Carpinteria Salt Marsh Restoration Plan
Basin 1 and South Marsh

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Introduction

This report assesses the existing conditions of the Basin 1 and the South Marsh areas of Carpinteria Salt Marsh, the vegetation communities and the biological resources therein, in the vicinity of the proposed Carpinteria Salt Marsh Wetland Enhancement Project for Basin 1 and the South Marsh ("Project") and provides a detailed restoration plan for disturbed areas. Specifically, the impacts associated with the creation of new tidal channels, removal of non-native vegetation, and establishment of new flood control structures are examined. The report describes detailed specifications for the restoration and revegetation of areas in Basin 1 and the South Marsh to be implemented once the grading for new channels and installation of the flood control wall are complete.

Project Area and Background

Carpinteria Marsh is located immediately west of Carpinteria, approximately 12 miles east of Santa Barbara. Figure 1 shows the project vicinity and location. It encompasses approximately 230 acres and is separated into the following subareas: Basin 1, Basin 2, Basin 3 and South Marsh as shown in Figure 2. The Carpinteria Salt Marsh Wetland Enhancement Plan ("Plan") calls for restoration and/or enhancement of degraded historic wetlands and transitional and upland areas (1991). Several groups are actively involved in accomplishing objectives of the Plan including the Land Trust for Santa Barbara with funding from the California State Coastal Conservancy, the Carpinteria Salt Marsh Steering Committee, the University of California at Santa Barbara (UCSB) and the Santa Barbara County Flood Control District (SBCFCD).

As the 15-acre Carpinteria Salt Marsh Nature Park (the Nature Park) has been recently restored, the Plan now calls for restoration and enhancement of Basin 1 and the South Marsh, which together encompass a 36-acre area. Basin 1 and South Marsh are composed of relic wetlands, and transitional and upland habitats. The Land Trust for Santa Barbara County recently secured funds from the California State Coastal Conservancy to design the improvements. As described below, this project is to finalize the conceptual enhancement plan for Basin 1 and South Marsh. Figure 3 shows the project site.

Project Description

The Land Trust for Santa Barbara County (Land Trust) is requesting a Coastal Development Permit (CDP) to remove large stands of non-native vegetation and to re-create historic tidal channels in Basin 1 which will serve to restore and enhance tidal circulation. The Land Trust is also proposing to establish public access opportunities in Basin 1, as well as installing a pedestrian bridge that will connect the adjacent Nature Park to Basin 1. Finally, the Land Trust is proposing to work cooperatively with Santa Barbara County Flood Control District to establish flood protection to adjacent home sites.

The proposed project will result in an increase of approximately 1.55-acres of tidal channels and 0.45-acres of salt marsh habitat in Basin 1 compared to the existing conditions. In addition, there will be an increase of 0.33-acres of brackish marsh habitat in Basin 1, with no net increase in South Marsh. In South Marsh there will be an increase of 2.31-acres of tidal channels and 0.54-acres of salt marsh compared to existing conditions. In total, 5.18-acres of new wetland area will be created by the project in Basin 1 and South Marsh, with 1.32 aces of this total constituting pickleweed habitat.

Although the overall amount of upland habitat may be decreased, removal of non-native plant species and replacement with native plant species will increase the value of habitats for wildlife using the marsh. In addition, the proposed project includes enhancement of dune scrub and will scrub habitat that will increase the diversity of the site and provide suitable habitat for wildlife.

Project Objectives

The objectives of the Carpinteria Salt Marsh Wetland Enhancement Plan for Basin 1 and the South Marsh are to:

1. Restore and/or enhance degraded historic wetlands including restoring tidal circulation;
2. Restore and/or enhance degraded transitional and upland areas;
3. Remove non-native vegetation;
4. Establish public access opportunities within Basin 1;
5. Replace earthen material sloughed off of the flood control levee at the Nature Park back onto the levee and restore one closed tidal connection to a small basin;
6. Coordinate improvements with future flood control improvements anticipated by the Santa Barbara County Flood Control District; and
7. Restore/re-establish historic wetland area that can be applied toward mitigation of impacts caused by the flood control project and installation of a flood wall.

Existing Conditions

General

Carpinteria Marsh is located in southeastern Santa Barbara County adjacent to the City of Carpinteria. The project site is a 36-acre marsh area in the coastal plain of Carpinteria, located at the foot of the Santa Ynez Mountain Range. The area is coastal salt marsh within a geologic syncline, separated from the ocean by a barrier sand spit and connected to the sea by a narrow tidal inlet. The entire marsh is 230 acres in area, with the 36-acre project site consisting of 24 acres in Basin 1, 9 acres in South Marsh and 3 acres within the Carpinteria Salt Marsh Nature Park.

Topography
The site generally is a coastal floodplain at the base of coastal streams. It is a structural trough filled with sediments from the upland watershed and from the ocean. The elevations in the marsh are low enough to allow tidal inflow through a network of channels that also convey flood flows from the watershed. Relief is very low, with a maximum range in elevation of 10 feet. The lowest elevations of –1 foot relative to mean sea level (MSL) occur in the main tidal channel near the tidal inlet. This main channel extends inward through the marsh along South Marsh and meets the two flood control channels of Santa Monica Creek and Franklin Creek. Channel bed elevations within the main channel and flood control channels remain relatively constant within the marsh at –1 foot MSL. Planting plans show the existing topography of the marsh and project site.

Marsh and upland areas lie adjacent to channels. The marsh is essentially a level plain incised by tidal channels. Marsh areas vary from low, to mid and high marsh. Transitional and upland areas lie above marsh areas. Elevations range from 0 feet to +4.2 feet MSL in marsh areas, and from +4.2 feet to +7 feet in transitional and upland areas. Levees border the main channel and flood control channels and elevations reach up to +9 feet MSL at some points.

A high stockpile of sandy dredge spoils is located immediately adjacent to and east of the tidal inlet. The stockpile was formed in 1983 from disposition of dredged materials from marsh channels. Channels were dredged after sedimentation from storm runoff during an El Nino winter. The material presents an opportunity for dune habitat creation and beach or near shore nourishment.

Soils
The Soil Conservation Service (SCS) mapped soil in Basin 1 as a "flooded aquept" with small areas of Camarillo fine sandy loam, Camarillo variant, fine sandy loam, and aquents (fill areas), over all but the northwest corner of the basin, which is mapped as Camarillo variant, fine sandy loam. All of South marsh is mapped as aquept except for a narrow band along Sandyland Cove Road that is identified as fill material (SCS, 1981).

It is known that both Basin 1 and South Marsh historically supported more extensive salt marsh and native upland habitats. In addition, a similar restoration and enhancement project was completed in 1997 at the Carpinteria Salt Marsh Nature Park, which resulted in the successful establishment of native salt marsh and upland habitats. Based on these observations and the information known about the soils on the site, it is expected that the soils will be suitable for establishment of native plants as proposed in this Plan. The Planting Specifications section of this document include methods for testing the soils after grading and prior to planting to determine if there is any need for soil modifications.

Vegetation
Information of biology in this study is contributed by the project biologist, Science Applications International Corporation (SAIC). The Carpinteria Salt Marsh supports a diverse assemblage of plant and animal species including many sensitive species. The vegetation in the salt marsh is greatly influenced by physical factors including elevation,

frequency of tidal inundation, and salinity. The patterns of wetland vegetation in Carpinteria Salt Marsh have been the subject of several studies including Callaway et al. (1990). The wetland vegetation ranges from +2.6 feet MSL to +4.2 feet MSL with a variable transition area between wetland and upland vegetation occurring from +4.2 to +4.9 feet MSL. Upland vegetation is dominant above +4.9 feet MSL.

The wetland vegetation is further divided into vegetation "zones" that typically correspond to elevation gradients and hydrologic regime. These zones are classified as low, middle, and high marsh.

- Low salt marsh habitats are inundated by tidal action at least daily and include estuarine intertidal mudflats and tidal channels. In other salt marsh habitats in Central and Southern California, the tidal estuarine flats and tidal channels may support Pacific cordgrass (*Spartina foliosa*) but this species is absent from Carpinteria Salt Marsh as well as other local coastal estuaries in Santa Barbara County. Mudflats in the Carpinteria Salt Marsh typically occur between +2.2 to +2.6 feet above MSL, and are flooded and exposed daily. These habitats do not support vegetation but provide an abundance of invertebrates and are considered important foraging habitat for resident and migratory birds that frequent the salt marsh.
- Middle coastal salt marsh is regularly inundated at its lowest elevation daily during high tides and is dominated by monotypic stands of pickleweed (*Salicornia virginica*). This is the dominant habitat type in the Carpinteria Salt Marsh and typically occurs above 2.6 feet MSL and higher.
- High salt marsh is found in association with the middle coastal salt marsh but at slightly higher elevations and is inundated only during extreme high tides. Pickleweed is present but is typically codominant with alkali heath (*Frankenia salina*) and fleshy jaumea (*Jaumea carnosa*). Parish's glasswort (*Salicornia [= Arthrocnemum] subterminalis*) often replaces pickleweed in the higher elevations of the coastal salt marsh. Salt pannes or unvegetated saline flats that are above the reach of most or all lunar tides are interspersed with the vegetation within the high salt marsh habitats. In the Carpinteria Salt Marsh, high salt marsh habitat typically occurs at the fringes of the middle marsh, often within the same elevation range but the topography and hydrology prevent these areas from being inundated except during extreme high tides that may only occur monthly or seasonally.

Natural upland habitats surrounding the Carpinteria Salt Marsh are limited due to the extent of urban development in the area. Much of the upland habitats are disturbed and dominated by non-native species including common roadside weeds and ornamental species, such as myoporum (*Myoporum laetum*) and exotic trees (eucalyptus and Monterey cypress), that were planted or have been relocated from neighboring residential or other developments. Small patches of coastal scrub and willows can be found at scattered locations around the upper edges of the salt marsh and represent remnants of native habitats that bordered the coastal salt marsh historically.

The botanical resources in Basin 1 and South Marsh were assessed through a review of existing information, including the Management Plan for the Carpinteria Salt Marsh Reserve (Ferren et al. 1997), local soil survey data (SCS, 1981), and field surveys. Since the characteristics of the vegetation in Basin 1 and South Marsh are similar, the following applies to both sites unless otherwise stated.

According to historical aerial photographs in the Carpinteria Marsh Management Plan (Ferren et al. 1997), the northern half of Basin 1 supported transitional and upland habitat while the southern half of Basin 1 and all of South Marsh supported salt marsh habitats consisting of meandering tidal channels through middle and high marsh vegetation. During the 1960s, both Franklin Creek and Santa Monica Creek were channelized and a portion of Basin 1 was filled. The tidal channels in Basin 1 were cut off from tidal inundation during this process. Based on historical aerial photos, South Marsh appears to have flooded during the late 1960s, which was followed by additional buildup of the Franklin Creek berm and infilling in the westernmost portion of South Marsh. Currently, the southern portion of Basin 1 and most of South Marsh still support high marsh vegetation although most of these areas only receive water from precipitation and runoff.

The predominant plant throughout most of the project site is pickleweed. One large area in Basin 1 supports only pickleweed. Although this area is no longer subject to daily tidal inundation, it has been classified as middle marsh based on the presence of pickleweed and the absence of higher salt marsh species, such as alkali heath and Parish's glasswort. Small channels present in Basin 1 along both sides of the Sandyland Cove Road, where it crosses Franklin Creek, allow tidal inundation of a small portion of the adjacent salt marsh during the highest tides (above approximately +6.5 feet MLLW). Pickleweed-dominated areas also occur in narrow bands along the lower banks of Franklin Creek and Santa Monica Creek channels, and in patches within the flood control basins in Basin 1.

