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Fairview Park

Master Plan Update DRAFT 2025-09-29

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"The site could be planned as the City's premier park, to include a wide diversity of recreational opportunities encompassing natural passive park land. The Master Plan for this site must address the distinctive character of the location and its adjacencies providing a park with unique citywide significance. The Santa Ana River, Talbert Nature Preserve, and the bordering school properties all should influence the park design and layout. In addition, the park contains important cultural and natural features which should be planned for future protection."

City of Costa Mesa Parks, Recreation, and Open space Master Plan,
January 1996

Facing page photo by City of Costa Mesa.

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* www.costamesaca.gov/fvpmp

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Contents

01 Introduction

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Executive Summary

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The Fairview Park Master Plan Update has attracted enthusiasm for the task of refining the master plan document to reflect current conditions and concepts for restoring and preserving the park as an environmental resource for study, interpretation, and education as well as passive recreation and a range of compatible public uses. These include walking and jogging trails, picnicking, wildlife viewing and nature exploration, unique hobbyist activities and other low-impact activities that connect community residents to the natural environment. Balancing resource protection and public use, which reflects the vested interests of the community and the City, is the essential purpose of this plan update. The Master Plan plays an important part in telling the greater story of this 208-acre parkland and conservation area. Fairview Park is a beloved cultural and natural resource asset for the community of Costa Mesa and the region and residents are deeply invested in preserving the region's natural and cultural resources and ensuring future generations have the same opportunity to enjoy this beloved and unique place.

Additionally, the Master Plan Update builds upon the success of the original plan and updates, but importantly maintains the momentum generated by recent initiatives to establish a more robust set of strategies to facilitate the continuing improvement of Fairview Park. By incorporating the information presented in this report, the Fairview Park Master Plan Update can effectively address the critical need for a Long-Term Management Plan that safeguards cultural resources and conserves biological resources, including the essential vernal pool habitat. This report serves as a valuable tool for informed decision-making and planning to ensure the future preservation and enhancement of Fairview Park's unique ecological features and cultural significance.



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Photo by Robert A. Hamilton

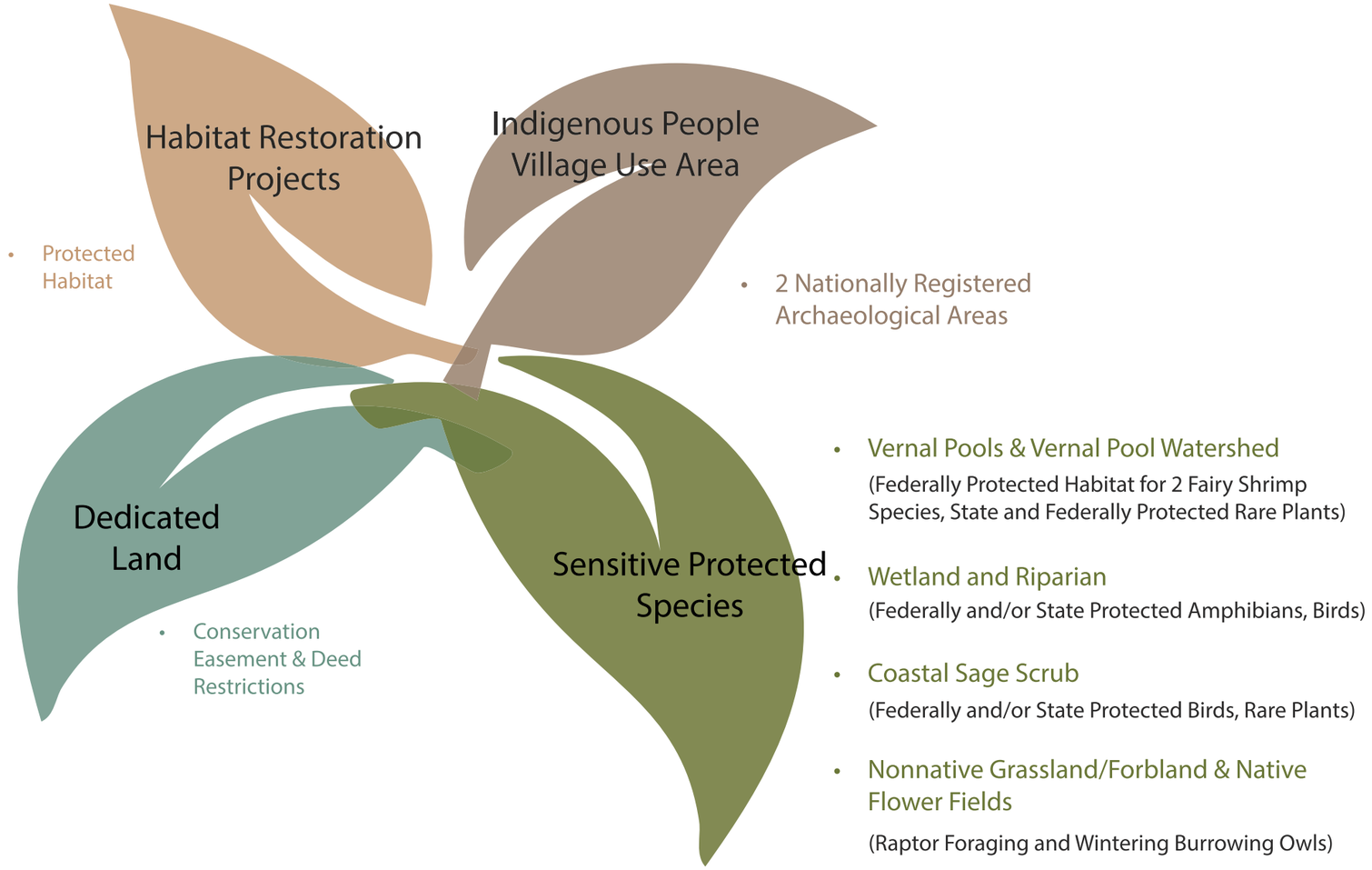
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Critical Themes and Initiatives

- **Findings from the technical investigations serve as a valuable tool for informed decision-making** and planning to ensure the future preservation and enhancement of Fairview Park's unique ecological features and cultural significance.

- **Fairview Park supports a remarkable array of special-status plant and wildlife species**, several of which are listed as threatened or endangered by state and/or federal governments. The park's combination of riparian habitats, coastal scrub, grasslands, and vernal pools is unique in Orange County, and rare anywhere in Southern California. Fairview Park is a regionally significant biodiversity hotspot, supporting 197 plant species—including 10 rare species—18 vegetation alliances, and critical habitat for protected wildlife such as Least Bell's Vireo, Coastal California Gnatcatcher, Burrowing Owl, and Crotch's Bumblebee. Its federally protected vernal pools sustain San Diego and Riverside fairy shrimp and eight rare vernal pool plants, while over 220 bird species and 20 butterfly species underscore its importance as a vital wildlife corridor in Southern California.

- **Fairview Park provides an exceptional level of public access,** featuring approximately 6.5 miles of trails the park has one of the highest trail densities in the region. This allows residents and visitors to enjoy passive recreational activities while experiencing diverse habitats and biological resources, a level of public access rarely permitted in other regional natural open spaces with comparable ecological and cultural significance.



BIODIVERSITY HOTSPOT

197 Plant Species

10 Rare Plant Species

20 Butterfly Species

220 Species of Birds

18 Vegetation Community Alliances

Wildlife Corridor

Habitat for Protected Species, including **Least Bell's Vireo, Coastal California Gnatcatcher, & Crotch's Bumblebee**

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VERNAL POOL

8 Special Status Vernal Pool Plants

Federally Protected Vernal Pool Habitat for **San Diego and Riverside Fairy Shrimp**



Least Bell's Vireo



Coastal California Gnatcatcher



Crotch's Bumblebee

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- **Threats to sensitive biological and cultural resources in Fairview Park come from human actions that destroy, degrade, and fragment the park's natural communities and erode protective soil cover.** These threats should be mitigated with a combination of education, management and physical protection measures and actions.

- **Regulatory Protections and Resource Management:** Fairview Park's biological, cultural, and paleontological resources are protected under a comprehensive regulatory framework at federal, state, and local levels, including the National Historic Preservation Act, National and California Registers of Historic Places, National Environmental Policy Act (NEPA), California's Environmental Quality Act (CEQA), and Tribal Cultural Resource provisions. These laws require that projects consider, avoid, or mitigate impacts to significant ecological, historical, and cultural resources. Additionally, local regulations such as Measure AA ensure that major changes to the park's facilities and infrastructure receive community oversight, reinforcing the protection of sensitive natural and cultural areas.

- **Prevent further damage to cultural resources through site management.** Erosion, unauthorized trails, vegetation clearing, pedestrian and bicycle activity are degrading sensitive areas. Stabilization should be achieved through revegetation with no-till methods, signage, barriers, and raised walkways to protect sediments and prevent trail proliferation.

- **Honor Tribal stewardship and ensure respectful handling of cultural materials.** Any Native American cultural materials encountered will remain on-site for reburial in locations kept confidential, in accordance with law and Tribal consultation. Ongoing collaboration with Tribal representatives will guide all management actions to ensure cultural integrity.

Key Findings from Community Engagement:

- **Strong Support for Conservation and Education:** Community members, and representatives from local Native American Tribes, emphasized the importance of protecting Fairview Park's sensitive biological and cultural resources while balancing public access and enhancing opportunities for education. There was broad consensus on interpretive



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signage, a central educational area, and guided or self-guided learning experiences focused on Tribal cultural history, ecology, archaeology, and biological resources.

- **Trail Management and Public Access:** Participants supported consolidating and maintaining well-defined trails including elevated walkways in vernal pool areas, while limiting off-trail use, motorized vehicles, and e-bikes. Fencing, natural barriers, and clear signage were encouraged to protect sensitive habitats while maintaining passive public access.

- **Resource Protection Measures:** The community supports science-based habitat restoration and enhancement strategies presented in the Master Plan Update, including natural weed abatement and minimal herbicide use, along with maintaining views and access for educational purposes. There was strong support for protecting vernal pools, sensitive flora and fauna, and cultural sites throughout the park.

- **Enhanced Park Operations and Amenities:** Feedback highlighted the need for increased ranger presence, ADA-accessible furnishings, additional dog waste receptacles, and improved trail and overlook access. The community endorsed the addition of a consolidated growing space on the east side of the park.

- **Conflicting Opinions on Recreational Activities:** While some stakeholders desired continued use of BMX trails, dirt bike mounds, and glider/model aircraft activities, others expressed concern over their impacts on biological and cultural resources. These conflicting viewpoints indicate the need for careful balancing of recreational activities with conservation priorities in the Master Plan Update and application of regulatory requirements.

Recommendations

- **Recognize and protect Fairview Park as a unified Tribal cultural landscape.** As the entire site has extremely high sensitivity for buried Native American origin cultural resources (not just recorded locations), additional signage and physical barriers to prevent the use of existing user-defined trails and new trails is recommended. All ground-disturbing activities must involve qualified cultural resource specialists and Tribal monitors, with an Archaeological Treatment Plan prepared in consultation with Tribes.

- **Prevent further damage to cultural resources through site management.** Erosion, unauthorized trails, vegetation clearing, pedestrian and bicycle activity are degrading sensitive areas. Stabilization should be achieved through revegetation with no-till methods, signage, barriers, and raised walkways to protect sediments and prevent trail proliferation.

- **Honor Tribal stewardship and ensure respectful handling of cultural materials.** Any Native American cultural materials encountered will remain on-site for reburial in locations kept confidential, in accordance with law and Tribal consultation. Ongoing collaboration with Tribal representatives will guide all management actions to ensure cultural integrity.

- **Prevent Resource Degradation.** Reduce erosion, unauthorized trails, and impacts from pedestrian, bicycle, and off-trail activity through targeted revegetation, no-till stabilization methods, signage, fencing, barriers, and raised walkways. Protect archaeological sites from unauthorized collection or disturbance while maintaining public access where appropriate.

- **Restore and Enhance Habitat.** Implement 80 acres of habitat restoration and 14.5 acres of habitat enhancement to support native plants and wildlife, remove artificial fill where feasible, and improve ecological health and biodiversity over the long term.

- **Define and Manage Trails:** Establish a clearly defined trail system that restores eroded or user-created paths, uses natural materials for trail delineation, and incorporates physical measures to prevent the creation of new informal trails, particularly in sensitive biological and cultural areas.

- **Enhance Public Amenities and Accessibility:** Concentrate park enhancements—including nature play, outdoor educational spaces, benches, picnic areas, and accessible trails—within existing developed areas such as the central lawn and east side of the park, minimizing impacts on sensitive habitats.

- **Manage Recreational Impacts:** Coordinate with organized user groups (i.e. model gliders and trains) to allow the continuation of designated uses while mitigating potential environmental impacts. In accordance with Resource Agency recommendations, relocate the model glider flying field with the goal of reducing ongoing impacts to sensitive biological resources.

Goals & Objectives

The following goals and objectives were defined in the consultant's scope of work, and were adopted during the City Council meeting of January 17, 2023 when the contract was approved by the City Council.

01 Protect, preserve, and enhance the unique natural and cultural resources of Fairview Park.

02 To restore and enhance the park as an environmental resource, and provide interpretive opportunities to educate users of the park's unique ecology, cultural history, and resources.

03 To manage the park as a passive recreational opportunity.

04 To engage stakeholders, users, and the community at large in developing a blueprint to manage the park, which accounts for passive use recreation, environmental restoration and preservation, and funding considerations for years to come.

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The Master Plan Process

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The Master Plan Update process recognizes the interdependence of meaningful stakeholder engagement, biological investigations, environmental documentation, and public use of the park. MIG staff has provided park planning, engagement, biological and environmental analysis and documentation. Land IQ has provided biological resource and restoration ecology services in collaboration with Hamilton Biological, who conducted several field investigations and provided an avian inventory and vegetation survey. Cogstone Resource Management Group led the Tribal Advisory Group, archeology, paleontology, and Tribal cultural resource services.

The project included the following tasks:

- Review of existing documentation
- Community outreach
- Resource assessment and analysis of existing conditions
- Update findings and recommendations
- Environmental compliance documentation

The project kicked off with the compilation and review of relevant project documents including the following: planning documents; existing biological surveys and observations; environmental documentation; relevant codes, regulations, and legal documents; and existing historical and cultural documents and reports. The MIG Team prepared a memo report summarizing the findings.

Community Outreach

Additionally, a Community Outreach Plan was developed, reviewed, and approved by City staff. General direction to the consultant team has been given by the general public in open meetings, and at city and community events such as Fairview Park Habitat Restoration Days and Earth Day 2024.

Below is a summary of community and stakeholder meetings conducted:

Fairview Park Steering Committee Meeting 1 (June 14, 2023) – The MIG Team presented an overview of the project scope, schedule, background documents, existing conditions, potential approaches and strategies for restoration and habitat enhancement. There was a facilitated discussion with the purpose of gaining an understanding of the committee members' vision for Fairview Park regarding elements for consideration in the Master Plan Update including lessons learned from previous restoration efforts.

Community Workshop 1 (August 31, 2023) – The MIG Team presented an overview of the project purpose, process, schedule, and background. Initial observations about existing site conditions and opportunities and constraints were presented. Small group discussions were conducted and were the primary method to capture community feedback to inform the Master Plan Update.

Fairview Park Steering Committee Meeting 2 (October 11, 2023) – The MIG Team presented findings from field investigations of biological resources, habitat restoration and enhancement opportunities. Public comment on items presented was provided.

Tribal Advisory Group (TAG) Site Visit (October 18, 2023) - The City and members of the MIG Team conducted a site visit so that representatives of local Native American Tribes can better understand project elements and potential impacts on sensitive cultural areas.



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Tribal Advisory Group (TAG) Meetings – The MIG Team presented an overview of the Master Plan Update to obtain feedback from experts that have a local understanding of the potential impacts on park use and proposed restoration activities, or park improvements on cultural, archaeological and paleontological resources at the park.

Parks and Community Services Commission Meeting (June 27, 2024) - MIG presented progress on the Master Plan Update, an overview of public feedback, and summary of resource assessment findings to inform Commissioners of the progress of the work and present, discuss, and gather feedback about the emerging recommendations for the Fairview Park Master Plan Update.

Fairview Park Steering Committee Meeting 3 (July 10, 2024) – The MIG Team presented 20 recommendations for discussion to determine adoption of proposed recommendations.

Community Workshop 2 (September 4, 2024) – The MIG Team presented an overview of completed studies, resident feedback, selection criteria guiding recommendations and draft recommendations of the Master Plan Update. Interactive open house stations followed the presentation and covered the following: Trails and Public Access, Public Education and Interpretation, Resource Conservation and Preservation, Operations and Maintenance, Site Activities and Uses.

City Council Study Session (January 28, 2025) – The MIG Team presented progress on the Master Plan Update to inform City Council of the progress of the work and present, discuss, and gather feedback about the draft recommendations for the Fairview Park Master Plan Update and review next steps for environmental documents.

To complete resource assessments and analysis of existing conditions, site investigations began in the spring of 2023. A team meeting occurred on March 29, 2023 and biological field investigations began late winter and early spring of 2023 to provide the basis for the biological field surveys. Investigations of site cultural and paleontological resources and analysis of park resources, uses and activities were conducted in the summer of 2023 followed by a final field visit on March 25, 2025 and the final Biological Resources Technical Report dated May 8, 2025. This technical report can be found in Appendix B.

Botanical field investigations were completed by botanist James Bailey on April 28, May 21, and June 8, 2023, to develop a comprehensive list of plants in the park and to search all habitat communities for special-status species potentially present. Each botanical survey lasted seven to eight hours, and covered the western side of the park, focusing on the vernal pools, grasslands, and scrub-covered bluff. The northern riparian lowlands were visited on April 28 and the area east of Placentia Avenue was visited on June 8. Due to the extended rainy season, many plants flowered about a month later than usual during the first half of 2023. The earliest vernal pool indicator species detected was slender woolly-marbles (Psilocarphus brevissimus), and the latest was mud fiddleleaf (Nama stenocarpa). During the more typical year of 2017, James Bailey observed that these two species had reached maturity and produced inflorescences by early March and mid-April respectively. In 2023, however, these milestones were pushed back to mid-April for Psilocarphus and mid-June for Nama. Specifically, late-season showers on May 3, 4, and 5 refilled the vernal pools with nearly 1 inch of water. While early season species had already developed by this time, later season species were stalled by repeated submergence, until the ponds dried again in mid to late May.

Focused surveys in June and July, 2024, for Crotch's Bumble Bee were conducted by Endemic Environmental Services across 16.5 acres of the park planned for habitat restoration. These surveys produced photographic records of 13 Crotch's Bumble Bees utilizing a variety of native and non-native shrubs and forbs. (Endemic Environmental Services. 2024. Crotch's Bumble Bee photo-only survey report for the Fairview Park Mesa Restoration Project located in the City of Costa Mesa, California. Technical report submitted to the California Department of Fish and Wildlife).

Biologist Robert Hamilton conducted wildlife investigations on nine dates between February 10 and June 8, as summarized in Table A, below.

