M E M O R A N D U M

TO: Members of the South Bay Salt Pond Restoration Project Management Team

FROM: URS

DATE: 8/13/14

RE: **Alviso-A8 Ponds (A8, A8S) Restoration Preliminary Design**

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1 INTRODUCTION

This memorandum documents the preliminary design of the South Bay Salt Pond (SBSP) Restoration Project’s Phase 2 actions at the Alviso pond complex’s Ponds A8 and A8S. These ponds are also referred to as the Alviso-A8 Ponds, the A8 pond cluster, or simply the A8 Ponds. This memorandum provides information for the CEQA and NEPA clearance, regulatory agency permitting processes, and a basis for final design.

1.1 Project Background

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 (see Appendix A, Figure A-1). Within this larger pond complex, the A8 pond cluster itself is bordered on the west by Guadalupe Slough, on the south by San Tomas Aquino Creek, commercial and industrial land, as well as NASA Ames Research Center and Sunnyvale Baylands Park, and on the east by Alviso Slough. USFWS owns and manages the 8,000-acre Alviso pond complex (EDAW et al. 2007).

The Alviso-A8 Ponds restoration preliminary design, along with the rest of the SBSP Restoration Project, is managed by the SBSP Project Management Team (PMT), which includes the State Coastal Conservancy (SCC), U.S. Fish and Wildlife Service (USFWS), California Department of Fish and Wildlife (CDFW), Santa Clara Valley Water District (SCVWD), Alameda County Flood Control and Water Conservation District (ACFCWCD), and others.

The Programmatic EIS/R for the SBSP Restoration Project (EDAW 2007) prescribed the initial framework under which restoration would proceed. In that document, program-level alternatives range from a restoration design of 50/50 tidal habitat/managed pond habitat mix for the entire restoration project area (Programmatic Alternative B) to a 90/10 tidal habitat/managed pond habitat mix for the entire restoration project area (Programmatic Alternative C) (see Appendix A, Figures A-5 and A-6). Phase 1 of the project has since been completed, restoring clusters of ponds at all three pond complexes including the A8 Ponds (see Appendix A, Figure A-7).

A design charrette was held May 13, 2010, to discuss conceptual restoration design ideas for Phase 2. URS built on ideas proposed in the charrette document and in coordination with the PMT to develop memos that described the opportunities and constraints associated with the construction or implementation of design ideas (URS Corporation 2012).

The A8 Ponds were not included in the charrette or the original Phase 2 opportunities and constraints memoranda, as they were somewhat late additions to Phase 2. However, the action alternative that was developed for Phase 2 at this pond cluster is simple enough that it was easily added to the design work. The action alternative proposed adding new upland fill material to the southern corners of Pond A8S to construct habitat transition zone (also referred to in some documents as transition zone habitat, upland transition zone, upland transition areas, or ecotone).

With the PMT, the alternative was developed for conceptual design and inclusion in the comprehensive analysis in the Public Draft EIS/EIR. Following the public comment period and the results of the impacts analysis, a preferred alternative that best meets the project objectives while providing a cost-efficient design will be identified. This memo summarizes restoration in the context of the site goal of constructing habitat transition zones in Pond A8S.

1.2 Organization and Scope

This memorandum presents the conceptual (approximately 10%) design for the Alviso Ponds A8 and A8S restoration. This preliminary design memorandum describes the work conducted to prepare the conceptual design. It also briefly documents the design constraints and considerations specific to Ponds A8 and A8S that formed the basis for the conceptual design.

The preliminary design memorandum is organized as follows:

- Section 2: objectives, design constraints, and considerations
- Section 3: available data, including site topography
- Section 4: preliminary design including restoration components and construction implementation

1.3 Limitations

This memorandum describes the preliminary design based on available information and our professional judgment pending future engineering analyses. Future design decisions or additional information may change the findings, the mix of design components included in the alternatives themselves, or the corresponding professional judgments presented in this report. Additional engineering will be necessary prior to construction. In the event conclusions or recommendations based on the information in this memorandum are made by others, such conclusions are not the responsibility of URS, or its subconsultants, unless we have been given an opportunity to review and concur with such conclusions in writing.

2 OBJECTIVES, DESIGN CONSTRAINTS, AND CONSIDERATIONS

The Alviso-A8 Ponds Phase 2 objective is a restoration action objective; there are no flood protection or recreation or public access objectives for this pond cluster. The restoration action objective is summarized below.

- To construct habitat transition zones along the southwestern and/or southeastern corner(s) of Pond A8S near its junction with Pond A8. The intent of this action is to make use of upland fill material from off-site construction projects to increase habitat diversity and complexity. It would also serve to protect the landfill immediately to the south of Pond A8S from wave action.

Ponds A8 and A8S were transitioned to muted tidal ponds in Phase 1. There is a multi-bay armored notch in the southeastern end of Pond A8. Also in Phase 1(see Appendix A, Figure A-2), A8 and A8S were connected to each other and to Ponds A5 and A7 to the west-northwest. Two culverts were placed at the northwest ends of A5/A7 to connect them to tidal flows. These ponds are seasonally managed to control the methyl mercury activation and releases into other waters and into the biota. They are also currently managed to avoid impacts to fisheries, as noted below.

The preliminary design was developed taking into account several design constraints and considerations. Design constraints are limiting factors that must be considered while developing the design. Design considerations are issues that contribute to design formulation, but are not limiting factors.

2.1 Design constraints

- *Fisheries.* Endangered Species Act (ESA)-listed steelhead smolts outmigrate through the adjacent Guadalupe River to San Francisco Bay. Due to mercury levels, current management of the A8 Ponds includes closing the existing notch to prevent steelhead from entering the ponds during their outmigration. Thus, any action to add fill within these ponds may be constrained by the outmigration season.
- *Recreation.* Recreation or public access options are not being considered for the A8 Ponds in Phase 2. The Bay Trail spine is nearby, but it would not be affected by the construction of habitat transition zones, and adding new recreation features is not part of Phase 2.

2.2 Design considerations

- *Mercury*. The mercury levels in the water in Ponds A8 and A8S, in the surrounding waterways, and in the fish species that may uptake and bioaccumulate mercury are being monitored as part of the SBSP Restoration Project’s science program. The placement of fill material in the ponds should be done in such a way as to minimize the disturbance of existing sediment and the disturbance of mercury.
- *Material quality*. The imported fill material in habitat restoration or improvement projects will require environmental screening for contaminants to assess the cleanliness and quality of the material (USFWS 2012). The “dirt broker” that has been acquiring upland fill and arranging for its transport to and use in other projects on land owned by the USFWS is assisting USFWS with a Quality Assurance Project Plan and a permit for assuring this cleanliness and quality.
- *Access.* The boundary of the proposed habitat transition zones can be accessed from a landfill construction and management road that runs on a levee along the southern edge of the ponds.