Pickleweed is also the dominant plant in other portions of the marsh but is mixed with species including alkali heath, Parish's glasswort, and non-native grasses. Spearscale (*Atriplex triangularis*), an annual species commonly found in salt marshes or alkali flats, is also present in patches, especially around the upper margins of the high salt marsh areas. High marsh is the dominant vegetation in South Marsh. The high salt marsh vegetation in Basin 1 and South Marsh is generally dense and lacks the unvegetated salt pans that are typical of high salt marsh habitats in other portions of the Carpinteria Salt Marsh. There are some scattered unvegetated areas but these are very small and isolated and appear to be the result of fill activities, rather than inundation. Remnant tidal channels are present within the high marsh of Basin 1 but these are mostly filled in with sediment or vegetation and are distinguishable only by slight topographic changes in the ground surface. Narrow channels with water are present in South Marsh, but most are overgrown with salt marsh vegetation. Some of these channels appear to be associated with drainage outlets from the residential area along Sandyland Cove Road that empty into South Marsh. The high marsh habitats in South Marsh appear to be high enough in elevation to prevent daily flooding, including those portions of the South Marsh that are exposed to tidal influence (e.g., along the open area of Franklin Creek and adjacent to

breaks in the Franklin Creek berm). Patches of quail bush or Brewer's saltbush (*Atriplex lentiformis*) and western goldenrod (*Euthamia occidentalis*) are present at scattered locations in the high marsh habitat in South Marsh. Although the areas identified as high marsh in Basin 1 and South Marsh are not periodically inundated by tidal action, the soils remained saturated for an extended period of time (several weeks) without precipitation. There are isolated areas where ponded water was observed during surveys conducted in both South Marsh and Basin 1. One low area in Basin 1 near the railroad tracks supports alkali bulrush (*Scirpus maritimus*). The topography at this location suggests that run-off collects here, and the presence of the bulrush indicates this area remains saturated.

Salt marsh transition and upland vegetation types in Basin 1 and South Marsh primarily occur along the levees associated with Franklin and Santa Monica creeks, areas adjacent to road and railroad rights-of-way, and the northern portion of Basin 1. Salt marsh transition is a mix of wetland and upland species such as pickleweed, saltgrass (*Distichlis spicata*), salt heliotrope (*Heliotropium curassavicum*), western goldenrod, alkali rye grass (*Leymus triticoides*), and non-native introduced grasses (*Hordeum marinum, Bromus* spp.). Scattered native shrubs are also present and include coast goldenbush (*Isocoma mensiezii*) and coyote brush *(Baccharis pilularis*). The presence of plant species that more commonly occur in wetland habitats as well as species more commonly found in upland habitats indicates these areas may be in the process of transitioning from a wetland habitat to an upland habitat. In South Marsh, the occurrence of these species seems to be associated with areas of slightly higher topography within the high marsh habitats (possibly due to fill).

It is expected that human activities, such as development of the flood control channels, installation of roads and the railroad, and disposal of fill material, have contributed to the development of the upland habitats in Basin 1 and South Marsh. Native shrubs, including species that typically occur in coastal scrub habitats, are present on the site either in patches or scattered within areas dominated by non-native grasses. The majority of the vegetation in the upland habitats includes non-native species such as annual grasses, invasive exotic iceplant (*Carpobrotus* sp.) and myoporum (*Myoporum laetum*), and ornamental species.

The distribution of coastal scrub in Basin 1 and South Marsh includes large and small patches on the eastern bank of Santa Monica Creek, the banks of Franklin Creek (specifically along the southeastern boundary of Basin 1 and the northern boundary of South Marsh), and scattered individuals or small groups of shrubs elsewhere. Native coastal scrub species include: California sagebrush (*Artemisia californica*); phacelia (*Phacelia ramosissima*); coyote bush; coast goldenbush; quail bush; purple nightshade (*Solanum xantii*); and giant wild rye (*Leymus condensatus*). One patch of willow scrub with arroyo willow (*Salix lasiolepis*) and mulefat (*Baccharis salicifolia*) is present along the east side of Sandyland Cove Road at the north entrance to Basin 1 and is possibly a remnant of the former natural creek channel. Remnant coastal dune habitat is present at one location in South Marsh. This area has sandy soils vegetated with common coastal dune species, such as sandmat (*Cardionema ramosissimum*) and white-leaved saltbush (*Atriplex leucophylla*), interspersed with iceplant and other non-native species.

Dense stands of weedy species, such as black mustard (*Brassica nigra*) and fennel (*Foeniculum vulgare*), are present on the levees and berms, especially where frequent disturbances related to flood control dredging activities have occurred. Other weed species commonly found include wild radish (*Raphanus sativus*), tree tobacco (*Nicotiana glauca*), and an ornamental iceplant (*Malephora crocea*). The stockpile in the western portion of South Marsh is vegetated with non-native grasses and common weedy species. Dense stands of iceplant are present in Basin 1, adjacent to Sandyland Cove Road, the railroad, and at scattered locations in South Marsh.

Monterey cypress (*Cupressus macrocarpa*), a California native, appears to have been planted adjacent to the railroad tracks, probably for screening purposes. Myoporum was also planted on the site, primarily along the berm next to Santa Monica Creek and near the residences along Sandyland Cove Road. Myoporum is known to be invasive in salt marsh and other mesic habitats as evidenced by the presence of scattered myoporum throughout Basin 1 and South Marsh. Areas where the myoporum was removed from the berm along the eastern bank of Santa Monica Creek now support a mix of native and non-native herbaceous species and shrubs. However, many small resprouts or seedlings were observed coming up in the area where the myoporum removal occurred. Other ornamental plant species are present along the north side of Sandyland Cove Road, directly adjacent to South Marsh, in the vicinity of the residences.

Disturbed areas include those that currently do not support vegetation (excluding Sandyland Cove Road). The berm along the western bank of Franklin Creek in Basin 1 is used during flood control operations and looks like a wide, flat dirt corridor. A dirt access road is present within the northern boundary of Basin 1, parallel to the railroad tracks, and connects the northern part of the Franklin Creek berm with Sandyland Cove Road. Flood control debris basins are also identified as disturbed although these areas may periodically support vegetation in all or part of the basins (a stand of pickleweed is present in the northeast corner of the southern basin).

Wildlife

Past studies of Carpinteria Salt Marsh have identified 190 species of birds, 37 species of fish, 11 species of mammals, 5 species of reptiles and amphibians, and over 100 species of invertebrates in the marsh (Ferren et al., 1997). All of the fish, most of the invertebrates, and many of the birds are associated with the creek channels, marsh channels, or the tidal inlet. Basin 1 is bounded by two channelized creeks but has no tidal channels within the basin. South Marsh is also bounded by a channelized creek on the north side, and residences on the south side. Tidal marsh channels are present in South Marsh, but these are narrow and primarily conduct run-off from the residences to Franklin Creek. Both Basin 1 and South Marsh channels support fewer wildlife species than other portions of the marsh.

Wildlife resources of Basin 1 were assessed through a review of published reports for the Carpinteria Salt Marsh, contacts with local experts, a reconnaissance level survey of Basin 1 and South Marsh, and small mammal trapping and bird surveys conducted in Basin 1 in April 2000 by SAIC. Wildlife use and habitat values were recorded for the

two creek channels and Basin 1 on the afternoon of November 30, 1999, and again during the Spring 2000 surveys. The April 2000 surveys included early morning and late afternoon bird surveys, which focused special attention on Belding's savannah sparrow and light-footed clapper rail use of Basin 1. A survey for Lepidoptera (butterflies and moths) was conducted on November 5 and 9, 1999. This survey included visits to Basin 1, Ash Avenue Restoration Site, and the Carpinteria Salt Marsh Reserve.

Several species of aquatic birds are found in the channels of Franklin and Santa Monica creeks including mallard, western grebe, gadwall, American coot, great blue heron, snowy egret, eared grebe, common yellowthroat, spotted sandpiper, belted kingfisher, black phoebe, and great egret. Upland bird species including white-crowned sparrow, house finch, mourning dove, American crow, Bewick's wren, Anna's hummingbird, and California towhee, are found in the upland habitat in Basin 1, and use predominantly non-native trees (pines and myoporum) and shrubs (found along the north and south margins of Basin 1) as habitat. Based on past surveys, the pickleweed-dominated areas appear to act functionally as upland scrub habitat, as opposed to wetland salt marsh, for bird species when no water is present. Surveys conducted when the pickleweed was flooded resulted in observations of song sparrow and common yellowthroat (both species associated with wetland habitat) along the periphery of the pickleweed–dominated habitat and at least two pairs of Belding's savannah sparrow within the pickleweed-dominated marsh in Basin 1. In addition, the marsh habitat and artificial basins in the north-east corner of Basin 1, which were flooded during the April surveys, attracted yellowlegs, American killdeer, mallard, snowy egret, and great egret, which are all associated with wetland habitats. Due to the proximity of Basin 1 and similarity of habitats, wildlife use of South Marsh is expected to be similar to that of Basin 1.

Open area associated with Carpinteria Salt Marsh, including Basin 1 and South Marsh, provide important habitat for raptors. During surveys on Basin 1, several raptors were observed including American kestrel, merlin, red-tailed hawk, white-tailed kite, and northern harrier. In addition, two loggerhead shrikes were recorded in the southern section of Basin 1. Several piles of feathers (from a finch or sparrow-sized bird) were found under different shrubs indicating the shrubs are being used as perches for raptors providing valuable food-chain support for species that use the marsh. White-tailed kites are frequently observed foraging over most of the Carpinteria Salt Marsh. During past surveys, it appeared that kite foraging focused more on the disturbed upland habitats and the outer edges of wetlands including the salt pans within Basin 2. However, kites have been observed on several occasions to hover over the larger sections of pickleweed-dominated habitat.

Harvest mice (*Reithrodontomys megalotis*) and house mice (*Mus musculus*) were caught in various locations within Basin 1 during small mammal trapping surveys. Rodents were captured in both upland and wetland habitats and within habitats dominated by native and non-native plant species. A higher percent of mice were captured within the upland habitats compared to wetland habitat, partially due to the recent rain events that flooded the lower elevations of the basin half-way through the trapping efforts. It is expected that rodents are more commonly found in the higher elevations because these

areas do not flood during rain events. After the rainy season, rodents are expected to move into the lower elevations when the tide is out. Although both harvest mice and house mice were captured in areas dominated by iceplant, the only traps to actually capture rodents in this habitat were those that were placed in small bare openings within the iceplant mat. Ground squirrel and pocket gopher burrows and numerous rodent-formed tunnels were observed in the grass thatch, and rodent burrows were present in the larger areas dominated by non-native grasses. The presence of healthy populations of harvest mice, house mice, gophers, and ground squirrels provide an important prey base for the aforementioned raptor species, all of which were observed foraging in Basin 1. Gophers also attract great blue herons and great egrets, which are also frequently observed foraging throughout the marsh.

Other mammals that use the salt marsh include feral or domestic cats and dogs. Dogs and cats can easily access both Basin 1 and South Marsh and several tracks were observed around the periphery of Basin 1, such as along the railroad tracks and levees.

A two-day butterfly survey in Basin 1 resulted in six species of Lepidoptera observed compared to 10 species at the Carpinteria Salt Marsh Nature Park and four species at Estero Way (Basin 2). Only one species, the moth *Perizoma custodiata*, observed in Basin 1 is a salt marsh specialist. The wandering skipper, another salt marsh specialist, was found at both of the other sites surveyed but not in Basin 1. The sandhill skipper and western pigmy blue butterfly, both found in Basin 1, are commonly found in marshes but can occur in non-salt marsh habitats as well.

Special Status Species

Several state- and federally-listed plants and animals are known to be present in Carpinteria Salt Marsh, at least seasonally (see Table 2.2). In addition, a number of special concern species are also known from the marsh (Ferren et al., 1997).