Table A: Wildlife Survey Summary

Date	Times	Temps (ºF)	Sky Conditions	Wind (mph)
2/10/23	1615–1700	66	80% overcast	2–3
3/28/23	1330–1730	58–59	50% overcast	3–5
3/31/23	1520–1700	62	90% overcast	4–8
4/7/23	1530–1700	64	20% overcast	4–6
4/14/23	1555–1645	63–61	40–80% overcast	2–5
4/28/23	0805–1205	57–65	100% overcast	1–4
5/19/23	1530–1655	64	100% overcast	3–5
5/28/23	0700–10:20	59–63	100% overcast	1–3
6/8/23	0905–1115	65	60% overcast to hazy	1–6

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The purpose of the wildlife visits in 2023 was to collect current information on the distribution of plant and wildlife species across Fairview Park. Nearly all of the survey effort was expended west of Placentia Avenue, with an emphasis on attempting to detect (a) special-status species potentially present, and (b) species detectable only when the vernal pools have water (as they did during and after the exceptionally wet rainy season of 2022/2023).

MIG staff conducted a reconnaissance-level field visit in 2023 to prepare a current GIS-based map of vernal pools, wetlands, and other features that fall within the jurisdiction of the U.S. Army Corps of Engineers and areas within Fairview Park, but outside of existing wetland mitigation sites.

The project archaeologist requested a search of the California Historical Resources Information System (CHRIS) from the South Central Coastal Information Center (SCCIC), which included the entirety of Fairview Park. Results of the record search indicate that 17 previous studies have been completed within the Park; seven of these postdate the 2002 Fairview Park Master Plan. Additionally, the project archaeologist requested a Sacred Lands File (SLF) search from the Native American Heritage Commission (NAHC) The NAHC responded on December 4, 2023 with a positive search result indicating that a tribal cultural resource is located within the same township, range, and section as the Project Area. The NAHC recommended that the Gabrieleño Band of Mission Indians – Kizh Nation, the Gabrieleño/Tongva San Gabriel Band of Mission Indians, the Juaneño Band of Mission Indians, and the Juaneño Band of Mission Indians Acjachemen Nation – Belardes be contacted for more information and provided a list of nine groups and individuals that may have information about the Project Area. Cogstone sent letters inviting all groups and individuals on the NAHC to engage in Native American tribal consultations under Assembly Bill (AB) 52 and Senate Bill (SB) 18 via United States Postal Service certified mail on October 7, 2024. Cogstone followed up via electronic mail (original consultation letter was attached) message on October 25, 2024 and by telephone call on November 8, 2024. (Appendix D). Cogstone also sent Native American Scoping letters to two individuals representing groups that are not on the NAHC list but may have information about the Project Area, on the same schedule. Cogstone is aware of five responses total.

On October 25, 2024, Juaneño Band of Mission Indians, Belardes Cultural Resources Director Joyce Perry responded via electronic mail indicating that Tribes want to engage in formal consultation on this project, noting, "this project is located in an extremely sensitive area to our tribe." Fairview Park is located on the sacred village site and known burial area of Genga. This place is also identified as the archaeological site CA-ORA-58, which is listed on the National Register of Historic Places.

On April 3, 2024, Cogstone archaeologists Pamela Gutierrez and Alyssa Polito conducted a field survey of the boundaries of the previously documented cultural resources P-30-000058 and P-30-000506 to assess damage to the resources caused by runoff, unauthorized "social" walking trails, vegetation clearing, etc. Ms. Gutierrez and Ms. Polito conducted the survey in 10-meter transects and by following the narrow, cleared paths along the park and site boundaries. Cogstone archaeologist Sandy Duarte







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returned to the park to complete the damage assessment survey on April 19, 2024 and was able to identify and quantify additional areas of disturbance to the cultural resources.

MIG staff has visited the site nine times to document and evaluate existing site uses and facilities. These visits occurred in a variety of seasons to observe and analyze site conditions during both wet and dry weather. Additionally, MIG staff visited the site during typical and high-use days to observe site usage patterns during events including OCME Free Train Ride Days. MIG recorded this data and developed an inventory of GIS based assets management inventory.

Together, these field investigations and mapping tasks informed the development and delivery of a Biological Resources Technical Report, a 2023 Vegetation Map and Habitat Restoration Opportunities Report and a Cultural, Tribal Cultural, and Paleontological Resources Assessment.

To complete the Master Plan Update findings and recommendations, the MIG Team evaluated the park's diverse resources and assets. Along with City staff, the team developed planning-level preliminary recommendations in accordance with findings and community input. Twenty-four recommendations were developed, presented to and approved by the Fairview Park Steering Committee. Recommendations were grouped by topic areas including trails and public access, public education and interpretation, resource conservation and preservation, operations and maintenance, and site activities and uses. The MIG Team developed plans, graphics and exhibits to illustrate the recommendations, which were presented during the outreach process. These findings and recommendations have been summarized and synthesized into the DRAFT Master Plan Update document. The next steps are to share the DRAFT Master Plan Update for public comment for a 30-day period and to receive and incorporate feedback into a final document.

The DRAFT Master Plan Update will be utilized to initiate the environmental compliance documentation phase of work. Because no specific development projects within the park are detailed in the Master Plan, it was determined that a programmatic Initial Study/Mitigated Negative Declaration (IS/MND) would be suitable for the Master Plan. The environmental impact analysis presented in the Initial Study will focus on those policies and programs in the Master Plan Update that could have a direct or indirect physical impact on the environment. In order for the City to approve the Master Plan Update with an IS/MND, all identified direct and indirect impacts must be mitigated to less than significant levels. The MIG Team will prepare the necessary technical reports to support the Initial Study. These technical reports will identify avoidance measures and Best Management Practices to be applied to each future project developed under the Master Plan to avoid significant environmental impacts, as defined by CEQA.

The MIG Team will prepare an Initial Study based on the City's Environmental Checklist to analyze the Master Plan Update's potential impacts and provide thorough and comprehensive answers to each checklist question including an environmental and regulatory setting discussion, impact discussion, and mitigation measures, as appropriate. The impact analysis will be supported by tables, figures, maps, and graphics, as appropriate. Source information will be referenced

The steps for preparation of the environmental documentation are outlined below:

- Submit draft project description
- Receive city staff feedback on project description
- Revise project description
- Submit admin draft IS/MND
- Receive city staff feedback on admin draft IS/MND
- Submit public review draft IS/MND
- 30-day public review of IS/MND
- Submit draft Response to Comments (RTC), Mitigation Monitoring and Reporting Program (MMRP), Notice of Determination (NOD)
- Receive city/staff feedback on RTC, MMRP, NOD
- Submit final RTC, MMRP, NOD
- Planning commission/City Council hearing
- Agency review meetings
- Prepare permitting flow chart document and narrative

The final deliverables for environmental compliance documentation will be new and updated environmental documents and a regulatory permitting memo.

Outreach Summary

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General direction to the consultant team has been given by the public in open meetings, the Fairview Park Steering Committee, City of Costa Mesa Parks and Community Services Department, and the City of Costa Mesa City Council. Additionally, input from local Native American Tribes has been provided separate from the general public in recognition of their standing as sovereign Nations. Due to the sensitive nature of the information provided, the reports and feedback provided by the Tribal Advisory Group will remain confidential and only shared with the City of Costa Mesa.

Community Workshops

As part of the community outreach strategy, two community workshops were conducted.

Workshop 1: On August 31st, 2023, the first workshop was conducted to introduce the community to the Fairview Park Master Plan and get initial feedback from the community, present initial findings from investigations, and learn from residents about their ideas on improving Fairview Park. Small group discussions were conducted and were the primary method to capture community feedback on items that will inform the Master Plan Update. Approximately 100 community members and park stakeholders turned out to participate in the workshop. Participants discussed six key features of the park including: Trails, Fencing, Signage, Furnishings, Nature Play, and a Museum/Field House. Emerging themes from the workshop regarding park features are summarized below. Full summary memos for each workshop are provided in Appendix A.

Trails: Consensus was generally formed around a desire for well maintained and clearly defined trails along with the removal of excess trails on the mesa to protect biological and cultural resources, while maintaining public access. Additionally, desires to utilize natural materials to define trails and prioritization of enforcement to control the use of motorized vehicles was emphasized. There was disagreement among attendees about the appropriate use of the dirt mounds as some expressed a desire to start allowing use by bikes and others expressed desire to remove the mounds and associated use.

Fencing: Most attendees agreed that fencing should enhance and improve clarity of public use for trails and that natural materials should be incorporated. Consensus around the need for fencing to protect biological and cultural resources was acknowledged.

Signage: Feedback centered around the need for upgraded and modernized signage that serves to increase appreciation of the park and park resources. Topics for signage include cultural, environmental and ecological subjects. All educational signage is to be presented in accessible and multilingual displays.

Furnishings: Community feedback centered around the desire for ADA accessible furniture and the use of natural materials for furnishings. Some respondents expressed a desire for existing park furnishings to remain, however, most respondents expressed desire for upgraded furnishings concentrated in the existing lawn area. Provision for improved and additional trash and dog waste receptacles throughout the park was identified as was the addition of benches and an accessible trail to the bluff overlook.





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Nature Play: Some respondents expressed a desire for nature play opportunities to be incorporated into the Master Plan Update, while others opposed providing facilities for nature play activities at the site. Consensus was formed around the desire to not provide any traditional structured playground and if provided, nature play should be located in the lawn area and coupled with educational features to enhance stewardship and appreciation of park natural resources.

Museum/Field House: Consensus among attendees was formed that a traditional museum was not desired and should be removed from the Master Plan Update. Some expressed desire for a centralized outdoor area to serve the educational and orientation program of a museum/field house. Others expressed enthusiasm for a field house that offered educational opportunities on numerous topics related to the park.

Additional topics addressed related to park use included consensus that E-bike use should be prohibited and is not compatible with and impacts user experiences at the park. There was strong disagreement about the compatibility and continued use of glider activities at the park. The opinion that glider flights impact sensitive areas of the park and should be prohibited was voiced along with the position that glider flights have a history at the park and should continue.

Workshop 2: On September 4, 2024, the second workshop was conducted, and the design team presented the draft Master Plan Update recommendations to participants and gathered public feedback. The presentation included a project progress overview, discussion of the decision-making tree to evaluate recommendations, and an overview of recommendation categories. The five categories explored built on feedback received in Workshop 1 and included: Trails and Public Access, Interpretation and Education, Resource Conservation and Restoration, Operations and Maintenance, Site Activities and Uses.

Participant feedback on draft recommendations is summarized below.

Trails and Public Access:

Consensus was generally formed around the following items:

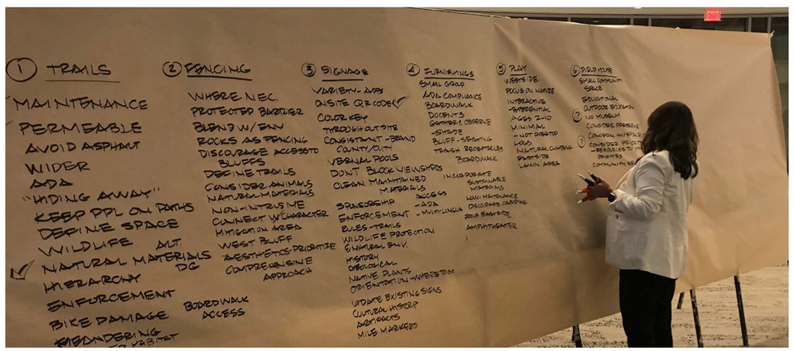
- Retain access to the natural and vernal pool areas on the Mesa for passive recreation and educational purposes. Restore existing boardwalks and protect future trails on the Mesa and through the vernal pools with elevated walkways.
- Limit the use of vehicles on sensitive paths and develop protocols to regulate vehicle access to park trails.
- Regulate electric bike usage across the park.
- Utilize fencing and vegetation as barriers between sensitive habitat and trails.

Education and Interpretation:

Consensus was generally formed around the following items:

- Make signage accessible and multilingual.
- Provide a central interpretive area for education.
- Integrate self-guided educational opportunities through creative interpretive tools.
- Provide education on topics such as archaeology, geology, human/wildlife interaction.







Photos by MIG Inc.

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Resource Conservation and Restoration:

Consensus was generally formed around the following items:

- Protect sensitive cultural and biological areas.
- Utilize natural non-native weed abatement strategies and limit the use of herbicides.
- Sustain and promote a balanced use of the park.

Operations and Maintenance:

Consensus was generally formed around the following items:

- Visitors would like to see an increased presence of park rangers at Fairview Park.
- Visitors understand the need for maintenance and emergency vehicle access to the park. Access protocols should be clear and work to protect sensitive areas.
- Provide more dog waste receptacles and protect sensitive areas from dog access.
- Maintain views within the vernal pool areas for educational purposes.
- Participants had positive feedback about the maintenance and growing space proposal and would like to see this space on the east side of the park.
- Participants find the presence of motorized bikes on sensitive trails and areas concerning. The Master Plan Update should outline specific enforcement and regulation of motorized bikes.

Site Activities and Uses:

Consensus was generally formed around the following items:

- Provide a dedicated educational space at the park.
- Program more guided educational opportunities.

Opposition and conflicting feedback focused primarily on the following items:

- Some attendees expressed the desire for additional active recreational activities at the park and to protect existing activities including BMX riding of the mounds and active sport activities in the lawn area. Others expressed concern that these uses are detrimental to both cultural and biological resources at the park and activities should be relocated to more appropriate park facilities.
- Attendees expressed strong desire to continue model aircraft flying at the park and questioned the validity of the biological resource findings and recommendation that the activity is incompatible with resource protection requirements. Other participants disagreed and expressed support for following the recommendation to remove the use from the park.

Fairview Park Steering Committee Meetings

Three public Steering Committee Meetings were conducted.

Meeting 1: On June 14, 2023, the first meeting was conducted with the purpose of presenting preliminary findings from research and obtain initial feedback from the Fairview Park Steering Committee to gain local and technical understanding of the project's impacts on the local community. The MIG Team presented an overview of the project scope, schedule, background documents, existing conditions, and potential approaches and strategies for restoration and habitat enhancement. There was a facilitated discussion with the purpose of gaining an understanding of the committee members' vision for Fairview Park regarding elements for consideration in the Master Plan Update including lessons learned from previous restoration efforts.

Meeting 2: On November 8, 2023, the second meeting was held with the purpose of presenting, discussing, and gathering feedback on the habitat restoration and enhancement opportunities for the Fairview Park Master Plan Update. The MIG Team presented findings from field investigations of biological resources and habitat restoration and enhancement opportunities. Travis Brooks along with biologist Robert Hamilton provided a presentation that outlined a historical overview of Fairview Park, restoration opportunities, and recommendations. Fairview Park stakeholders were provided an opportunity to ask questions and provide comments and feedback.

Meeting 3: On July 10, 2024, the third meeting was conducted with the purpose of presenting Master Plan Update updates to the committee for member consideration and approval. The MIG Team presented draft recommendations and committee members commented and reviewed. Public comments were also provided and recorded. The approved recommendations are included in Appendix A.

Parks & Community Services Commission Meeting

This meeting was conducted on June 27, 2024 with the purpose of introducing commissioners to the Fairview Park Master Plan Update process and share findings for restoration and recreational opportunities. MIG presented an overview of the Fairview Park Master Plan Update Process including an introduction and purpose of the project, findings from outreach, surveys, paleontological research, and restoration opportunities. Meeting notes for Community Workshops and Steering Committee meetings can be found in Appendix A.

02 Existing Planning Conditions

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The Site & Adjacent Uses

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The Fairview Park site is split into two distinct sections by Placentia Avenue. 155 acres lie to the west of Placentia, and 53 acres to the east.

West of Placentia Avenue

The western border of the western section of Fairview Park is joined by Talbert Regional Park (also referred to as Talbert Nature Preserve). At 180 acres, Talbert Regional Park consists of North Talbert and South Talbert, which is a restored natural habitat with public access trails. The park is owned and managed by the County of Orange, OC Parks. The presence of Talbert Regional Park is a strong influence upon the planning of Fairview Park. An opportunity exists to build upon the existing natural habitat at Talbert Regional Park as a crucial wildlife corridor, connecting to the Santa Ana River system of trails and parks to other open spaces in the region, including Randall Preserve and the Huntington Beach Wetlands. Talbert Regional Park has no parking facilities and is currently entered by trails only. A major access trail to north of Talbert Regional Park exists through Fairview Park along the northwestern bluffs. The County of Orange has expressed interest in a joint parking facility located off Placentia Avenue in the lowlands area with a new trail into Talbert, but this is not recommended in the Master Plan Update.

The bluffs to Swan Drive (Wetland and Riparian Area)

The northwest portion of the site, 45 acres, joins Talbert Regional Park to the west, private residences on Swan Drive to the north, Placentia Avenue to the east, and the park bluff to the south. This section of the site contains important plant species and soil conditions comprising alluvial scrub habitat. Habitat restoration projects have been implemented in northwest portion of the site including 35 acres of created wetlands and native scrub habitat as part of the Fairview Wetlands and Riparian Habitat Project and the Headlands Project Mitigation Area. Fairview Channel is a major storm drain structure which serves a broad area outside of the park boundary. The channel connects to the Greenville-Banning Channel to the west of Talbert Nature Preserve. The Fairview Channel lies approximately fifty feet from the backyards of adjoining residential properties on Swan Drive. The Swan Drive residents strongly oppose the introduction of active public use in close proximity to their backyards. The Placentia Drain, an earthen drainage channel created during agricultural use of the site, cuts diagonally through this area from northeast to southwest. Flows from this portion of the drain generally flow south along the border with North Talbert.

The bluffs area, south to Pacific Avenue (Bluff and Mesa Area)

Approximately 110 acres lie west of Placentia Avenue and are defined by bluffs dropping down into Talbert Regional Park to the west, into the Fairview Park lowlands to the north, and south to the residential community of Pacific Avenue and Canyon Drive. A parking area for 26 cars exists for park use at the north end of Canyon Drive. Waldorf School Orange County and Estancia High School form the remainder of the south border of the western area.

The southeastern portion of this area contains approximately 1.62 acres utilized by the Harbor Soaring Society for flying model aircraft. Model aircraft enthusiasts have been participating in this activity at Fairview Park since the early 1960s. Review of historical aerial imagery shows that the area devoted to the flying field has varied considerably from year to year, but has remained in the southern part of the western mesa. In 2005, a reconfigured fly field (approximately 150-ft by 470-ft) was graded within the existing vernal pool watershed, which the Harbor Soaring Society used with City's permission until the COVID-19 pandemic led to temporary closure of the park in March of 2020. In 2023, the City provisionally re-opened the fly field for use on weekends. Currently, flying is limited to non-powered gliders on the first and third Saturdays of the month.



Photo by MIG, Inc.

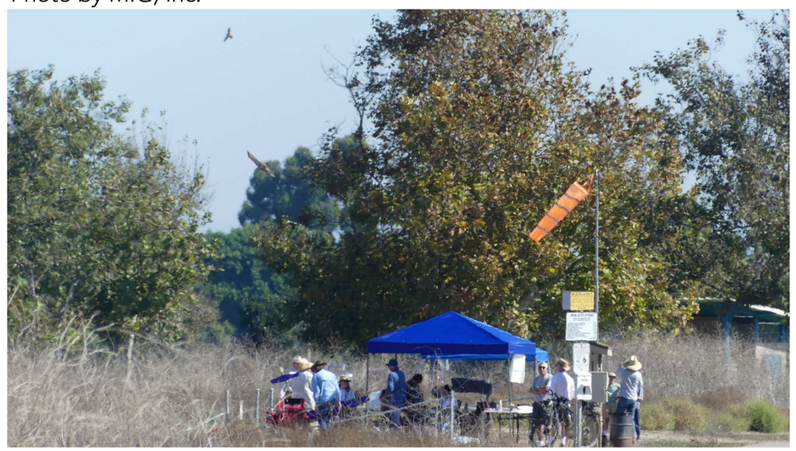


Photo by City of Costa Mesa.

