

# Hammond's Meadow – Shalawa Preservation and Management Plan



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Prepared By



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Prepared For  
County of Santa Barbara Community Services Park Division

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## 1.0 INTRODUCTION

Hammond's Meadow (officially "Hammond's Meadow County Open Space") is located in Montecito in the Sea Meadow community, adjacent to a public beach, between Eucalyptus Lane and Channel Drive. Hammond's Meadow and the adjacent parcel on the beach (009-600-021) are owned by Santa Barbara County and managed by the County Community Services Department - Parks Division. The property is a Chumash heritage site known as *Shalawa*.

The site is identified as Assessor's Parcel Number 009-600-020. Although the Assessor's Parcel Maps says that the parcel is 2.96 acres, a professional land surveyor found that the parcel is actually 3.82 acres (Prober Land Surveying, March 9, 2011). The parcel includes the relatively flat meadow as well as the western half of the coastal bluff. East of the meadow, the parcel includes a former creek bed below the meadow and next to a private home. West of the meadow, the parcel includes a large area between the beach and the ocean-facing home that is presently vegetated by iceplant (Figure 1).

### 1.1 History

#### Chumash History

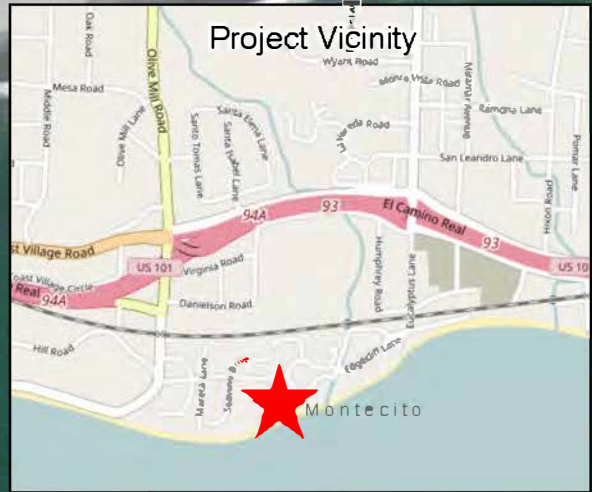
"Hammond's Meadow" is located within a portion of the site of a prehistoric village recorded as CA-SBA-1213. Contemporary Chumash refer to this site as "*Shalawa*." The site was occupied by Native Americans for about 200 years from years 1000 to 1200 C.E. (approximately) (Glassow n.d., Glassow 1977). By 1542, when the first European explorers sailed through the Santa Barbara Channel, the village had been abandoned. The reason that the village was abandoned is unknown but may have been due to a depleted food supply (Glassow 1977). The Chumash village of *Shalawa* was occupied in the 1700s. A historical record of *Shalawa* village members who were baptized and made neophytes of the Santa Barbara Mission after 1782 is recorded in Mission Baptismal records. (Johnson 1985). Though archaeological evidence for the location of *Shalawa* has yet to be obtained, contemporary Chumash descendants consider CA-SBA-1213 ("Hammond's Meadow") to represent this important Chumash ceremonial site. It is listed on the National Register of Historic Places.

#### Modern History

In 1860 (and probably in preceding years) the northern half of the site and much of the surrounding area was farmed as shown in Figure 2 and in photographs in Appendix 1. A creek flowed along the site's eastern boundary, and sand dunes existed in the southern half of the site (Figure 2).

In 1906, a mansion that was part of a 7.5-acre estate named "Bonnymede" was built by William Davidson. In 1912, Esther Fiske Hammond bought the Bonnymede estate, and gradually bought several adjacent properties, so that by 1927, the size of the estate had

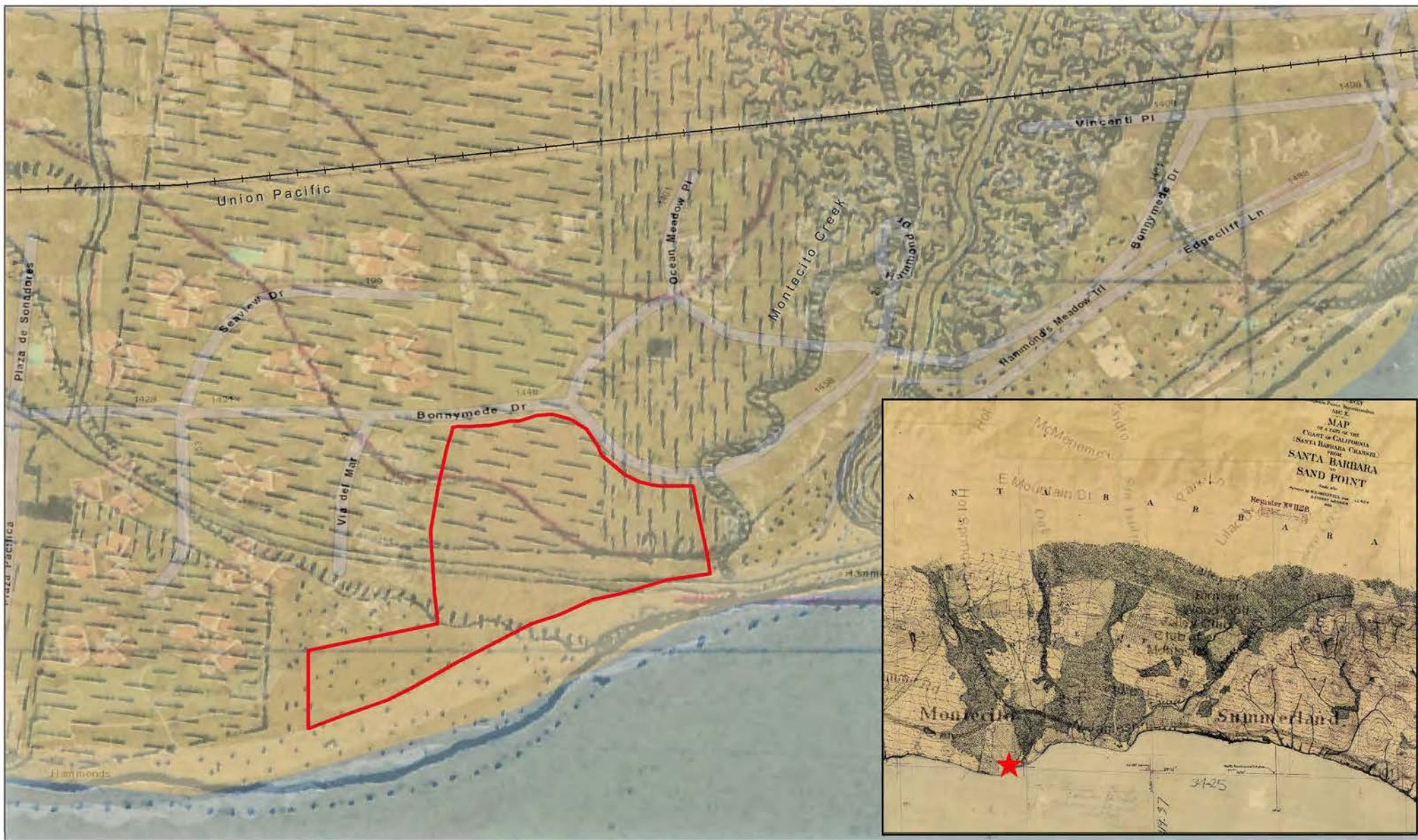




**Figure 1. Project Site: Hammond's Meadow**







0 0.1 0.2 0.4 Miles

**Figure 2. Vegetation in 1860**  
 Source: U.S. Coast and Geodetic Survey, 1860  
 (with modern existing roads and imagery overlain)

-  Agricultural Crops 1
-  Agricultural Crops 2
-  Sand Dunes
-  Project Site





increased to 46 acres and extended from the present day Coral Casino on the west to Eucalyptus Lane to the east, and from north of the railroad to the beach (Redmon 2010).

