REPORT

OPPORTUNITIES AND CONSTRAINTS FOR RAVENSWOOD POND COMPLEX

SOUTH BAY SALT PONDS RESTORATION, PHASE II

Prepared for

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TABLE OF CONTENTS

TABLE OF CONTENTS

Tables

Figures

Acronyms and Abbreviations

AMP	Adaptive Management Plan
BA	Biological Assessment
Bayfront Park	Bedwell Bayfront Park
BCDC	(San Francisco) Bay Conservation and Development Commission
BO	Biological Opinion
CDFG	California Department of Fish and Game
CEQA	California Environmental Quality Act
Conservancy	California State Coastal Conservancy
EFH	Essential Fish Habitat
EIS/EIR	Environmental Impact Statement
ESA	Endangered Species Act
HMMP	Habitat Mitigation and Monitoring Plan
LEDPA	Least Environmentally Damaging Practicable Alternative
ISP	Initial Stewardship Plan
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOI/NOP	Notice of Intent/Notice of Preparation
PMT	Project Management Team
project	South Bay Salt Ponds Restoration Project
PWA	Philip Williams and Associates
refuge	Don Edwards National Wildlife Refuge
ROD	Record of Decision
ROW	right of way
SBSP	South Bay Salt Ponds (Restoration Project)

Shoreline Study	South San Francisco Bay Shoreline Feasibility Study
SR	State Route
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

The South Bay Salt Pond (SBSP) Restoration Project (project) encompasses approximately 15,100 acres of former salt ponds located on the perimeter of San Francisco Bay, including the 1,600 acre Ravenswood Pond Complex at the western end of Dumbarton Bridge (Figure 1). The project also includes the Eden Landing Pond Complex and the Alviso Pond Complex. The Ravenswood and Alviso Pond Complexes are part of the U.S. Fish and Wildlife Service's (USFWS) Don Edwards National Wildlife Refuge (Refuge). The Eden Landing Pond Complex is under the California Department of Fish and Game's (CDFG) Eden Landing Ecological Reserve.

The project has three main goals: habitat restoration, flood management, and improved public access. Each of these is briefly described below.

The purpose of this memorandum is to

- Develop a set of proposed Phase II project actions for the Ravenswood Pond Complex
- Evaluate the ability of those actions to achieve project goals and objectives
- Make an initial assessment of the opportunities and constraints of those actions
- Outline a strategy for environmental clearance and permitting

This memorandum was written for the California State Coastal Conservancy (Conservancy) and the Project Management Team (PMT) of key stakeholder representatives. As such, it assumes that the reader is familiar with the overall project, the setting, and the actions undertaken under the Initial Stewardship Plan (ISP) and Phase I.

1.1 HABITAT RESTORATION

Habitat restoration is the project's primary goal, to be achieved while incorporating flood management and public access as corollary goals. The actual configuration of each Ravenswood Pond Complex Phase 2 restoration activity will be guided by the Adaptive Management Plan (AMP; FEIS/R App. D 2007) – a strategy that is continuously adjusted based on each site's response to previous restoration activities observed through strategic monitoring and data evaluation – and furthered by this initial analysis of opportunities and constraints. The habitat restoration goals are linked to numerous species – including those listed under the Federal or California Endangered Species Acts (ESA), California species of special concern, migratory birds, and others – that depend upon these habitats for all or part of their life cycles.

Restored habitat should be of sufficient size, function, and appropriate structure to promote restoration of special status species, support current migratory bird species that utilize existing salt ponds and associated structures, and increase abundance and diversity of native species in various South San Francisco Bay aquatic and terrestrial ecosystem components (EDAW et al. 2007).

1.2 FLOOD MANAGEMENT

In order to address sea level rise and public safety, one of the project's main purposes is flood management. The specific objective listed in the EIR is to maintain or improve existing levels of flood protection in the South Bay Area (EDAW et al. 2007). Flooding in the project area can potentially be caused by high tides, El Niño effects, sea level rise, and fluvial flood hazards (rainwater runoff). Congress authorized the Corps of Engineers to conduct the South San

Francisco Bay Shoreline Feasibility Study (Shoreline Study), together with the Santa Clara Valley Water District and State Coastal Conservancy, to identify and recommend projects that simultaneously address flood damage reduction, ecosystem restoration, and public access. The initial focus of the Shoreline Study is on projects in the Alviso Complex of the Don Edwards NWR.

1.3 PUBLIC ACCESS

A key component of the pond complex design goals is to provide wildlife-compatible public access and recreational opportunities. Public access activities may include hiking, hunting, fishing, wildlife viewing, and other recreational activities. Facilities for public access may include walkways and trails, as well as interpretive signage and elevated viewing platforms. These public access and recreation features will be integrated with the Bay Trail and other existing regional and local plans for trails. Evaluating and addressing possible conflicts between recreation and restoration goals will be a key part of this project.

1.4 RESTORATION APPROACH

The basic restoration approach is to restore tidal marsh and managed pond habitat with an ultimate ratio somewhere between 50/50 and 90/10 for tidal marsh/managed pond. Initially, restoration design will aim to meet the 50/50 level goal, and will later aim to increase the percentage of tidal marsh restoration to as much as 90 percent. The actual configuration of each restoration activity will be guided by the AMP. Regular monitoring and evaluation of the data is a vital component of a successfully administered AMP. The PMT will direct URS to maintain or improve upon what has been a successful AMP. This approach is a valuable and necessary strategy for projects with a complex set of interrelated variables. In addition, the precise impacts of climate change and associated sea-level rise or changes in amounts or intensity of rainfall are unknown. Yet, they are likely to affect flood control management and tidal marsh restoration and must also be adaptively managed.

This section provides a summary list of reports and other documents reviewed as part of the background research on this project.

Ackerman, Josh, U.S. Geological Survey (USGS); Mark Marvin-DiPasquale, USGS; Darrell Slotton, UC Davis; Collin Eagles-Smith, USGS. 2010. Memo to Laura Valoppi (USGS), Ann Buell, State Coastal Conservancy, Meghan Hertel, Resources Legacy Fund; Quarterly Report for RLF Grant #2009-0421. The Effects of Wetland Restoration on Mercury Bioaccumulation in the South Bay Salt Pond Restoration Project: Using the Biosentinel Toolbox to Monitor Changes across Multiple Habitats and Spatial Scales. April.

Fulfrost, Brian, Brian Fulfrost Associates. 2011. *Annual Report (Year Two) on the Habitat Evolution Mapping Project for the South Bay Salt Pond Restoration Project*. July 6.

Brown and Caldwell in association with PWA, EDAW, Harvey and Assoc. 2008. South Bay Salt Pond Restoration Project, Attachment to the Application for 401 Water Quality Certification Operations and Maintenance and Phase 1 Actions. May.

Foxgrover, Amy; David Finlayson, Bruce Jaffe. 2011. 2010 Bathymetry and Digital Elevation Model of Coyote Creek and Alviso Slough, San Francisco Bay, California; USGS Survey Open File Report 2011-1315.

Harvey and Assoc. 2008. *South Bay Salt Pond Restoration Project, Phase 1 Monitoring Plan*. October.

Philip Williams and Associates (PWA), EDAW, Harvey and Assoc., Brown and Caldwell. 2006. *South Bay Salt Pond Restoration Project, Final Alternatives Report*. January.

PWA, EDAW, Harvey and Assoc., Brown and Caldwell, and Geomatrix. 2007. *South Bay Salt Pond Restoration Project, Final EIS/R*. December.

Santa Clara Valley Water District. Not Dated. *Relationship between Groundwater Elevations and Local Subsidence in Santa Clara County*.

Stacey, Mark. 2010. *The Interactions of Island Pond Restoration and Coyote Creek Final Report to Legacy Fund*, Grant #2009-0105; UC Berkeley; 6/2011. South Bay Salt Pond Restoration Project; Annual Report, 2011; 2/2012. South Bay Salt Pond Restoration Project, Project Status Report, 8/2009. South Bay Salt Pond Restoration Project, Table of Key Uncertainties and Phase 1 Studies. August.

SBSP (South Bay Salt Pond) Project Management Team. 2010. South Bay Salt Pond Restoration Project, Phase 2: Preliminary Options for Future Actions. September.

SBSP (South Bay Salt Pond) Project Management Team. 2009. *South Bay Salt Pond Restoration Project Status Report*. August.

Takekawa, J., Arriana Brand, Isa Woo, Stacy Moskal. 2011. Effects of regional wetland restoration on the Alviso Shoals of the South San Francisco Bay: migratory bird ecology, food webs, and sediment supply. February.

United States Fish and Wildlife Service (USFWS) and United States Geological Survey (USGS). 2012. *South Bay Salt Pond Restoration Project, 2011 Annual Self-Monitoring Report*. March.

United States Fish and Wildlife Service (USFWS). 2007. Recovery Plan for the Pacific Coast Population of the Western Snowy Plover (*Charadrius alexandrinus nivosus*). In 2 volumes. Sacramento, California. xiv + 751 pages.

This section first provides an overview of Ravenswood Pond Complex Phase II actions. Three of ponds in the complex are proposed for Phase II: R4, R5, and S5. Specific actions under consideration are:

- Restore tidal action at Pond R4
- Enhance habitat value at Pond R5 and Pond S5

This section evaluates the proposed actions and the opportunities and constraints for the design elements that may be used to implement the two main actions. Table 1 summarizes actions, alternative approaches or components, and the opportunities and constraints associated with them. Opportunities are essentially alternatives for how particular actions could be achieved. Constraints are technical, legal, financial, temporal, or political/social barriers to successful implementation. They are included to assist the PMT in considering cost, ease of permitting, and consistency with any of the three goals of habitat restoration, flood control, and public access/recreation.