3 AVAILABLE DATA

The preliminary design was completed based on the following information.

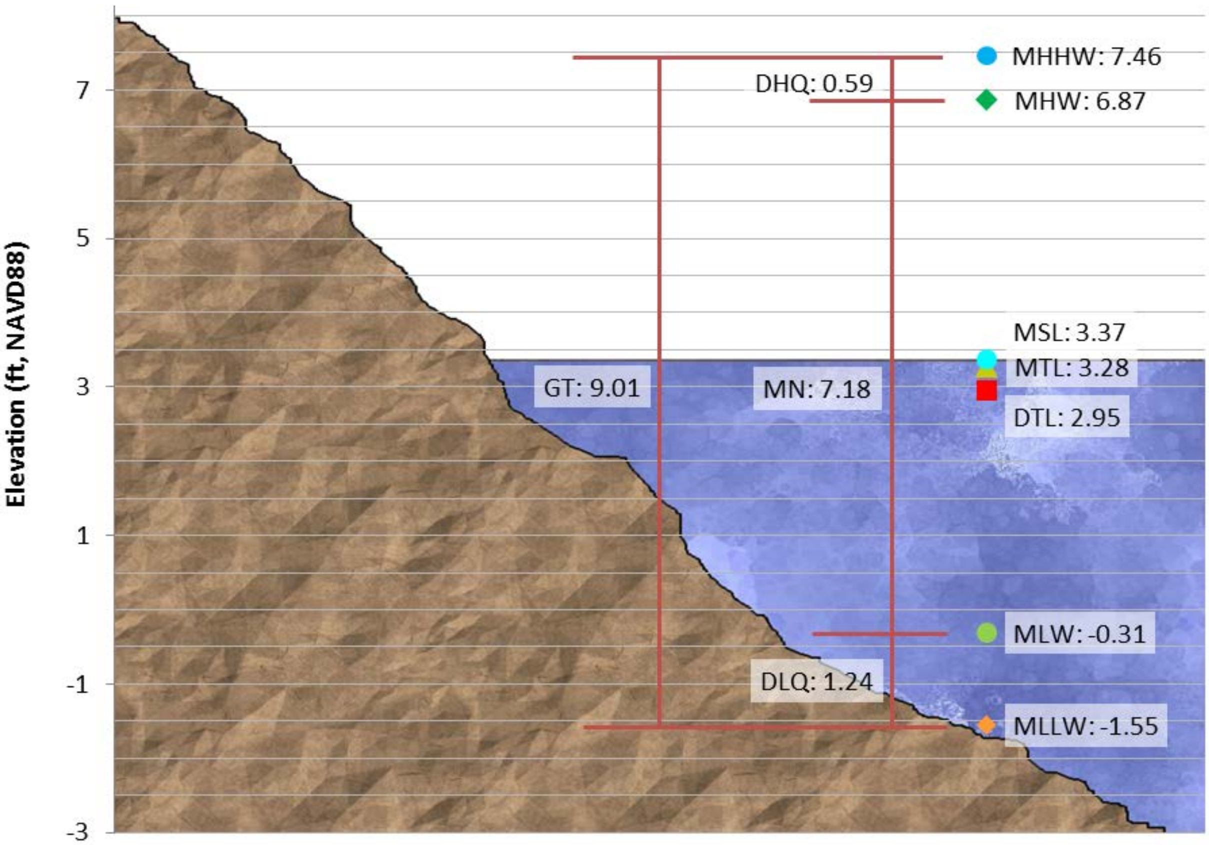
3.1 Site Topography and Project Datum

The available site topography is from USGS (2010) which developed a surface elevation dataset derived from high-accuracy Light Detection and Ranging (LiDAR) technology for the USGS San Francisco Coastal LiDAR project area (San Francisco, Marin, Solano, Contra Costa, Alameda, San Mateo, Santa Clara counties, California). The LiDAR data were processed by USGS to a bare-earth digital terrain model (DTM). USGS developed detailed breaklines and bare-earth DEMs and data were formatted according to tiles with each tile covering an area of 1500 m by 1500 m. A total of 712 tiles were produced for the entire survey area encompassing approximately 610 sq. miles. The horizontal and vertical spatial reference system for the USGS San Francisco Coastal LiDAR Project is NAD83, UTM Zone 10N, meters and NAVD88, meters.

The below water elevations in the ponds were obtained from 2005 Hydrographic Survey of South San Francisco Bay, California by the USGS, published in 2007. These data consisted of xyz data collected in 2005 using a single beam acoustic sampler. The horizontal spatial reference system for the bathymetry is NAD83, UTM Zone 10N with Z-values provided in meters relative to NAVD88.

3.2 Hydrologic Data

Water surface elevations representative of tides at the A8 Ponds site were obtained from the Coyote Creek tide gauge near the mouth of Coyote Creek (NOAA gauge 9414575). This gage is roughly 4.5 miles (7.5 kilometers) from the A8 Ponds. The time series has an increment of 6 minutes and the tide elevation generally varies between -1.64 feet (-0.5 meters) and 7.9 feet (2.4 meters). The daily tide data were obtained from National Oceanic Atmospheric Administration's Tides and Currents website and converted to NAVD88 with data available on the SBSP monitoring tide gauge data webpage. **Figure 3.1** shows the average tide elevations for the Coyote Creek station.



Note: All elevations in feet, NAVD88	Source: NOAA 2013; SBSP 2013	
Key: MHHW (mean higher high water)	MHW (mean high water)	MSL (mean sea level)
MTL (mean tide level)	DTL (mean diurnal tide level)	MLW (mean low water)
MLLW (mean lower low water)	GT (great diurnal range)	DHQ (mean diurnal high water inequality)
MN (mean range of tide)	DLQ (mean diurnal low water inequality)	

Figure 3.1. Coyote Creek gauge tide elevations

3.3 Geotechnical Data

Geotechnical data for the South Bay Salt Ponds Restoration Project was provided by the U.S. Army Corps of Engineers and was collected as part of their South San Francisco Bay Shoreline Study. The available data include soil borings, cone penetrometer tests (CPTs), and geotechnical data from laboratory tests performed on samples taken from the soil borings. Data is available for the Alviso complex pond levees in the vicinity of the A8 Ponds. However, it appears the borings were performed along the Bay Trail to the south of Tomas Aquino Creek which is south of and runs parallel to the southern pond levee.

During future design phases, geotechnical data should be collected along the A8/A8S levees to assess their ability to support construction equipment and additional levee material, where applicable. It may also be desirable to assess the existing pond substrate in areas where habitat transition zones are proposed because the pond substrate is generally weak and may require additional fill material to reach proposed grade. The stability of the nearby landfill slopes adjacent to the southeast corner of the ponds may also need to be assessed to determine whether they can support the habitat transition zone material without damaging the landfill cap, if applicable.