In the early 1930s, Esther's son, George Hammond, constructed two airstrips at Bonnymede. The eastern end of one of them extended into the current project site as illustrated in the historical photographs in Appendix 1. They were irrigated and grass-covered to reduce dust. The strips also served as a nine-hole golf course and as a polo field. Hammond became good friends with the Lester family on San Miguel Island, and over the years, George Hammond made more than 200 flights to the island to deliver mail and other supplies. Esther died in 1955 and the westerly portion of the estate was sold in 1958. The house was torn down and two luxury condominium complexes were subsequently constructed over time: Bonnymede and Montecito Shores. George Hammond continued to live on the estate north of the railroad until he died in 1982. Afterward, the easterly 22 acres was sold (Redmon 2010).

In 1987, the Sea Meadow residential project (Tract Map 13,416) was approved by the County, allowing 27 privately-owned parcels with single family homes. The Tract Map also included the 2.96-acre publicly-owned open space parcel ("Hammond's Meadow"), a 1.25 – acre publicly-owned parcel on the beach, and two privately-owned common open space parcels owned and managed by the Sea Meadows Homeowners Association. The 2.96-acre parcel (shown in Figure 1) was conveyed in-fee to Santa Barbara County in order to protect the archaeological resources of the site. The site is currently administered by the County Community Services Department - Parks Division.

In 2010, the Land Trust for Santa Barbara County, in partnership with the County, proposed a plan for changing the site from a weed-dominated and degraded area to a restored habitat characterized by native plant species. Conceptual plans were prepared and presented to the various stakeholders, and a series of meetings have taken place since then in an effort to move the project forward.

In the past, the County of Santa Barbara would mow the site once each year to minimize the risk of fire. However, when concerns were raised that the mowing equipment might be damaging cultural resources, the mowing practice stopped. Channel Islands Restoration (CIR) took over the project management role from the Land Trust in 2013. CIR first weeded the site with brush cutters ("weed whackers") in May 2014, and continued the practice in 2015 and 2016. CIR also conducted a successful weed-suppression experiment on the site, "solarizing" a non-native plant called "castor bean". In late 2016, CIR began applying an organic herbicide to non-native weeds that were in the young seedling stage. This Preservation and Management Plan is the next step in the process to restore Hammond's Meadow.

## 1.2 Development of the Preservation and Management Plan

CIR and Van Atta Associates, Inc. have undertaken extensive background research and consultation in developing this plan: conducted site visits during the spring of 2010, 2012, 2013, 2015 and 2016; reviewed County landscape practices and appropriate background literature; attended stakeholder meetings; made presentations to and consulted with stakeholder groups; tested the soil; met with Chumash contemporary descendants of *Shalawa* to identify potential concerns and worked with them to protect Chumash heritage while restoring the native plant community; and developed a landscape plan illustrating the various native plant communities that could be established at the site while retaining the two native species still present: lemonade berry (the large shrubs at the top of the bluff) and jimson weed (a low growing plant in the meadow with large white flowers) whose Barbareño Chumash name was Mo'moy (Timbrook 2007).

The Draft Plan (May 2017) was presented to and discussed with Chumash contemporary descendants of *Shalawa*, other Barbareño Chumash, the adjacent Homeowner's Association, neighbors and the general community at-large. Two community meetings about the draft plan to which the public was invited were held on the meadow and advertised in the local media. Copies of the draft plan were distributed Chumash contemporary descendants of *Shalawa*, other Barbareño Chumash, the adjacent Homeowner's Association, neighbors and others. The draft plan was also posted on the web so that anyone could read it and comment on it.

## 1.3 Goals

The landscape goal of this Preservation and Management Plan is to establish a beautiful meadow of native grasses that grow up to four feet in height, surrounded by evergreen and flowering native shrubs on the edges, native vegetation on the bluff, and an oak-woodland in the southeast corner. The desired landscape is illustrated in Figure 3 and Photo 4. The cultural goals of this Preservation and Management Plan are to protect the integrity of this Chumash village site, provide native plant species considered appropriate by contemporary Chumash representatives, and to provide sacred space for Chumash ceremony. The site could also be used for collection of plant material (leaves, seeds, stems, roots) by Chumash in support of cultural activities.

Specifically, the goals of the project are:





- Restore native habitat that supports native plants and animals.
- Create a landscape that is visually pleasing and maintains views of the ocean.
- Protect the integrity of the Chumash village.
- Reduce erosion and vandalism that continues to degrade Chumash cultural resources.
- Enhance stewardship of the site that is respectful of Chumash heritage.



**Goals of Hammond's Meadow Preservation and Management Plan**

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- Create a landscape that is visually pleasing and maintains views of the ocean.
- Protect the integrity of *Shalawa*.
- Reduce erosion and vandalism that continues to degrade Chumash cultural resources.
- Enhance stewardship of the site that is respectful of Chumash heritage.
- Provide native plant species considered appropriate by the Chumash community.
- Provide sacred space for Chumash ceremony.
- Increase sense of safety and security for the people who live by the meadow and the public that visit the beach.
- Retain and enhance the public trail to the beach.

**Plant List**

<p><b>Rose Garden Buffer Planting</b></p> <p><b>Botanical Name</b> <i>Rosa californica</i></p>  <p><b>Common Name</b> California Rose</p>	<p><b>Meadow</b></p> <p><b>Botanical Name</b> <i>Achillea millefolium</i> <i>Agrostis pallens</i> <i>Aristida intermedia</i> <i>Bromus carinatus</i> <i>Elygona foliosus</i> <i>Eriogonum parvifolium</i> <i>Eriophyllum confertiflorum</i> <i>Eriochloa californica</i> (coastal form) <i>Isocoma merriellii</i> var. <i>venenoides</i> <i>Lupinus succulentus</i> <i>Muhlenbergia ligens</i> <i>Syrinchium bellum</i> <i>Sida pulchra</i></p> <p><b>Common Name</b> White Yarrow Sea-side Bergamoss Common Fieldneck California Brome Lefly Daisy Sea-cliff Buckwheat Golden Yarrow California Poppy Coastal Goldenbush Succulent Lupine Deer Grass Blue-eyed Grass Purple Needlegrass</p>
<p><b>Oak Woodland</b></p> <p><b>Botanical Name</b> <b>TREES</b> <i>Platanus racemosa</i> <i>Quercus agrifolia</i> var. <i>agrifolia</i></p> <p><b>SHRUBS</b> <i>Bromus carinatus</i> <i>Calystegia acuminata</i> <i>Hesperomelos arbutifolia</i> <i>Melicis imperforata</i> <i>Rubus ursinus</i> <i>Salvia spathacea</i></p> <p><b>Common Name</b> Western Sycamore Coast Live Oak  California Brome Coast Morning Glory Troyan Small-flowered Melic California Blackberry Hummingbird Sage</p> 	<p><b>Coastal Sage Scrub (seed)</b></p> <p><b>Botanical Name</b> <i>Astragalus glaber</i> <i>Eriogonum parvifolium</i> <i>Eriophyllum confertiflorum</i> <i>Isocoma merriellii</i> var. <i>venenoides</i> <i>Lonicera subsopita</i> var. <i>subopitata</i> <i>Salvia leucophylla</i> <i>Sisymbrium officinalis</i> <i>Solanum elaeagnifolium</i> var. <i>axense</i></p> <p><b>Common Name</b> Deerweed Sea-cliff Buckwheat Golden Yarrow Coastal Goldenbush Santa Barbara Honey-suckle Purple Sage California Figwort Purple Nightshade</p> 
<p><b>Coastal Bluff Scrub</b></p> <p><b>Botanical Name</b> <i>Distichlis spicata</i> <i>Eriochloa californica</i> <i>Eriogonum parvifolium</i> <i>Malacothrix saxatilis</i> var. <i>saxatilis</i> <i>Rhus integrifolia</i> <i>Suaeda torreyana</i></p> <p><b>Common Name</b> Salt-grass Coast or Bush Sunflower Sea-cliff Buckwheat Cliff Aster Lemonade Berry Waxy Sea-olive</p> 	

**Existing Shalawa Monument**



**General Notes**

1. Six inches of imported soil will be placed above two inches of sand on top of native soil in order to protect cultural resources, as per Management Plan.
2. For additional landscape information, including plant community descriptions, soils and future planting techniques, please see:

Hammond's Meadow / Shalawa Preservation and Management Plan, February 2019.  
Prepared by Channel Islands Restoration with the assistance of Van Atta Associates, Pat Saley & Associates and David Stone, M.A. Prepared for County of Santa Barbara Community Services Park Division.