TABLE 1. SPECIAL STATUS SPECIES IN THE BASIN 1 AREA

Species	*Status*[1]	*Comments*
Salt marsh bird's beak *Cordylanthus maritimus* ssp. *maritimus*	FE,SE	Two populations in Carpinteria Salt Marsh; successfully planted at Carpinteria Salt Marsh Nature Park; none found in Basin 1 or South Marsh during surveys.
Salt marsh goldfields *Lasthenia glabrata* ssp. *coulteri*	FSC	Two populations in Carpinteria Salt Marsh; successfully planted at Carpinteria Salt Marsh Nature Park; known to occur in Basin 1, but none observed during surveys. Not expected to occur in South Marsh.
American peregrine falcon *Falco peregrinus anatum*	SE	Removed from federal list in 1999; uncommon visitor to marsh area.
Western snowy plover *Charadrius alexandrinas*	FT, SSC	Occasional winter visitor in vicinity of estuary.
Belding's savannah sparrow *Passerculus sandwichensis beldingi*	SE	Resident, breeding population at Carpinteria Salt Marsh; two singing males were observed in Basin 1 during April 2000 surveys.
Light-footed clapper rail *Rallus longirostris levipes*	FE, SE	Historic resident; northwestern limit of range; a few present in 1995-97; presence in Basin 1 unlikely. No vocalizations of this species were recorded in Basin 1 during the April 2000 surveys.
California least tern *Sterna antillarum browni*	FE, SE	Post-breeding visitors in July and August; rest and forage in the vicinity of the estuary mouth.
California brown pelican *Pelecanus occidentalis californicus*	FE, SE	Uses coastline near Carpinteria Salt Marsh; a few use marsh channels for roosting/bathing.
Northern harrier *Circus cyaneus*	SSC	Regular winter visitor; forages over marsh.
Double-crested cormorant *Phalacrocorax auritus*	SSC[2]	A few regularly use the channels of the marsh during winter.
American bittern *Botaurus lentiginosus*	SSC	Uncommon winter visitor; forages in channel habitat.
White-tailed kite *Elanus leucurus*	SFP	Frequently forages over Carpinteria Salt Marsh; no nesting at marsh.
Long-billed curlew *Numenius americanus*	SSC	Regular visitor to Carpinteria Salt Marsh July to April.
Osprey *Pandion haliaetus*	SSC	Occasionally forages at Carpinteria Salt Marsh in fall and winter.
Merlin *Falco columbarius*	SSC	Occasionally forages at Carpinteria Salt Marsh in fall and winter.
Loggerhead shrike *Lanius ludovicianus*	SSC	Regular winter visitor.
Salt marsh shrew *Sorex ornatus salicornicus*	SSC	Taxonomic status uncertain; Point Mugu Salt Marsh is northern limit of range (Collins, personal communication). Unlikely to be present at Carpinteria Marsh; no shrews were captured during April 2000 pitfall trapping.

1. F = Federal, S = State; E = Endangered, T = Threatened, FP = Fully Protected, SC = Species of Concern
2. Special concern only at rookeries (on Channel Islands).
Source: Ferren et al., 1997; Lehman, 1994

Wetlands

Basin 1

Routine wetland determinations, based on the 1987 Corps of Engineers Wetlands Delineation Manual, were conducted at several selected locations to determine which areas within Basin 1, the Nature Park along the Franklin Creek berm, and South Marsh meet the federal criteria for wetlands. The sites were also assessed for wetlands under the criteria used by the California Coastal Commission. Areas that appeared topographically low and supported salt marsh or other wetland types of vegetation were checked to determine if they met the three criteria (vegetation, soils, and hydrology) used by the Corps of Engineers or one of the three criteria as used by the Coastal Commission.

Wetlands were delineated in Basin 1 as a part of a biological assessment (SAIC 2000) for the County of Santa Barbara. All of the areas checked in Basin 1 had layered, moist, but not saturated, soils within approximately 12 inches of the surface. As noted in Section 2.3.1 only the southern portion of Basin 1 has the potential for tidal inundation during extreme high tides. Furthermore, the soil sampling did not find mottles to the surface or waterlogged conditions as described in the soil survey (SCS 1981). The mottles found generally were more than five inches below the ground surface and were very small (about 1 to 2 mm in diameter), brightly colored, with very distinct margins. This would seem to indicate relict conditions rather than currently active hydric conditions. The soil hue and value from the Munsell chart also were not indicative of hydric soils.

Observations during an extreme high tide event on December 22, 1999, showed that only a small portion of Basin 1 is inundated by very high tides. Rainfall events during the winter and spring, if frequent enough, could result in inundated or saturated conditions for 12.5 percent of the growing season (assumed to be 330 days per year), or 41 consecutive days, required to meet the hydrology criterion for wetland determination. On average, this would need to occur in at least half of the years to result in a positive hydrology indicator. The 1999/2000 rainy season had below average rainfall in the early part of the season. In February, several large storms occurred with above average rainfall bringing the total up to average annual precipitation. The site was visited following nearly 3 weeks of no rain, to determine if the soils were saturated or inundated for the required number of days to meet the criterion for wetland hydrology. Areas dominated by pickleweed (middle marsh) and alkali bulrush (scirpus marsh) were inundated with one to several inches of water. Areas with high marsh habitat, had soils that were saturated to the surface. In addition, oxidized root channels, a secondary hydrology indicator, were observed in the area dominated by alkali bulrush. These areas were determined to meet the criterion for wetland hydrology. In addition, the flood control basins were inundated during the March survey. Although the flood control basins would likely meet wetland hydrology criteria, these areas are subject to frequent disturbance associated with flood control operations and would not be considered natural wetlands.

Over half of Basin 1 is dominated by pickleweed and Parish's glasswort, located primarily in the southern portion of the basin. Areas dominated by salt heliotrope and annual grasses or by saltgrass occurred in the north central portion of the basin, and an

area dominated by bulrush with some pickleweed occurred in the northern portion of the basin. The latter appears to be in an area influenced by rain runoff. The vegetation in Basin 1 tended to have little diversity at any one location (i.e., few species were present). The areas sampled usually had only one or two dominant species. The annual grasses had no remnants of the inflorescence and seeds for use in identification. The perennial species, however, were easily identified and most were obligate wetland species. Thus, the vegetation criterion was met at all of the sampled sites (assuming that only one species of annual grass was present and abundant). The predominance of obligate wetland species can be at least partially explained by the fact that most of these species are fairly deep rooted and have persisted due to saline conditions (that prevent many other species from becoming established) and high groundwater levels.

Combining the information for all three criteria, the areas in Basin 1 that appear to currently be Corps jurisdictional wetlands are depicted in previously submitted plan sheets. It is likely that these wetlands were more extensive in the past before sediment deposits resulting from human disturbances in the watershed occurred and the hydrology was altered. Based on field observations, all areas with wetland plants are wetlands under the Coastal Commission criteria. This includes all of Basin 1 except the levees along the creeks, the road fill, and the higher area in the northwest portion of the basin that supports primarily upland species, except a few mulefat and arroyo willows. In addition, the flood control basins would meet the Coastal Commission criteria for wetland hydrology. Submitted plan sheets depict the distribution of wetlands in Basin 1 that meet the Coastal Commission criteria.

South Marsh

Soils in South Marsh were sandy in many areas, and the hue and value from the Munsell chart were not indicative of hydric soils. However, hydric conditions were obviously present at some locations, and the hydrology and wetland vegetation criteria were met, making these areas Corps' jurisdictional wetlands. In other areas, the deposition of sediments has raised the elevation, and upland plants now dominate or hydrology and soils criteria are not met. As described for Basin 1, some areas contain wetland plants but do not meet the other Corps' criteria due to sediment deposition. These areas are wetlands under the Coastal Commission criteria and are delineated on submitted plan sheets.

Areas of middle and high marsh in South Marsh generally have little plant diversity in any particular location although the dominant species varies from place to place. Construction of dikes, placement of fill, and other human activities have altered the marsh considerably. However, remnants of several tidal channels are still present. Salt marsh vegetation has persisted in many areas, but upland species have become established where elevations are higher. Most, if not all, of South Marsh was historically a wetland under both Corps and Coastal Commission criteria.

Habitat Restoration, Revegetation and Management

The marsh habitats present in Basin 1 and South Marsh generally have at least moderate habitat values for plants and animals while the upland habitats, even though used by a number of wildlife species, have low to moderate values due to the abundance of non-native plants. The following recommendations are provided to enhance the habitats and increase their ecological value. Planting specifications are presented below and include details on planting methods, weed control techniques, maintenance, monitoring and other information related to project implementation. A plant palette and locations of revegetation sites are specified on plan sheets previously submitted. A phased approach may be needed to accommodate available budgets for restoration work. The recommendations are presented in order of priority based on enhancing and restoring the functional values of the salt marsh and providing habitat for wildlife.

Salt Marsh Enhancement

The salt marsh habitats in Basin 1 and South Marsh have been essentially isolated from tidal influence. The following recommendations are designed to restore tidal flushing which will improve the habitat quality:

- Tidal flushing in salt marsh dominated portions of Basin 1 and South Marsh, particularly in the middle and high marsh areas will be restored by creating meandering channels in the marsh that terminate at culverts through the levees. The depth and width of these channels will be designed so that regular tidal inundation occurs and scour from tidal flows is minimal.
- Disturbance to existing salt marsh habitats will be minimized and any areas not subject to work should be protected.
- Light equipment will be used for constructing the channels (to minimize soil compaction) and the area disturbed by the work should be limited.
- Cobble beds will be added to the newly created channels to create habitat for mussels and oysters.
- Native salt marsh plant species will be salvaged and used for planting in salt marsh habitats to be created or enhanced.
- Excavated materials, unless salvaged, will be removed to barren upland areas on site or disposed of off site.
- Fill will be removed from salt marsh areas, to the extent feasible. Removal of fill will include the edges of the berms that have encroached on salt marsh vegetation and the stockpile of fill material at the western edge of South Marsh.
- Plant salt marsh and transition species as follows:
    - Plant middle marsh at approximately +2.5 to +3.6 feet MSL.
    - Plant high marsh at approximately +3.6 to +4.0 feet MSL.

- Native plant species that commonly occur in the transition zone between salt marsh and upland will be incorporated into buffer areas along the berm and road banks at approximately +5 to +7 feet MSL.

Non-native Species Removal and Weed Control

Exotic species, which are common in the existing salt marsh and upland areas surrounding the restoration site, will be the target of vigorous weed control efforts. Several exotic species have been targets for removal from the existing salt marsh and adjacent upland communities. Extremely invasive exotic species, such as iceplant (*Carpobrotus edulis*) and myoporum (*Myoporum laetum*), are known to preclude growth of native species and should be targeted for complete removal from the project site. Myoporum is identified as a priority species to be targeted for removal. Iceplant is also identified for removal, but the iceplant currently on the site is in localized areas and is not likely to spread into the revegetation or enhancement areas during the maintenance and monitoring period (although it should be monitored and removed if found). Upland areas support a mix of non-native weedy grassland habitat with scattered individuals or patches of native grasses and shrubs. Non-native grassland provides habitat value, but non-native grasses and herbs may invade restoration and enhancement areas and impede native plant establishment at the site. Complete elimination of all non-native plant species is likely to be infeasible; however, removal of exotic species and replacement with native vegetation will deter weeds from reestablishing.

- Weed control efforts will be implemented prior to planting prior to planting.
- Invasive exotics and weedy plant species, such as myoporum, iceplant, mustard, and others, will be removed from upland and transition areas and replaced with native plant species compatible with the habitat type and the anticipated use of the area.
- Eradicate weeds by mechanical control methods (i.e., using heavy equipment, hand tools, or solarization), refer to the planting specifications for details on these methods and where in the project area they may be applicable. Spot application of Glyphosate will be considered for perennial species control.
- In Basin 1, the Monterey cypress along the south side of the railroad will be left to provide habitat for birds.

The Land Trust and its project Biologist will conduct regular checks for weeds (at least once each during spring, summer, and fall) while native species are becoming established.

Upland and Transitional Marsh Habitat Enhancement

The Land Trust will establish a mosaic of shrub and grassland in the upland and transition habitats that will increase habitat value for a variety of wildlife, including rodents and raptors.

- In areas that are cleared of all vegetation to reach ideal elevations (e.g., graded areas, edges of berms, or areas where weeds are removed), seed with a mix of colonizing native grasses and shrubs for immediate ground cover will be broadcast. Container stock will be used to supplement the planting and increase species diversity.