4 PRELIMINARY DESIGN

The preliminary design elements of the A8 Ponds are discussed in the sections below.

4.1 Preliminary Design Components

The only design component proposed for Pond A8/A8S site is the construction of transition zone habitat (see Appendix A, Figure A-3).

4.1.1 Habitat Transition Zones

Habitat transition zones are transitional areas that would increase habitat diversity and complexity by providing a gradual shift in elevation from upland zones to tidal marsh zones allowing for low marsh, high marsh, tidal fringe, and upland habitats to develop. The habitat transition zones would make use of upland fill material available from off-site construction projects. It would also serve to protect the landfill immediately to the south of Pond A8S from wave action. Habitat transition zones would be located along the following levee alignments in Alternative A8 B:

- Up to 1,400 linear feet of habitat transition zone along the southwest corner perimeter levee of Pond A8S
- Up to 1,500 linear feet of habitat transition zone along the southeast corner perimeter levee of Pond A8S

These areas will have varying slopes to facilitate habitat diversity and erosion protection; they will also be sized based on the amount of upland fill and dredged material available. The preliminary design assumes a slope of 30:1 (h:v), which is the flattest slope that would be considered for construction, and thus the maximum fill volume and footprint for the habitat transition zone. This shallow slope would provide a very gradual transition between the pond itself and the adjacent uplands, adding habitat complexity and a larger area over which the transition zone can buffer against sea-level rise, storm surge, wave run-up, and other tidal influences, if – as is intended – these ponds are converted to fully tidal sometime in the future. Future designs may include slopes as steep as 10:1 (h:v), but these would require less fill material and have a smaller footprint. **Figure 4.1** below shows a typical cross-section of the proposed transition zone slopes along the proposed levee alignments.

Design Criteria:

- Top elevation and slope: From levee elevation 7.0 feet NAVD88 (between MHHW and MHW) extending down to pond bottom with slope 30:1 (h:v).
- Compaction: Fill will be placed to a minimum of 70% and a maximum of 80% of dry density as measured using ASTM D1557. It is important not to over-compact the habitat transition zone fill areas. Over-compacting can inhibit the establishment of vegetation by not allowing sufficient growth of root systems.
- Slope Protection: Establishment of native vegetation by hydroseeding with native seed mix and planting schema that would successfully transition from upland vegetation to tidal marsh.

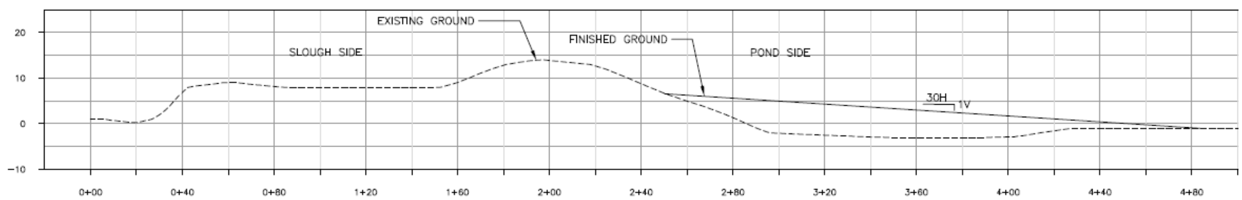


Figure 4.1. Proposed Habitat Transition Zone – Typical Section

4.2 Construction Implementation

Construction would be implemented by procuring the services of a general contractor with experience in performing restoration activities and working within and near tidal waters. Site access information along with a preliminary analysis of the schedule and cost estimate to complete the construction activities are discussed below.

4.2.1 Access

Primary access to A8 would be from an unnamed road from Gold St. north of U.S. Highway 237 and the Great America Parkway exit (see Appendix A, Figure A-4). This leads to the southeast corner of Pond A8 where it meets Pond A8S.

The construction areas in and around the ponds themselves may be accessed via existing levee crest and a service road for the working landfill that runs along the southern boundary of these ponds. The existing south perimeter road is known to support heavy equipment. For this preliminary design, the lateral levees are assumed to be able to support heavy equipment. During construction, heavy vehicles would avoid crossing structures in the levees if the vehicle exceeds the weight-bearing capacity, as assessed during final design. If this is not possible, engineer-approved precautions would be taken to avoid damaging the structure.

4.2.2 Schedule

Construction schedule would be driven by the habitat windows, weather conditions, and volume of earthwork quantities to be moved.

4.2.2.1 Habitat Windows

Construction activities would be limited during the following habitat windows that are applicable to Ponds A8 and A8S. The dates provided were developed based on permits obtained during the Phase 1 projects. Future permits for this project could have different construction limitations.

- Bird nesting window – From February 1 through August 31 (Work may continue within this window with the presence of a biological monitor.)
- In-channel work – From April 15 to October 15
- Steelhead could be present in the slough channels and in the ponds from December 15 to April 30. In-channel work during the period April 15- April 30 would have an approved biological monitor present.
- Longfin smelt and sturgeon could be present year round. In-channel work should have an approved biological monitor present.

4.2.2.2 *Construction Schedule*

Based on the preliminary design, estimated volumes of earthwork proposed for the A8 alternatives are shown in **Table 4.1**. A list of the equipment, methods and means is shown in Appendix B.

Table 4.1. Estimated earthwork volumes

Alternative	Estimated Earthwork Volume (CY)	
	Cut	Fill
Alternative A8 A	--	--
Alternative A8 B	--	48,600

Construction is expected to begin in the summer of 2016. Construction of Alternative A8 B is anticipated to require two bull dozers moving dirt on-site from the receiving dump trucks to the habitat transition zone areas for approximately 650 equipment hours total. If work is completed during 8-hours days, 5 days a week, the project is likely to be completed within 9 weeks in one construction season (June 1 through August 15) assuming full material availability.

4.2.3 Preliminary Estimate of Construction Quantities and Probable Implementation Costs

Table 4.2 contains a preliminary cost estimate for Alternative A8 B based on the Alviso-A8 Ponds (A8, A8S) Restoration Preliminary Design Plan and Details (Appendix C). Quantities were measured with the AutoCAD Civil3D software utilized in preparation of the drawings. Earthwork quantities were typically calculated based on terrain models of the existing and proposed ground surfaces and using the grid method in Civil3D.

Unit costs were developed based on a combination of previous, similar URS project experience, unit construction costs from construction contractor experienced in salt marsh restoration construction, the R.S. Means estimate guide, and vendor quotes.

Table 4.2. Preliminary Cost Estimate for Alternative A8 B

Item	Description	Quantity	Units	Unit Price	Extended Price
1	Mobilization & Demobilization	1	LS	15%	$19,000
2	Habitat Transition Zone Fill	48,600	CY	$2.50	$122,000
	Subtotal				$141,000
	Design & Unit Cost Contingency			20%	$29,000
	Total Direct Construction Cost				$170,000
	Construction Contingency			20%	$34,000
	Total				**$204,000**

Assumptions:

The following assumptions were made in developing this preliminary cost estimate.

