsh	110.0
	Subtotal Alviso Island Wetlands	***301.7***
Alviso Mt. View	A2W Fringing Marsh	49.8
Alviso Mt. View	A1 Fringing Marsh	66.4
Alviso Mt. View	Outer Charleston Slough Fringing Marsh	18.7
Alviso Mt. View	Inner Charleston Slough	2.2
Alviso Mt. View	Coast Casey Forebay Brackish Marsh	10.0
	Subtotal Alviso Mt. View Wetlands	***147.1***
Ravenswood	Ravenswood Slough Fringing Marsh	71.8
Ravenswood	Caltrans Ditch Fringing Marsh	0.3
Ravenswood	West Point Slough Fringing Marsh	3.0
Ravenswood	R4 Fringing Marsh	2.6
Ravenswood	R3 Fringing Marsh	3.6
Ravenswood	S5 Fringing Marsh	1.8
Ravenswood	R5 Fringing Marsh	0.9
	Subtotal Ravenswood Wetlands	***84.0***
TOTAL of Wetlands		**583.1**
	Other Waters of the U.S.	
Alviso A8	Alviso Slough	11.1
Alviso A8	A8S	172.0
Alviso A8	A8	406.5
	Subtotal Alviso A8 Other Waters	***589.6***
Alviso Island	Coyote Creek	46.4
Alviso Island	Mud Slough	21.6
Alviso Island	A19	255.1
Alviso Island	A21	31.9
Alviso Island	A20	31.3
	Subtotal Alviso Island Other Waters	***386.3***
Alviso Mt. View	Permanente Creek/Mountain View Slough	18.2
Alviso Mt. View	A2W	429.9

Table 3-1. Summary of Section 404 Features Identified in the Study Area

Section 404 Wetland Feature Name		
Alviso Mt. View	A1	270.0
Alviso Mt. View	Inner Charleston Slough	106.9
Alviso Mt. View	San Francisco Bay	4.1
Alviso Mt. View	Stevens Creek	3.9
Alviso Mt. View	Outer Charleston Slough	11.3
Alviso Mt. View	Coast Casey Forebay	2.5
	Subtotal Alviso Mt. View Other Waters	***846.8***
Ravenswood	Caltrans Ditch	2.9
Ravenswood	R4	295.5
Ravenswood	R3	271.9
Ravenswood	S5	33.4
Ravenswood	R5	30.9
Ravenswood	All American Canal	6.9
Ravenswood	AAC Pool 1	0.1
Ravenswood	R3 Pool 1	0.6
Ravenswood	R4 Pool 1	0.4
Ravenswood	San Francisco Bay	3.6
Ravenswood	West Point Slough	0.7
	Subtotal Ravenswood Other Waters	***646.9***
Total of Other Waters of the U.S.		**2,469.6**
TOTAL of Potentially Jurisdictional Features		**3,052.7**

Table 3-2. Summary of Historic and Current Section 10 Waters Identified in the Study Area

Pond Complex	Section 10 Waters	Area (acres)*
Ravenswood	Historic	177.5
Alviso A8	Historic	26.5
Alviso Island Ponds	Historic	98.2
Alviso Mountain View	Historic	174.7
	Total acres of historic waters	***477.0***
Ravenswood	Current	14.0
Alviso A8	Current	622.6
Alviso Island Ponds	Current	554.2
Alviso Mountain View	Current	892.4
	Total acres of current waters	***2,083.2***

Implementation of the South Bay Salt Pond Restoration Project is anticipated to have temporary and permanent impacts on the potentially jurisdictional features identified in this delineation report. To comply with federal and state regulations protecting aquatic resources, permits will be required from the U.S. Army Corps of Engineers (USACE), the San Francisco Bay Conservation and Development Commission (BCDC), and the Regional Water Quality Control Board (RWQCB).

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Malamud-Roam, Frances. 2016. San Francisco District Regulatory Project Manager, San Francisco, California. August 16, 2016. Email to David Halsing, AECOM, regarding mapping of fringing wetlands, confirming methodology for mapping the fringing wetlands within the tidal and non-tidal ponds.