- Local stock will be used for propagation of container plants and for seed collection.
- Upland and transition habitats in the north part of Basin 1 and along berms and roads will be enhanced by planting native coastal sage scrub species, such as coast golden bush, and native grasses after the non-native species have been removed.
- The area in South Marsh that supports remnant coastal dune vegetation will be preserved, enhanced, and expanded. Enhancement will include removing non-native species and planting dune species similar to those present on the site or may have been present historically. Dune habitat was successfully established at the Carpinteria Salt Marsh Nature Park and similar species should be appropriate for dune habitat at South Marsh.
- Willow scrub areas in the north part of Basin 1, adjacent to Sandyland Cove Road, should be enhanced with willows and riparian shrub species after removal of iceplant.
- The area between the northern boundary of Basin 1 and the railroad right-of-way should be planted with native species to create a buffer area between native habitats and the railroad once non-native specie are removed. Native trees (such as western sycamore, and large native shrubs) should be used at this location to increase perching, roosting, and potentially nesting areas for raptors.

Performance Criteria

All planting shall have a minimum of 70% survival, by species, the first year and 100% survival thereafter and/or shall attain 75% cover after 3 years unless otherwise stated below. Qualified landscapers shall install the plants with oversight and instruction to be provided by Project Biologist. If the survival and cover requirements have not been met, the Land Trust is responsible for replacement planting to achieve these requirements. Replacement plants shall be monitored with the same survival and growth requirements for 3 years after planting.

Monitoring

The objectives of restoration and enhancement as they relate to monitoring are twofold:

1. To restore and enhance the degraded portions of Basin 1 and South Marsh within Carpinteria Salt Marsh and to reestablish self-sustaining wetland, transitional, and upland plant communities in these areas.
2. For the restored area to develop the full complement of wetland functions and attributes characteristic of existing portions of Carpinteria Salt Marsh having similar tidal regimes and plant communities.

A monitoring program for the Basin 1 and South Marsh Restoration and Enhancement is needed to:

1. Document the success of the initial program objectives;
2. Determine additional maintenance or remedial action during project implementation;
3. Increase scientific understanding of the processes involved in salt marsh restoration.

The following monitoring program is based on the Monitoring Plan that was developed for the Carpinteria Salt Marsh Enhancement Project, Phase 1 – Ash Avenue Wetland, now more commonly referred to as the Nature Park.

This section describes a cost-effective approach to the basic project monitoring and maintenance that:

- Verifies re-establishment of tidal flows (and seeks to correct the situation if tidal action is inadequate or dissimilar compared to similar situations elsewhere in the Marsh); and
- Verifies re-establishment of self-sustaining native plant communities and provides for remedial actions, if necessary, to ensure the eventual establishment of self-sustaining native plant communities.

Monitoring proposed for the Basin 1 and South Marsh Enhancement project falls into the following categories, which are described below:

1. Maintenance-related inspections; and
2. Performance monitoring.

Maintenance-Related Inspections

Maintenance-related inspections are conducted to determine that systems are progressing as expected and to identify remedial action (e.g., weeding, plant replacement, etc.). Maintenance-related inspections should be conducted during the establishment phase and will include the following:

1. Inspect and verify tidal exchanges and inundation levels within the marsh at various tides (as predicted on the tide tables). Planting zones within the restoration area are based on distribution of vegetation zones with respect to elevation in Basin 2 of Carpinteria Marsh. It will be important to establish that the restoration area has similar tidal inundation regimes to those in Basin 2 at a given elevation. If not, plant community objectives need to be adjusted to match the actual tidal regime. Monitoring will demonstrate that tidal channels are subject to adequate flushing on a daily basis. Banks, channels, and flats will be inspected for evidence of excessive erosion. The marsh tidal channels should not exhibit areas of stratified, stagnant water.

2. Inspect planting areas to verify that transplants, sprigged plants, direct cuttings, and salvaged materials are healthy appearing and establishing. Monitor germination and establishment of seeded species and weeds in uplands and wetlands.
3. Inspect temporary irrigation systems; verify that they are in place, undamaged, and functioning adequately.
4. Monitor weed growth and treat as necessary. Consult specifications for list of weed species to be removed whenever encountered ("zero tolerance" species) versus tolerable species provided they do not exceed certain thresholds of cover or frequency.
5. Items 2, 3, and 4 above should be performed monthly.

The Project Biologist will periodically review the General (Grading) Contractor's and Revegetation Contractor's maintenance records and make periodic field checks to ensure that an adequate level of inspection and maintenance is being conducted by the Revegetation and General (Grading) Contractors to ensure project success.

Performance Monitoring

Performance monitoring includes quantification of attributes such as tidal flushing and vegetation establishment and comparing them to predetermined standards that include comparison to reference areas in Carpinteria Salt Marsh. Performance monitoring is conducted to confirm that the project is achieving the goals set forth during the planning process. Performance monitoring will also serve to test the first part of the hypothesis presented above.

Hydrology

The goal is to restore a normal regime of tidal flushing. Tidal cycles and inundation more or less equivalent to areas in the Nature Park of Carpinteria Marsh having similar elevations would constitute successful performance. Allowances can be made for lags due to distance from mouth and intervening elevations. Measurements will be made with a tide staff anchored in each basin that can be visually read by a monitor.

Vegetation

The goal is to establish self-perpetuating marsh, transitional, and upland plant communities, composed wholly or predominately of native plant species, with plant vigor, growth rates, and plant cover similar to equivalent areas in Basin 2.

- Plant communities: The goal is to establish plant communities similar in species composition, structure, and function to plant communities in equivalent physical environments in functioning portions of Carpinteria Salt Marsh. Exact replication of plant communities at any one location in the marsh is not a requirement. Prior to project implementation, reference areas will be identified for each of the plant communities this plan will attempt to establish. The selection of reference areas may change during the establishment period to better reflect the developing vegetation, because "as built" to tidal regimes and soils may differ from planned conditions, and

the vegetation will reflect this. Basin 2 in Carpinteria Salt Marsh has been identified as a target because it supports well established and functioning salt marsh habitat. However, the Carpinteria Salt Marsh Nature Park may also be an appropriate reference area for comparing the progress of the restoration effort.

- Upland planting is designed to support the salt marsh habitat by preserving and enhancing the native dune scrub, coastal sage scrub, and grassland habitats that historically have occurred adjacent to native salt marsh habitats. Although it is difficult to find representative native upland habitats in the vicinity of the Carpinteria Salt Marsh for comparison, other areas that support these habitat types occur locally and may be used as reference sites. Upland habitats, including native dune scrub, coastal scrub and grasslands, were incorporated into the landscaping plan for the Carpinteria Salt Marsh Nature Park. Although the landscaping is not typical of natural communities, it may be appropriate to use these sites for reference by comparing the success of plant establishment.
- Rather than rigid adherence to a series of narrowly defined target communities, acceptable vegetation would include vigorous, predominately native vegetative cover reflective of salt marsh, transitional, and upland environments. For example, extensive areas dominated by pickleweed and minimal Parish's glasswort zones with narrower transition zones to upland may develop despite what is suggested in the planting plan. If actual hydrological performance results in different levels of inundation and salinity regimes than those found at similar elevations in Basin 2, then the target plant community and reference areas will be adjusted accordingly. The species mix will resemble that proposed in the individual habitat categories, but strict adherence to obtaining all of the species will not be a criterion for success.
- Cover of exotic species should be stable or decreasing at acceptance. The Planting Specifications provides a list of exotic plant species that should be totally excluded from the restoration area. Other exotic species, such as non-native grasses, which are well established in parts of the Carpinteria Salt Marsh and provide a valuable habitat function for wildlife, would be acceptable.
- At acceptance, cover of native plants should be equivalent to native plant cover in reference areas and native plants should be of equal or greater vigor and growth rate in the restoration area compared to the reference site. During establishment, cover of natives should show a trend of increasing cover vigor.
- By the third year (after acceptance of planting/replanting [if necessary]), the percent cover of native vegetation for each of the created salt marsh habitats should be as stated below. In addition, if an area includes more than the maximum cover or frequency of exotic species (non-wetland species or non-native species) then restoration should not be considered successful for that area. The species diversity, mix and percent cover (individual and cumulative) should approximate similar functional areas within Basin 2 or exhibit a trend to reach that goal within a reasonable period of time (e.g., 1 to 2 additional years).

Performance criteria to be met at the end of the Maintenance Period described in the Planting Specifications are:

For graded areas:

1. Tidal channels and mudflats - 0 percent establishment of vegetation expected.
2. Middle marsh - a minimum 70 percent total vegetative cover of which 95 percent cover is native species and a maximum 5 percent cover and/or frequency is attributed to exotic species.
3. High marsh - a minimum 70 percent total vegetative cover of which 80 percent cover is native species and a maximum 20 percent cover and/or 5 percent frequency of exotic species. This habitat may be susceptible to invasion by the introduced sea lavender (*Limonium ramosissimum*).
4. Transition areas- a minimum 50 percent total vegetative cover of which 60 percent is native species and a maximum 40 percent cover and/or 10 percent frequency of exotic species.
5. Grassland and Coastal Scrub - a minimum 50 percent total vegetative cover of which 60 percent is native species and a maximum 40 percent cover and/or 10 percent frequency of exotic species.

For enhancement of existing vegetation:

6. Dune enhancement - a minimum 40 percent total vegetative cover for both planted and existing vegetation (naturally occurring foredune habitats typically have low percentage of plant cover) of which 70 percent is native species and a maximum 5 percent cover and/or 5 percent frequency of exotic species, excluding sea rocket (*Cakile martima*), if present. This habitat may be vulnerable to invasion by iceplant.
7. Other areas that receive enhancement planting should have at least 50% establishment. Plants must be healthy and showing signs of normal growth.
8. The enhancement areas must have an assemblage of plant species reflective of natural habitats or are likely to become so (some seeded plants may still be small but plants are present and growing).
9. There should be no bare areas greater than 2 square feet in size unless this is a common component of the habitat (i.e., mud flats).
10. Exotic species should not exceed the specifications described above.

(Note: transitional and upland areas may be susceptible to invasion by annual non-native grass species, which may contribute a significant portion of vegetative cover during the early stages of habitat development. As these habitats mature and shrubs become established and develop, it is anticipated that percent cover of native shrubs will continue to increase accompanied by decreased cover of non-native species. It will be essential to determine after the 3 year monitoring period that a pattern is developing to support this assumption.)

Schedule

Performance monitoring will be conducted annually for the first 3 years prior to acceptance of any plant community and up to 5 years if additional work is need to meet objectives. It is anticipated that 3 to 5 years after initiation of restoration activities, vegetation in the different plant communities will show sufficient development and stability for acceptance.

Vegetation Monitoring Methods

Vegetation monitoring will consist of quantitative sampling using transects, quadrats or other reproducible objective methods proposed and justified by the monitoring contractor, coupled with qualitative observations. To document changes over time a series of permanent monitoring transects and photopoints should be set up at the outset of the program and periodically resampled and rephotographed during the performance monitoring period to track changes at the restoration sites. Resampling and rephotographing should be conducted at least annually, but may be conducted more frequently (e.g., to record seasonal changes). Comparisons with target areas are to be conducted annually.

Soils Monitoring

Soils will not be tested if plant growth and establishment appear to be normal. It is assumed that normal plant growth will be a reflection of adequate soil conditions. Soils would be a logical subject of investigation if there are problems with plant establishment or growth.

Monitoring Reports for Regulatory Agency Review

The Land Trust shall submit, for the review and approval of the Executive Director of the California Coastal Commission, on an annual basis, for a period of five (5) years, a written monitoring report, prepared by a monitoring resource specialist indicating the progress and relative success or failure of the restoration on the site based on the specifications above. This report shall also include photographs taken from pre-designated sites (annotated to a copy of the site plans) indicating the progress of recovery at each of the sites. At the end of the five year period, a final detailed report on the restoration shall be submitted for the review and approval of the Executive Director of the California Coastal Commission.

Planting Plan and Specifications

Introduction

The Planting Plan for the Carpinteria Salt Marsh Restoration Plan for Basin 1 and South Marsh is presented in this section and the referenced plan sheets. The Planting Plan was prepared based on recommendations presented in the Biological Assessment for Basin 1 (SAIC 2000). This section describes the methods and considerations for planting and maintenance of the wetland and upland habitats to be created, restored, or enhanced as identified on the planting plan sheets.