- Import fill is assumed to be provided to the projects by a dirt broker at no cost to the project and in a quantity that does not limit typical equipment production rates.
- The estimate includes a design and unit cost contingency of 20 percent to cover changes to the design assumptions and components and uncertainty in material unit costs.
- The estimate includes a construction contingency of 20 percent to cover changes to the project costs during construction.
- The contingencies do not include costs for engineering design, environmental documentation, or permits.

5 References

AMEC Geomatrix, Inc. 2009. Draft Geotechnical Study. South Bay Salt Pond Restoration Project.

EDAW, Philip Williams and Associates (PWA), H.T. Harvey and Assoc., Brown and Caldwell, and Geomatrix. 2007. South Bay Salt Pond Restoration Project, Final EIS/R. December.

NOAA 2013. National Oceanic and Atmospheric Administration. Tides and Currents Datums webpage. http://tidesandcurrents.noaa.gov/datums.html?id=9414575. Accessed December 30.

SBSP 2013. South Bay Salt Pond Restoration Project. Monitoring, tide gauge data webpage. http://www.southbayrestoration.org/monitoring/tidegauge/. Accessed on December 30.

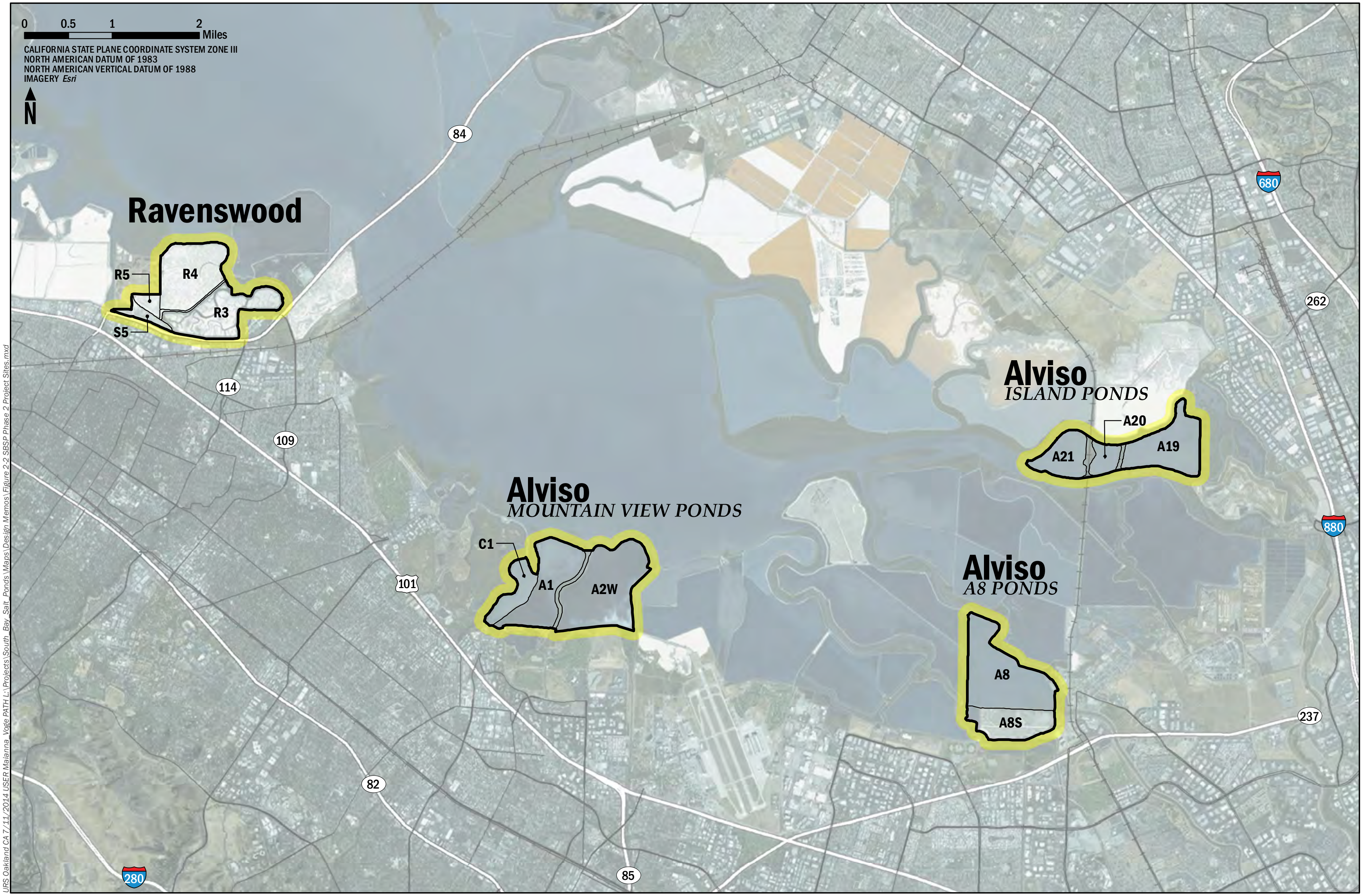
URS Corporation 2012. Opportunities and Constraints Memorandum for the Alviso Pond Complex. Prepared for the South Bay Salt Pond Restoration Project's Management Team. June.

USFWS 2012. U.S. Fish and Wildlife Service. Quality Assurance Project Plan for South Bay Stockpile Fill Import and Placement Projects. June 15. Unpublished draft.

USGS 2007. U.S. Geological Survey. 2005 Hydrographic Survey of South San Francisco Bay, California. Published 2007. Foxgrover, A., Jaffe, B., Hovis, G., Martin, C., Hubbard, J., Samant, M., and Sullivan, S.

USGS 2010. U.S. Geological Survey. San Francisco Coastal LiDAR Project.