Facing page photo by MIG, Inc.

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This area is also referred to as the Mesa, and is a vernal pool watershed. Several restoration projects have occurred in this area including planting of coastal sage scrub, purple sage scrub, and vernal pool habitats. Non-native grasslands on the Mesa occur on soils that have been historically disturbed, including areas impacted by grading for the fly field and numerous informal paths. Non-native cover exceeds 75 percent, with wild oats, annual bromes, and redstem filaree being dominant throughout. Nonnative weeds occurring in patches include fennel, black mustard, wild radish, cheeseweed mallow, and tocalote. Clustered tarplant, a disturbance-tolerant native herb, also occurs commonly in these grasslands along with scattered patches of coast goldenbush, big saltbush, mulefat, and California buckwheat.

While the entire park area should be considered a single unified Native American cultural landscape, the northwest bluff region contains the registered archaeological site CA-ORA-58, which is a well-documented and defined area to be protected and preserved. With the intent of capping the archaeological site prior to construction of new park amenities, fill material was placed on the Mesa in 1987 and 1988. The fill material did not, however, meet standards for capping an archaeological site, and included chemically active construction and paving debris that can degrade archaeological artifacts instead of preserving them. In addition to the fill material being improper cover for the protection of indigenous cultural resources, it also created three new threats to biological resources on the Mesa. First, the fill material covers and takes away habitat for native flower fields and fairy shrimp. Second, the fill material impairs the hydrologic function of the vernal pool watershed by reducing the amount of precipitation that would feed the vernal pool complex, which is especially critical in below-average rainfall years when the pools do not typically form. The fill was moved for study of the archaeological site limits in east to west strips in the 1993 investigation, resulting in uneven and unnatural topography. Portions of another archaeological site, CA-ORA-506, lie beneath the existing developed park and the area east of Placentia Avenue. This site has been the subject of far less research than ORA-58. Studies conducted in 1994 identified certain seasonally wet areas of the western area of the park as vernal pools. This identification was an important ecological discovery. Vernal pools were once widespread, but many have given way to development before their importance was fully understood; and very few remain in Orange County. The pools are a protected ecosystem and closely regulated. These resources will be restored and protected as described in the following chapters of this document.

Existing Developed Park (Lawn Area)

This section of the site contains the developed portion of Fairview Park consisting of approximately 13 acres of lawn and trees with restrooms, picnic facilities, and informal gathering areas and parking for 109 cars. These existing facilities are to be retained and improved.

East of Placentia Avenue

The entire eastern border of the park is bounded by Costa Mesa Golf Course, which is separated from the park by a fence. The eastern part of the park is cut into two sections by the Fairview Channel. The north and south sections created by the channel are joined by a foot bridge which crosses the channel. The east and west sections of Fairview Park are connected by a pedestrian bridge crossing Placentia Avenue.

North of Fairview Channel

The site slopes steeply up from Placentia Avenue and the Fairview Channel to join single family residential areas at Canary Drive. At the Canary Drive park boundary, there is a grade separation of approximately 15 feet; the park being higher. The slope varies, but averages approximately 1:1, or a 45-degree slope. This slope is currently used for park entry under hazardous conditions. Additional studies are required to find an entry solution acceptable to the City and the neighborhood. No parking facilities for park use exist in this area and the community opposes the creation of functions which may attract vehicles, and excessive traffic.

South of Fairview Channel (Model Train Area)

The southern portion of the east side of the park site contains approximately 45 acres and is currently utilized by the Orange County Model Engineers (OCME) railroad. Installed as a volunteer project over a ten-year period, with nearly five miles of narrow gauge rail track, the system is open to the general public at no charge one weekend each month. Other weekends are used for system maintenance and entertainment of private parties on a reservation basis. The railroad has become a popular feature, often attracting over 5,000 visitors on a weekend. The current parking is on unimproved soil and gravel. The Goathill Junction Station has a restroom, gift shop, and picnic tables. These facilities are used for gathering for train rides and private parties. The Chris Anten Memorial Compound is a train maintenance and storage facility and is not open to the public.

Previous Plans

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The first Fairview Park Master Plan was adopted in March 1998. The Master Plan has undergone two revisions, the most recent update was completed in 2008. The open space of Fairview Park is included and referenced in other City and County planning efforts.

1977 General Development Plan - County of Orange

1984 General Development Plan - County of Orange and City of Costa Mesa

1988 Master Plan - City of Costa Mesa

1995 Fairview Park Development Plan

1998 Fairview Park Master Plan

2001 Fairview Park Master Plan Revised

2002 Fairview Park Master Plan Revised

2008 Fairview Park Master Plan Update

The Master Plan updates and related studies involved a range of activities gradually moving to more passive uses in each successive plan. The studied uses have included golf, baseball fields, extensive interpretive center buildings, and habitat restoration. The plans calling for more active uses and development met with strong citizen opposition. A plan for potential development of the sports fields of Estancia High School by Andrew Goetz & Associates, undated, was researched and determined to have no significant impact upon the Master Plan for Fairview Park.

Since the 2008 Master Plan, several changes to resources and management of the Park have occurred including the following:

1. In 2014, Phase 1 of the Fairview Wetlands and Riparian habitat Project was completed, and Phase 2 of the project to establish 35 acres of created wetlands and native scrub habitat in the northwestern portion of the park was begun and is ongoing.

2. In 2005, a reconfigured fly field was graded within the existing vernal pool watershed, which the Harbor Soaring Society has used with City's permission until the COVID-19 pandemic led to temporary closure of the park in March of 2020. In 2023, the City provisionally re-opened the fly field for use on weekends.

3. In 2016, Measure AA passed with over 70% of the vote, amending the Costa Mesa Municipal Code to subject certain changes to Fairview Park to voter approval.

4. In 2017, the City created and filled the Fairview Park Administrator staff position to help manage the natural and cultural resources provided within Fairview Park.

5. In 2017, the City created the Fairview Park Steering Committee to provide advice to the City Council on the implementation of the Master Plan and Measure AA. The Committee is comprised of seven members appointed by the City Council. The Committee meets bimonthly, complies with the Brown Act, and includes the Fairview Park Administrator and other City staff as City staff liaisons.



Fairview Park City of Costa Mesa Master Plan

Regulatory Framework

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Planning for Fairview Park is shaped by an extensive framework of federal, state, and local regulations that protect cultural, biological, and historical resources while guiding responsible public access and use. These laws ensure that restoration activities, proposed improvements, and long-term management decisions avoid or mitigate environmental impacts, respect cultural and Tribal cultural resources, and preserve the park's unique character for future generations.

At the federal level, the National Historic Preservation Act, National Environmental Policy Act, and Antiquities Act establish requirements to identify and safeguard resources of historic, cultural, and scientific significance. State protections, including the California Environmental Quality Act, Tribal Cultural Resources statutes, and the California Register of Historical Resources, require careful evaluation of potential project impacts and the integration of mitigation measures. Locally, Costa Mesa's Measure AA provides additional oversight by requiring voter approval for certain park improvements and changes in use.

Applicable laws protecting vernal pool species and their habitat include the California Endangered Species Act (CESA) and the Federal Endangered Species Act (ESA) provide for the conservation of threatened and endangered species and their ecosystems. These Acts prohibit the take of threatened and endangered species except under certain circumstances and only with authorizations from the California Department of Fish and Wildlife (CDFW) and/or the U.S. Fish and Wildlife Service (USFWS). Under CESA and ESA, take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.

Together, these regulations provide the foundation for responsible stewardship of Fairview Park. They ensure that the Master Plan Update supports the City's commitment to preserving sensitive resources while balancing community access, environmental restoration, and long-term park sustainability.

National Historic Preservation Act

The National Historic Preservation Act (NHPA) is the primary federal law governing the preservation of cultural and historic resources in the United States. The law establishes a national preservation program and a system of procedural protections which encourage the identification and protection of cultural and historic resources of national, state, tribal and local significance. A primary component of the act requires that federal agencies take into consideration actions that could adversely affect historic properties listed or eligible for listing on the National Register of Historic Places, known as the Section 106 Review Process.

National Register of Historic Places

The National Register of Historic Places is the nation's official list of buildings, structures, objects, sites, and districts worthy of preservation because of their significance in American history, architecture, archeology, engineering, and culture. The National Register recognizes resources of local, state and national significance which have been documented and evaluated according to uniform standards and criteria.

National Environmental Policy Act

NEPA directs federal agencies to use all practicable means to "Preserve important historic, cultural, and natural aspects of our national heritage…". If the presence of a significant environmental resource is identified during the scoping process, federal agencies and their agents must take the resource into consideration when evaluating project effects. Consideration of paleontological resources may be required under NEPA when a project is proposed for development on federal land, or land under federal jurisdiction. The level of consideration depends upon the federal agency involved.

Antiquities Act

The Antiquities Act states, in part: That any person who shall appropriate, excavate, injure or destroy any historic or prehistoric ruin or monument, or any object of antiquity, situated on lands owned or controlled by the Government of the United States, without the permission of the Secretary of the Department of the Government having jurisdiction over the lands on which said antiquities are situated, shall upon conviction, be fined in a sum of not more than five hundred dollars or be imprisoned for a period of not more than ninety days, or shall suffer both fine and imprisonment, in the discretion of the court.

Although there is no specific mention of natural or paleontological resources in the Act itself, or in the Act's uniform rules and regulations [Title 43 Part 3, Code of Federal Regulations (CFR)], "objects of antiquity" has been interpreted to include fossils by the National Park Service, the Bureau of Land Management, the Forest Service, and other Federal agencies.

California Environmental Quality Act

CEQA states that: It is the policy of the state that public agencies should not approve projects as proposed if there are feasible alternatives or feasible mitigation measures available which would substantially lessen the significant environmental effects of such projects, and that the procedures required are intended to assist public agencies in systematically identifying both the significant effects of proposed project and the feasible alternatives or feasible mitigation measures which will avoid or substantially lessen such significant effects.

CEQA declares that it is state policy to: "take all action necessary to provide the people of this state with...historic environmental qualities." It further states that public or private projects financed or approved by the state are subject to environmental review by the state. All such projects, unless entitled to an exemption, may proceed only after this requirement has been satisfied. CEQA requires detailed studies that analyze the environmental effects of a proposed project. In the event that a project is determined to have a potential significant environmental effect, the act requires that alternative plans and mitigation measures be considered.

Tribal Cultural Resources

As of 2015, CEQA established that "[a] project with an effect that may cause a substantial adverse change in the significance of a tribal cultural resource is a project that may have a significant effect on the environment" (Public Resources Code, § 21084.2). PUBLIC RESOURCES CODE Section 5097.5: No person shall knowingly and willfully excavate upon, or remove, destroy, injure or deface any historic or prehistoric ruins, burial grounds, archaeological or vertebrate paleontological site, including fossilized footprints, inscriptions made by human agency, or any other archaeological, paleontological or historical feature, situated on public lands (lands under state, county, city, district or public authority jurisdiction, or the jurisdiction of a public corporation), except with the express permission of the public agency having jurisdiction over such lands. Violation of this section is a misdemeanor. As used in this section, "public lands" means lands owned by, or under the jurisdiction of, the state, or any city, county, district, authority, or public corporation, or any agency thereof.

California Register of Historical Resources

The California Register of Historical Resources (CRHR) is a listing of all properties considered to be significant historical resources in the state. The California Register includes all properties listed or determined eligible for listing on the National Register, including properties evaluated under Section 106, and State Historical Landmarks No. 770 and above. Per the California Register statute, historical resources listed, or determined eligible for listing on the California Register by the State Historical Resources Commission, must be given consideration under CEQA. Resources that meet the California Register criteria must also be given consideration under CEQA. Other resources, such as resources listed on local registers of historic resources or in local surveys, may be listed if they are determined by the State Historic Resources Commission to be significant in accordance with criteria and procedures to be adopted by the Commission and are nominated; their listing in the California Register is not automatic.



Photo by City of Costa Mesa.

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Measure AA

In 2016, Measure AA passed with over 70% of the vote, amending the Costa Mesa Municipal Code to subject certain changes in use at Fairview Park to voter approval. Changes including 1) construction of playgrounds, athletic fields, platforms/retaining walls for vista overlook, stairways to provide access to bluffs, new restrooms, parking lots, museum/multipurpose building, boardwalk and pedestrian bridges; 2) extended park hours for community events; 3) installation of parking lot lighting; or 4) other permanent structures are subject to voter approval.

California Endangered Species Act (CESA):

CESA prohibits the unauthorized take of any species listed as endangered or threatened under the Act. Burrowing Owl (Athene cunicularia) and Crotch's Bumble Bee (Bombas crotchii) are candidate species for listing under CESA and receive the same legal protections as listed species. California Orcutt Grass (Orcuttia californica) and San Diego Button-Celery (Eryngium aristulatum var. parishii) are listed as endangered and occur in the vernal pools. Any activity that may lead to take could potentially violate CESA. The City would need an Incidental Take Permit (ITP) or other authorization from CDFW to legally conduct such an action, but otherwise, such take is illegal under state law.

To obtain an ITP, the City would need to demonstrate that the take is "incidental" to an otherwise lawful activity, that any impacts from the take will be minimized and fully mitigated, and that adequate funding exists to implement minimization and mitigation measures. No ITP will be issued if CDFW determines that a project would "jeopardize the continued existence" of the listed species covered by the permit.

Citation: Cal. Fish & Game Code § 2050 et seq.

California Protections for Birds

The California Fish and Game Code (FGC) states that it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by this code or any regulation made pursuant thereto.

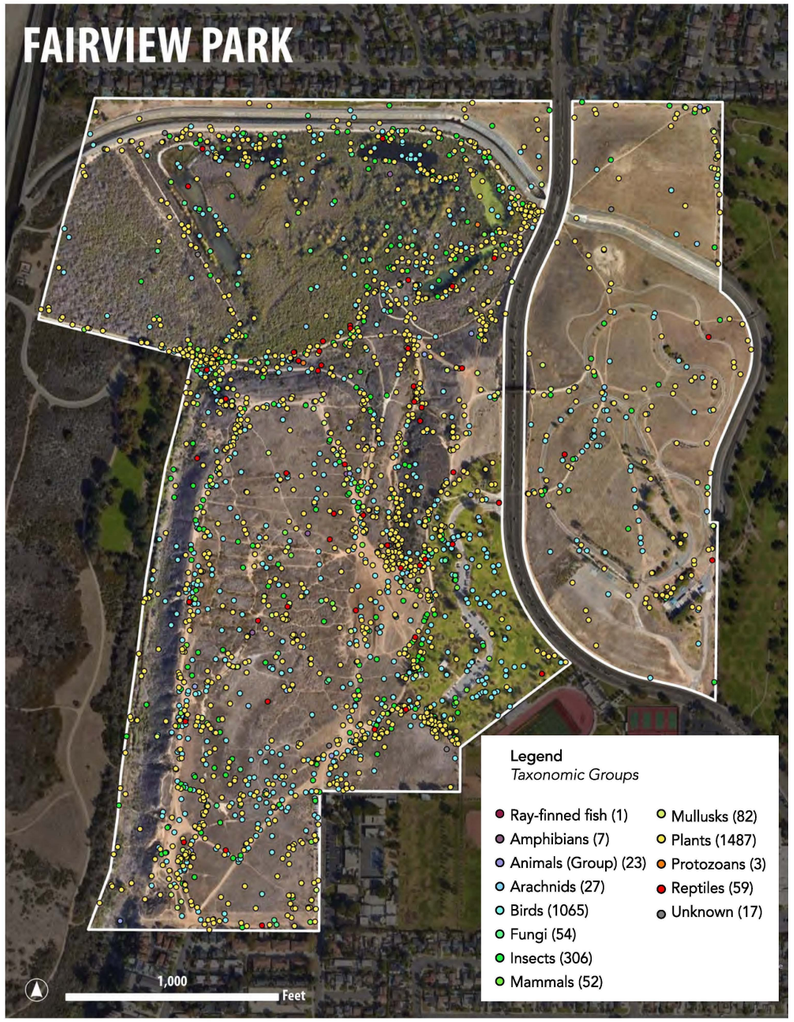
The FGC contains several sections outlining protections for birds, their eggs and nests. FGC section 3503 covers unlawful take, possession or needless destruction of nests or eggs of any bird. FGC section 3503.5 covers unlawful take, possession or destruction of birds of prey or their nests or eggs. FGC Section 3513 covers unlawful take of any migratory nongame bird.

Citation: Cal. Fish & Game Code § 3503 and § 3513

California Fully Protected Species

FGC Fully Protected species include White-tailed kite (Elanus leucurus), a raptor that forages in the vernal pool watershed and other areas of Fairview Park. Fully protected species cannot be taken or possessed without special authorization.

Citation: Cal. Fish & Game Code § 3511



Biodiversity Hotspot Map

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Lake and Streambed Alteration (LSA)

Notification to CDFW requires notification and an agreement for activities that substantially divert or obstruct the natural flow, or change or use material from the bed, channel, or bank of any river, stream, or lake, including ephemeral bodies of water such as vernal pools and their flood plains.

Vernal pools are unique aquatic habitats that support sensitive species and are protected by CDFW regulations, which mandate an LSA Agreement if an activity could alter their flow, bed, banks, or channel, or adversely affect fish and wildlife resources.

Citation: Cal. Fish & Game Code § 1602

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act is the primary California law for regulating water quality, establishing a comprehensive program to protect all state waters and their beneficial uses, including surface waters, wetlands, and groundwater, from both point and nonpoint pollution sources. Wetland protections include isolated and ephemeral waters, such as vernal pools and their watersheds. It grants the State Water Resources Control Board and nine Regional Water Quality Control Boards the authority to set water quality objectives, issue permits, and enforce regulations, including through various orders, civil liabilities, and court actions.

The Water Boards have the authority to issue permits, such as Waste Discharge Requirements (WDRs), and to enforce compliance through Cleanup and Abatement Orders, Cease and Desist Orders, Administrative Civil Liabilities, and Criminal Prosecutions.

Citation: California Water Code § 13000 et seq.

Migratory Bird Treaty Act (MBTA)

The MBTA implements four international conservation treaties that the U.S. entered with Canada in 1916, Mexico in 1936, Japan in 1972, and Russia in 1976. It is intended to ensure the sustainability of populations of all protected migratory bird species. The law has been amended with the signing of each treaty, as well as when any of the treaties were amended, such as with Mexico in 1976 and Canada in 1995.

The MBTA prohibits the unauthorized take (including killing, capturing, selling, trading, and transport) of protected migratory bird species without prior authorization by USFWS.