The planting specifications are based upon the following assumed organizational structure for the native habitat restoration and enhancement portions of the project. A General Contractor will perform the grading and earthwork on portions of the project site, followed by habitat restoration and enhancement to be performed by an Installation Contractor. In other portions of the site, grading will not be done and the Installation Contractor will be planting these areas with a native plants identified in the plans. In these areas, the Land Trust has previously completed significant work to eradicate invasive plants such as ice plant, myoporum and castor bean. In these non-graded areas, the Installation Contractor will work to achieve successful planting of container plants provided and to prevent/control weed growth through mulching and weed management.

Collection of seed and cuttings and propagation of plants to be planted has been or will be done by separate contract growers (Growing Contractor). Plants and seed will be delivered to the site in a timely manner and in condition to be planted. The Installation Contractor and Project Biologist will receive and inspect all contract grown plants and seed prior to use.

As one part of the Project, an Installation Contractor will coordinate with the General Contractor to harvest and replant wetland plant species, as specified herein, within designated areas by an Installation Contractor. Distinct areas totaling approximately 3 acres will be targeted for transplant of wetland species. The Installation Contractor and General Contractor are required to coordinate closely, under the direction of the Project Biologist, to achieve the harvest of wetland vegetation and maximum feasible transplanting of it within the three acres identified on the plans.

The Installation Contractor is expected to review thoroughly the plans and specifications prior to initiating work and provide any suggestions or changes to improve project outcomes to the Land Trust's Project Biologist for approval.

As-Built Record of Plantings and Irrigation System

The Installation Contractor shall prepare and keep up-to-date a list of container plants installed in each planting area shown on the plans, including the number of each plant species installed. This list shall be kept on the job site and be available for inspection by the Project Biologist. This record of plantings will be used to verify progress and to determine planting success ratios at the end of the performance monitoring period.

The Installation Contractor shall provide a written as-built record of the temporary irrigation system after it is installed. Any deviations in layout, location of valves or other changes to the irrigation system from the original plans shall be clearly measured and marked on the plan sheet and provided to the Land Trust upon completion. The as-built submittals shall include a legend of all equipment installed and copies of manufacturer specification sheets, operating and maintenance manuals.

Plant Materials

The tables provided on the planting plan sheets provide lists of plant species suitable for planting in the project area, and describe the planting methods (i.e. container stock, direct transplant, seed dispersal), plant densities and other planting direction by habitat and plant type.

1. All plants shall be true to name.
2. In cases of discrepancy; botanical names shall take precedence over common names.
3. Representative samples of each species of each clone, species, or cultivar shall be delivered to the site or stockpiled and labeled with their full botanical name. Each individual plant shall be labeled for those species, clones, or cultivars which are very similar to other species and could be easily confused. The Project Biologist will advise the Growing Contractor on which species must be individually labeled.
4. Any plant material, determined by the Client's Project Biologist to be untrue to the species, clone, and/or variety specified, shall be replaced by the Growing Contractor, at no cost to the Land Trust.

No substitutions of plant materials will be allowed. Some substitutions of quantities may be allowed on a case-by-case basis as approved by the Project Biologist.

Seed

1. Seed collected for broadcast seeding shall be mixed, as appropriate, packaged, and shipped in approved containers, labeled specifically for the seeding area, and delivered to the job site.
2. Seed and seed mix are not interchangeable and shall be applied only to those areas as specified.
3. Seed and seed mix shall be stored and handled to prevent moisture or insect damage to the product.
4. Permission of landowners/managers is required for all seed and propagule collection.

Direct Transplant Materials

1. Species identified for direct transplant, for all or part of the planting installation, are listed on planting plan sheets and include saltgrass (*Distichlis spicata*), salt marsh baccharis (*Baccharis douglasii*), western goldenrod (*Euthamia occidentalis*), basket rush (*Juncus textilis*), pickleweed (*Salicornia virginica*), alkali heath (*Frankenia salina*), fleshy jaumea (*Jaumea carnosa*), and several regionally rare species.
2. Propagules designated for direct transplant (other than salvaged materials, discussed below) shall be identified in the field at previously selected locations by the Project Biologist.

3. Plant materials collected for direct transplanting (other than salvaged materials) shall be immediately transported to their designated planting locations and planted.
4. An 8"x 8" x 8" mass of root structures (approximately) and adherent soil shall be collected from healthy populations on adjacent areas. Collect the root structures in discontinuous patches to avoid excessive disturbance to existing populations. (Materials may be salvaged from the tidal channels to be cut into the existing salt marsh if root/soil mass is kept intact and stored appropriately.)
5. Keep root sections moist and protected from wind and sunlight from time of collection to time of installation. If stored overnight, a temporary irrigation system or garden hose shall be used as necessary to ensure maintenance of proper moisture content. A temporary shade house may be constructed on-site for short-term storage of transplanted materials.
6. Saltgrass "stolons" may include above-ground runners and below-ground rhizomes.
7. Stolons will be excavated by hand using shovels or picks.
8. Stolons collected shall be a minimum of 1/16-inch in diameter.
9. Stolons will be collected from both male and female plants at a variety of separate locations as approved by the Project Biologist to ensure genetic diversity.
10. Stolons may be removed during either active or dormant periods, and will be transplanted promptly to designated areas.
11. Storage of direct transplant plant materials is not recommended. The Project Biologist is required to coordinate with the General Contractor to achieve the harvest and transplant as specified herein.

Salvaged Materials

1. Plant material salvaged from the areas where new tidal channels are to be dug in the existing salt marsh shall be immediately transferred to covered and shaded areas and irrigated.
2. Salvaged material shall not be allowed to dry, decay, or be exposed to direct sunlight or excessive wind.
3. Salvaged plant materials should not be held for prolonged periods (more then 4 weeks) prior to planting. Planting should ideally occur within seven days of salvaging. If necessary to accommodate the construction schedule, salvaged materials may be potted and stored on site or transferred off site for storage, with approval of the Project Biologist.
4. As root/soil plugs (ideally measuring approximately 8"x 8" x 8") of salvaged material are available, these may be planted at the restoration site using the direct transplant method.

5. If vegetative (above ground) material of species including *Salicornia virginica, Frankenia salina,* and *Jaumea carnosa* is available and in good condition (i.e., not dried or decayed), then this material may be cut up and planted at the restoration site using the broadcast sprigging method.

Harvesting and Cutting

1. Any harvesting of fresh propagules shall be conducted under the supervision of the Project Biologist in a manner that avoids long-term damage to existing salt marsh vegetation and donor plants. Harvesting locations and methods shall be approved by the Project Biologist, prior to their implementation.
2. No harvesting of propagules will be allowed in areas where concentrations of weedy species such as introduced sea lavender are known to occur.
3. Harvesting of fresh propagules shall be between November and January, just prior to broadcast date, when plants are dormant and handling and storage are less damaging. However, timing of harvesting may be adjusted so that planting can occur within a reasonable time once grading has been completed.
4. No harvesting will be conducted between February 1st and August 30th, during the Belding's savannah sparrow nesting period.
5. During the harvesting operation, all plant materials shall immediately be transferred to covered and shaded areas. Plant material shall not be allowed to dry, be exposed to direct sunlight, or decay.

Container Stock

1. It will be the responsibility of the Growing Contractor to ensure that container stock planted in saline habitats will be able to acclimate to the salinity conditions at the restoration site after planting. The Growing Contractor is responsible for the successful establishment of those species to be planted at the site using the container stock method.
2. Container stock shall be transported to the site in their original containers and shall be inspected and accepted upon delivery to the site by an Installation Contractor and Project Biologist.
3. All container stock plants brought to the site from outside sources shall be in accordance with the California Department of Agriculture's regulation for nursery inspections, rules, and ratings.
    a. All plants shall have a normal habit of growth and shall be sound, healthy, vigorous, and free of insect infestations, plant diseases, sunscalds, fresh abrasions of the bark, excessive abrasions, or other objectionable disfigurements.

b. Tree trunks shall be sturdy and have well "hardened" systems and vigorous and fibrous root systems that are not root- or pot-bound. In the event of disagreement as to condition of root system, the root conditions of the plants in containers will be determined by removal of earth from the roots of not less than two plants or not more than two percent of the total number of plants of each species or variety.

c. Where container-grown plants are from several sources, the roots of not less than two plants of each species or variety will be inspected. In case the sample plants inspected are found to be defective, the Installation Contractor or Project Biologist reserves the right to reject the entire lot or lots of plants represented by the defective samples.

Execution

Protection of Existing Native Habitats

Native habitats where no grading is planned are identified on the planting plan sheets and are considered environmentally sensitive areas to be protected during salt marsh restoration activities using appropriate methods, described below and included in the grading plan, and as approved by the Project Biologist.

The Project Biologist shall ensure that existing salt marsh habitat, coastal scrub, swales or other wetlands, and other native vegetation on the project site, are protected (as indicated on planting plan sheets) against unnecessary damage during grading, digging of tidal channels, propagule collection, installation of plants, and the installation of the irrigation system (if used), as follows:

1. Staking, installation of temporary orange protective fence, or other acceptable means of protection along "Limits of Grading" line to protect existing native habitats will be provided by the General Contractor or Installation Contractor as shown on the plan sheets.

2. Any contractor causing adverse impact to sensitive habitat shall restore damaged habitat to its original condition to the satisfaction of the Project Biologist. Said contractor shall be subject to a penalty of $100 per square foot of habitat damaged and not successfully restored.

At the direction of the Project Biologist, existing salt marsh vegetation identified for removal during restoration activities (i.e., digging of new tidal channels through the existing salt marsh) shall be salvaged, to the maximum extent feasible and used to enhance existing salt marsh vegetation or in the planting for the restored salt marsh site, as specified herein.

Invasive weed eradication in the project area has been partially done by the Land Trust in the project area. Additional weed eradication (clearing and grubbing) will be done by the General Contractor in the areas to be graded. Incidental weed removal and weed control measures during and after plant installation will occur. Herbicide use is limited to Glyphosate and by location in the specifications and permit conditions.

Site Preparation

A. Weed Eradication.

1. Several exotic species have been identified as targets for removal from the existing salt marsh and adjacent upland communities. Extremely invasive exotic species, such as iceplant (*Carpobrotus edulis*) and myoporum (*Myoporum laetum*), known to preclude growth of native species over large areas, are targeted for complete removal from the project site. Myoporum has been cut and stumps treated with glyphosate extensively in the project site, and will be removed along Del Mar Avenue west of Sandyland Cove Road (South Marsh). Iceplant in most of the site has been treated with solarization or use of Glyphosate. The residual dead iceplant material will be left in place to provide a barrier to weed growth, and cleared only as needed for planting.

2. Non-native grasses and herbs are also an impediment to native plant establishment at the site. Areas identified for upland planting currently support a mix of non-native weedy grassland habitat with scattered individuals or patches of native grasses and shrubs. The upland areas that support non-native grasslands are currently dominated by species including Bermuda grass (*Cynodon dactylon*), brome (*Bromus* sp.), Italian ryegrass (*Lolium multiflorum*), wild oat (*Avena* sp.), Mediterranean barley (*Hordeum marinum*) and others. Focused weed control measures in areas to be enhanced with native upland plantings prior to planting will be implemented. Complete elimination of all non-native plant species is likely to be infeasible; however, removal of exotic species and replacement with native vegetation will deter weeds from reestablishing.

3. *Mechanical weed control*. In Project areas not specified for clearing, grubbing and grading appropriate methods of weed eradication and control to achieve successful native plant restoration will be employed:

    a. Care shall be taken to assure that the species are not spread by the removal process. If the species reproduces by seed, a technique is required to remove the plants without distributing the seed shall be used.

    b. The entire root system must be removed or killed for plants that reproduce by rhizome or stolon.

    c. For areas that are to be graded, the grading will remove the vegetation and the topsoil containing the weed seed. Any areas dominated by weed species that are to be graded should have the vegetation and topsoil removed from the site and properly disposed. If topsoil is needed for use elsewhere, or offsite soil disposal is not recommended, then methods shall be used to reduce the weed seed-bank in the soil before distribution in the project area (i.e., solarization or “grow and kill” described below).

d. The following methods are recommended for removal of specific species:

- *Myoporum* – Myoporum is a large shrub that has been identified in several locations within the project site. Mechanical removal of myoporum involves cutting the shrubs and removing the root system. The plant materials must be removed from the site and disposed of appropriately. Follow-up is required to remove any plants that re-sprout from roots or stems that were missed during the removal process or from seed left in the soil. Significant stands and plants of myoporum have been previously cut and treated with Glyphosate within the Project site. Any identified remaining or resprouting Myoproum within the planting areas shall be eradicated as part of the Project.
- *Iceplant* - Large patches of iceplant are present at several locations in the project area, as identified on the Planting Plan. To a large degree, this iceplant has been successfully killed by solarization or Glyphosate treatment prior to start of this Project. The dead iceplant can be left in place, and native plants can be planted in "planting spots" within the dead iceplant mat except along Sandyland Cove Rd. where saltgrass is to be planted. In those areas, the iceplant shall be removed.
- *Non-native grasses and herbs* – The most common mechanical control of non-native grasses and herbs (such as mustards and thistles) is cutting by mower or weed-whacker. Most of the target plants are annual. During construction a diligent effort to remove seed heads as they develop shall be employed to reduce the distribution of seed on the site and allow seeded or planted native plants an opportunity to become established.

