



A New Vision Takes Flight:

Developing a Master Plan for the Great Park Botanical Garden

This **redevelopment project** transforms the former MCAS El Toro military base into a vibrant **botanical garden** within Irvine's Great Park through the creation of a long-range master plan guiding future design and development.

UCLA Extension Landscape Architecture Program
Instructors: Meg Rushing Coffee & Jim Pickel
Summer 2022

Capstone Studio | Ethan Fisher



MCAS El Toro

Photo Credit: www.wearethemighty.com

PERSONAL STATEMENT

Growing up near El Toro, I would often hear the roar of jets and rumble of military helicopters. I watched the land-use battles that ensued with the closure of the base and the many people that tried to plan a new future for the site. This project blends my interest in public garden design and my history in the region.

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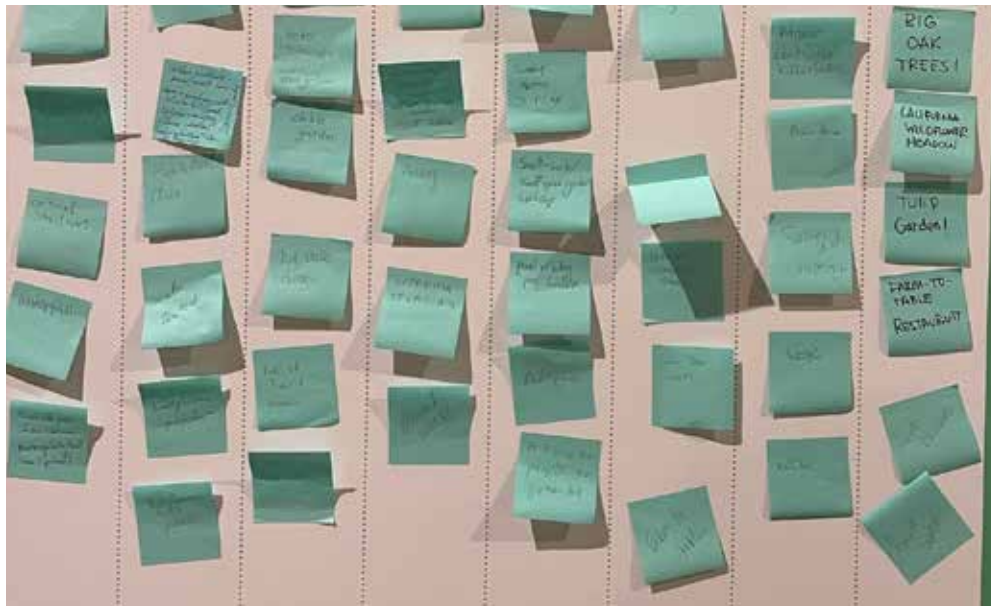
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PROJECT STATEMENT

This **redevelopment project** transforms a post-military site into a vibrant **botanical garden** within Irvine's Great Park. The project recommends the best location for major features while addressing site accessibility challenges and conceptually developing the first phase of a master plan.

THEORETICAL PREMISE

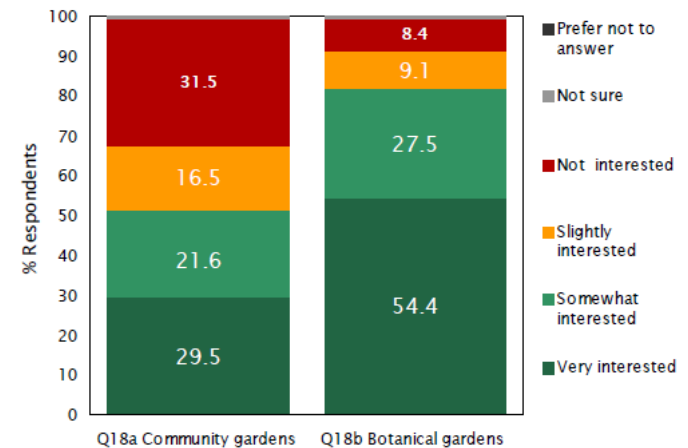
What is the role of landscape architecture in reclaiming highly disturbed land into an equitable place for both the public and wildlife. Can a public garden effectively mitigate the disturbances inherent in a post-military site, including: impermeable surfaces, low biodiversity, and contamination in order to create a vibrant, mission-driven organization that connects to the community.



Community Outreach - Great Park Garden Coalition

Question 18 The Great Park could include _____. Would your household be very interested, somewhat interested, slightly interested, or not interested in this feature of the Park?

FIGURE 47 INTEREST IN GARDENS



2017 Great Park Planning Survey - City of Irvine

PROJECT JUSTIFICATION

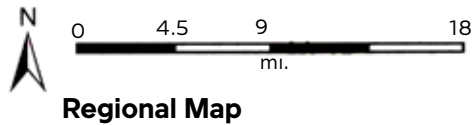
All master plans for the Great Park include a botanical garden. Until 2022 the location was within the proposed cultural museum terrace area of the park, but this year the focus shifted towards a contentious parcel at the northern extent of the park called the ARDA Site. Political forces within the City of Irvine blocked a State veteran's cemetery on the ARDA site and now the City desires to explore this parcel for the garden.

The ARDA Site is the focus of this proposed project. A botanical garden has been demonstrably vetted by the public through substantial public comment, outreach efforts, and even the formation of a non-profit Great Park Garden Coalition.

The City owns the 130 acre ARDA Site and a public garden is an acceptable use within the general plan. The site presents the opportunity and challenge of restoring the land to create habitat for wildlife, community recreation and education opportunities, and a sense of place.

Over 90% of survey participants were interested in a botanical garden feature, based on 2017 City of Irvine planning surveys.

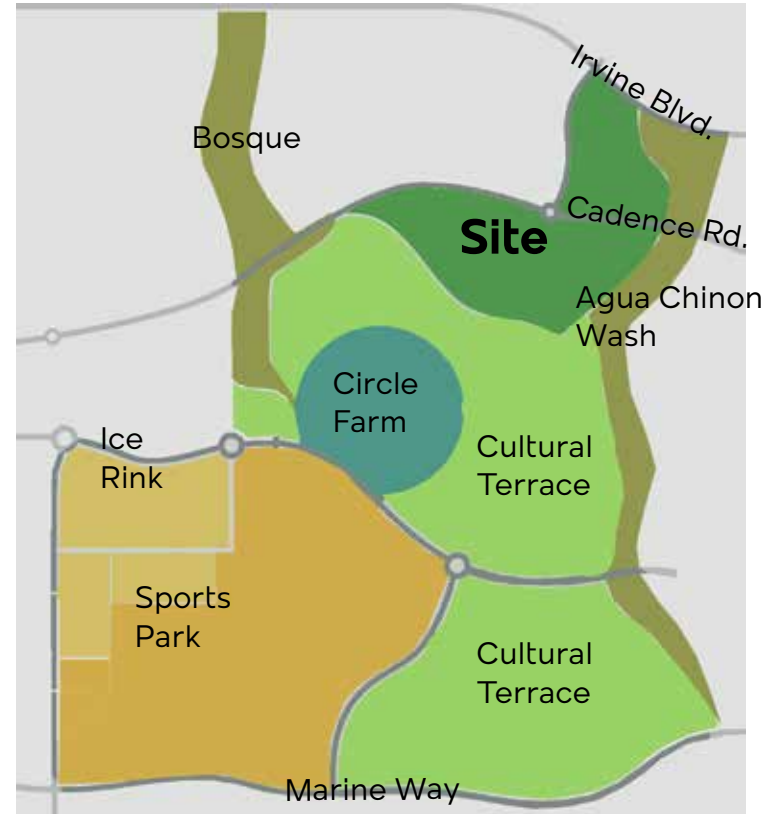
SITE INFORMATION



Regional Map

- Irvine, California - County of Orange
- 130.3 acre ARDA site**
- Ownership - City of Irvine
- Zoning - 8.1; Trails and Transit Oriented Development (proposed use is consistent)
- Parcel/APN - assemblage of 18 interconnected parcels; largest parcel is 58076267. All parcels begin with 580762XX or 591151XX
- City of Irvine has full jurisdiction over the parcels, except one structure owned by FAA

**Final project will be a smaller parcel within this site

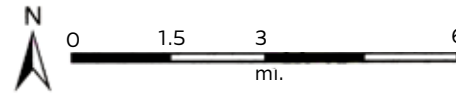


Great Park Enlargement
Conceptual Layout - N.T.S.

SITE CONTEXT



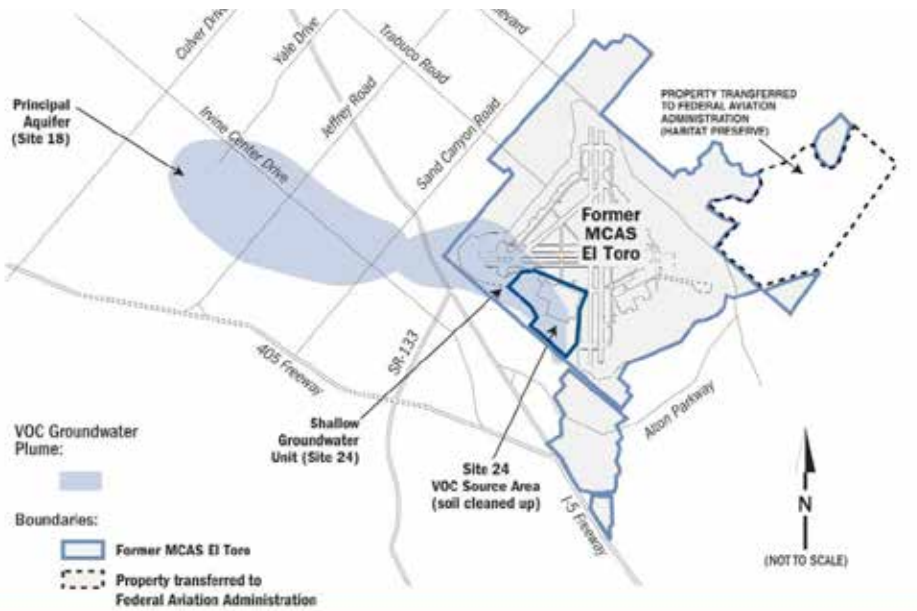
Context Diagram
Imagery: Google Earth 2022



NOTABLE HISTORY

- Full Marine Corps Air Station El Toro was 4,682 acres
- Property was sold to Lennar in 2005
- Approximately 1,300 acres was deeded to the City of Irvine for the Great Park
- The Amended and Restated Development Agreement (ARDA) parcel was added in 2009 and was not an original City of Irvine property
- Department of the Navy continues remediation of trichloroethylene groundwater contamination, due to 1970's lax environmental regulations.

- Orange County Voters prohibited an airport on the site in 2002
- An award-winning master plan for the park was completed by Ken Smith in 2006 and abandoned in 2013 with approval of an alternative plan by developer Five Points
- A contentious battle was waged over the location of a State veteran's cemetery and appears to have come to an end in 2022 with the cemetery moving to an adjacent city



Contamination Plume N.T.S.

Source: US Navy



Proposed Veteran's Cemetery

Source: <https://buildtheveteranscemetery.org>

MASTER PLANS

The first master plan was designed by Ken Smith in 2006 and included major features like a canyon and lake. A conservatory bridge crossed the lake connecting to the botanical garden. Depositions from City of Irvine staff later claimed many elements of this plan were not constructible. The Navy which has some jurisdiction over the site won't allow a lake due to groundwater contamination issues.

The second master plan was developed closely with the City of Irvine's development partner, Five Points. This plan includes a botanical garden as part of the cultural terrace, but there are limits on ground disturbance on certain areas of the site at this time because the Navy has a remediation well system underground. Neither master plan included development of the ARDA site which was slated for a cemetery.



2006 Master Plan

Source: City of Irvine

 Botanical Garden Location



2013 Master Plan

Source: City of Irvine

 Botanical Garden Location



SITE PHOTOS



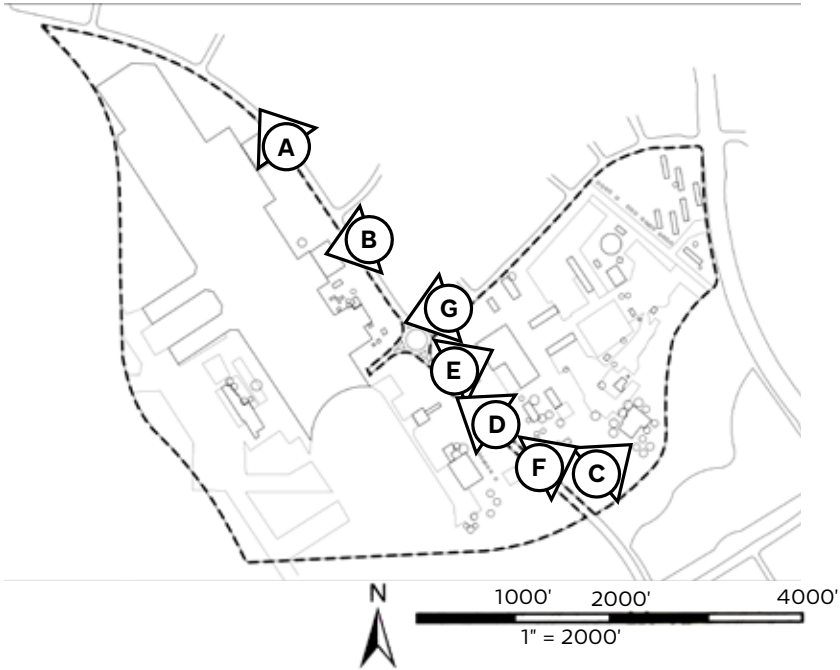
A. Residential edge condition, northern edge



B. Abandoned military structures



C. Wildlife corridor edge condition, northeastern edge



SITE PHOTOS



D. Invasive fountain grass, *Pennisetum setaceum*



E. Native wildflowers - desert marigold, *Baileya multiradiata*



F. Desert marigold, *Baileya multiradiata*



G. Traffic circle on Cadence Road

DESIGN METHODOLOGY

There is not a legal accreditation program for botanical gardens, but there are generally accepted benchmarks for botanical gardens.

- Garden is **open to the public**
- Gardens are an **aesthetic display, educational**, or provide a **research** purpose
- Plant **records** are maintained with staff
- Plant ID and **interpretive materials** are available



Inspirational Image - Desert Botanical Garden - Phoenix, AZ

The **American Public Gardens Association** (APGA) identifies a number of key issues for public gardens, including: **climate sustainability** crisis, native **plant conservation**, worldwide plant conservation, **pollinator health**, and **advocating for horticulture** and supporting future leaders.

APGA Climate Sustainability Workbook
-Climate strategy 1.b. advocates for green, **climate resilient infrastructure**: permeable surfaces, efficient water distribution, green roofs, and additional engineering methods to use natural resources wisely.

Public Garden Management: A Complete Guide to the Planning and Administration of Botanical Gardens and Arboreta 2nd Edition by Donald Rakow, Sharon Lee, Peter H. Raven is another resource for facility design.

DESIGN METHODOLOGY

Sustainable and regenerative **environmental design** methodologies including **storm-water management, carbon sequestration, ecological restoration, site remediation, sensitivity to adjacent habitat, conservation** (facilities and flora) are all critical methodologies relevant to this proposed project. In addition to the materials available from the APGA, text resources include:

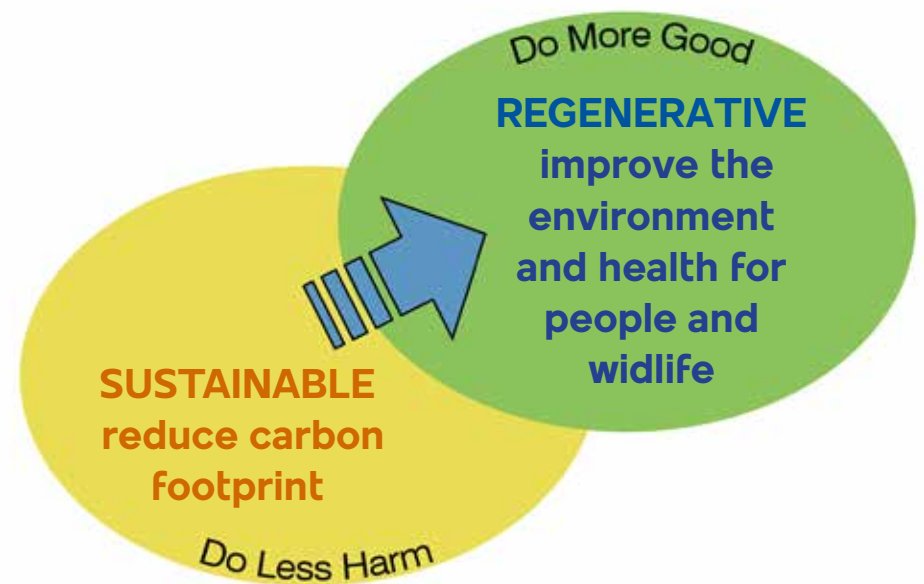
Low Impact Development: A Design Manual for Urban Areas

Planting in a Post-Wild World: Designing Plant Communities for Resilient Landscapes by Thomas Rainer and Claudia West

Garden Revolution: How Our Landscapes Can Be a Source of Environmental Change by Larry Weaner

Asphalt to Ecosystems: Design Ideas for Schoolyard Transformation by Sharon Gamson Danks

Phyto: Principles and Resources for Site Remediation and Landscape Design 1st Edition by Kate Kennen (Author), Niall Kirkwood



PROJECT PRECEDENT - VENTURA BOTANICAL GARDEN

Development of this 106 acre botanical garden is focused on the Ventura Coast and similar Mediterranean biome regions.

- Masterplan was developed in 2014 with a focus on Mediterranean biome plants and the largest Chilean garden outside of Chile.
- Plan includes installation of interim structures like pre-fabricated facilities while the garden is developed, to be reused or removed later.
- Projected annual attendance of 50,000-100,000 paid visitors.
- Planned facilities: visitor center, book/plant/gift shop, snack bar/restaurant, administration, conservation center, discovery center, children's center, heritage center, lath and shade houses, propagation/growing areas, maintenance areas, and tram storage.



Photos (from top): master plan graphic, entry interim structure, South African garden slope.

Credits: Ventura Botanical Garden

PROJECT PRECEDENT - VENTURA BOTANICAL GARDEN



Take Away - Consider phased and light construction as a way to stage the development of the site.

PROJECT PRECEDENT - BALLAST POINT PARK

This 6.4 acre site represents transformation of an industrial brownfield in Australia into a waterfront park.

Features:

- Gabion baskets face retaining walls and are filled with recycled building rubble from the site.
- Recycled waste was incorporated throughout the site, including: timber from garbage dumps, old seat belts for shade structures, recycled aggregate, and old metal fuel tanks.
- A true cradle to cradle approach was challenging to apply and some demolition materials ended up being sent off-site for processing with alternative recycled materials brought in.
- Soil was created from recycled wood (pallets) and organic waste.

Take Away - Consider re-purposing concrete and novel designs with abandoned military structures.