Appendix A.
Representative Photographs of Delineated Wetlands and Waters

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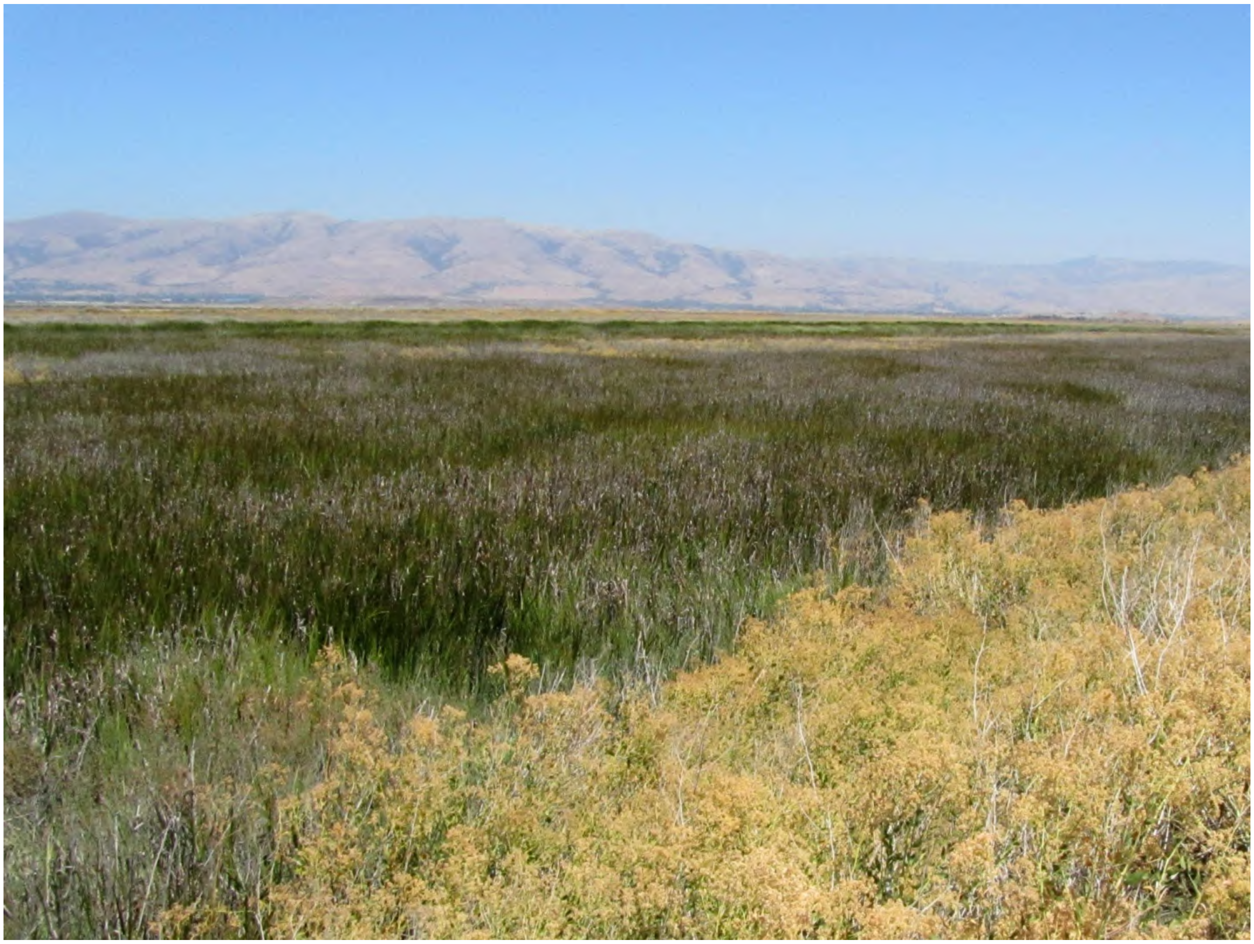
Tidal Salt Marsh and Brackish Marsh

Tidal salt marsh near the mouth of Mountain View Slough between ponds A1 and A2W; featuring cordgrass low marsh, pickleweed middle marsh, and gumplant and alkali heath high marsh.

Characteristic brackish marsh at A19 pond interior (top) and along Mud Slough (bottom) featuring a mixture of pickleweed, perennial pepperweed, and bulrush species.

Freshwater Marsh



Dense stands of bulrush on the terraced floodplain of the Guadalupe River, adjacent to A8.

Upland/Levees

Ruderal, upland vegetation found on levee tops (R4- left, R3-right) including ripgut brome, Italian thistle (dry), and Australian saltbush.

Mudflat

Photo 5. Pickleweed margin unvegetated mudflat of A19 pond basin.

Unvegetated Non-Mudflat

Interior basins of salt ponds R3 (top left), S5 (top right), and R4 (bottom).

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Appendix B.
Plant List

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List of Vascular Plant Species Identified

Species Name	Common Name	Wetland Indicator	Nativity	Cal-IPC status
Atriplex prostrata	spearscale	FACW	non native	NL
Atriplex semibaccata	Australian saltbush	FAC	non native	moderate
Avena fatua	wild oats	NL	non native	moderate
Baccharis pilularis	coyote brush	NL	native	n/a
Bolboschoenus maritimus ssp. *paludosus*	saltmarsh bulrush	OBL	native	n/a
Bolboschoenus robustus	seacoast bulrush	OBL	native	n/a
Brassica nigra	black mustard	NL	non native	moderate
Bromus diandrus	ripgut brome	NL	non native	moderate
Carduus pycnocephalus	Italian thistle	NL	non native	moderate
Carpobrotus chilensis	sea fig	FACU	non native	moderate
Centaurea solstitialis	yellow star-thistle	NL	non native	high
Cotula coronopifolia	brass buttons	OBL	non native	limited
Cuscuta salina	saltmarsh dodder	NL	native	n/a
Digitaria sanguinalis	crabgrass	FACU	non native	NL
Distichlis spicata	saltgrass	FAC	native	n/a
Elymus ponticus	tall wheat grass	NL	non native	NL
Foeniculum vulgare	sweet fennel	NL	non native	high
Frankenia salina	alkali heath	FACW	native	n/a
Grindelia stricta var. *angustifolia*	marsh gumplant	NL	native	n/a
Hordeum marinum ssp. *gussoneanum*	Mediterranean barley	FAC	non native	NL
Jaumea carnosa	marsh jaumea	OBL	native	n/a
Lepidium latifolium	perennial pepperweed	FAC	non native	high
Lolium multiflorum	Italian rye grass	NL	non native	moderate
Lotus corniculatus	bird's foot trefoil	FAC	non native	NL
Malva neglecta	common mallow	NL	non native	NL
Mesembryanthemum nodiflorum	small flowered iceplant	FAC	non native	NL
Rumex crispus	curly dock	FAC	non native	limited