4. *Chemical weed control*. If necessary, glyphosate (Rodeo®) may be used on the restoration site by a licensed pest control applicator and as approved by the Project Biologist. Herbicide application shall be performed by a licensed pest control applicator (PCA)**.** The existing salt marsh habitat shall be protected against herbicide spray, unnecessary cutting, breaking, smothering, and foot and vehicular traffic during any weed control work.

a. A broadcast spray of Rodeo® may be used, as necessary, as part of a "grow and kill" treatment to control invasive weeds. This method may be suitable to reduce the cover of non-native grasses and weedy species from the edges of the berms, especially areas that are graded, to allow planted native species time to establish and grow. To implement a "grow and kill" treatment, water the affected areas for a minimum period of seven days to stimulate weed germination within the topsoil horizon. After allowing

sufficient time for weeds to germinate and emerge, apply the herbicide, allow the herbicide to act, and allow the soil to recover before seeding or other planting operations are initiated. Reapplication of herbicide may be required if precipitation falls within 48 hours. The Installation Contractor shall ensure that herbicide spray does not drift into areas with existing salt marsh vegetation during operations. If required, repeat operation. All Glyphosate use will be under the supervision of the Project Biologist.

b. The following minimum requirements shall be employed for spraying of Glyphosate:

- No spraying within restoration site shall occur without prior approval by the Project Biologist of methods to protect non-target species to be employed.
- No herbicide applications shall be allowed when wind speed exceeds 5 MPH.
- No spraying will be allowed when coastal fog is present, unless effectiveness under these conditions is demonstrated.
- No spraying shall be allowed within 48 hours of predicted rainfall or 72 hours after rain.
- No non-target plants shall be contaminated by spray drift.
- Ambient temperatures shall be within the recommended range for each of the specified herbicides. (Use of glyphosate requires temperatures exceeding 65° Fahrenheit.)
- Target plants shall not be disturbed until the herbicide has taken effect, approximately 4 to 6 weeks, depending on the time of year.

B. Finish Grading and Soil Surface Preparation

1. The Project Biologist and Installation Contractor shall inspect graded areas of the Project site to determine that the General Contractor has provided finished grade elevations, stable contours and soil conditions acceptable for planting consistent with contract plans and specifications.
2. In some cases, soils may need to be augmented with a suitable material to increase aeration and improve conditions for vegetation (i.e., sand added to the proposed dune planting area). The General Contractor will adjust the grading contours to allow for the addition of sand or topsoil as directed by the Project Biologist.

3. Soil testing may be necessary prior to planting and importation of topsoil or augmentation of existing soil may be considered prior to seeding or planting operations. A professional soil testing facility shall be used to conduct the necessary tests if necessary.

4. Sand may be imported from the dredge spoils at the mouth of the Carpinteria Salt Marsh or other on site locations identified by the General Contractor with approval from the Project Biologist. In particular, sand will be relocated from the marsh mouth to the area east of the mouth to create elevations suitable for establishment of coastal dune habitat.

5. Survey stakes marking topographic contours at completion of grading and soil preparation will be set in place marking limits of the restoration site.

    a. Topographic contour lines will be marked with stakes spaced 10 feet apart along the contour, at contour intervals of 0.5 foot, from 2.5 to 6.5 feet above mean sea level (MSL) within the salt marsh restoration areas. Elevation is to be indicated on each stake.

    b. Appropriate plants to be installed will be based on the specifications and elevation markers provided by the General Contractor.

C. Soils Testing

1. Once grading is complete and accepted, representative soil samples will be taken from the proposed planting areas (minimum of 3 samples per habitat area, unless the sampling protocol is modified by the Project Biologist).

2. Soil shall be analyzed by an approved commercial soil-testing laboratory for suitability for planting with specified vegetation.

3. Notification to the Project Biologist will be given if any harmful substances found in the soil.

4. Augmentation of the existing soils with amendments and/or fertilizer to provide suitable conditions for plant establishment and growth will be determined by the Project Biologist.

D. Pre-Planting Soil Stabilization

1. All soils shall be stable or stabilized within 7 calendar days of the spreading of topsoil or acceptance of final grading.

2. Soils stockpiled on the site for future use or to be disposed of will be stabilized using an appropriate method (approved by Project Biologist) and no impacts shall occur to existing salt marsh vegetation or areas to be revegetated due to the presence of stockpiled soils. Any surplus sand or soil not utilized for restoration planting shall removed from the site and disposed of properly.

G. Irrigation

1. A temporary irrigation system, shall be installed after grading sign-off and prior to planting, as specified in the plans.
2. No permanent irrigation system will be installed.

Planting Methods

Broadcast Seeding

Broadcasting of seed by hand, versus hydroseeding, is recommended for the upland portions of the site for the following reasons: (1) discrete areas are to receive different seed mixes and hand broadcasting will be more accurate; and (2) seed of some species may be difficult to obtain and hand broadcasting methods may be more conservative. Hand broadcasting of seed shall be conducted as described below.

In the field verification of the dimensions and locations of each area to be seeded will be done in accordance with the planting plan. Each area to be seeded will be marked in the field in a manner that clearly designates each seeding area and appropriate seed/seed mixes. The location of seeding areas will be confirmed by the Project Biologist prior to seeding operations.

If seed is not mixed, a seed mix specific to each area to be seeded shall be prepared to obtain the desired species and quantity of seed. Special care shall be exercised to achieve a uniform distribution of seeds within the mix and to achieve uniform distribution of the mix over the prescribed area for that mix.

Prior to seeding, soils (not already loosened) shall be scarified by ripping the surface to a depth of 12 inches with ripper blades placed approximately one foot apart, where space allows use of such equipment. Ripping shall follow the contours of the slopes. If the slopes exceed 2:1, ripping is not recommended. Instead, the soil surface should be loosened by dragging a section of chain-link fence or a harrow behind a tractor.

The specified seed mix shall be evenly spread by hand in the seeding area. Designated areas shall be seeded uniformly at a rate to include total seed needed for each specified area. Seed shall be applied in two passes at the rate of half of the seed total required for each area per pass. Each pass shall be in opposite directions to one another. Seeded areas will be lightly raked after seed application or use other methods (i.e., dragging a chain between two people) to incorporate seed into the soil and prevent it from floating or blowing away. Seed shall not be planted more than 2 inches deep. All seeded areas will be watered as conditions require to maintain moisture content necessary for proper germination and establishment of the seed, and as directed by the Project Biologist.

It is recommended that broadcast seeding operations be completed prior to transplanting operations and application of soil stabilization techniques. This will allow for minimal disturbance of transplants and soil stabilizers.

For seeding in enhancement areas, where native plants are present, the methods above are applicable except care will be required to avoid damage to existing native plants. In this case, it is recommended that raking or other low-impact method be used to scarify and loosen the soil prior to seed dispersal. Seed shall be dispersed in the open areas between shrubs or other established vegetation.

Broadcast Sprigging

Pickleweed, jaumea, and alkali heath will readily resprout from vegetative fragments, particularly stems and rhizomes. The broadcast sprigging method may be used in graded areas to be revegetated with middle and high marsh vegetation.

Fragments for broadcast sprigging shall be created by either cutting the plant material by hand or using mechanical means to form fragments approximately 4 to 6 inches long. Salvaged material, as available, will be used in addition to the total amount of material needed per area identified in the planting plan sheets. Salvaged material may be available from the tidal channels to be dug into the existing salt marsh. Material not suitable for direct transplant may be used for broadcast sprigging in addition to the fresh material.

Locations for broadcast sprigging include middle and high marsh habitats identified in the Planting Plan. Substrate needs to be muddy prior to broadcast. The Installation Contractor shall, if necessary, irrigate the designated areas sufficiently to achieve a muddy surface.

Broadcast sprigging must be completed within one week or less of harvesting and preferably within 48 hours after harvest. It is recommended that propagules be collected when planting surface is ready thus eliminating the need for storage.

The plant material shall be raked in by hand, pressed into the mud surface using wood planks, or any other method to assure plant material is in good contact with the substratum and does not float or blow away.

Irrigation shall be applied to those areas planted by broadcast sprigging method, if daily inundation does not occur, until plants sprout and become established or if deemed necessary by the Client's Project Biologist.

Container Stock

Planting of container stock will be performed during those periods when weather and soil conditions are suitable and in accordance with locally accepted practice. The number of plants installed per day will be limited to the amount that can be watered on that same day in any particular planting area.

Containers will be opened and plants removed in such a manner that the ball of earth surrounding the roots is not broken and they shall be planted and watered immediately. Containers shall not be opened prior to placing the plants in the planting area.

Planting holes will be excavated to a size twice as large as the rootball. The holes will be partially backfilled with suitable native soil. Plants are to be examined for a healthy root system. If there are signs of being rootbound or girdling, scarify the rootball. Rootballs are to be inserted into the planting hole so the top of rootball is slightly above finished grade. The soil around the plant is to be firmed and more backfill added if necessary to bring soil to the root crown at finished grade. Immediately after installation, plantings are to be irrigated so as to settle the soil. If roots become exposed, additional soil will be placed around the root crown.

All containerized plants shall be laid out in their containers at the locations indicated by the planting plan sheets before plant holes are dug. If underground construction or a utility line is encountered in the excavation of planting areas, other locations for planting may need to be selected.

Willow Pole Cuttings Installation

Willows (*Salix* sp.) and mulefat (*Baccharis salicifolia*) are present in the project area within areas identified as Willow Scrub, to be protected, on the planting plan sheets. Willows and/or mulefat may be used to enhance or expand existing willow scrub once iceplant is removed from areas adjacent to the existing willow scrub. Both willows and mulefat sprout readily from pole cuttings. Plant materials may be obtained from existing willows and mulefat on-site or other areas nearby, as approved by the Project Biologist.

Pole cuttings will be obtained from adjacent areas during the winter while plants are dormant (generally December through March 15th, depending on species). Cuttings are to be taken with sharp pruning shears, cutting the bottom at a slant, without causing injury to the bark. Pole cuttings will be from 2 to 4 feet long, and from 1/2-inch to 1-1/2 inches in diameter at the bottom. Side branches will be trimmed with sharp pruning shears, flush with the main branch without causing injury to buds. One set of leaves will be left at the top of the pole.

Pole cuttings will be kept moist by wrapping them with wet fabric or immersing them in water during transport. If possible, cuttings will be installed on the same day as cut, or store overnight fully immersed in water.

A planting hole 8 to 12 inches in diameter will be augured to a minimum depth of 4 feet. (Or, poles may be hammered into the ground using a mallet. If this method is used, at least half to three-quarters of the length of the pole should be below the ground surface.). Pole cuttings are to be placed right side up, approximately 4 feet into the hole with slanted end pointing down (buds pointed up). Holes will be backfilled with friable native soil and compact the planting hole to finished grade. Remaining leaves are to be removed and the hole is to be irrigated immediately to settle the soil. Soil level will be adjusted as necessary to finished grade.

Direct Transplant

Direct transplants will be installed by first excavating a planting hole twice the size of the rootball. The transplant will then be planted and the rootball compacted thoroughly into

soil. Suitable native soil will be used for backfill as required. Immediately after planting, transplants are to be watered. Green stems remaining will be cut to one foot above root structure.