Photos (from top): Removed tank raised gardens, gabion walls with recycled aggregate, gabion close-up
Credits: Landscapeperformance.org



PROJECT PRECEDENT - CHICAGO BOTANIC GARDEN

Regenstein Learning Campus is a 6 acre nature play and learning garden within the Chicago Botanic Garden.

- Multi-sensory experiences were incorporated throughout the site. The planting palette provides a variety of scents, colors, textures, and sounds, while nature play elements provide sensory and tactile development for children.
- Rain garden elements in the site filter stormwater and contribute to resiliency in the floodplain location of the site.
- The project utilized green infrastructure, including: grass pavers, suspended pavers, and permeable paving.
- 171 native species were included in the landscape design and represent 58% of the plants in the landscape.

Take Away - Climate resiliency infrastructure can be multi-functional and fun. Think about how site challenges can be turned into opportunities.

Photos (from top): site before construction, outdoor classroom plaza, nature play area withstanding flooding, and runnel feature.
Credits: Landscapeperformance.org



USERS

Local residents

The City of Irvine has over 307,000 residents according to the US Census Bureau. Visitors may include people of all ages and multi-generational families. The City of Irvine will be the client for this project.

Students

According to the Orange County Department of Education there are over 500,000 K-12 students in Orange County and over 125,000 community college students. Over 48% of the 485,000 public school students are eligible for free or reduced-price meals and over 23% are English learner students. Students can use the gardens for education, recreation, and volunteer opportunities.

Volunteers

Botanical gardens are frequently host to extensive volunteer programs with volunteers playing many functions from education roles and visitor services to fundraising and horticultural assistance.

Corporate

Corporate interests in the garden may be in the form of partnerships for goods and services, corporate social responsibility, or volunteer service.

Researchers

The garden has the capacity to support in-house staff performing scientific advancement, partnering with local universities, and collecting data and materials for collaborative research projects.

Tourists

According to the 2020 US Census, over 13 million people live in the Los Angeles-Long Beach-Anaheim Metro Area and have a median age of 37.1 years. There is a significant population to support tourists on day trips to the gardens.

Other botanical gardens

Botanical gardens typically work together sharing information and specimens. National organizations including the American Public Garden Association and ArbNet host meetings and support member organizations.

Wildlife

The site has a significant wildland-urban interface and all manner of invertebrates and vertebrates will be users of the garden for food and shelter.

USERS

13 Million People
Los Angeles-Long Beach-
Anaheim Metro Area

Densely Populated Region

310,000
Irvine
Residents

Top Irvine Employers
Public Schools
Fortune 500 Companies
Biotech Industry

Irvine Demographics

Well-Educated Community

97% High School Graduates
69% College Graduates

Diverse Populace

44% Asian
38% White
11% Hispanic or Latino
7% Two or more races

Middle Class

\$105,126 Median Household
Income
\$861,700 Median Household Value

The garden will serve a
wide cross-section of the
community.



Residents



Students



Researchers



Tourists



Wildlife



Volunteers

Photo Credits: Irvine Company (Residents), Chicago Botanic Garden (Students/Researchers),
Freepik (Tourists), E. Fisher (Volunteers/Wildlife)



Inspirational Image - Ruth Bancroft Garden, Walnut Creek, CA

Photo Credit: E. Fisher

PROJECT GOALS AND OBJECTIVES

1

Provide space for education

Objective 1A: Create a space that will serve as a hub for education on **conservation, sustainability, and regenerative practices.**

Objective 1B: Provide **agricultural history** and **botanical** education.

2

Utilize sustainable and regenerative practices

Objective 2A: **Re-purpose buildings** and materials from the air station.

Objective 2B: Incorporate **climate-adapted species, carbon sequestration, stormwater capture** and mitigate heat islands.

3

Create new habitat

Objective 3A: Create habitat through **plant selection** and **site design** to augment the nearby chaparral areas.

Objective 3B: Provide space for **user experiences** and **engagement** in natural habitats.

4

Attract residents and tourists

Objective 4A: Provide unique **botanical experiences** for the local community and broader region.

Objective 4B: Provide experiences and spaces fostering multi-generational interactions and **benefits for all ages and abilities.**

MAJOR PROJECT ELEMENTS

In 2016 and 2017 the City of Irvine contracted Simon Engineering to perform community outreach and collect feedback from residents on the Great Park. After surveying nearly 4,000 residents, a number of frequently recurring suggestions for the gardens emerged. A selection of highly-rated community-driven elements are provided in black. In addition, other elements (in red) that support project goals and objectives may warrant further study and consideration of inclusion in the botanical garden design during concept testing.



Community Engagement
Photo Credit: City of Irvine

1. Natural landscape experiences with trails
2. Nature education center/programming
3. Cultural themed gardens (i.e. Japanese garden, Chinese garden, Persian garden)
4. Orchards/edible landscapes
5. Forest areas/arboretum
6. Children's garden
7. Veteran's memorial or healing garden
8. Native plants and pollinator habitat
9. Conservatory
10. Community gardens/programming
11. Seasonal events
12. Conservation propagation nursery
13. Butterfly experience
14. Apiary
15. Restaurant/cafe
16. Meadow area
17. Sculpture garden/art area
18. Nature play
19. Significant conservation and scientific advancement program
20. Ethnobotanical garden
21. Fire-resistant landscaping areas
22. Orange County's history of agriculture

PROJECT ELEMENT STUDY - SURVEYS

A successful public garden is a mixture of popular and unique elements.

Gardens included in survey:

- Sherman Library & Gardens
- Fullerton Arboretum
- UCR Botanic Garden
- CA Botanic Garden
- South Coast Botanic Garden
- LA Arboretum
- Huntington Library
- Descanso Gardens
- UCLA Botanic Garden
- San Diego Botanic Garden

Lower Frequency/Unique

- Sculpture Garden/Art
- Ethnobotanical Garden
- Children's Garden
- Cultural/Themed Gardens
- Local Farming History
- Butterfly Experience
- Nature Play Area
- Fire-Resistant Landscape
- Apiary
- Veteran's Memorial Garden
- Healing Garden

High Frequency/Popular

- Community Program Space
 - Natural Trails
 - Education Center
 - Events/Event Space
 - Pollinator Habitat
- Conservation Propagation
 - Forest Areas/Arboretum
 - Orchards/Edibles
 - Conservatory
 - Meadow Area
 - Restaurant/Cafe

- Selected Elements

MAJOR PROJECT ELEMENTS

Goal 1:

Provide space for education

- Education center/
programming
(4,000 S.F.)
- Orange County farming
history (4 acres)



Goal 2:

*Sustainable and
regenerative practices*

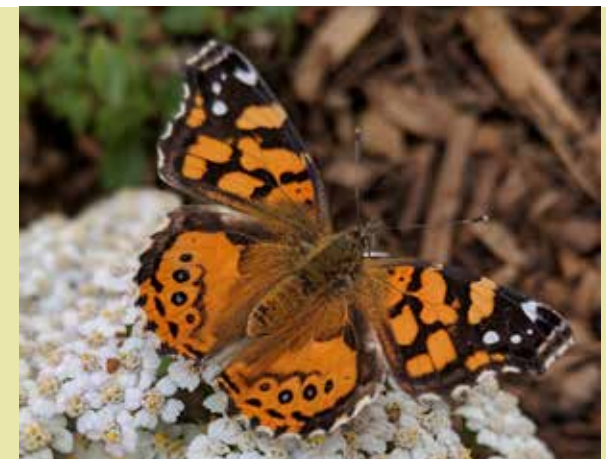
- Fire-resistant landscaping
areas (8 acres)



Goal 3:

Create new habitat

- Natural landscape with
trails (40+ acres)
- Native and pollinator
habitat (7+ acres)



MAJOR PROJECT ELEMENTS

Goal 4:

Attract residents and tourists

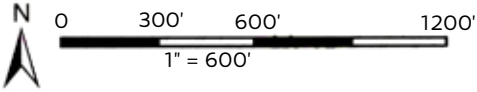
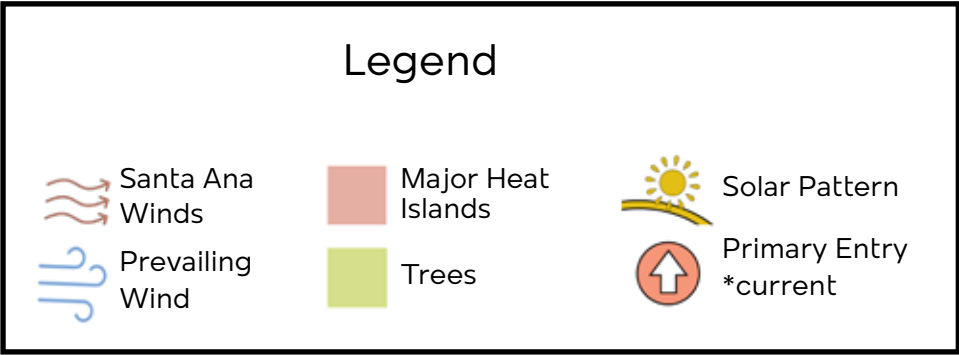
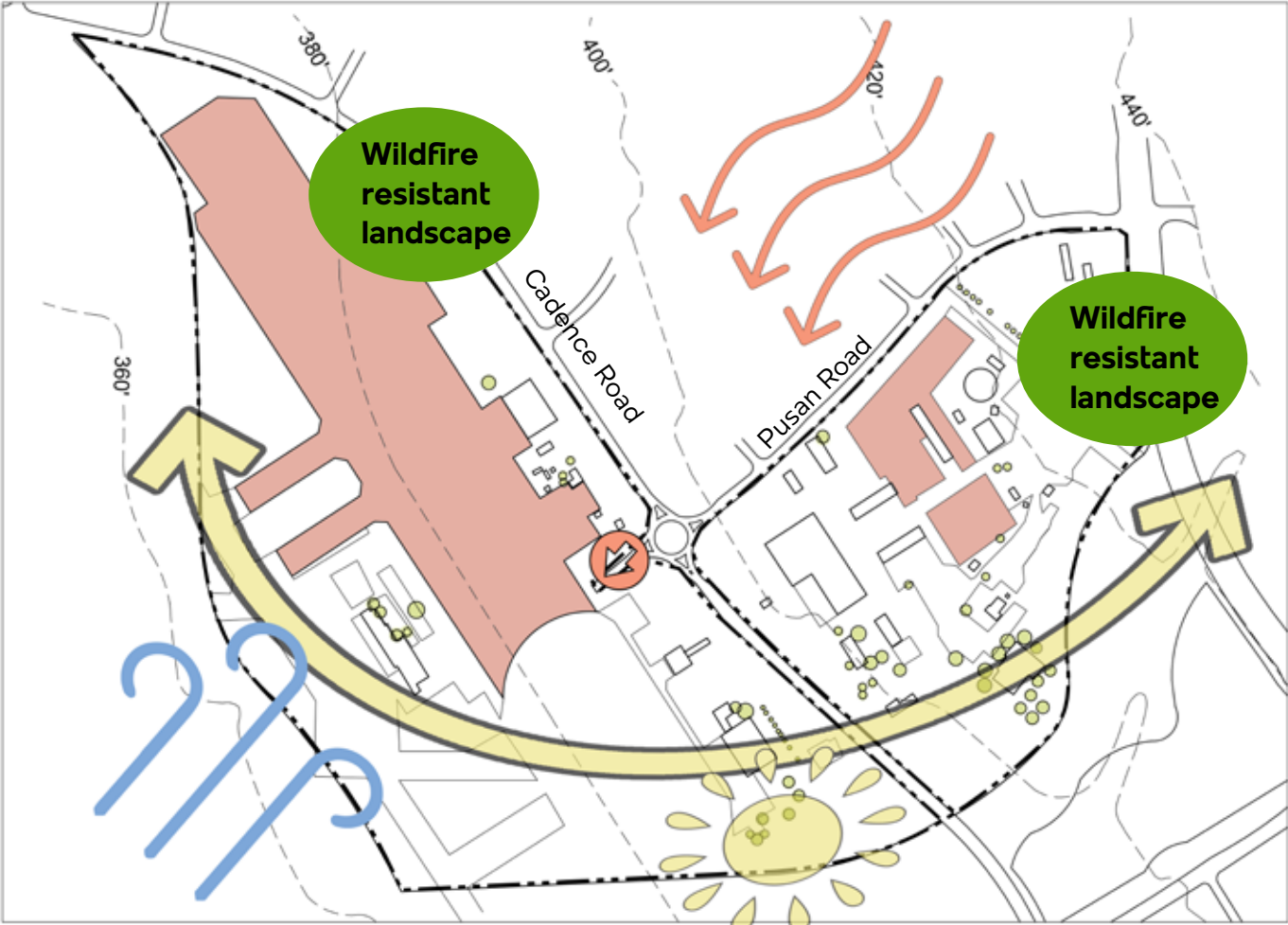
- Children's Garden (2 acres)
- Veteran's Memorial Garden (2 acres)
- Cultural themed gardens (2-4 acres per garden)
 - Restaurant/Cafe (10,000 S.F.)



Additional Operations Infrastructure:

- Admissions Building (20,000 S.F.)
- Parking Lot (3.5 acres)
- Maintenance and propagation facilities (4 acres)
- Restrooms (5,000 S.F., throughout)

SITE ANALYSIS - ENVIRONMENTAL



SITE ANALYSIS - ENVIRONMENTAL

The site was graded flat for farmland and later the air field with drainage patterns to the southwest. Few trees exist on the site, the most notable being a row of large Canary Island date palms in questionable condition. The site experiences significant Santa Ana wind events in the fall. Historically, farmers in this region designed wind breaks utilizing large Eucalyptus trees, often *Eucalyptus globulus*. The region also experiences major wildfire events that are exacerbated by the seasonal winds and low humidity. **This project will need to mitigate the climatic conditions through shade, wind protection, and wildfire-conscious design elements.**

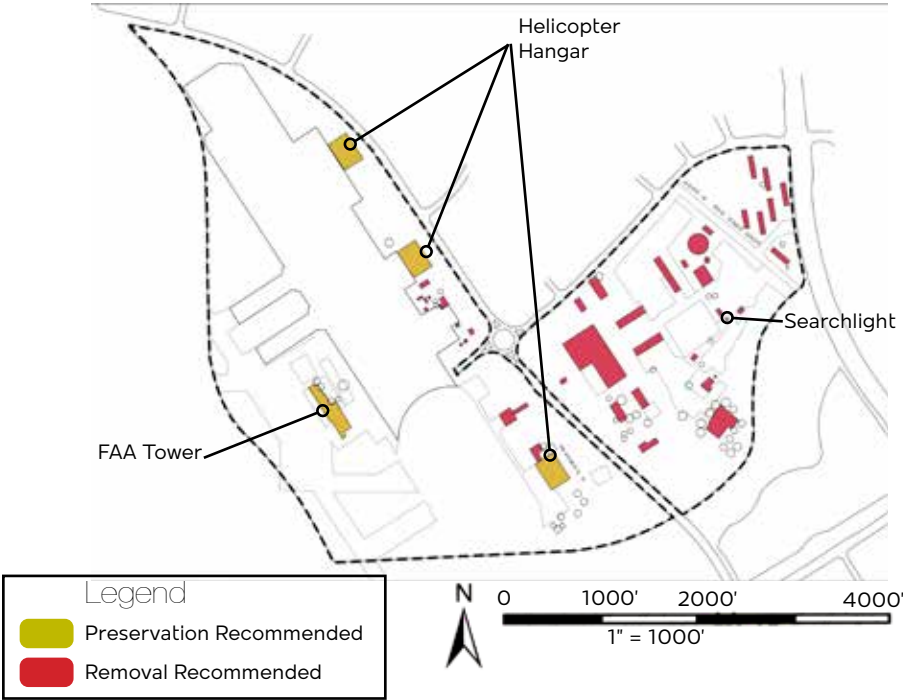


El Toro Air Station utilized as a helicopter staging area during 2020 wildfires.