**Hammond's Meadow • Shalawa • Landscape Plan**





- Provide native plant species considered appropriate by the Chumash community.
- Provide space for Chumash ceremony.
- Increase sense of safety and security for the people who live by the meadow and the public that visit the beach.
- Retain and enhance the public trail to the beach.

## **2.0 EXISTING CONDITIONS**

The site is adjacent to the beach and ocean, and is surrounded on three sides by the residential community of Sea Meadow. Condominium complexes are nearby (Figure 1). Photographs of the site are provided in Appendix 1.

### **2.1 Overview**

The current site conditions include the following characteristics:

- The site is beautiful to some people and unattractive to others.
- Weeds that are not native to California dominate the site with few native plant species present. In some places, the weed covers the native *Datura* and appears to be degrading the population.
- People have been observed digging into the shoreline bluff looking for archaeological artifacts and removing items on multiple occasions. Others have been observed looking for artifacts on the meadow after a rain event.
- An informal trail at the east end of the bluff is associated with erosion and exposure of sensitive archaeological resources.
- Existing vegetation has little habitat value for native wildlife.
- An extensive population of pocket gophers continues to damage archaeological resources 2-3 feet beneath the soil surface. The gophers' activities also promote the growth of weed species.
- Uncontrolled weeds block visual access of the interior of the meadow in spring and summer, resulting in potential security problems for the public and adjacent homeowners.
- Uncontrolled weeds present a fire hazard, which has prompted letters of concern from the Montecito Fire Protection District.

- Individuals have been observed coming up from the beach to use the Myoporum woodland as a “restroom” that provides some privacy; evidence of a homeless encampment in the Myoporum has also been observed.

## 2.2 Soil

To understand the characteristics of the soil at Hammond's Meadow, FGL Environmental Agriculture, under the direction of David Anderson and Ken Owen (CIR), collected 12 soil samples for analysis. The samples were collected (with a Chumash monitor present and observing the work) at each of six sites (two coastal, two central, and two interior): one sample 0 – 3 inches below the surface and a second sample 3 – 6 inches below the surface (Appendix 3). Information regarding soil nutrients, for example, is important because if deficiencies are identified various soil amendments can be proposed to make the soil more conducive to successful growth of the desired vegetation. Conversely, an overabundance of nutrients, extremes in soil pH or salinity, and other factors also can be deleterious and may need amendments to adjust the conditions so they are suitable for the proposed plant palette.

Soil conditions at Hammond's Meadow reflect the long-term anthropogenic land use of the site. Prehistoric midden soils are commonly silty-loam, rich, in organic content from the biodegradation of food remains. Excessive concentrations of nitrate and phosphorus in many of the samples are probably attributable to long-term human use of the site. Environmental factors also impact soil conditions. The soil samples with elevated chloride are located nearest the beach and probably reflect increased salinity due to salt spray or over-wash during storms.

The results of the 12 soil samples suggest the soil conditions are suitable for habitat restoration. The soil pH (acidity/alkalinity) is mostly neutral and the majority of macro- and micro-nutrients have suitable concentrations. Exceptions include the following:

- Nitrate (a primary nutrient) is at low and high levels depending on the sample;
- Phosphorus (a primary plant nutrient) is at high levels, likely from past agricultural use of site;
- Boron (a micronutrient) is at low levels;
- Chloride (associated with salt) tends to be high closer to the ocean;
- Soil moisture is low.

FGL (2013) provided several recommendations based on their analysis:

- Add gypsum, especially close to the coastal sample areas, to reduce effects of salinity (chloride).
- Add boric acid.
- Add organic carbon (e.g., compost) to help with soil moisture.



- Add lime in the interior to address the acidity.

### 2.3 Plant Species Currently on the Meadow

Three native species and twenty non-native species occur on the site. These are listed below, and described in detail in Appendix 4.

#### Native species:

<i>Datura wrightii</i>	Jimson Weed
<i>Rhus integrifolia</i>	Lemonade Berry
<i>Solanum douglasii</i>	Douglas' Nightshade

#### Non-native Species:

<i>Anagallis arvensis</i>	Scarlet Pimpernel
<i>Avena fatua</i>	Wild Oats
<i>Brassica nigra</i>	Black Mustard
<i>Bromus diandrus</i>	Ripgutgrass
<i>Carduus pycnocephalus</i>	Italian Thistle
<i>Carpobrotus edulis</i>	Freeway Iceplant
<i>Chenopodium murale</i>	Nettle-leaved Goosefoot
<i>Delairea odorata</i>	Cape Ivy
<i>Ehrharta erecta</i>	Panic veldtgrass
<i>Euphorbia peplus</i>	Petty Spurge
<i>Malva parviflora</i>	Cheeseweed
<i>Malva pseudolavatera</i>	Cretan Mallow
<i>Marrubium vulgare</i>	Horehound
<i>Myoporum laetum</i>	Myoporum
<i>Oxalis pes-caprae</i>	Sourgrass, Bermuda Buttercup
<i>Pennisetum clandestinum</i>	Kikuyu Grass
<i>Ricinis communis</i>	Castor Bean
<i>Salsola australis</i>	Russian Thistle
<i>Sisymbrium orientale</i>	Sisymbrium
<i>Sonchus oleraceus</i>	Common Sowthistle

### 2.4 Current Maintenance Practices

CIR is currently implementing a “grow-kill” program in order to decrease the amount of viable seeds of non-native herbaceous species on the meadow including Cheeseweed, nettle-leaved goosefoot and black mustard, and to prepare the site for habitat restoration. Shrubs are not being treated. This program uses organic herbicide, cutting the grasses and other weeds by hand, rain water, and when necessary, irrigation water. All native plants are being protected and are not being treated with herbicide. CIR also

maintains erosion control measures on the bluff, conducts routine visits of the site, and picks up trash that others have left

### **3.0 ENVISIONED LANDSCAPE**

The envisioned landscape includes six communities (Figure 3 and Photo 4). The grasses and forbs would be one to two feet tall; and the shrubs would be about three to four feet in height. Each community would be distinct, yet the communities would collectively blend together so that they are visually pleasing and functional.

#### **The Meadow**

The meadow will consist of a mosaic of grasses, herbaceous wildflowers and occasional low-growing shrubs. Winter and spring grasses, spring wildflowers, and summer asters and golden grasses would be some of the changing and appealing elements of the vegetation. The meadow will include occasional shrubs and patches of open unvegetated ground in order to provide habitat for wildlife. This community is expected to require a substantial on-going maintenance effort forever to prevent it from returning to a weed dominated site. Species that would be in the meadow are listed in Table 1. The ornamental roses that are currently maintained along the northern perimeter of the site, and the iceplant west of the trail will remain.

#### **Chumash Ceremony Area**

A place for Chumash ceremony will be provided within the existing rock circle in the meadow. The area will not be planted. However, the weeds will be cut low to the ground so that people can stand on the ground comfortably. As an alternative to ongoing weeding and to enhance the aesthetic of the ceremony space, placement of decomposed granite and sand within the rock circle will be considered.

#### **Coastal Sage Scrub**

The Coastal Sage Scrub community includes a wide array of shrubs that are about 3 to 4 feet tall as well as herbaceous species that are 6 inches to 2 feet tall. Plants of Coastal Sage Scrub have a long flowering season and a variety of colors, textures, and fragrances. It provides an attractive foreground to the foothill views and requires minimal maintenance. At Hammond's Meadow, coastal sage vegetation is proposed on the northern, western and northeastern perimeters of the site. The coastal sage scrub species include those listed in Table 3. The ornamental roses that are currently maintained along the northern perimeter of the site will remain.