3.1 RESTORE TIDAL ACTION AT POND R4

As part of the Phase II action to restore tidal action to R4, the following design elements may be included:

- Breaching, lowering or altering levee to restore tidal action
- Constructing upland habitat transition zone
- Creating western snowy plover (*Charadrius alexandrinus*) habitat
- Enhancing the levee between R3 and R4 for sediment storage and flood protection
- Developing recreational trails, facilities and signage

In order to meet the Phase II objective of restoring tidal action in R4, some of these design elements (e.g., levee breach or lowering) will be required. Many of these elements, however, are design options that are not required, but if implemented could advance the project goals of habitat restoration, recreation, and flood control. The opportunities and constraints of each of these design alternatives are described below. Potential options for the design elements are shown on Figure 2. The drawings in Figure 2 illustrate the various concepts under consideration for Phase II actions; not all of the concepts would occur in those locations or in combination with other individual actions. For example, Figure 2 shows three different sizes of ecotones, several different trail options, and two different breach locations. Some of these are not compatible with each other, and some are more than would be advisable. The intent of figure is to illustrate possibilities of the actions themselves, not necessarily appropriate combinations of them. That specificity and compatibility will be a part of future design memoranda.

3.1.1 Breaching, lowering, or altering levee to restore tidal action at R4

In order to restore tidal action to R4, the exterior levee separating the former salt pond from the bay must be lowered or breached to allow tidal water to enter the pond. Design options to be considered include the depth and width of the breach and the location of the breach. Two breach locations have been proposed: at the eastern side of R4 between the remnant R4 slough channel and Ravenswood Slough and/or at the northwestern corner of R4 between the outer borrow

channel and Greco Slough (Figure 2). There is potential for additional breaches, but they are not extensively evaluated in this report. The location and cross-sectional area or dimensions of the breach would be determined based on the results of calculations or models to estimate the flow volume and velocity of water entering R4 after the breach and evaluation of potential scour or erosion. The breach location and design will aim to provide tidal action without resulting in significant undesirable scour, rapid salinity changes of the receiving waters, flooding risk, or rapid erosion of other constructed elements (e.g., upland habitat transition zones, trails).

Opportunities

Two breach location options are assessed to determine opportunities for the reintroduction of tidal action into R4 and to promote the growth of wetland vegetation. Opportunities associated with these two breach locations differ. The eastern breach location is at the remnant slough channel, which might lead to a more even distribution of accreted sediment. The northwestern location is somewhat more protected from storm-driven high tides.

If only a few breaches are made in the external levee, but most of the levee is left in place there is opportunity for increased sediment deposition within R4 due to the limited tidal exchange. This sedimentation will, slowly increase the bottom elevation, helping to establish marsh vegetation and allowing the marsh plain to transition with sea level rise. In addition, with few breaches the remaining external levee would provide some flood protection by limiting the amount water that could enter R4 during the tidal cycle.

Opportunities associated with multiple breaches in the R4 levee include providing tidal exchange and isolating the bay-front levee to provide refugia free of predator corridors.

All breaches would introduce tidal action helping the site to progress towards tidal marsh habitat and channel network creation. The tidal marsh habitat and channel network could provide protected nursery habitat, ultimately increasing fish and populations and recreational opportunities for fishing and birding. R4's proximity to Greco Island strengthens habitat connectivity, allowing genetic exchange and increased habitat area for neighboring populations. This increased habitat may ultimately increase populations and recreational opportunities for fishing and birding.

Constraints

The primary constraint is that introduction of tidal action could result in flooding unless additional flood protection is provided. Thus, in order to introduce tidal action to R4, additional flood protection must be provided. This could be achieved by enhancing the levee between R3 and R4 as described below.

Pond R4 currently serves as habitat for nesting western snowy plover; restoring tidal action to Pond R4 would eliminate this habitat. This is a significant constraint because the SBSP Restoration Project has committed to providing 125 nesting pairs (250 breeding individuals) of this species. Eliminating existing snowy plover habitat is only possible if it can be replaced and increased elsewhere. Otherwise, the project is likely to experience increased difficulty in receiving permits. Potential replacement locations for snowy plover habitat are described further below.

Restoring tidal action in R4 will undoubtedly affect how Ponds R5, S5, and R3 could be restored and managed in the future. The determination as to whether and how to connect these ponds to

each other will be affected by restoring tidal action in R4. The restoration timing/schedule should be developed in consideration of the other restoration actions proposed.

A constraint of the breach design may be in the erosion and scour that could result because of the breach. A breach at the Greco Slough location is likely to increase the tidal prism on both sides of this opening, scouring larger channels and potentially eroding part of Greco Island. Alternatively, a breach on the eastern side of R4 would also result in scour. Overall, scour would occur until the channel dimensions adjust to the new volume. If this is increase in scour is problematic, then the breach would need to be hardened to halt channel enlargement.

The breach on the Greco Island side of R4 may also be incompatible with upland habitat transition plans if the borrow channel along the western edge of R4 is needed to provide hydrologic connectivity.

3.1.2 Constructing upland habitat transition zone

To enhance the habitat value associated with the restored tidal wetlands of Pond R4, provide resiliency for sea level rise, and to protect the landfill at Bedwell Bayfront Park (Bayfront Park), the creation of an upland transition zone around Bayfront Park is proposed (Figure 2). The size, slope and shape of the upland transition zone will be further evaluated in the conceptual design. The design will consider the amount of available fill material, sea level rise scenarios, public access benefits, species benefits, and permitting constraints. The transition area would likely include only a portion of the western edge of R4.

Opportunities

The primary purpose of the upland transition zone is to provide habitat complexity and refugia for tidal marsh wildlife species during high tides. However, there are additional opportunities. The upland transition area provides resiliency to sea level rise by having a transitional area that can slowly be converted to tidal marsh habitat with sea level rise. If the habitat transition zone is wide enough, a trail may be able to be included in the design. This trail could attach to the existing trail along the edge of Bayfront Park to create a small trail through diverse habitats. If dredged or upland fill material is plentiful, the upland transition area provides a location for reuse. In addition, the upland transition habitat would provide an extra buffer to protect the toe of the landfill that underlies Bayfront Park.

Constraints

Construction of the upland transition area will likely require a large volume of fill, depending on the final design. If dredged material is abundant, this could serve as an opportunity. If dredged material is scarce, it would be a significant constraint to the creation of the upland transition area. During construction there would be a short-term impact to recreational users of Bayfront Park as the exterior recreation trail would be the most efficient way to transport the material to R4. The larger the transition zone, the longer the construction and the more trail access would be affected.

Having a trail through the upland transition zone, as described in the Opportunities section above, may not be desirable because, during high tide events, the presence of people there may discourage rails and other wildlife from using that habitat as a refuge and/or may make rails more prone to predation if they do.

In addition, constructing the upland transition area around Bayfront Park would require fill of the borrow channel around the interior side of the western and southern R4 levees. This borrow channel currently increases connectivity to portions of the marsh plain that are not immediately adjacent to the breach. If filled, additional channels may need to be dug within R4 to maintain connectivity. Filling of this borrow channel may also affect permitting. This would result in a larger amount of fill placed in USACE jurisdictional waters of the United States. Because of the restoration focus of this project, this is not expected to be a significant problem for permitting.

3.1.3 Creating western snowy plover habitat

Western snowy plover habitat currently in R4 will be lost when the pond is opened to tidal action. *The Recovery Plan for the Pacific Coast Population of the Western Snowy Plover* directs a recovery criterion of 500 breeding adults of western snowy plover in San Francisco Bay (USFWS 2007). As noted above, the SBSP Project has committed to providing half of this total. In order to be compatible with this plan, snowy plover habitat within the area needs to be maintained or enhanced. In 2010, 74 western snowy plover nests were observed throughout the Ravenswood complex; 37 nests were observed in 2011. The loss of potential nesting habitat in R4 needs to be compensated by providing or enhancing habitat within R4 or elsewhere in the Ravenswood complex or other sites within the SBSP. Proposed potential locations for western snowy plover habitat creation or preservation are shown on Figure 2.

A number of design options have been proposed, listed here in no particular order:

- Create snowy plover islands out of segments of existing levee (e.g., R3/R4 or exterior R4 levees).
- Create salt mogul fields (small mounds of dirt, salt deposits, and other materials) in isolated pockets around the corners of ponds by creating a cutoff levee (e.g., northeast corner of R4, E end of R3, southwest corner of R4).
- Create supplemental habitat by adding shells/salt along existing levees (e.g., north side of R4)
- Do not design western snowy plover habitat at this location
- Build islands within the marsh plain (e.g., in R4) out of dredged material
- Build floating habitat islands that would rise and fall with tidal exchange.

Opportunities

Building habitat islands is a potential opportunity for the reuse of dredged or upland material. In contrast, creating snowy plover habitat on existing levee structures may be a way to provide habitat without the need for additional fill provided minimum elevations are met. Building interior/cutoff levees to create fields of salt moguls would allow the preservation of existing habitat that is already known to support snowy plover. Snowy plover may be more likely to use this preserved habitat than artificially made habitat structures.