Salicornia depressa	pickleweed	OBL	native	n/a
Salicornia pacifica	Pacific pickleweed	OBL	native	n/a
Salsola soda	Russian thistle	FACW	non native	moderate
Schoenoplectus acutus var. *occidentalis*	hard stemmed tule	OBL	native	n/a
Schoenoplectus californicus	California bulrush	OBL	native	n/a
Spartina foliosa	Pacific cordgrass	OBL	native	n/a
Spartina sp. *(S. alterniflora, S. alterniflora* x *S. foliosa)*	saltwater cordgrass	OBL	non native	high
Tetragonia tetragonioides	New Zealand spinach	NL	non native	high

Wetland Indicator:
NL = not listed
FAC = Facultative: equally likely to occur in upland or wetland habitats.
FACW = Facultative Wetland: more commonly occurs in wetlands but can occur in uplands.
FACU = Facultative Upland: more commonly occurs in uplands but can occur in wetlands.
OBL = Obligate Wetland: almost always occurs in wetlands, rarely occurs in uplands.

Cal-IPC:
High – Species with severe ecological impacts in California: on physical processes, ecological communities, and vegetation structure.
Moderate – Species with substantial and apparent – but generally not severe – impacts in California on physical processes, ecological communities, and vegetation structure.
Limited – Species that are invasive in California but whose ecological impacts may be minor (though potentially locally persistent and problematic), or information is limited.

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Appendix C.
Arid West Data Sheets

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WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: SBSP Ravenswood City/County: Menlo Park, San Mateo County Sampling Date: 7/10/13

Applicant/Owner: USFWS State: CA Sampling Point: WL01

Investigator(s): S. Lindquist, J. Novak, D. Peña, E. Maroni Section, Township, Range: S14 T5S R3W

Landform (hillslope, terrace, etc.): Local relief (concave, convex, none): none Slope (%): 0

Subregion (LRR): C - Mediterranean California Lat: 37.49797157 Long: -122.1657307 Datum:

Soil Map Unit Name: Novato clay NWI classification: L2USKh

Are climatic / hydrologic conditions on the site typical for this time of year? Yes (●) No ( ) (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes (●) No ( )

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes (●)	No ( )
Hydric Soil Present?	Yes (●)	No ( )
Wetland Hydrology Present?	Yes (●)	No ( )

Is the Sampled Area within a Wetland? **Yes** (●) **No** ( )

Remarks: Photos 0918-0924

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	%		
Herb Stratum			
1. *Salicornia depressa*	100	Yes	OBL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
Total Cover:	100%		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum 0 % % Cover of Biotic Crust %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0 % (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	100	x 1 =	100
FACW species		x 2 =	0
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species		x 5 =	0
Column Totals:	100 (A)		100 (B)

Prevalence Index = B/A = 1.00

Hydrophytic Vegetation Indicators:

- ☒ Dominance Test is >50%
- ☒ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** (●) **No** ( )

Remarks:

SOIL

Sampling Point: WL01

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture[3]	Remarks
0-12	Gley1 3/1	80	5YR 4/6	20	C	PL	silty clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☒ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? Yes ◉ No ○

Remarks: Munsell M-3

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☒ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☒ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ○ No ◉ Depth (inches):
Water Table Present? Yes ○ No ◉ Depth (inches):
Saturation Present? (includes capillary fringe) Yes ◉ No ○ Depth (inches): 0-12

Wetland Hydrology Present? Yes ◉ No ○

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Located within high tide location of San Francisco Bay.

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: SBSP Ravenswood City/County: Menlo Park, San Mateo County Sampling Date: 7/10/13
Applicant/Owner: USFWS State: CA Sampling Point: UP01
Investigator(s): S. Lindquist, J. Novak, D. Peña, E. Maroni Section, Township, Range: S14 T5S R3W
Landform (hillslope, terrace, etc.): Local relief (concave, convex, none): Slope (%):
Subregion (LRR): C - Mediterranean California Lat: 37.49791468 Long: -122.1657342 Datum:
Soil Map Unit Name: Novato clay NWI classification: L2USKh
Are climatic / hydrologic conditions on the site typical for this time of year? Yes (●) No ( ) (If no, explain in Remarks.)
Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes (●) No ( )
Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?	( )	(●)
Hydric Soil Present?	( )	(●)
Wetland Hydrology Present?	( )	(●)

Is the Sampled Area within a Wetland? Yes ( ) No (●)

Remarks: Photos 0925-0927. Point located on San Francisco Bay side of levee.

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	%		
Herb Stratum			
1. *Bromus diandrus*	60	Yes	UPL
2. *Frankelia salina*	25	Yes	FACW
3. *Salicornia depressa*	10	No	OBL
4.			
5.			
6.			
7.			
8.			
Total Cover:	95 %		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum 5 % % Cover of Biotic Crust %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 50.0 % (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	10	x 1 =	10
FACW species	25	x 2 =	50
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species	60	x 5 =	300
Column Totals:	95 (A)		360 (B)

Prevalence Index = B/A = 3.79

Hydrophytic Vegetation Indicators:

- ☐ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ( ) No (●)

Remarks:

SOIL

Sampling Point: UP01

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture[3]	Remarks
0-8	10YR 3/4	100					loamy sand	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? Yes ○ No ●

Remarks: 40% gravel.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ○ No ● Depth (inches):
Water Table Present? Yes ○ No ● Depth (inches):
Saturation Present? (includes capillary fringe) Yes ○ No ● Depth (inches):

Wetland Hydrology Present? Yes ○ No ●

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Located within high tide location of San Francisco Bay.