#### **Oak Woodland**



Coast live oak trees will be planted in the southeastern corner of the meadow replacing the Myoporum, palm and pine trees that are there currently. Remnant Coast Live Oak (*Quercus agrifolia* var. *agrifolia*) trees in the area of Hammond's Meadow suggests an Oak Forest or Woodland community likely existed along some portions of this coastline. Early Spanish explorer descriptions of Montecito emphasized extensive oak woodlands in this area (Brown 2001). Removal of the stand of Myoporum trees (*Myoporum laetum*, an introduced species) in the southeastern corner of Hammond's Meadow would provide an area to create Oak Woodland habitat. The majority of the woody species associated with the oak community produces fleshy fruits and are bird dispersed. The species listed in Table 4, including several grasses, would be representative of the community as it matured in stature. To facilitate the growth of the oaks and other species in the oak woodland, the two existing non-native species of ivy will need to be treated with herbicide.

#### **Coastal Bluff Scrub**

A number of lemonade berry shrubs are growing at the top edge of the bluff above the beach. These are native shrubs that are holding the slope in place and slowing the rate of coastal bluff erosion. The shrubs are also a remnant of native Coastal Bluff vegetation. Most of the bluff is too steep to plant, but to the west, where the slope is not as severe, seeds of low-growing native plants (average 2 to 3 feet in height) will be cast in an attempt to vegetate the slope (Table 6).

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## 4.0 IMPLEMENTATION

This part of the Preservation and Management Plan articulates how the plan will be implemented, including: coordination, site preparation, planting techniques, schedule, and maintenance and monitoring.

### 4.1 Coordination

Meetings with Chumash descendants of *Shalawa*, the County of Santa Barbara, and the Sea Meadow HOA, users of the trail and the beach, and others will be held from time to time to gather additional advice and counsel on the plan.

### 4.2 Site Preparation

Because the site is highly disturbed and dominated by non-native species, a significant amount of site preparation is required prior to planting.

#### **Reduce Amount of Annual Weed Seeds on the Meadow**

Allowing weeds to sprout after rains and irrigation and then killing the sprouts, and then repeating the cycle is called a “grow - kill cycle.” Beginning in fall 2016, this method is being used to reduce the seedbank of Cheeseweed and other non-native weeds on the meadow. Citrus oil and clove oil (non-toxic herbicides that are derived from edible plants) and mowing with a scythe and/or with brush cutters are used to kill the weeds shortly after they have sprouted. This is expected to continue over a period of at least two years.

#### **Capping the Soil**

In order to protect cultural resources beneath the soil surface, the native soil will be capped with white sand and soil. Approximately 586 cubic yards white sand will be imported on to the site and will be distributed over approximately 2 acres of the site. Biodegradable jute or coconut netting will be placed on top of the sand. The sand and the netting will serve as a visual boundary, buffering the boundary of the native soil. In this manner, when plants are being planted, the people planting will see and feel the boundary at which no further digging is permitted.

Approximately 1,757 cubic yards of soil will be imported to the site and distributed on top of the white sand. The imported soil will be approximately 6 inches deep. This will give the plants soil to grow in without needing to dig into the native soil.



The area that will be capped is shown in Figure 5 (“Capping/Grading Plan). No grading will occur on the meadow. The area that will be capped is the flat to nearly flat surface of the meadow (Figure 5). Sand and soil will not be imported to the canyon on the east side of the project site, nor on the bluff, nor on the beach.

The sand and soil are not permitted to be chemically active, meaning they must be in the same general range as the native soils (usually around 7.5 pH). Therefore, the sand and soil will be in the range of 6.5 to 8.5 pH and will be approved by an archaeologist prior to importation to the project site.

The added soil will be delivered in dump trucks and deposited on the edge of the meadow. The soil will be transported across the meadow in wheel barrows and carried by hand. The area that will be capped with sand and soil covers 2 acres (Figure 5). The total amount of fill material (sand and soil combined) will be approximately 2,343 cubic yards. This is expected to require approximately 234 dump truck deliveries. Deliveries will be scheduled to occur at times that would cause only minimal disturbance to the neighbors.

#### **Remove Non-Native Trees (Myoporum, Pine, Palm and Fruit Trees)**

All of the trees on the meadow are in the southeast corner of the preserve. These will be removed after a permit is issued by the County with the exception of one or two Myoporum trees that may be retained in order to provide perching opportunities for raptors.

#### **Remove Perennial Weeds beneath Myoporum**

Use of sheets of black plastic to “solarize” plants may be used. The technique involves placing black plastic on top of non-native vegetation. The heat and lack of sunlight kill many non-native plants. Black plastic might be used on an experimental basis on the weeds that are beneath the Myoporum. The plastic would be weighted down with stones or other weights to ensure it is not blown away. It can be less effective on plants with underground perennial parts such as rhizomes. The weeds growing under the Myoporum and other trees have rhizomes and will be difficult to eliminate. Once solarization is complete, if the plants are dead, the plant material will either be removed or left in place and native plants planted within it. If the solarization is not effective, herbicide will be applied to these plants.

### **4.3 Build up the Health of the Soil**

The following organic minerals would be added to the soil in order to increase the biological health of the soil and support a rich biota in the meadow pursuant to the recommendations of the soil report (FGL Environmental Agriculture 2013).

- Add gypsum in the areas closest to the coast.
- Add lime in the perimeter areas.
- Add boric acid throughout the site.
- Add compost to provide a source of organic carbon throughout the site.

#### 4.4 Propagation

Plants will be propagated from seeds and cuttings that are collected in Montecito and Santa Barbara and grown at CIR's native plant nursery.

#### 4.5 Planting

Approximately 4,200 plants would be planted on the project site. Each of the native plants would have a root ball that is not taller than 4 inches. Each plant would be planted in the imported soil that is approximately 6 inches deep underlain by 2 inches of white sand. Thus, all resources beneath the surface of native soil will be protected. Acorns would also be planted in the imported soil in the southeast corner of the meadow. Approximately 2,985 plants would be planted in the meadow, 395 plants in the coastal sage scrub, 555 in the oak woodland (Tables 1 through 3). In addition, seeds of six native species will be cast on the east end of the bluff (Table 5).

**Table 1**  
**Plant Species to be Included in the Meadow**

Scientific Name	Common Name	Approximate Quantity
<i>Achillea millifolium</i>	White Yarrow	150
<i>Agrostis pallens</i>	Seashore Bentgrass	100
<i>Amsinckia intermedia</i>	Common Fiddleneck	0
<i>Bromus carinatus</i>	California Brome	0
<i>Erigeron foliosus</i>	Leafy Daisy	300
<i>Eriogonum parvifolium</i>	Seacliff Buckwheat	50
<i>Eriophyllum confertiflorum</i>	Golden Yarrow	145
<i>Eschscholzia californica (coastal form)</i>	California Poppy	0
<i>Isocoma menziesii var. vernonioides</i>	Coastal Goldenbush	40
<i>Lupinus succulentus</i>	Succulent Lupine	0
<i>Muhlenbergia rigens</i>	Deer Grass	1000
<i>Sisyrinchium bellum</i>	Blue-eyed Grass	200
<i>Stipa pulchra</i>	Purple Needlegrass	1000
<b>Total</b>		<b>2985</b>

**Table 2**  
**Plant Species to be Included in the Coastal Sage Scrub**

Scientific Name	Common Name	Approximate Quantity
<i>Acmispon glaber</i>	Deerweed	100
<i>Eriogonum parvifolium</i>	Seacliff Buckwheat	50
<i>Eriophyllum confertiflorum</i>	Golden Yarrow	75
<i>Isocoma menziesii</i> var. <i>vernonioides</i>	Coastal Goldenbush	100
<i>Lonicera subspicata</i> var. <i>subspicata</i>	Santa Barbara Honeysuckle	0
<i>Salvia leucophylla</i>	Purple Sage	25
<i>Scrophularia californica</i>	California Figwort	25
<i>Solanum xanti</i> var. <i>xanti</i>	Purple Nightshade	20
<b>Total</b>		<b>395</b>

**Table 3**  
**Plant Species to be Included in the Oak Woodland**

Scientific Name	Common Name	
<i>Bromus carinatus</i>	California Brome	150
<i>Calystegia macrostegia</i>	Coast Morning Glory	25
<i>Heteromeles arbutifolia</i>	Toyon	0
<i>Melica imperfecta</i>	Small-flowered Melic	100
<i>Platanus racemosa</i>	Western Sycamore	5
<i>Quercus agrifolia</i> var. <i>agrifolia</i>	Coast Live Oak	5
<i>Rubus ursinus</i>	California Blackberry	170
<i>Salvia spathacea</i>	Hummingbird Sage	100
<b>Total</b>		<b>555</b>

**Table 4**  
**Plants Species (Seeds) to be Included in the Coastal Bluff Scrub**

Scientific Name	Common Name
<i>Distichlis spicata</i>	Salt-grass
<i>Encelia californica</i>	Coast Sunflower
<i>Eriogonum parvifolium</i>	Sea-cliff Buckwheat
<i>Malacothrix saxatilis</i> ssp. <i>saxatilis</i>	Cliff Aster
<i>Rhus integrifolia</i>	Lemonade Berry
<i>Suaeda taxifolia</i>	Wooly Sea-blite



## 4.6 Plant Height

The shrubs in the meadow would be an average of 3 to 4 feet tall and the grasses and forbs would be 1.5 to 2 feet tall.