Providing shelter/screens, such as tall vegetation or other visual barriers, around bird nesting locations may allow public access closer to nesting sites without significant disturbance of the birds. This would not work for snowy plover, however, which generally use open and vegetation-free sites for nesting.

Constraints

Maintaining existing snowy plover habitat in R4 is incompatible with restoration to tidal marsh. Snowy plover currently use the R4 pond bottom, so any changes to this pond would be considered "new" to them. Adding design elements (e.g. nesting islands) to provide snowy plover habitat, while still restoring R4 to tidal marsh, has the potential to be costly both for construction and maintenance. Levees would likely need to be lowered and islands would need to be reinforced and periodically maintained.

Artificial habitat construction should consider the existing surface substrate, making an effort to conserve material that is suitable for snowy plover habitat (e.g., salt or shells). If substrate is not maintained, plants may colonize the area, reducing the suitability for plover nesting. Also, floating islands surrounded by water may present a problem for perinatal chicks. They would need to be low enough in the water to let chicks forage, yet high enough to prevent flooding.

Western snowy plover are generally disturbed by the presence of people or dogs. While dogs are not allowed on the Refuge and are theoretically not an issue, the presence of people on the Refuge, and people or dogs in adjacent Bedwell Bayfront Park, is likely to be somewhat disruptive to nesting plover. In the past, nesting has been unsuccessful at S5, which is both small and ringed by a public access trail. At SF2 – a salt pond in this complex recently restored to managed pond habitat – buffer distances of 300 feet from trails and 600 feet from viewing platforms were implemented. The location of public access trails and viewing platforms will limit where snowy plover nesting could be sited.

The construction of snowy plover habitat will need to consider project timing. For example, if existing habitat is to be preserved in place, it would need to be isolated from tidal inundation by, for example, adding or raising levees. This would need to occur prior to breaching R4 so that salt substrate is not lost during tidal introduction.

Permitting conditions will be a major constraint associated with the provision of snowy plover habitat. Regulatory agencies – as part of permit conditions – may require certain amounts or types of habitat to be conserved or constructed.

3.1.4 Enhancing levee between R3 and R4 for sediment storage and flood protection

One way to reduce the risk of flooding associated with restoring tidal action to R4 would be to enhance the levee between R3 and R4. This is actually a dual levee with a small channel called the All-American Canal running between them. In this option, fill material would be placed in the All-American Canal channel between R3 and R4 to create a single, higher levee. This could incorporate reuse material, as described elsewhere. Design of the R3/R4 levee will depend on availability of suitable fill material as well as the designs for adjacent ponds (R3, R4, S5, and R5).

Opportunities

As an alternative to filling the All-American Canal, the levee enhancement could occur on one of the levees and extend into one of the ponds. This would leave the canal open and could reduce the total fill volume needed.

In addition to providing flood protection, this raised levee could also serve as a storage location for fill until R3 restoration is feasible. If restoration at R3 becomes an option, material stored on this levee could be removed and used to raise, strengthen, or complete the levee south of R3 along State Route (SR) 84.

An improved levee between R3 and R4 could serve as a location for a public access trail, creating a loop trail with the existing trail along SR 84 (Figure 2). Alternatively, the levee could be left isolated for use as snowy plover habitat or developed into ecotone and upland refugia.

Constraints

Increasing the height of the levee between R3 and R4 may limit the future restoration opportunities at R3. If a trail is constructed on this levee, it may be difficult to get the public support needed to remove or modify the trail, levee, and fill during the restoration of R3.

Enhancing this levee may require significant volume of fill material. This is a constraint if material is not available. Construction would also require hauling of material on public access roads which could limit recreational use in the area for a short time.

3.1.5 Developing recreational trails

There are several options for providing public access around R4 that are compatible with restoring R4 to tidal marsh. Any breach in the exterior levee of R4 would limit the potential for a recreational trail on the exterior levee; however, bridges could be installed over the breach points in order to provide access. Alternatively, trails could be developed on existing interior levees, particularly if they were to be improved to provide flood control. Restoration actions at R4 provide the following trail location options as shown in Figure 2.

1. On exterior levee surrounding R4: this would require bridge over breach and maintenance of exterior levee, or the trail would end at the breach.
2. On interior levee between R3 and R4: this levee will likely require additional fill placement to build up levee for flood protection. Incorporation of a trail may require construction of additional levee segments or raising an existing levee to connect to existing trails that run along SR 84 and Bayfront Park. This connection point could use the existing levee between R4 and R5 or between R5 and S5.
3. New trail on the surface of the proposed upland transition area: this would require that sufficient dredged material be available to create a transition area wide enough to support a trail.
4. A spur trail off the northwest corner of Bayfront Park extending to a viewing area and/or short elevated boardwalk on the exterior levee between R4 and the bay. This could provide a control point for dogs while allowing habitat connectivity beneath the boardwalk. It also provides a great opportunity and logical place for signage. Similar overlooks are also possible at breach locations.

Opportunities

Providing public access is a priority goal of the project. In addition, signage along trails and at viewing platforms provides an opportunity to raise public awareness about restoration activities,

the ecosystem and its inhabitants, and what individuals can do to help the environment. Specific opportunities provided by the potential trail options at R4 include:

- Location for the reuse of dredged material in the levee between R3 and R4.
- Potential location for a viewing platform at the end of the spur trail on the northwest corner of R4. This location provides opportunity to view multiple ecosystems for a single vantage point: restored tidal marsh (Greco Island), restoring tidal marsh (R4), San Francisco Bay, and upland (Bayfront Park).
- A trail on the upland habitat transition area would provide a loop trail option, potentially reducing the need to provide loop trails at other locations that might conflict with restoration goals.
- Trail on the upland transition area would allow users to view transition habitat, which is uncommon in the bay area.
- An exterior levee trail would provide a large loop for users who want longer trail options.
- Trails into the Ravenswood Pond Complex provide an opportunity to place interpretive signage about the Refuge itself.
- Trails also provide locations for notices and/or barriers to educate public about the no-dog policy on USFWS lands.

Constraints

While recreation use is compatible with restoring tidal action to R4, there are some constraints:

- Trails may require that levees be raised, strengthened, resurfaced, and/or maintained. The natural erosive forces of tidal areas may increase the difficulties associated with maintaining trails over the long-term.
- Signage or barriers may be required to exclude dogs from USFWS lands.
- The amount of law enforcement required (and its associated costs) would likely increase.
- Recreational use is not always compatible with wildlife use. Studies have shown that snowy plover nesting at S5 has been unsuccessful, potentially due to the high recreational use in the area. If trails go near nesting habitat, visual screens may be needed to reduce impacts on nesting birds. These screens would be placed around potential nesting habitat shielding wildlife from disturbance, but not altering the habitat within the nesting site. Screens could be useful to reduce disturbance to various wildlife species including snowy plover or other nesting birds.
- Use of a trail through the upland transition zone, as described in the Opportunities section above, may disturb rails.
- If levee between R3 and R4 is raised and a trail is constructed there, the public may resist proposals to remove or modify the trail during the restoration of R3. This may limit restoration options for R3.
- The location of such a trail may also be constrained by the desire to connect with the Bay Trail.

3.2 ENHANCE HABITAT VALUE AT PONDS R5 AND S5

Ponds R5 and S5 are currently managed seasonal ponds. The restoration objective for R5/S5 is to enhance habitat value. While originally proposed as year-round managed ponds to benefit birds, other restoration approaches that enhance habitat are being considered: the ponds can be restored as one unit or restored separately; the ponds could be further subdivided, each portion being restored differently. This area may provide significant opportunity to alleviate flooding concerns and improve runoff water quality from nearby neighborhoods and has potential to support additional recreational trails. The specific design elements discussed here are:

- Enhancing habitat value
- Providing flood retention and the potential for water quality improvement
- Installing water control structures
- Creating snowy plover habitat
- Developing recreational trails

3.2.1 Enhancing habitat value

There are several design options for habitat enhancement at Ponds R5 and S5:

- Both R5 and S5 could be reconfigured to change or enhance management.(e.g. by making them year-round managed ponds instead of seasonal ponds
- Portions of R5 and S5 could become enhance managed ponds, while the remainder could be converted into snowy plover habitat or some other use
- R5 and/or S5 could be converted to a willow glen, which is typically a rare riparian habitat with ecological and scenic values of its own, despite not being habitat that is specifically useful for snowy plover or other listed species

Historically, both ponds R5 and S5 were tidal, however, once converted to salt production ponds, the suite of species using the ponds shifted. The former salt ponds and now managed ponds provide habitat for nesting, migration, and foraging for shorebirds and ducks. Restoration of the ponds to tidal marsh habitat is possible but was not considered in the EIS/EIR, even under the 90%/10% scenario and so is not considered further here.

In order to create habitat diversity and provide flood storage, it is recommended that at least one of the two ponds be converted from a seasonal to a year-round managed pond. Due to its location further from R4, which is slated to be restored to tidal marsh, and its proximity to neighborhoods in need of flood water storage, S5 has been proposed for conversion to a fully managed pond that would provide both habitat values and flood control (Figure 2). Alternatively, R5/S5 could be restored into a willow glen with a large bioswale in its center. Further evaluation of R5/S5 would be necessary to determine whether it is better suited for tidal marsh, managed pond, upland transition, or some other habitat type. Opportunities and constraints are summarized below.