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: SBSP Ravenswood | City/County: Menlo Park, San Mateo County | Sampling Date: 7/10/13

Applicant/Owner: USFWS | State: CA | Sampling Point: WL02

Investigator(s): J. Novak and D. Peña | Section, Township, Range: S24 T5S R3W

Landform (hillslope, terrace, etc.): | Local relief (concave, convex, none): | Slope (%):

Subregion (LRR): C - Mediterranean California | Lat: 37.48718592 | Long: -122.1475286 | Datum:

Soil Map Unit Name: Novato clay | NWI classification: L2USKh

Are climatic / hydrologic conditions on the site typical for this time of year? Yes (●) No ( ) (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes (●) No ( )

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes (●)	No ( )
Hydric Soil Present?	Yes (●)	No ( )
Wetland Hydrology Present?	Yes (●)	No ( )

Is the Sampled Area within a Wetland? **Yes** (●) **No** ( )

Remarks: Photos 4533-4540

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	%		
Herb Stratum			
1. *Scirpus schoenoplectus*	5	No	OBL
2. *Grindelia*	25	Yes	FACW
3. *Lepidium latifolium*	5	No	FAC
4. *Salicornia*	50	Yes	OBL
5. *Digitaria sanguinalis*	40	Yes	FACU
6.			
7.			
8.			
Total Cover:	125 %		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum ____ % | % Cover of Biotic Crust ____ %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	2	(A)
Total Number of Dominant Species Across All Strata:	3	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	66.7 %	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	55	x 1 =	55
FACW species	25	x 2 =	50
FAC species	5	x 3 =	15
FACU species	40	x 4 =	160
UPL species		x 5 =	0
Column Totals:	125 (A)		280 (B)

Prevalence Index = B/A = 2.24

Hydrophytic Vegetation Indicators:

- ☒ Dominance Test is >50%
- ☒ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** (●) **No** ( )

Remarks: Edge of Schoenoplectus complex; channel has Salicornia / Schoenoplectus as dominants.

SOIL

Sampling Point: WL02

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture[3]	Remarks
0-6	2.5YR 5/1		5YR 5/8	15	C	M	sapric\hemic	Semi "greasy" muck horizon
6-14	Gley1 3/1	70	Gley1 2.5/black	20			clay	See remarks

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☒ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☒ Loamy Gleyed Matrix (F2)
- ☒ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- ☒ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ◉ No ○

Remarks: Hand lens test; Hemic horizon when unrubbed (50%). Sapric horizon when rubbed (<15%).

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☒ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ○ No ○ Depth (inches):

Water Table Present? Yes ○ No ○ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ○ No ○ Depth (inches):

Wetland Hydrology Present? Yes ◉ No ○

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Edge of standing water at low tide, channel between two levees.

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: SBSP Ravenswood | City/County: Menlo Park, San Mateo County | Sampling Date: 7/10/13

Applicant/Owner: USFWS | State: CA | Sampling Point: UP02

Investigator(s): J. Novak and D. Peña | Section, Township, Range: S24 T5S R3W

Landform (hillslope, terrace, etc.): | Local relief (concave, convex, none): | Slope (%):

Subregion (LRR): C - Mediterranean California | Lat: 37.48721975 | Long: -122.1475466 | Datum:

Soil Map Unit Name: Novato clay | NWI classification: L2USKh

Are climatic / hydrologic conditions on the site typical for this time of year? Yes (●) No ( ) (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes (●) No ( )

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?	( )	(●)
Hydric Soil Present?	( )	(●)
Wetland Hydrology Present?	( )	(●)

Is the Sampled Area within a Wetland? Yes ( ) No (●)

Remarks: Pictures 4541-4542. On top of levee at top of bank.

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	%		
Herb Stratum			
1. *Bromus diandrus*	65	Yes	UPL
2. *Atriplex sp.*	40	Yes	
3. *Lepidium latifolium*	1	No	FAC
4. *Grindelia*	4	No	FACW
5.			
6.			
7.			
8.			
Total Cover:	110 %		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum ___ % | % Cover of Biotic Crust ___ %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0 % (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 = 0
FACW species	4	x 2 = 8
FAC species	1	x 3 = 3
FACU species		x 4 = 0
UPL species	65	x 5 = 325
Column Totals:	70 (A)	336 (B)

Prevalence Index = B/A = 4.80

Hydrophytic Vegetation Indicators:

- ( ) Dominance Test is >50%
- ( ) Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ( ) No (●)

Remarks:

SOIL

Sampling Point: UP02

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture[3]	Remarks
0-14	5Y 3/2		N/A				silty clay loam	High root content -
								very light when dry.
								Mildly hydrophobic.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? **Yes** ○ **No** ◉

Remarks: No hydric soil indicators.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ○ No ○ Depth (inches):

Water Table Present? Yes ○ No ○ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ○ No ○ Depth (inches):

Wetland Hydrology Present? **Yes** ○ **No** ◉

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Top of bank of levee.

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: SBSP Alviso Pond A8 City/County: San Jose, Santa Clara County Sampling Date: 7/12/13

Applicant/Owner: USFWS State: CA Sampling Point: WL03

Investigator(s): S. Lindquist, E. Maroni Section, Township, Range: S9 T6S R1W

Landform (hillslope, terrace, etc.): Local relief (concave, convex, none): Slope (%):

Subregion (LRR): C - Mediterranean California Lat: 37.42548194 Long: -121.9803801 Datum:

Soil Map Unit Name: Novato clay NWI classification: L2UBK1h

Are climatic / hydrologic conditions on the site typical for this time of year? Yes (●) No ( ) (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes (●) No ( )

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?	(●)	( )
Hydric Soil Present?	(●)	( )
Wetland Hydrology Present?	(●)	( )

Is the Sampled Area within a Wetland? **Yes** (●) **No** ( )

Remarks: Wetland east side of levee. Photos 1049-1050.