Photo Credit: Los Angeles Times

SITE ANALYSIS - EXISTING CONDITIONS

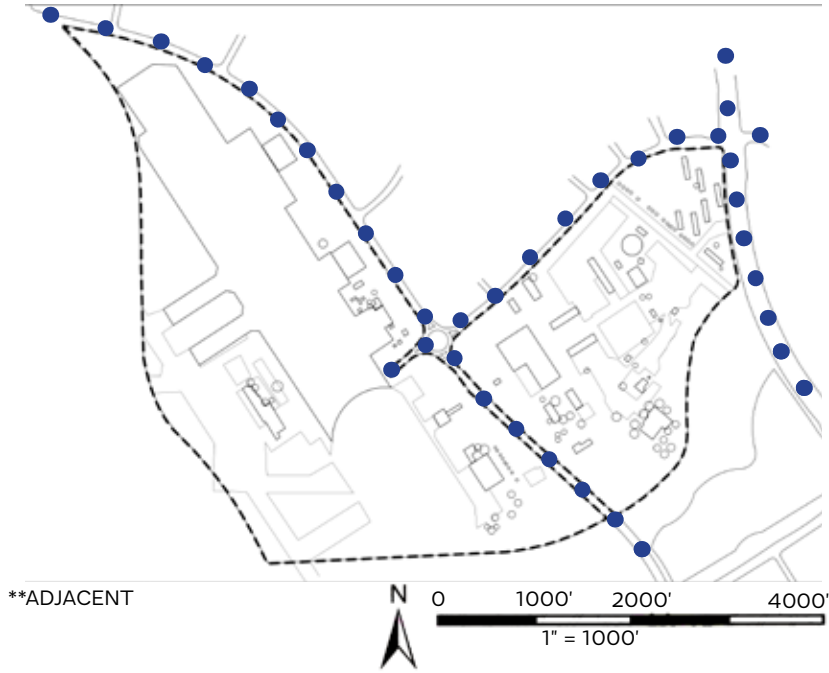
STRUCTURES



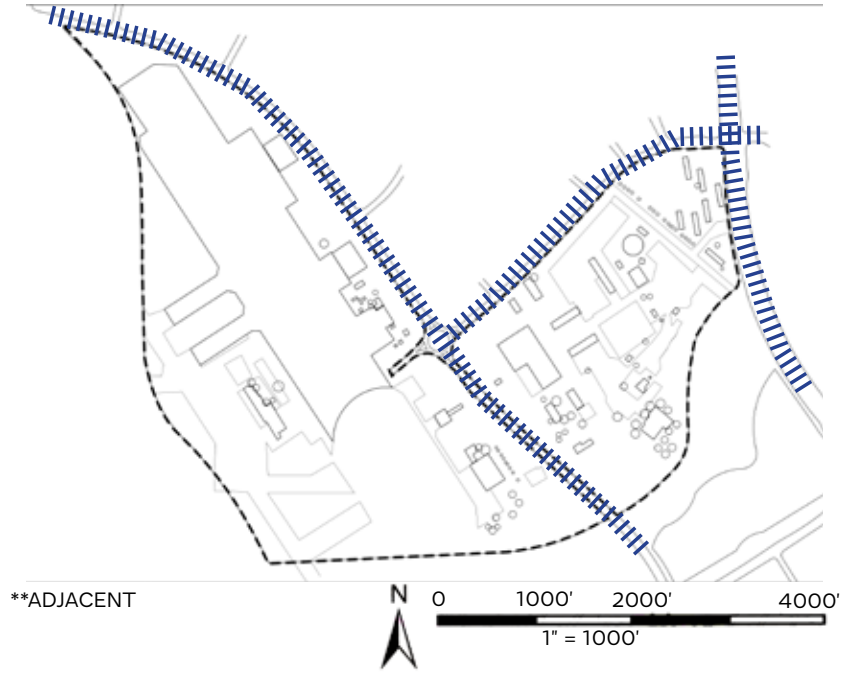
HARDSCAPE



VEHICULAR CIRCULATION



PEDESTRIAN CIRCULATION

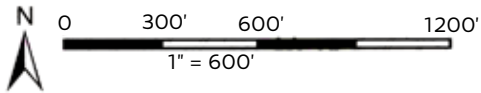


SITE ANALYSIS - EXISTING CONDITIONS

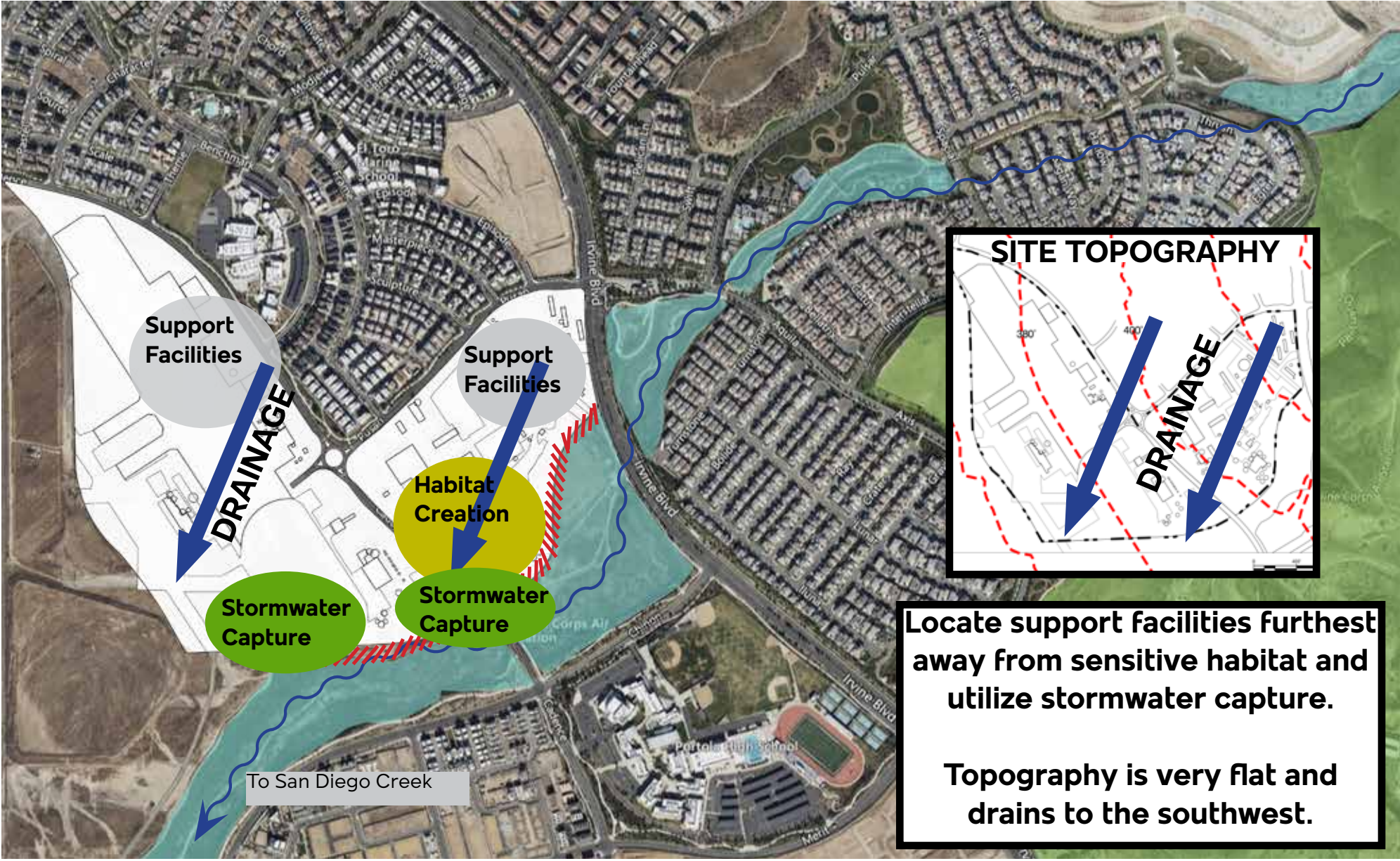


Legend





- Buildings Acceptable Condition
- Buildings Poor Condition
- Hardscape - Concrete

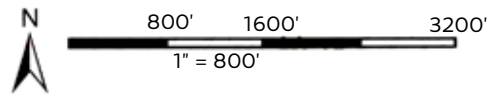


SITE ANALYSIS - WILDLAND-URBAN INTERFACE OPPORTUNITIES



Legend

	Agua Chinon		Agua Chinon Flow Line
	El Toro Preserve		Wildland-Urban Interface





Existing Agua Chinon flow line.

The Agua Chinon Creek or Agua Chinon Wash flows from the Santa Ana Mountains to San Diego Creek, ultimately emptying into the Upper Newport Bay and Pacific Ocean in Newport Beach. The creek is heavily urbanized with portions in concrete channels or buried.

SITE ANALYSIS - OPPORTUNITIES



Concrete can be reused for parking and other formal areas

FAA Tower preserve and integrate into designs

Traffic circle on Cadence Road is a key gateway into the site --> Entry

Parking locations on existing tarmac

Helicopter Hangars - Good condition, can be rehabilitated for operations needs

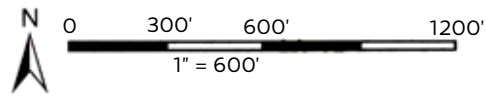


Opportunities to salvage materials

Major road provides access to freeway and connections

Legend

- Building Preservation Recommended
- Hazardous Structures/Poor Condition
- Hardscape

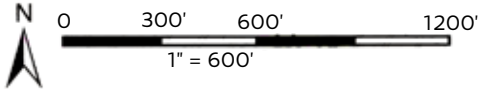
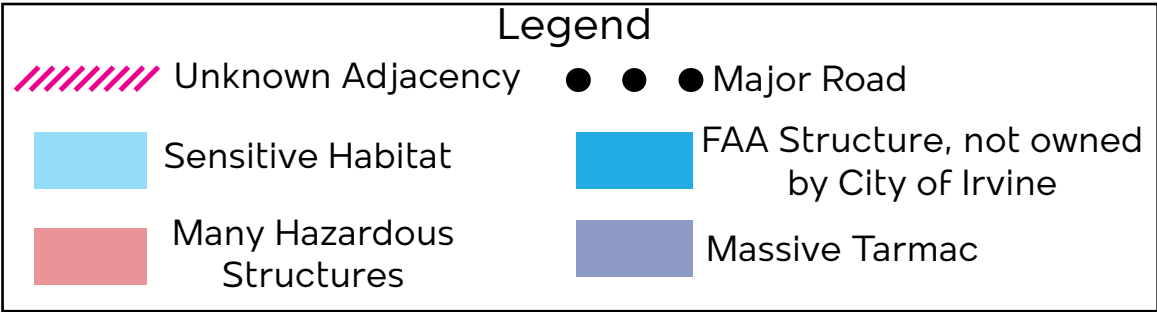
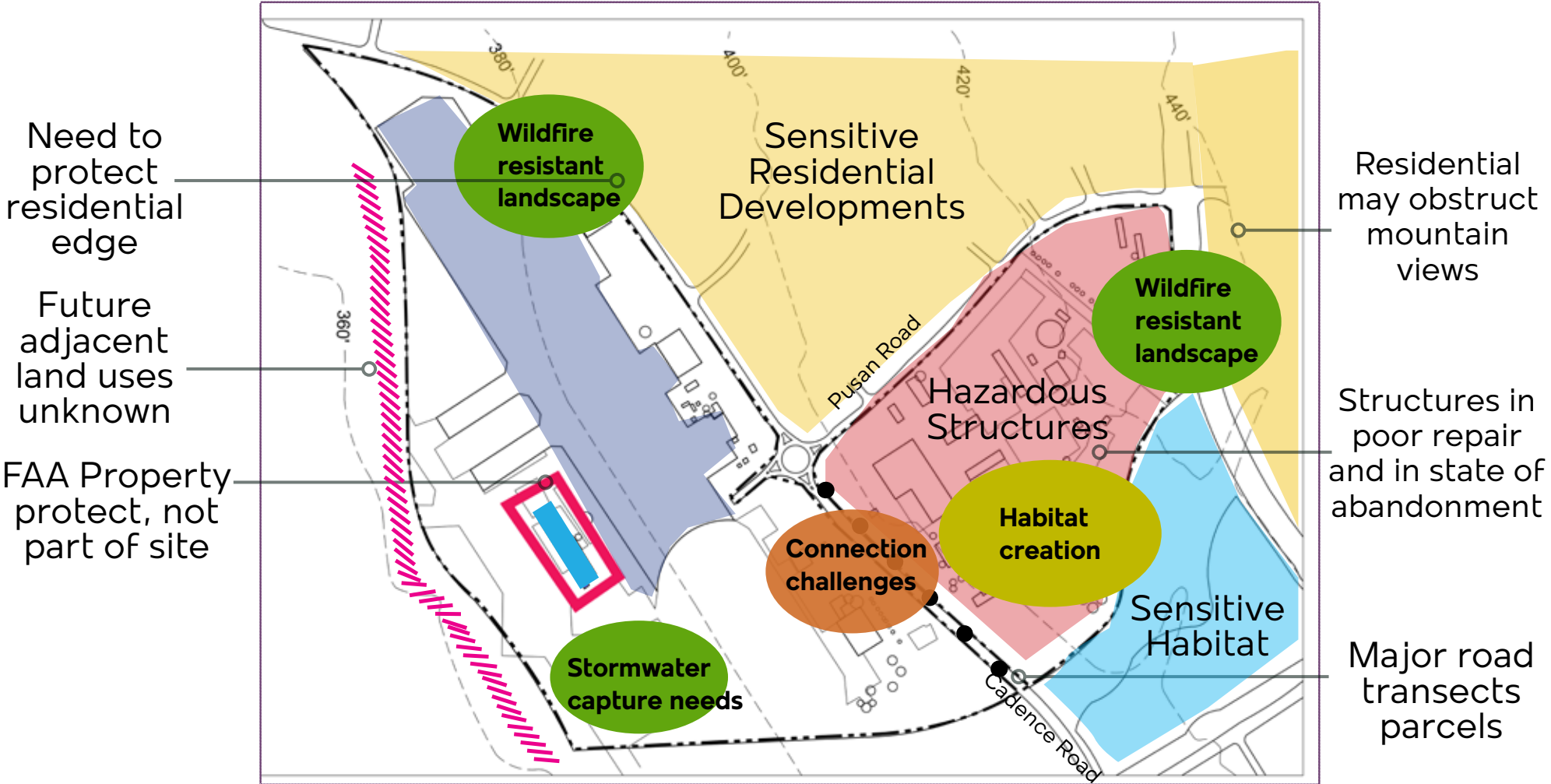




Existing Cadence Road traffic circle - a potential entry point and branding opportunity

Major opportunities exist with re-purposing materials from the air station infrastructure. Unique items like large fuel tanks, communications towers, corrugated metal, and doors can be salvaged and stockpiled for future reuse. Parts of the tarmac and runway can be recycled for pathways and road-base. Concrete pieces can fill gabion walls and large pieces stacked to make retaining walls for planters or walkway borders. The traffic circle presents an entry opportunity. The tarmac and hangars may function as support facilities.

SITE ANALYSIS - CONSTRAINTS



SITE ANALYSIS - CONSTRAINTS



Typical abandoned building condition

Many structures are scattered throughout the site ranging from simple steel coverings to a multi-story brick building that housed flight simulators. Due to years of abandonment, vandalism, and design inconsistent with public use, most structures should be removed. Some buildings have no windows because they were designed for specific military purposes.

Photo Credit: E. Fisher

Walt Disney and the El Toro Flying Bull



El Toro was historically represented by a winged bull designed by Walt Disney. The symbolism of the bull can mean many things like aggression, bulldozing the land, and recklessness. A bull is the antithesis of harmony with the land.

Photo Credit: Flying Leatherneck Museum, MCAS Miramar, San Diego

DESIGN METAPHOR - BUTTERFLY

Butterflies are the metaphor for the design concepts and reveal themselves in several ways including:



FLIGHT



<https://www.oregister.com/wp-content/uploads/migration/naz/nazyja-b88177340z.120140827201602000gc24k2fd.20.jpg?w=620>

FOUR WINGS



Photo Credit: E. Fisher

MIGRATION



https://journeynorth.org/sites/default/files/styles/juicebox_large/public/2017-08/1347509939.full_.jpg?itok=Q9hyMarW

REGENERATION



<https://cdn.lawnlove.com/images/iStock-1135338910.jpg>

BEAUTY & COLOR



Photo Credit: E. Fisher

POTENTIAL DESIGN METAPHOR - BUTTERFLY



CONNECTIONS

- Pathways
- Education Programs
- Community
- Bridge
- Emergency Staging

PEOPLE

- Entry/Parking
- Cultural Gardens
- Veteran's Garden
- Children's Garden
- Support Buildings
- Agriculture History

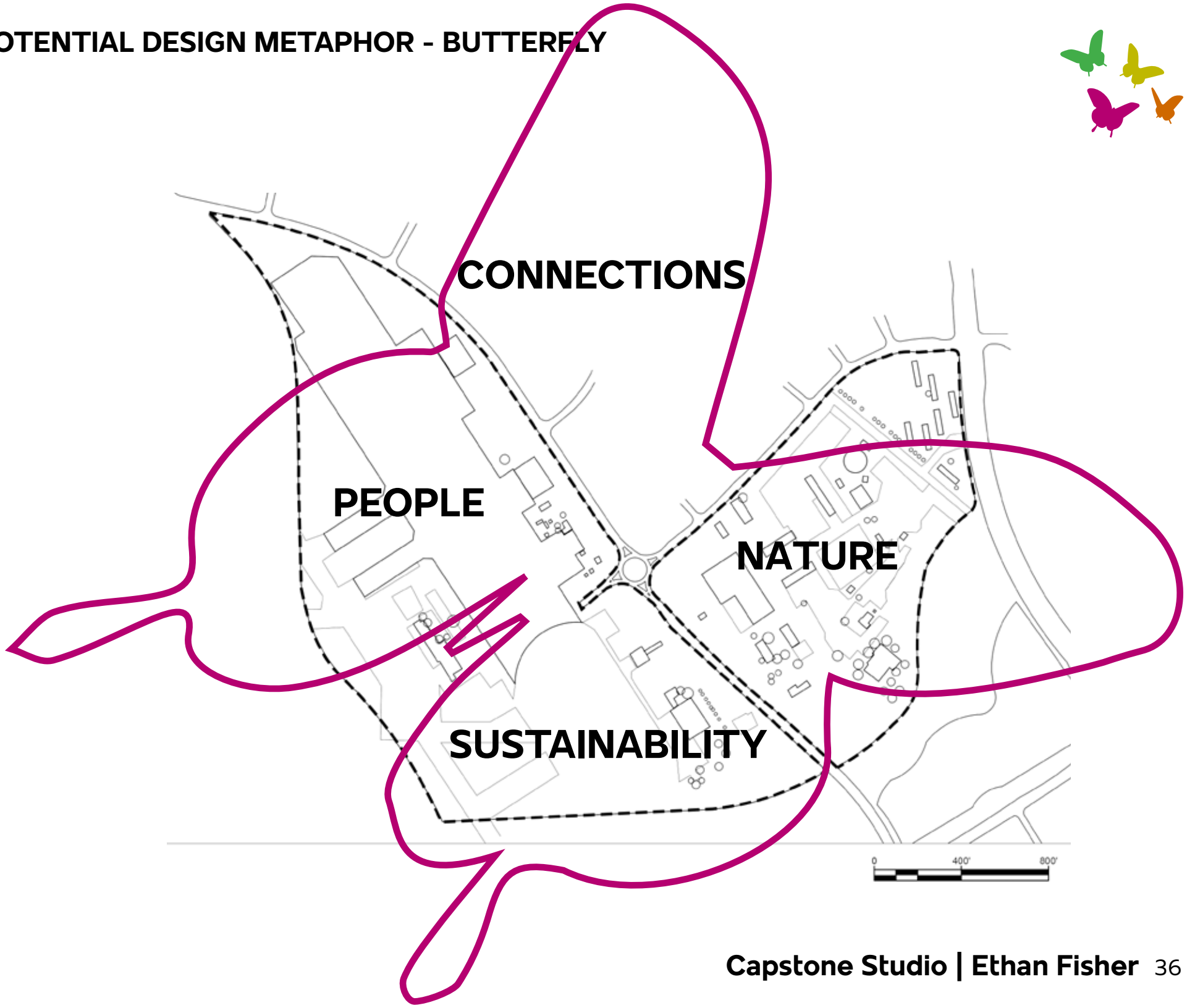
NATURE

- Healthy Ecology
- Pollinators
- Wildlife
- Trails

SUSTAINABILITY

- Regenerative Practices
- Fire Resistant Landscapes
- Stormwater Collection
- GHG Sequestration
- Shade

POTENTIAL DESIGN METAPHOR - BUTTERFLY





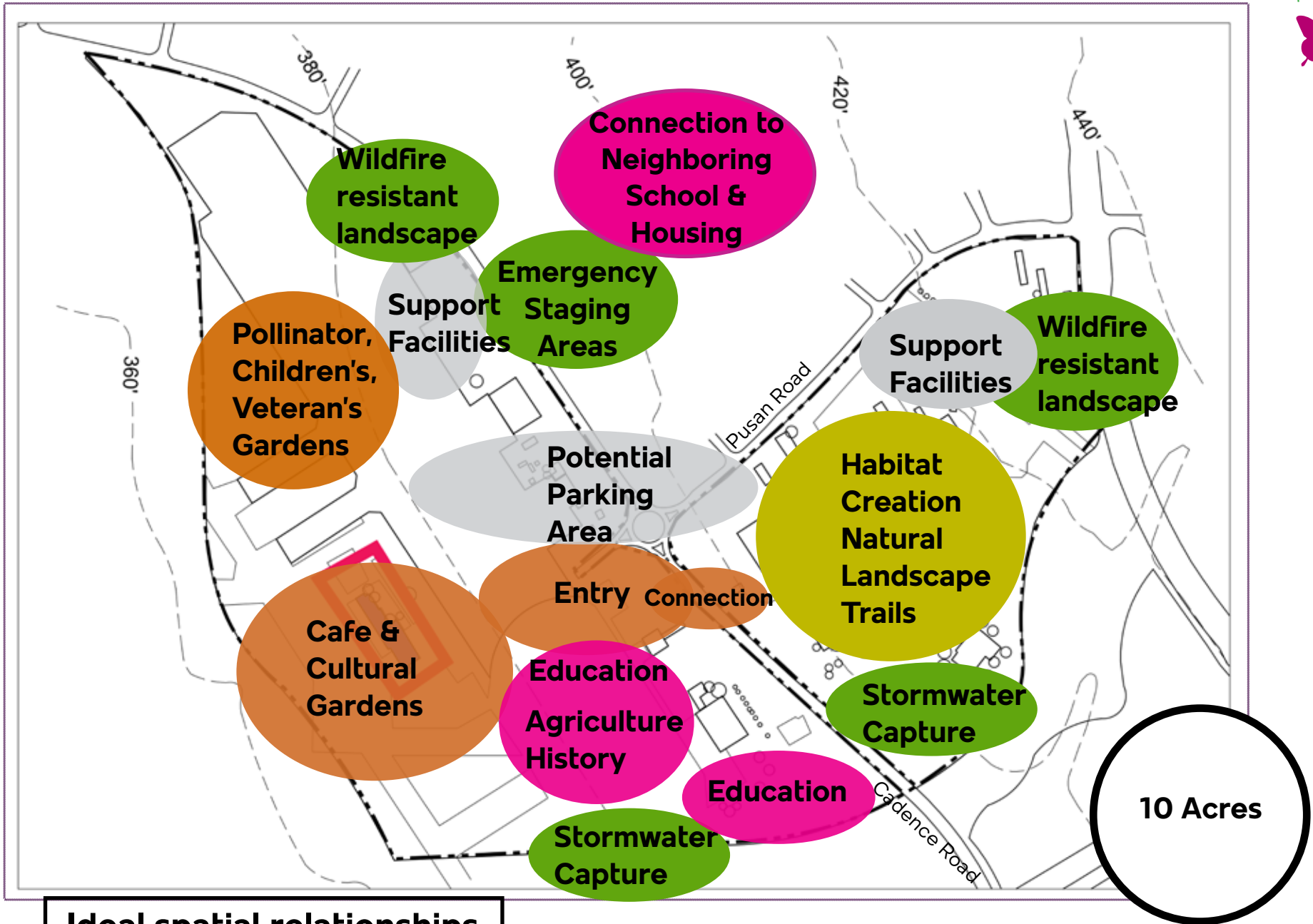
Based on the site analysis and identified goals, elements can be loosely arranged on the site in their ideal locations. This important step helps ensure the final design is functional. After creation of the spatial analysis diagram, three concepts were evaluated before creating a final design and illustrative site plan.