Appendix A – Figures



LEGEND

Phase 2 Project Area

URS
South Bay Salt Pond Restoration Project

Figure A-1
SBSP Phase 2 Project Sites

URS Oakland CA 7/11/2014 USER Maianna_Voge PATH L:\Projects\South_Bay_Salt_Ponds\Maps\Design Memos\Figure 2 3-17.mxd

LEGEND

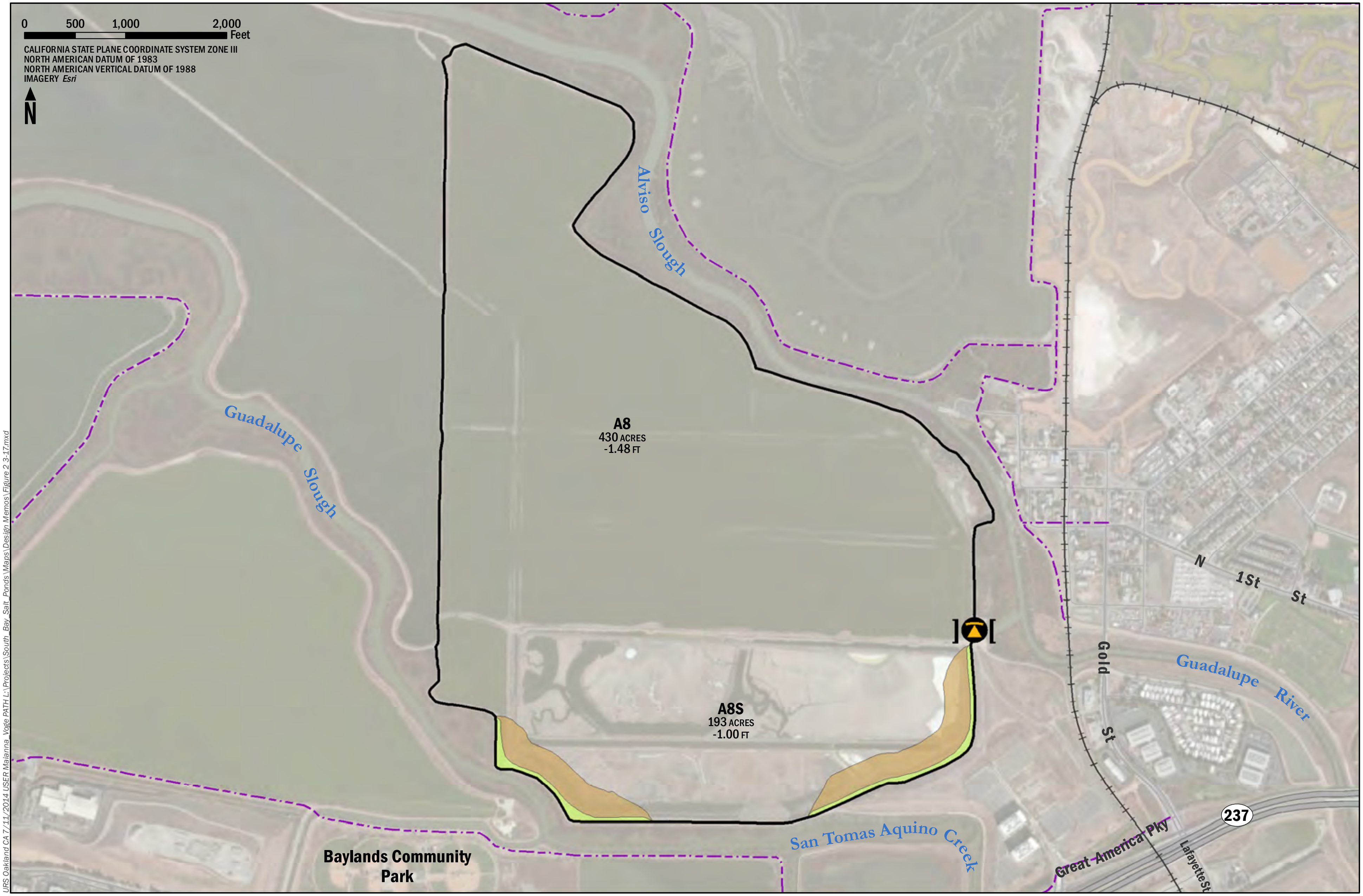
Existing reversible armored notch

Existing trail

Pond boundary

URS
South Bay Salt Pond Restoration Project

Figure A-2
Alternative A8 A



URS Oakland CA 7/11/2014 USER Maianna_Voge PATH L:\Projects\South_Bay_Salt_Ponds\Maps\Design Memos\Figure 2 3-17.mxd

LEGEND

- Existing reversible armored notch
- Existing trail
- Pond boundary

Transition Zone Habitat

- High marsh habitat
- Intertidal habitat

URS
South Bay Salt Pond Restoration Project

Figure A-3
Alternative A8 B

LEGEND

Access Route

Phase II Project Areas

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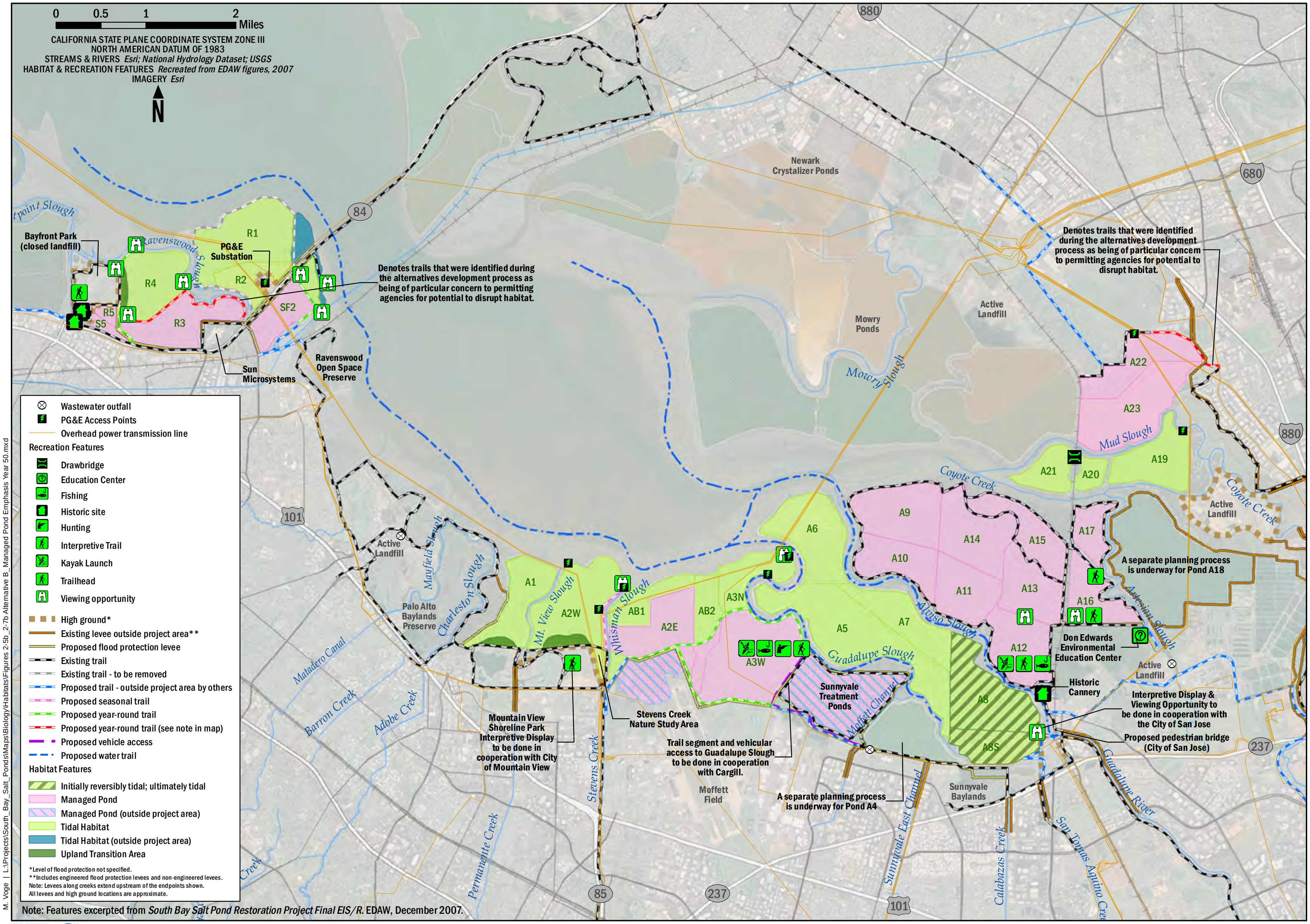
South Bay Salt Pond Restoration Project

