



# Changing Course

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## Project Statement

This project imagines how a portion of an existing public golf course in Morro Bay can be restored as a botanical garden that protects biodiversity, educates the public, and connects the community to nature.



Change This



To This



### Why restore?

Estero Bay is an biodiversity hot-spot with many endemic species of California wildlife. Anthropogenic factors like cattle grazing, development, climate change, and the introduction of invasives have all factored in reducing habitat for these sensitive plants, animals, insects, and lichens.

The ecologically depleted Morro Bay Golf Course, located in the middle of Estero Bay, is situated next to a natural area that is within the preferred habitat range of over 50 sensitive species. This project would extend the reserve by restoring a portion of the course, increasing the habitat potential for these species by ~70 acres.



Morro Manzanita, *Arctostaphylos morroensis*



Indian Knob Mountainbalm, *Eriodictyon altissimum*



Morro Bay Kangaroo Rat, *Helminthoglypta walkeriana*



### Why here?

Estero Bay is a natural treasure and there is a need to increase awareness about its value. A botanical garden will serve as a site for the education and conservation of the area's natural heritage.

The Morro Bay Golf Course is the perfect site for this because of its proximity to other correlating programming including trails, Museum of Natural History, Heron Rookery and Preserve, and camping. Its proximity to the city of Morro Bay would also provide easy access to nearby residents and tourists.



Natural History Museum



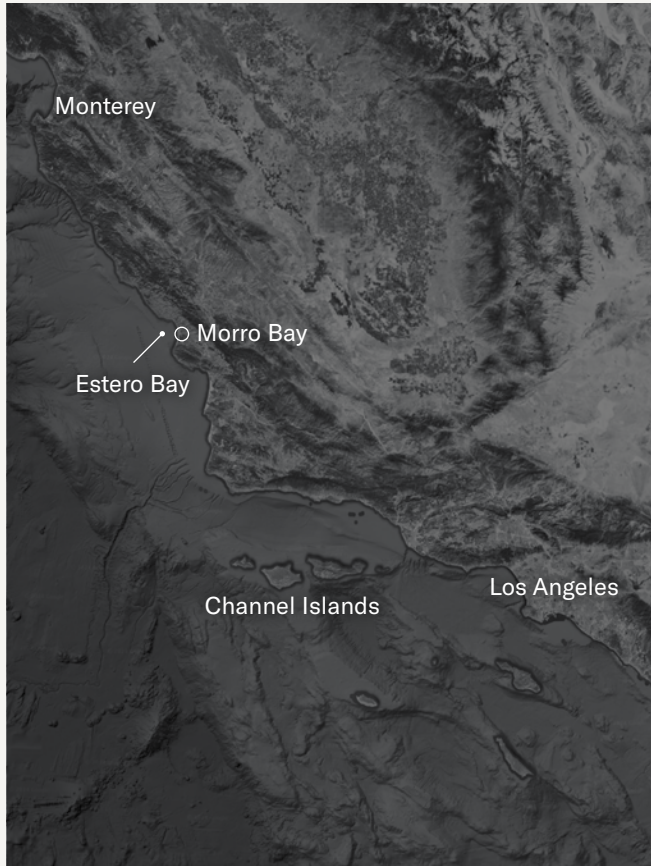
View of estuary from natural area adjacent to golf course.



Heron at the Heron Rookery



## Site Location



Central and Southern California

### Estero Bay

Spanish for “Estuary” Estero Bay is about 15 miles from its South End at Point Buchon/Montana de Oro State Park to its North end at Point Estero.

### Morro Bay (Chicqawt')

The bay was inhabited by the Chumash and Salinan people for thousands of years. It is known for Morro Rock (Lisamu') which is an extinct volcano that is one of seven others that form a row into San Luis Obispo. Lisamu is sacred to the Chumash and there is an effort to reunite stone that was broken off a century ago to create the breakwater for the port.



Morro Bay



## Site Information



Lisamu (Morro Rock)



### Project Site

The Morro Bay Golf Course is positioned between natural areas and the city of Morro Bay. It is adjacent to a heron rookery, campground, and natural history museum. This project considers the Southern half of the golf course leaving the Northern portion intact which was the original footprint of the course until it changed to 18 holes in 1951.

### Info

Location: Morro Bay, California Size: 72 ac, 3,138,250 ft<sup>2</sup> Ownership: California State Parks Date Built: 1925 – 1951 Parcel Number: 066-381-003 Parcel Address: 0 Black Mountain RD, Morro Bay, 93442 Zoning: Recreation

### Stakeholders

City of Morro Bay California State Parks Wildlife Residents of Morro Bay Tourists Naturalists Researchers Students California Coastal Commission Morro Bay National Estuary Program



Golf Course



# Existing Site Conditions





Existing Site Conditions





# Site Photos



## KEY

1. Young Monterey Cypress Trees

2. Rows of Eucalyptus

3. Transitional Habitat



4. View from Top of Site



5. View of Edge Along Road



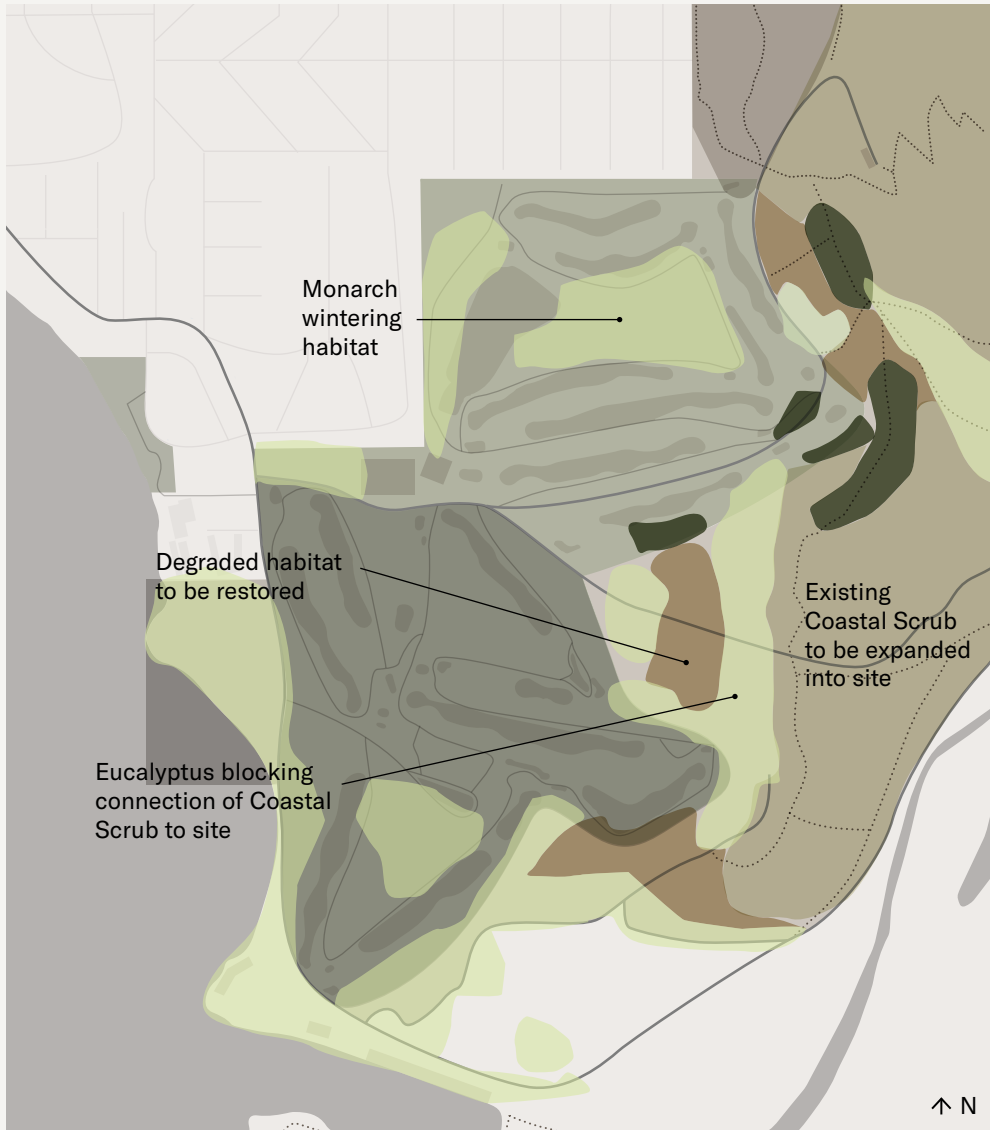
6. View Up Course



7. Existing Maintenance Shed



## Analysis: Vegetation

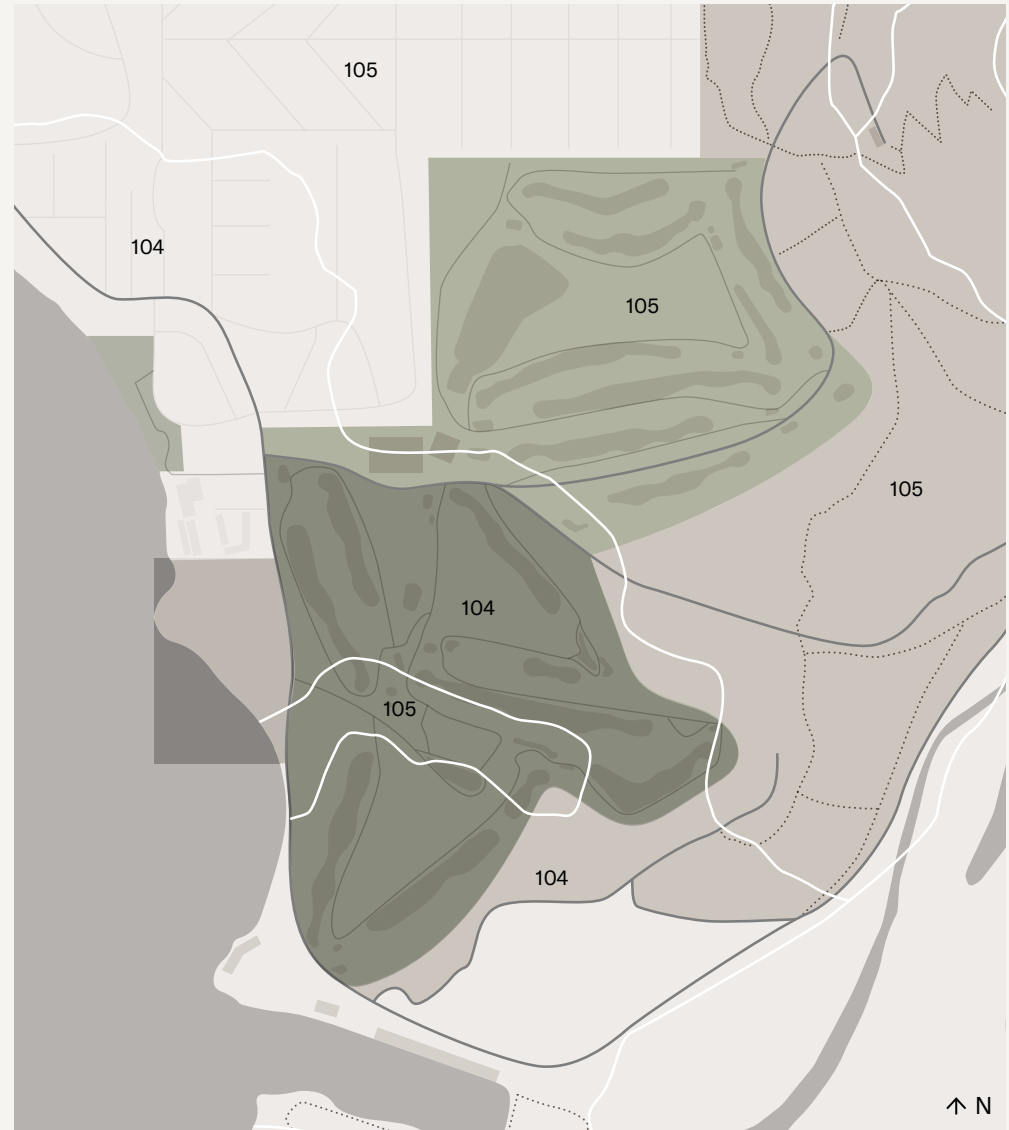


- Transitional
- Eucalyptus
- Oak Woodland
- Coastal Scrub
- Monterey Pine
- Project Area
- Upper Course

*Eucalyptus globulus* cover many areas of the site and were planted to screen the course and to break the wind. The invasive trees are problematic since they suppress native habitat. Paradoxically, they have also become an adopted habitat for Monarch butterflies which feed on the tree's winter blooms. The Monarchs winter on the Northern portion of the course.

To the East of the site are hills of intact coastal scrub, oak woodland and Monterey Pine habitats. The spaces in-between the course and the scrub are transitional and disturbed, made up of invasives and natives. These areas would be restored as well.

## Analysis: Soil



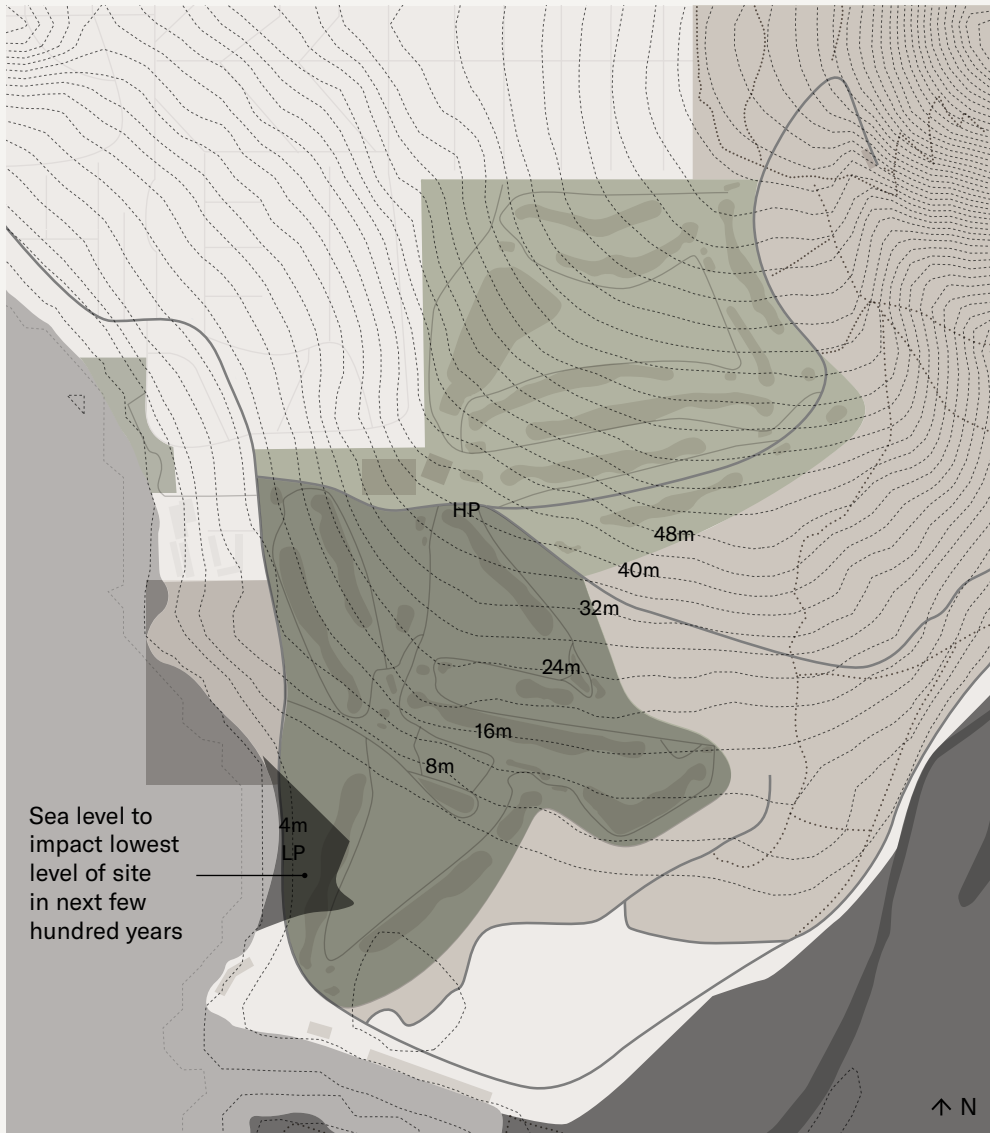
- Project Area
- Upper Course
- 104 + 105 Baywood Series

### 104 + 105 Baywood Series

The soil on the site is best described as dark, sandy, and quick draining soil. Baywood soils form on old sand dunes near the coast with slopes of 0-50 percent and elevations are up to 800 feet. The reference habitats are also classified in the Baywood series.