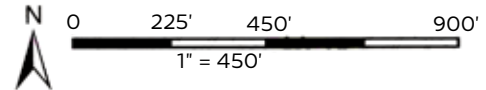
Inspirational Image - Desert Botanical Garden, Phoenix, AZ

Photo Credit: E. Fisher

CONCEPT DIAGRAM



Ideal spatial relationships based on site analysis.



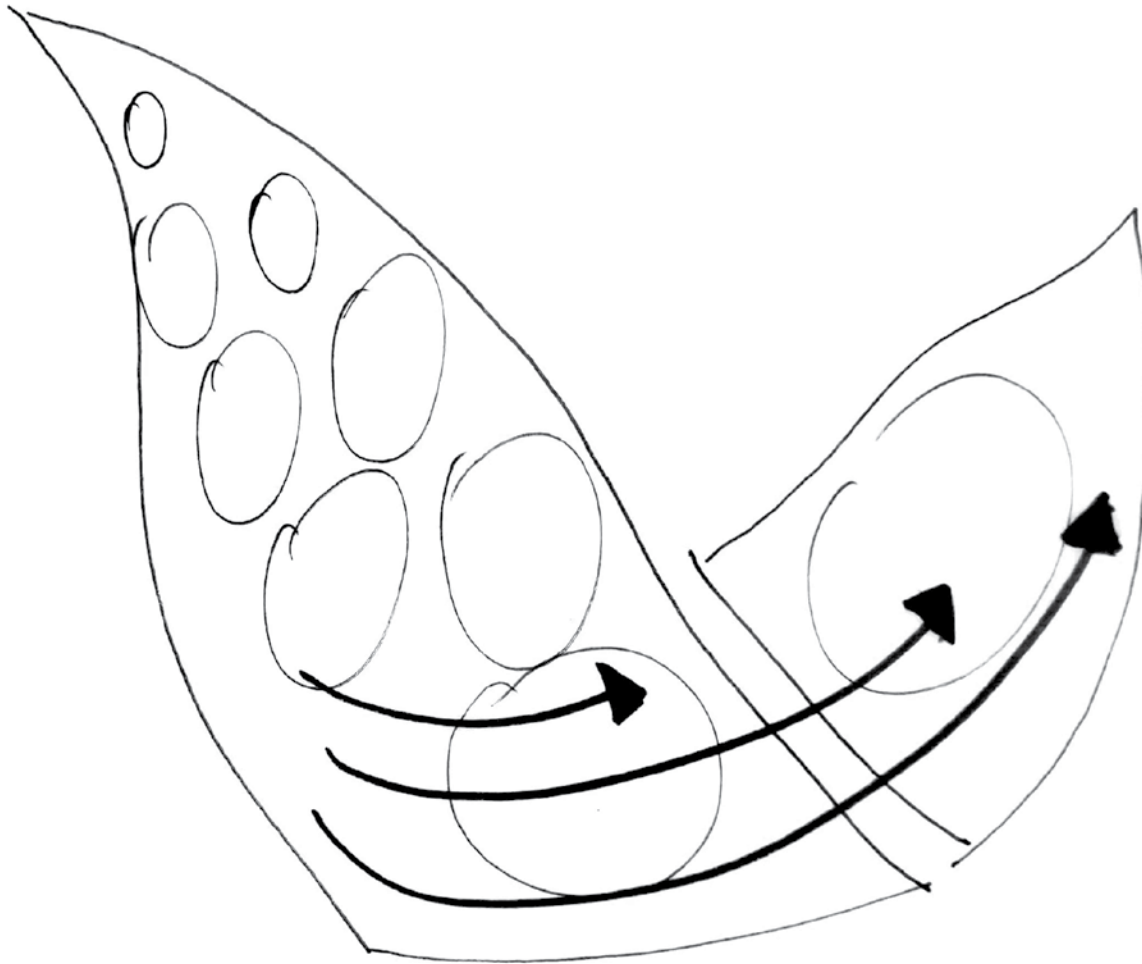
DESIGN CONCEPT 1 - MIGRATION



MIGRATION

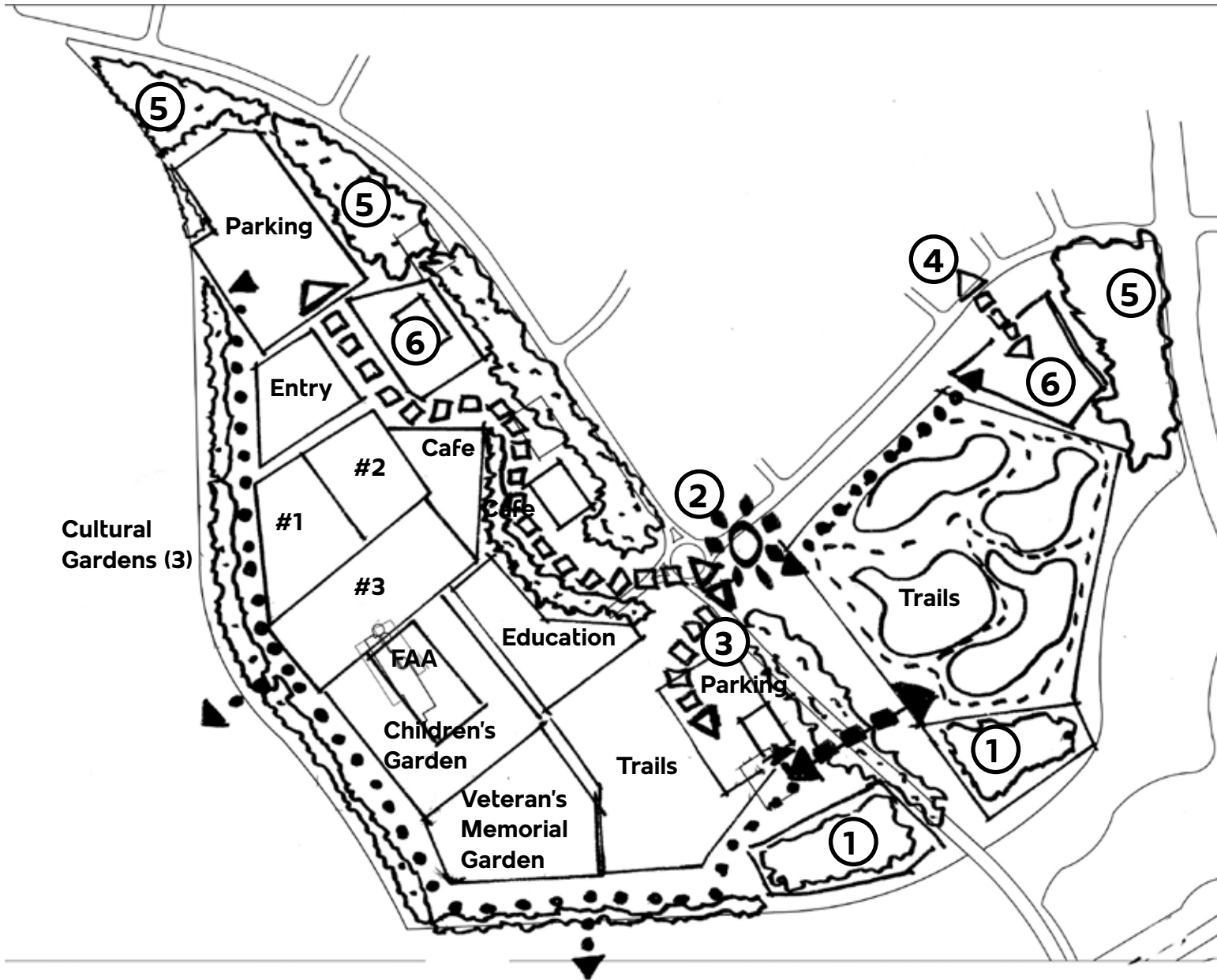


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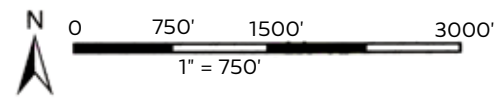


This concept is inspired from the mass migrations of Monarch butterflies and movement from one end of of the site to the other.

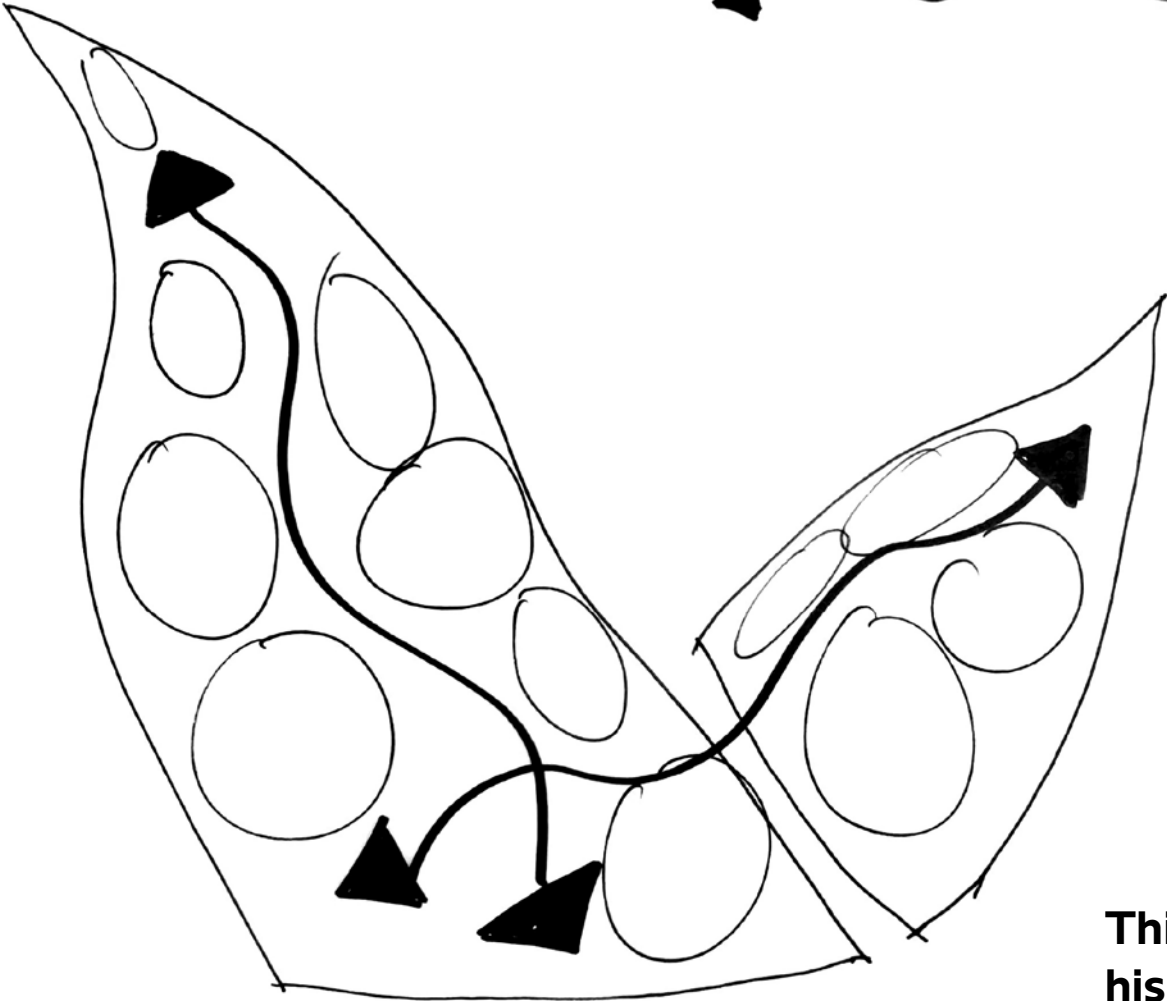
DESIGN CONCEPT 1 - MIGRATION



- ① Stormwater Management
- ② Entry from Street
- ③ Bridge
- ④ Secondary Entrance
- ⑤ Firescape Area
- ⑥ Maintenance Area



DESIGN CONCEPT 2 - FLIGHT



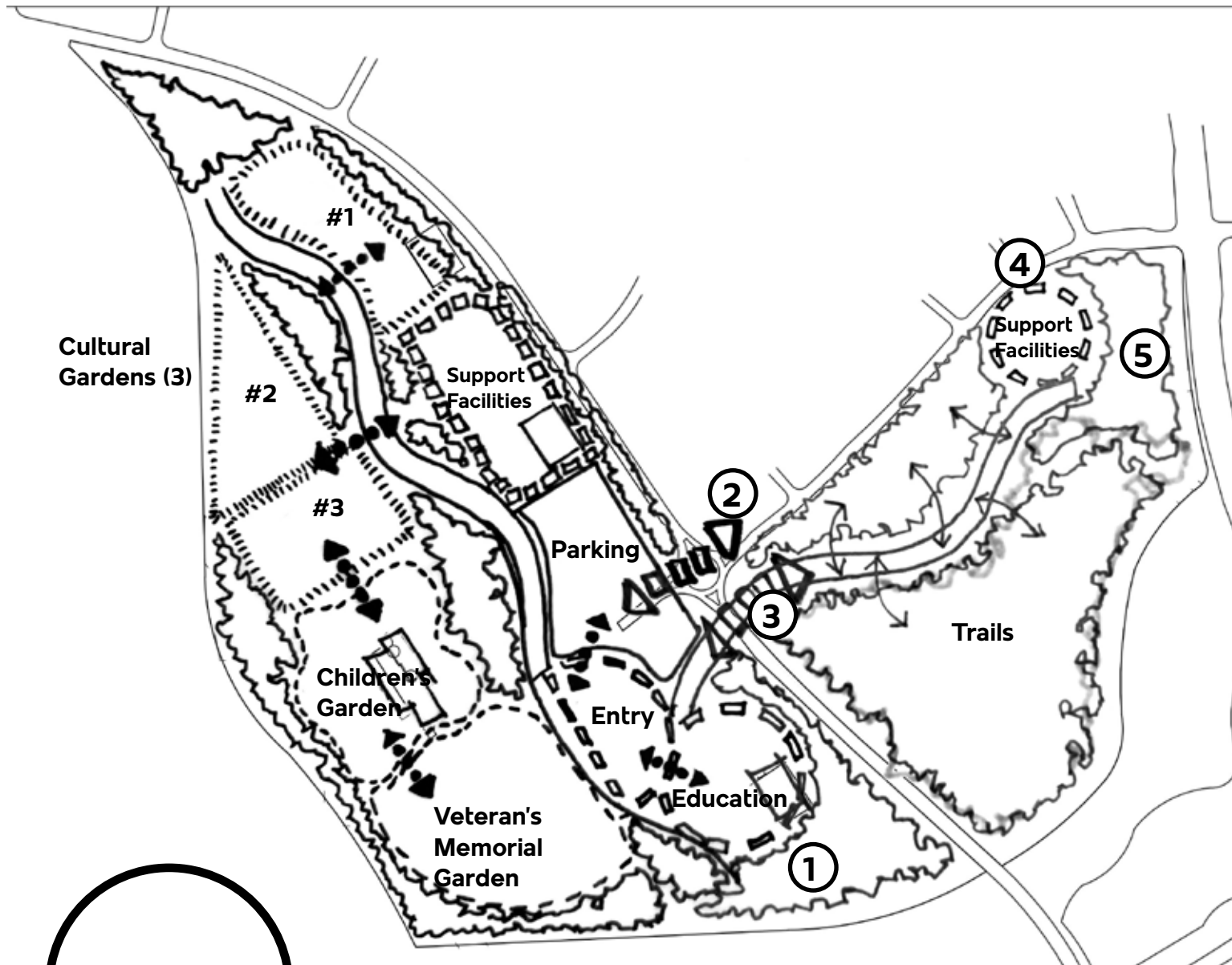
FLIGHT



<https://www.oregister.com/wp-content/uploads/migration/naz/nazyja-b88177340z.120140827201602000gc24k2fd.20.jpg?w=620>

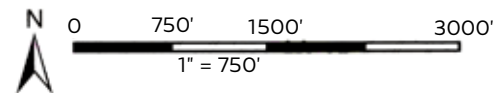
This concept is an ode to the flight history of the site and inspired by the fluttering of butterfly flight.