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	%		
Herb Stratum			
1. *Schoenoplectus sp.*	100	Yes	OBL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
Total Cover:	100 %		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum 0 % % Cover of Biotic Crust %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	1	(A)
Total Number of Dominant Species Across All Strata:	1	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100.0 %	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	100	x 1 =	100
FACW species		x 2 =	0
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species		x 5 =	0
Column Totals:	100 (A)		100 (B)

Prevalence Index = B/A = 1.00

Hydrophytic Vegetation Indicators:

- ☒ Dominance Test is >50%
- ☒ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** (●) **No** ( )

Remarks:

SOIL

Sampling Point: WL03

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture[3]	Remarks
0-12	2.5YR 3/1	90	10YR 4/6	10	C	PL	clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☒ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? **Yes** ◉ **No** ○

Remarks: Munsell M-3.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☒ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☒ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

	Yes	No	Depth (inches)
Surface Water Present?	○	◉	
Water Table Present?	○	◉	
Saturation Present? (includes capillary fringe)	◉	○	0

Wetland Hydrology Present? **Yes** ◉ **No** ○

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: SBSP Alviso Pond A8 | City/County: San Jose, Santa Clara County | Sampling Date: 7/12/13
Applicant/Owner: USFWS | State: CA | Sampling Point: UP03
Investigator(s): S. Lindquist, E. Maroni | Section, Township, Range: S9 T6S R1W
Landform (hillslope, terrace, etc.): | Local relief (concave, convex, none): | Slope (%):
Subregion (LRR): C - Mediterranean California | Lat: 37.4254814 | Long: -121.9804279 | Datum:
Soil Map Unit Name: Novato clay | NWI classification: L2UBK1h

Are climatic / hydrologic conditions on the site typical for this time of year? Yes (●) No ( ) (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes (●) No ( )

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?	( )	(●)
Hydric Soil Present?	( )	(●)
Wetland Hydrology Present?	(●)	( )

Is the Sampled Area within a Wetland? **Yes** (●) **No** ( )

Remarks: Upland on back side of levee. Photos 1052-1053.

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1. *Baccharis pilularis*	25	Yes	UPL
2.			
3.			
4.			
5.			
Total Cover:	25 %		
Herb Stratum			
1. *Foeniculum vulgare*	75	Yes	UPL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
Total Cover:	75 %		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum 0 % | % Cover of Biotic Crust %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	0	(A)
Total Number of Dominant Species Across All Strata:	2	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	0.0 %	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species	100	x 5 =	500
Column Totals:	100	(A)	500 (B)

Prevalence Index = B/A = 5.00

Hydrophytic Vegetation Indicators:

- ☐ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** ( ) **No** (●)

Remarks:

SOIL

Sampling Point: UP03

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture[3]	Remarks

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils:[4]

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? Yes ○ No ◉

Remarks: Crushed rock from back of levee formed majority of matrix.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☒ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☒ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ○ No ◉ Depth (inches):
Water Table Present? Yes ○ No ◉ Depth (inches):
Saturation Present? (includes capillary fringe) Yes ◉ No ○ Depth (inches): 0

Wetland Hydrology Present? **Yes** ◉ **No** ○

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: SBSP Alviso Island Ponds City/County: Fremont, Alameda County Sampling Date: 7/12/13

Applicant/Owner: USFWS State: CA Sampling Point: WL04

Investigator(s): Shannon Lindquist, Erin Maroni Section, Township, Range: S27 T5S R1W

Landform (hillslope, terrace, etc.): Local relief (concave, convex, none): Slope (%):

Subregion (LRR): C - Mediterranean California Lat: 37.47455533 Long: -121.9544606 Datum:

Soil Map Unit Name: Reyes clay NWI classification: E2EM1Nh

Are climatic / hydrologic conditions on the site typical for this time of year? Yes (●) No ( ) (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes (●) No ( )

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes (●)	No ( )
Hydric Soil Present?	Yes (●)	No ( )
Wetland Hydrology Present?	Yes (●)	No ( )

Is the Sampled Area within a Wetland? **Yes** (●) **No** ( )

Remarks: Pond A21. Photos 1015-1016.

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	%		
Herb Stratum			
1. *Salicornia depressa*	85	Yes	OBL
2. *Frankelia salina*	15	No	FACW
3.			
4.			
5.			
6.			
7.			
8.			
Total Cover:	100 %		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum 0 % % Cover of Biotic Crust %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	1	(A)
Total Number of Dominant Species Across All Strata:	1	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100.0 %	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	85	x 1 =	85
FACW species	15	x 2 =	30
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species		x 5 =	0
Column Totals:	100 (A)		115 (B)

Prevalence Index = B/A = 1.15

Hydrophytic Vegetation Indicators:

- ☒ Dominance Test is >50%
- ☒ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** (●) **No** ( )

Remarks:

SOIL

Sampling Point: WL04

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture[3]	Remarks
0-12	2.5YR 3/1	85	2.5YR 4/8	15	C	PL	clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☒ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? **Yes** ◉ **No** ○

Remarks: Munsell M-3.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☒ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☒ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☒ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☒ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☒ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):
Water Table Present?	Yes ○	No ◉	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches): 0