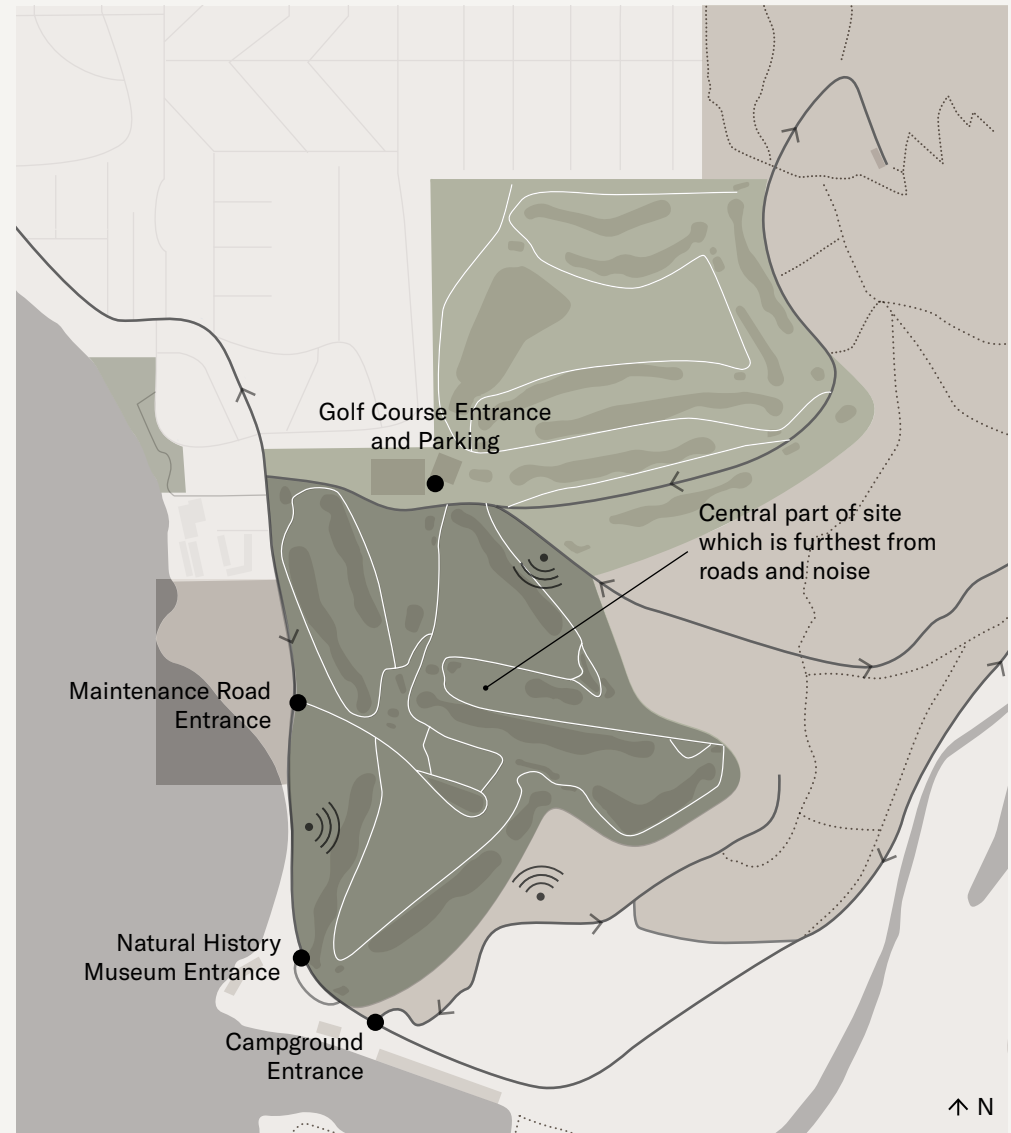
## Analysis: Topography



■ Project Area ■ Upper Course ■ Sea Level Rise

This map illustrates how the bay would change with sea level rise of 4 ft which is an approximate average of projections for the year 2100. Structures that are intended to exist hundreds of years into the future should be positioned above 10 feet above sea level.

## Analysis: Circulation



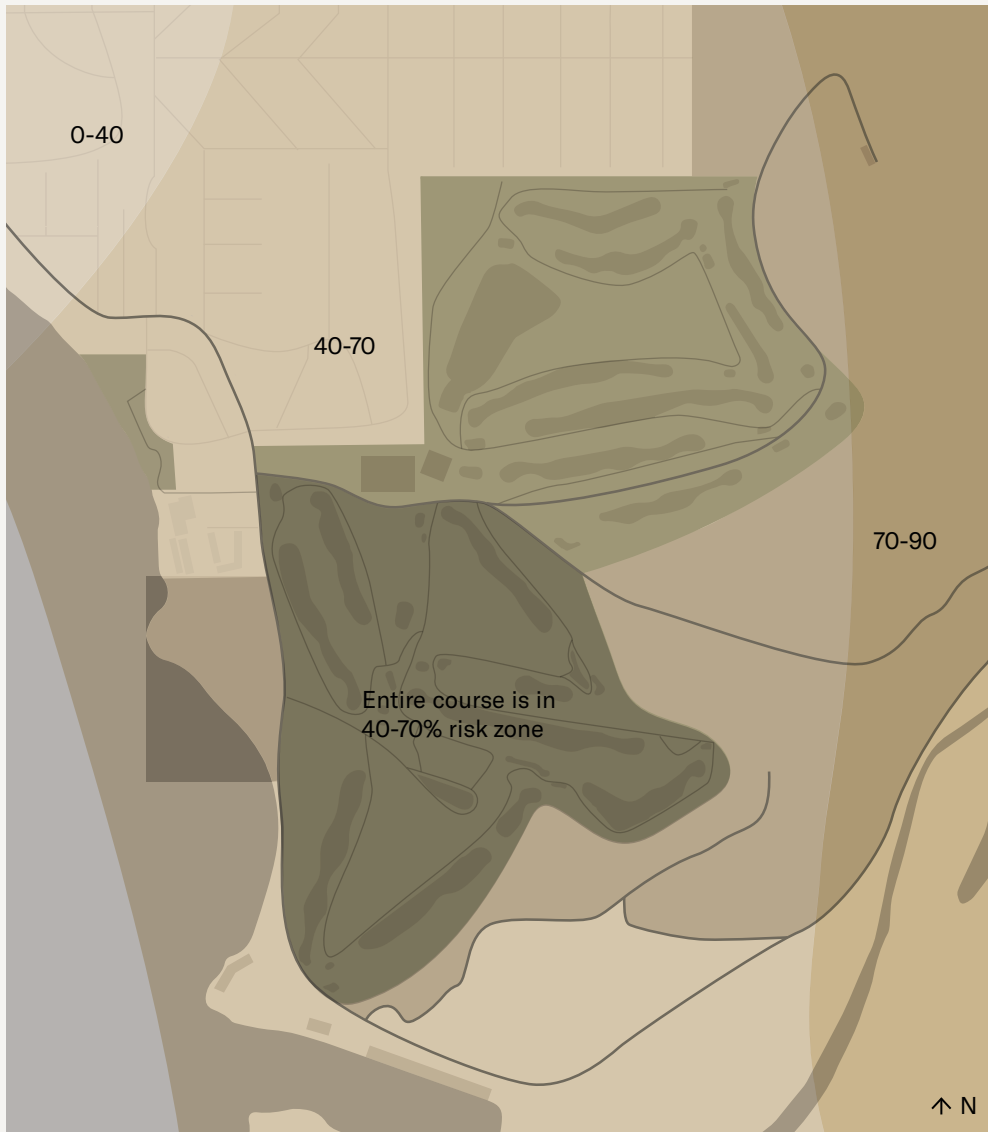
■ Project Area ■ Upper Course ..... Trails ☹ Noise

Park View Drive goes across the top of the site and Main Street goes under the bottom of the site. Main Street is the busier of the two and is one of the main roads into Morro Bay from South East of the city. The street forms a barrier to wildlife that access the bay.

Traffic noise may be a deterrent for some wildlife and is responsible for conditions that are dangerous to animals that are seeking to cross the road which is more of a problem on Main Street next to the estuary.



## Analysis: Wildfire Risk

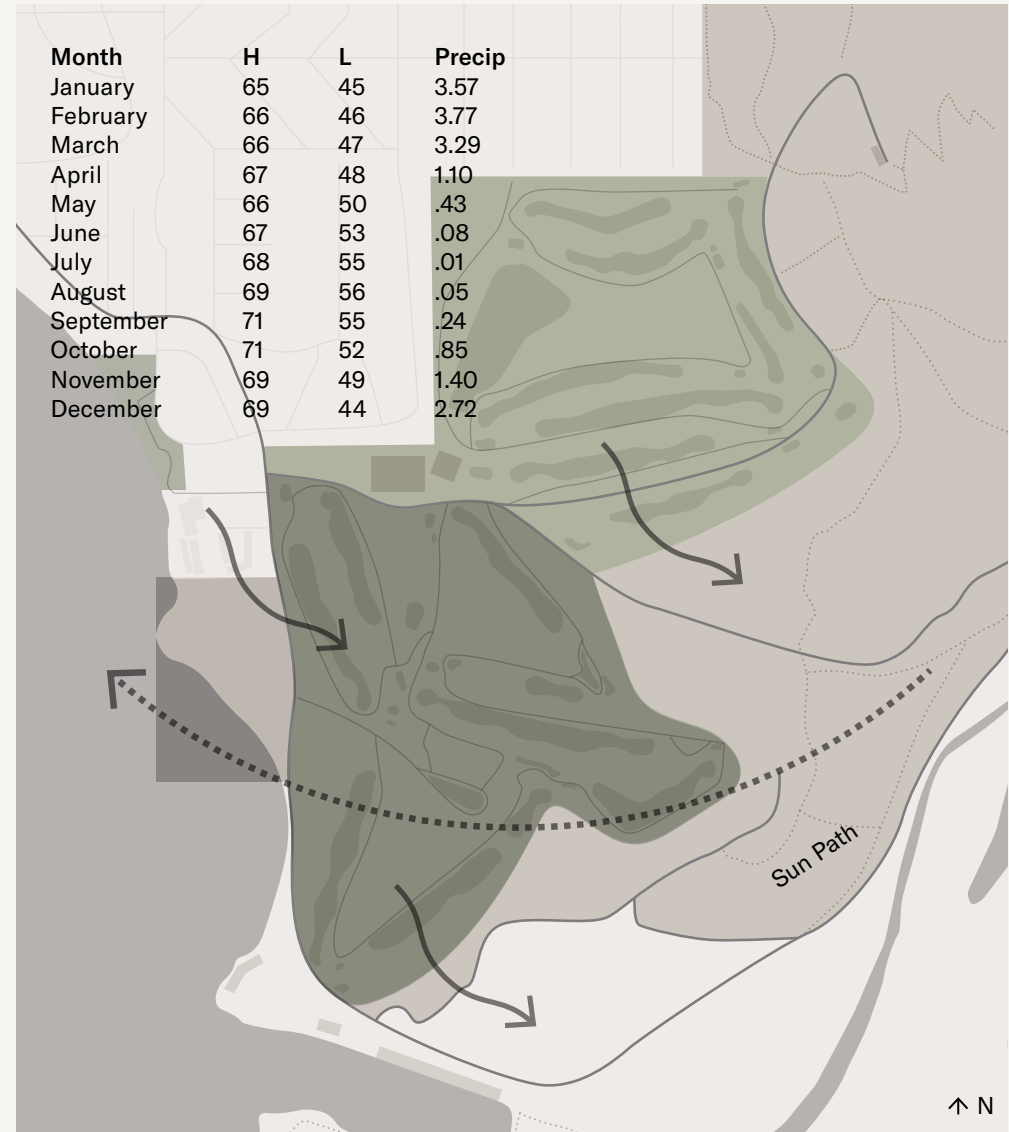


Risk Percentile 0-40 40-70 70-90 Project Area Upper Course

The area hasn't experienced a wildfire in over 150 years, yet like most natural areas in California, the site would be susceptible to fire. There are neighborhoods that are directly adjacent to wild areas above the Northern portion of the golf course.

In the event of a fire the roads around the site would provide a barrier and access for firefighters to contain its spread. North of the site the remaining golf course would provide a barrier as well. The estuary is also another barrier. And lastly the golf course's irrigation system could be deployed in the event of a fire.

## Analysis: Elements



Project Area Upper Course

Temperature averages are mild and typically never over 80 degrees. The site is mostly full sun, but existing Eucalyptus trees create shadows that may affect small patches of the site in the mornings and afternoons.



## Analysis: Threatened and Sensitive Species

Plants and animal species whose habitat range extends into the adjacent wildlife area.