## 5.0 MAINTENANCE

To be consistent with County Green Landscape Practices, some combination of the following maintenance practices will be used.

### 5.1 Weeding

Weeds that will be targeted for removal from the site include Cheeseweed, Cretan Mallow, Summer Mustard, Tree Tobacco, Castor Bean, Myoporum, Cape Ivy, Periwinkle, Panic Veldtgrass, Kikuyu Grass and Algerian Ivy. Iceplant will not be removed west of the trail to the beach. Appendix 4 provides detailed descriptions of each of the weedy species, and groups them into high priority and low priority species.

The "County of Santa Barbara Green Landscape Practices" uses a holistic approach employing Integrated Pest Management (IPM) with careful stewardship of land, natural and cultural resources, and protection of public health and safety. The IPM approach includes mowing, weed whipping, manual removal of weeds, mulching, steaming, re-mulching, laying down black plastic to solarize weeds ("solarization"), applying compost tea for fertilizer and disease prevention, extensive use of groundcovers, and careful use of water. Virtually all landscape practices on County land on the South Coast (680 acres) is done without pesticides and herbicides, but limited use of herbicides is allowed on some sites to facilitate restoration where weeds cannot be controlled by other means. Mechanical trapping is used for gopher control.

"Grow - Kill Cycles" will be used to diminish the seed bank of non-native weeds. This process works by irrigating or allowing rain fall to induce seeds to sprout, and then treating the young sprouts with an organic herbicide. The current herbicides that are being used are either citrus oil, or clove or vinegar. When applied to young annual plants they are highly effective on dicotyledons and can also work on monocotyledons if they are treated when young.

After sand and soil are imported and plants are planted, the meadow will be weeded by hand. Mulching could be selectively used around selected plants, but will not be used extensively. The mulch would be composted in order to kill seeds of non-native species.

## 5.2 Fertilization

Compost tea and compost as well as organic materials: gypsum, lime and boric acid may be added to the soil, consistent with the soil tests and recommendations described above.

## 5.3 Irrigation

In order to supplement rainfall and sustain the native plants during the early years of plant establishment, water will be used to irrigate the site. Individual shrubs and trees will be irrigated by drip irrigation for the first year or two and then allowed to persist without irrigation. Some grasses in the meadow will be irrigated with an overhead sprinkler and others by drip irrigation during the winter and spring if rain has not fallen and is not expected. Several measures will be used to monitor and minimize water use, such as drip irrigation tubes, automatic timers, and regularly monitoring for leaks and quickly fixing problems.

Water will be supplied by the Montecito Water District. Water will be accessed from a fire hydrant (MF618 or MF623) near the meadow with a temporary construction meter. The construction meter will be removed after the plants have become established (one to two years after planting has been completed). To the extent feasible, irrigation lines will be beneath the surface of the imported soil.

## 5.4 Gopher Control

Hammond's Meadow supports a large population of Botta's Pocket Gophers. They dig the soil 2-3 feet beneath the ground surface constantly. A single pocket gopher can move vast quantities of soil within a few weeks, and can create several mounds in a day and can construct as many as 300 soil mounds in a year. Gopher densities can be as high as 60 or more per acre in irrigated alfalfa fields or in vineyards, and less in non-irrigated areas such as Hammond's Meadow. Burrows are continually changing, with old tunnels being sealed off and new ones excavated. A single gopher burrow system is typically about 50 feet in diameter. The constant movement of dirt beneath the ground surface results in continual disturbance, which makes the site conducive to invasion by weedy species and impacts archaeological resources.

The gopher problem will need to be addressed in order to protect any plants that are planted and to protect archaeological resources. Wire cage material will be laid down on the surface of the ground beneath the plants and imported soil. During the first two to three years of the project, carbon monoxide will be injected into gopher burrows to control gophers. This method is successfully

employed at most Santa Barbara County park facilities where gophers are impacting habitats and public use areas. This is expected to deter the gophers long enough to allow the plants to become established to the point where they can withstand herbivory. After this initial period, injection of carbon monoxide and installation of wire cage material around newly planted seedlings is not expected to be needed or employed.

## 5.5 Erosion Control

Large portions of the bluff are denuded of vegetation (Photographs are in Appendix 1). Erosion threatens further bluff failure, endangering archeological resources. Archeological artifacts have been exposed, and as a result, have reportedly been removed by the public. In the winter of 2015/2016, coconut straw matting was installed on the bluffs to control erosion. Seeds of native plants were cast on the sloped bluff prior to mat installation. The matting is held in place with sand bags and rocks. The matting and sand bags remain in place.

Erosion control measures will continue to be implemented as necessary. These will include replacement of decaying coconut straw matting with new coconut straw matting or with more permeable matting that will help facilitate seed germination, and replacement of the sand bags with tan-colored biodegradable sand bags (Figure 4). The condition of the bags will be monitored to ensure that litter is not added to the site. Additional erosion control measures will include hydroseeding the bluff face and the flat top of the bluff with native coastal bluff scrub species as described in Section 3.

The existing lemonade berry shrubs at the top of the edge of the bluff have been there for more than 90 years, as seen in the earliest aerial photograph from 1928 (Appendix 2). They are helping to hold the bluff in place and will be retained because they are native and slowing the process of bluff erosion. No trimming of these shrubs is planned.

## 5.6 Monitoring and Adaptive Management

The site will be continually monitored to ensure the site is being well maintained, including adequate weeding and irrigation. Practices will be modified if necessary to obtain the goals of the plan.

## 5.7 Public Trail and Information

The public trail that provides public access to and from the beach (Figure 1) will remain in place. Enhancement with decomposed granite will be considered. Occasional public meetings will be held, to which everyone will be invited. A few informative signs that explain the goals and processes of habitat restoration at



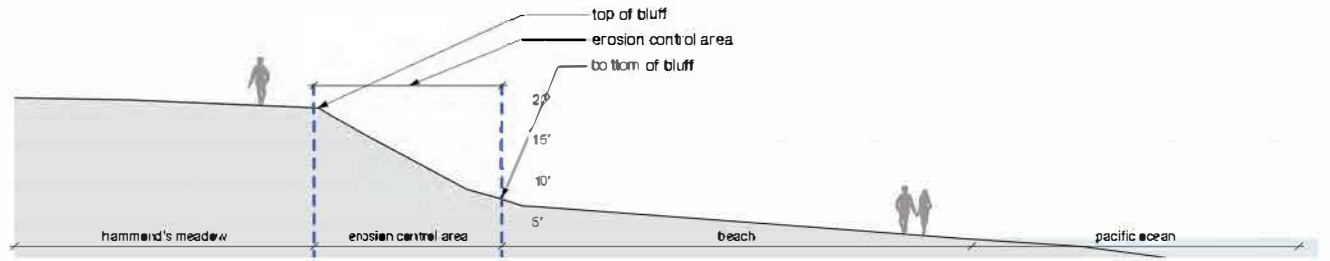
the site will be attached to vegetation or other materials that do not require disturbance of the soil. The purpose of the signs will be to keep neighbors and visitors informed of the practices that are being used, and why and when they will be used.