Opportunities

The R5/S5 managed ponds option provides opportunities for providing waterfowl habitat or possible nesting or foraging habitat for western snowy plover, depending on the restoration

decisions made. Enhancing the managed ponds at R5 or S5 could provide additional flood storage capacity and simultaneously provide waterfowl habitat. If these managed ponds were enhanced, they could provide foraging habitat for snowy plover and other shorebirds and/or foraging and roosting habitat for waterfowl. Their use as roosting habitat for snowy plover is also possible though less likely to be successful.

The willow glen option, if successful, would provide habitat to passerine birds and increase habitat diversity. Willow glens were always a rare habitat around SF Bay, but development has further reduced them. Restoring even a small patch of this unique habitat would be an interesting and valuable contribution from this project.

Constraints

There are constraints placed on the species and habitats that could successfully use ponds S5 and R5, depending on the habitat restoration approach taken. Managed ponds would require active management and maintenance which could be somewhat more time consuming than a tidal marsh system at this location would be.

The development of a willow glen at S5 is potentially limited by the existing soil and hydrology conditions at the site. Soils would need to be tested for salts and metals to see whether they could support willows. In addition, the conceptual design would need to provide an appropriate water source appropriate for growing willows. Finally, the addition of a willow glen will provide raptor perches near snowy plovers and shorebirds.

3.2.2 Providing flood retention

In conjunction with enhancing S5 as a managed pond, it could be connected to Flood Slough or to the Bayfront Canal (part of the surrounding drainage network) to serve as flood storage to relieve adjacent communities. Options for this connection include installing culverts, overflow weirs, one-way or two-way gate structures between Flood Slough and the southwest corner of S5 (Figure 2).

Opportunities

Creating an enhanced managed pond at S5 provides opportunity for flood storage to help relieve flooding in the neighboring communities of Menlo Park and Redwood City. While currently disconnected from the surrounding drainage systems, S5 could be connected to Flood Slough or other existing drainages through the installation of culverts with water control structures. During periods of high rainfall, water could be released into S5 to reduce flooding in the neighborhoods. A water control structure installed at the north or east side of S5 could allow flood water to be discharged into R3 or R4.

Flood flows from the nearby neighborhood potentially contain elevated concentrations of constituents common to urban and suburban runoff, including suspended sediments, metals, nutrients, bacteria, and pesticides. Temporary storage of flood flows in Pond S5 would provide coincidental water quality improvement through a number of mechanisms: suspended solids are removed by settling in quiescent areas and filtering through vegetation; and dissolved constituents are removed through chemical or biological mechanisms mediated by the soils, vegetation, and microbial fauna. The resulting discharges to San Francisco Bay may be improved over current conditions.

There is an opportunity to create localized estuarine conditions by facilitating the mixing of fluvial outflow with bay tides. These salinity gradients are ecologically productive.

Constraints

Managed ponds could require active management and maintenance, though there may also be passive structures that could work to provide flood risk control at lower cost. To allow discharge of flood waters, a gate structure would need to be installed between these ponds and R3 or R4. Gate structures also require on-going maintenance. Flood modeling is needed to assess the storage capacity of S5 and R5 and determine whether these ponds would be useful as storm water protection. Additional maintenance (i.e., periodic dredging) may be required to maintain capacity in the flood storage pond.

The use of R5 and S5 as flood control storage would require connecting existing flood control structures and systems (which empty into the bay via Flood Slough) to these ponds. That would require passing under the small Bayfront Park parking lot entrance road. Doing that would require working around a large number of easements for transportation and utility lines and easements.

If the contaminants that settle out of storm water runoff and stay in Pond S5 or get filtered through vegetation, contaminants could accumulate over time and be hazardous to wildlife.

There are more than 20 of Right of Ways (ROW), easements and utilities in the area that could serve as constraints to building water control structures. The conceptual design would need to consider ROWs owned by Caltrans, Cargill and others. These groups would need to be notified and included during the design process if construction would impact their properties, facilities, or ROWs.

3.2.3 Installing water control structures

Water control structures would need to be installed to move water between the various ponds. Water transport out of the managed ponds may be desired during times of heavy rain to reduce flooding potential or to manage water levels for nesting or foraging birds. In addition, it may be desirable to release tidal waters into the managed ponds (R5/S5) in order to control water levels for waterfowl or to control vegetation growth or pond salinity. Water control structures can consist of two-way culverts or gates or one-way gates. Potential locations for water control structures would be:

- Between Flood Slough/adjacent neighborhood into S5
- Between S5 and R5
- Between S5 into R4
- Between S5 into R3 (in preparation for possible future actions there)
- Between R5 into R4

These locations are shown on Figure 2. The type of structure and location of structure needs evaluation based on studies. Historic slough traces and locations that connect with the existing, adjacent drainage system are being considered as locations for the water control structures.

Opportunities

Water control structures between the ponds allow for better pond management for maximizing waterbird habitat. Maintaining waterbird habitat may increase recreational value by providing hunting or bird opportunities. The gates also allow water management for flood control.

Constraints

Water control structures require active operation, long-term maintenance and replacement. Erosional forces, particularly in those areas with tidal action, may produce scour along the edges of the control structures. The control structures could sink, scour, or generally not remain secure if placed in a location where there is tidal action or other opportunities for erosion. Fish passage controls may also be needed.

3.2.4 Creating snowy plover habitat

The options for snowy plover habitat described for the restoration of R4 are also applicable to R5/S5 and shown on Figure 2. Specifically, the following may be options for creating snowy plover nesting habitat:

- Create snowy plover islands out of segments of existing levee (e.g., levee between R5/S5).
- Create salt mogul fields in isolated pockets around the corners of ponds by creating a cutoff levee (e.g., bottom half of R5)
- Supplement habitat by adding shells/salt along existing levees (e.g., S5/R5 levee)
- Build islands in the pond bottom (e.g., in R5) out of dredged material
- Build floating islands
- Create "furrows" in the bottom of R5 or S5 with shallow-water flow through; this snowy plover restoration technique has worked elsewhere, but never really been tested in the Bay
- Alternatively, the “no-action” option is not to plan snowy plover habitat features and instead reserve them for other complexes or let come in naturally

Opportunities

The opportunities are similar to restoration of R4 with the following additional opportunities:

- Since R5 and S5 are already isolated from R4, they will not be impacted through the restoration of tidal action at R4. Snowy plover enhancement activities could occur on a variety of timelines, independent of the R4 breach.
- Since habitat is more easily accessed, monitoring may be able to be done more easily, perhaps with less disturbance of the nesting area.
- If restored to year-round managed ponds, there may be an opportunity to try floating nesting islands.

Constraints

The constraints are similar to restoration of R4 with the following additional constraints:

- Snowy plover habitat in the R5/S5 area is in closer proximity to human disturbance than R4 and likely more affected by it.
- The small size of the R5/S5 ponds limits the area that can be used as snowy plover habitat; the proximity of this small area to an active park and an adjacent hill may lead plover not to use the area at all
- Restoring S5/R5 to completely managed ponds would limit the options for providing nesting habitat to anchored, floating islands or habitat on levees.

3.2.5 Developing recreational trails

Enhancement of R5/S5 may limit options for recreational trails in the area (potential options shown on Figure 2). Previously, a cutoff trail between SR 84 and Bayfront Park was proposed along the levee S5/R3 and R5/R4 levee. This trail would still be an option in the managed pond scenario. If all or part of R5 is opened to tidal action, a bridge over a breach point, or a walkway over a water intake structure would be required to complete this trail. Depending on other restoration options chosen, the levee separating R5 from S5 could be enhanced to provide a walking trail. This levee would also serve as flood protection. Using the levees as trails limits the potential for their use as snowy plover habitat.

Opportunities

Maintaining R5 and S5 as separate ponds rather than connecting them would allow a trail to be built on the levee separating the two ponds. There is also potential for a trail to be built on the levee between R4 and R5. These trails provide opportunities for recreation.

Constraints

Increasing public access in the S5/R5 area decreases the habitat value of the area. A trail on the levees between R4 and R5 or between R5 and S5 limits the use of these levees as nesting bird habitat or snowy plover enhancement areas. Building the recreational trails may limit future restoration options, including eventually restoring S5 to tidal action. To build the trails, levee improvements would be needed. This could be a limitation depending on the type and volume of material available. The levees/trails would also need to be maintained.

4.1 NEPA/CEQA STRATEGY

A Programmatic Environmental Impact Statement and Environmental Impact Report (EIS/EIR) for the entire SBSP Restoration Project was completed and signed in 2007 (PWA et al. 2007). That document also served as a project-level EIS/EIR for the Phase I actions that were to be undertaken at all 3 complexes. Under the current scope, the preparation of an EIS/EIR for Phase II projects at the Alviso and Ravenswood Pond Complexes will be tiered off of the Programmatic document and will use as much of the existing Phase I project material as possible. A similar EIS/EIR for the Eden Landing Pond Complex will be produced as part of a subsequent project task with the Conservancy.

In order to streamline the National Environmental Policy Act and California Environmental Quality Act (NEPA/CEQA) process, a single EIS/EIR will be prepared that will cover both Alviso and Ravenswood Pond Complexes. After the conceptual (10%) design alternatives have been developed, the impacts of at least three alternatives will be compared, including the 'no project' alternative. Alternatives may be in the form of the number/sequence of restoration actions (as done for the Phase 1 EIS/EIR) or could be different design alternatives for each restoration action proposed. The likely case will be a mixture of both of these interpretations of "alternatives."