Citation: Migratory Bird Treaty Act of 1918 (16 U.S.C. 703-712)

Federal Endangered Species Act (ESA)

The ESA prohibits the take of any species listed as endangered or threatened under the Act. Take includes harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping, capturing, or collecting any endangered species. In this case, California Orcutt Grass, and San Diego Button-Celery, Riverside Fairy Shrimp (Streptocephalus woottoni), and San Diego Fairy Shrimp (Branchinecta sandiegonensis) are federally-listed endangered species, and any activity that may lead to take could potentially violate Section 9 of the ESA. Violation of this section may result in civil or criminal penalties.

The City would need an Incidental Take Permit (ITP) under Section 10(a)(1)(B) of the ESA from USFWS, which requires developing an approved Habitat Conservation Plan (HCP). The HCP details how you will avoid, minimize, and mitigate the impacts of the activity on listed species and must demonstrate funding for these measures.

Citation: 16 U.S.C. § 1531-1544

California State Wetlands and Riparian Area Protection Policy could be mentioned here, if not addressed in other regs.

https://www.waterboards.ca.gov/water_issues/programs/cwa401/wrapp.html

California State Wetlands and Riparian Area Protection Policy

In California, wetlands and riparian areas are protected by the State Water Resources Control Board's (SWRCB) Wetland Riparian Area Protection Policy. In 2019 the State Water Board adopted the State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State (Procedures), and the Procedures became effective May 28, 2020. The Procedures consist of four major elements: 1) a wetland definition; 2) a framework for determining if a wetland is a water of the state; 3) wetland delineation procedures; and 4) procedures for the submittal, review, and approval of applications for dredge or fill activities.

General Plan

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The Costa Mesa 2015-2035 General Plan sets forth the vision, goals, objectives, and policies for the City through 2035. Over the long term, general plan implementation will ensure that development decisions and improvements to public and private infrastructure are consistent with this plan. Included in the General Plan and relevant to Fairview Park is the Conservation Element, Recreation and Open Space Element, and the Historical and Cultural Resources Element.

The **Conservation Element** describes Fairview Park and its importance as an open space, linking to Talbert Regional park and the Santa Ana River system of trails and parks. Additionally, the Conservation Element identifies the ecological importance of riparian habitat restoration through the creation of wetlands within the north section of Fairview Park and the unique significance of the vernal pools. The document includes an inventory of biological resources found in Costa Mesa natural areas, many of which are found in Fairview Park. Included in the Goals, Objectives and Policies is, "Policy CON-1.A.4: Promote and protect native plant species within Fairview Park, and remove and control the spread of invasive species, including plants, animals, and fungi."

The **Open Space and Recreation Element** classifies Fairview Park as a Community Park, encompassing approximately 210 acres. The Open Space and Recreation Element describes the site in the following excerpt: "This passive open space park consists of bluffs, vernal pools, trails, native plant communities, and wildlife. Park visitors can also enjoy special events that occur at the park, as well as take a train ride on the Goat Hill Junction Model Railroad." Future classification of Fairview Park as an ecological preserve, rather than a community park, should be considered in future updates to this Element. As 195 acres of Fairview Park are dedicated to natural open space and wildlife habitat, it is among the largest urban parks in Orange County. The habitat diversity, unique vernal pools, and wildlife connectivity to the Santa Ana River system make this a significant regional natural resource to be recognized as such.

The **Historic and Cultural Resources Element**, generally describes the recorded and potential prehistorical archaeological and sites located within City limits and the paleontological resources located within City limits. Included in the Goals, Objectives and Policies is, "Policy HCR-1.DA.4: Require, as part of the environmental review procedure, an evaluation of the significance of paleontological, archaeological, and historical resources and the impact of proposed development on those resources." And, "Policy HCR-1.6: Encourage development of an interpretive center for paleontological, archaeological, and historical resources at Fairview Park. The center may contain resources found in the park area as well as resources found throughout the City."

Photo by City of Costa Mesa.



Open Space Master Plan

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The City's Open Space Master Plan serves as a guide for the development and management of the City's park facilities. The original Open Space Master Plan was adopted by City Council in 1969 as a part of the Long Range Comprehensive Plan. It has been updated multiple times, including 1996 and again in 2003 and is currently in the process of being updated.

The Parks, Recreation, and Open Space Master Plan was adopted by the City Council in 1994 and 2002. The Plan established long-term goals for the City's open space and recreation needs and established priorities and implementation measures. The goals of this plan have been included as part of the Fairview Park Master Plan.

The Parks, Recreation and Open Space Master Plan calls for the Fairview Park plan to recognize the important adjoining uses, links to existing bike and walking trails, and stresses the need to preserve the important natural and cultural features.

Also proposed by the Open Space Master Plan was the potential for additional active ball fields in the area of Estancia High School. Alternative design schemes have considered this option. Ball fields have not been included in the Fairview Park Master Plan due to recent acquisition of land for this purpose, and citizen requests for a passive park at Fairview.



Photo by MIG Inc.

Local Coastal Program

Utilities & Easements

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Local Coastal Program

The Coastal Zone and Commissions were created in 1972 in order to protect the State's coastal resources. The Zone extends 1,000 yards inland from the mean high tide line. The California Coastal Act of 1976 modified the boundary eliminating the 1,000 yard boundary, but retaining portions of the Santa Ana River lowlands and most of Canyon Park. Fairview Park is not included in the Coastal Zone.

The 1976 Act mandated the preparation and adoption of a Local Coastal Program (LCP) by local governments for their areas of jurisdiction within the Coastal Zone.

The City of Costa Mesa has coordinated its efforts with the County of Orange. The County of Orange produced a coordinated plan in 1990 for a linked "stair step of parks" progressing from the coast up the Santa Ana River to Fairview Park. This Santa Ana River Mouth Open Space Study encompasses salt marsh restoration, wetlands, woodlands, and grassland for the open space along the southern side of the river. The elements of this plan involve the City of Newport Beach, the City of Costa Mesa (at Canyon Park and Fairview Park), the County of Orange and the Corps of Engineers. Restoration of the County's Talbert Nature preserve was an important link in this park system. Fairview Park is a significant piece of the plan due to unique ecological resources, its size and adjacency to Talbert Nature Preserve and the Santa Ana River. The completion of Fairview Park as anticipated by this master plan is consistent with the intent of the Santa Ana River Mouth Open Space Study.

Utilities & Easements

Public utility easements are limited to the north and south boundaries of the park. Domestic and reclaimed water lines lie along the extreme north property line. These lines are a barrier to creating a simple ramped connection from the park to Canary Drive. A regional gas main crosses in the east-west direction at the southern property line in the area of Parsons School. The gas main continues down the bluff into Talbert Nature Preserve and constitutes no obstruction to park planning.

A potable water line is in place for service to the park extending from Canyon Drive to Placentia Avenue. New potable water services are possible from mains located in Placentia Avenue.

Sewer mains exist off the site in Pacific Avenue and Canyon Drive. A study by the City Engineer determined that these lines are the only potential gravity flow source of sewer service to the park site. A preliminary plan indicates the potential to extend a gravity flow main from Pacific, across the western site, extending across Placentia to serve the train station site. This long gravity sewer appears to be more cost effective than a forced sewer main to the Estancia High School area. Electrical service is available along Placentia Avenue.



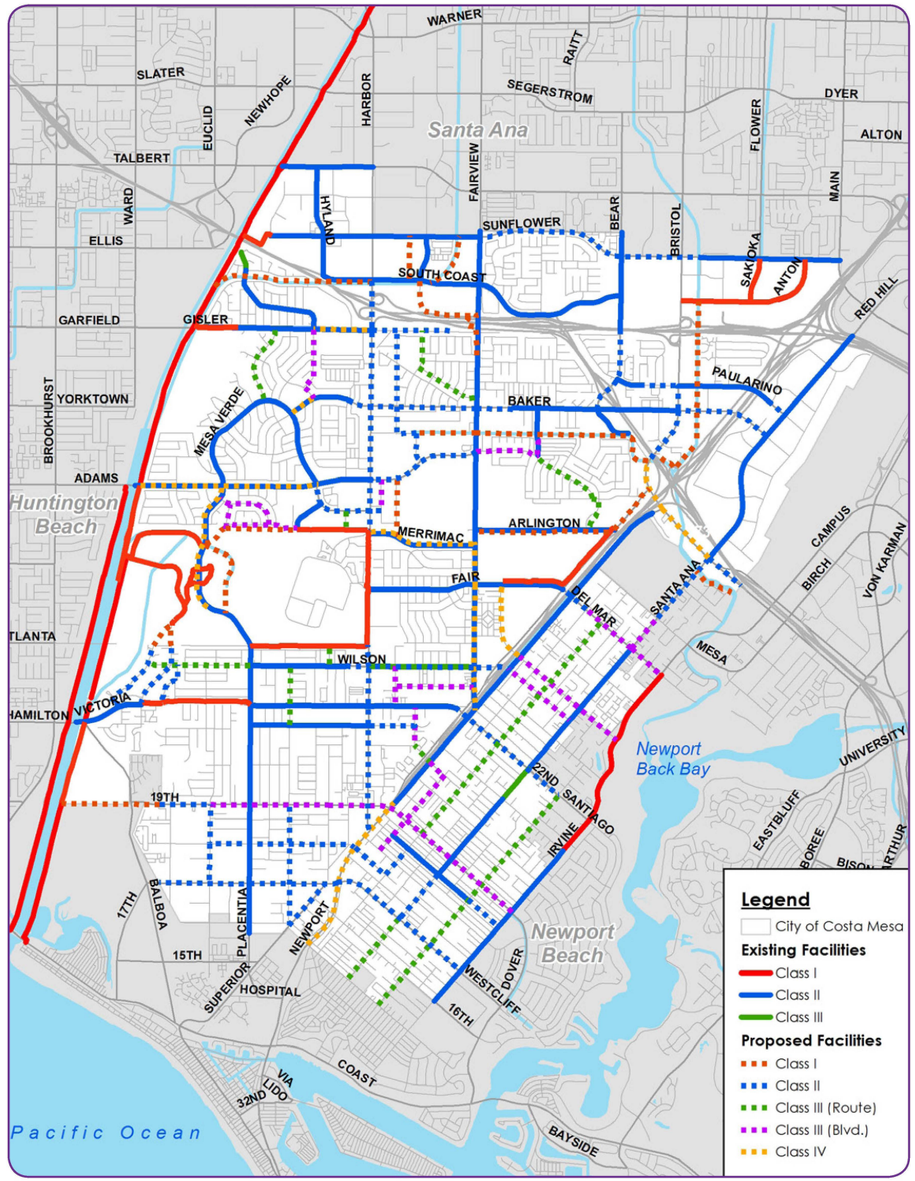
Photo by City of Costa Mesa.

Transportation Plans

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Fairview Park is served by only one arterial street, Placentia Avenue, which bisects the park. A park entrance from Placentia Avenue exists to the western section of the park. This intersection serving the western park entry is currently controlled by a traffic signal. The eastern section of the park (the train parking area) is entered by a signal-controlled intersection at the southern tip of the site at the entrance to Estancia High School. Both signal-controlled intersections are to be retained for access to Fairview Park.

Several local and regional bicycle routes are connected to Fairview Park including local routes to school and connection to the Santa Ana River Trail. Fairview Park provides Class I off-street bicycle paths within the park and Class II buffered bicycle lanes are located along Placentia Ave. The Costa Mesa Bicycle Master Plan DRAFT, prepared in 2017, outlines the vision, strategies, and actions that will be implemented to improve the cycling experience in Costa Mesa. This Master Plan focuses on the completion of the bicycle network by identifying existing and absent connectivity and providing recommendations for potential improvements to the system and programs.



Proposed Bicycle Facilities Map

03 Existing Site Conditions

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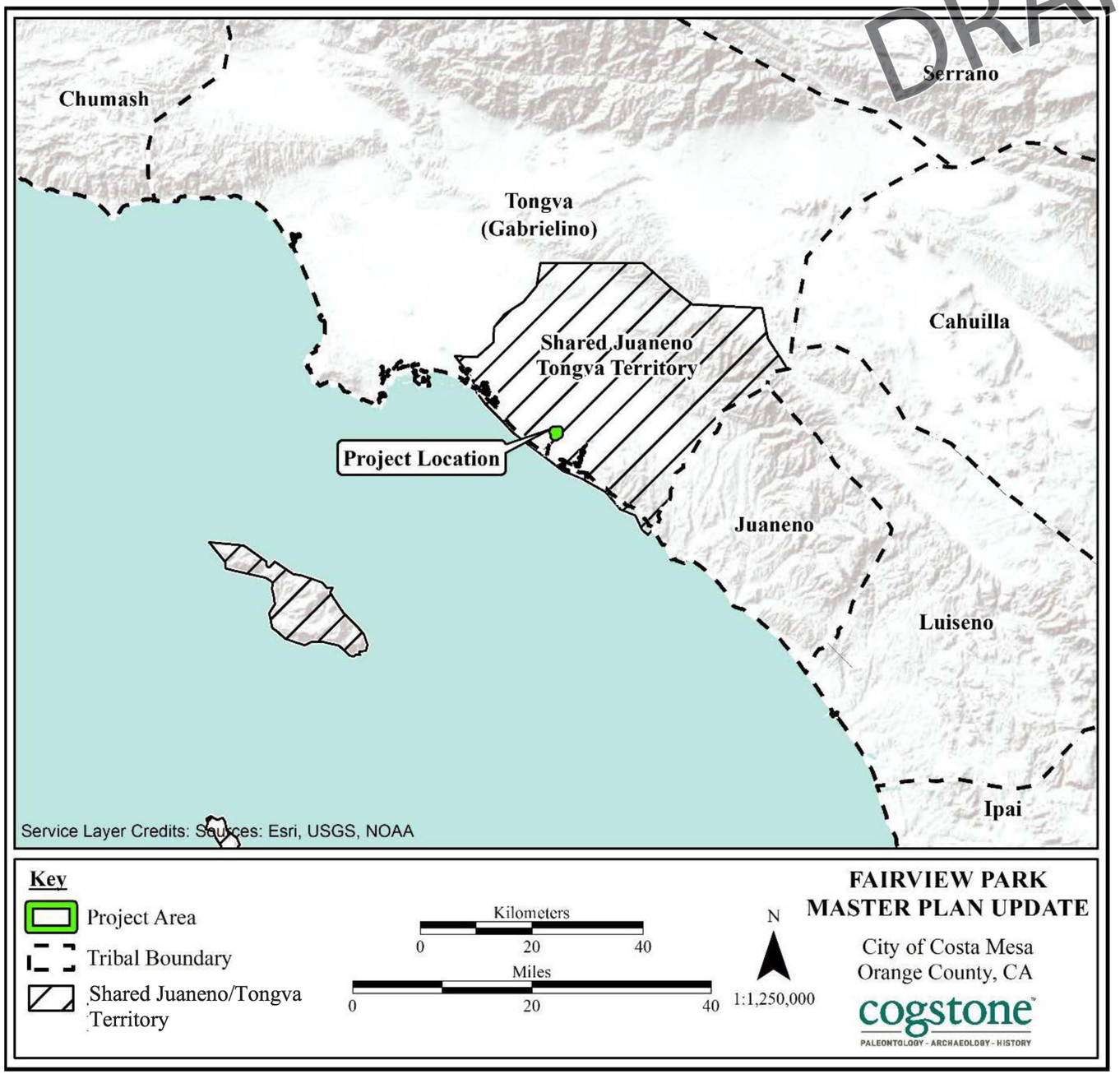
Site History

Prehistoric Cultural Setting

For thousands of years, indigenous peoples inhabited coastal Southern California, establishing a complex network of groups and villages. Their settlements were strategically situated near freshwater sources and ecosystems that provided essential resources, such as food and fuel (Anderson 2007). By the time Spanish explorers arrived, the region was already home to a well-established and thriving indigenous society. This historical context underscores the importance of considering long-standing human relationships with the natural environment when planning management and conservation of Fairview Park.

Prior to the Spanish Mission Colonization Period, which began in 1769 (Mooney and Zavaleta 2016), the Greater Los Angeles Basin, which extends to the San Joaquin Hills east of Fairview Park, exhibited a rich tapestry of diverse ecosystem types. These included coastal dunes and estuaries, fast-flowing and highly seasonal rivers, expansive flower fields, and southern California walnut (Juglans californica) and oak (Quercus spp.) woodlands (Ethington et al. 2020, Longcore and Ethington 2023). The varied landscape was shaped by the array of abiotic and biotic conditions characteristic of coastal southern California (Stein et al. 2007). Referring to the pre-colonial setting as the "Indigenous Landscape," Longcore and Ethington (2023) emphasized the role of humans in manipulating the region's natural communities during the long period that predated large-scale introduction of non-native plants and animals from Europe and elsewhere. This historical context serves as a reminder of the region's ecological diversity and the importance of human-environment interactions in shaping the landscape of Fairview Park and its surroundings.

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Tribal territories map

Facing page photo by MIG Inc.

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Spanish Period

Fairview Park was part of the 63,414-acre Rancho Santiago de Santa Ana, granted to José Antonio Yorba and his nephew Pablo Peralta in 1810 by California Governor José Joaquin de Arrillago. Yorba built an adobe residence at what is now First and Sullivan Streets in Santa Ana. The site of the native Rancheria of Genga (Gena in Gabrielino) gave way to Spanish occupation. By 1780, records of Mission San Juan Capistrano indicate use of the site area by Mission cattle herds. The Yorba family re-established their own herds on the site by 1835.The Eduardo Polloreno adobe was situated on the northeast corner of the park in the area of Canary Drive. Only the foundations remain of this, the youngest of three adobe buildings in the immediate area, the others being the Estancia, or Diego Sepulveda Adobe, and the Rice Adobe. The Diego Sepulveda Adobe remains today and is located at Estancia Park.

City of Costa Mesa History

From 1810 to 1868, the majority of what would later become the City of Costa Mesa fell within the boundaries of the Spanish land grant Rancho Santiago de Santa Ana. After the Mexican War of Independence, the land fell under Mexican governance and was retained by Yorba. Through California's Spanish and Mexican periods, the land was primarily used for the rearing of cattle. Following the annexation of California by the United States in 1848, the Rancho heirs began the process of breaking up the land into smaller portions and property was continuously sold and subdivided which made the area ideal for the California land boom of the 1880s. The three communities of Fairview, Polloreno, and Harper arose from this period and united to form Costa Mesa (Miller 1970).

With the expansion of railroads to the American west coast, affordable transportation and cheap land opportunities drove a flood of new settlers into California. As a response, various land syndicates formed which contracted survey teams to outline new land tracts. The Fairview Development Company (FDC) was one such entity which filed their plans for the Fairview Tract with the City of Santa Ana in 1887. FDC sales soared resulting in the rapid growth of the area near the corner of Adams and Placentia, restored by the City of Costa Mesa.

The land changed hands several times and was used for agricultural purposes, escaping development perhaps due to the topography of the eastern portions and the wet conditions of the western area. In 1926 the first documented archaeological remains were discovered during plowing operations. Important discoveries continued to be found and studied, and by 1935 State Emergency Relief crews began formal archaeological excavations. Federal Works Progress Administration crews were active in 1936 and 1937. In the 1970's the County of Orange and the City of Costa Mesa purchased the land of Fairview Park for park and recreation purposes.