Saltgrass Stolon Installation

Prior to installation, stolons will be cut into 2-inch pieces. Ideally, stolons shall be planted within six hours of collection. Those stolons left over are to be kept moist (up to 48 hours maximum). Outplanting of stolons shall be accomplished by using a dibble stick, or similar, to create holes with dimensions similar to the individual stolons, keeping the hole the same length as the stolon. If the soil is not moist, about one cup of water shall be added to each hole before planting. Soil will be gently returned to each hole and tamped to settle the plant in contact with the soil. Watering will occur immediately after planting.

Soil Stabilization and Mulching

Areas with steep slopes and loose soils may require the application of temporary erosion control technique(s) until vegetation can become established. Techniques to be used in the seeded areas shall hold the soil in place without prohibiting germination of seeds. The techniques described below may be employed if approved by the Project Biologist.

a. *Jute Netting.* Jute netting may be used to stabilize steeper slopes with loose soils, such as the banks of levees, roadsides, or other areas as needed. (Jute netting may also be applied to soils stockpiled on the site, if necessary.) It is recommended that jute netting be used in the foredune area to hold sand in place and help anchor transplanted nursery-grown seedlings until they become established. The following specifications apply to the application of jute netting:

- Jute netting shall be new and shall be of a uniform, open plain-weave. The netting shall be made from unbleached single jute yarn. The yarn shall be of loosely twisted construction and shall not vary in thickness by more than one-half its normal diameter. Jute netting shall be furnished in rolled strips and shall meet the following requirements:
  - Jute shall not contain any plastic mesh (“bird net”) or other plastic.
  - Width of 48 inches, with a tolerance of plus or minus 1 inch.
  - Minimum of 78 weft ends per width.
  - Minimum of 41 weft ends per yard.
  - Weight shall average 1.22 pounds per linear yard, with a tolerance of 5 percent heavier or lighter.

- The jute netting shall be anchored with 1-inch by 9-inch #11 gauge wire staples.
- For areas where this method is to be applied, the jute netting shall be unrolled without stretching and placed flat, in complete contact with the soil. The soil shall be free of protruding sticks and rocks. If the slope is 5 feet in length or greater, the jute shall be placed perpendicular to the contour. The jute shall be placed parallel to the contour on all slopes less than 5 feet in length.
- The edge of the jute shall be buried in a trench 6 inches deep and anchored with staples on 12-inch centers. The end of each roll shall overlap the next roll by 18 inches and shall be anchored with staples on 12-inch centers. The outside edge of each roll of jute shall overlap the next roll by a minimum of 4 inches, with the upwind layer on top and anchored with staples on 3-foot centers.

b. *Straw crimping*. Straw crimping may be applied as a method of stabilizing steep slopes or loose soils. The straw to be used for crimping shall be certified by an agricultural inspector to be weed free. The straw shall be spread on the areas identified for treatment evenly and at a rate of 3 tons per acre. The straw shall be punched into the ground with a finned straw crimper or by hand labor using shovels.

c. *Hydromulching*. Hydromulching may be used to stabilize steep slopes or loose soils. Hydromulching operations shall not be permitted when wind velocities at the site of application exceed 15 miles per hour or when the ground is unduly wet, or otherwise not in a tillable condition as determined by the Project Biologist. Before hydromulching, all necessary erosion controls such as waterbars on slopes shall be installed to prevent runoff from eroding slopes before plants are established. Apply hydromulching in one step with 2000 lbs per acre hydromulch and 100 lbs per acre organic binder. Hydromulching shall consist of the uniform application by spraying of a homogeneous mixture of water and mulch. The slurry shall have the proper consistency to adhere to the earth without limping or running. Apply the mixture using equipment containing a tank with a built-in, continuous agitation and recirculation system, and a discharge system which will allow application of the slurry to the slopes at a continuous and uniform rate. The nozzle shall produce a spray that does not concentrate the slurry nor erode the slope.

Timing of Plant Installation

Plant installation shall occur after completion of grading, soil tests, determination of tidal inundation levels, and (if necessary) installation of irrigation. The following timing considerations reflect "ideal" planting times with regard to the dormant period of species to be planted. However, it is recommended that planting be initiated as soon as feasible after grading is completed and that most of the plant species identified in this plan may also be planted in the late summer or early fall. It is not recommended that materials be planted during the flowering time as plants tend to be in a state of high stress when blooming and fruiting. All installation work is prohibited by permit conditions between February 1st and August 30th.

In areas where multiple planting methods are proposed, which include broadcast seeding or sprigging, installation of nursery grown seedlings or transplants shall be conducted after broadcast operations to minimize disturbance/damage to transplanted materials

Broadcast sprigging installation shall be complete by January 31st.

Direct transplants will be installed during the winter while plants are dormant. Plants in this area normally become dormant by mid-December. Transplant installation shall be complete by January 31st

Salvaged plants suitable for direct transplant will be planted as soon as possible once grading is complete. These plants may require periodic watering until the onset of the rainy season.

Willow pole and mulefat cuttings will be installed during the winter while plants are dormant, generally between mid-December and late February. Pole cutting installation shall be complete by January 31st.

Planting of regionally rare and endangered species shall commence once it has been determined that salt marsh vegetation and functions have been established. Planting of regionally rare species shall be conducted under the direction and supervision of the Project Biologist. Seeding of salt marsh bird's beak (*Cordylanthus maritimus* ssp. *maritimus*), if included, shall be conducted when an adequate host plant canopy has been obtained.

Irrigation of Plantings

A temporary irrigation system for watering shall be installed until plants appear to be well rooted and maturing. Successful restoration of hydrology at the site may eliminate the need for irrigation in most of the wetland and transition planting areas over time. However, moist conditions are ensured and will be maintained for the successful establishment of salt marsh and transition vegetation.

If supplemental watering of any or all of the wetland portions of the project site is necessary, then a temporary overhead irrigation system, or other method for supplemental watering (i.e., water truck), may be employed with approval from the Project Biologist.

The supplemental watering system shall be maintained in proper working condition so that all planting areas shall receive water adequate for plant establishment and growth.

Appropriate water management practices shall be employed for irrigation of the plantings at all planting locations for the site. Areas of middle marsh that are inundated by daily tides may require supplemental irrigation during low tide periods (10-15 days per month). If conditions are such that the middle marsh areas experience more than two consecutive days of dry conditions, such as may occur in the summer months during periods of extreme low tides, supplemental water will need to be applied.

Irrigation will be used on the site only as necessary to ensure establishment of plants and shall be removed once it is determined that plants are healthy and growing and able survive without supplemental water. Suitable water management practices will be employed to allow for ample plant establishment without prolonged application of supplemental water.

Inspection and Acceptance of Planting Work

At the completion of the installation portion of this contract, a post-installation inspection shall be performed. The Project Biologist shall receive a request for inspection of work 10 days before the completion of the installation work in order to arrange for a mutually agreeable time.

If, after inspection of seeding, planting operations, and the irrigation system, the Land Trust and/or Project Biologist is satisfied that all installation work has been performed in compliance with the Plans and Specifications, that all plant materials are in satisfactory growing condition, and that the irrigation system is properly installed, the Land Trust will give written notice of acceptance of work to contractor.

Defective work requiring corrective action as directed by the Land Trust or Project Biologist shall be performed within 10 working days after the post-installation inspection. Corrective work and materials replacement shall be in accordance with the plans and specifications, to the satisfaction of the Land Trust and Project Biologist. Acceptance of the planting work shall mark the beginning of the maintenance period.

Maintenance of Restoration Site

A. Weed control.

1. Weedy exotic plant species shall be controlled in the revegetation area to the extent necessary to prevent detrimental competition with native plants for water, nutrients, and light during the entire contract period.

    a. All remaining non-native, invasive weeds shall be removed from the revegetation site mechanically (e.g., by hand), if feasible, before they set seed.

    b. Weed removal shall cause minimal disruption to the root systems of the installed plants and maintain the mulch layer intact.

2. It will be ensured that weed control activities do not remove or otherwise cause damage to young native plants, or parts of plants, that have grown from rhizomes, stolons, root sprouts, or seeds from the plants that were originally installed.

3. Maintenance crews must be familiar with native plant seedlings and avoid them during maintenance activities.

4. The Project Biologist shall inspect germination of native seedlings to ensure that maintenance crews are not removing them during weeding operations.

5. All material removed during weed control operations shall be hauled off the site and disposed of properly.

6. The following plant species are targeted for removal and/or control:

Arundo donax	Giant reed
**Atriplex semibaccata*	Australian saltbush
**Avena* sp.	Wild oat
**Bromus diandrus*	Ripgut grass
Carpobrotus chilensis (=C. aequilaterus)	Sea fig
Carpobrotus edulis	Iceplant
Cortaderia jubata	Pampas grass
Cynodon dactylon	Bermuda grass
**Hordeum marinum* subsp. *gussoneanum (=H. geniculatum)*	Mediterranean barley
Limonium ramosissimum	Introduced sea lavender
**Lolium multiflorum*	Italian ryegrass
Myoporum laetum	Myoporum
Pennisetum clandestinum	Kikuyu grass

   a. A zero percent cover tolerance of perennial weed species and a 10 percent cover tolerance of those species marked with a "*" above, as measured by the Project Biologist, shall be required throughout the revegetation area. All personnel involved in weed control shall be able to recognize these weed species and to distinguish them from related beneficial native species (e.g., *Limonium ramossissimum* vs. *L. californicum*; *Hordeum marinum* subsp. *gussoneanum* vs. *H. depressum*).

   b. Several of the species marked with an (*) above are common components of the non-native grasslands on the site. These species will be targeted for removal only if they are becoming established in the areas where they compete with native plants installed as part of the Project.

B. Irrigation.

1. All irrigation systems shall be thoroughly inspected on a regular basis in order to ensure proper functioning. Defects shall be corrected immediately upon discovery.

2. Moist conditions shall be maintained to ensure plant establishment. If necessary, supplemental watering of salt marsh, wetland, transition, and upland areas shall be conducted and shall continue until plants become established, or as directed by the Project Biologist.

C. Debris removal.

1. Debris removal shall be ongoing throughout the contract period.

2. All areas of work will be kept clean, neat, and orderly at all times.

3. All trash and non-organic debris shall be removed from the site as discovered and disposed of off-site.

D. Supplemental planting.

1. The goal of this restoration project is a functioning salt marsh habitat. The performance criteria were developed with some flexibility so that the revegetation operations (planting, weeding, etc.) would be allowed to adapt to the physical conditions (hydrology, chemistry, soils) that may currently occur and/or change as tidal flushing is restored. Areas where vegetation appears to be not adequately establishing or plants are in poor health will require supplemental planting with the same species (i.e., filling in open areas) rather than replacement of dead or dying plants on a per plant basis. Maintenance of any areas receiving supplemental planting shall be included with the regular maintenance activities on the site.

2. If after one growing season, establishment of vegetation is not progressing at a satisfactory manner, as determined by the Project Biologist, and it is determined that physical conditions are appropriate for the establishment of salt marsh vegetation, then replanting will be employed.