DESIGN CONCEPT 2 - FLIGHT



- ① Stormwater Management
- ② Entry from Street
- ③ Bridge
- ④ Secondary Entrance
- ⑤ Firescape Area

10 Acres



DESIGN CONCEPT - MONARCH WINGS

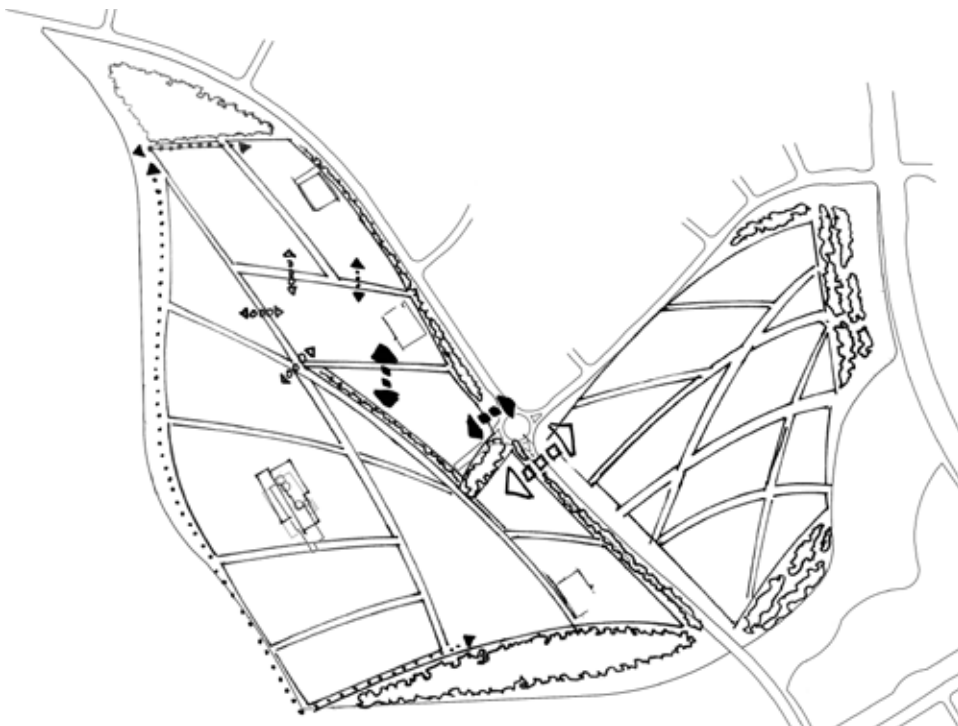
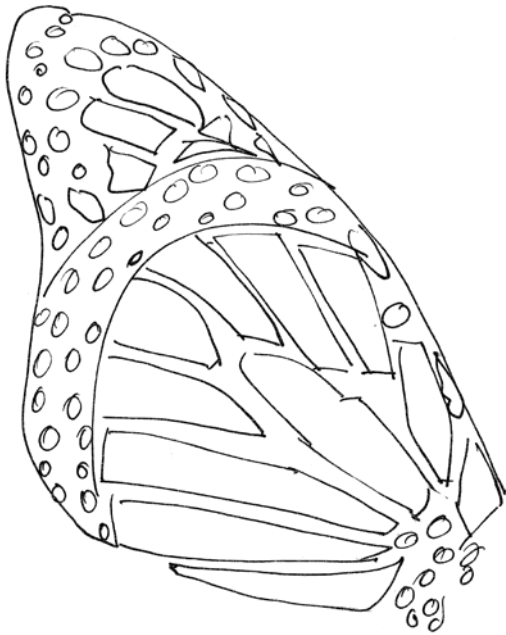


WINGS

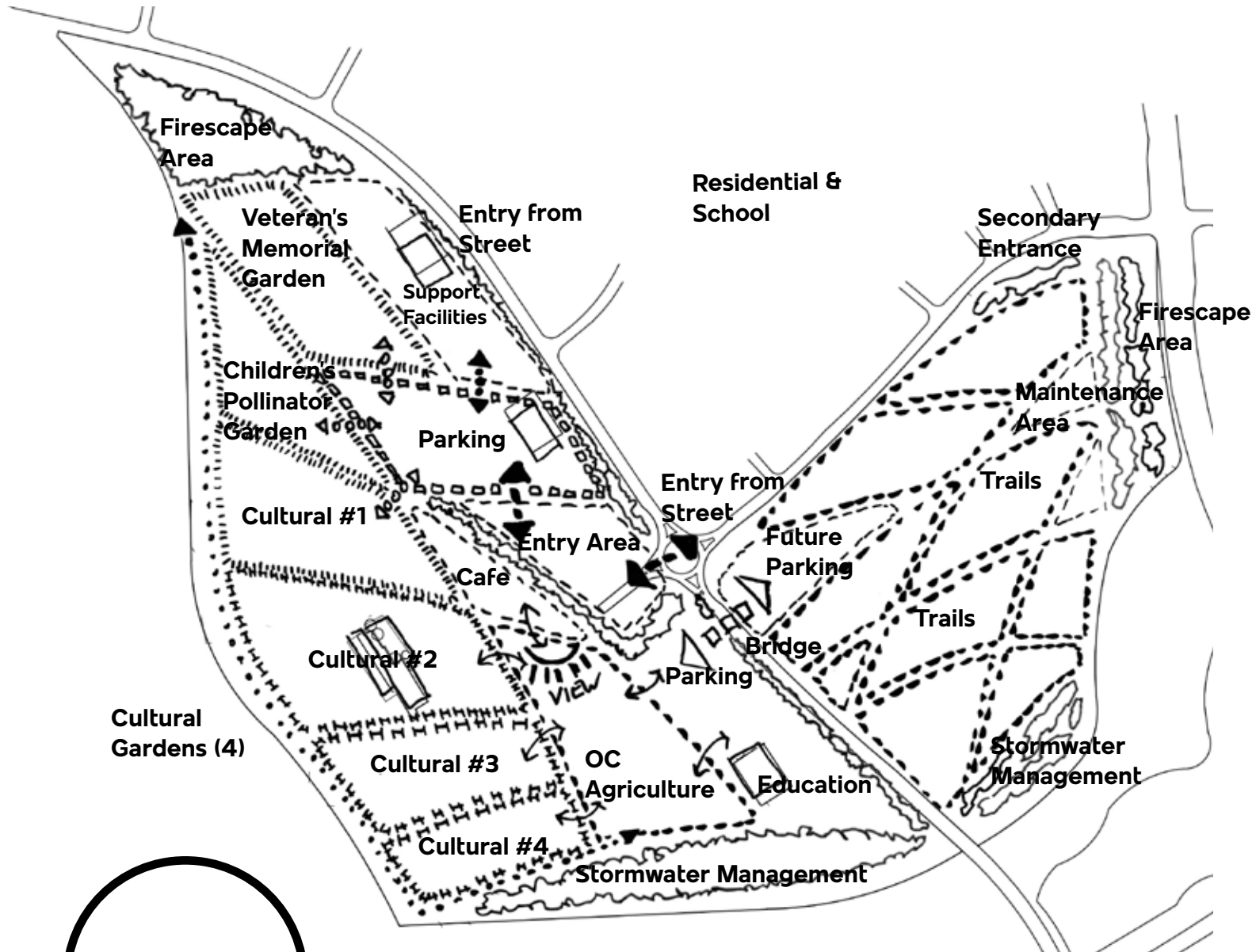


https://ucanr.edu/blogs/entomology//blogfiles/74999_original.jpg

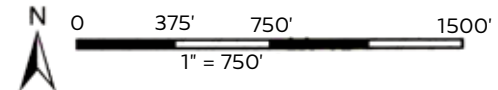
This concept is inspired from the geometric pattern of a Monarch butterfly wing.



DESIGN CONCEPT - MONARCH WINGS



10 Acres

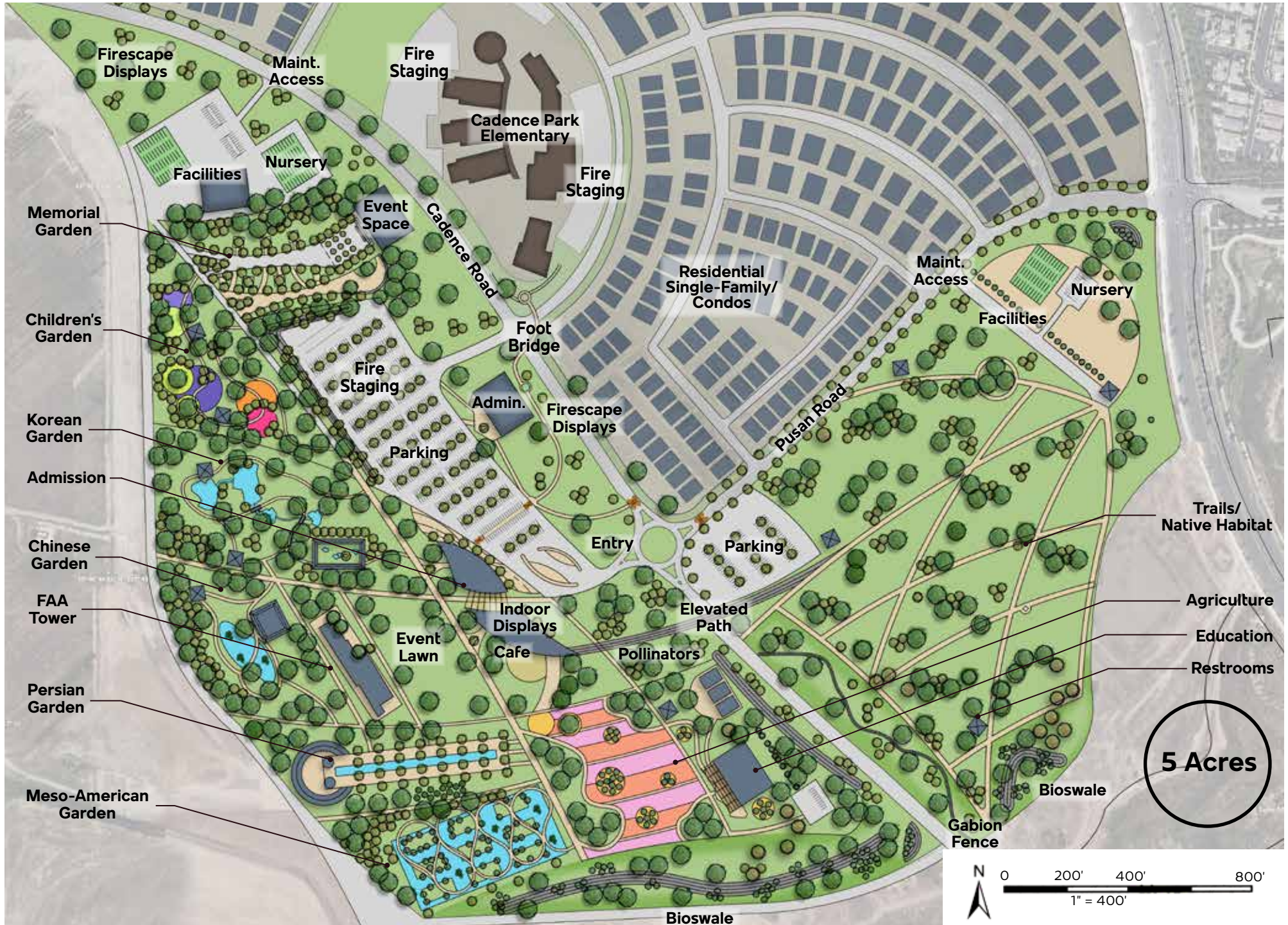




Inspirational Image - Huntington Library and Gardens, San Marino, CA

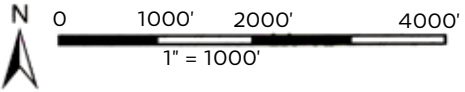
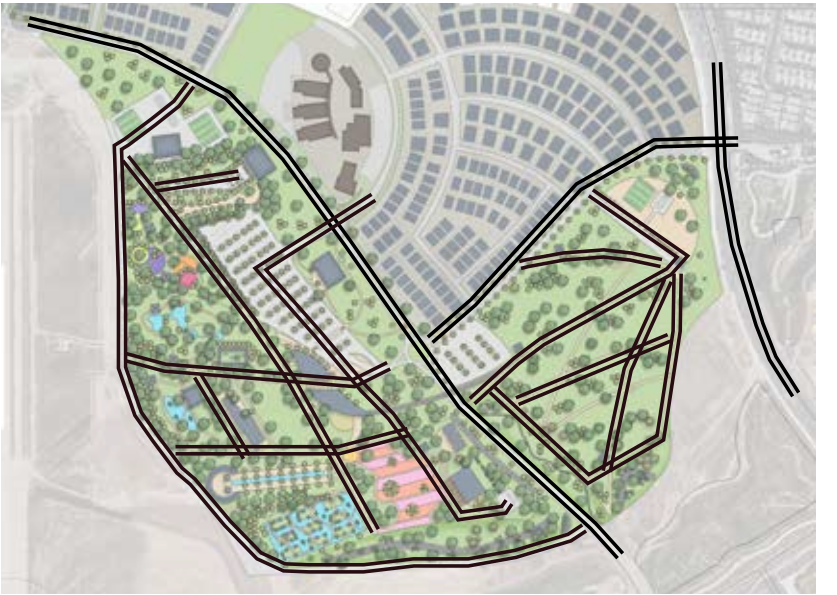
Photo Credit: E. Fisher

ILLUSTRATIVE PLAN

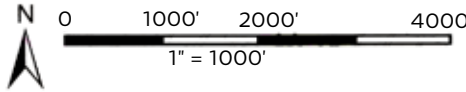


CIRCULATION

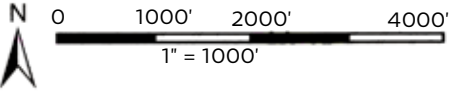
**MAINTENANCE
VEHICULAR CIRCULATION**



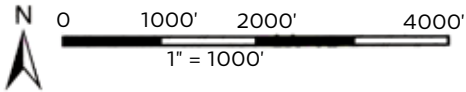
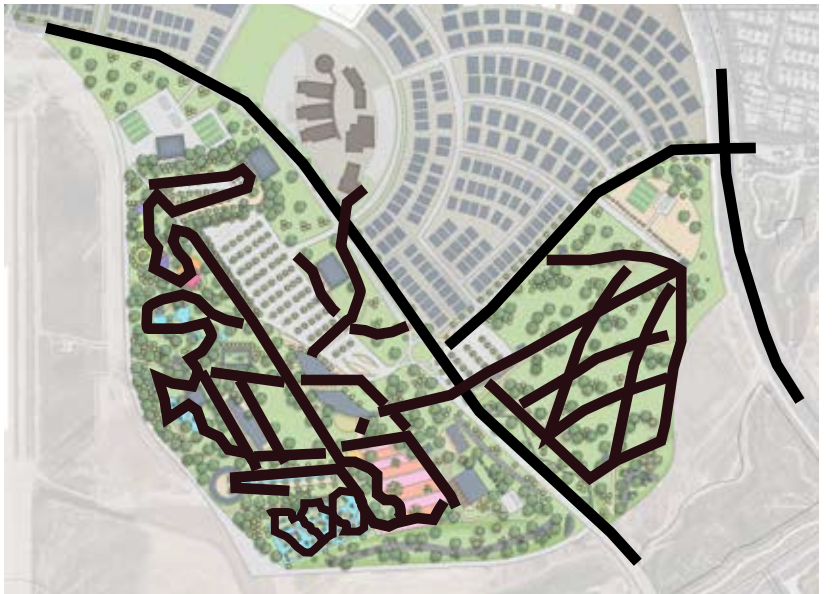
**BICYCLE
CIRCULATION**



**GENERAL PUBLIC
VEHICULAR CIRCULATION**



**PEDESTRIAN
CIRCULATION**



MATERIALS

Presented are potential materials for pathways and construction. Materials include wood and steel in warm color tones.