Wetland Hydrology Present? **Yes** ◉ **No** ○

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: SBSP Alviso Island Ponds | City/County: Fremont, Alameda County | Sampling Date: 7/12/13

Applicant/Owner: USFWS | State: CA | Sampling Point: UP04

Investigator(s): Shannon Lindquist, Erin Maroni | Section, Township, Range: S27 T5S R1W

Landform (hillslope, terrace, etc.): | Local relief (concave, convex, none): | Slope (%):

Subregion (LRR): C - Mediterranean California | Lat: 37.47455156 | Long: -121.9544399 | Datum:

Soil Map Unit Name: Reyes clay | NWI classification: E2EM1Nh

Are climatic / hydrologic conditions on the site typical for this time of year? Yes (●) No ( ) (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes (●) No ( )

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?	( )	(●)
Hydric Soil Present?	(●)	( )
Wetland Hydrology Present?	(●)	( )

Is the Sampled Area within a Wetland? Yes ( ) No (●)

Remarks: Pond A21. Photos 1017-1018.

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	%		
Herb Stratum			
1. *Brassica nigra*	85	Yes	UPL
2. *Frankelia salina*	15	No	FACW
3.			
4.			
5.			
6.			
7.			
8.			
Total Cover:	100 %		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum 0 % | % Cover of Biotic Crust %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0 % (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 = 0
FACW species	15	x 2 = 30
FAC species		x 3 = 0
FACU species		x 4 = 0
UPL species	85	x 5 = 425
Column Totals:	100 (A)	455 (B)

Prevalence Index = B/A = 4.55

Hydrophytic Vegetation Indicators:

- Dominance Test is >50%
- Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ( ) No (●)

Remarks:

SOIL

Sampling Point: UP04

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture[3]	Remarks
0-8	2.5YR 4/1	95	7.5YR 5/8	5	C	PL	sandy loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☒ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ◉ No ○

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☒ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

	Yes	No	Depth (inches)
Surface Water Present?	○	◉	
Water Table Present?	○	◉	
Saturation Present? (includes capillary fringe)	○	◉	

Wetland Hydrology Present? **Yes** ◉ **No** ○

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: SBSP Alviso Island Ponds | City/County: Fremont, Alameda County | Sampling Date: 7/12/13

Applicant/Owner: USFWS | State: CA | Sampling Point: WL05

Investigator(s): Shannon Lindquist, Erin Maroni | Section, Township, Range: S27 T5S R1W

Landform (hillslope, terrace, etc.): | Local relief (concave, convex, none): | Slope (%):

Subregion (LRR): C - Mediterranean California | Lat: 37.47276001 | Long: -121.9543397 | Datum:

Soil Map Unit Name: Reyes Clay | NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes (●) No ( ) (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes (●) No ( )

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes (●)	No ( )
Hydric Soil Present?	Yes (●)	No ( )
Wetland Hydrology Present?	Yes (●)	No ( )

Is the Sampled Area within a Wetland? Yes (●) No ( )

Remarks: Wetland point on backside of levee. Pond A21. Photos 1031-1032.

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	%		
Herb Stratum			
1. *Salicornia depressa*	75	Yes	OBL
2. *Carex sp.*	25	Yes	
3.			
4.			
5.			
6.			
7.			
8.			
Total Cover:	100 %		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum 0 % | % Cover of Biotic Crust %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	1	(A)
Total Number of Dominant Species Across All Strata:	2	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	50.0 %	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	75	x 1 =	75
FACW species		x 2 =	0
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species		x 5 =	0
Column Totals:	75 (A)		75 (B)

Prevalence Index = B/A = 1.00

Hydrophytic Vegetation Indicators:

- ☐ Dominance Test is >50%
- ☒ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes (●) No ( )

Remarks:

SOIL

Sampling Point: WL05

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture[3]	Remarks
0-12	10YR 3/1	100					clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- [ ] Histosol (A1)
- [ ] Histic Epipedon (A2)
- [ ] Black Histic (A3)
- [ ] Hydrogen Sulfide (A4)
- [ ] Stratified Layers (A5) (**LRR C**)
- [ ] 1 cm Muck (A9) (**LRR D**)
- [ ] Depleted Below Dark Surface (A11)
- [ ] Thick Dark Surface (A12)
- [ ] Sandy Mucky Mineral (S1)
- [ ] Sandy Gleyed Matrix (S4)
- [ ] Sandy Redox (S5)
- [ ] Stripped Matrix (S6)
- [ ] Loamy Mucky Mineral (F1)
- [ ] Loamy Gleyed Matrix (F2)
- [ ] Depleted Matrix (F3)
- [x] Redox Dark Surface (F6)
- [ ] Depleted Dark Surface (F7)
- [ ] Redox Depressions (F8)
- [ ] Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- [ ] 1 cm Muck (A9) (**LRR C**)
- [ ] 2 cm Muck (A10) (**LRR B**)
- [ ] Reduced Vertic (F18)
- [ ] Red Parent Material (TF2)
- [ ] Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? **Yes** (●) **No** ( )

Remarks: Munsell M-3.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- [ ] Surface Water (A1)
- [ ] High Water Table (A2)
- [x] Saturation (A3)
- [ ] Water Marks (B1) (**Nonriverine**)
- [ ] Sediment Deposits (B2) (**Nonriverine**)
- [ ] Drift Deposits (B3) (**Nonriverine**)
- [ ] Surface Soil Cracks (B6)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [ ] Water-Stained Leaves (B9)
- [ ] Salt Crust (B11)
- [ ] Biotic Crust (B12)
- [ ] Aquatic Invertebrates (B13)
- [ ] Hydrogen Sulfide Odor (C1)
- [ ] Oxidized Rhizospheres along Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Plowed Soils (C6)
- [ ] Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- [ ] Water Marks (B1) (**Riverine**)
- [ ] Sediment Deposits (B2) (**Riverine**)
- [ ] Drift Deposits (B3) (**Riverine**)
- [ ] Drainage Patterns (B10)
- [ ] Dry-Season Water Table (C2)
- [ ] Thin Muck Surface (C7)
- [ ] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [ ] Shallow Aquitard (D3)
- [ ] FAC-Neutral Test (D5)