Project descriptions will be written for each of the alternatives and summarized in the Notice of Intent / Notice of Preparation (NOI/NOP). After the NOI/NOP is released, a public scoping meeting will be held to inform the public and agencies of the project alternatives and their potential impacts and to solicit their input regarding the environmental analysis. The EIS/EIR will then be drafted. The following sections are expected to be included in the EIS/EIR which largely follows the format of the Programmatic EIS/EIR (PWA et al. 2007):

- Hydrology, Flood Management, and Infrastructure (to include Sea-level Rise)
- Surface Water, Sediment, and Groundwater Quality
- Wetlands and Waters of the United States
- Geology, Soils, and Seismicity
- Biological Resources
- Recreation/Public Access Resources
- Cultural Resources
- Land Use
- Public Health and Vector Management
- Socioeconomics and Environmental Justice
- Traffic
- Noise
- Air Quality/Greenhouse Gas Emissions
- Public Services

- Utilities
- Visual Resources
- Cumulative Impacts

Additional field and technical studies are needed to complete the wetlands and other waters, biological resources, cultural resources, and recreation/public access sections. These studies will be conducted early during the development of the EIS/EIR and used to further inform future permitting tasks.

The Draft EIS/EIR will be released for public review. Interested parties and adjacent property owners will be notified directly. In addition, a public hearing will be conducted to receive public comments on the draft document. A Final EIS/EIR will be produced based on the public comments and a record of decision (ROD) and findings statement will be published and filed.

4.2 PERMITTING STRATEGY

Permitting preparation will begin after the 10% conceptual design for the restoration actions is completed and NEPA/CEQA document is drafted in order to increase efficiency. The permits will utilize the framework of the Phase 1 permit applications and the project description prepared for the 10% design memo. Similarly, the Phase I permit conditions and/or those proposed in the Phase I applications will be used as source material for the Phase II applications. Though the conditions will not be exactly the same, the material will be useful in developing and proposing appropriate avoidance, minimization, and mitigation measures.

The permitting for Ravenswood will be combined with the permitting for the Alviso complex (both owned by USFWS) to the extent possible. This will limit the number of applications that need to be prepared and can reduce redundancy in preparation of background material that is the same for both complexes.

The following permit documents are expected to be needed for this complex:

- Jurisdictional Wetland Delineation Report for the U.S. Army Corps of Engineers (USACE)
- Biological Assessment for the U.S. Fish and Wildlife Service (USFWS) (through USACE)
- Biological Assessment for the National Marine Fisheries Service (NMFS) (through USACE)
- Clean Water Act Section 404 permit application for U.S. Army Corps of Engineers (USACE)
- Clean Water Act Section 401 water quality certification application for the Regional Water Quality Control Board
- Clean Water Act Section 404(b)(1) Alternatives Analysis for the Environmental Protection Agency
- Consistency Determination request or Incidental Take Permit application for California Department of Fish and Game (CDFG)
- National Historic Preservation Act (NHPA) Section106 Technical Report for the State Historic Preservation Officer (through USACE)
- Native American consultation letters for NHPA compliance for USACE archaeologist

- Habitat Mitigation and Monitoring Plan for the USACE
- San Francisco Bay Conservation and Development Commission (BCDC) major permit application

Many regulatory agencies will be involved in the permitting process. To streamline the various application processes, prior to the preparation of applications, permit scoping will be a primary subject at the annual SBSP multi-agency meeting. Communication with agency staff will be on-going through the application development process to ensure that applications adequately cover all of the topics of interest. Additional strategies related to each permit application or document are provided below.

4.2.1 Jurisdictional Delineation of Waters of the United States

A delineation of jurisdictional wetlands and other waters of the U.S. will be conducted in order to quantify those wetlands and other waters that would be impacted by the restoration actions. To the extent possible, the delineation will rely on existing LiDAR data and aerial imagery to define wetland and other waters extents. These extents will be verified and/or modified in the field. A previous delineation of wetlands was done for those ponds included in the Phase I actions, but it does not cover the area impacted under the Phase II actions. The wetland delineation will be conducted as early as possible, to serve as background data for the preparation of the NEPA/CEQA document, but more importantly, will be timed to occur with the blooming period of the wetland-indicator plant species.

As early as possible, the jurisdictional delineation report will be submitted to the USACE for its review and approval or modification of the jurisdictional boundaries. This is a critical step to take in the early parts of the project because several subsequent project applications and steps depend on a verified delineation from the USACE.

4.2.2 Biological Assessments for USFWS and NMFS

The Biological Assessment (BA) documents will be prepared concurrently with the 404/401 applications and will address federally-listed species with potential to occur in the Ravenswood complex and potentially impacted by the project. These BAs will be based on those prepared for Phase I and the issued Programmatic Biological Opinion (BO) and the BO for Phase I. The species expected to be covered under the BA for USFWS are: western snowy plover, California least tern, salt marsh harvest mouse, and California clapper rail. The species expected to be covered under the BA for NMFS are Central California Coast steelhead and green sturgeon.

As part of the biological assessment, conflicts among the recovery plans will need to be identified. Restoration actions beneficial to one listed species may be detrimental to another listed species. BAs will rely primarily on desktop data to map habitats and determine the potential presence of species, but some field work to assess species occurrence may be necessary.

4.2.3 Essential Fish Habitat Consultation with NMFS

Under the Magnuson-Stevens Fishery Management and Conservation Act, consultation with NMFS about impacts to areas designed as Essential Fish Habitat (EFH) for federally managed fish species is required. NMFS must consider whether a federal or state action would adversely

affect EFH and is required to provide conservation recommendations if it is. Much of the information in the BA that will be submitted to NMFS as part of Section 7 ESA consultation can be re-used in the EFH consultation.

4.2.4 Clean Water Act 404/401 applications

The 404 and 401 applications will be developed concurrently by staff that is familiar with the requirements of both USACE and RWQCB. Much of the information in these documents is the same, so figures and text will be shared between the two documents to the extent possible.

4.2.5 404(b)(1) Alternatives Analysis

This document describes alternatives to the project and identifies the Least Environmentally Damaging Practicable Alternative (LEDPA). The Alternatives Analysis will use the alternatives and project goals as defined the EIS/EIR prepared for the Phase II actions. It will analyze impacts to wetlands and other waters as defined by the wetland delineation, and therefore, must be developed after the wetland delineation is complete and has been verified by the USACE.

4.2.6 Consistency Determination/Incidental Take Permit

Of the species potentially affected and covered under the USFSWS Biological Opinion, the California clapper rail, California least tern, and salt marsh harvest mouse are also state listed. There are two avenues for obtaining take permission from CDFG for these species: a consistency determination or an Incidental Take Permit.

A consistency determination is appropriate only for species listed under both the Federal and California Endangered Species Acts. It is a letter from CDFG indicating that it agrees with the provisions of the Biological Opinion and that the measures therein are adequate to avoid jeopardy for the species; it also allows some level of take. It is the simplest and least costly way to obtain permission to take a California ESA-listed species.

CDFG will be approached about Consistency Determinations for those species covered under the BO(s) issued by USFWS and/or NMFS. But in recent years, CDFG has not been as willing to issue them as it had been previously. Early consultation with CDFG will be initiated to determine whether Incidental Take Permit applications will be necessary for dually listed species.

For species listed only under the California ESA, Incidental Take Permits from CDFG would be necessary if they would be affected by the project. There are several species listed in the 2007 EIS/EIR that are state-listed, but not federally listed. If these species are to be impacted, an Incidental Take Permit would be required as these species would not be covered under the Biological Opinion. These state-listed species include American peregrine falcon, California black rail, and bank swallow. None of these species are expected to be nesting in the vicinity of the Ravenswood complex. It is assumed that they would not be impacted by the Phase II project activities, and would not trigger the need for an Incidental Take Permit.

4.2.7 Consultation in Accordance with the National Historic Preservation Act

While both Eden Landing and Alviso qualify as National Register of Historic Places eligible as cultural landscapes, Ravenswood does not. The impacts to an eligible cultural landscape would require some sort of mitigation, potentially Historic American Buildings Survey/Historic American Engineering Record documentation. This is not expected to be needed at Ravenswood.

However, since the CEQA/NEPA documentation and permitting will be combined for Ravenswood and Alviso, time required to address cultural resources at Alviso with correspondingly affect the Ravenswood project schedule.

At Ravenswood, a desktop survey and field assessment for cultural resources would be conducted as part of the evaluation for the CEQA/NEPA document. The results of these surveys would be provided in a Technical Report to be submitted to the State Historic Preservation Officer. If no eligible resources are identified, mitigation would not be required. If eligible cultural resources are identified, then mitigation, such as recordation and interpretive development, may be needed. In addition to the preparation of the technical report, consultation would include preparation and submittal of letters to relevant local Native American tribes associated with the landscape.

4.2.8 Habitat Mitigation and Monitoring Plan (HMMP)

This is a document required to be submitted with the 404 and 401 applications. It discusses project mitigation and post-construction monitoring and success criteria. The HMMP will comply with the AMP, will incorporate the results of the ongoing Applied Science Studies, and will be based on the approaches and measures used in the Phase 1 projects and the permits and other documents associated with it. It will include post-construction mitigation measures for fill in wetlands and other waters of the United States. The mitigation approach will be to suggest that the project is self-mitigating, and that on-site restoration activities account for any wetland and other waters lost as part of the project. No off-site mitigation is expected to be necessary or proposed as part of the project. The HMMP structure will follow the USACE outline for wetlands and other waters mitigation. In addition, mitigation requirements to enhance wildlife habitat or protect water quality that might be required under the biological opinions or other permits may also be included. This would allow a single document to be used to describe all post-construction monitoring and maintenance requirements.