## **6.0 SCHEDULE**

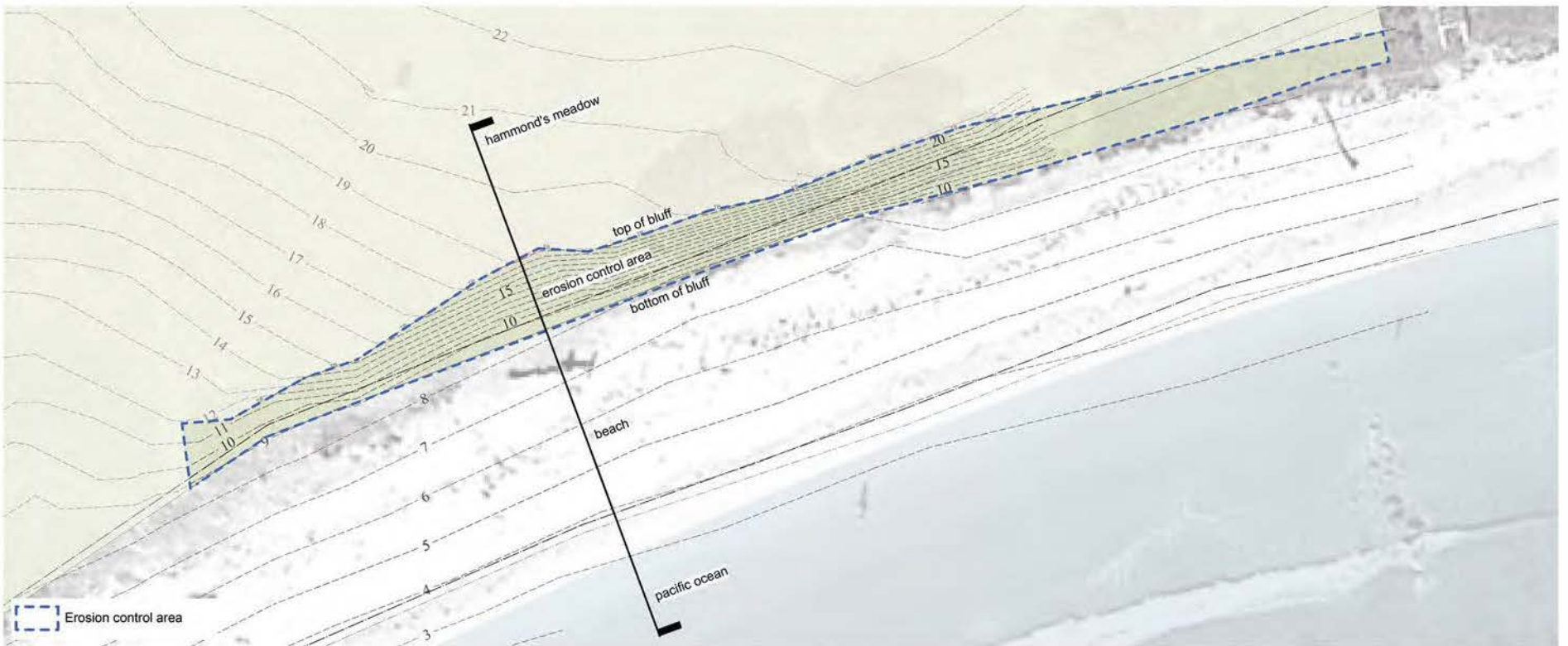
The project is expected to proceed along a gradual schedule that begins with weeding on the site, obtaining permits for the work, and then implementation, including continued weeding, importing sand, soil and soil minerals, followed by planting. This would be followed by maintenance activities including on-going weeding, irrigation, and possibly additional seeding and planting. A preliminary implementation schedule is provided in Table 7.



scale: 1" = 100' 0"



scale: 1" = 10' 0"





**Legend**

--- Cap Limit

**Total Area**

Total area of fill within cap limit: 94,896.72 square feet (2.18 acres)

**Cap Material Volume**

2" of sand: 585.78 cubic yards

6" of soil: 1,757.35 cubic yards

**General Note**

1. Within the cap limit, six inches of imported soil will be placed above two inches of sand on top of native soil, in order to protect cultural resources, as per Management Plan.

**Hammond's Meadow • Shalawa • Capping/Grading Plan**



**Figure 5**



**Table 7**  
**Preliminary Implementation Schedule**

Year	Permitting	Plant Propagation	Import Sand and Soil	Planting	Weeding	Irrigation
2019	Obtain Permits	Begin	None	None on site. Grow plants at greenhouse for future planting.	Weeding continues	None
2020	None	Continue	Import Sand and Soil	Planting begins. Maintain some bare ground between grasses and shrubs.	Weeding continues	Irrigation
2021	None	Continue	None	Planting continues. Maintain some bare ground between grasses and shrubs.	Weeding continues	Irrigation
2022	None	Continue	None	Planting continues. Maintain some bare ground between grasses and shrubs.	Weeding continues	Irrigate new plants
2023	None	None	None	None	Weeding continues	Irrigate new plants
2024	None	None	None	None	Weeding continues	None
2025	None	None	None	None	Weeding continues	None
2026	None	None	None	None	Weeding continues	None
2027	None	None	None	None	Weeding continues	None
2028	None	None	None	None	Weeding continues	None
2029 and Beyond	None	None	None	Replace Plants as Needed	Weeding continues	Only on newly planted individuals

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# **APPENDIX 1**

## **PHOTOGRAPHS**





**Photo 1. Aerial View of the Hammond Estate 1920s. Joel Conway Historical Collection.**



**Photo 2. Hammond's Estate, 1920s.**



**Photo 3.** Meadow looking south. February 3, 2016.



**Photo 4.** Post-restoration concept for Hammond's Meadow.





**Photo 5. Unauthorized trail on bluff from beach to Myoporum. January 30, 2015.**



**Photo 6. Myoporum trees and pine tree in southeast corner looking southeast. May 12, 2016.**





**Photo 7.** Brush cutter being used at Hammond's Meadow to cut Cheeseweed and other weeds above ground level, avoiding soil disturbance. Looking southeast. May 5, 2014.



**Photo 8.** Meadow looking southwest. February 2, 2015.





**Photo 9.** Eroded bluff face above beach looking north. January 30, 2015.



**Photo 10.** Bluff above beach looking east. January 30, 2015.





**Photo 11.** Erosion control being installed on bluff. February 4, 2016.



**Photo 12.** Erosion control being installed on bluff. February 4, 2016.

## **APPENDIX 2**

### **HISTORICAL AERIAL PHOTOGRAPHS**



1928



1964



1938



1973



1943



1989



1953



2016





## **APPENDIX 3**

### **SOIL TEST RESULTS**

May 14, 2013

**SOIL ANALYSIS** SP 1304514:1-12

Land Trust for Santa Barbara County  
 P.O. Box 91830  
 Santa Barbara, CA 93190-1830

Customer ID : 2-20208  
 Sampled On : May 7, 2013  
 Sampled By : Jamie Johnson  
 Received On : May 7, 2013  
 Depth : --

**Analytical Results for Hammonds Meadow Preserve**

**Native Plant Soil Analysis - Primary and Secondary Nutrients**

Sample Area	Variety	Lbs/AF Nitrate-N	Lbs/AF Phosphorus	Lbs/AF Exch. K	Lbs/AF Sol. K	Lbs/AF Exch. Ca	Lbs/AF Sol. Ca	Lbs/AF Exch. Mg	Lbs/AF Sol. Mg	Lbs/AF Exch. Na	Lbs/AF Sol. Na	Lbs/AF Sulfate
Site 1 0-3"	Native Plant	221	200	744	99.2	9540	798	1260	187	250	346	386
Site 1 3-6"	Native Plant	293	216	901	131	9300	858	1280	208	210	257	346
Site 2 0-3"	Native Plant	340	256	1550	380	11100	1070	1330	257	170	241	432
Site 2 3-6"	Native Plant	82.8	264	1100	130	10200	440	1430	110	150	98	211
Site 3 0-3"	Native Plant	273	356	2750	843	17200	850	1050	117	280	429	305
Site 3 3-6"	Native Plant	124	348	2470	464	17600	536	1070	70.5	190	163	166
Site 4 0-3"	Native Plant	45.2	284	2310	508	17600	914	885	100	210	263	509
Site 4 3-6"	Native Plant	53.2	300	1800	227	18200	516	1020	56.9	200	109	246
Site 5 0-3"	Native Plant	90.8	176	1250	200	8500	523	1370	145	420	675	428
Site 5 3-6"	Native Plant	71.6	148	759	70.8	8900	400	1420	110	350	384	227
Site 6 0-3"	Native Plant	404	304	3410	1520	14600	1130	1040	202	260	643	459
Site 6 3-6"	Native Plant	166	288	2220	497	14700	693	1180	121	200	212	184
<b>Optimum Range - Average</b>		<b>70 - 110</b>	<b>86 - 150</b>	<b>320 - 1900</b>	<b>110 - 430</b>	<b>9700 - 13000</b>	<b>240 - 720</b>	<b>980 - 2000</b>	<b>110 - 260</b>	<b>0 - 930</b>	<b>0 - 1300</b>	<b>340 - 4100</b>