Existing tarmac and paving



Integral colored exposed aggregate concrete paving



Rammed concrete



Corten steel



Perforated Metal



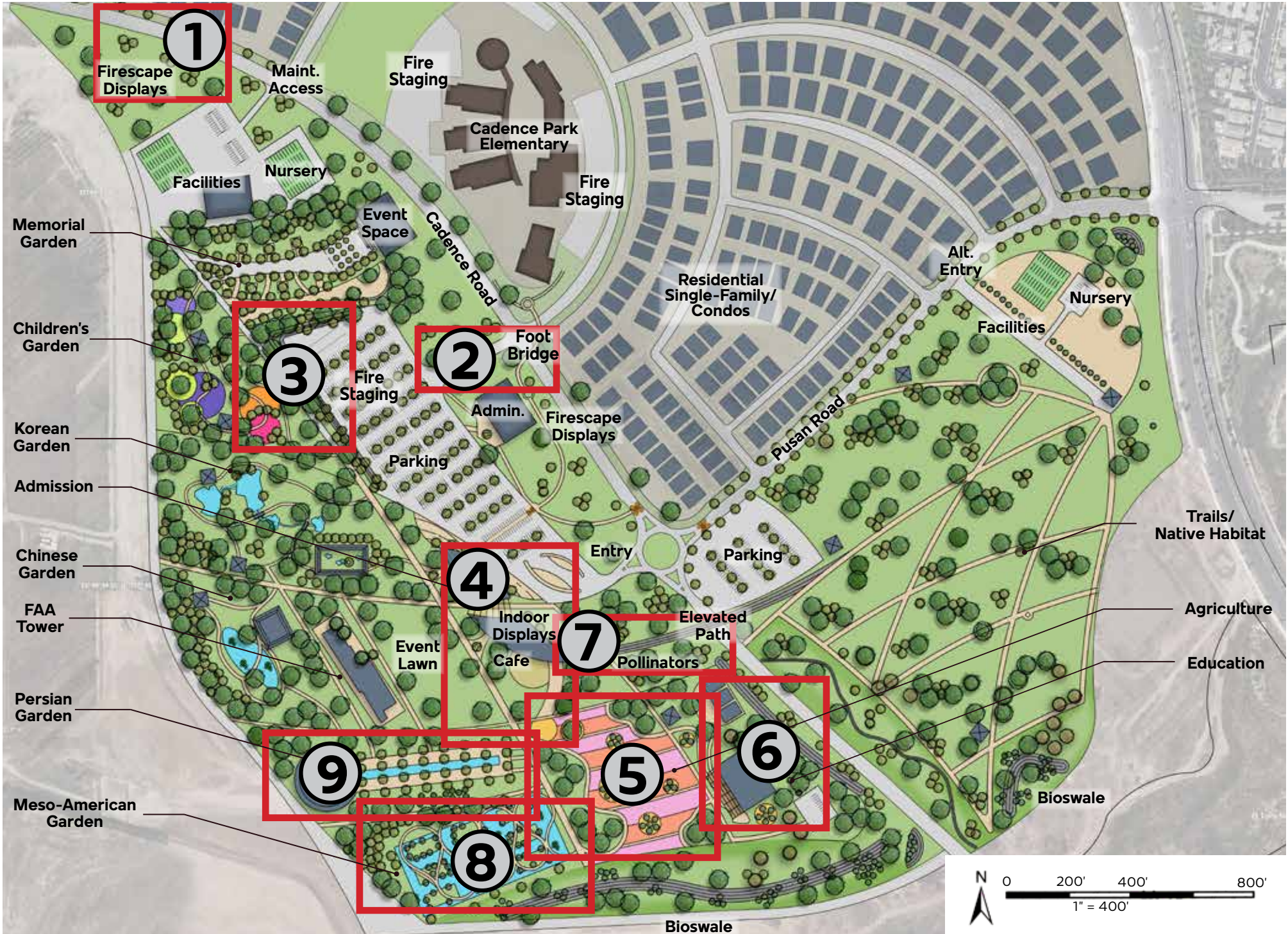
Recycled urban wood

Photo Credits: E. Fisher

ILLUSTRATIVE PLAN - TARMAC OVERLAY



AREA OF ENLARGEMENTS



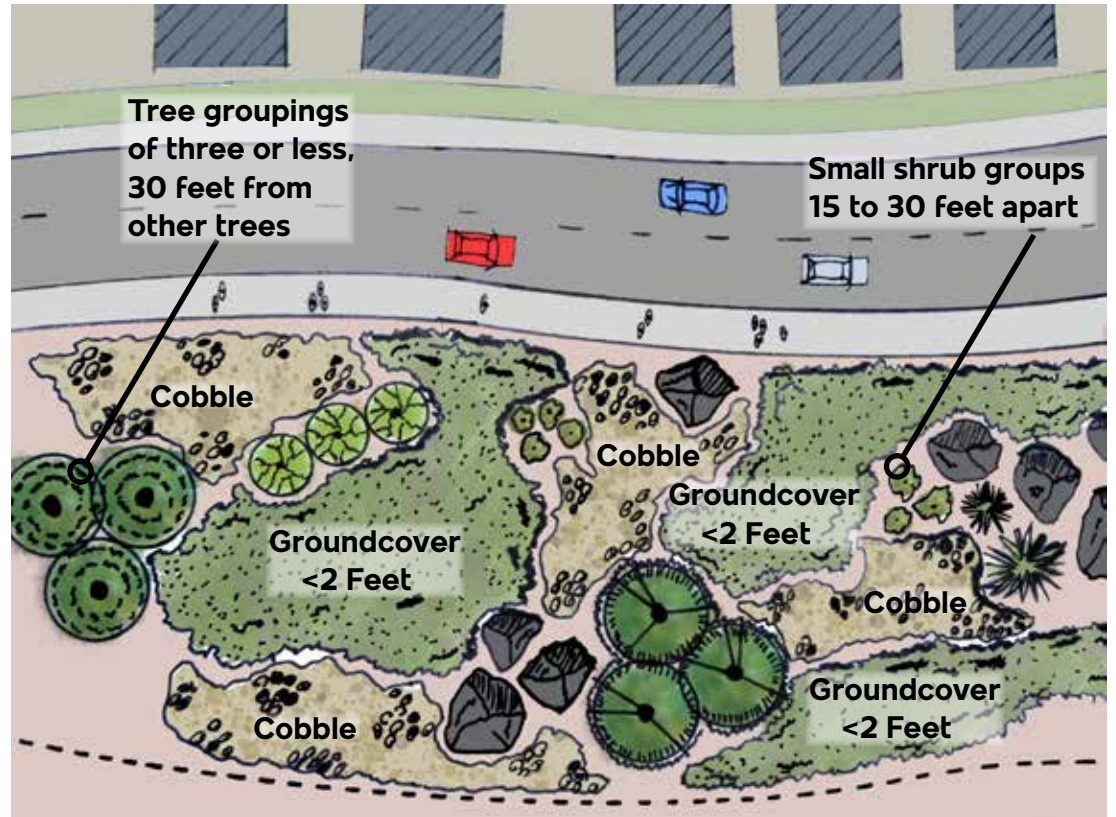
1 FIRESCAPE - FUEL MODIFICATION ZONES



Key Map

Fuel modification zones are viewable on driving approach to garden entry.

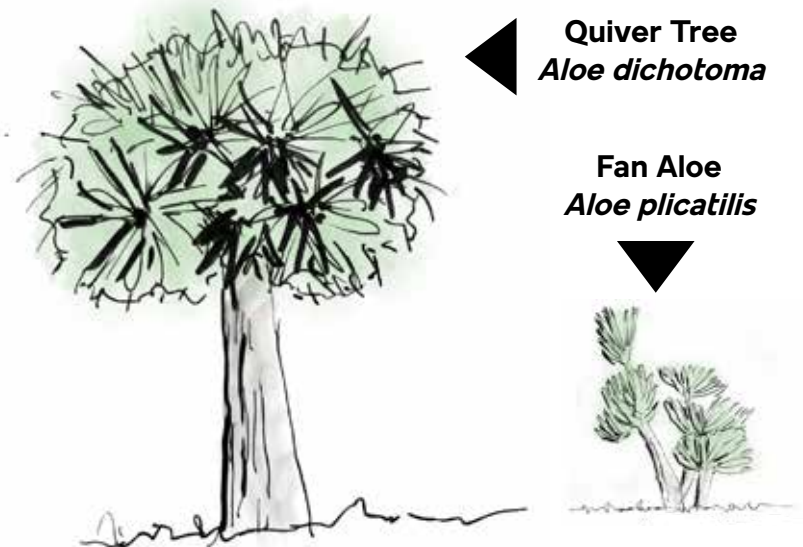
The concept of fuel modification zones can be applied to various geographic plantings; i.e. the South African Cape and pollinator-friendly plantings



Firescape Planting Demonstration Layout N.T.S.



South African Cape Fynbos & Karoo - Firescape
51 Capstone Studio | Ethan Fisher



1 FIRESCAPE - SAMPLE CLIMATE-ADAPTED POLLINATOR SELECTIONS

Presented are potential specimens that support pollinators while also achieving the goals of the fuel modification zones.



Sticky Monkeyflower
Mimulus aurantiacus



Purple Cedros Island Verbena
Verbena lilacina 'de la mina'



Purple-Flowered Rock Rose
Cistus purpureus



Baja Fairy Duster
Calliandra californica



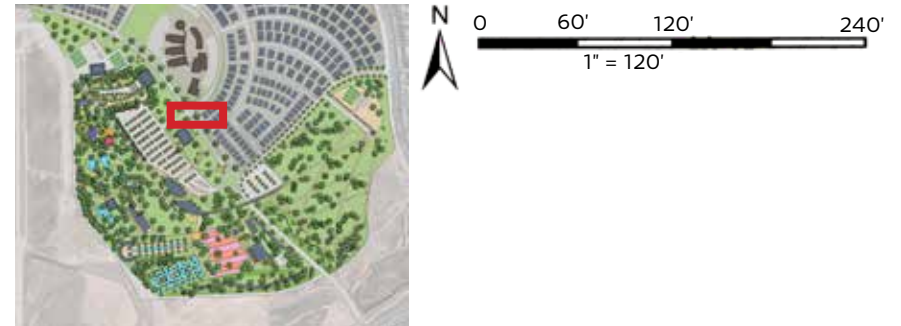
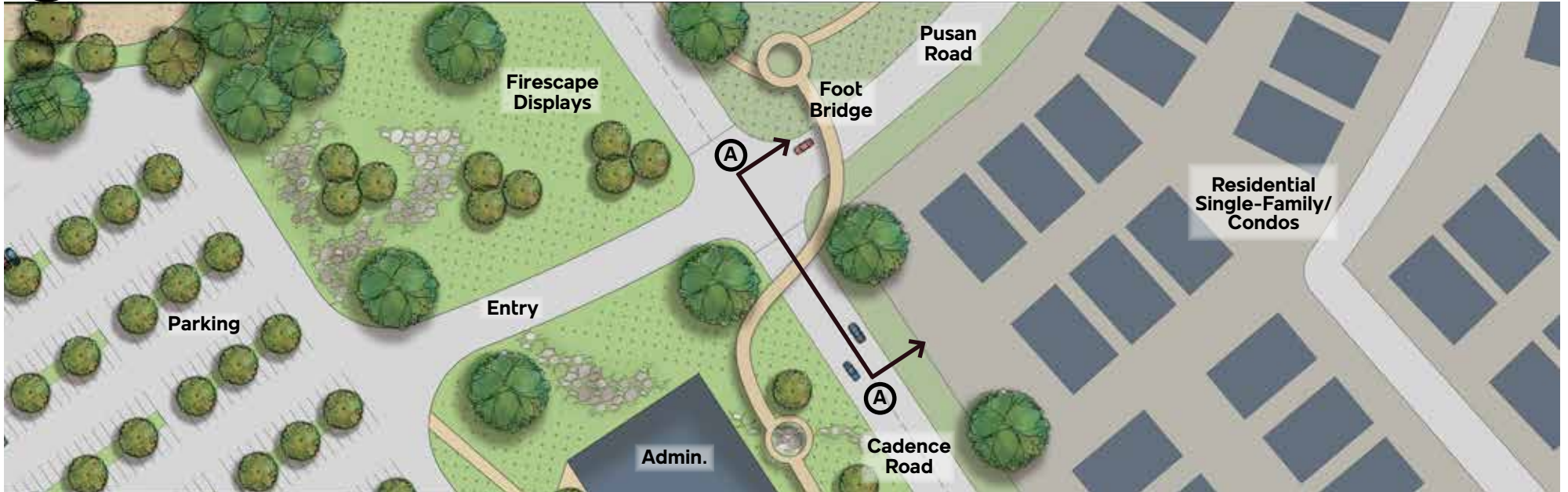
Bush Sunflower
Encelia californica



Creeping Sage
Salvia leucophylla 'Bee's Bliss'

Photo Credits: Salvia - https://upload.wikimedia.org/wikipedia/commons/b/bd/Salvia_leucophylla.JPG;
Verbena - https://upload.wikimedia.org/wikipedia/commons/d/de/Verbena_lilacina_de_la_mina.jpg;
all other photos - E. Fisher

② INTERNAL CONNECTION - FOOT BRIDGE



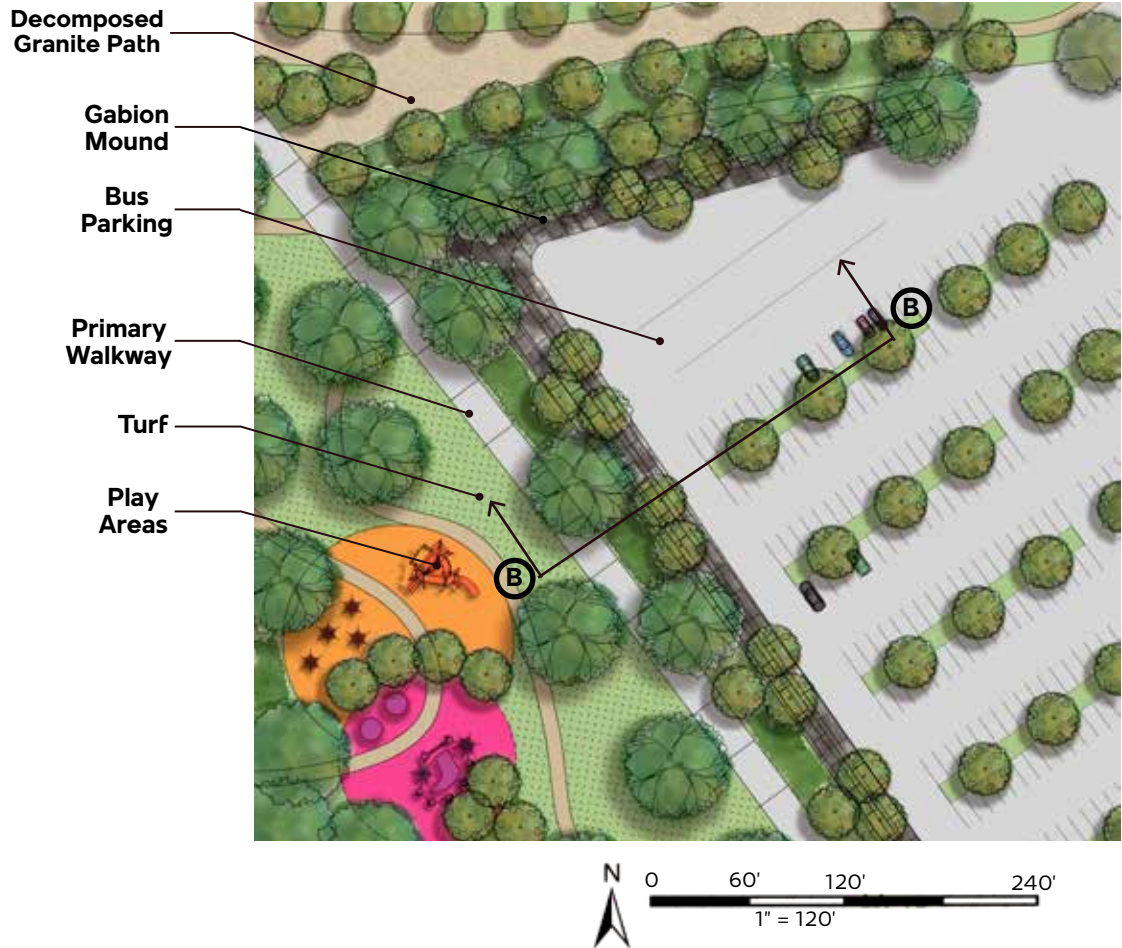
Key Map

A foot bridge over Cadence Road easily connects the neighborhood and school to the entry of the garden.

With the accessible crossing the school parking is a potential overflow parking area during weekend festivals and special events.

Section Elevation A

3 ENLARGEMENT - GABIONS



Example of gabion filled with recycled materials.
Photo Credit: Landscapeperformance.org

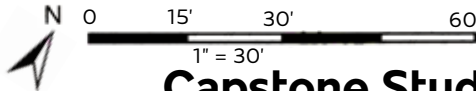


Gabions can be utilized along pathways



Walkway Recycled Tarmac Gabion Planter Driveway Parking Area

Section Elevation B



Key Map

4 ENLARGEMENT - ENTRY EXPERIENCE



Elevation of Entry Building



Cable trellis system for building facade

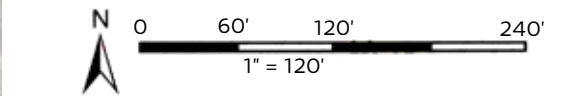
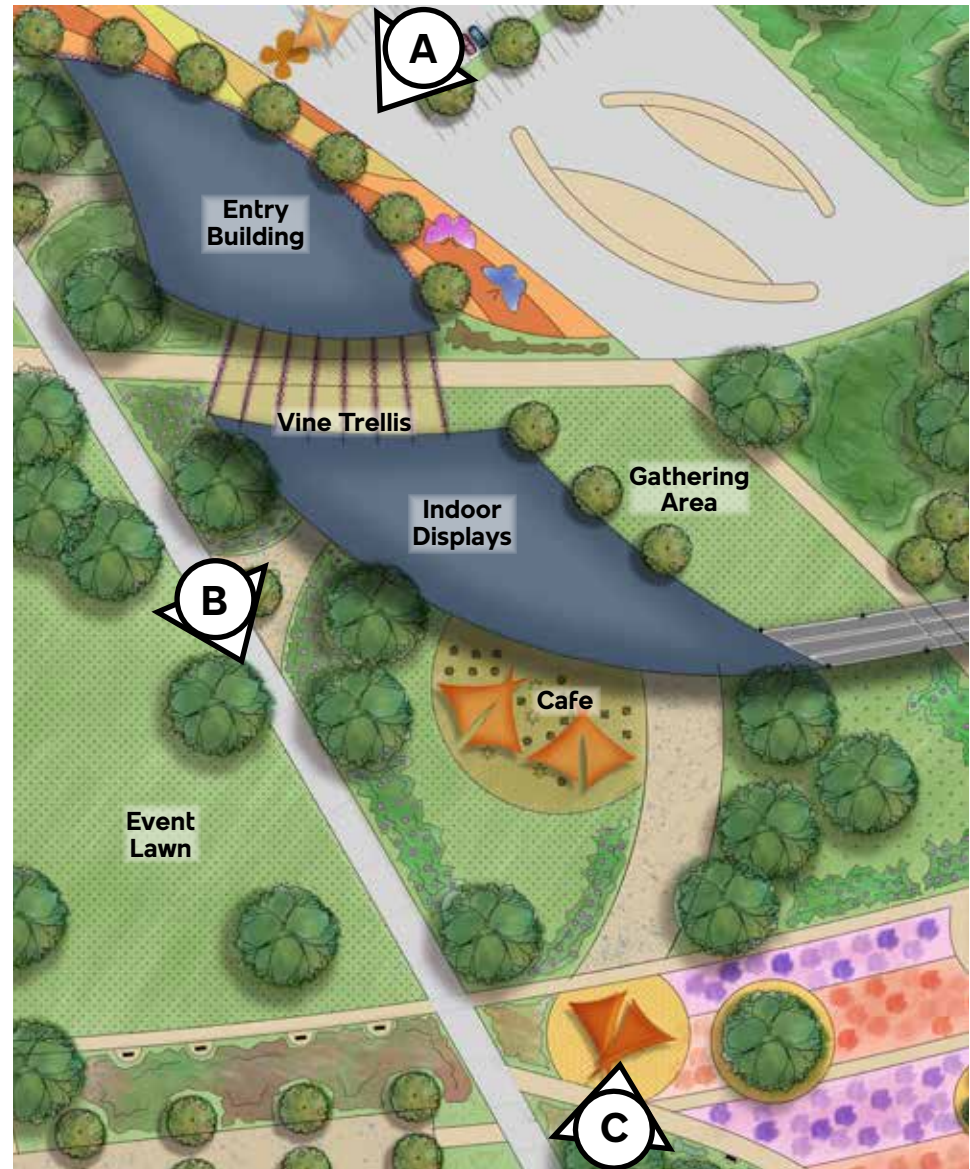
4 ENLARGEMENT - ENTRY EXPERIENCE



B - View of primary circulation pathway.



C - View from citrus node towards entry.



Key Map

5 ENLARGEMENT - ORANGE COUNTY AGRICULTURE



Avocado node with "orange" themed paver walk and seating area



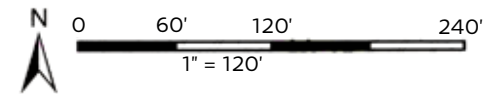
Lavender Farm, Pacific Northwest

Photo Credit: <https://homewithhollyj.com/wp-content/uploads/2021/08/Flower-Farms-of-the-Pacific-Northwest-Part-2-Purple-Haze-Lavender-Farm-25-scaled.jpg>



The agriculture area presents an opportunity to engage visitors in the immersive experience of a flower field or pumpkin patch.

Circular areas may highlight avocados and citrus, a nod to the history of the region.



Key Map

5 BOTANICAL - ORANGE COUNTY AGRICULTURE

The agricultural zone of the garden may be planted with both historically appropriate species and species providing experiential value for visitors.



▲
Avocados, *Persea americana*, have a long history in California dating to the 1800s. Limited groves still exist in Orange County, with California remaining the major domestic producer.



▲
Oranges, *Citrus × sinensis*, and lima beans, *Phaseolus lunatus*, were the most common crops farmed in Orange County through the 1900s.