4.2.9 San Francisco Bay Conservation and Development Commission Major Permit

In previous discussions the Conservancy has had with BCDC, the latter has indicated that its preference would be to amend an existing permit rather than apply for a new permit. A single permit amendment application would be prepared for Ravenswood and Alviso complex Phase II actions. Prior to acceptance of the amendment request, two hearings, one with the Design Review Board and a second with the Commission, are anticipated.

Though many regulatory agencies prefer to be the last one to issue a permit – so that they can review the others before issuing their own – BCDC generally insists on it. Therefore, this application is planned to be the last one applied for.

4.3 PERMITTING SEQUENCE

The attached Gantt chart (Figure 3) depicts a proposed permitting sequence and relative timing. While the dates may change, the sequence and relationship between different permitting elements is expected to stay the same. The conceptual design and project alternatives would be developed first, followed by development of the EIS/EIR document.

Permit application preparation would follow the completion of these two documents, though the field work, pre-application meetings with agencies, development of the strategies behind the

individual permits, and even the drafting of portions of the text (e.g., the project descriptions) will likely begin before those documents are complete.

The planned schedule for the applications will contain time for responding to agencies' requests for additional information. The maximum agency review period will be assumed to be required. We also anticipate that all regulatory agency application processing fees will be required.

4.4 RISKS

Risks to permitting the project include:

- Cultural resources: Identification of unexpected cultural resources during survey may delay permitting process by adding additional mitigation in the form of recordation and interpretation.
- Public access: Recreational users interested in using the area may be particularly interested in seeing that the design provides public access opportunities. This risk will be minimized by having frequent and early stakeholder involvement.
- Threatened and endangered species habitat: Due to differing species habitat requirements, it is impossible to create habitat that will be compatible or suitable for all species. For example, tidal marsh habitat that is suitable for salt marsh harvest mouse will be unsuitable for western snowy plover. In order to obtain permits from state and federal wildlife agencies, the designs must include a diversity of habitats that can accommodate multiple species. Early consultation with state and federal agencies during the design process will ease obtaining permits. Communication should involve both state and federal agencies, where appropriate.
- Tidal marsh versus managed ponds: In addition to threatened and endangered species, wildlife species that do not have state or federal designations also use the managed pond habitats. Many of these species are waterfowl or shorebirds, which have different habitat requirements. The trade-offs between these habitat types needs to be considered in the restoration decisions.

Each of these risks should be considered and addressed early in the design processes in order to minimize delays in the permitting process and limit comments on the EIS/EIR.

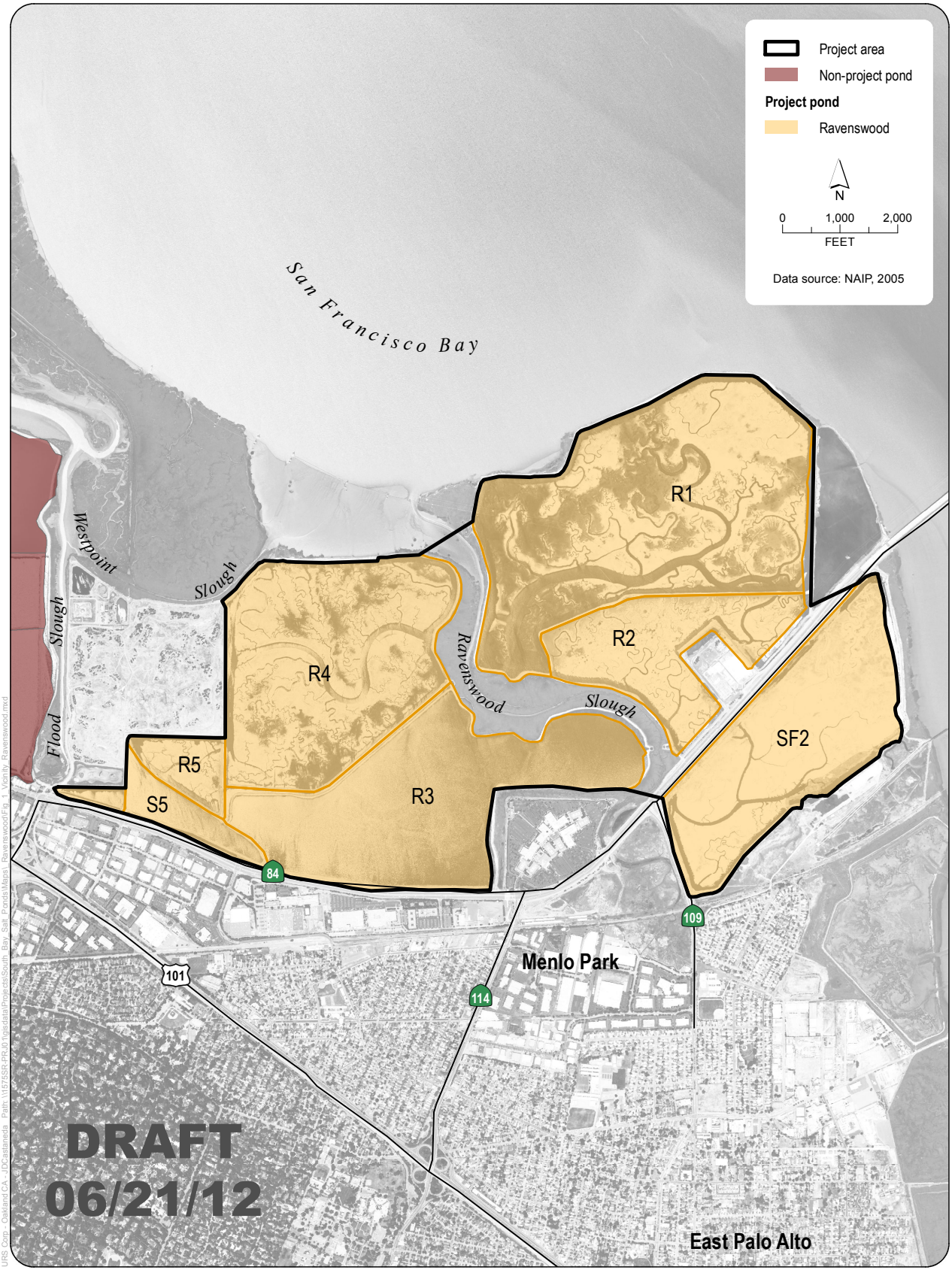
Existing, available data in combination with the results and reports of ongoing studies is believed to be mostly sufficient for preparing the 10% conceptual designs and NEPA/ CEQA document. However, the following information may be needed:

- Hydraulic calculations to evaluate breach locations and sizes. Because of the critical need for flood control to be incorporated into the restoration design hydrodynamic modeling will be required. Presently, it is assumed that the County will conduct the modeling as part of its flood control studies. However, because of the County emphasis on flood control rather than restoration it is imperative that there be coordination between the restoration team and flood control study team. If the county does not conduct the modeling then some analysis may be necessary for the restoration design.
- Quantities or estimates of tidal and storm surge-delivered sediment to inform understanding of likely accretion rates in breached ponds
- Information on available dredged material and upland material for reuse (to be done under URS and Moffatt & Nichol scopes)
- Evaluation of sea level rise study results. Although the design will not be driven by SLR concerns, a discussion of how the design may respond under future SLR conditions should be included.
- Results from ongoing or new SBSP-sponsored priority studies that may be available or become available
- Latest information on bird use of ponds
- Jurisdictional wetland delineation report and eventual verification by the USACE (to be done under URS scope)
- Cultural resources desktop records review and field surveys for artifacts that may need mitigation
- Reconnaissance site visits to confirm or update the most recent externally developed data on biological resources such as habitats for listed species (to be done under URS scope)
- The existing LiDAR/topography data (with 1-ft or less accuracy) needs to be reviewed and incorporated
- Geotechnical studies may be needed as the design progresses
- Quality (and quantity available) of sediment to be imported
- Specific preferences for trail corridor and interpretive center locations
- Public feedback on proposed restoration design options