### Invertebrates

<b>Morro Shoulderband Snail*</b>	<b>Helminthoglypta walkeriana</b>
<b>Morro 10 Lined June Beetle*</b>	<b>Polyphlla species novae 'morrensis'</b>
Monarch Butterfly	Danaus plexippus

### Reptiles

California Horned Lizard	<i>Phrynosoma coronatum frontale</i>
Silvery Legless Lizard	<i>Anniella pulchra pulchra</i>
Southwestern Pond Turtle	<i>Actinemys marmorata pallida</i>

### Birds

White Tailed Kite	<i>Aleanus leucurus</i>
Double Crested Cormorant	<i>Phalacrocorax auritus</i>
Northern Harrier	<i>Circus cyaneus</i>
Sharp-Shinned Hawk	<i>Accipiter striatus</i>
Golden Eagle	<i>Aquila chrsaetos</i>
Merlin	<i>Falco columbarius</i>
Prarie Falcon	<i>Falco mexicanus</i>
Heermann's Gull	<i>Larus heermanni</i>
Allen's Hummingbird	<i>Salasphorus sasin</i>
Olive-Sided Flycatcher	<i>Contopus cooperi</i>
Willow Flycatcher	<i>Empdonax traillii</i>
Loggerhead Shrike	<i>Lanius ludovicianus</i>
Purple Martin	<i>Progne subis</i>
Oak Titmouse	<i>Baeoluphus inornatus</i>
Wrentit	<i>Chamaea fasciata</i>
California Thrasher	<i>Toxostoma redivium</i>
Yello Warbler	<i>Denroica petechia</i>

### Mammals

<b>Morro Bay Kangaroo Rat*</b>	<b>Dipodomys heermanni morroensis</b>
Big Free-Tailed Bat	<i>Nyctinomops macrotis</i>
Pallid Bat	<i>Antrozous pallidus</i>
Fringe Myotis	<i>Myotis thsanodes</i>
Yuma Myotis	<i>Myotis yumanensis</i>
Long-legged myotis	<i>Myotis volans</i>
Long-Eared Myotis	<i>Myotis evotis</i>
Western Small-Footed Myotis	<i>Myotis cilioabrum</i>

### Plants

Red Sand-Verbena	Abronia maritima
Hoover's bent grass	Agrostis hooveri
<b>Morro Manzanita*</b>	<b>Artostaphylos morroensis</b>
Bishop Manzanita	Artostaphylos obispoensis
<b>Osos Manzanita*</b>	<b>Artostaphylos osoensis</b>
Pencho Manzanita	Artostaphylos pechoensis
Santa Margarita Manzanita	Arctostaphylos pilosula
Carlotta Hall's Lace Fern	Aspidotis carlotta-halliae
Miles Milk-Vetch.	Astragalus nuttallii var. nuttallii
Coulter's Saltbush	Atriplex coulteri
Cambria Morning-Glory	Calystegia subacaulis ssp. episcopalis
Lompoc Ceanothus	Ceanothus cuneatus var. fascicularis
Costal Goosefoot	Chenopodium littoreum
Point Reyes Salty Bird's-Beak	Cholophyron maritimum ssp. palustre
Palmer's spineflower	Chorizanthe palmeri
Dune Larspur	Delphinium parri ssp. blochmaniae
<b>Eastwood's Larspur*</b>	<b>Delphinium parryi ssp. eastwoodiae</b>
Beach Spectaclepod	Abronia maritima
<b>Betty's Dudleya*</b>	<b>Dudleya abramsii ssp. bettinae</b>
Blochman's Dudleya	Dudleya blochmaniae ssp. blochmaniae
Blochman's Leafy Daisy	Erigeron blochmaniae
Saints' Daisy	Erigeron sanctarum
<b>Indian Knob Mountainbalm*</b>	<b>Eriodictyon altissimum</b>
Suffrutescent Wallflower	Erysimum suffrutescens
Kellogg's Horkelia	Horkelia cuneata var. sericea
Southwestern Spiny Rush	Juncus acutus ssp. leopoldii
Coulter's Goldfields	Lasthenia glabrata ssp. coulteri
Jones' Layia	Layia jonesii
Palmer's Monardella	Monardella palmeri
Coast Woolly-Heads	Nemacaulis denudata var. denudata
Sand Almond	Prunus fasciculata var. punctata
Chaparral Ragwort	Senecio aphanactis
Blochman's Ragwort	Senecio blochmaniae
California Seablite	Suaeda californica
Brewer's Spineflower	Chorizanthe breweri

\* Species endemic to Morro Bay and Los Osos



## Goals



### Restoration

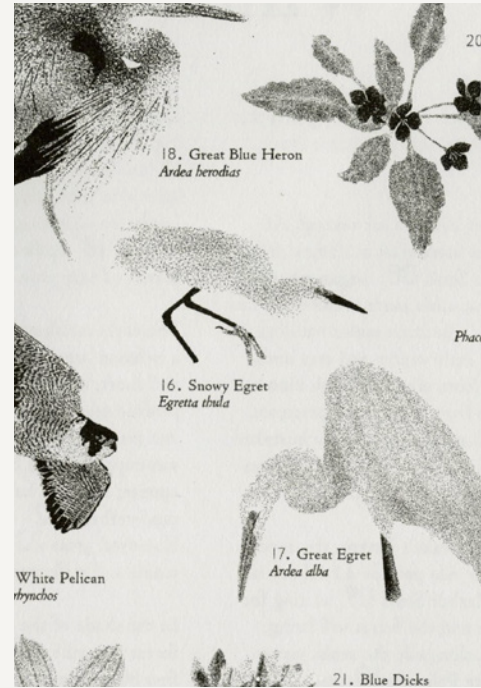
Increase habitat potential for sensitive wildlife by restoring the land to a former natural state which could include a phased removal of Eucalyptus trees.

#### Programming Elements

Nursery  
Trails  
Seed Farm

#### Users

Naturalists  
Ecologists  
Volunteers  
Wildlife



### Education

Increase awareness about the region's special natural heritage by creating opportunities for visitors to engage with nature.

#### Programming Elements:

Interpretive Signage  
Visitor Center  
Outdoor Classrooms  
Botanical Garden

#### Users

Students  
Locals  
Visitors



### Recreation

Expand trail network by connecting to existing trails and creating spaces for outdoor group exercise.

#### Programming Elements

Trails  
Benches  
Spaces for Group Exercise

#### Users

Hikers  
Mountain Bikers



### Conservation

The garden functions as a genetic bank of the Morro Bay area through a collection of specimens and active planting of endangered and threatened species.

#### Programming Elements

Botanical Garden  
Seed Farm  
Nursery

#### Users

Wildlife  
Scientists



# Methodology



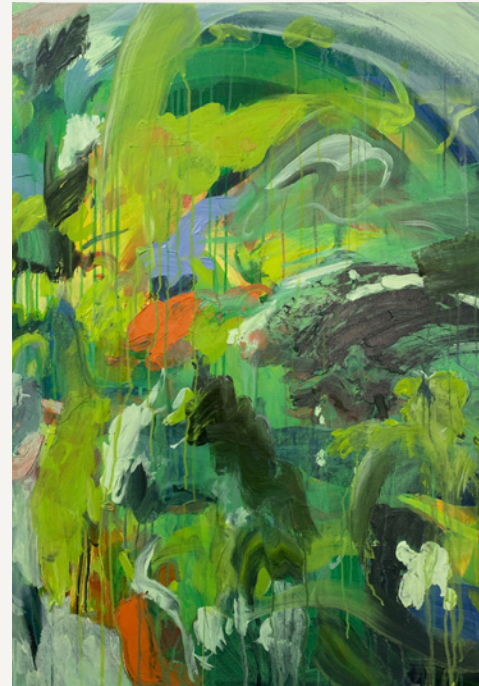
## Restoration

### 1. Primer of Ecological Restoration

Karen Holl introduces the ecological restoration at a broad level. This book was used to determine which model habitat the restoration will reference as well as guide considerations for land-form and hydrology. The book also broadly guides how plant material will be sourced for restoration efforts.

### 3. Puente Hills Habitat Authority Restoration Plan

This report outlines the process used in restoration efforts in a similar sage-scrub ecosystem. The plan will serve as a step by step blueprint for the restoration component of the project in terms of process and project outline. See *Case Study*



## Botanical Garden

### 1. Designing California Native Gardens : the Plant Community Approach to Artful, Ecological Gardens

This book guides the botanical garden the project by offering a model for designing California native communities in a garden context. This is used to consider the specific plant communities of Estero Bay which will be demonstrated in the botanical garden.

### 2. Shrouded in Light

This book is a discussion about shrubs. More theoretical and poetic in its approach, the book aims to identify key characteristics and patterns in this landscape type which will be a large focus in the design of the botanical garden since many of the plant communities are shrub-lands.



## Site Wide

### 1. Sea Ranch Design Principles

The design approach to the site are inspired by the same design thinking that guided the development of Sea Ranch.

- The approach will be light on the land
- Building materials should draw from nature: rough and simple
- Building will be clustered to avoid disturbance to natural areas
- Buildings will be humble and recede into the landscape
- Design will work with nature to meet goals



# Users

## Locals

Morro Bay and Los Osos  
Residents (26,219 people)  
+65 year old demographic

## Threatened Wildlife

Morro Manzanita  
Indian Knob Mountainbalm  
Morro Shoulderband Snail  
Morro Kangaroo Rat

## Educators

K-12  
Undergraduate  
Graduate

## Students

K-12  
Community College  
Undergraduate  
Graduate

## Scientists

Botanists  
Ecologists

## Campers

Tent Campers  
Car Campers  
RV Campers

## Tourists

800,000 yearly  
Morro Bay visitors

## Naturalists

Birders  
Nature Enthusiasts

## Recreationist

Hikers  
Trail Runners



## Users

Morro Bay Population 10,757  
Median Household Income 88,547  
Average Price of a home: 802,700  
Total Households: 4,852

### Retired Population

28.6%  
65 Years and Older in Morro Bay  
(15.8% 65 Years and Older in California)

65 to 74 years 17.8%

75 to 84 years 8.4%

85 years and over 2.4%

### Disability

16.1%  
Disabled Population in  
Morro Bay  
(11.7% Disabled Population in California)

Hearing difficulty 4.3%

Vision difficulty 3.1%

Cognitive difficulty 6%

Ambulatory difficulty 7.7%

Self-care difficulty 2.9%

Independent living difficulty 6.1%

## Student Population

### Nearby Universities:

Cal Poly San Luis Obispo  
20,963 Undergraduate Students  
815 Graduate Students

Cuesta Community College  
9,908 Students

### Local Schools K-12:

Monarch Grove Elementary  
Del Mar Elementary  
Baywood Elementary

Los Osos Middle School  
Morro Bay High School



## Users

Morro Bay welcomes approximately 800,000 visitors who spend approximately \$161 million each year which is 9% of total visitor spending in San Luis Obispo County each year.

Morro Bay Assets as Outlined by Tourism Board:

1. Friendly and Welcoming Community
2. **Outdoor Recreation**
3. **Environmental Protection**
4. Eclectic Community

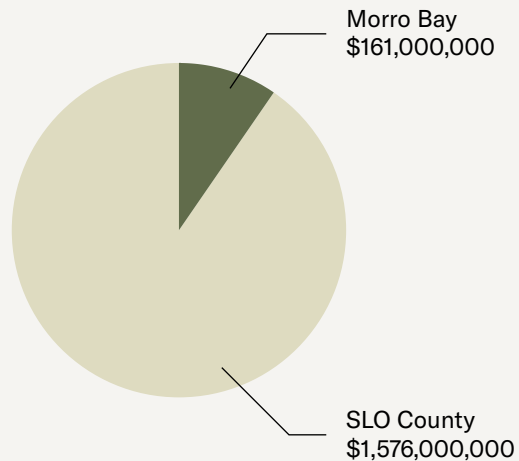
The area's abundant natural beauty offers residents and visitors many recreational activities to choose from including surfing, hiking, biking, and paddle-boarding.

The Morro Bay Tourism strategy states that "Local residents are protective of the area's natural resources and environment. The estuary, harbor and "The Rock" are the centerpiece of local residents passion for the environment. While they do want visitors to enjoy the environment, they always want visitors to respect the environment."

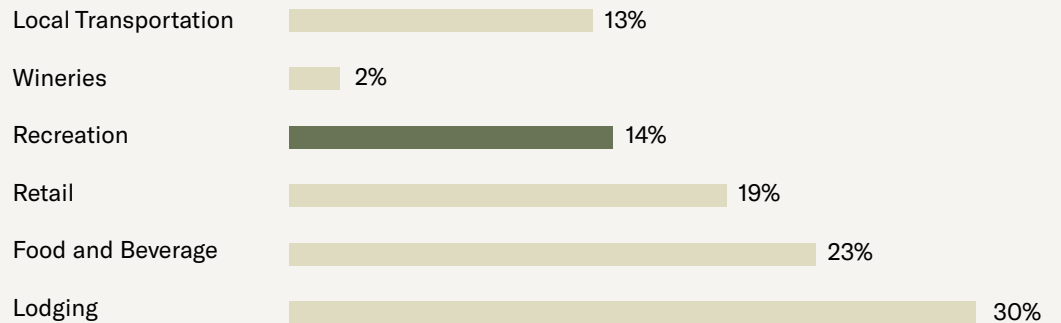
There is an opportunity here to create a new attraction that is focused on the *Environmental Protection* asset outlined by the tourism board. The botanical garden would not only restore the landscape of a portion of Morro Bay, but provide a means of engaging with tourist through education and awareness about the area's natural value. This is also a branding strategy that could help differentiate Morro Bay from the surrounding cities as an ecological tourism destination.



Site is about a 20-30 minute walk away or a 3 minute drive from the main tourist attractions of Morro Bay.



Overall spending of visitors broken down by type:





## Users: Stories

### The Botany Professor

... is conducting a class at 10 am on Thursday morning. This is where their field botany class is meeting this week. He is planning to start the class in the botanic garden to go over their collection of specimens from the region. After the garden he will take his class through the restored landscape which will provide a teaching moment, and into the wild areas where he will continue to instruct his class on native ecology of the area. They loop around through the trail system and end up back where they met in the parking lot of the botanical garden.

### The Entomologist

... regularly comes to the site to catalogue the monarch population within the groves of eucalyptus trees as well as in the botanical garden. He has been monitoring the site to see how the plan for phasing out some of the eucalyptus trees is affecting the population of the monarch butterflies.

### The undergraduate student

...shows up to the botanic garden at 10am on a Thursday. This is where her class is meeting this week. She tours the garden guided by her professor who is an plant expert in California natives. They walk through the garden taking notes about unique specimens that are endangered in the wild but are being propagated in the botanical garden. There is access to many plants that are covered in her curriculum all within a small space. They finish their tour by exiting the garden and walking into a trail where they learn about the processes of sage-scrub restoration and into the wild area adjacent to the site where they continue their tour, finding more examples of native plants in the wild.

### Elementary School Student

...arrives on a bus at the botanical garden with her classmates. Her teacher and a staff from the garden greets them in the entry and they walk into the garden where they meet in a space that functions as an outdoor classroom which is where their lesson starts. Following their morning lesson, they have lunch at tables in the garden followed by a tour where they see Monarchs, herons, hummingbirds, and rabbits. After their walk in the garden they walk through restored area which offers them yet another teaching moment on their way to the Natural History Museum.

### The Retired Volunteer

...shows up every Saturday morning in the Spring to help weed the restoration area of the site. She has made a group of friends that are also volunteers that all show up every week. She also frequents the botanical garden where she does Tai Chi at the amphitheater.

### The Retired Yogi

...attends classes at the garden on Saturdays. When the amphitheater is being used for Tai Chi, classes happen in the outdoor classroom or wedding gazebo.

### The Hiker

...who is also a birder is able to continue their hike through the restored landscape to the Heron Rookery. They continue their walk along a different path that forms a loop.

### The Camping Family

...is staying at the Morro Bay State Park campgrounds. After visiting the Morro Bay Embarcadero they decide to stop by the botanical garden on the way back to the campground where they learn about the region's unique biodiversity. They leave their trip with a profound appreciation and respect for the area.

### The Tourist

...is visiting Morro Bay for the first time and is unfamiliar with the area's unique natural heritage. After kayaking in the bay, they visit the botanical garden since they saw someone post about it on Instagram. They leave the garden with a newfound understanding of California's biodiversity.

### The Undergraduate Student Volunteer

...is leading the restoration volunteer efforts at the site and into the adjacent wildlife area where they have been removing invasive grasses and mustard.