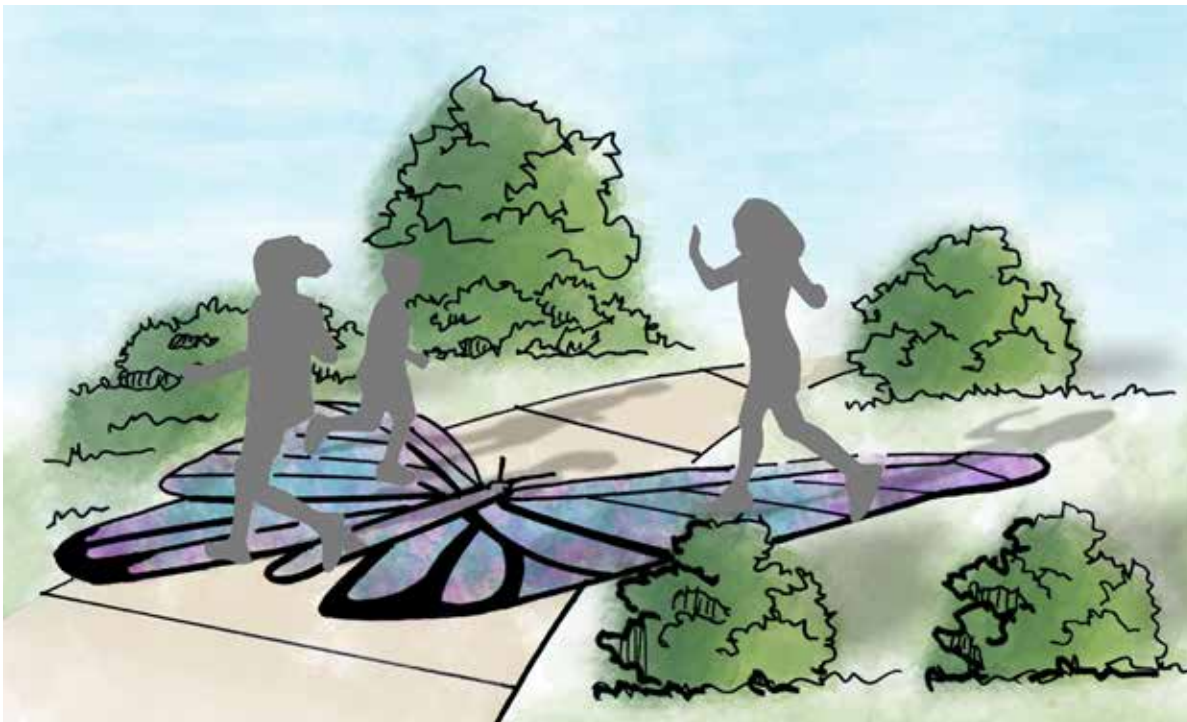
◀
Lavender, *Lavendula sp.*, does not have roots in Orange County, but is farmed in California and other Mediterranean climate regions.

Photo Credits: Avocado - Getty Images; Orange - <https://satsumafarm.com/photos>
Lima Beans - <https://www.theranchtable.com/field-notes/limabeansalad>
Lavender - <https://www.thespruce.com/shrubs-with-blue-or-lavender-flowers-4154012>

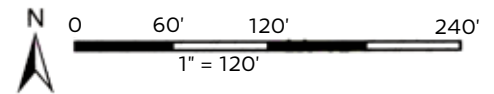
6 EDUCATION HUB ZONE



Adaptive reuse of hangar as building serving educational programming



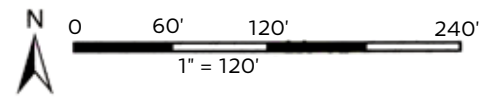
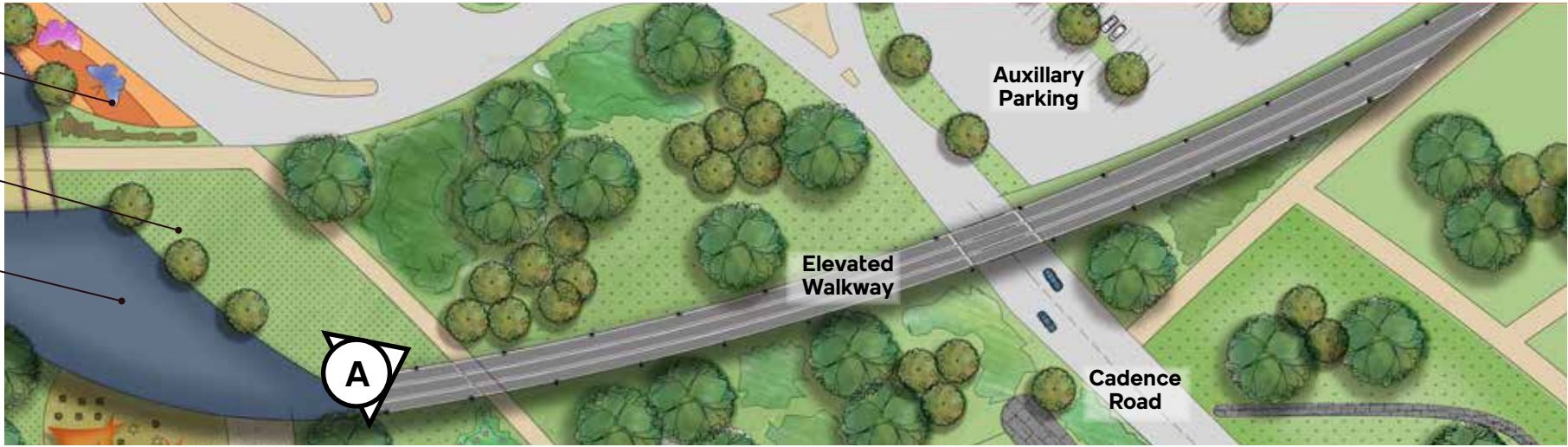
Butterfly trail mosaic detail



Key Map

7 EXTERNAL CONNECTION - ELEVATED WALKWAY

- Entry Paving
- Lawn
- Cafe & Indoor Displays

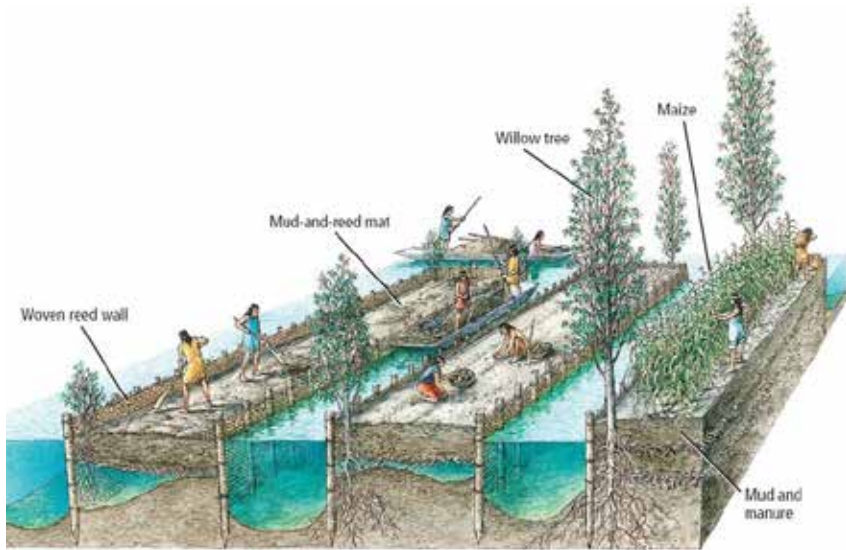


View of suspended walkway crossing over garden pathway.

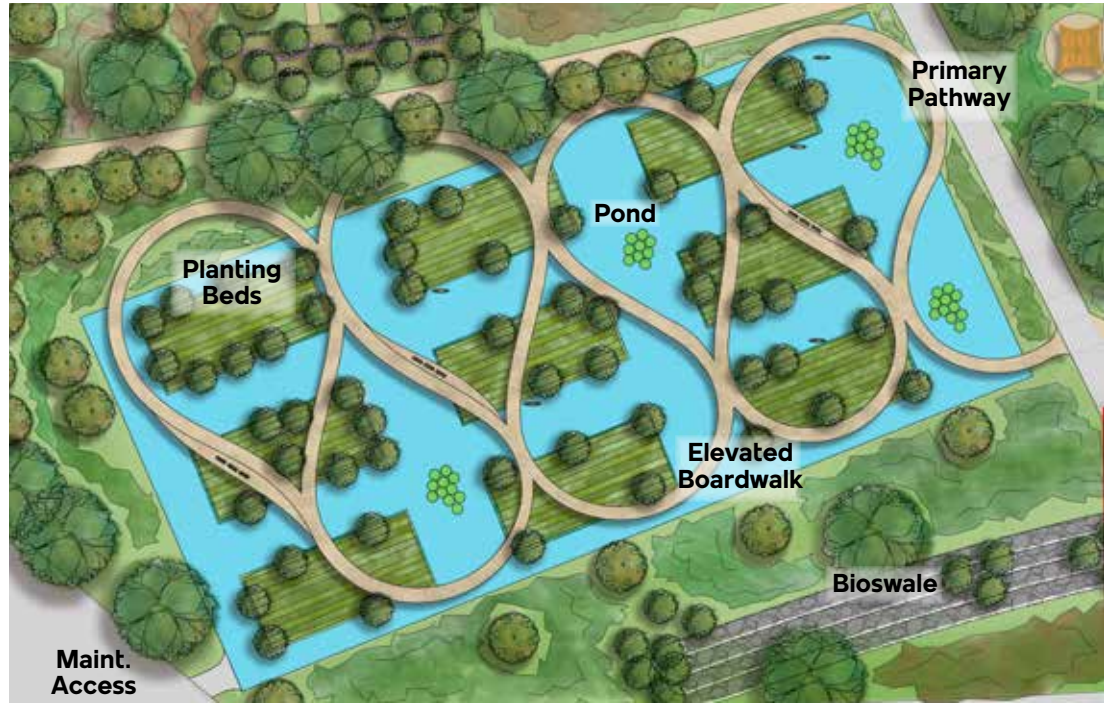
An elegant elevated walkway provides a different vantage point of the garden and a safe crossing over Cadence Road, seamlessly connecting both quadrants of the garden.

The crossing over Cadence Road also provides a significant branding opportunity.

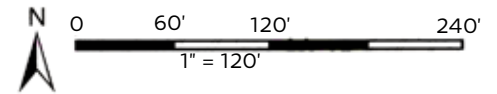
8 ENLARGEMENT - MESO-AMERICAN GARDEN



Chinampas or Aztec floating islands are a pre-colonial agricultural technique for farming in the shallow lakes near Mexico City.



Within the stakes and reed walls, mud, manure, and leaves are piled up to create arable islands.



Serpents represent renewal and transformation.



Key Map

Photo Credits: <https://images.squarespace-cdn.com/content/v1/6047d405b02148755f-b6e601/1629639410568-6ELT82DQKECQ94HIDEPI/WH07p03449.jpg>
https://encrypted-tbn2.gstatic.com/licensed-image?q=tbn:ANd9GcRwyWeoeZwIFVU-VekuBWQG0dGMxeXC9vNgY7vFyflqyeeeK7GO2K_Kam2AVblwLd016zsQmsbjMsfHavx-B1lait53bE-PCyWrEaO08; https://en.wikipedia.org/wiki/Double-headed_serpent

BOTANICAL - MESO-AMERICAN GARDEN



▲
The stately Montezuma cypress, *Taxodium mucronatum*, is well suited for the riparian conditions of chinampas.

Chinampas are fortified by two tree taxa, cypress and willows. Within the fertile planting beds of the floating islands the primary crops historically included: corn, beans, squash, amaranth, tomatoes, chilies, and flowers.



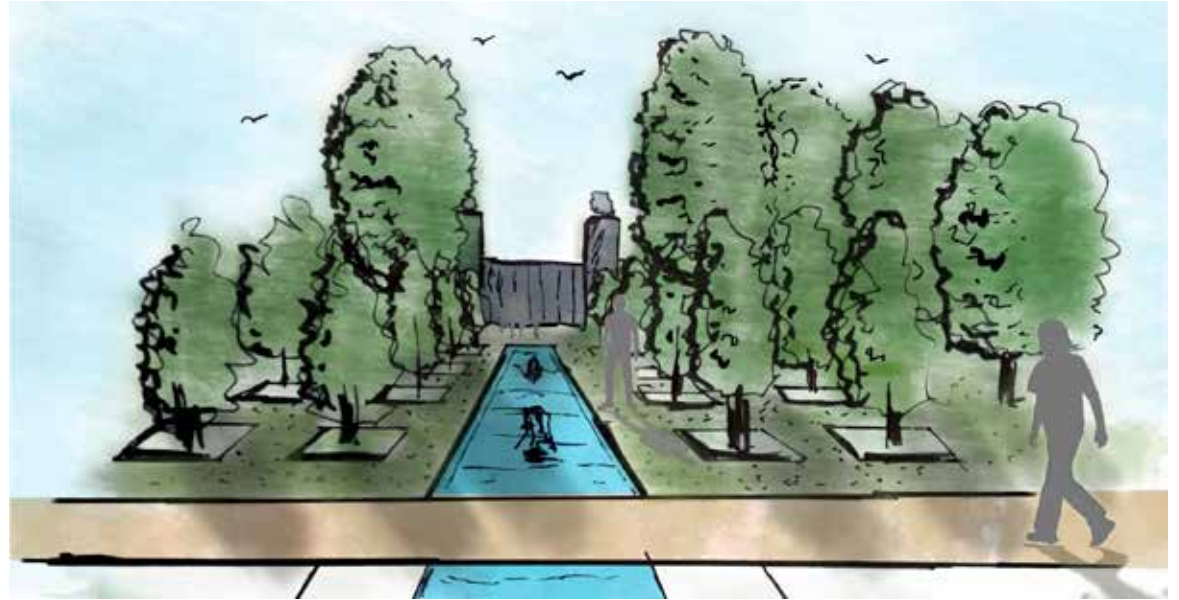
▲
Red willow, *Salix laevigata*, is a species commonly used in Mexico. Other native willow species would also work and build habitat for wildlife

◀
Amaranth (top), was a key crop grown. Today (bottom), modern farmers grow crops like lettuce, cauliflower, kale, and broccoli.

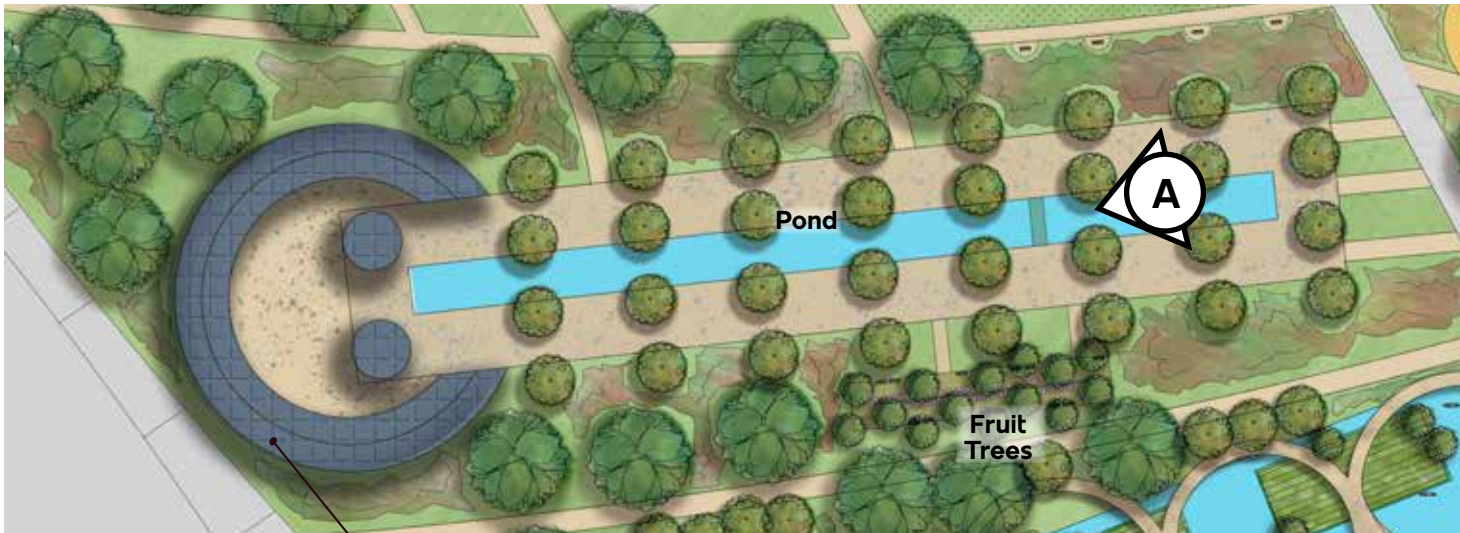
9 ENLARGEMENT - PERSIAN GARDEN



Goftogu Garden- Tehran, Iran

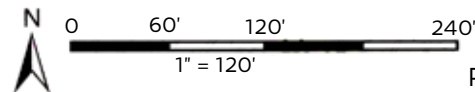


View A with central, linear water feature.



Key Map

Focal Architectural Feature



9 BOTANICAL - PERSIAN GARDEN

Persian gardens are dominated by trees and have few shrubs. Seasonal flowers may be included in pots in the garden. Some species in Persian gardens are already widely represented in California gardens.



▲
Mediterranean cypress, *Cupressus sempervirens*, is the tree of choice. The Cypress of Abarkuh shown here is over 4,000 years old.



▶ Many gardens also include fruit trees, a small area is included in the Southern part of the Persian garden. N.T.S.



▲
Mondell pines, *Pinus eldarica*, are a typical species planted in Iran and a water-wise selection for California.

◀ *Platanus orientalis* is quite similar to other plane trees found in California and European gardens. It can be grown natural form or pollarded.