**Native Plant Soil Analysis - Micro Nutrients and Base Saturation**

Sample Area	Lbs/AF Zinc	Lbs/AF Manganese	Lbs/AF Iron	Lbs/AF Copper	Lbs/AF Boron	Lbs/AF Chloride	meq/100g CEC	% CEC - Ca	% CEC - Mg	% CEC - K	% CEC - Na	% CEC - H
Site 1 0-3"	36.8	97.6	172	4.00	1.12	455	15.2	78.3	17.0	3.13	1.80	< 1.00
Site 1 3-6"	43.2	62.4	185	4.00	1.16	448	15.0	77.3	17.5	3.84	1.49	< 1.00
Site 2 0-3"	32.8	62.4	136	3.60	1.04	604	17.7	78.0	15.4	5.58	1.04	< 1.00
Site 2 3-6"	34.0	36.8	144	3.60	1.12	109	16.5	77.0	17.9	4.25	0.970	< 1.00
Site 3 0-3"	47.2	123	78.4	2.80	0.920	1020	25.7	83.7	8.37	6.85	1.19	< 1.00
Site 3 3-6"	46.4	60.8	77.6	2.80	0.800	471	25.9	84.6	8.49	6.10	0.807	< 1.00
Site 4 0-3"	25.6	74.4	55.6	2.40	0.680	1940	25.4	86.2	7.17	5.83	0.894	< 1.00
Site 4 3-6"	24.0	40.4	54.8	2.40	0.720	537	26.2	86.6	8.02	4.39	0.817	< 1.00
Site 5 0-3"	52.4	158	108	4.00	1.08	1180	14.7	72.1	19.1	5.43	3.07	< 1.00



May 14, 2013

**SOIL ANALYSIS** SP 1304514:1-12

Land Trust for Santa Barbara County  
 P.O. Box 91830  
 Santa Barbara, CA 93190-1830

Customer ID : 2-20208  
 Sampled On : May 7, 2013  
 Sampled By : Jamie Johnson  
 Received On : May 7, 2013  
 Depth : --

**Analytical Results for Hammonds Meadow Preserve**

**Native Plant Soil Analysis - Micro Nutrients and Base Saturation**

Sample Area	Lbs/AF Zinc	Lbs/AF Manganese	Lbs/AF Iron	Lbs/AF Copper	Lbs/AF Boron	Lbs/AF Chloride	meq/100g CEC	% CEC - Ca	% CEC - Mg	% CEC - K	% CEC - Na	% CEC - H
Site 5 3-6"	46.4	78.8	117	4.00	0.920	830	14.9	74.5	19.6	3.26	2.54	< 1.00
Site 6 0-3"	41.2	87.6	46.4	3.20	0.86	1930	22.8	79.8	9.34	9.56	1.25	< 1.00
Site 6 3-6"	41.6	43.6	48.8	2.80	0.880	861	22.5	81.8	10.8	6.31	0.956	< 1.00
<b>Optimum Range - Average</b>	<b>5.9 - 170</b>	<b>9.8 - 250</b>	<b>60 - 220</b>	<b>1.8 - 43</b>	<b>1.5 - 8.7</b>	<b>24 - 670</b>	<b>14 - 35</b>	<b>60 - 80</b>	<b>10 - 20</b>	<b>1.0 - 6.0</b>	<b>0.0 - 5.0</b>	<b>0.0 - 3.0</b>

**Native Plant Soil Analysis - Additional Elements**

Sample Area	pH	mmhos/cm ECe	SAR	% Limestone	Tons/AF Gyp Req	Tons/AF Lime Req	Moisture %	% Saturation
							Low Opt High	
Site 1 0-3"	6.71	1.97	1.4	< 0.10	< 0.50	0	7.6	41.0
Site 1 3-6"	6.51	2.11	1.0	< 0.10	< 0.50	0	4.9	42.3
Site 2 0-3"	7.01	2.72	0.9	< 0.10	< 0.50	0	8.1	42.0
Site 2 3-6"	7.16	0.98	0.5	< 0.10	< 0.50	0	5.0	41.5
Site 3 0-3"	7.52	2.79	1.8	6.1	< 0.50	0	8.7	50.4
Site 3 3-6"	7.64	1.50	0.9	4.3	< 0.50	0	7.7	50.3
Site 4 0-3"	7.65	2.35	1.1	2.9	< 0.50	0	8.8	43.4
Site 4 3-6"	7.74	1.10	0.6	4.0	< 0.50	0	6.7	42.0
Site 5 0-3"	7.09	2.02	3.4	< 0.10	< 0.50	0	7.5	41.0
Site 5 3-6"	7.03	1.33	2.2	< 0.10	< 0.50	0	4.1	40.1
Site 6 0-3"	7.48	4.19	2.3	3.3	< 0.50	0	8.4	46.0
Site 6 3-6"	7.53	1.92	1.0	2.3	< 0.50	0	4.7	44.0
<b>Optimum Range - Average</b>	<b>6.5 - 7.5</b>	<b>0.0 - 4.0</b>	<b>0.0 - 7.0</b>	<b>0.0 - 4.0</b>	<b>---</b>	<b>---</b>	<b>4.4 - 31</b>	<b>40 - 50</b>

Good  Problem  Low  High  Indicates physical conditions and/or phenological and amendment requirements.  
 Note: Color coded bar graphs have been used to provide you with 'ATA-GLANCE' interpretations.



May 14, 2013

**SOIL ANALYSIS** SP 1304514:1-12  
Customer ID : 2-20208

**Land Trust for Santa Barbara County**

**SOIL ANALYSIS** Footnotes and comments:

Soil pH & Limestone levels are important to consider when making plant selections. Soil pH levels above 7.0 are not suitable for acid loving plants. Soils containing limestone are not suitable for plants sensitive to Limestone.

If you have any questions regarding your results, please call.

FRUIT GROWERS LABORATORY, INC.

*Scott Bucy*

---

Scott Bucy, Director of Ag. Services

SB1:EHB



## **APPENDIX 4**

### **SPECIES DESCRIPTIONS**

## NATIVE PLANTS

Only three native plant species presently occur at Hammond's Meadow: Jimson Weed, Lemonade Berry and Douglas' Nightshade.

### ***Datura wrightii* (Jimson Weed or Toloache)**

Jimson Weed or "Toloache" has big, showy white flowers and hairy leaves. This species is scattered in sandy soils at Hammond's Meadow. All parts of this plant are highly poisonous to humans and can cause death if ingested. Nevertheless, it is one of the most important medicinal plants for the Chumash (Timbrook 2007).

### ***Rhus integrifolia* (Lemonade Berry)**

Lemonade berry is an evergreen native shrub that is common on the bluffs above the beach in southern Santa Barbara County. It occurs at the top of the bluff at Hammond's Meadow.

### ***Solanum douglasii* (Douglas' Nightshade)**

Douglas' nightshade is a common herbaceous shrub with small star-shaped white flowers that occurs occasionally in the meadow near the Myoporum trees.

## HIGH PRIORITY WEEDS

Many non-native weedy species that occupy Hammond's Meadow are invasive and dominate disturbed soils. The following list and comments includes the most problematic species at this site. It is a high priority to remove these from the site.