# Program Elements

<b>Restoration</b>	
Habitat Restoration	~60 acres
<b>Education</b>	
Visitor Center	4,000 sq ft
Parking	60 Spots
Interpretive Signage	Plant Tags Educational Displays Trail Markers
<b>Gazebo</b>	900 sq ft
<b>Recreation</b>	
Trails	Main Trail 8ft Side Trails 4ft
Furniture	Benches Trash Cans Tables
<b>Conservation</b>	
Botanical Garden	~70 acres
Nursery	3,000 sq ft
Seed Farm	1 acre



Paths



Gazebos



Visitor Center



Restoration



Trail Markers



# Opportunities





# Constraints





# Case Study: California Botanic Garden

## Overview

The California Botanic Garden is the largest botanic garden dedicated exclusively to native plants in California. The garden spans 86 acres in Claremont California and is organized into three overall categories which include plant communities, thematic gardens and Southern California gardens. Besides serving the community as a living museum the garden is also a space for academic and field based programs that center around conservation and restoration. Ecologists and staff help to manage seed banks that are used for growing plants in restoration projects, the botanical garden, and for growing nursery material. In addition to its academic programming, the garden serves the community as a space for weddings and events, educational classrooms, bird walks, and yoga. The garden is staffed by over 100 people and is funded in different ways including admission fees, donations, rentals, merchandise and the on-site nursery.

## Application

The California Botanic garden is a blueprint for the Morry Bay Botanic garden in many ways and offers examples for how the garden can be organized:

## Trails

The CBG is organized based off a main trail that branches off into smaller trails. The main trail is paved in asphalt to facilitate maintenance traffic, while the smaller trails that branch off and are paved with low impact materials like gravel and DG.

## Garden Design

Garden is designed by community and also thematically (cultivars, flowers, grasses etc)

## Structures

Indoor/outdoor structures provide space for gathering that can be used for weddings, or just sitting to enjoy the garden.

## Venue

The grounds of the garden have the potential to be the backdrop for weddings. The design of outdoor structures can be included as spaces for gathering and framing views.

## Signage

Way-finding and interpretive signage are used throughout the garden to highlight areas, plants and visitor location.

## Nursery

There is a nursery on-site that sells natives functioning as a tool for raising money, spreading genetic materials for plants that might be at risk, and also to encourage sustainable climate appropriate gardening, and extending habitat potential into the community's private gardens.





# Case Study: California Botanic Garden





# Case Study: Native Garden at San Francisco Botanic Garden

## Overview

The native garden at the San Francisco Botanical Garden was a feature of the garden since it started in 1937. Since that time the native section of the garden became a collection and somewhat of a repository for native specimens. In 1980 it was redesigned by Lutsko and Associates. The goal of the redesign was to give order to the garden by creating entrances and hierarchy to the planting. Every plant in the garden was evaluated and either kept in place or re-propagated.

“What makes the garden a human rather than a purely organic creation is that plants were combined that don’t occur in nature. The Menzies Garden has plants from several ecotypes including coastal scrub, woodlands, and a meadow.

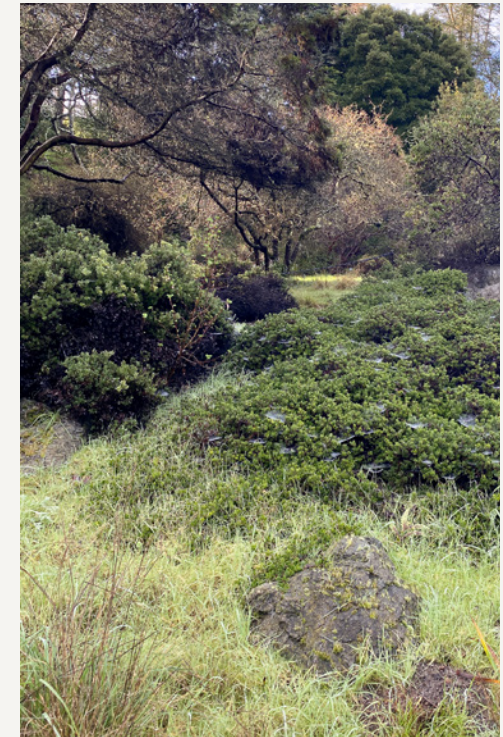
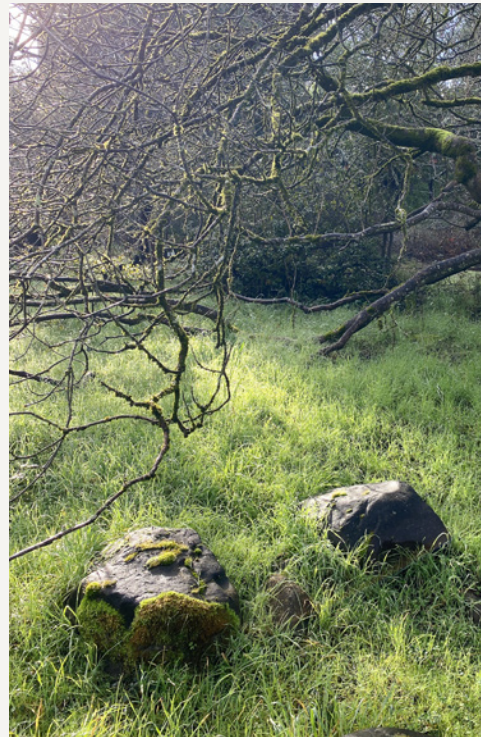
## Application

### Hierarchy/Planting Design

There is a clear experience in this garden that is easy to read. There are thresholds that you experience as you enter and exit the garden and larger open spaces inside that feel enclosed by the surrounding taller vegetation. There is an extensive palette that is used, but the design feels cohesive and natural.

### Paths

Larger paths circulate in the periphery but smaller paths can be accessed along the way providing visitors with more intimate garden experiences.





# Case Study: Puente Hills Habitat Preservation Authority

## Overview

Puente Hill Habitat Preservation Authority manages and restores lands on the Puente Hills Preserve. They have restored 300 acres including 194 acres of mitigation restoration.

They work on restoring “functional aspects of a given ecosystem to a semblance of its pre-disturbed state (reference habitat).” The process involves a multi year approach focused on removing non-native vegetation and replacing it with native vegetation through seeding and planting.

## Seed Collection

Seed material is gathered from nearby areas and eventually from the restored site for other restoration projects.

## Site Preparation

Site goes through several “grow and kill” cycles where weeds are removed. Sometimes site is irrigated to encourage germination of invasive seed bank.

## 50’ Weed Barrier

A 50’ perimeter outside of restoration site is weeded to protect restoration site while plants are establishing

## Installation

Site is seeded and planted with plants that have a difficult time growing from seed.

## Maintenance

Restoration site is weeded. Watered to supplement rain.

## Remedial Seeding

Restoration site is seeded again if first seeding is unsuccessful.

## Monitoring

Site is monitored for several years.

## Data Collection

Project is evaluated for success.

## Application

Although a professional restoration ecologist would need to be consulted for the restoration aspect of the project the plan for a small patch of restoration in Puente Hills provides a general blueprint and ideas for plant material to be used in seed mixes and in container plantings.

	Year 1				Year 2				Year 3				Year 4				Year 5				Year 6				Year 7				Year 8							
Restoration Tasks	W	S	S	F	W	S	S	F	W	S	S	F	W	S	S	F	W	S	S	F	W	S	S	F	W	S	S	F	W	S	S	F	W	S	S	F
Seed Collection	●	●	●	●	●	●	●	●	●	●	●	●																	●	●	●	●	●	●	●	●
Site Preparation Irrigated ‘Grow and Kill’ Treatments	●	●	●	●	●	●	●	●																												
Final Site Preparation: Mowing & Weed Thatch Removal												●																								●
Weeding in the 50-foot Weed Management Buffer	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Installation–Seeding and Planting								●	●																											●
Maintenance Weeding									●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●			●	●						
Remedial Seeding												●	●			●	●																			
Horticultural Monitoring	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			●	●		
Annual Performance Monitoring Data Collection													●				●				●				●				●				●			

● If necessary



# Case Study: Puente Hills Habitat Preservation Authority



La Habra Heights, 2016



La Habra Heights, 2023



Whittier, 2018



Whittier, 2023



## Case Study: Laguna Canyon Foundation

### Overview

This spot of land which had lived many previous lives as a pig farm, walnut orchard and Mormon Community settlement was restored by the team at Terremoto in collaboration with the Laguna Canyon foundation. Following a flood and clean up effort the site was terraced into three main levels which were programmed into a 'Discovery Terrace'(play), Gathering Terrace(Socializing and Education), and Utility Terrace(used by the staff of the Laguna Canyon Foundation for seed harvesting etc). The approach was light on the land with not too many heavy interventions. Materials were light and natural to blend in with this center for environmental restoration.

### Application

Since the aim of the project is to have a positive impact on the health of the biosphere, it makes sense to approach the project with a light on the land ethos. This could mean embracing the existing contours and not changing the grading drastically. It also means using natural materials and materials found on site like rocks. Rather than use concrete, other materials like DG and timber steps can be used as flooring materials.





# Case Study: Irvine Ranch Conservancy

## Overview

The Irvine Ranch Conservancy has worked to restore thousands of acres of open space in Orange County which have been degraded over time by grazing, frequent fires, and invasive species. Projects are aimed at restoring different habitat types such as coastal sage scrub, chaparral, riparian, oak woodland and native grassland.

The restoration process takes place over many years and involves the removal of invasive species and seed bank over time. Native seeds are then introduced, which are more adaptable to micro-site variation than using container plants. Over time the native seed-bank becomes greater than the invasive seed-bank.

In an ideal scenario, native seeds would be gathered at the site or near the site since the likelihood that the material will be adapted to local conditions is higher. This increases the odds that the restored plant community will possess the genetic diversity necessary to successfully adapt to changing environmental conditions.

Rather than gather seeds that are not regionally specific or depleting the natural seed bank of the area, the project maintains a rotating crop of ~50 native species on a seed farm which has created a seed bank large enough to supply restoration efforts.

## Application

### Native Seed Farm

A native seed garden could be set aside for the cultivation of seeds that would be used for restoration at the site and beyond.

### Volunteers

Because the operation is so large, a network of volunteers would be developed to help with gardening and restoration efforts on site and beyond.





## Case Study: Test Plot

### Overview

Test Plot which was started in 2020 is a community based experiment in land-care. Part restoration, part native community garden, the gardens are responsive to their unique sites, community and resources. The approach to these plots are based on experimentation, trial and error, observations, questioning and work. Each plot brings together many hands from the community with the goal of connecting people back to the land and enhancing biodiversity and native habitat. There are 13 plots in different parts of California.

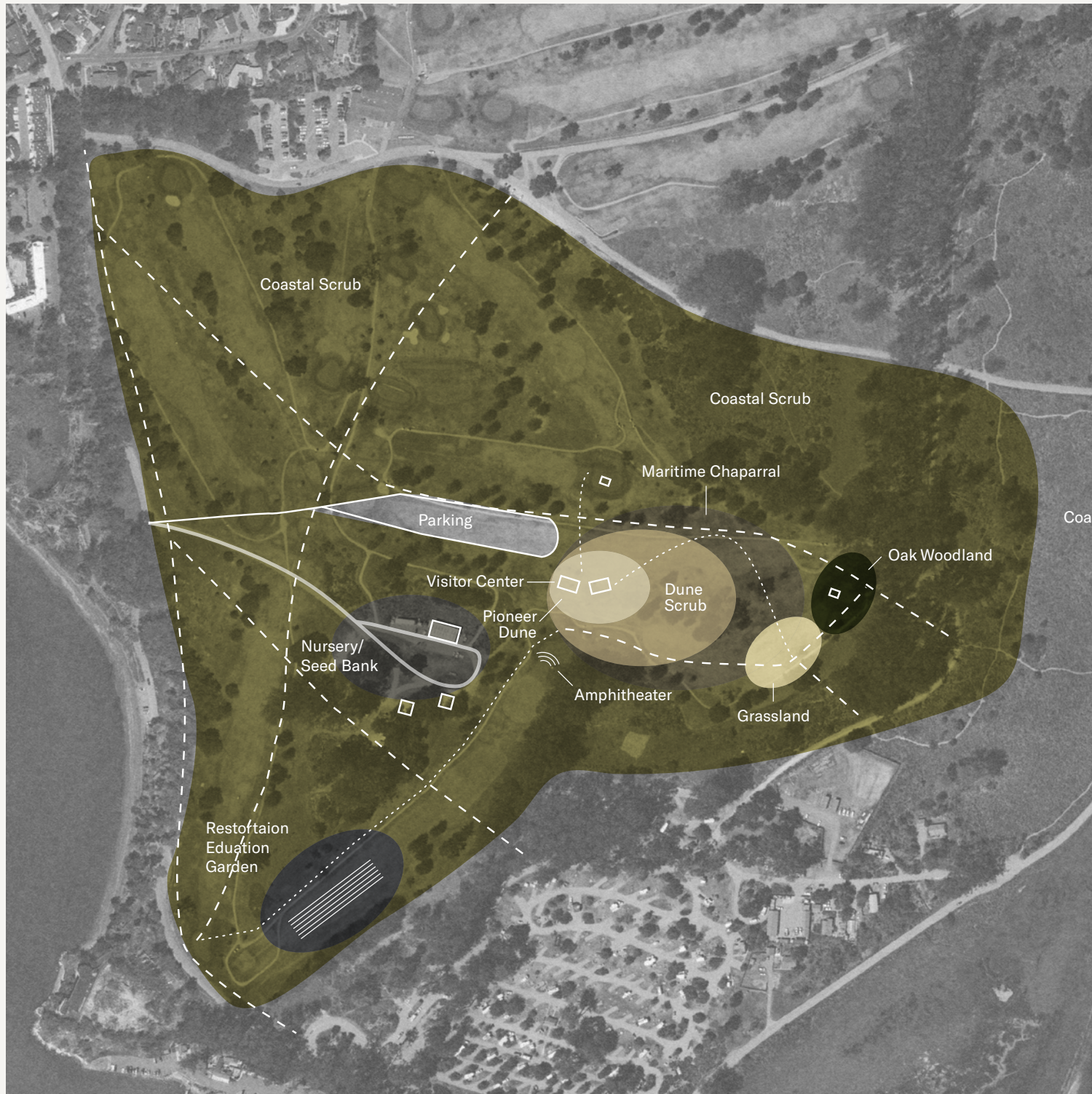
### Application

Restoration work at the Morro Bay Botanic Garden is an opportunity to engage the community with restoration efforts. Volunteers can help by getting their hands dirty in a reciprocal relationship of giving time and energy in exchange for the benefits of gardening, learning about Morro Bay's ecological heritage, rebuilding natural beauty, and community.





## Concept 1: Growing From the Middle



Most of the site is restored as the dominant adjacent habitat of Coastal Scrub while smaller gardens emanate from the center around the visitor center.