Figure A-4
A8 Ponds Construction Access Routes



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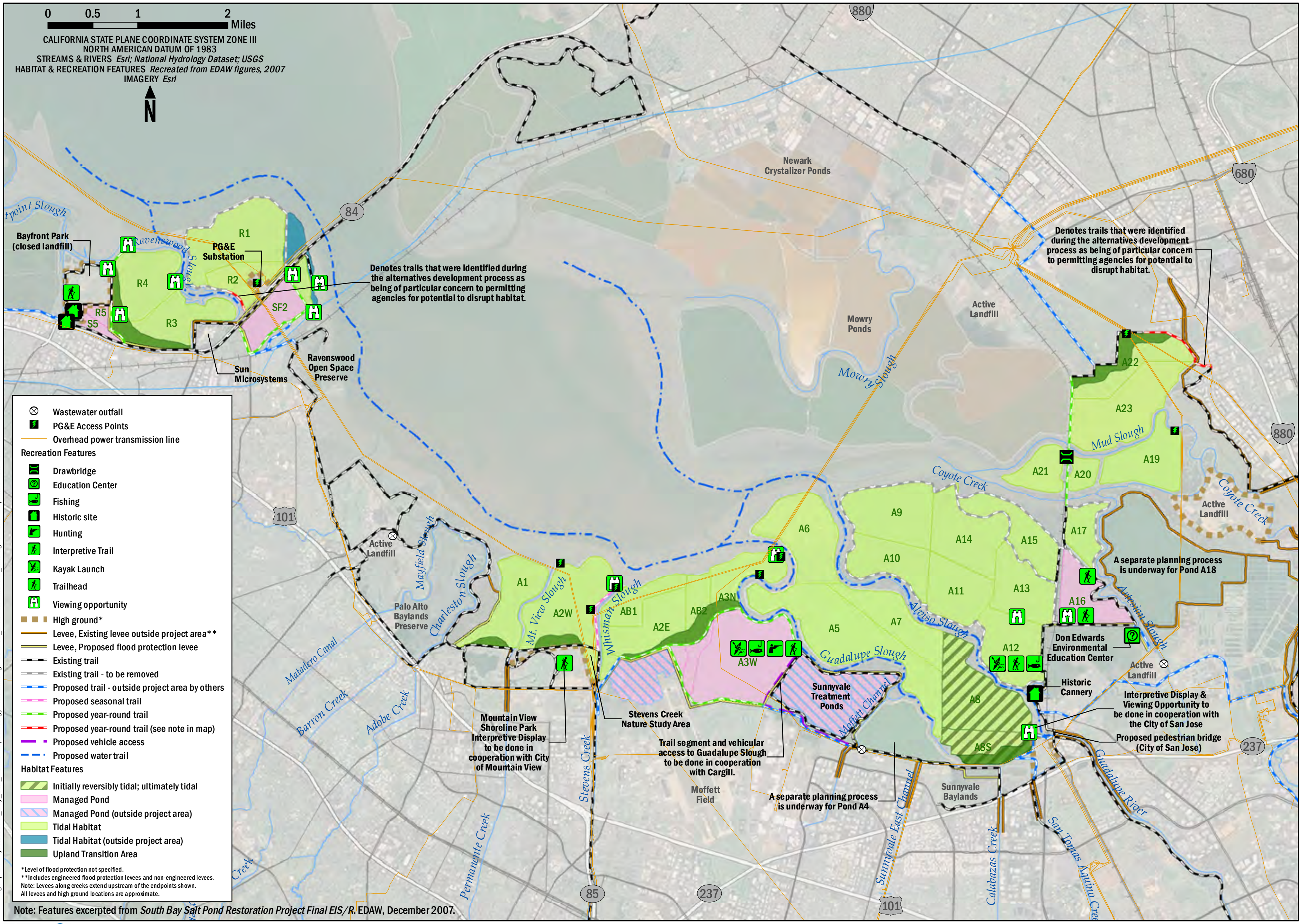
South Bay Salt Pond Restoration Project