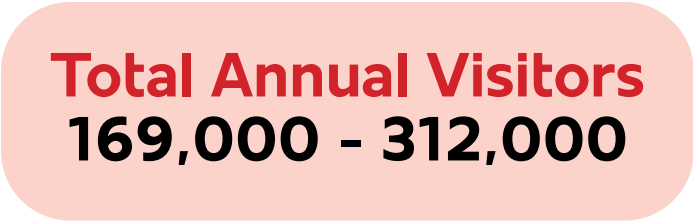
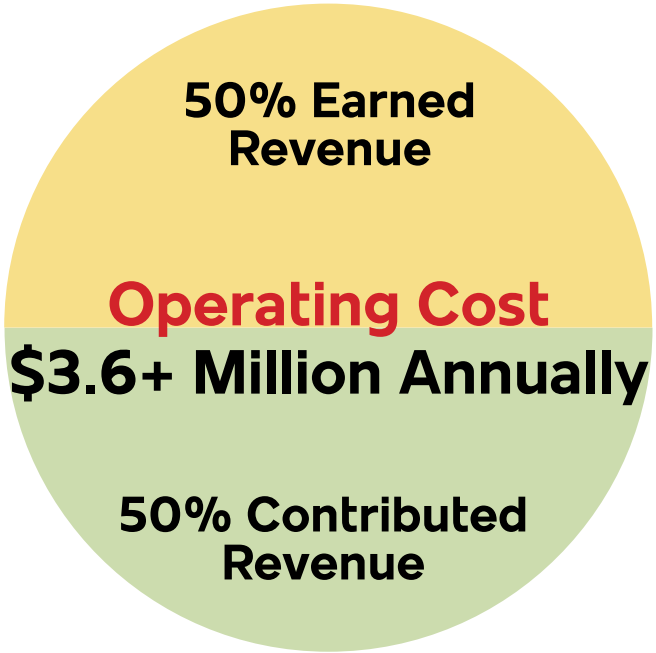
Photo Credits: Platanus - <https://selectree.calpoly.edu/tree-detail/1105>
 Cypress - https://en.wikipedia.org/wiki/Cupressus_sempervirens#/media/File:Cypress_of_Abarqu.JPG
 Pine- <https://selectree.calpoly.edu/tree-detail/1046>

BOTANICAL GARDEN MARKET ANALYSIS - KEY FINDINGS

In 2017 the City of Irvine contracted consulting firm AECOM to complete a preliminary market analysis, they estimated:



+



- Special Assessment Area/Bonds
- Existing Mello-Roos Taxes
- Donations/Grants
- State/Federal Funding

BOTANICAL GARDEN MARKET ANALYSIS

In **2017** the City of Irvine contracted the consulting firm, AECOM to perform a preliminary market analysis of a botanical garden in the Great Park. AECOM identified a number of key findings in their study, including:

1. Botanical gardens

- Successful cultural attractions attracting hundreds of thousands of visitors
- Provide event spaces and community programming
- Typically operated by a non-profit, but requires a subsidy because earned revenue doesn't usually cover the full cost of operations
- It takes time for the plantings to develop and the attraction to reach its full potential

2. Attendance

- Many things affect attendance including the quality of the attraction, size, proximity, local market, etc.
- AECOM estimated a **60 acre** garden at the Great Park may reach **169,000 to 312,000 annual visitors**. AECOM reached this number after researching both resident and tourist markets.
- Risks include competition with theme parks and beaches for leisure time

3. Operating Model

- Typically operated as either a non-profit or governmental entity
- Earned revenue (ticket sales, memberships, food and beverage, etc.) provides part of operations expenses
- Contributed revenue (donations, grants, subsidies) needs to provide the balance of operations expenses
- Capital costs to develop the garden and debt service from initial construction are in addition to earned and contributed revenue for ongoing operations

4. Finances

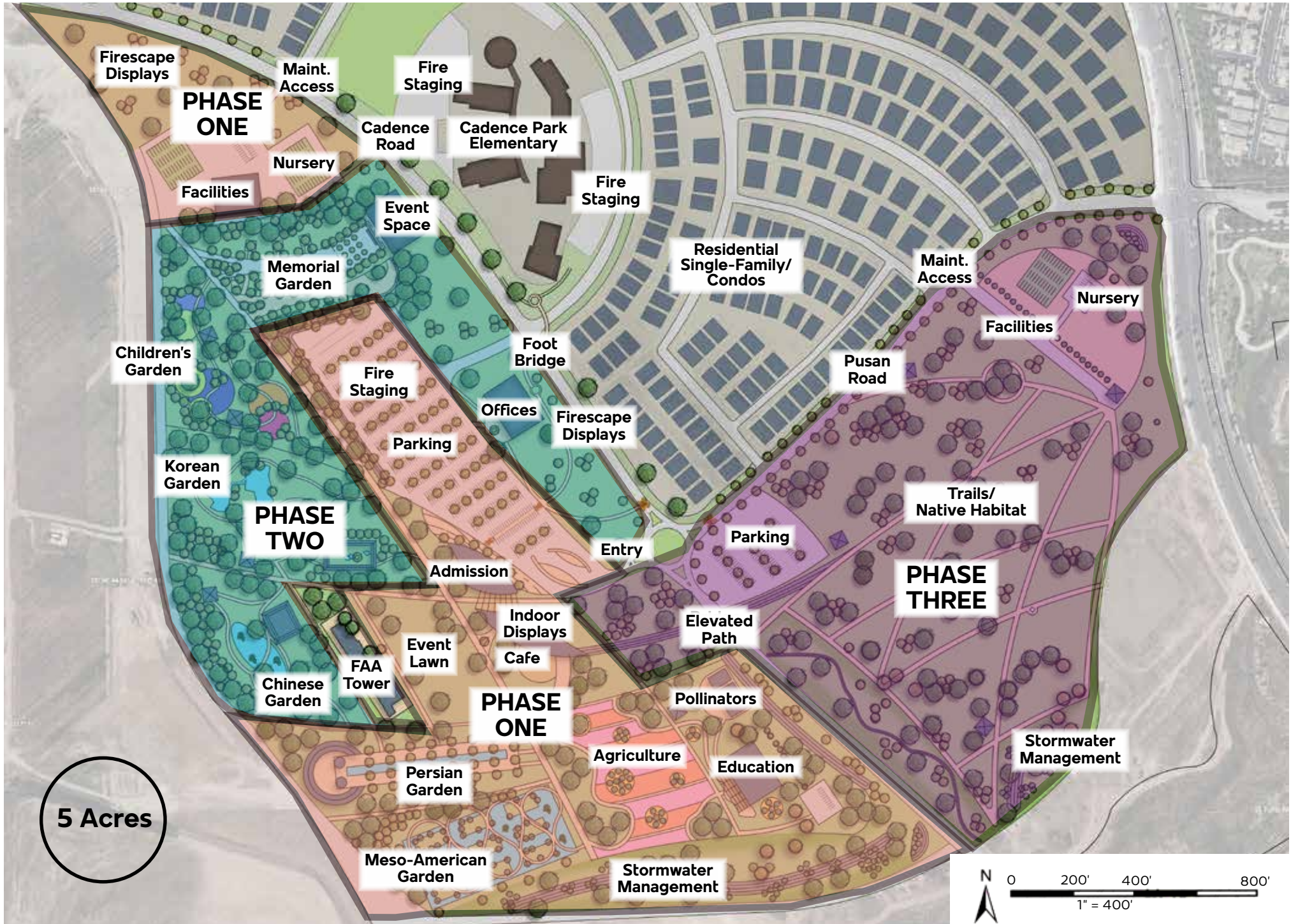
- AECOM estimated a **60 acre** botanical garden may cost **\$3.6 million to operate garden areas***
- Earned revenue through admissions, programs, site rentals, and retail may cover 50 percent of operations
- \$1.8 million* of contributed revenue (donations, grants, subsidies) would be required
- **Natural park areas will require additional expenses to manage** and vary depending on the infrastructure and amenities

5. Development

- Development cost of a **60 acre botanical garden could exceed \$55 million***
- A **120-acre natural park area may cost \$60 million***, with many variables affecting cost

***Based on 2017 dollars, costs would be higher today

POTENTIAL FUNDABLE PHASES



CONCLUSION - GOALS ACHIEVED

Goal 1:

Provide space for education

- 18,000 S.F. Education Center
- 7,000 S.F. Research and Learning Greenhouses

Goal 2:

Sustainable and regenerative practices

- 1,122 Large Trees = 27 metric tons of carbon captured per year*
 - Preserved for reuse, 15 of 43 acres of hardscape (35%); the balance in pathways and topography in the new habitat area
 - 1.3 acres of hardscape repurposed in swales and 0.5 acres in gabion barriers
- *Arbor Day Foundation

Goal 3:

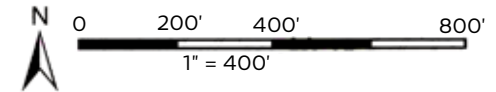
Create new habitat

- Over 34 acres of new native CA habitat with trails and amenities

Goal 4:

Attract residents and tourists

- Four cultural gardens
- 18,000 S.F. Indoor Event Area
- 2.3 Acre Outdoor Event Area



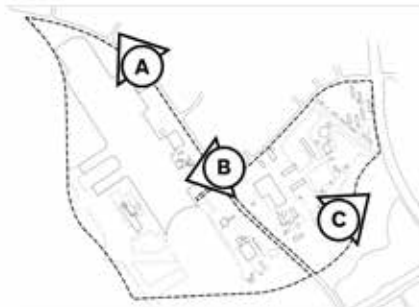
A public garden is a landscape architecture solution to mitigate the disturbances presented by the El Toro military site.

GREAT PARK BOTANICAL GARDEN MASTER PLAN

This **redevelopment project** transforms a post-military site into a vibrant **botanical garden** within Irvine's Great Park through the creation of a long-range master plan guiding future design and development.



REGIONAL MAP



KEY MAP - SITE PHOTOS



A. Residential edge condition, northern edge



Context Diagram
Imagery: Google Earth 2022

Legend	
	Area of enlargement
	Great Park - City of Irvine
	Future residential
	Residential
	Future development
	Retail
	Industrial/Commercial
	Preserved land

PROJECT GOALS AND OBJECTIVES

- 1 Provide space for education**

Objective 1A: Create a space that will serve as a hub for education on **conservation, sustainability, and regenerative practices.**

Objective 1B: Provide **agricultural history and botanical education.**
- 2 Utilize sustainable and regenerative practices**

Objective 2A: **Re-purpose buildings and materials** from the air station.

Objective 2B: Incorporate **climate-adapted species, carbon sequestration, stormwater capture** and mitigate heat islands.
- 3 Create new habitat**

Objective 3A: Create habitat through **plant selection and site design** to augment the nearby chaparral areas.

Objective 3B: Provide space for **user experiences and engagement** in natural habitats.
- 4 Attract residents and tourists**

Objective 4A: Provide unique **botanical experiences** for the local community and broader region.

Objective 4B: Provide experiences and spaces fostering multi-generational interactions and **benefits for all ages and abilities.**



B

GREAT PARK BOTANICAL GARDEN | ETHAN FISHER | UCLA CAPSTONE STUDIO 2022

BOARDS

GREAT PARK BOTANICAL GARDEN MASTER PLAN



GREAT PARK BOTANICAL GARDEN | ETHAN FISHER | UCLA CAPSTONE STUDIO 2022

BOARDS

ENLARGEMENTS AND SKETCHES



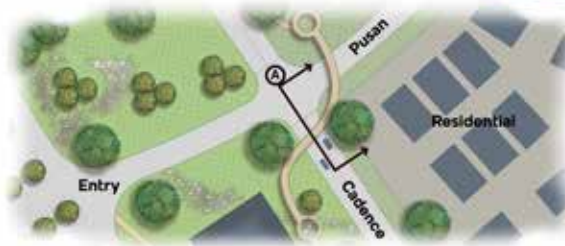
Entry building elevation



View of primary path in garden



Section Elevation A of pedestrian foot bridge across Pusan and Cadence Roads (above/below)



Persian Garden

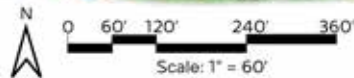


Enlargements Key Map

An elegant elevated walkway provides a different vantage point of the garden and a safe crossing over Cadence Road, seamlessly connecting both quadrants of the garden. ▶



View of elevated path



The agriculture zone presents an opportunity to engage visitors in the immersive experience of a flower field or pumpkin patch. Circular areas may highlight avocados and citrus, a nod to the history of the region. Cultural gardens in the southwestern quadrant tell the story of diversity in the City of Irvine. Meso-American agricultural techniques of floating island chinampas are not represented in any Southern Californian garden.



Shade Sails



Butterfly Trail



Avocado Node



Learning Tree Education Building

ACKNOWLEDGMENTS

This capstone project represents the culmination of nearly six years in the UCLA Extension Landscape Architecture Program. It wouldn't have been possible without the countless hours invested by the dedicated team of instructors, guest critics, and UCLA staff. I hope to return as much in the future as has been provided to me.

Meg, Jim, and Stephanie pushed, supported, and championed as they guided us through the capstone process, for that, thank you! Thank you to the City of Santa Ana for providing part of the tuition cost of the UCLA program.

A thank you to my friends, family, and the multiple cohorts I participated with for their support. Lastly, a special thanks to Chan, Zooey, and Skye for living with my drafting table taking over the dining room table for several years.



Inspirational Image - Sherman Library and Gardens, Corona Del Mar, CA

Photo Credit: E. Fisher

REFERENCES

Books:

- University of Arkansas, Fayetteville. Community Design Center. *Low Impact Development: A Design Manual For Urban Areas*. University of Arkansas Press. 2010
- Rainer, Thomas, and Claudia West. *Planting in a post-wild world: designing plant communities for resilient landscapes*. Timber Press. 2015
- Weaner, Larry, and Christopher Thomas. *Garden Revolution: How Our Landscapes Can Be a Source of Environmental Change*. Timber Press. 2016
- Danks, Sharon. *Asphalt to Ecosystems: Design Ideas for Schoolyard Transformation*. New Village Press. 2010
- Rakow, Donald, et. al. *Public Garden Management: A Complete Guide to the Planning and Administration of Botanical Gardens and Arboreta*. Wiley. 2011
- Kennen, Kate, and Niall Kirkwood. *Phyto: Principles and Resources for Site Remediation and Landscape Design*. Routledge. 2015

Reports:

- Great Park DESIGN STUDIO. *Comprehensive Master Plan "A Vision For The Great Park of The 21st Century."* The City of Irvine. 2007
- Department of the Navy. *Site 24 Groundwater Cleanup Installation Restoration Program Former Marine Corps Air Station, El Toro*. Department of the Navy. 2005
- AECOM. *Orange County Great Park Botanical Garden Preliminary Market Analysis Final Report*. The City of Irvine. 2017
- Simon Wong Engineering. *Public Outreach Surveys Orange County Great Park Results Final Report: 2016-2017*. The City of Irvine. 2017

Internet Links:

- City of Irvine Great Park Master Plan Maps. <https://www.cityofirvine.org/orange-county-great-park/park-development>
- APGA Climate Sustainability Workbook. <https://www.publicgardens.org/sustainability-index/attributes/resources-climate-adaptation-risk-management>
- U.S. Census Bureau. American Community Survey 5-year estimates. Retrieved from Census Reporter Profile page for Los Angeles-Long Beach-Anaheim, CA Metro Area <<http://censusreporter.org/profiles/31000US31080-los-angeles-long-beach-anaheim-ca-metro-area/>>
- City of Irvine. City of Irvine Census Data. Retrieved from City of Irvine Demographics page for local data <<https://www.cityofirvine.org/about-irvine/demographics>>
- Proposed Veteran's Cemetery. Retrieved from website <<https://buildtheveteranscemetery.org/>>
- Ventura Botanical Garden. Retrieved from website <<https://venturabotanicalgardens.com/>>
- Ballast Point Park. Retrieved from Landscape Performance page on Ballast Point Park <<https://www.landscapeperformance.org/case-study-briefs/ballast-point>>
- Chicago Botanic Garden. Retrieved from Landscape Performance page on Chicago Botanic Garden <<https://www.landscapeperformance.org/case-study-briefs/regenstein-learning-campus>>
- San Diego State University Healing Garden. Retrieved from News Center website <https://newscenter.sdsu.edu/sdsu_newscenter/news_story.aspx?sid=77855>
- In Mexico City, Aztec-Era Floating Gardens Offer a Path to Sustainable Eating <<https://www.cntraveler.com/story/in-mexico-city-aztec-era-floating-gardens-offer-a-path-to-sustainable-eating>>
- The Walled Garden. <<https://www.untermerygardens.org/walled-garden.html>>

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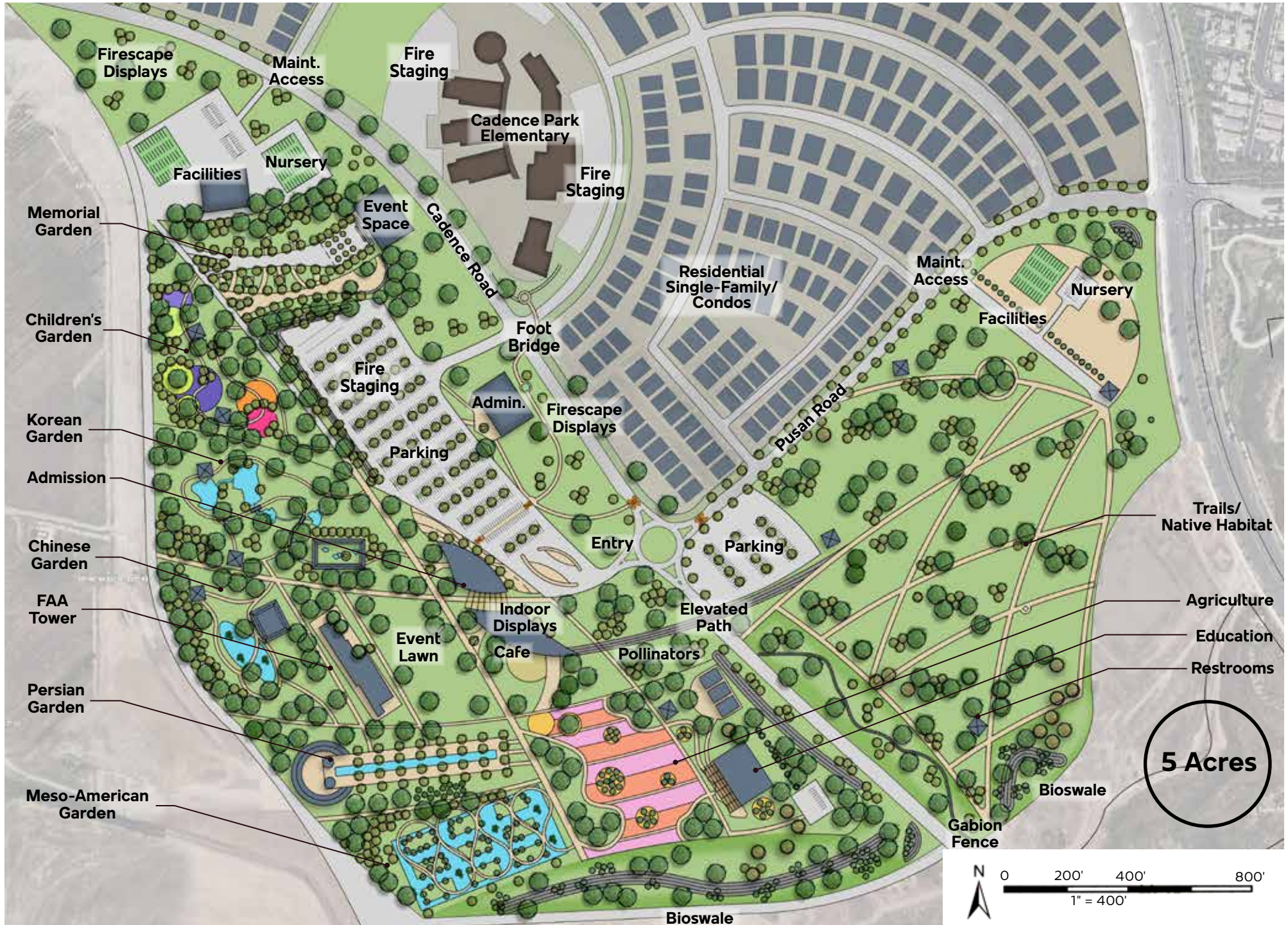
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Fire Staging

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Cadence Road

Memorial Garden

Children's Garden

Korean Garden

Admission

Chinese Garden

FAA Tower

Persian Garden

Meso-American Garden

Fire Staging

Parking

Admin.

Firescape Displays

Entry

Parking

Event Lawn

Indoor Displays

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Pollinators

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Pusan Road

Residential Single-Family/Condos

Maint. Access

Nursery

Facilities

Trails/
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Agriculture

Education

Restrooms

Bioswale

Gabion Fence

Bioswale