### Pros

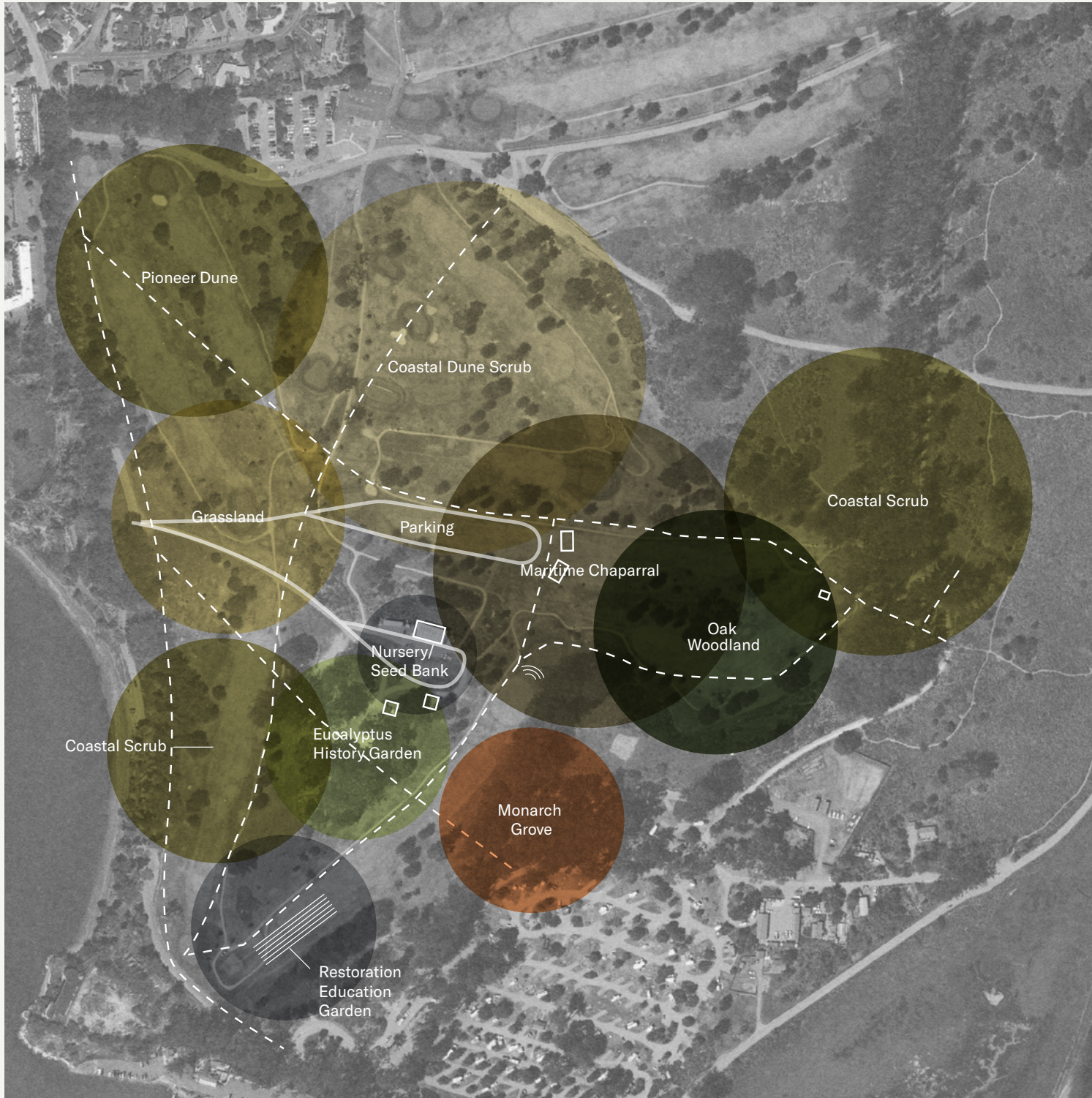
- Largest expression of habitat type most likely to be found on site
- Educational components are grouped with nursery

### Cons

- Site programming may decrease connection of natural areas.



## Concept 2: Habitat Zones



This concept gives much more space to habitats that might not be found in this location such as Pioneer Dune and Coastal Dune Scrub.

### Pros

- Largest expression of habitat types for clarity
- Educational components are grouped with nursery

### Cons

- Certain habitat types would require more maintenance
- Building in interior portion of site could limit connection of natural areas



### Concept 3: View From the Top



Drawing from successional plant communities this design starts with the most sparse habitat type and moves outward to the likely plant community of this particular parcel, Coastal Scrub.

#### Pros

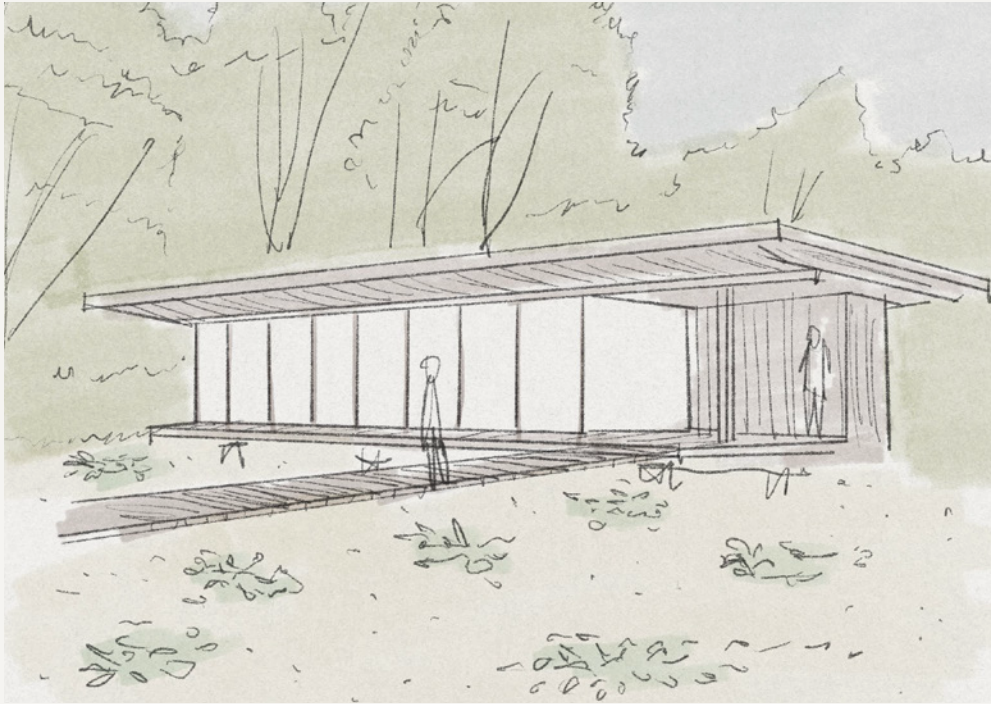
- Best views on site
- Large portion of undisrupted connectivity through site
- Habitat example gardens are smaller in scale

#### Cons

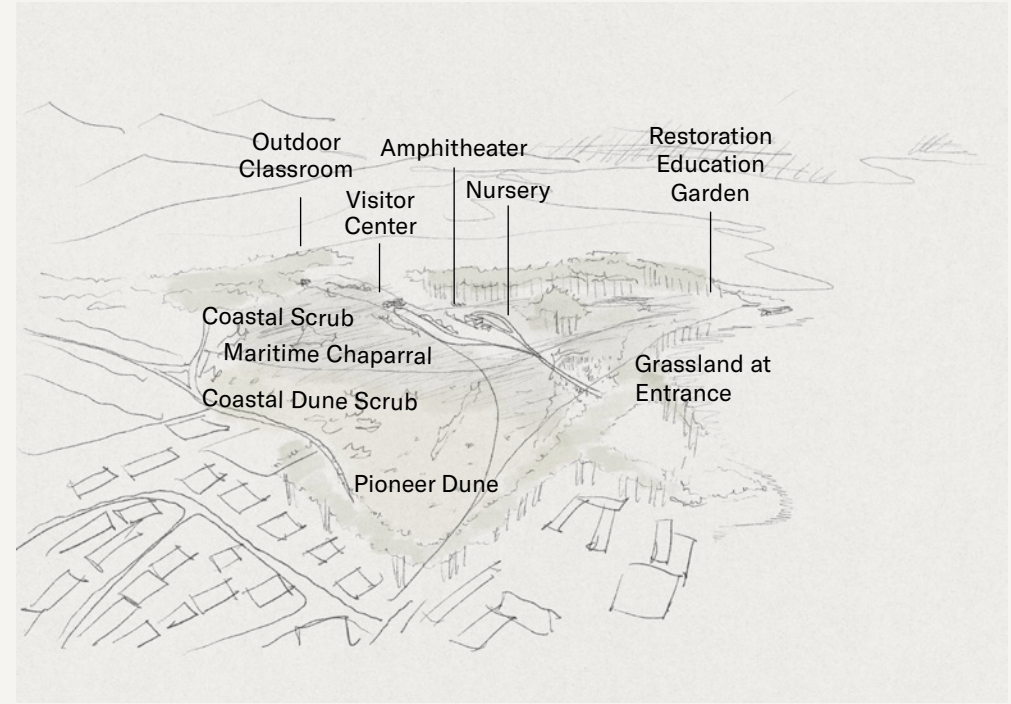
- Sloped topography is most defined at the top of the site



# Process Sketches



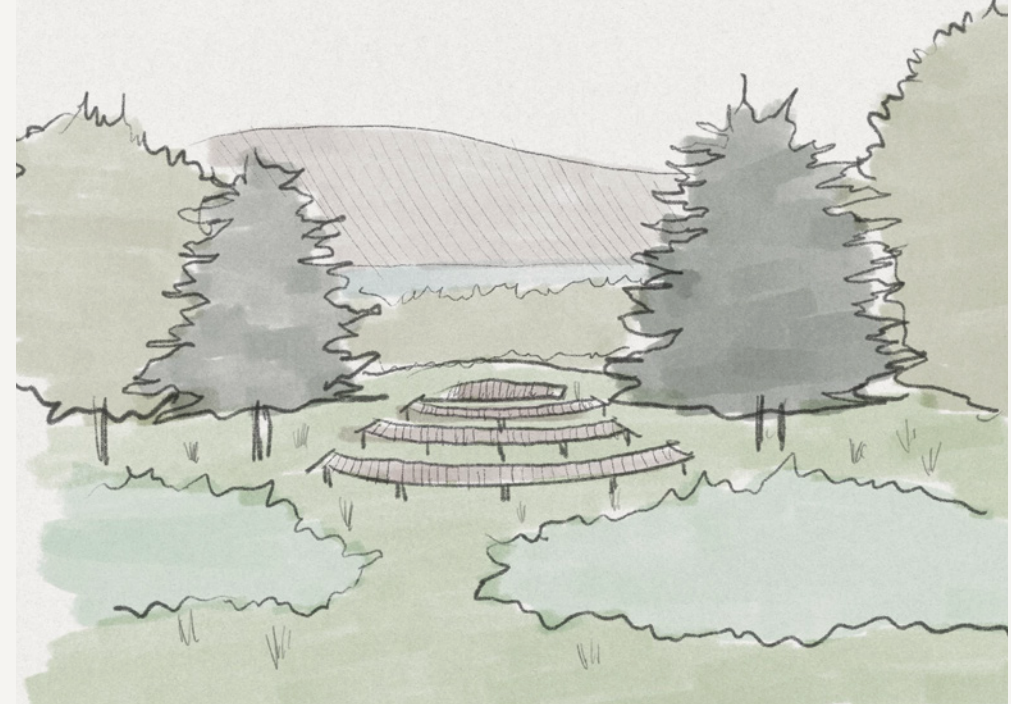
Visitor Center Sketch



Perspective of Concept 2



Seed Farm



Amphitheater Overlooking Bay



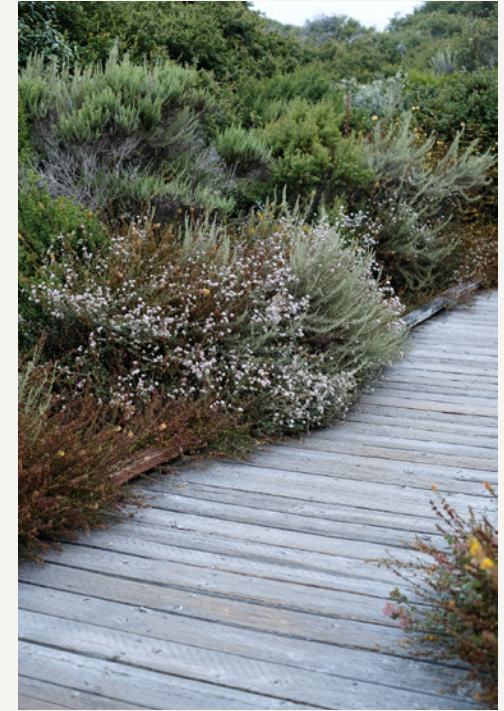
# Inspiration Images



Visitor Center



Fencing



Boardwalk



Boardwalk



Timber Steps



Terraced Seed Farm



## Inspiration Images



Amphitheater



Glade



Outdoor Classroom



Avian Water Feature



## Botanical Garden Organization: Terrestrial Native Plant Communities of Morro Bay Area



### Pioneer Dune

Typically this plant community is located on beaches and active dunes that are very close to the shoreline. These communities are equipped to deal with the disturbances associated with their proximity to the ocean such as salt spray, water inundation, high winds and sand coverage.



### Coastal Dune Scrub

Usually adjacent to Pioneer Dunes, this community tends to establish on older dunes that have more fertile and stable soils and contain higher amounts of organic matter and lower levels of salt content. Their less disturbed conditions help to accommodate a greater amount of species diversity than Pioneer Dunes.



### Coastal Scrub

This community is typically associated with slopes and moderately dry conditions. The soil profile of this community is typically shallow and retains moisture during the Winter and Spring. Many of the plants in this community are shrubs that form short canopies a few feet in height which accommodate a variety of plants.



### Maritime Chaparral

This community is one of the dominant communities in the Morro Bay area and establishes in the sandy soils of old sand dunes like that of the project area.



### Coastal Live Oak Woodland

The community is dominated by *Quercus agrifolia* and also forms tapestries with other communities like grassland, coastal scrub, and maritime chaparral.



### Native Bunchgrass Grassland

Much of the grassland that we see in California is now invasive, but originally native grasslands once covered ~25% of California. Many vanished because of farming, construction and commerce. Native grasses can still be found in the area.



### Rock Outcrop

This community tends to be most common in areas with high erosions and therefore low soil profiles. Rock outcrops tend to lack larger vegetation due to the extreme soil conditions. Shrubs that do survive tend to be stunted because of inadequacies in nutrients and water.