FIGURE A-5

Alternative B: Managed Pond Emphasis

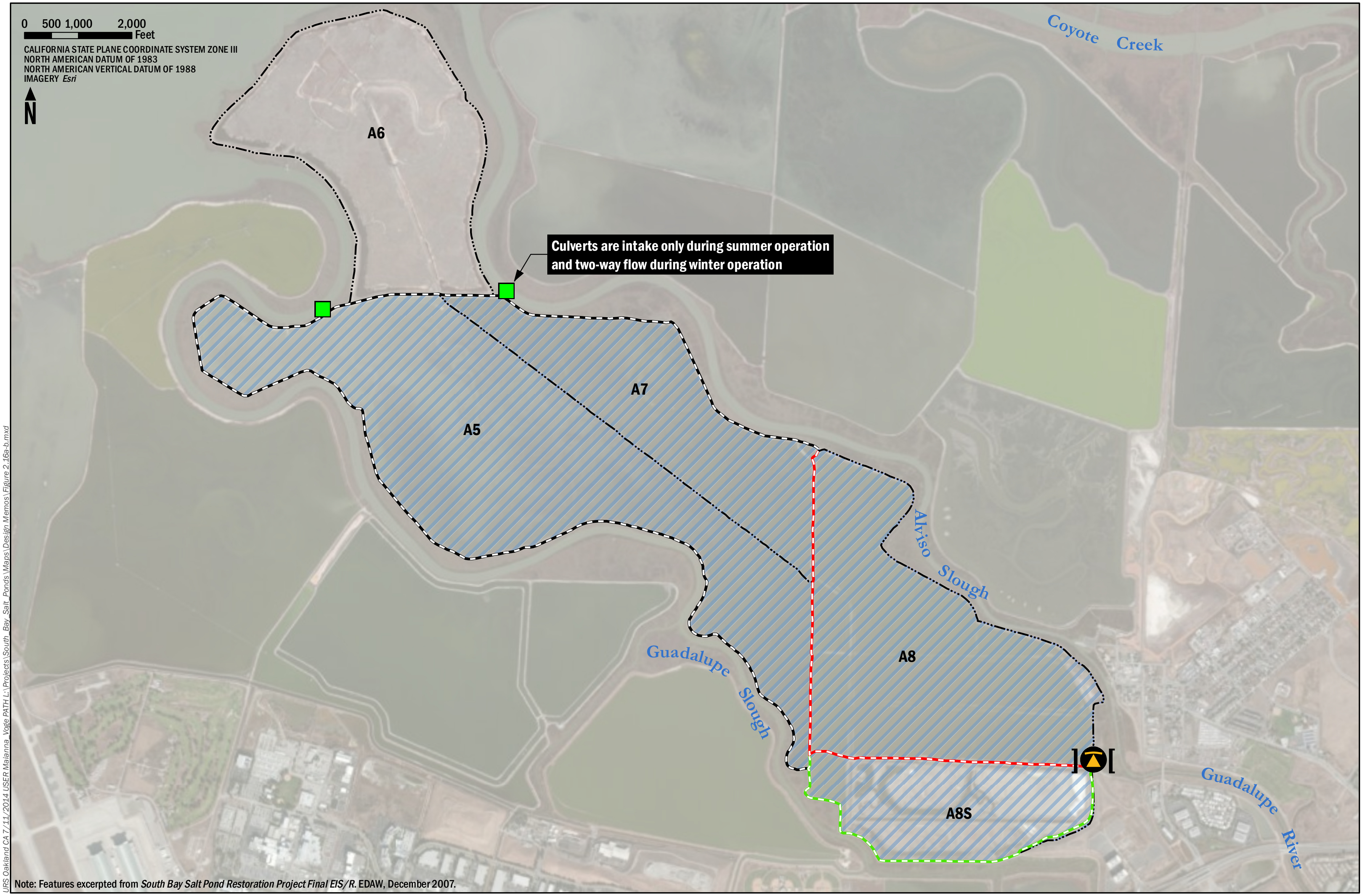


M. Voge | L:\Projects\South_Bay_Salt_Ponds\Maps\Biology\Habitats\Figures 2-5b_2-7b Alternative B_Managed Pond Emphasis Year 50.mxd

URS
South Bay Salt Pond Restoration Project

FIGURE A-6

Alternative C: Tidal Habitat Emphasis



URS Oakland CA 7/11/2014 USER Maianna Voge PATH L:\Projects\South_Bay_Salt_Ponds\Maps\Design Memos\Figure 2.16a-b.mxd

LEGEND

- Existing culvert with flap gates
- Existing Reversible Armored Notch
- Maintain existing vehicle access
- Provide new vehicle access
- Remove power lines & abandon vehicle access
- Muted tidal

URS
South Bay Salt Pond Restoration Project

Figure A-7
Alviso Pond A8 Phase 1 Action Restoration Plan

Appendix B – Means and Measures

Appendix B

Anticipated Means, Methods and Durations for the Alviso-A8 Ponds

Preliminary Design (10 Percent Design Level)

Pond A8S - Alternative B

Basis of Design

1. It is assumed that the bottom of Pond A8S will support placement of upland fill with low ground pressure equipment.
2. Superintendent, fuel service, maintenance service, personal vehicles, small tools and small equipment are not included in the list of Resources. Equipment hours are operated hours.

Sequence	Component	Scope	Means & Methods	Resources	Quantity	Total Equip. Hours	Total Labor Hours
1	Mobilization	Develop submittals, staging areas and other facilities. Mobilize and demobilize equipment and labor to and from the site.	Equipment and labor will be brought in by ground transportation.	Lowbed Truck Laborer	1 1	32	32 32
2	Construct Transition Zone Habitat	Place and grade import fill.	Slopes would be scarified prior to placement. A water truck would be available for moisture conditioning and dust control as required. Fill would be imported and dumped at the placement site by others. A dozer would shape and moderately compact the fill into place.	Dozer Water truck	2 1	648	648 162