Field Observations:

	Yes	No	Depth (inches)
Surface Water Present?	( )	(●)	
Water Table Present?	( )	(●)	
Saturation Present? (includes capillary fringe)	(●)	( )	0

Wetland Hydrology Present? **Yes** (●) **No** ( )

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: SBSP Alviso Island Ponds
City/County: Fremont, Alameda County
Sampling Date: 7/12/13
Applicant/Owner: USFWS
State: CA
Sampling Point: UP05
Investigator(s): Shannon Lindquist, Erin Maroni
Section, Township, Range: S27 T5S R1W
Landform (hillslope, terrace, etc.):
Local relief (concave, convex, none):
Slope (%):
Subregion (LRR): C - Mediterranean California
Lat: 37.47274559
Long: -121.9543691
Datum:
Soil Map Unit Name: Reyes clay
NWI classification: E2EM1Nh

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ○	No ◉
Hydric Soil Present?	Yes ○	No ◉
Wetland Hydrology Present?	Yes ○	No ◉

Is the Sampled Area within a Wetland? Yes ○ No ◉

Remarks: Upland point on backside of levee. Pond A21. Photos 1033-1034.

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1. *Baccharis pilularis*	20	Yes	UPL
2.			
3.			
4.			
5.			
Total Cover:	20 %		
Herb Stratum			
1. *Brassica nigra*	50	Yes	UPL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
Total Cover:	50 %		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum 0 % % Cover of Biotic Crust %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	0	(A)
Total Number of Dominant Species Across All Strata:	2	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	0.0 %	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species	70	x 5 =	350
Column Totals:	70 (A)		350 (B)

Prevalence Index = B/A = 5.00

Hydrophytic Vegetation Indicators:

- ○ Dominance Test is >50%
- ○ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ○ No ◉

Remarks:

SOIL

Sampling Point: UP05

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture[3]	Remarks
0-8	2.5YR 4/1	95	7.5YR 5/8	5	C	PL	sandy loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ◯ No ◉

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ◯ No ◉ Depth (inches):

Water Table Present? Yes ◯ No ◉ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ◯ No ◉ Depth (inches):

Wetland Hydrology Present? **Yes** ◯ **No** ◉

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: SBSP Alviso Mountain View Ponds   City/County: Mountain View, Santa Clara Co   Sampling Date: 7/11/13

Applicant/Owner: USFWS   State: CA   Sampling Point: WL06

Investigator(s): Jan Novak, Danielle Pena   Section, Township, Range: S33 T5S R2W

Landform (hillslope, terrace, etc.):   Local relief (concave, convex, none):   Slope (%):

Subregion (LRR): C - Mediterranean California   Lat: 37.44896232   Long: -122.0809111   Datum:

Soil Map Unit Name: Novato clay   NWI classification: L2UBK1h

Are climatic / hydrologic conditions on the site typical for this time of year? Yes (●) No ○ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed?   Are "Normal Circumstances" present? Yes (●) No ○

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic?   (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?	●	○
Hydric Soil Present?	●	○
Wetland Hydrology Present?	○	●

Is the Sampled Area within a Wetland? **Yes** ○ **No** ●

Remarks: Photos 4633-4635

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	%		
Herb Stratum			
1. *Frankelia*	98	Yes	FACW
2. *Salicornia depressa*	2	No	OBL
3.			
4.			
5.			
6.			
7.			
8.			
Total Cover:	100 %		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum ____ %   % Cover of Biotic Crust ____ %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0 % (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	2	x 1 =	2
FACW species	98	x 2 =	196
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species		x 5 =	0
Column Totals:	100 (A)		198 (B)

Prevalence Index = B/A = 1.98

Hydrophytic Vegetation Indicators:

- ☒ Dominance Test is >50%
- ☒ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** ● **No** ○

Remarks:

SOIL

Sampling Point: WL06

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture[3]	Remarks
3-0	-		-				-	organic matter
0-6	2.5YR 4/1		10R 4/8	30			clay	
6-15	2.5YR 4/2		10YR 4/8	30			clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☒ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ◉ No ○

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ○ No ◉ Depth (inches):

Water Table Present? Yes ○ No ◉ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ○ No ◉ Depth (inches):

Wetland Hydrology Present? Yes ○ No ◉

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: 2.5' above high tide line. Soil moist but not saturated, near top of levee.