### ***Malva parviflora* (Cheeseweed)**

Cheeseweed is a tall weed that is abundant at Hammond's Meadow. Treatment will include: manual removal of plants less than 6 inches tall, by applying citrus oil or a 20% vinegar solution to newly emerged seedlings, or by weed whacking taller plants.

### ***Malva pseudolavatera* (Cretan Mallow)**

Cretan Mallow, native to southern Europe, is similar to Cheeseweed but often has a larger stature with more scattered leaves. It is frequently biennial rather than strictly annual. As with Cheeseweed, at Hammond's Meadow it can grow in dense patches often containing both species. Treatment will include manual removal of plants less than 6 inches tall, solarization of young plants, or application of citrus oil or a 20% vinegar solution to young plants.

### ***Brassica nigra* (Black Mustard)**

Black Mustard is an annual yellow-flowered mustard native to Europe that can be quite tall and abundant. It can dominate some disturbed habitats to the exclusion of native plants. Treatment will include: manual removal of plants less than 6 inches tall, cutting or weed whacking repeatedly before seed is dispersed,

solarization of young plants, or by applying citrus oil or a 20% vinegar solution to newly emerged seedlings.

***Hirschfeldia incana* (Summer Mustard)**

Summer Mustard is an annual or perennial non-native plant with hairy leaves and basal rosettes. It is frequently lower-growing than Black Mustard, which is a strict annual, and flowers throughout summer whereas Black Mustard is mostly a spring and early summer species depending on the timing of rainfall. At Hammond's Meadow many plants are functioning perennials, repeatedly sprouting from the base and also producing low-spreading flowering branches. Solarization may not eliminate the well-established perennial plants. As with many other weeds at Hammond's Meadow, Summer Mustard can develop an extensive seedbank, which responds to repeated disturbance. Treatment will include manual removal of plants less than 6 inches tall, or application of citrus oil or a 20% vinegar solution to newly emerged seedlings.

***Myoporum laetum* (Myoporum)**

Myoporum is a shrub to small evergreen tree native to New Zealand that is planted frequently in the Santa Barbara region. At Hammond's Meadow it is restricted to a stand likely planted along the eastern margin. All Myoporum trees will be removed by cutting the trunks at ground level. An herbicide will be applied to the cut stumps to prevent resprouting from the trunks. Removal of the Myoporum will eliminate use of the area as a bathroom by some beach users.

***Delairea odorata* (Cape Ivy)**

Cape Ivy is an invasive perennial vine native to southern Africa. It is highly invasive and difficult to eradicate. It is creeping and can root from the nodes. Cape Ivy generally grows in shady, disturbed habitats. At Hammond's Meadow it is confined to the Myoporum area along the eastern boundary and occurs with Lemonade Berry in the coastal scrub vegetation. Treatment will consist of repeated application of herbicide.

***Hedera canariensis* (Algerian Ivy)**

Algerian Ivy is a perennial, evergreen, woody vine. Once established in an area, no native plants can become established. It occurs at Hammond's Meadow in the Myoporum area along the eastern boundary.

***Ricinis communis* (Castor Bean)**

Castor bean is an annual or perennial, shrub. It is native to Europe, is toxic (in particular the seeds) and can be fatal if ingested. At Hammond's Meadow it grows as scattered or clumped, relatively small individuals. Seedlings are

relatively common in areas disturbed by gophers, so spread of Castor Bean elsewhere onsite is likely. Treatment will include manual removal of plants recommended and cutting from the base may be effective. Newly emerged seedlings of this plant will be controlled with citrus oil or a 20% vinegar solution.

***Nicotiana glauca* (Tree Tobacco)**

Tree Tobacco is a shrub to small tree native to South America. The flowers are adapted for hummingbirds. It naturalizes in open areas and can become quite numerous. At Hammond's Meadow it grows as scattered individuals. Newly emerged seedlings of this plant may be able to be controlled with citrus oil or a 20% vinegar solution.

***Raphanus sativa* (Wild Radish)**

Wild Radish is an annual with white to pink flowers. Treatment will include manual removal of young plants less than 6 inches tall, solarization and an application of citrus oil or a 20% vinegar solution.

***Carduus pycnocephalus* (Italian Thistle)**

Italian Thistle is an annual that is native to the Mediterranean region that is relatively tall with spiny stems, lobed and spiny leaves, and pink-purple flowers. It is common in disturbed habitats such as roadsides, fields, and pastures. This species spreads easily (dispersed by wind). Once other species are eliminated from a site or the disturbed soils are exposed, it can become the nearly sole dominate weed. Treatment will include: manual removal of plants less than 6 inches tall, solarization of young plants, or by applying citrus oil or a 20% vinegar solution to newly emerged seedlings.

***Chenopodium murale* (Nettle-leaved Goosefoot)**

Nettle-leaved Goosefoot is a common annual species that was introduced from Europe. The species is characterized by many small green flowers, each of which produces one small black seed. It is common in disturbed habitats, produces an extensive often long-lived seedbank, and responds to repeated disturbances that reduce competition from larger weedy species. Although not as dominant in the landscape as some of the other species at Hammond's Meadow this and other species of goosefoot, native and introduced, can form dense patches as observed in spring and early summer. It can flower and produce seeds as rather small plants, so it can escape the effects of weed whacking. Treatment will include: manual removal of plants less than 6 inches tall, solarization of young plants, or by applying citrus oil or a 20% vinegar solution to newly emerged seedlings.



***Marrubium vulgare* (Horehound)**

Horehound is a perennial member of the Mint Family with hairy leaves and small white flowers that was formerly cultivated for tea and flavoring and has now escaped into disturbed areas. It frequents over-grazed pastures and is common to scattered at other disturbed sites such as at Hammond's Meadow. It is likely avoided by gophers and hence may persist in the disturbed habitats. Each flower produces four nutlets that can persist in the seedbank. Mowing does not kill the perennial base and low-growing branches can still produce flowers that bare viable nutlets. Horehound is best eradicated manually. Newly emerged seedlings of this plant may be able to be controlled with citrus oil or a 20% vinegar solution.

**LOW PRIORITY WEEDS**

Numerous additional weed species occur throughout the site, but many are not particularly invasive or dominant in large areas and many are small in stature and do not have a visual or functional impact on the site. Removal of these species is a low priority.

***Carpobrotus edulis* (Freeway Iceplant)**

Freeway iceplant is a creeping perennial native to southern Africa that dominates the area west of the trail. It is enhanced through irrigation and often invades open spaces. It also can be spread by ground squirrels and other small animals, which eat its leaves and fleshy fruits. It can develop an extensive seedbank that will germinate once the living plant material is removed and the soil is disturbed. Iceplant west of the trail will be tolerated in the near term. Over the long-term, solarization might be used. Once the plant material is dead it would be allowed to decay in place and native plants would be planted within it.

***Anagallis arvensis* (Scarlet Pimpernel)**

Scarlet Pimpernel is a spreading annual common in disturbed places including coastal habitats. It can dominate in local conditions, but due to its low stature and general weak presence it is not particularly invasive. It is native to Europe. Newly emerged seedlings of this plant can be controlled with citrus oil or a 20% vinegar solution.

***Sisymbrium orientale* (Sisymbrium)**

Unlike others mustards onsite such as Summer Mustard and Black Mustard, *Sisymbrium* rarely dominates habitats and generally grows in small clusters or individuals among other weeds in disturbed areas, fields, and roadsides. It can be reduced in number through general site maintenance as described herein, although it may persist as scattered individuals. Newly emerged seedlings of this plant can be controlled with citrus oil or a 20% vinegar solution.

***Bromus diandrus* (Ripgutgrass)**

Ripgutgrass is an annual grass species native to Europe that is common to grasslands and disturbed sites in the Santa Barbara region. The flowering heads or spikes include spikelets with long awns notorious for attaching to socks and also problematic for dogs. This opportunistic species can spread if competition from other larger weedy species is reduced. Treatment will include: manual removal of plants less than 6 inches tall, solarization of young plants, or by applying citrus oil or a 20% vinegar solution to newly emerged seedlings.