Appendix C – Plan and Details

May 27, 2015 – 4:23pm
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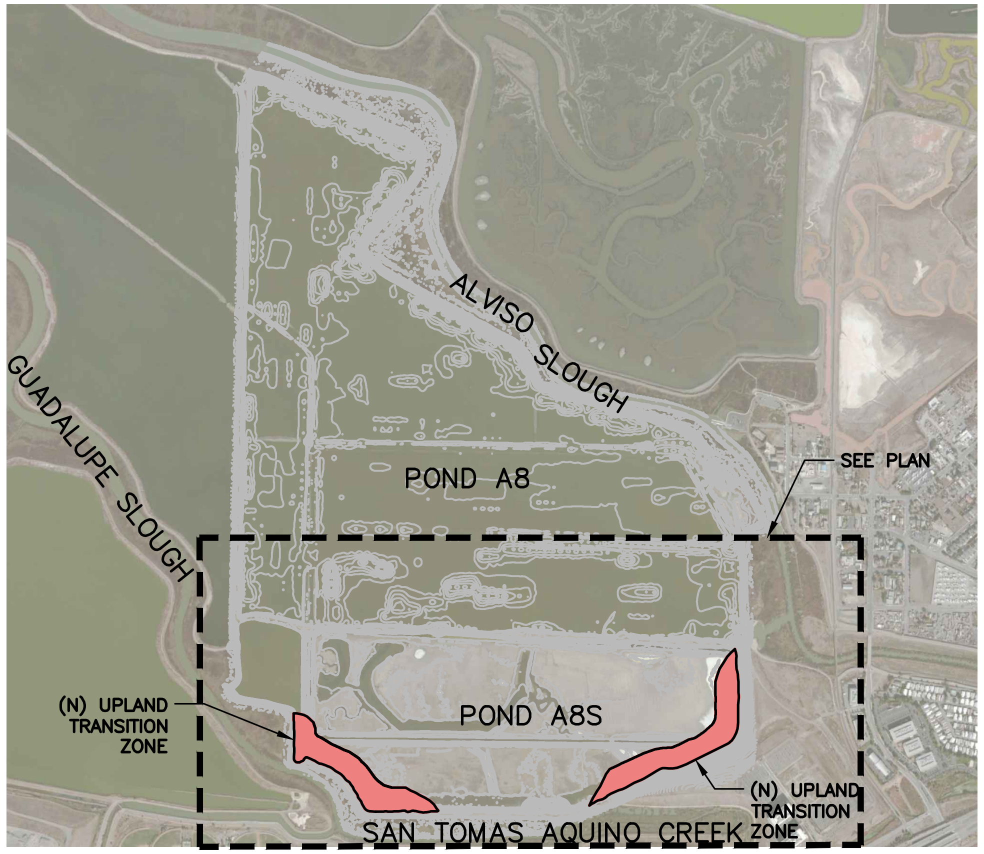
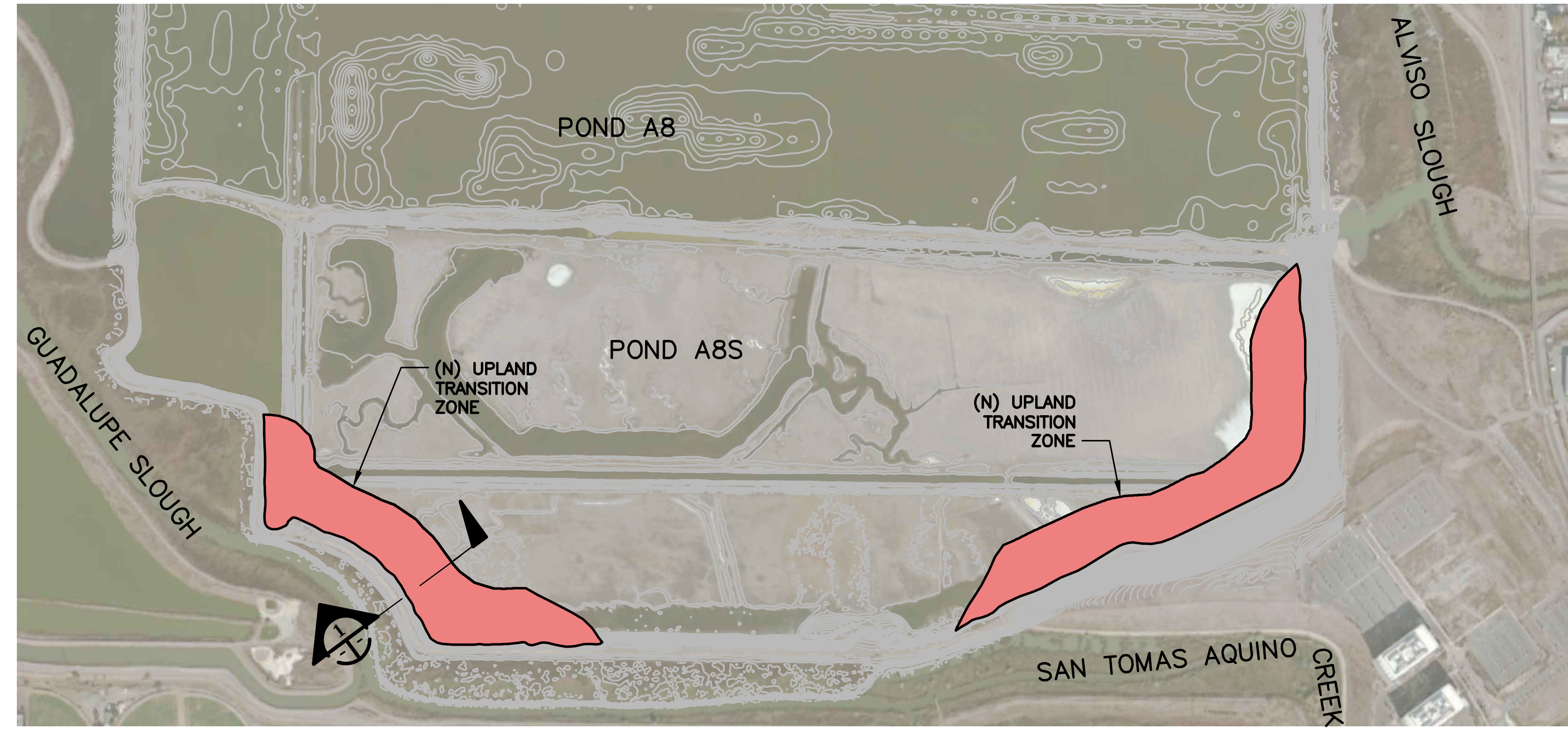


KEY MAP
SCALE: 1"=2000'

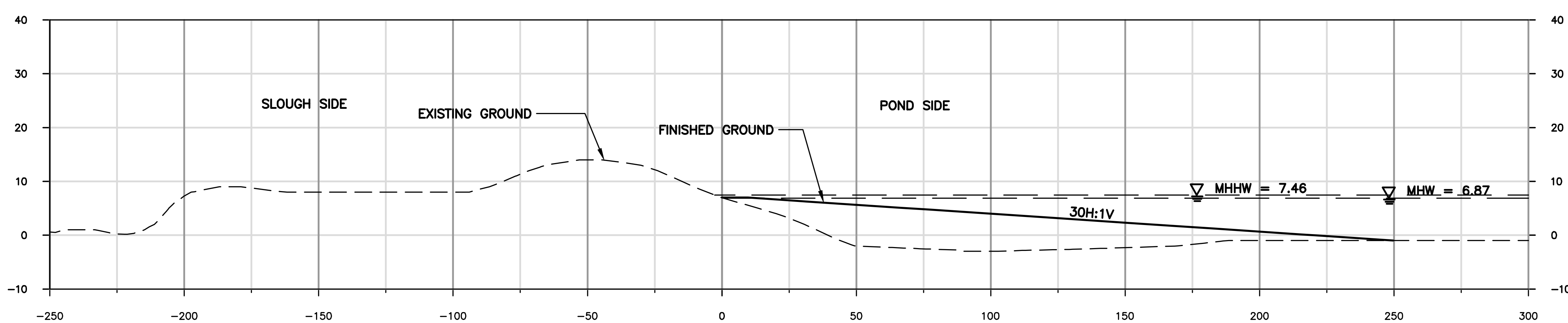
2000' 0' 2000' 4000'
GRAPHIC SCALE



PLAN
SCALE: 1"= 800'

LEGEND
UPLAND TRANSITION ZONE

800' 0' 800' 1600'
GRAPHIC SCALE



UPLAND TRANSITION ZONE – TYPICAL SECTION 1
HORIZONTAL SCALE: 1"=50'
VERTICAL SCALE: 1"=25'

25' 0' 25' 50'
50' 0' 50' 100'
GRAPHIC SCALE

REV	DESCRIPTION OF REVISION	BY	DATE

CALIFORNIA COASTAL CONSERVANCY
1330 BROADWAY, 13TH FLOOR
OAKLAND, CA 94612

URS
1333 BROADWAY, SUITE 800
OAKLAND, CA 94612
PHONE: (510) 893-3600
FAX: (510) 874-3268

DESIGNED	
DRAWN	SS
CHECKED	??
PEER REVIEWED	
PROJECT MANAGER	
DATE	09/25/2013

ALVISO - A8 PONDS (A8, A8S)
RESTORATION PRELIMINARY DESIGN PLAN AND DETAILS

REVISION
PROJECT 26818349
DRAWING
SHEET 1 OF 1