Table 1. Opportunities and Constraints Matrix

Pond Number	Action	Main Restoration Goal(s)			Opportunities	Constraints	Details of Action/Action Options	Next steps
		Habitat	Flood Mgmt	Recreation / Access				
R4	Tidal marsh restoration	x			No FEMA levee needed. Could add temporary walking trail along new R3/R4 levee. May allow spur trail near Greco Island. May enable hunting/fishing. Lowering external levee may help promote natural sedimentation, gradually increasing marsh plain elevation with sea level rise. Provides habitat connectivity to Greco Island for genetic exchange. Nursery for fish.	Requires that additional flood protection be provided (currently proposed as building levee between R3/R4). Must leave rip-rapped portion of outboard levee facing bay and prevailing winds. Would reduce existing plover habitat in dry pond bottom. Where to store fill? Design could limit future restoration options at R3. Need topographic data. Work done at R4 affects what is possible at R5/S5.	Restoring tidal action to R4 would require a levee breach or lowering, currently proposed on the E side of R4 adjacent to Ravenswood Slough or on the west side adjacent to Greco Island. Existing exterior levee could be left or removed, but currently planning to be left to provide protection to R4 and promote sedimentation. Channels may need to be constructed to connect the marsh plane with the interior slough.	Look at hydrology data and topography/bathymetry data. Do hydrology analyses to determine the amount of water that will enter the area at different breach options (varying depth and width of breech). Model sedimentation rates and salt discharge rates with breach. Determine whether hydrology is sufficient to provide water to the entire marsh plane. Model flood scenarios and sealevel rise scenerios. Investigate what, if any, additional channel cuts are needed to increase circulation. Evaluate incremental difference of include R3 restoration with R4.
R4/R5	Upland Habitat Transition	x			Provide refugia for species during high tides. Allow resiliency to see level rise. Add buffer to Bayfront Park landfill waste to limit exposure to tidal action/potential erosion. May provide location for loop trail. Provides location for reuse of dredged material.	Requires a lot of fill material - if dredged material is limited, this could be problematic. If constructed from the Bayfront Park hillside area would result in disruption of public access during construction. Reduces connectivity of the marsh provided by the exterior (western) channel in R4. If built along upland transition would likely requiring filling large amount of WUS leading to bigger impacts associated with permitting and potentially mitigation.	Fill in the western channel on R4 and/or wrap upland transition south of Bayfront Park in R5/S5. Create a shallow slope going from tidal habitat to upland habitat. Width and location of upland transition in part dependant upon availability of dredged material. Trails may be able to be constructed in the transition area if space allows.	Review/model sea level rise. Investigate sources and amounts of potential dredged material. Design of upland transition will be directly related to the availablity of dredged material. Provide estimates of how much dredged material would be needed under different width/slope/location scenerios. Discuss/design public access trails/signage on upland transition habitat if appropriate.
All ponds	Creation/mainenance of snowy plover habitat	x			Creation of snowy plover island habitats - potentially by breaking up existing levee structure. May be able to provide shelter/screens from public by providing tall/dense vegetation around plover habitat.	Maintaining existing snowy plover habitat in R3/R4/R5 is incompatible with restoration to tidal marsh or managed ponds. Plover habitat needs to have a substrate that surpresses the growth of plants or must be regularly maintained (requiring access). Plover nesting success is limited by disturbance; therefore, it is best if plover nesting habitat is not close to trails (at least 300-600 ft away as done for SF2).	Options: 1) Create snowy plover islands out of segments of existing levee (e.g. levee between R5/S5). 2) Create salt mogel fields in isolated pockets around the corners of ponds by creating a cutoff levee (e.g., NE corner of R4, E end of R3, SW corner of R4, or R5/S5). 3) supplement habitat by adding shells/salt along existing levees (e.g. N side of R4) 4)Don't plan snowy plover habitat features - reserve them for other complexes or let come in naturally 5) Build islands within the marsh plane (e.g. in R4) out of dredged material	Review topography data and snowy plover nesting data to identify areas that may serve as good nesting island locations. Review literature/discuss with experts snowy plover nesting preferences. Develop 1 to several potential options to discuss with stakeholders.
R3/R4	Establish levee between R3/R4		x		Serves a storage location for fill until R3 restoration is feasible. Can provide public access trail between R3 and R4. Could also provide ecotone and refugia.	May limit restoration opportunities at R3. Would require significant amount of fill. Construction may require lots of trips on public roads.	Fill material would be brought in to fill the All American Canal between R3 and R4 and create a higher levee. Design of the R3/R4 levee will depend on available fill material as well as the designs for adjacent ponds (R3, R4, S5, R5).	Model hydrology associated with R4 restoration to determine the flood protection necessity of a levee between R3 and R4. Estimate amount of fill needed and potential fill sources. Consider options for additional levee/trail cut off on E side of R3 (potentially Phase 3 action). May need geotechnical investigation to evaluate stability requirements.
R4	R4 Spur Trail			x	Wildlife viewing that would work with many other actions.	Would need signage to inform people about dog rules and where not to go. Would need to maintain trail and levee. Potentially building platform. Would require leaving levee in place (eliminating option to remove levee).	Would require signage and potentially levee/trail reinforcements. May build viewing platform at end of spur. Trail design may be dependent on upland transition design in the area.	Priority study. Solicit public feedback. Design trail/signage.

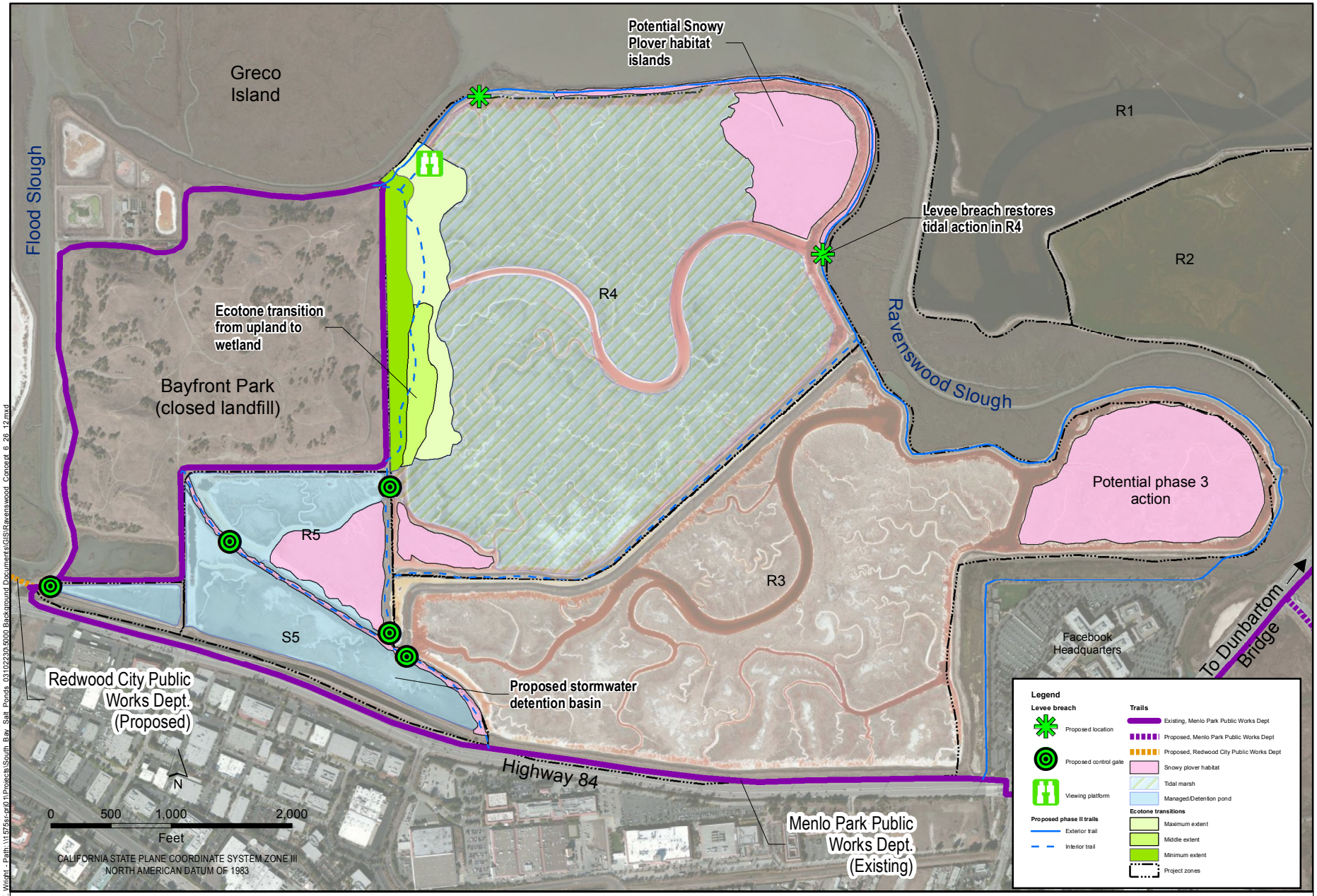
Table 1. Opportunities and Constraints Matrix								
Pond Number	**Action**	**Main Restoration Goal(s)**			**Opportunities**	**Constraints**	**Details of Action/Action Options**	**Next steps**
		Habitat	**Flood Mgmt**	**Recreation / Access**				
R5/S5	Managed Ponds	x			Improves flood management. Decisions about depth and which species to manage toward habitat for. Could also link in with desire for increased flood protection from nearby Flood Slough (Menlo Park). Provides habitat for diving ducks/waterfowl. Managed ponds may provide foraging opportunity for snowy plover. Improves water management capabilities. Allows the ability to manage for multiple species by manipulating water flow/levels throughout the seasons.	Limits progress towards 90/10 scenario. Would require active management of the ponds. May require a gate structure between R5 and R4 to allow floodwater to be discharged. Gate structures have associated maintanance risks. Does not provided habitat for tidal marsh species or snowy plover. Would be good to know soil chemistry/salinity in these ponds. Could also provide habitat for plovers depending on how the ponds were managed.	Consider different pond management options for R5 and S5. This may result in recommendations to make all, part, or none of the area into managed pond. R5 may be suited for tidal action. Some of S5 may be retained as a detention basin for flood runoff. Water control structures can be installed at these ponds to allow/limit water transfer between them and R4.	Review topography data. Review drainage/flood data from neighboring properties to determine freshwater runoff input. Esitmate capacity of ponds R5 and S5 under different shape configurations and then model these under different flood scenerios. Evaluate what type and size levee would be needed to prevent flooding.
R4, R5, S5	Water control structures		x		Allows better pond management for maximizing waterbird habitat. May allow hunting.	Long-term maintenance requirement. Need protection from scour if exposed to tidal action.	Potential locations for water control structures 1)outflow of Flood Slough/neighborhood into S5 2)S5 into R5 3) S5 into R4 4) S5 into R3 (in preparation for next Phase of action) 5)R5 into R4. The type of structure and location of structure needs evaluation based on studies.	Evaluate hydrology and flooding potential in ponds S5, R5, and R4. Identify potential locations for water control structures that would alleviate flooding. Review potential types of gate structures. Perform geological studies to determine subsurface and anchoring structure. Model potential scour. Select and design gates.