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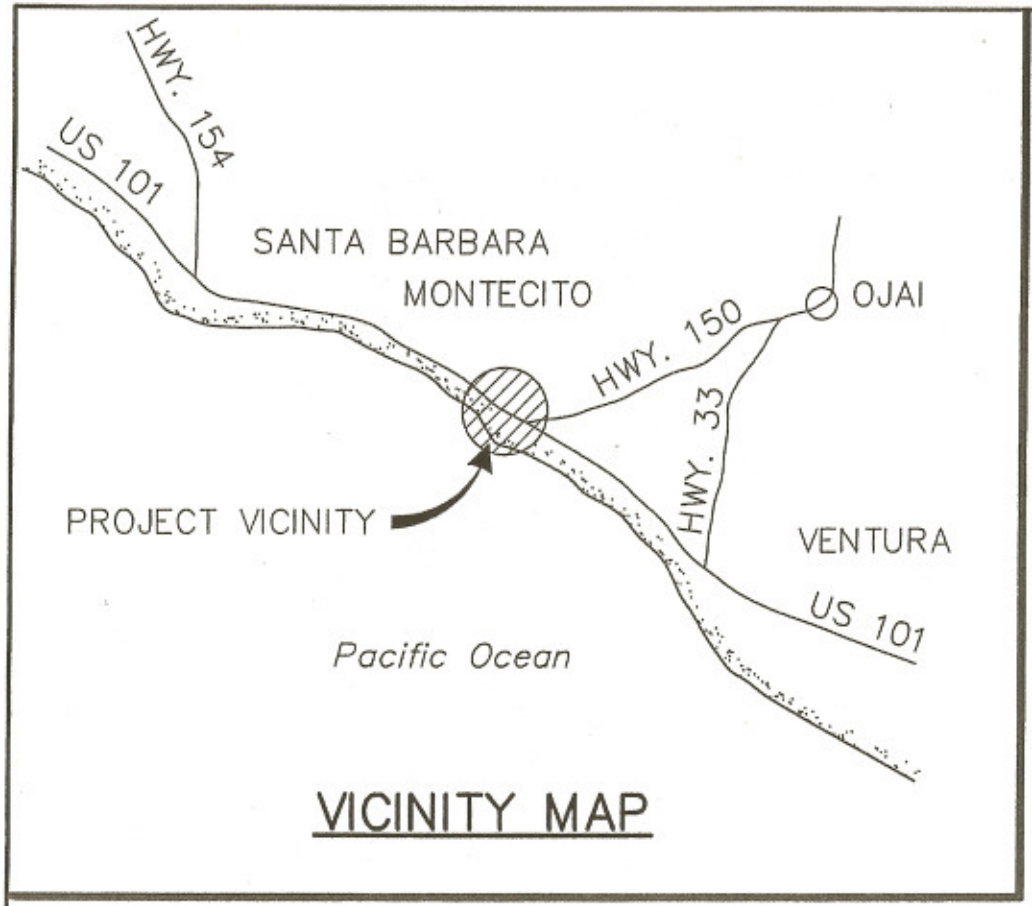
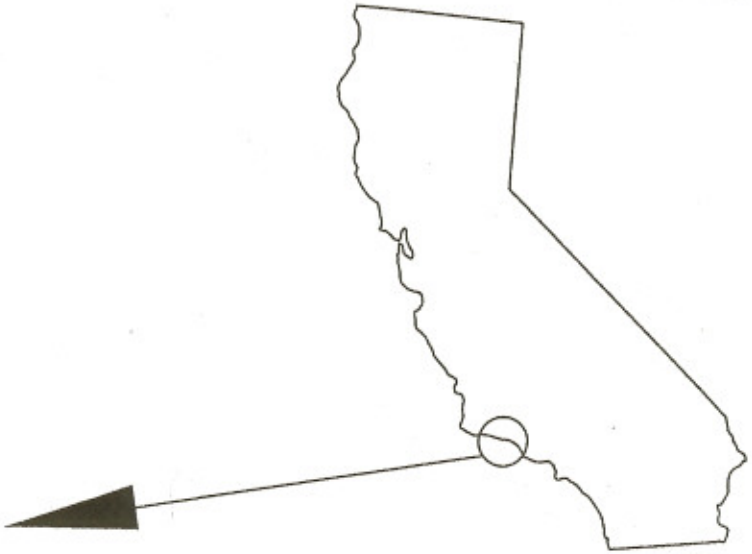
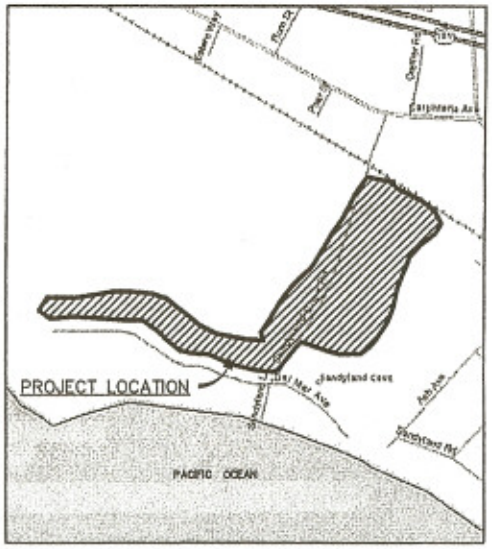
REPORT FIGURES



VICINITY MAP





LOCATION MAP

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SCALE: VARIES

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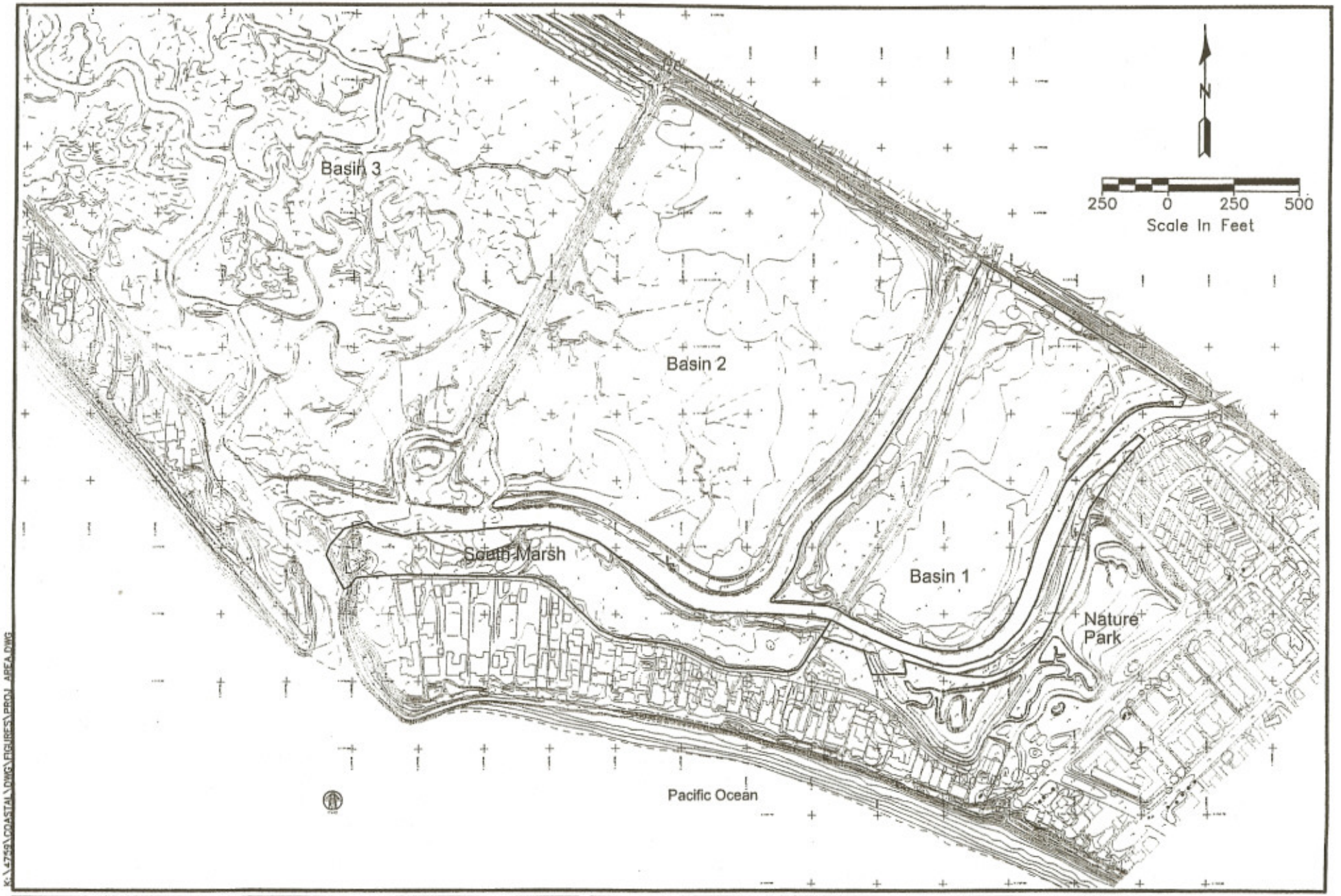
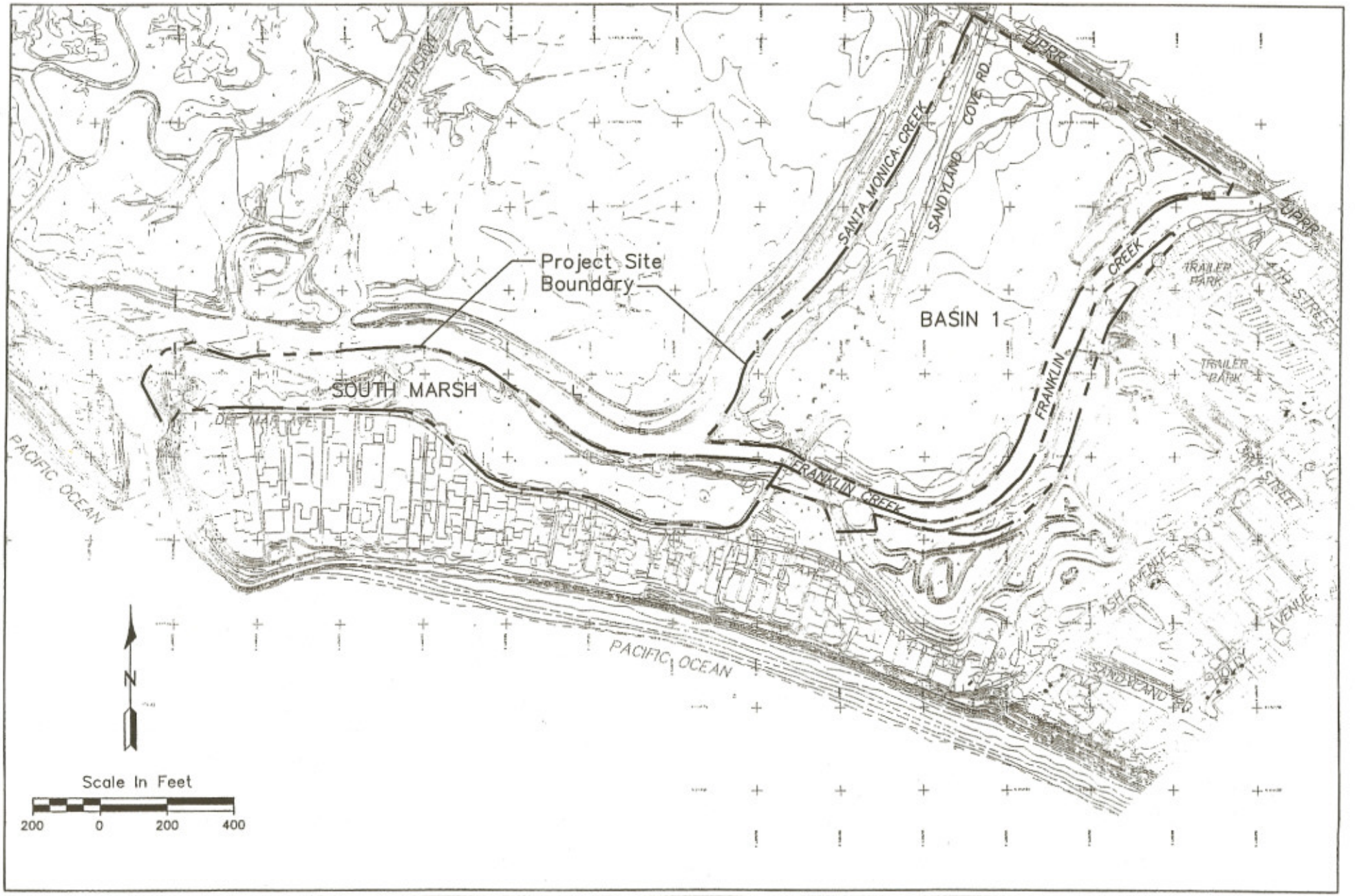
Carpinteria Salt Marsh Wetland Enhancement Plan	PROJECT VICINITY AND LOCATION	Figure 1



Carpinteria Salt Marsh Wetland Enhancement Plan	PROJECT AREA	Figure 2



Carpinteria Salt Marsh Wetland Enhancement Plan	PROJECT SITE	Figure 3