## Pioneer Dune Palette



Beach Bur  
*Ambrosia chamissonis*



Beach Sand Verbena  
*Abronia latifolia*



Yarrow  
*Achillea millefolium*



Beach Saltbush  
*Atriplex leucophylla*

## Coastal Dune Palette



Mock Heather  
*Ericameria ericoides*



Cliff Buckwheat  
*Eriogonum parvifolium*



Dune Bush Lupine  
*Lupinus chamissonis*



California Sagebrush  
*Artemisia californica*



## Maritime Chaparral



Chamise  
*Adenostoma fasciculatum*



Buck Brush  
*Ceanothus cuneatus*



Morro Manzanita  
*Arctostaphylos morroensis*



Fuchsia - Flowering Gooseberry  
*Ribes speciosum*

## Coastal Scrub Palette



Coyote Bush  
*Baccharis pilularis*



Black Sage  
*Salvia mellifera*



Sticky Monkey Flower  
*Diplacus aurantiacus*



California Sagebrush  
*Artemisia californica*



## Coastal Live Oak Woodland Palette



Coast Live Oak  
*Quercus Agrifolia*



Coffeeberry  
*Frangula californica*



Bracken Fern  
*Pteridium aquilinum var. pubescens*



Toyon  
*Heteromeles arbutifolia*

## Native Bunch Grassland Palette



Blue Wild Rye  
*Elymus glaucus*



Rush  
*Juncus patens*



California Melic Grass  
*Melica californica*



California Fescue  
*Festuca californica*







Master Plan



Heron Rookery

Neighborhood

Remaining Golf Course

Grassland

Coastal Scrub

Seed Farm

Entrance

Parking Lot

Outdoor Classroom

Rock Outcrop Garden

Existing Natural Area (Coastal Scrub)

Grassland

Growing Nursery

Plant Nursery

Visitor Center

Amphitheater

Oak Woodland

Avian Water Feature

Maritime Chaparral

Morro Bay

Pioneer Dune/  
Dune Scrub

Campground

Natural History Museum

Morro Estuary Natural Preserve



# Master Plan: Habitat Zones and New Trees





# Master Plan: Trail Network



○ Connection    — Primary Path    - - - Secondary Path    ..... Boardwalk Loop

1"=400'    — 200'    ↑ N    45

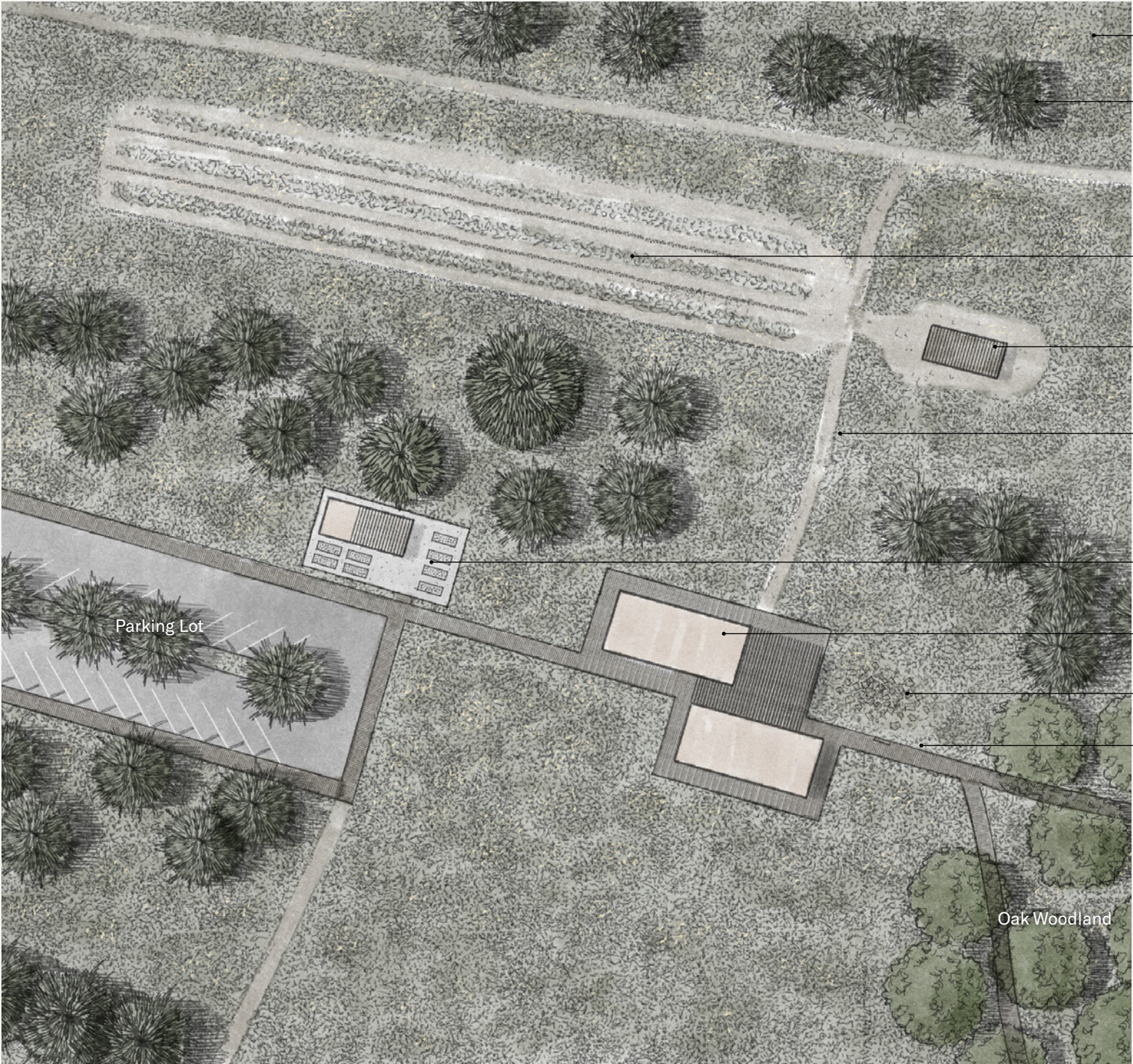


Entrance





# Central Programming



- Coastal Scrub
- Monterey Cypress Trees
- Seed Farm
- Outdoor Classroom Gazebo
- Dirt Path
- Plant Nursery
- Visitor Center
- Rock Outcrop Garden
- Wood Boardwalk

Parking Lot

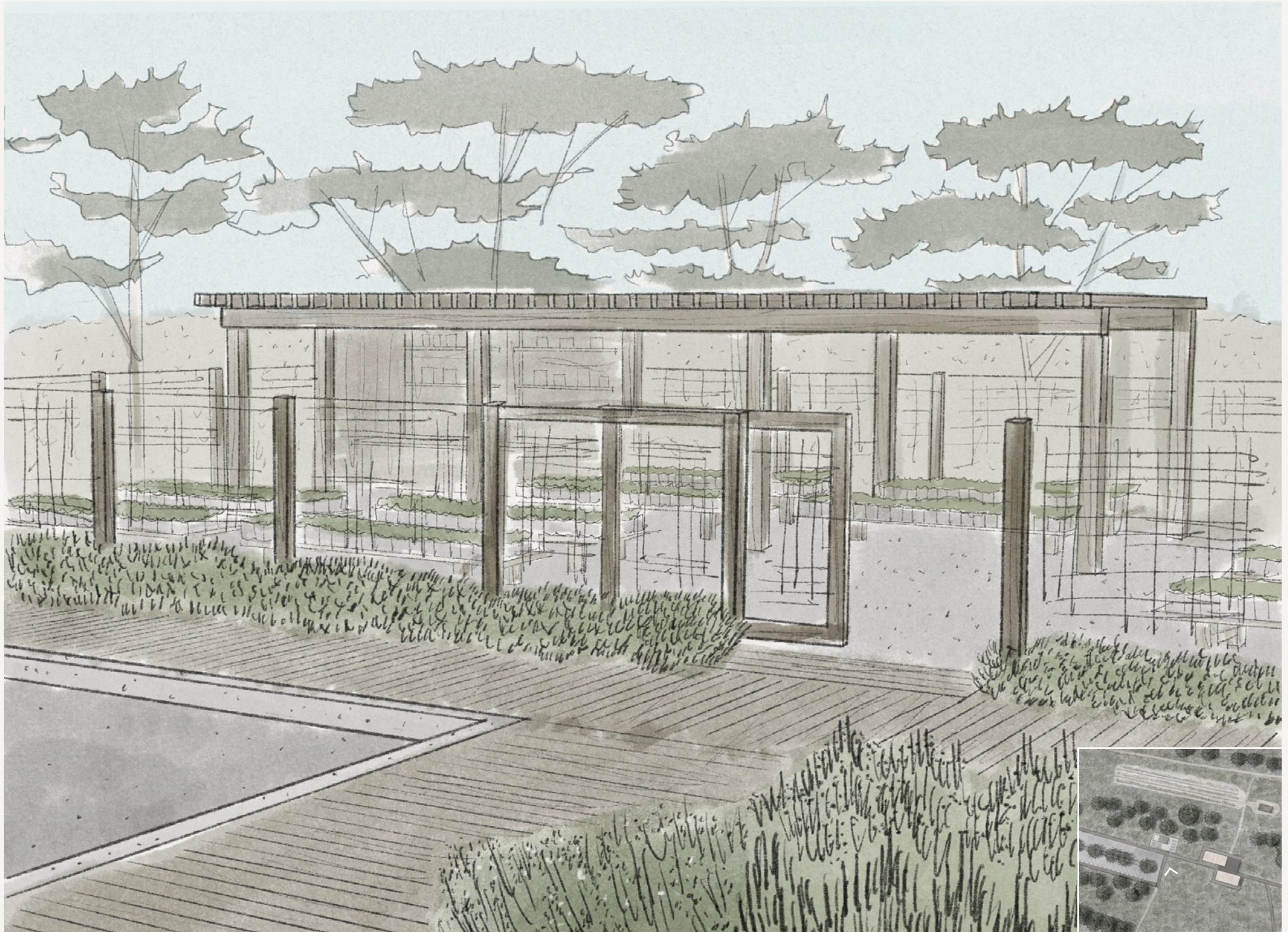
Oak Woodland



35' 1"=70' ↑ N

↑ N 47





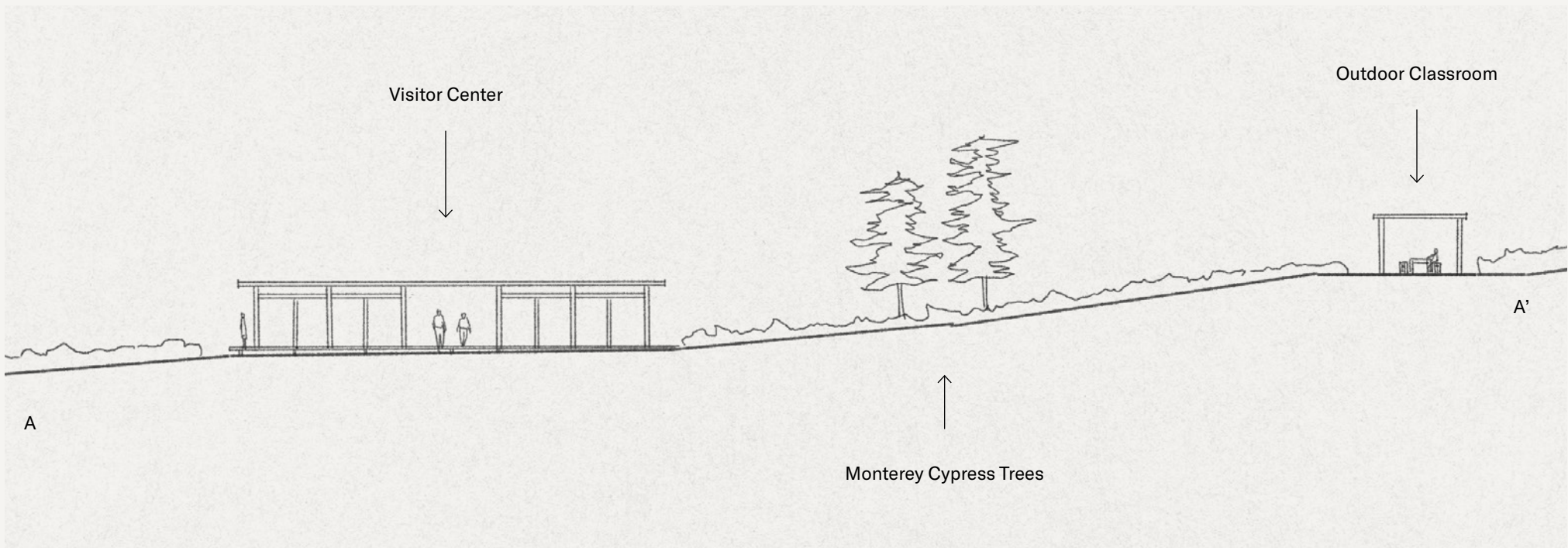


# Visitor Center

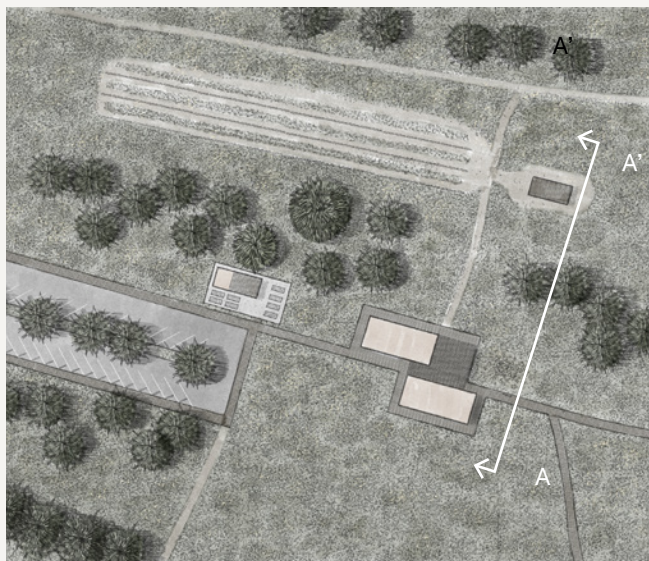




# Visitor Center



15' 1"=30'