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: SBSP Alviso Mountain View Ponds City/County: Mountain View, Santa Clara Co Sampling Date: 7/11/13

Applicant/Owner: USFWS State: CA Sampling Point: UP06

Investigator(s): Jan Novak, Danielle Pena Section, Township, Range: S33 T5S R2W

Landform (hillslope, terrace, etc.): Local relief (concave, convex, none): Slope (%):

Subregion (LRR): C - Mediterranean California Lat: 37.44896232 Long: -122.0809111 Datum:

Soil Map Unit Name: Novato clay NWI classification: L2UBK1h

Are climatic / hydrologic conditions on the site typical for this time of year? Yes (●) No ( ) (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes (●) No ( )

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?	(●)	( )
Hydric Soil Present?	(●)	( )
Wetland Hydrology Present?	( )	(●)

Is the Sampled Area within a Wetland? **Yes** ( ) **No** (●)

Remarks: Photos 4633-4635

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	%		
Herb Stratum			
1. *Frankelia*	98	Yes	FACW
2. *Salicornia depressa*	2	No	OBL
3.			
4.			
5.			
6.			
7.			
8.			
Total Cover:	100 %		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum ____ % % Cover of Biotic Crust ____ %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0 % (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	2	x 1 =	2
FACW species	98	x 2 =	196
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species		x 5 =	0
Column Totals:	100 (A)		198 (B)

Prevalence Index = B/A = 1.98

Hydrophytic Vegetation Indicators:

- ☒ Dominance Test is >50%
- ☒ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** (●) **No** ( )

Remarks:

SOIL

Sampling Point: UP06

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture[3]	Remarks
3-0	-		-				-	organic matter
0-6	2.5YR 4/1		10R 4/8	30			clay	
6-15	2.5YR 4/2		10YR 4/8	30			clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☒ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? **Yes** ◉ **No** ○

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ○ No ◉ Depth (inches):

Water Table Present? Yes ○ No ◉ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ○ No ◉ Depth (inches):

Wetland Hydrology Present? **Yes** ○ **No** ◉

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: 2.5' above high tide line. Soil moist but not saturated, near top of levee.

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: SBSP Alviso Mountain View Ponds City/County: Mountain View, Santa Clara Co Sampling Date: 7/11/13

Applicant/Owner: USFWS State: CA Sampling Point: WL07

Investigator(s): Shannon Lindquist, Erin Maroni Section, Township, Range: S3 T6S R2W

Landform (hillslope, terrace, etc.): Local relief (concave, convex, none): Slope (%):

Subregion (LRR): C - Mediterranean California Lat: 37.44511 Long: -122.0651734 Datum:

Soil Map Unit Name: Novato clay NWI classification: L2UBK1h

Are climatic / hydrologic conditions on the site typical for this time of year? Yes (●) No ( ) (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes (●) No ( )

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes (●)	No ( )
Hydric Soil Present?	Yes (●)	No ( )
Wetland Hydrology Present?	Yes (●)	No ( )

Is the Sampled Area within a Wetland? **Yes** (●) **No** ( )

Remarks: Wetland on Bay side of A2W. Photos 0990-0992.

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	%		
Herb Stratum			
1. *Salicornia depressa*	100	Yes	OBL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
Total Cover:	100%		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum 0 % % Cover of Biotic Crust %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0 % (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	100	x 1 =	100
FACW species		x 2 =	0
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species		x 5 =	0
Column Totals:	100 (A)		100 (B)

Prevalence Index = B/A = 1.00

Hydrophytic Vegetation Indicators:

- ☒ Dominance Test is >50%
- ☒ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** (●) **No** ( )

Remarks:

SOIL

Sampling Point: WL07

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture[3]	Remarks
0-12	10YR 3/2	85	5YR 4/6	15	C	PL	clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☒ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? **Yes** ◉ **No** ○

Remarks: Munsell M-1.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☒ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☒ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ○ No ◉ Depth (inches):

Water Table Present? Yes ◉ No ○ Depth (inches): 4

Saturation Present? (includes capillary fringe) Yes ◉ No ○ Depth (inches): 0-12

Wetland Hydrology Present? **Yes** ◉ **No** ○

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: SBSP Alviso Mountain View Ponds City/County: Mountain View, Santa Clara Co Sampling Date: 7/11/13

Applicant/Owner: USFWS State: CA Sampling Point: UP07

Investigator(s): Jan Novak, Danielle Pena Section, Township, Range: S33 T5S R2W

Landform (hillslope, terrace, etc.): Local relief (concave, convex, none): Slope (%):

Subregion (LRR): C - Mediterranean California Lat: 37.44896232 Long: -122.0809111 Datum:

Soil Map Unit Name: Novato clay NWI classification: L2UBK1h

Are climatic / hydrologic conditions on the site typical for this time of year? Yes (●) No ( ) (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes (●) No ( )

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?	(●)	( )
Hydric Soil Present?	(●)	( )
Wetland Hydrology Present?	( )	(●)

Is the Sampled Area within a Wetland? Yes ( ) No (●)

Remarks: Photos 4633-4635

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	%		
Herb Stratum			
1. *Frankelia*	98	Yes	FACW
2. *Salicornia depressa*	2	No	OBL
3.			
4.			
5.			
6.			
7.			
8.			
Total Cover:	100 %		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum % % Cover of Biotic Crust %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0 % (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	2	x 1 =	2
FACW species	98	x 2 =	196
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species		x 5 =	0
Column Totals:	100 (A)		198 (B)

Prevalence Index = B/A = 1.98

Hydrophytic Vegetation Indicators:

- ☒ Dominance Test is >50%
- ☒ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes (●) No ( )

Remarks:

SOIL

Sampling Point: UP07

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture[3]	Remarks
3-0	-		-				-	organic matter
0-6	2.5YR 4/1		10R 4/8	30			clay	
6-15	2.5YR 4/2		10YR 4/8	30			clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☒ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ◉ No ○

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ○ No ◉ Depth (inches):

Water Table Present? Yes ○ No ◉ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ○ No ◉ Depth (inches):

Wetland Hydrology Present? Yes ○ No ◉

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: 2.5' above high tide line. Soil moist but not saturated, near top of levee.

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