A joint use plan was studied in the 1980's, which planned several active uses, which were met with strong objections by the residents of Costa Mesa. The City purchased 210 acres of the 300-acre site in 1985 in order to insure a lower level of development. The land purchased by the City site is now the subject of this Master Plan. The remaining 90-acre County of Orange site has been restored as the Talbert Regional Park.

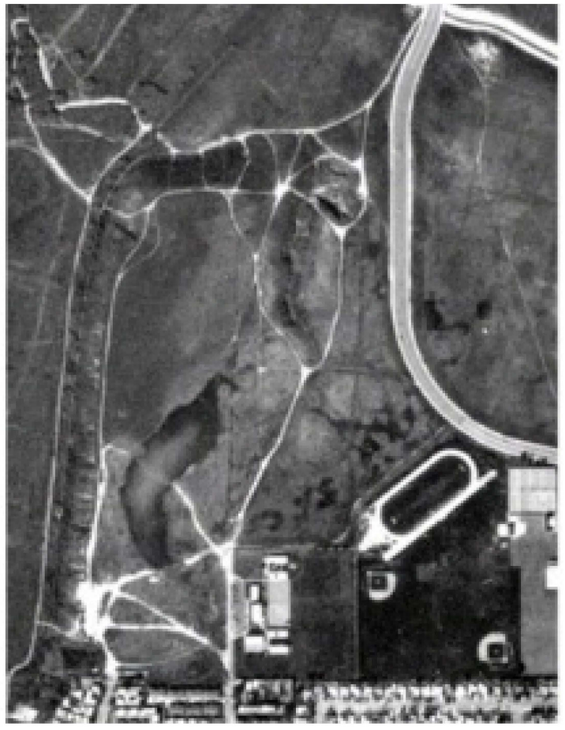
Project Area History

The earliest known U.S. Geological Survey (USGS) topographic map of the area shows no development in 1896 within the area which would become Fairview Park (Santa Ana, 1:62,500, 1896). By 1932, multiple unimproved roads are visible within the Project Area along with several large retaining ponds (Newport Beach, 1:31,680, 1932). By 1935, three buildings are visible within the northern half of the Project Area (Newport Beach, 1:32,680, 1935). By 1949, only one building remains near the center of the Project Area and a long intermittent stream cuts through the north/south on its western boundary (Newport Beach, 1:24,000, 1949). A 1953 USDA aerial photograph of the Project area depicts a single building with small ancillary buildings near the middle of the Project Area and a narrow water channel (NETROnline 1953). By 1963, the building in the middle of the Project Area is no longer extant (NETROnline 1963). A large concrete channel (currently extant) traverses along the east and northern boundary of the Project Area. By 1972, what is now Placentia Avenue is present, cutting through the eastern section of the Project Area (NETROnline 1972). Between 1987 and ca. 2000, a network of unimproved roads is established through the Project Area (NETROnline 1987 and 2000). Between 1987 and 1992, the facility near 2480 Placentia Avenue at the southeast area of the Project Area is extant (NETROnline 1987 and 1992).

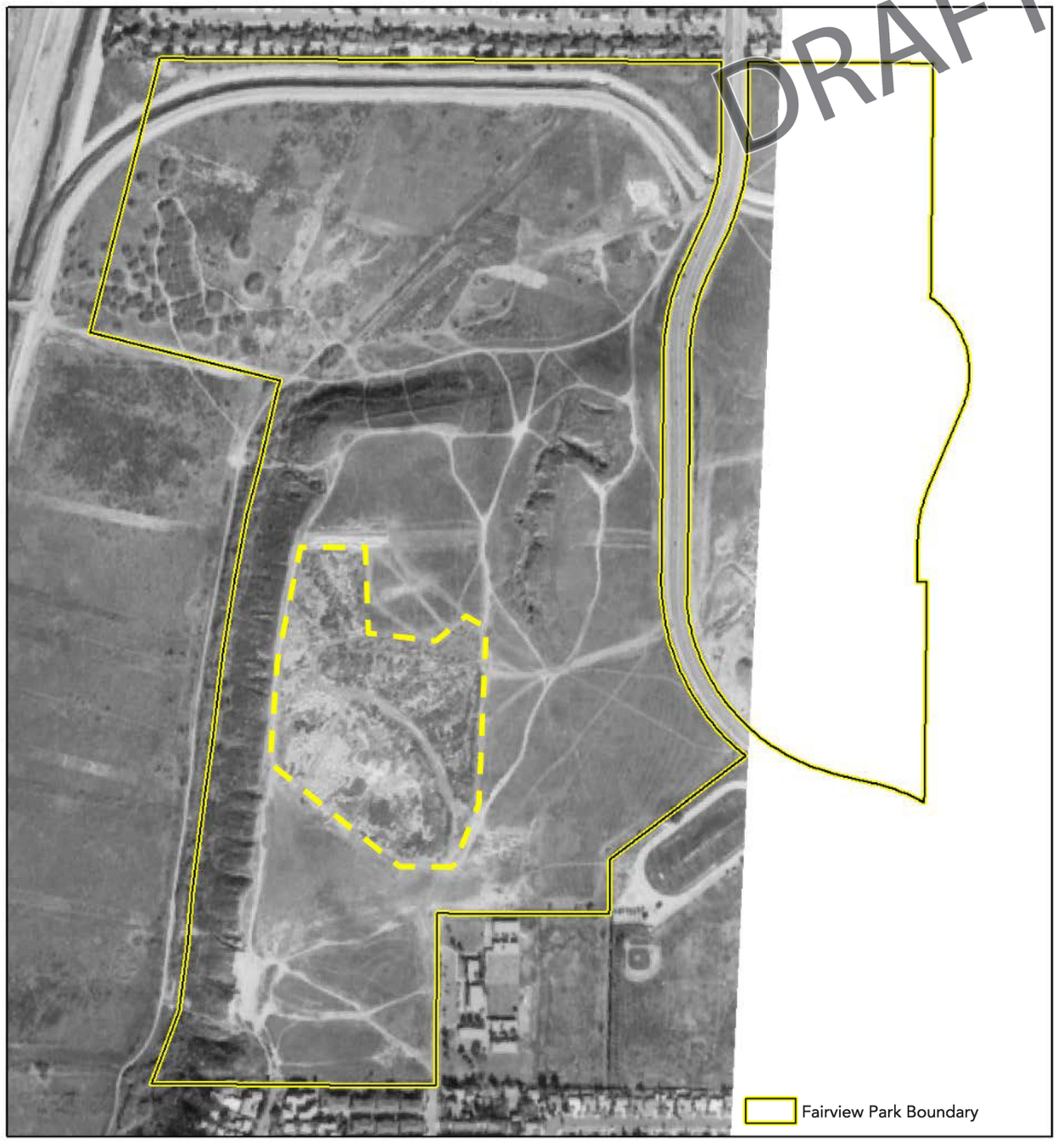
1970



1980



http:// www.ocgis.com/ocpw/historicalimagery/



Geology & Soils

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The broad, valley portion of the study area is called the Tustin Plain. The Tustin Plain is bounded by the Santa Ana Mountains to the east, the Puente and Coyote Hills to the north, the Pacific Ocean to the west, and the San Joaquin Hills to the south. Orange County is in the northern extent of the California Geomorphic Province known as the Peninsular Ranges. This geomorphic province is located in the southwestern corner of California and is bounded by the Transverse Ranges Geomorphic Province to the north and the Colorado Desert Geomorphic Province to the east. It extends from Mount San Jacinto in the north, through the tip of Baja California, Mexico in the south. The Peninsular Ranges Geomorphic Province is characterized by elongated northwest-trending mountain ranges separated by sediment-filled valleys. Faults branching off from the San Andreas Fault to the east create the local mountains and hills. The northwestwards motion of the Pacific Plate relative to the North American Plate has created these ranges and their corresponding valleys (Wagner 2002).

Topographically, the site is differentiated by a bluff 60 to 70 feet high creating an upper mesa and a lower flood plain. The Newport Mesa is comprised of deposits of clays, silty clays, silts, sands, and fine to coarse gravels of the Upper Pleistocene Lakewood formation. These deposits are of continental to very shallow marine origin. The Lakewood formation is underlain by the slightly upturned and truncated Lower Pleistocene San Pedro formation. The Lakewood formation is approximately 70 to 100 feet thick in the area of Fairview Park.

The mesa portion of the park site is underlain by a layer of heavy clay, which provides the hardpan responsible for the creation of the vernal pools on the southern third of the mesa. The lower portions of the site generally consist of 8 feet of sand and silty sand fill. Care must be taken in the design of structures or bridges due to the potential for overlaying alternating beds of soft to medium-stiff silt/clay and loose to dense sand and silty sand. Ground water has been found at depths of 10- and 11-feet.



Photo by City of Costa Mesa.

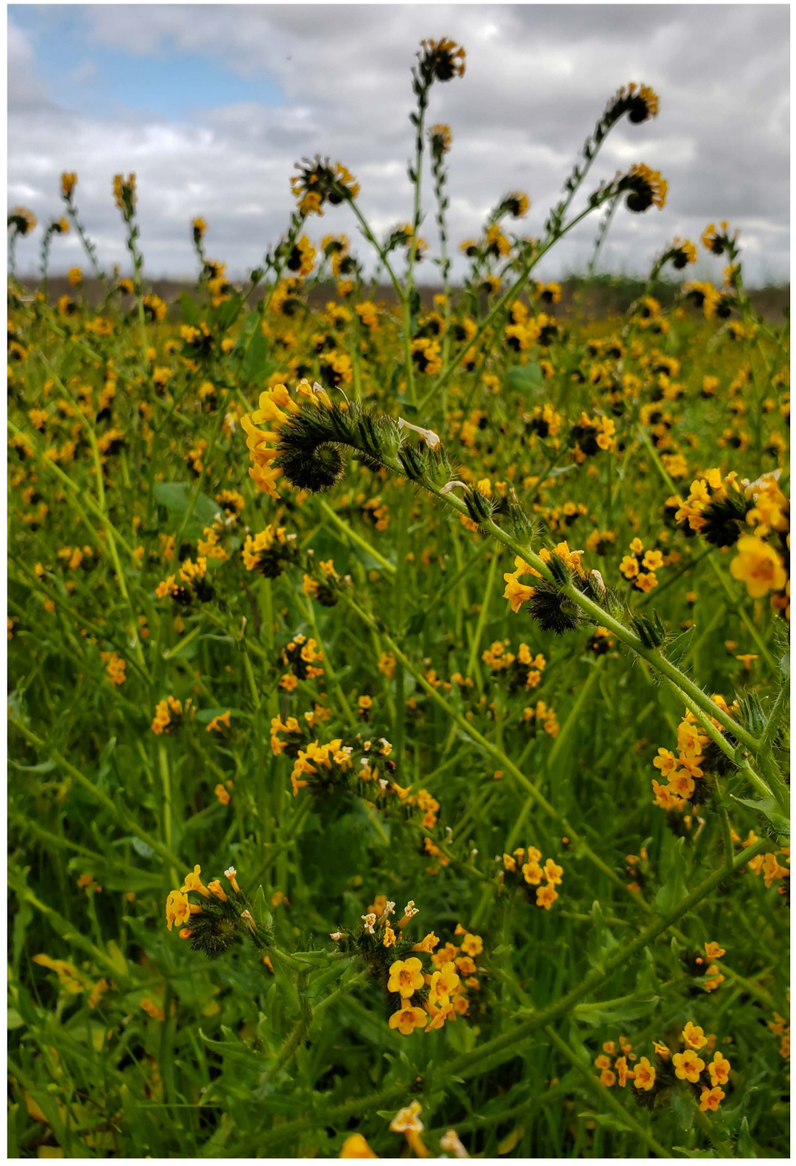
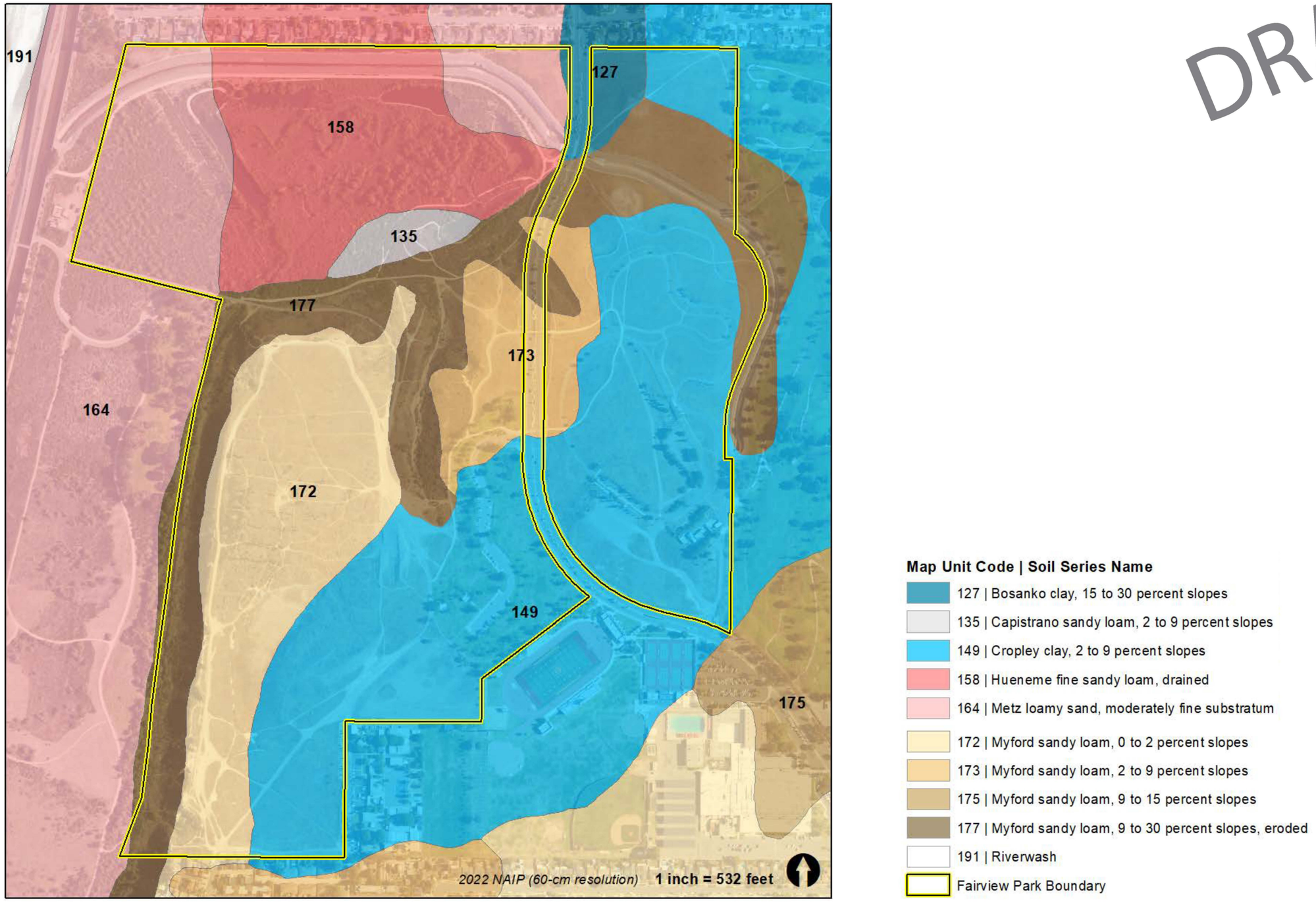


Photo by City of Costa Mesa.

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Soils Map of Fairview Park.

Site Drainage & Hydrology

Fairview Park is predominantly vegetated with little impervious surfaces making it an important natural ecosystem for supporting water filtration, and flood management functions for the City. The deep, well-drained, carbon rich soils of the Fairview Park floodplain terrace can store a great deal of water, and the natural depressions of the vernal pools slow and store rainfall, helping reduce peak flows. Rainfall not absorbed into the soil eventually flows into the Santa Ana River and Newport Bay.

Fairview Park is located on a bluff and is not impacted by sea level rise or storm surges. The flat bluff and natural depressions characteristic of much of Costa Mesa's developed watershed tend to facilitate ponding and large storm events can overwhelm the exiting storm drain system and potentially cause pluvial flooding. The Canyon storm drain, which begins at the southern edge of Fairview Park near Pacific Avenue is identified in the 2024 Existing Conditions Assessment Report (ECAR) Storm Drain System Master Plan Update as an area prone to chronic ponding. The Canyon storm drain discharges near Canyon Drive in Canyon Park.

Fairview Park lies within the West watershed subarea studied in the ECAR. At the northwestern and northeastern portions of the park, Fairview Channel conducts flows from the northern portion of the West watershed to the Greenville Banning Channel, which drains to the Santa Ana River. The major portion of rainfall runoff from the site is collected in the Placentia Drain, a ditch created during past agricultural uses of the site. This drain cuts diagonally across the sandy soils of the northwest lowlands and runs south along the lower face of the bluffs to enter Talbert Regional Park. The drain is filled in places and currently has no clear flow line through its full length.

Erosion of the bluffs is attributed to the poor condition of the vegetation, pedestrian and wheeled traffic. Two areas, one at the north and at the south end of the bluffs, are generating small canyons as erosion removes the bluff soil.

Vernal Pool watersheds occur both on the west and east sides of Fairview Park. A large portion of the mesa, with a drainage connecting to the southern border of the site is included in the vernal pool watershed. This area contains large vernal pools features that support several rare and endangered plant and animal species. The vernal pool and a description of the depressional features can be found in Appendix B.

At the southern site border near Canyon Drive, rainwater collects on park property and extends into the adjoining residential property during heavy rain. This border flooding condition is south of the sensitive vernal pool watershed area. The City has reviewed potentially adding a new storm drain along the southern boundary of the park to divert flows west down the bluff into Talbert Regional Park. This potential solution needs further study.



Photo by City of Costa Mesa.