↑ N

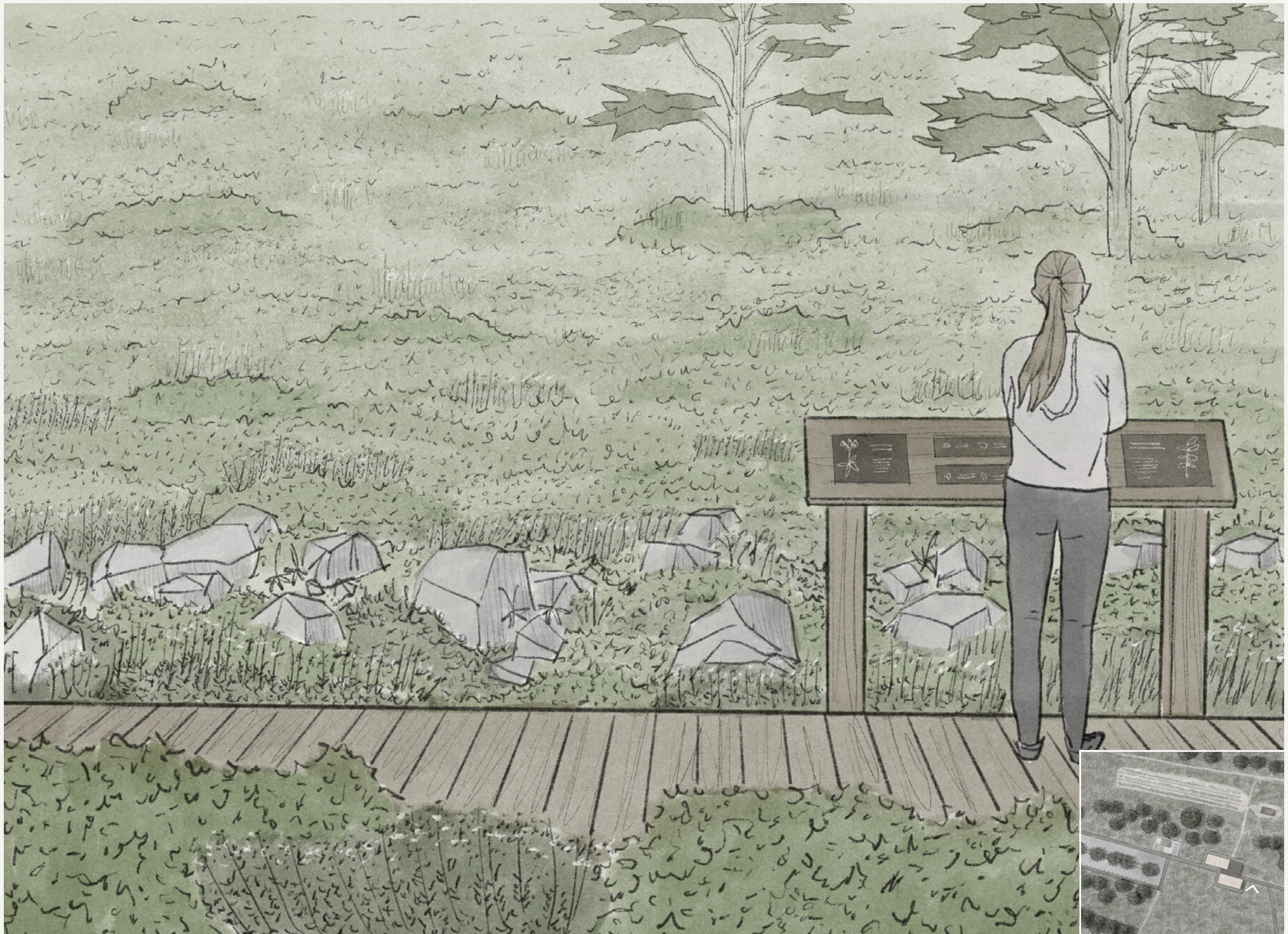


# Terraced Seed Farm and Outdoor Classroom



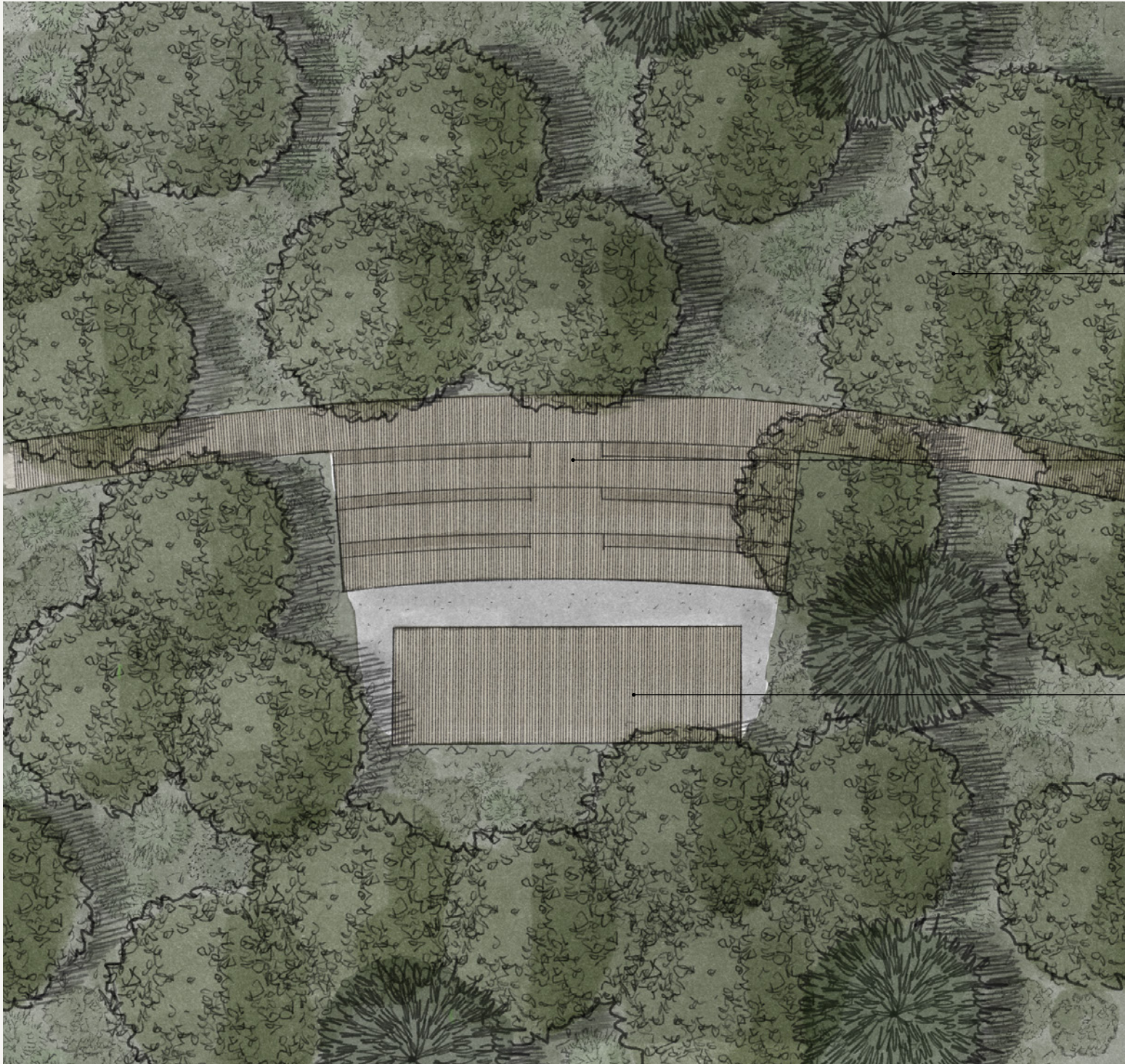


# Rock Outcrop Garden and Interpretive Signage





# Woodland Amphitheater



Oak Woodland

Boardwalk Descends  
Into Amphitheater

Stage

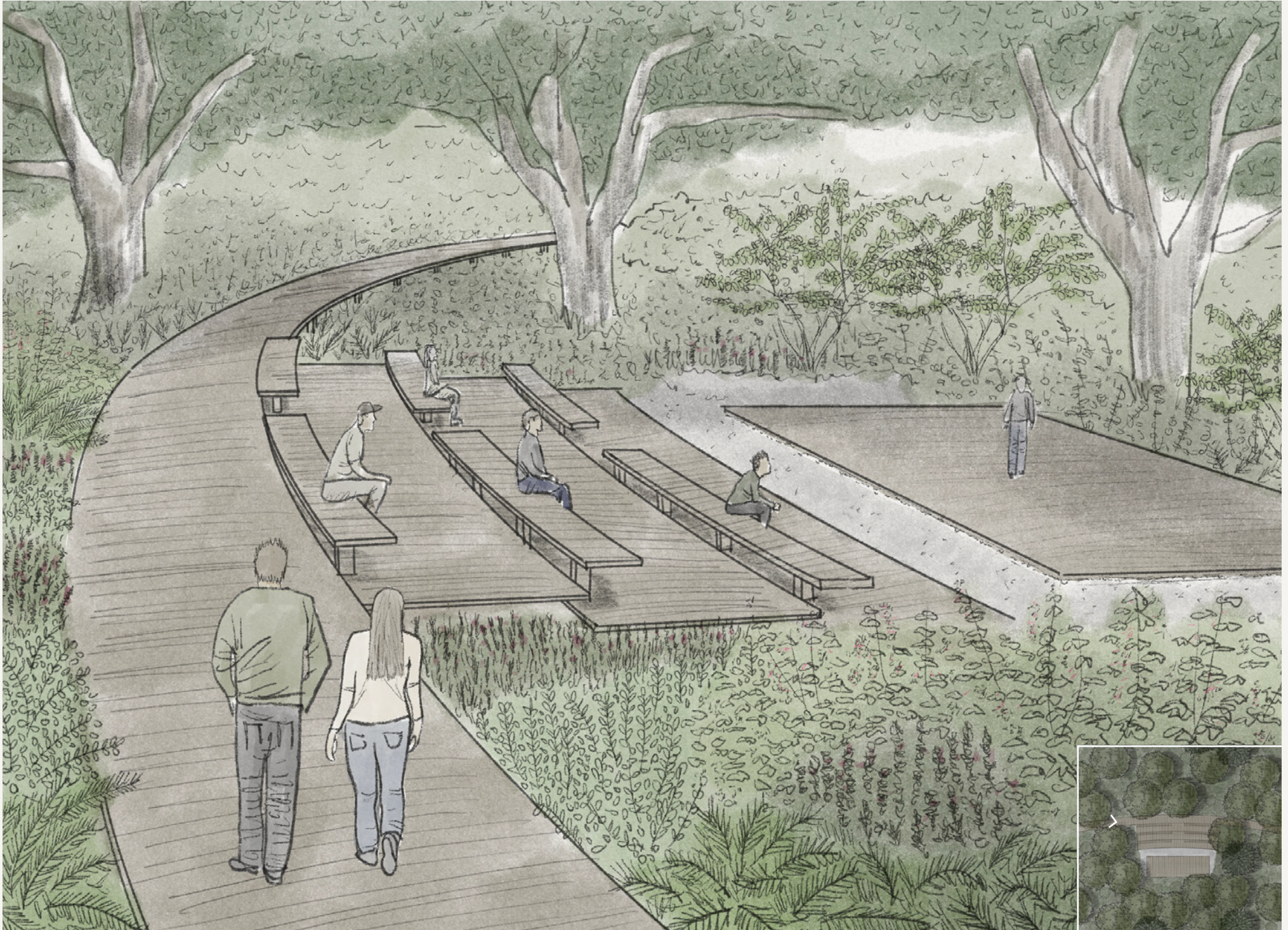


12.5' 1"=25' ↑ N

↑ N 53

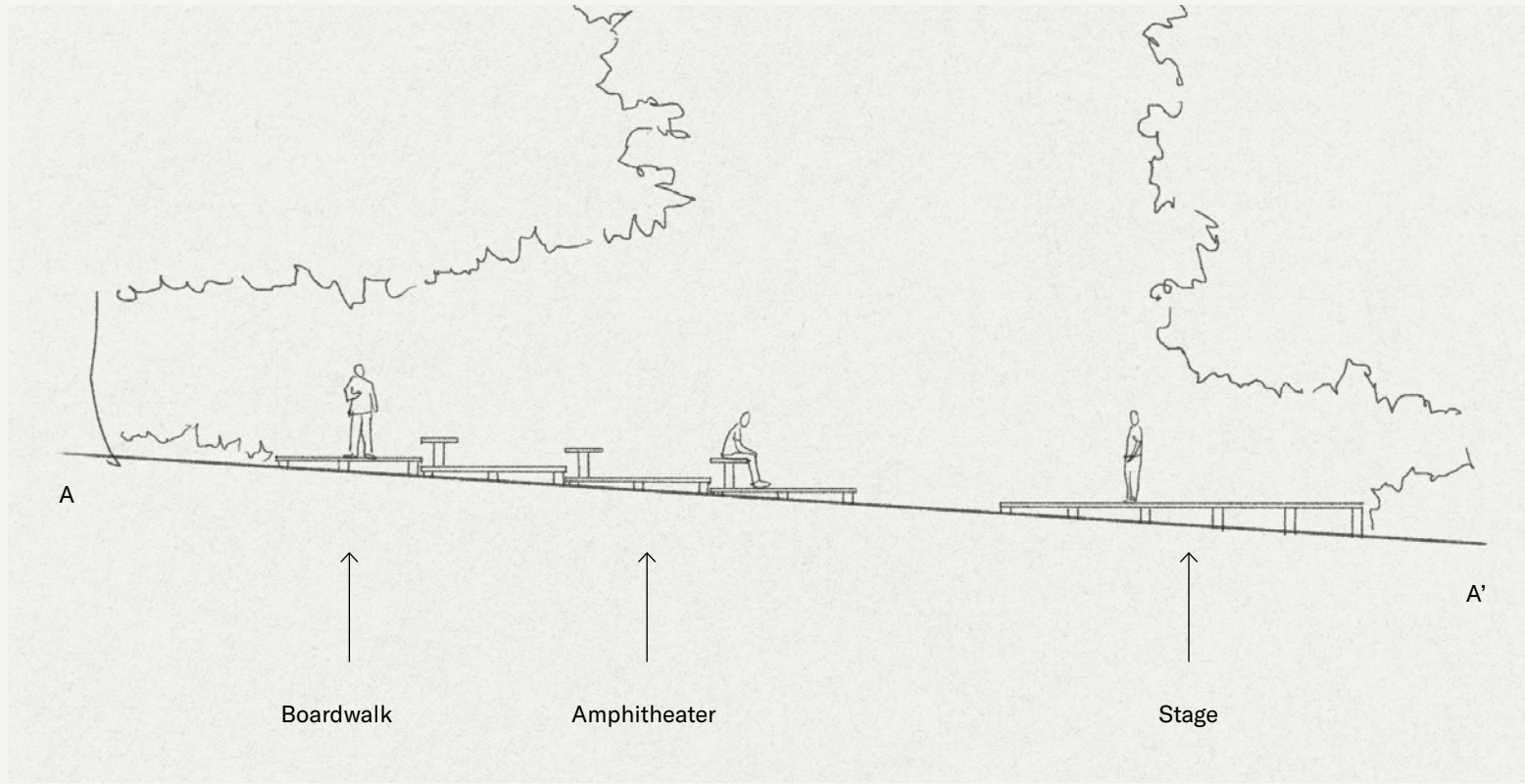


# Woodland Amphitheater



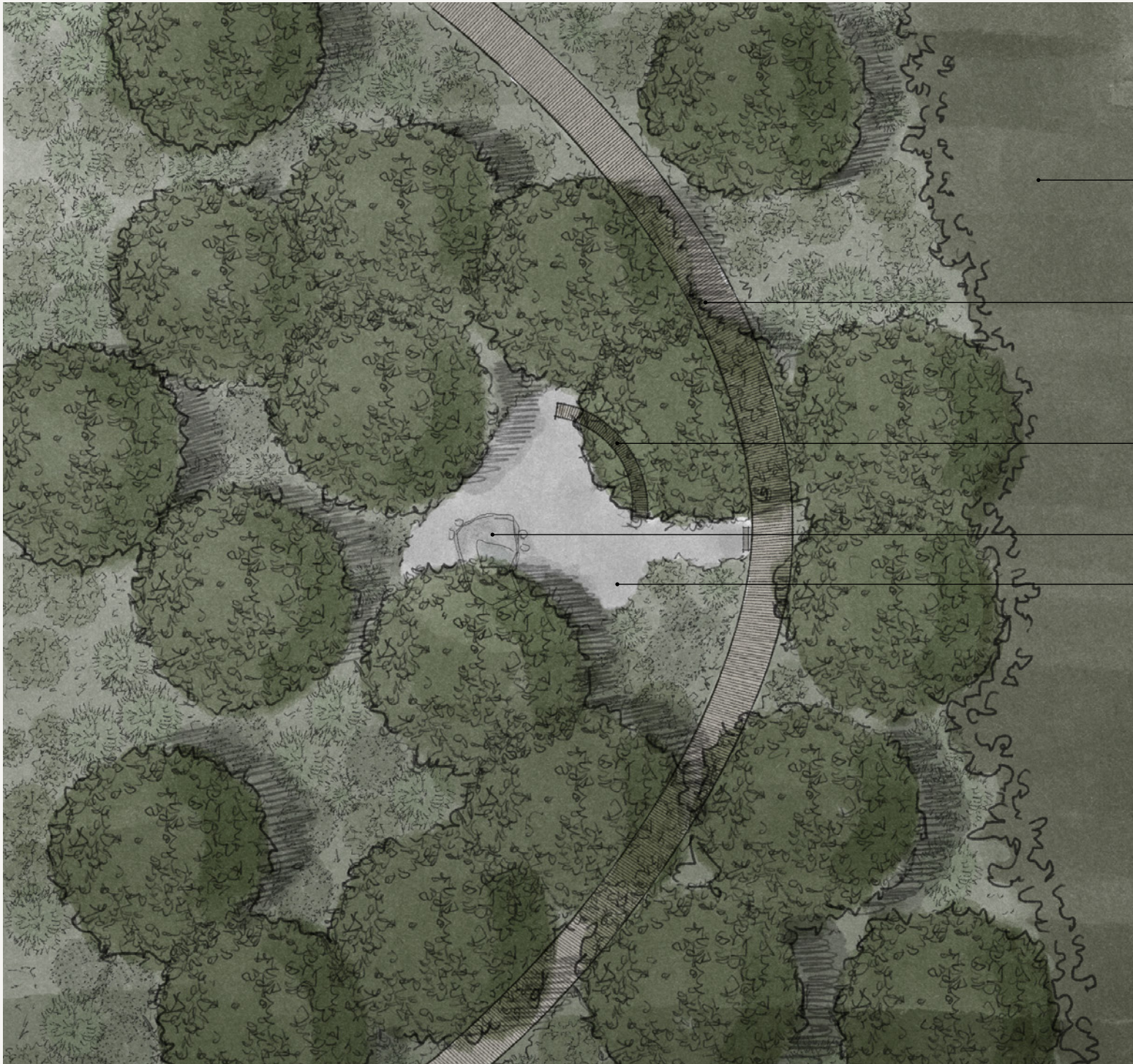


# Woodland Amphitheater





# Woodland Glade



Remaining Eucalyptus

Boardwalk

Bench

Avian Water Feature

Gravel



12.5' 1"=25' ↑ N

↑ N 56

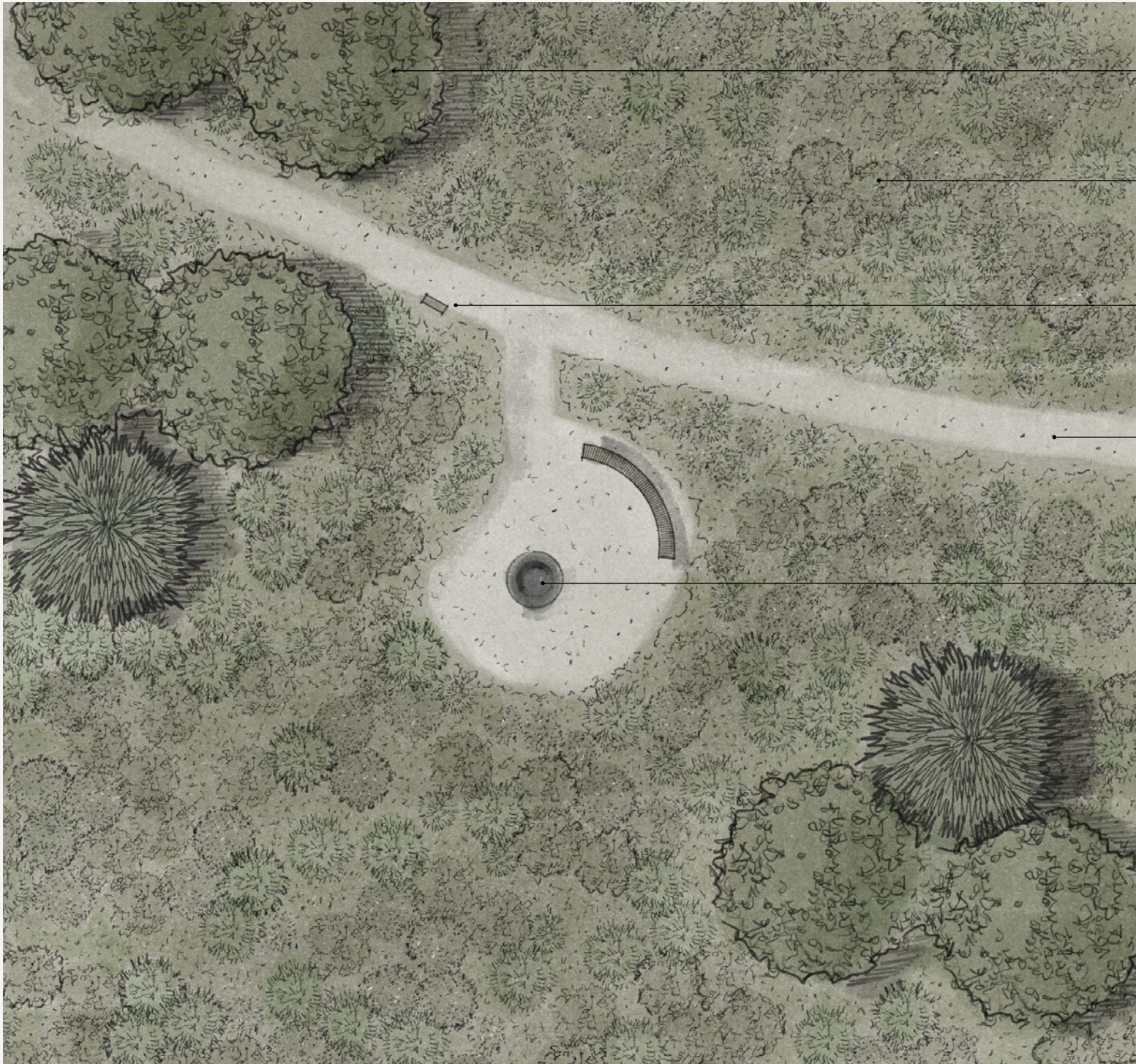


# Woodland Glade and Avian Water Feature





# Coastal Scrub Glade and Seed Burning Sculpture



Oak Trees

Coastal Scrub

Interpretive Signage

Trail

Seed Scarification Sculpture

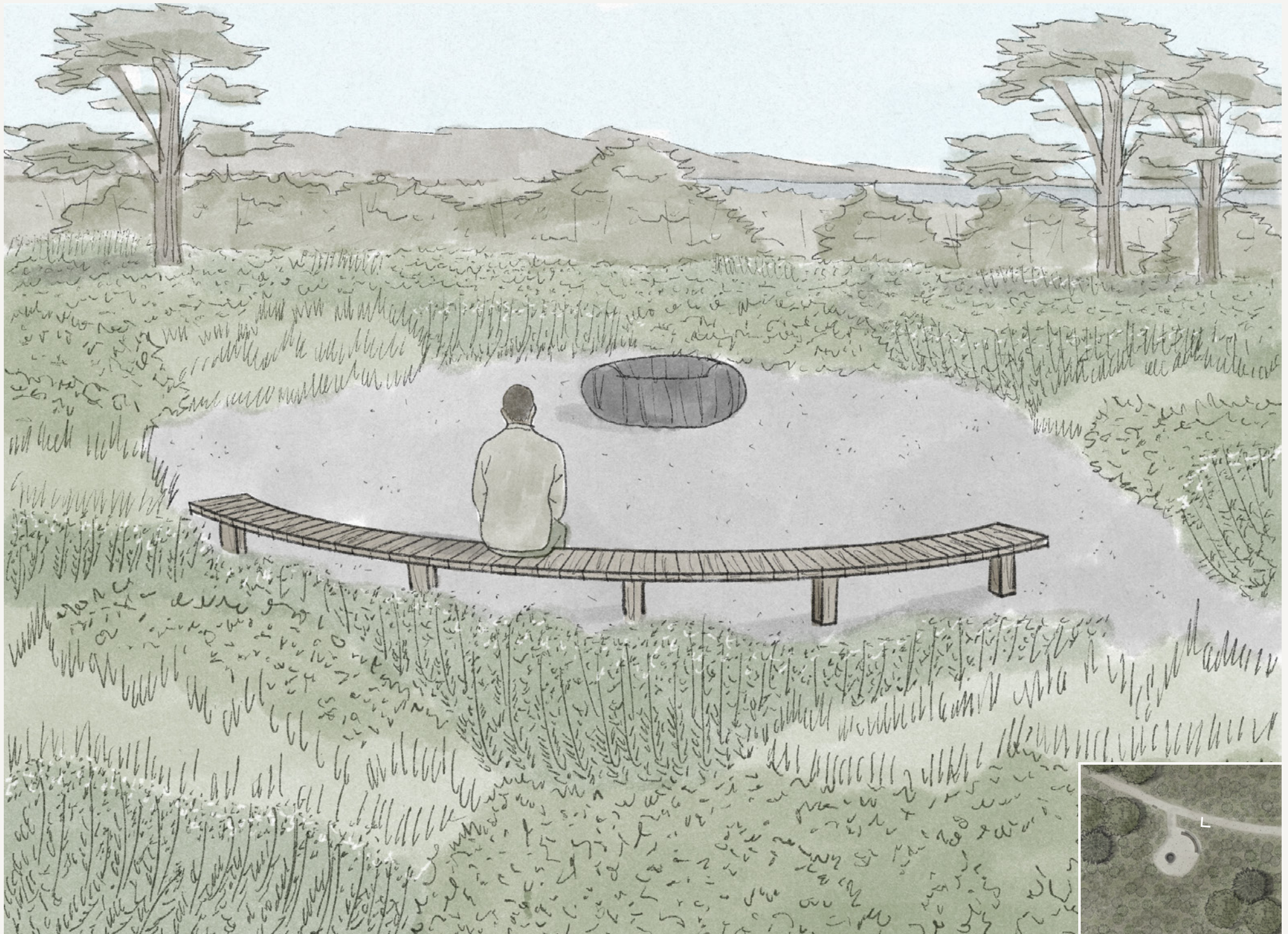


12.5' 1"=25' ↑ N

↑ N 58



# Coastal Scrub Glade and Seed Burning Sculpture Perspective





# Trail Perspective and Signage





# Dune Scrub Quadrant



Morro Bay

Trail

Natural History  
Museum

Rock Outcrop

Pedestrian Crossing

Existing DG Parking Lot

Log-lined Trail to  
Campground

Existing Asphalt Golf Course Path

Dune Scrub

Oak Trees

Dune Scrub Glade

Acorn Grinding Sculpture



35' 1"=70' ↑ N

↑ N 61



## Conclusion

### Restoration

Increased habitat potential for sensitive species by ~80 acres.

### Education

Introduction of interpretive signage system throughout restored landscape to provide context to visitors about specific plants, habitats, animals and indigenous history.

### Recreation

Trail network has been expanded by over 14,000 feet and the Morro Bay community has safer and easier access to the trail network of Black Hill.

### Conservation

Endangered and threatened species are actively included in gardens and propagated to increase numbers. Plants are sold in nursery to extend restoration into private gardens.





# Credits

## Page 1

Google Earth

## Page 3

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## Page 4

Kangaroo Rat

[https://upload.wikimedia.org/wikipedia/commons/b/be/Federally\\_endangered\\_Morro\\_bay\\_kangaroo\\_rat%2C\\_last\\_documented\\_in\\_the\\_wild\\_in\\_1986\\_%2831045316021%29.jpg](https://upload.wikimedia.org/wikipedia/commons/b/be/Federally_endangered_Morro_bay_kangaroo_rat%2C_last_documented_in_the_wild_in_1986_%2831045316021%29.jpg)

Mountainbalm

[https://calscape.org/Eriodictyon-altissimum-\(Indian-Knob-Mountainbalm\)](https://calscape.org/Eriodictyon-altissimum-(Indian-Knob-Mountainbalm))

Morro Manzanita

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## Page 5

Natural History Museum

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Estuary

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Heron

[https://commons.wikimedia.org/wiki/File:Ardea\\_alba\\_-Morro\\_Bay\\_Heron\\_Rookery\\_-8.jpg](https://commons.wikimedia.org/wiki/File:Ardea_alba_-Morro_Bay_Heron_Rookery_-8.jpg)

## Page 6

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## Page 7

Morro Rock

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Map

Google Earth

Golf Course

Dante Iñiguez

Sources

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## Page 8

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## Page 9

Morro Bay Course

[https://images.squarespace-cdn.com/content/v1/54a65094e4b0631d0c489ac8/1548532938549-6AHK6FR-Z9ONDWVEUDHVO/DJI\\_0080.jpg?format=2500w](https://images.squarespace-cdn.com/content/v1/54a65094e4b0631d0c489ac8/1548532938549-6AHK6FR-Z9ONDWVEUDHVO/DJI_0080.jpg?format=2500w)

## Page 10

Key

Google Earth

Image 1-7

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## Page 11