URS

State Coastal Conservancy
South Bay Salt Ponds Project, Phase 2

Figure 1
Vicinity map - Ravenswood



URS Oakland CA - K. Wright - Path: \\r-675sr-prd01\Projects\South Bay Salt Ponds (31\22230\5000 Background Documents\GIS\Ravenswood Concept 6_26_12.mxd

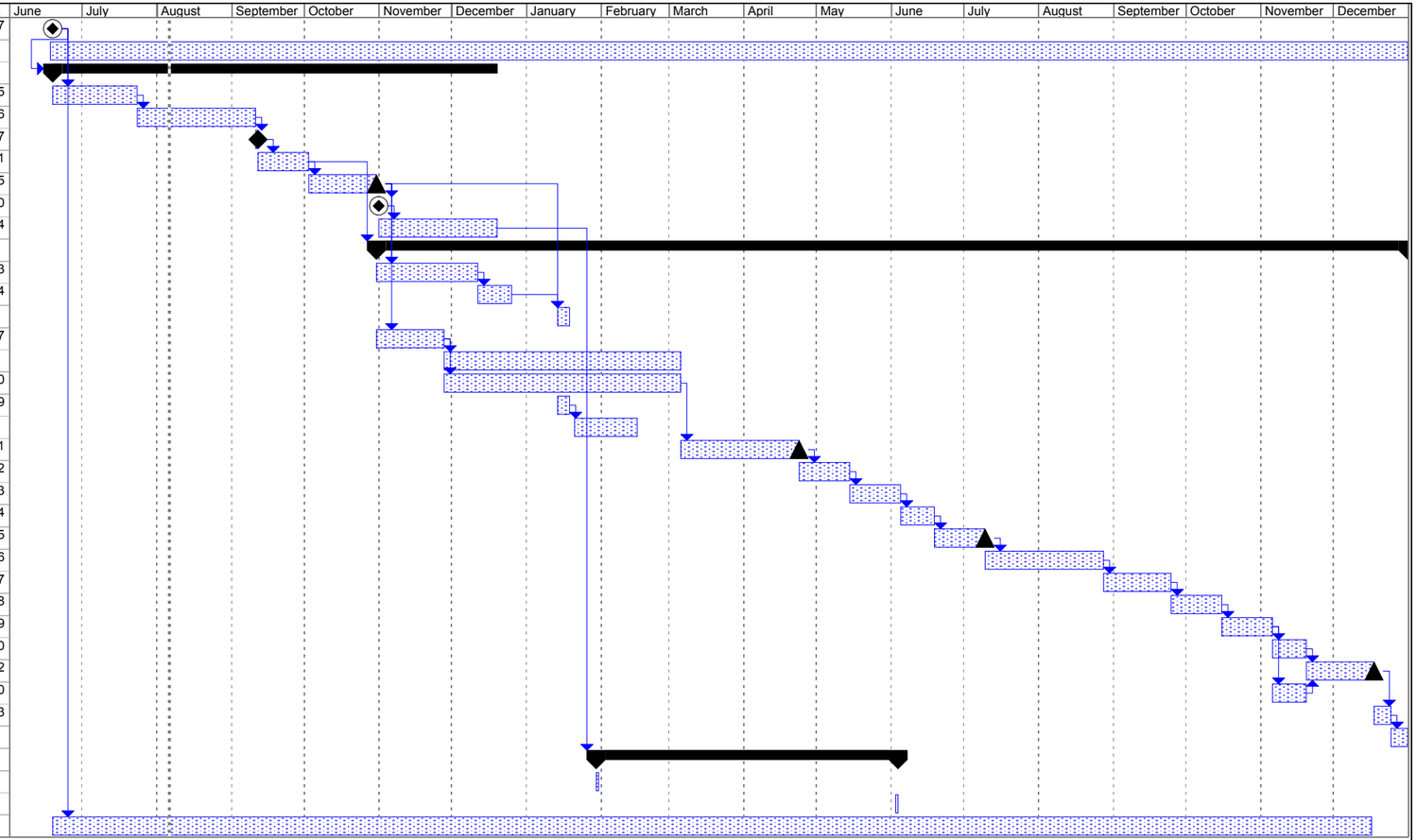
URS

SOUTH BAY SALT PONDS
RAVENSWOOD
SAN MATEO COUNTY, CA

DATE OF PREPARATION: 7/30/2012
DRAFT, FOR INTERNAL USE ONLY
URS PROJECT NO. 26818346

FIGURE 2
ACTIONS PROPOSED FOR FULL ANALYSIS AT RAVENSWOOD POND COMPLEX

ID	Task Name	Duration	Start	Finish	Predecesso	Successors
1	Notice to Proceed	1 day	Mon 6/18/12	Mon 6/18/12		4,3,37
2	Project Management	402 days	Mon 6/18/12	Tue 12/31/13		
3	**Alternatives Development and Conceptual Design**	**132 days**	**Tue 6/19/12**	**Wed 12/19/12**	**1**	
4	Review Phase II projects, AMP and Phase I Applied Stu	25 days	Tue 6/19/12	Mon 7/23/12	1	5
5	Develop Initial Concepts and Rank Project Features	35 days	Tue 7/24/12	Mon 9/10/12	4	6
6	PMT Meeting	1 day	Tue 9/11/12	Tue 9/11/12	5	7
7	Revise Preliminary Design concepts	15 days	Wed 9/12/12	Tue 10/2/12	6	8,11
8	Develop Alternatives Draft 10% Design memo	20 days	Wed 10/3/12	Tue 10/30/12	7	14,9,12,15
9	Constructability Review Workshop	1 day	Wed 10/31/12	Wed 10/31/12	8	10
10	Refine and Deliver Alternative Design Memo	35 days	Thu 11/1/12	Wed 12/19/12	9	34
11	**NEPA/CEQA Documenation (Ravenswood and Alviso)**	**305 days**	**Wed 10/31/12**	**Tue 12/31/13**	**7**	
12	Prepare Project Description / Alternatives Descriptions	30 days	Wed 10/31/12	Tue 12/11/12	8	13
13	Prepare and File NOP/NOI	10 days	Wed 12/12/12	Tue 12/25/12	12	14
14	Conduct Scoping Meetings	5 days	Mon 1/14/13	Fri 1/18/13	8,13	
15	Prepare Environmental Setting	20 days	Wed 10/31/12	Tue 11/27/12	8	16,17
16	Background and field data collection and analysis	70 days	Wed 11/28/12	Tue 3/5/13	15	
17	Prepare technical sections (impacts, mitigation measure	70 days	Wed 11/28/12	Tue 3/5/13	15	20
18	Wetland Delineation - Field Surveys	5 days	Mon 1/14/13	Fri 1/18/13		19
19	Prepare Wetland Delineation Report	20 days	Mon 1/21/13	Fri 2/15/13	18	
20	Prepare First Administrative Draft EIS/EIR	35 days	Wed 3/6/13	Tue 4/23/13	17	21
21	PMT Review	15 days	Wed 4/24/13	Tue 5/14/13	20	22
22	Prepare Second Admin Draft EIS/EIR	15 days	Wed 5/15/13	Tue 6/4/13	21	23
23	PMT Review	10 days	Wed 6/5/13	Tue 6/18/13	22	24
24	Prepare Public Draft EIS/EIR	15 days	Wed 6/19/13	Tue 7/9/13	23	25
25	Public Review	35 days	Wed 7/10/13	Tue 8/27/13	24	26
26	Prepare First Admin Final EIS/EIR	20 days	Wed 8/28/13	Tue 9/24/13	25	27
27	PMT Review	15 days	Wed 9/25/13	Tue 10/15/13	26	28
28	Prepare Second Admin Final EIS/EIR	15 days	Wed 10/16/13	Tue 11/5/13	27	31,29
29	PMT Review	10 days	Wed 11/6/13	Tue 11/19/13	28	30
30	Revise and Publish Final EIS/EIR	20 days	Wed 11/20/13	Tue 12/17/13	31,29	32
31	Prepare Findings/Record of Decision	10 days	Wed 11/6/13	Tue 11/19/13	28	30
32	File NOD and Publish ROD	5 days	Wed 12/18/13	Tue 12/24/13	30	33
33	Certify, Approve, NOD	5 days	Wed 12/25/13	Tue 12/31/13	32	
34	**Prepare Permit Applications (Ravenswood and Alviso)**	**89 days**	**Wed 1/30/13**	**Mon 6/3/13**	**10**	
35	Alternatives Feedback Meetings	1 day	Wed 1/30/13	Wed 1/30/13		
36	Regulatory Agencies Feedback Meeting	1 day	Mon 6/3/13	Mon 6/3/13		
37	**GIS Support**	390 days	Tue 6/19/12	Mon 12/16/13	1	



Project:South Bay Salt Ponds Restora

Task | Milestone | Project Summary | External Milestone | Progress

Split | Summary | External Tasks | Inactive Task | Deadline