Cultural, Tribal Cultural, Paleontological & Archaeological Resources

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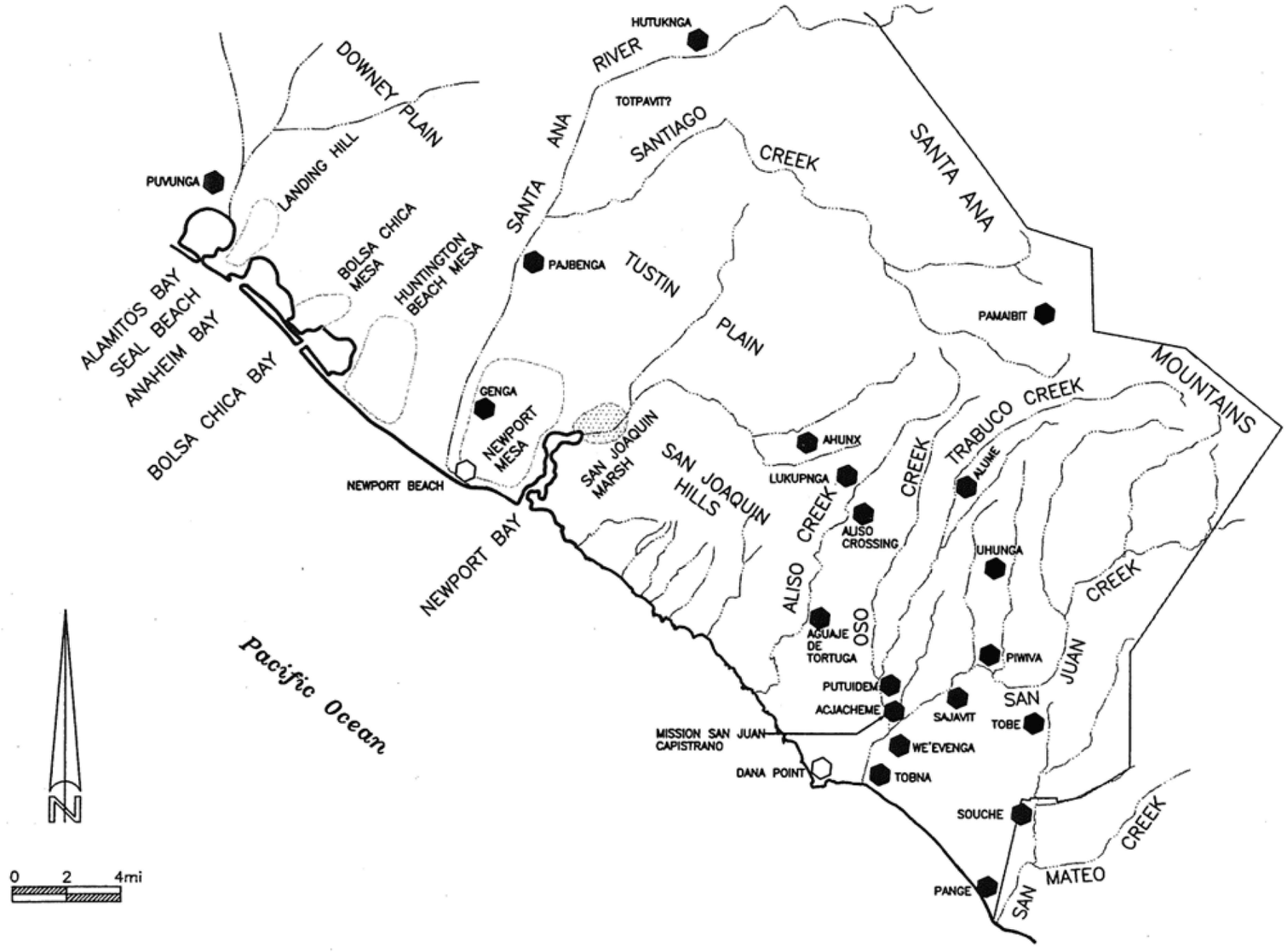
Cultural and Tribal Cultural Resources

Based on the South Central Coastal Information Center records search conducted for this master plan update, especially the documented history of CA-ORA-000058, the positive Sacred Lands File (SLF) search, and informal conversations with local tribes, Fairview Park has an extremely high sensitivity for buried Native American origin cultural resources. The available data also indicate a low to moderate, patchy sensitivity for European-origin cultural resources.

The Project Area is within the traditional use area of both Gabrielino Tongva and Juaneño Acjachemen groups. A review of the site records for resources within Fairview Park indicates that the Park area should be considered a single unified Native American cultural landscape rather than as a place with four separate archaeological sites. Additional description of the Gabrielino Tongva and Juaneño Acjachemen in the region of Fairview Park can be found in Appendix D: Cultural, Tribal Cultural, and Paleontological Resources Assessment for the Fairview Park Master Plan.

The Project Area was not home to any known major villages. The closest known named Gabrielino villages are Lukupa and Kengaa which are 2.3 miles northwest and 3.7 miles southeast of the Project Area, respectively. However, Acjachemen villages, and smaller Gabrielino villages and seasonal camps may have been present closer to the Project Area.

The bluffs of Fairview Park in the prehistoric setting looked out over river bottomlands cut by meandering streams of salt water at high tide and fresh water when the tide was low. The environment



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supported thousands of birds and an abundance of shellfish; and supported a village settlement whose remains indicate a very high level of social complexity. There were two periods of site occupancy by different cultural groups: at least 1500 BC, - AD 500 and AD 500 - the late 19th century.

The Fairview Park site contains two listed archaeological sites, arguably portions of the same general site, which have been investigated and documented. CA-ORA-58 occupies the northwestern bluff top of the site to the west of Placentia Avenue. CA-ORA-506 lies to the east of ORA-58 and is east of Placentia Avenue in the general area of the model railroad extending north to the Canary Drive area. Of the two sites CA-ORA-58, the bluff-top site, has been the subject of greater attention through archaeological study and preservation methods.

The City of Costa Mesa engaged The Keith Companies in 1993 to investigate the park site and to recommend protection and preservation methods. Their Report on Investigations to Delineate Site Boundaries and Further Characterize Cultural Remains at CA-ORA-58, Costa Mesa, California is a very comprehensive document which relates the history of archaeological study in the site, the significant artifacts which have been recovered and the boundaries if the site. The report recommended capping the CA-ORA 58 site with a layer of fill soil prior to the development of an active use park.

This Master Plan calls for the CA-ORA 58 site to be restored to its original natural plant communities and to be preserved as high-quality habitat in a combination of native grasslands and coastal sage scrub. The site would be accessible by trails, but general access to the archaeological deposit and the potential for artifact hunting is to be discouraged. The change of planned use of the site from possible active park to passive activities led the Consultants back to the author of the Keith Companies report, Dr. Henry C. Koerper, Ph.D., to update the protection / preservation recommendations. His report is presented in Appendix B.

A total of four cultural resources have been previously recorded within the park. These consist of two prehistoric archaeological sites (one NRHP listed and one unevaluated), one multicomponent archaeological site, and one historical archaeological site. This project is located in an extremely sensitive tribal cultural area. Surveys have been completed to assess damage to the resources caused by runoff, unauthorized "social" walking trails, vegetation clearing, etc. Disturbances identified were in the form of social trails that de-vegetated the ground surface and resulted in erosion due to water movement and pedestrian and bicycle-based travel. Disturbances averaged approximately two feet wide and five to eight inches in depth.

Most cultural resources, including burials, have been found within the areas currently recorded as P-30-000058, P-30-000506. As such, these areas are considered most sensitive within a highly sensitive landscape. Efforts to stabilize the sediments in these areas are most important. Stabilization methods include re-vegetation and keeping visitors from further eroding the site. Methods include barriers signing, physical barriers restricting social trails, and constructing raised walkways.

As the entire site has extremely high sensitivity for buried Native American origin cultural resources, additional signage and physical barriers to prevent the use of existing, and creation of new, social trails is recommended throughout the park. Additionally, re-vegetation of existing social trail areas, in coordination with plant biologists, with no till options is also recommended.

Mitigation Measures include the following:

- The City staff shall ensure that qualified cultural resources and Native American monitors are present for all ground disturbing activities, and all vegetation clearance that is beyond normal maintenance that occurs within Fairview Park.

- The City shall ensure that an Archaeological Treatment Plan including a presence/absence testing program and a contingent data recovery program is prepared by a qualified archaeologist in consultation with Tribes prior to ground disturbing activities that extends below the historic ploughzone.

- Native American-origin cultural materials encountered during ground disturbing activities, including vegetation clearing activities, shall be stored on site at Fairview Park pending reburial on site at a location not to be disclosed to the public.

Disposition of tribal cultural resources will be in accordance with applicable law and in consultation with the consulting tribes.

Paleontological Resources

Orange County has a complicated paleoenvironmental history which began at the age of dinosaurs about 250 million years ago. The past 250 million years has seen the region transition from marine in the Triassic through the Cretaceous, to coastal lowlands during the Paleocene to Oligocene, to shallow marine during the early Miocene, to deep marine during the early to early-late

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Fossils from the vicinity of the Project from unnamed Quaternary deposits.

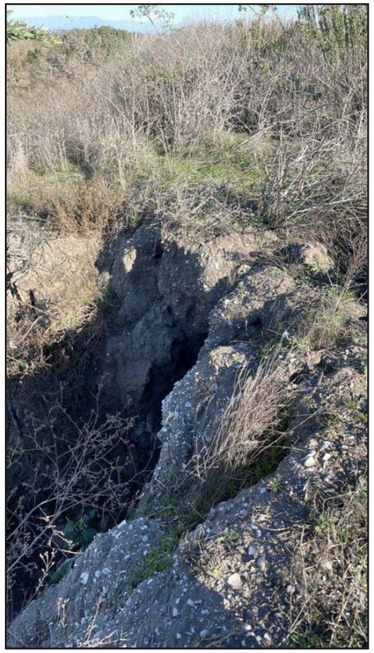
Common Name	Taxon	Depth below original surface	Age	Locality	Location	Reference
ground sloth	†*Megalonyx* sp.	unknown	Pleistocene	LACM 186	Along MacArthur Blvd. N of intersection with Jamboree Road, Irvine	Bell 2020
ground sloth	†*Paramylodon* sp.	unknown	late Pleistocene, Rancholabrean	LACM 1068	East of MacArthur Boulevard and north of what is now Bison Avenue, Irvine	McLeod 2018
California tapir	†*Tapirus californicus*					
horse	†*Equus* sp.					
yesterday's camel	†*Camelops* sp.					
deer	*Odocoileus* sp.					
bison	†*Bison* sp.					
rabbit	*Sylvilagus* sp.					
mammal	Mammalia	unknown	Quaternary	LACM 1069	South side of University Drive east of MacArthur Boulevard, Irvine	McLeod 2018
ground sloth	Edentata	unknown	Pleistocene	LACM 1089	General McArthur Blvd Bridge, Newport Beach	Jefferson 1991b
111 taxa of mammals, sharks, rays, fish, amphibians, reptiles, or birds, including fossils belonging to 17 extinct taxa	multiple	unknown	Pleistocene	15 localities with LACM	older Quaternary sediments on the eastside of Newport Bay	McLeod 2013
mammoth	†*Mammuthus* sp.	~15 feet	Pleistocene	LACM 1339	Adams Ave east of the Santa Ana River, Costa Mesa	McLeod 2011, 2017, 2018
camel	Camelidae					
proboscidean	Proboscidea	unknown	Pleistocene	LACM 3267	near 19th Street and Anaheim Ave., Costa Mesa	McLeod 2019
even-toed ungulate	Artiodactyla	unknown	Quaternary	LACM 3978	Adjacent to the SE side of the intersection of University Drive and MacArthur Boulevard	McLeod 2018
turkey	*Meleagris* sp.					
deer	*Odocoileus* sp.	unknown	Holocene or Pleistocene	LACM 4018	Oceanview High School, Seal Beach	Jefferson 1991b
mammoth	†*Mammuthus* sp.	6-8 feet	late Pleistocene	LACM 65113	Warner Ave, close to Bolsa Chica St, Warner	McLeod 2017
bison	†*Bison* sp.	14-20 feet				
horse	†*Equus* sp.	unknown	Pleistocene	LACM 6370	Hoag Hospital lower campus near Superior Ave. and the Pacific Coast Hwy, Costa Mesa	McLeod 2019
Harlan's ground sloth	†*Paramylodon harlani*	unknown	late Pleistocene, Rancholabrean	LACM 69121	Bolsa Chica State Park	Jefferson 1991b
mammoth	†*Mammuthus* sp.					
ancient bison	†*Bison* sp.					
Harlan's ground sloth	†*Paramylodon harlani*	12-20 feet	late Pleistocene, Rancholabrean	OCPC, no number as yet	North of Jamboree and Michelson, Irvine	Scott and Gust 2007, Gust 2010
ground sloth	†*Paramylodon* sp.					
sabre-toothed cat	†*Smilodon fatalis*					
carnivore?	Carnivora?					
western horse?	†*Equus occidentalis?*					
yesterday's camel	†*Camelops hesternus*					
ancient bison	†*Bison antiquus*					
bison	†*Bison* sp.					
Columbian mammoth	†*Mammuthus columbi*					
rabbit?	Leporidae?					
Botta's pocket gopher	*Thomomys bottae*					
gopher	Geomyidae					
squirrel	Sciuridae					
black vulture	†*Corygyps occidentalis*					
bird	Aves					
rattlesnake	*Crotalus* sp.					
pine snake	*Pituophis melanoleucus*					
snakes	Serpentes					
alligator lizard	*Elegaria* sp.					
oak	*Quercus* sp.					

† = extinct taxon

Miocene, back to shallow marine in the latest Miocene through the Pliocene, and finally to increasingly arid terrestrial deposits from the Pleistocene to the Holocene. In addition, younger sediments have been washed into the ocean by the action of streams.

The geology of the Fairview Park consists of middle to late Pleistocene old paralic deposits emplaced between 774,000 [774 ka] to 126 ka and late Pleistocene to Holocene young alluvial fan deposits less than 126 ka. No fossils were observed during the survey conducted for this project. Unnamed Pleistocene deposits have produced fossils of mammoth and camel less than half a mile to the north of the Project Area. While these fossils were approximately 15 feet below the surface, other nearby localities have been recovered from as little as six feet deep. Other extinct vertebrates recovered from unnamed Pleistocene deposits near to the Project Area include ground sloths, sabre-toothed cat, California tapir, horses, camels, bison, mammoths, proboscidean, and black vulture. Other megafauna recovered locally include deer and sea turtle, as well as a variety of small vertebrates that are found in southern California today.

Fossils recovered from the "Palos Verdes Sand" appear to have come from the old paralic deposits (Qopf) which are also mapped within the study area. This is a highly productive unit which has produced numerous marine and nonmarine fossils, many of which are still found in the California area today. Extinct vertebrates recovered from these sediments include ground sloths, dire wolf, tapirs, horse, llama, camels, bison, Pacific mastodon, Del Rey gannet, and flightless sea duck. Other megafauna recovered include mule deer, pronghorn, Steller sea lion, California sea lion, sea otter, elephant seal, whale, and sea turtles. The marine invertebrate record from these deposits is extensive with over 200 species known from the Newport Bay area.





Photos by Cogstone. Potential shell midden.



Photo by City of Costa Mesa.

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Biological Resources

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The field investigations conducted, and resource reports developed for the Master Plan Update, build upon a tremendous body of scientific field work that has been conducted at the project site for decades. In October of 1995 the City of Costa Mesa engaged Robert A. Hamilton, Consulting Biologist, to survey the existing biological conditions, along with biologist Tony Bomkamp to survey the vernal pools section and to make recommendations regarding the planning of the park. In June of 2007 LSA Associates performed an update to the 1995 survey of existing biological conditions. These reports and recommendations guided the development of the 2008 Fairview Park Master Plan Update. Since the 2008 update, additional field investigations and summary reports have been developed including the following:

- 2015 LSA BUOW Management Plan
- 2017, Glenn Lukos Associates Wet Season Survey for Listed Branchiopods
- 2019 Endemic Environmental Services Branchiopods Wet Season Survey
- 2019 Endemic Environmental Services OCME Train Track Nesting Bird Survey
- 2019 Tania Asef Wet Season Focused Surveys for Listed Fairy Shrimp Species
- 2020-2022 Sea and Sage Audubon Society Fairview Park Point Count Avian Survey

Rather than repeat studies documenting existing conditions, this master plan update leverages current knowledge about the park and conducted targeted investigations focused on mapping existing habitat; evaluating habitat quality for targeted species; and specifying what measures to include to protect the species, minimize permit requirements, and improve overall habitat quality. Two technical reports were developed including:

- 2023 Hamilton Biological Resources Technical Report Fairview Park (Appendix B)
- 2023 Vegetation Map and Habitat Restoration Opportunities for Fairview Park (Appendix C)

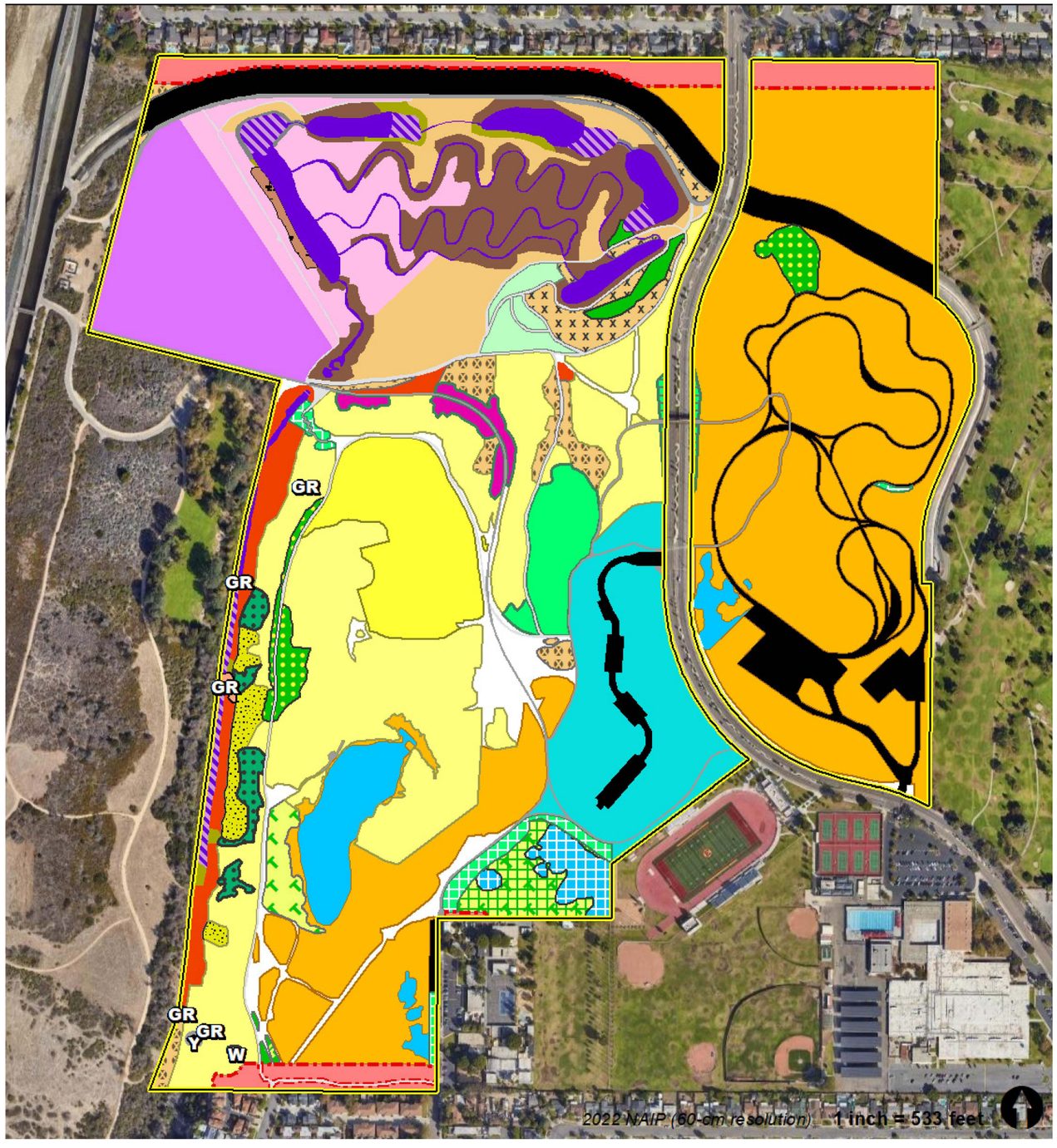
These technical reports support the Fairview Park Master Plan Update by offering an updated assessment of the park's vegetation communities, identifying appropriate habitat restoration and enhancement opportunities, and providing best practices for restoration projects. The report also presents invasive plant control guidelines to be integrated into the Long-Term Management Plan for the Fairview Park Master Plan Update to ensure the ongoing preservation of the park's resources. The report synthesizes biological resource findings made since the last Fairview Park Master Plan Update in November 2008, incorporating data from recent biological surveys conducted in winter, spring, and summer of 2023 by MIG, Land IQ, and Hamilton Biological.