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## Page 15

Goals

Companion Platform

[https://www.instagram.com/p/CVep-pplbH8/?img\\_index=1](https://www.instagram.com/p/CVep-pplbH8/?img_index=1)

Other images

Dante Iñiguez

## Page 16

Restoration

Dante Iñiguez

Botanical Garden

[https://www.aucart.com/wp-content/uploads/2023/08/Basilone\\_Nicole\\_Candid.jpg](https://www.aucart.com/wp-content/uploads/2023/08/Basilone_Nicole_Candid.jpg)

Sea Ranch

Dante Iñiguez

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## Page 19

Google Earth

Sources

<https://www.morrobayca.gov/Archive/ViewFile/Item/4859>



# Credits

## Page 21

Program Elements

Paths

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Gazebo

<https://www.instagram.com/p/Nj1zkrD7lx/?epik=dj0yJnU9WHBVZFYVY25LQWFuWkNRSXZGYVdpeXpOVUFaLVNXU-zAmcD0wJm49MU9meTdfQXVXQjRINORFRENQc09sdyZ0PUFBQUFBR2JEMTdv>

Visitor Center

[https://64.media.tumblr.com/903fcb0ffa94b4d102bda87d3dd6e33f/tumblr\\_nmzmlxjZma1twhq1io4\\_640.jpg](https://64.media.tumblr.com/903fcb0ffa94b4d102bda87d3dd6e33f/tumblr_nmzmlxjZma1twhq1io4_640.jpg)

Restoration

[https://www.instagram.com/groundstudiolandscape/p/CpTGHnRPO44/?img\\_index=1](https://www.instagram.com/groundstudiolandscape/p/CpTGHnRPO44/?img_index=1)

Trail Markers

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## Page 22-23

Google Earth

## Page 24-25

Photos

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Puente Hills

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## Page 29

Images and source

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## Page 30

Seed Farm

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Volunteers

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## Page 31

Volunteers

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Other Images

Dante Iñiguez

## Page 36

Per Friberg House

[https://www.instagram.com/p/CYsxlXDMY\\_/?epik=dj0yJnU9Vkc4RG1jMEp5LXloU3k2X3ZOLWg1TIFKZktvRINzQ-zAmcD0wJm49R0JXTUVMYVrtUXN2b205ZW1jR1pXdyZ0PUFBQUFBR2JEM1lz](https://www.instagram.com/p/CYsxlXDMY_/?epik=dj0yJnU9Vkc4RG1jMEp5LXloU3k2X3ZOLWg1TIFKZktvRINzQ-zAmcD0wJm49R0JXTUVMYVrtUXN2b205ZW1jR1pXdyZ0PUFBQUFBR2JEM1lz)

Fence

<https://kevinmampay.com/wp-content/uploads/2023/09/G6A3814.jpg>

Boardwalk

Dante Iñiguez

Split Boardwalk

<https://i.pinimg.com/originals/86/66/2f/86662f7c8be209afe0a5cf2f7cd20c51.jpg>

Timber Stairs

[https://api.terremoto.la/media/w\\_2400/searanch2111-215.jpg](https://api.terremoto.la/media/w_2400/searanch2111-215.jpg)

Rock Terraces

[https://api.terremoto.la/media/w\\_2400/scribe2004-003.jpg](https://api.terremoto.la/media/w_2400/scribe2004-003.jpg)

## Page 37

Wooden Amphitheater

<https://i.pinimg.com/originals/4d/48/5f/4d485f3ca633e7a50ce782479ef009d5.jpg>

Outdoor Room

<https://www.instagram.com/danielnolandesign/p/CseX6yrpZul/>

Judd Pergola

<https://juddfoundation.org/research/local-history/local-history-selections-from-judd-foundations-photo-archive-part-iv/>

Water feature

<https://www.experiencedbricks.com/products/reclaimed-hardscapes/landscape-water-features>

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Rock Outcrop

<https://www.slohorsenews.net/wp-content/uploads/2018/06/DSC02120.jpg>

Other images

Dante Iñiguez

Sources

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Beach Saltbush

<https://inaturalist.nz/observations/162040741>

Other images

Dante Iñiguez

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Blue Wild Rye

<https://calscape.org/Elymus-glaucus-%28Blue-Wildrye%29>

California Melic Grass:

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## Other Images

Dante Iñiguez

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