Key components of the report found in Appendix B include:

- Description of 2023 vegetation communities in Fairview Park: Section 3 provides an overview of the various plant communities present in the park, including the unique vernal pool habitat, and highlights any changes observed since the previous Master Plan Update.
- Identification of ecologically appropriate habitat restoration and enhancement opportunities: Section 4 incorporates the vegetation assessment to identify targeted opportunities for habitat restoration and enhancement that will support the conservation of biological resources and protect cultural resources within the park.
- Best practices for restoration projects: Attachment A offers guidelines and recommendations to promote cost-efficient, high-quality outcomes for restoration projects in Fairview Park.
- Long-term invasive plant management plan: Attachment B provides recommendations for managing invasive plant species, which are crucial to maintaining the ecological health of the park and protecting its sensitive habitats.

The findings and recommendations made in these biological resources reports guide and inform the following chapters in this document including Chapter 04: Opportunities and Constraints, Chapter 05: Design Objectives, Chapter 06: Master Plan Recommendations, and Chapter 07: Implementation. By incorporating the information presented, the Fairview Park Master Plan Update can effectively address the critical need for a Long-Term Management Plan that safeguards cultural resources and conserves biological resources, including the essential vernal pool habitat. These reports serves as a valuable tool for informed decision-making and planning to ensure the future preservation and enhancement of Fairview Park's unique ecological features and cultural significance.

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Map Code | 2023 Vegetation Map Unit Common Name

- 1720 | Black Willow - Red Willow Riparian Woodland and Forest
- 1740 | Fremont Cottonwood – Red Willow
- 1810 | Mulefat Thickets
- 1820 | Arroyo Willow Thickets
- 1830 | Southern California Walnut Groves (W)
- 1840 | Sandbar Willow Thickets
- 1845 | Sandbar Willow – Blue Elderberry Thicket (Habitat Creation Project)
- 1910 | Giant Reed (GR)
- 2310 | Coyote Brush Scrub
- 2315 | Coyote Brush Scrub (Disturbed)
- 3110 | California Sagebrush Scrub
- 3120 | California Sagebrush – California Buckwheat Scrub
- 3125 | California Sagebrush – California Buckwheat Scrub (Restoration Area)
- 3145 | California Sunflower Bush – Ashy Buckwheat Scrub (Disturbed)
- 3150 | California Buckwheat Scrub
- 3195 | Purple Sage Scrub (Introduced Vegetation Community/Restoration Area)
- 3330 | Coast Goldenbush Scrub
- 3335 | Coast Goldenbush Scrub (Disturbed)
- 4210 | Wild Oats and Annual Brome Grasslands
- 4250 | Upland Black Mustard and Tocalote Fields
- 4255 | Upland Shortpod Mustard and Tocalote Field
- 4270 | Poison Hemlock or Fennel Patches
- 4310 | Fiddleneck – Phacelia Fields
- 6135 | California Bulrush – Cattail Marsh
- 6500 | Clustered Tarplant Fields
- 6550 | Clustered Tarplant Fields (Restoration
- 6600 | Pale Spike Rush Vernal Pool Bottoms
- 6650 | Pale Spike Rush Vernal Pool Bottoms (Restoration Area)
- 8120 | Coast Prickly Pear Scrub
- 9100 | Introduced Trees (Y)
- 9150 | Irrigated Lawn and Ornamental Landscaping Trees
- 9300 | Urban/Disturbed
- 9310 | Urban-Sidewalk/Bridge/Trail
- 9315 | Natural Soil or Decomposed Granite (DG) Tra
- 9320 | Fuel Modification Zone
- 9330 | Anthropogenic Areas of Little or No
- 9800 | Water Body
- 9810 | Rip-rap/Concrete Pond Liner

- Fairview Park Boundary
- Improper Fill Material (Extent in 2023)
- Vernal Pool High Estimated High Flood Mark
- Vernal Pool Watershed (Remaining, Undeveloped Extent)

2023 Vegetation Communities

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Botanical Resources

The botanical surveys in 2023 recorded 197 species of vascular plants in the park system, including several special-status species, most of them associated with vernal pools.

Plant Communities and Associations

Apart from 13 acres of turf and developed areas, vegetation at Fairview Park occurs within 195 acres of natural communities and vegetation associations, each hosting a suite of characteristic plant species.

Grasslands, which occupy the flatter upland portions of the park on either side of Placentia Avenue, consist mainly of non-native grass and forb species. A handful of native species are represented, including clustered tarweed (Deinandra fasciculata), great valley gumweed (Grindelia camporum), coast goldenbush (Isocoma menziesii), fiddleneck (Amsinckia menziesii ssp. intermedia), small-flowered microseris (Microseris douglasii var. platycarpha), and purple needlegrass (Nassella pulchra).

Scattered across the southern grasslands are vernal pools, the species composition and ratio of which varies considerably from pond to pond and month to month during the time of year when the soil is moist. All of the roughly 18 vernal pool indicator species previously recorded at Fairview Park were recorded during the 2023 field visits. The most widespread of these indicator species include low woolly-marbles (Psilocarphus brevissimus), common spike-rush (Eleocharis palustris), bigbract verbena (Verbena bracteata), water clover (Marsilea vestita), golden dock (Rumex fueginus), flowering quillwort (Trigochlin scilloides), California waterwort (Elatine californica), shortseed waterwort (Elatine brachysperma), pygmyweed (Crassula aquatica), Virginia cress (Planodes virginicum), American pillwort (Pilularia americana), and water starwort (Callitriche sp.). Rarer indicators of this sensitive habitat include San Diego button-celery (Eryngium aristulatum var. parishii), California Orcutt grass (Orcuttia californica), mud nama (Nama stenocarpa), little mousetail (Myosurus minimus ssp. apus), and prostrate vernal pool navarretia (Navarretia prostrata). Fairview Park supports the only Orange County population of several of these rare species.

Coastal bluff scrub, most of which shows signs of disturbance and invasion by non-native weeds, occurs on the west-facing slope above Talbert Regional Park. Characteristic native plants in this association include California boxthorn (Lycium californicum), bladderpod (Cleomella arborea), coast prickly-pear (Opuntia littoralis), and wishbone bush (Mirabilis laevis). Chilicothe (Marah macrocarpa) formed an extensive blanket over large areas of bluff scrub on this bluff in response to wet conditions in 2023. A few southern California black walnuts (Juglans californica) occur on the bluff in the southeastern corner of the park.

Alluvial scrub formerly occurred widely across the sandy northern lowlands of Fairview Park, prior to conversion of most of this area to created ponds and associated riparian scrub and woodland. Remnants of the alluvial scrub remain in the northwestern corner of the park, represented by sandbar willow (Salix exigua ssp. hindsiana), California evening-primrose (Oenothera californica), California croton (Croton californicus), Lewis's evening-primrose (Camissoniopsis lewisii), and coyote brush.

The **riparian woodlands and scrub** established around the ponds created in the northern lowlands include several species of willow (Salix lasiolepis, S. laevigata and S. gooddingii), yerba mansa (Anemopsis californica), California wild rose (Rosa californica), California bulrush (Schoenoplectus californica), California mugwort (Artemisia douglasiana), western sycamore (Platanus racemosa), marsh fleabane (Pluchea odorata), trailing blackberry (Rubus ursinus), and mule fat (Baccharis salicifolia).

Coastal sage scrub vegetation has been restored in the dry canyon north and west of the main park entrance off Placentia Avenue. Dominant species in this community include California Sagebrush (Artemisia californica), California buckwheat (Eriogonum fasciculatum), black sage (Salvia mellifera), purple sage (Salvia leucophylla), white sage (Salvia apiana), lemonade berry (Rhus integrifolia), coyote brush, coastal brittlebush (Encelia californica), and laurel sumac (Malosma laurina).

The 2023 surveys also recorded some expanses of non-native, invasive weed species that, in some cases, effectively exclude most native plants. These include black mustard (Brassica nigra), devil's thorn (Emex spinosus), sweet fennel (Foeniculum vulgare), artichoke thistle (Cynara cardunculus ssp. flavescens), and crown daisy (Glebionis coronaria).

Wildlife

Two federally listed invertebrates, San Diego fairy shrimp (Branchinecta sandiegonensis) and Riverside fairy shrimp (Streptocephalus woottoni), have been documented in some of the park's vernal pools. Their more common relative, the versatile fairy shrimp (Branchinecta lindahli), occurs more widely in pools

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Map Code | Habitat Restoration Targets (Common Veg Name)

- 1810 | Mulefat Thickets
- 1830 | Southern California Walnut Groves (W)
- 3120 | California Sagebrush – California Buckwheat Scrub
- 3140 | California Sunflower Bush – Ashy Buckwheat Scrub
- 3190 | California Sagebrush – Coast Prickly Pear Scrub
- 3210 | Black Sage Scrub
- 4310 | Fiddleneck – Phacelia Fields
- 6500 | Clustered Tarplant Fields

- Fairview Park Boundary
- Improper Fill Material (Extent in 2023)

2023 Vegetation Map and Habitat Restoration Opportunities for Fairview Park

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and small depressions. The two listed species were last observed at the park in 2017 (Glen Lukos Associates 2017); they were not detected during surveys conducted two years later (Asef 2019). Although it was not possible to collect and identify fairy shrimp during our field visits in 2023, fairy shrimp were observed in several ponds, and we consider it likely that all three species persist in the park.

Twenty species of butterfly were seen in Fairview Park during 2023, including the funereal duskywing (Erynnis funeralis), western pygmy-blue (Brephidium exilis), Reakirt's blue (Echinargus isola), Lorquin's admiral (Limenitis lorquini), American lady (Vanessa virginiensis), and western giant swallowtail (Papilio rumiko). Other invertebrates found in vernal pools at Fairview include unknown species of ostracods (Ostracoda spp.) and at least one species of copepod (Copepoda spp.).

Five species of amphibian have been reported in Fairview Park: Western toad (Anaxyrus boreas), California tree frog (Pseudacris cadaverina), Baja California tree frog (Pseudacris hypochondriaca), black-bellied slender salamander (Batrachoseps nigriventris), and southern California slender salamander (Batrachoseps major). Three species of snake and five species of lizard have been reported in Fairview Park: California kingsnake (Lampropeltis californiae), gopher snake (Pituophis catenifer), southern pacific rattlesnake (Crotalus oreganus), southern alligator lizard (Elgaria multicarinata), western fence lizard (Sceloperus occidentalis), common side-blotched lizard (Uta stansburiana), western skink (Plestiodon skiltonianus), and western whiptail (Aspidoscelis tigris).

Birds are the most conspicuous forms of wildlife at Fairview Park, where approximately 220 species have been recorded. Most have been reported to eBird; citations for additional taxa recorded during biological studies of the park are provided in the Appendix B species list. With the establishment of permanent ponds in the northern lowlands, various waterfowl have become regular there. Year-round residents include the Canada Goose, Mallard, Ruddy Duck, Pied-billed Grebe, various herons and egrets, Common Gallinule, and American Coot. Small numbers of White-faced Ibis, a special-status species, have nested in the created wetlands in recent years. Riparian scrub and woodland provide habitat for many species, including such special-status species as the Least Bell's Vireo, Yellow-breasted Chat, and Yellow Warbler.

During wet winters and springs, an array of waterfowl and shorebirds rely on the park's vernal pools for foraging and as resting areas. Ducks that use the pools include Blue-winged Teal, Cinnamon Teal, Gadwalls, American Wigeon, and Mallards. Shorebirds observed using the pools include Black-necked Stilts, American Avocets, Long-billed Curlews, Long-billed Dowitchers, Greater Yellowlegs, and Lesser Yellowlegs. Large flocks of swallows forage over the pools, including Barn, Tree, Cliff, Northern Rough-winged, and Violet-green.

Grasslands on either side of Placentia Avenue provide foraging habitat for several species of raptor, including Burrowing Owls, Northern Harriers, White-tailed Kites, and Red-tailed Hawks. Insectivores found in the park include Vermilion Flycatchers, Ash-throated Flycatchers, Western Kingbirds, Cassin's Kingbirds, Black Phoebes, and Say's Phoebes. Wintering species include various sparrows, such as White-crowned and Savannah, along with American Pipits, Western Meadowlarks, and other open-country species. Stands of non-native mustard that have developed on the mesa provide nesting habitat for Red-winged Blackbirds and Song Sparrows.

Coastal bluff scrub and coastal sage scrub in the park support small numbers of resident California Gnatcatchers, along with more widespread species, such as Song Sparrows, California Towhees, Spotted Towhees, Common Yellowthroats, and Orange-crowned Warblers.

Turf and trees in the developed parts of the park provide habitat for a number of species tolerant of humans, including Western Bluebirds, House Finches, Lesser and American Goldfinches, and wintering Yellow-rumped Warblers.

Sensitive Biological Resources

Federal, state, and local regulations exist to protect and conserve sensitive biological resources. For purposes of this report, a biologically sensitive resource refers to any of the following:

- A natural community recognized as having special-status by federal, state, and/or local governments, and requiring a permit or agreement prior to its disturbance.
- A plant or animal species identified by federal or state governments as endangered, threatened, rare, protected, sensitive, vulnerable, or a Species of Special Concern.
- A plant or animal species that is a candidate, or that is proposed for federal or state listing.


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Sensitive Natural Communities

The State of California (CDFW 2023) identifies as "Sensitive" the following natural communities that occur in Fairview Park:

- Vernal Pools/Native Grasslands
- Coastal Bluff Scrub
- Coastal Sage Scrub
- Riparian Scrub and Woodland

Special-Status Species

The special-status plants and wildlife that occur in Fairview Park, or that have realistic potential to occur there, are identified and briefly discussed are listed in Appendix B. To help determine which species warrant consideration in the report, the project team conducted a nine-quadrangle query of the California Natural Diversity Database CNDDB (2023), which yielded recent and historical records of 177 special-status species:

- 52 plant taxa
- 2 crustacean taxa
- 11 insect taxa
- 4 mollusk taxa
- 5 fish taxa
- 2 amphibian taxa
- 10 reptile taxa
- 72 bird taxa
- 19 mammal taxa

Facing page photo by Robert A. Hamilton

Through critical review of this extensive list, Hamilton Biological excluded numerous species that have no potential to occur at Fairview Park, except possibly very rarely. For example, the Fork-tailed Storm-Petrel is a special-status bird of deep ocean waters that could conceivably be carried onshore by gale-force winds, but because Fairview Park provides no effective conservation value for this seabird it has been excluded from further consideration. Furthermore, some wildlife taxa are given special status only during certain parts of their annual cycle—usually on the nesting grounds. Such species are considered "sensitive" at Fairview Park only if they have potential to occur in the designated manner. For example, the Sharp-shinned Hawk is considered a Species of Special Concern on its nesting grounds, but this raptor occurs in Orange County only during migration and winter and so is not included in Table B in Appendix B.

For special-status plant species, Table B in Appendix B includes 10 taxa known to occur in Fairview Park; one taxon that occurred in recent years but that may now be extirpated; four taxa with moderate potential to occur; and five taxa with low potential to occur. Table B also includes one plant taxon that has been erroneously reported to occur in Orange County.

For special-status wildlife species, Table B includes 24 taxa known to occur in Fairview Park; two taxa apparently extirpated from the park; five taxa with high potential to occur; five taxa with moderate potential to occur; and 15 taxa with low potential to occur. Table B also clarifies that Fairview Park lies outside of the described range of one mammal taxon found within several miles of the park, farther north along the coast.

Resource Protection Recommendations

Fairview Park supports a remarkable array of special-status plant and wildlife species, several of which are listed as threatened or endangered by state and/or federal governments. The park's combination of riparian habitats, coastal scrub, grasslands, and vernal pools is unique in Orange County, and rare anywhere in Southern California. In the past three decades, for reasons not fully understood but likely related to habitat degradation and fragmentation, at least two special-status species, the Cactus Wren and San Diego black-tailed jackrabbit, have become extirpated from the park and surrounding areas. Chaparral sand-verbena, a special-status plant species may also have died out, possibly due to brush clearance activities. Species that persist only in small numbers and/or in very limited patches of suitable habitat include southern tarplant, San Diego button-celery, vernal barley, little mousetail, prostrate vernal pool navarretia, California Orcutt grass, southwestern pond turtle, burrowing owl, and California gnatcatcher.

The most important threats to sensitive biological resources in Fairview Park come from human actions that destroy, degrade, and fragment the park's natural communities. The placement of numerous piles of fill dirt across the western mesa during the late 1980s, with the intent to cap archaeological resources prior to establishing sports fields that were planned but never built, created an ecological limbo for natural resources on the mesa. Approximately two acres of this fill were later removed to restore a large vernal pool that had been buried, but this left more than 20 acres of disturbed, weedy habitat, crisscrossed by an extensive lattice of informal trails.

Not only do the dense weeds in this area persist and spread to other parts of the park, but they render the northern half of the mesa effectively incapable of being maintained and managed through routine methods. In recent years, cyclists, e-bike riders, and remote-controlled vehicle enthusiasts have expanded a barren area on the east side of the mesa while establishing a new riding track farther west, in the middle of the fill-pile area. To prevent and reverse the loss of natural lands to such unauthorized active uses, the recommendations in Chapters 06 and 07 of this document provide guidance and a feasible approach to restoring and managing the most disturbed parts of the park to protect and enhance these unique resources.

Additionally, Hamilton Biological has documented evidence of intentional destruction of listed plant species in some of the vernal pools at Fairview Park. The Master Plan recommendations and implementation guidelines incorporate specific protections against such malicious actions including protective fencing and educational opportunities for the public to learn about the federal Endangered Species Act and consequences of its violation.



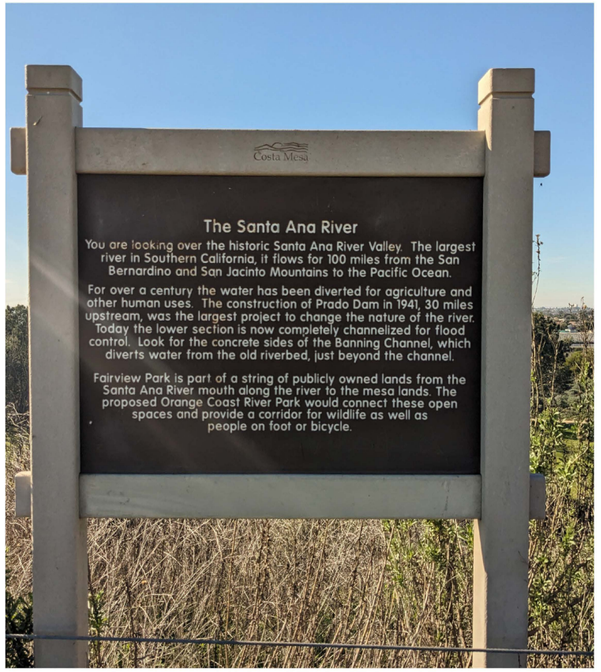
Photo by Robert A. Hamilton

Site Features

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Fairview Park offers a blend of natural open space, recreational amenities, and unique attractions that support passive recreation and community use. The park contains an extensive network of trails for walking and bicycling, which link to other recreational areas and provide access to diverse landscapes. Supporting infrastructure includes pedestrian bridges, benches, picnic tables, a shaded picnic pavilion, restrooms, interpretive and monument signage, trash receptacles, and dog waste bag stations, ensuring accessibility and user comfort.

Approximately 13 acres of lawn area provide more traditional park amenities within the predominantly natural setting. Two unique facilities are operated in partnership with non-profit organizations including a narrow-gauge miniature railroad, which offers an educational and recreational attraction for visitors, and a model glider flying field, which serves as a dedicated space for hobbyists.







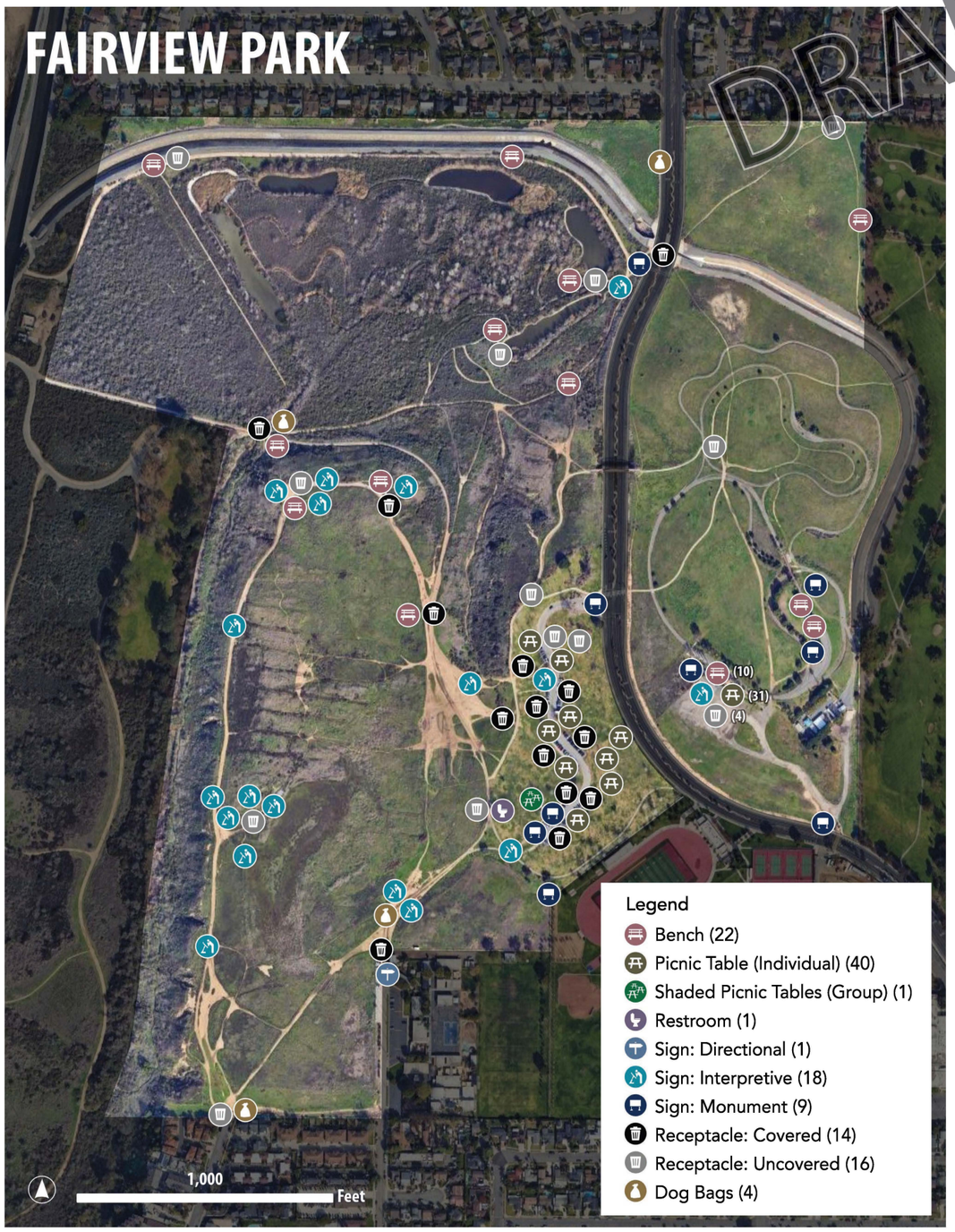




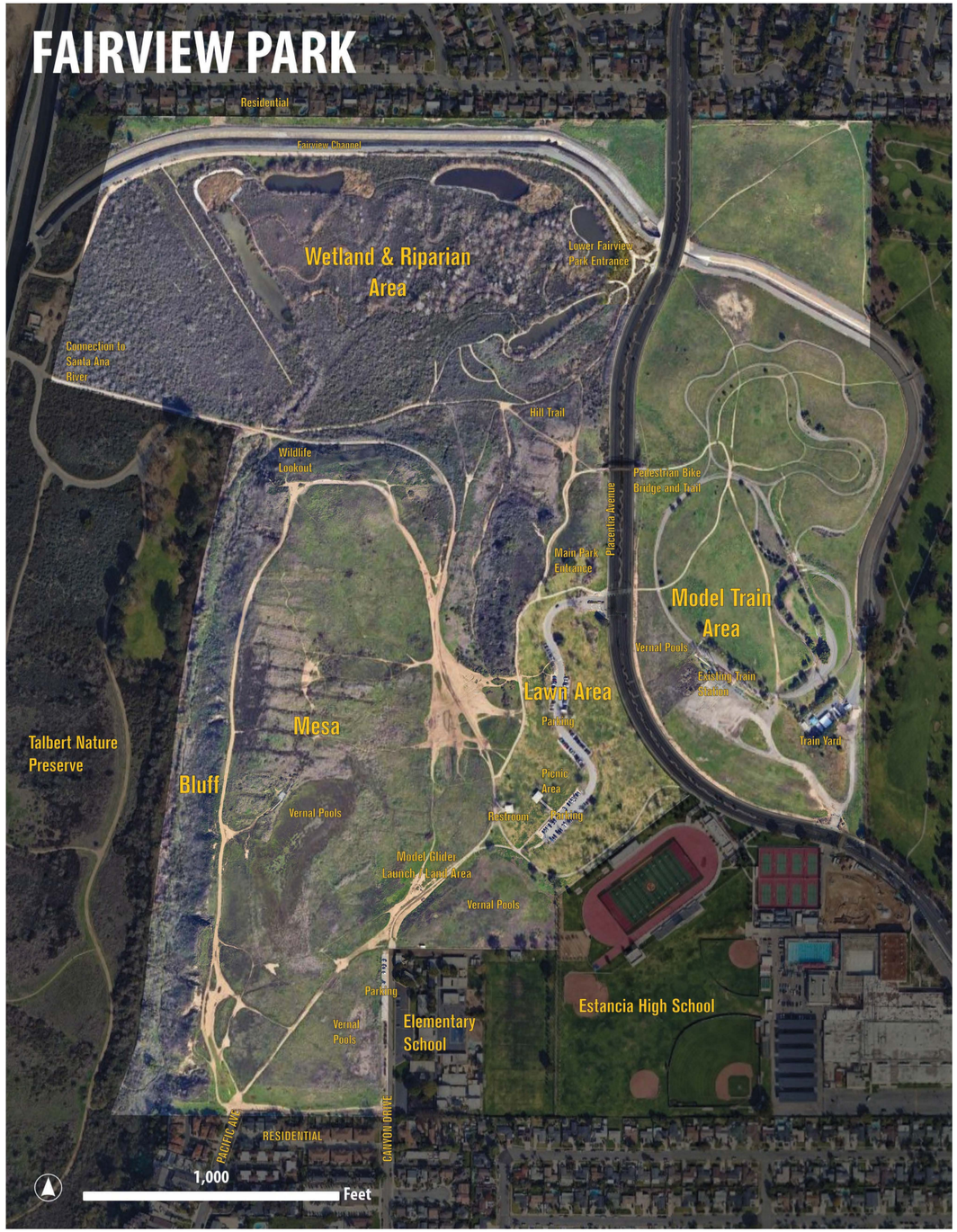
Photos by MIG Inc.



Fairview Park Site Signage Maps



Fairview Park Site Furniture Maps



Fairview Park Site Existing Conditions

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04 Opportunities & Constraints

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Considerations

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Alignment with goals and objectives

Fairview Park is a beloved cultural and natural resources asset for the community of Costa Mesa and the region. The park is a unique and culturally and ecologically valuable site for the region. Fairview Park has two Nationally Registered Cultural Resource Historic Sites and serves as the gateway to the Santa Ana River Trail and a connection to rich natural coastal resources for residents and visitors. The Master Plan Update presents the opportunity to play an important part in telling the greater story of this 208-acre parkland and conservation area. Restoring and preserving the park as an environmental resource for study, interpretation, and education as well as passive recreation is a challenging and meaningful goal in alignment with the project goals and objectives outlined in chapter 01 including:

- Protect, preserve, and enhance the unique natural and cultural resources of Fairview Park.
- Restore, and enhance the park as an environmental resource, and provide interpretive opportunities to educate visitors about the park's unique ecology, cultural history, and resources.
- Manage the park as a passive recreational opportunity.
- Engage stakeholders, users, and the community at large in developing a blueprint to manage the park, which accounts for passive use recreation, environmental restoration and preservation, and funding considerations for years to come.

Maximizing benefits

Protecting biodiversity is central to regional conservation and human well-being. In cities like Costa Mesa, nature regulates flooding, mitigates water pollution, and captures carbon from the atmosphere. Urban nature can improve human health by reducing air pollution and exposure to extreme heat, promoting active lifestyles, and improving psychological well-being. While traditional parks also can provide similar benefits, there is a wide range of positive health responses to cues from environments that are more natural and more biodiverse, such as lowered heart rates, increased concentration, lower cortisol levels and improved mood. Protecting and enhancing biodiversity at Fairview Park is critical for preserving natural spaces where people and other species can thrive. In addition to the human health benefits, exposure to wildlife can inspire awe and foster a sense connection to place for residents, which can motivate stewardship and investment in conservation of place. Evidence of this effect can be seen in the active community-based organizations supporting and invested in this special place.

Facing page photo by Robert A. Hamilton.

Balancing human activities with ecological process

Understanding and working within the natural, cultural, and ecological processes of the site will be a touchstone throughout the planning process. The Master Plan Update provides the opportunity to incorporate ecologically-friendly design and to strategically plan for the protection and enhancement of biological and cultural resources on the site. Achieving this objective requires planning and guidance informed by science including the following ecological principles:

- **Patch Size** – One of the most predictable patterns in ecology is the relationship between the size of a habitat patch and the number of species found within it. At 208 acres, Fairview Park is a large and ecologically important habitat, especially for the area-sensitive species that are restricted to this type of regional biodiversity hub for rare and threatened species. Preserving large habitat areas without human disturbance provides the opportunity to support the life cycle and habitat needs of substantial populations of plant and animal species.
- **Connections** – Features in the landscape that facilitate the movement of plants and animals and landscape with high connectivity support higher numbers of species. Opportunities to increase connectivity exists by filling in breaks where the continuity of vegetation is created either by human use, erosion or invasive species. Additionally, removing barriers, or increasing connections across existing barriers allow organisms to move freely to access resources and a variety of habitats during different life stages. By considering the vernal pool watershed as interconnected, rather than discrete features, we can enhance hydrological connectivity by removing barriers and reconnecting the entire watershed to the vernal pool features. This will enable movement of aquatic species among different habitat types across seasons and life stages. Opportunities exist to prioritize hydrological connectivity and connections between different habitats.
- **Management** – Improving the way humans manipulate the landscape can help support more species and strategic stewardship of vegetation can improve its habitat value. Avoiding vegetation removal during bird and mammal breeding seasons can help reduce the impact of these activities on wildlife. Retaining vegetative debris and leaf litter, seeds and fruit can also increase food availability and improve soil health. Soil compaction and degradation can impede native vegetation communities from establishing. Opportunities for soil quality improvements through mulching, soil decompaction, and in some cases removal of degraded soil, can benefit native plants and the animal communities that depend on them.

Constraints

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Analysis of the overall natural setting and planning/jurisdictional context reveals many opportunities and constraints upon the planning of the park and the proposed uses. Many features considered are constraints to one form of improvement and opportunities for another and therefore are listed as both opportunities and constraints.

Placentia Avenue

The major vehicular arterial of Placentia Avenue divides the site into two distinct sections. This division has been somewhat relieved by the signalization of the existing park entrance intersection and construction of a pedestrian bridge connecting over Placentia Avenue. However, the road continues to physically separate the park for users and serves as a barrier for species that can not effectively cross the street, such as small ground-dwelling species.

The Fairview Channel

The drainage structure and fences of the Fairview Channel divide the eastern portion of the site into north and south sections. The opening of a pedestrian bridge to pedestrian and bike traffic creates a link between these two sections of the park. On the western side of Placentia Avenue the Channel imposes less of a divisive element, but does create a 50-foot-wide strip of land along the rear of homes facing Swan Drive, which is unsuited to public uses due to the proximity to those homes.

Steep Slopes

The topography of the western bluffs constrains development of park activities other than habitat restoration and enjoyment of the views afforded by their elevated position. These bluffs must be protected from erosion associated with pedestrians and wheeled traffic. The northeastern park area also contains steep slopes in the vicinity of the Fairview Channel.

Bluffs and Erosion

The bluffs contain several sites where erosion will require treatment to preserve the bluff and trails. With the absence of any restraint to traffic, vegetation has become compromised and erosion is developing deep canyons that threaten to continue to carve into the Mesa.

Archaeological Resources

The important resources of the archaeological sites require protection and preservation. Development of active uses or construction of fencing, signage and trail enhancements in the entire park site will require compliance with measures outlined in the Cultural, Tribal Cultural, and Paleontological Resources Assessment for the Fairview Park Master Plan including monitoring and study by a qualified cultural resources and Native American monitor.

Existing Park Entrance

The existing entrance represents significant prior investment and is located in a suitable location for traffic safety on Placentia Avenue. Improvement of existing signage and landscaping along with removal of traffic spike strips will improve visitor experience of the park.

Existing Fill Soils

The western portion of the site contains fill soils placed as a cap for the archaeological site CA-ORA 58. These soils were not graded smoothly when placed, and were further disturbed in the investigations to determine the boundaries of the site. The soils are known to contain asphalt, concrete, mortar and other construction debris in significant amounts. Prior to the discovery of the vernal pools as a sensitive natural resource, fill soils were placed in portions of the largest pool. Portions of this pool have been restored by removing the fill soil, and, as funds become available, this restoration of natural grade at the pools is to be continued. Due to the fill soils being contaminated and improperly placed, an acceptable protective cap for the archaeological site has not been achieved and is no longer required for protection as the old plans for development of sports fields and active recreation have been removed from the Master Plan Update recommendations.

Drainage and Flooding

The southern border of the site at Canyon Drive to Pacific Avenue experiences seasonal flooding, which extends into the rear yards of adjoining residential properties. Care must be taken in correcting this problem not to disturb the vernal pools or create bluff erosion.

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Vernal Pools

The discovery of the vernal pool complex more than 30 years ago has significantly affected subsequent planning in the park. These resources fall under the protection and control of the US Army Corps of Engineers and the US Fish and Wildlife Service. Not only are these important biological resources, which should be preserved and restored, but the regulatory agency restrictions on management and protection of these resources will guide the recommendations of the Master Plan Update.

Existing Park Facilities

The park contains an existing thirteen-acre area of lawn and trees with parking. The parking is centralized within the park; allowing access to all areas, and the parking area and lawn areas provide for picnicking and gathering within the park.

Existing Narrow-Gauge Railroad

Since 1988, the Orange County Model Railroad Engineers, Inc., a club open to the public, has been granted permission to construct and operate a rail system in Fairview Park, on the east side of Placentia Avenue. Over three miles of track have been constructed by the club. Free train rides are offered to the public on the third weekend of each month. Attendance at these weekends exceeds 50,000 persons per year. The presence of the tracks and the intermittent train traffic is consistent with the passive use goals of the park, and is compatible with other uses, such as walking, picnicking, and habitat enhancement.

Sewer Connection

The Costa Mesa Sanitary District installed sewer lines in Fairview Park on the east and west sides of Placentia Avenue in 2000.

Measure AA/Costa Mesa Municipal Code

In 2016, citizens adopted Measure AA, which requires that new permanent constructed improvements and significant changes require approval by a majority vote of the Costa Mesa electorate. The Code also includes several exceptions to the voter approval requirement including changes for restoration purposes, preservation purposes, public safety, and other exceptions as defined in the code.







Photos by MIG Inc.

Opportunities

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Remnant Native Plant Species

All areas of the site have been changed from their natural conditions by human activity. Pockets of remnant native plant communities exist on the site and the opportunity exists to preserve and restore these plant communities. These plant communities are described in Appendix B. Though all areas of the site are disturbed and contain many non-native species, remnant habitats and analysis of existing soils and historical ecology indicate the potential for restoration of healthy plant communities and wildlife habitat.

Archaeological Resources

The existence of documented archaeological sites within the park presents strong opportunities for education and interpretation. The fact that CA-ORA 58, the bluff-top site has been well researched and documented will allow a rich story to be told concerning the people who occupied this site three thousand years ago. The preservation and protection of the archaeological sites is compatible with the passive uses proposed by the plan.

Trail Linkage

The Costa Mesa General Plan includes a Master Plan of Bikeways that calls for connections to the Santa Ana River Trail system through Fairview Park. The Bikeway Plan also calls for a Class 3 bikeway connection in the vicinity of Canary Drive. In the north-south direction the park trail system can offer trails allowing pedestrian and bike traffic to avoid the heavily traveled Placentia Avenue. In the east west direction the park can provide access to the extensive pedestrian and bike trails along the Santa Ana River. These trails are reached through Talbert Nature Preserve trails which connect to bridges over the Greenville-Banning Channel and the Santa Ana River. By connecting to the Talbert trails system access is also provided to the extensive hiking and interpretive opportunities within the Nature Preserve. The Canary Drive pedestrian and bike trail connection is separated by a twelve to fifteen foot grade change at the park boundary. The opportunity exists for trail connection here if the obstacles of grade and water mains can be overcome.

The bridge over the Fairview Channel, which exists at the eastern tip of the site, allows for pedestrian and bike traffic. The connection of trails to this bridge provides an important link to the isolated northeast corner of the site from the railroad area.

Photo by MIG Inc.



Link With Adjoining Habitat Restoration

Talbert Nature Preserve is a 90-acre restoration of native habitat completed by the County of Orange. The opportunity exists to soften the hard-edge boundary between these two parks and to expand upon the work which has been established in Talbert Nature Preserve.

View Opportunities

The bluffs offer extensive views to the north and west over the Santa Ana River. These views can be enjoyed from trails along the bluff. The northeast corner of the park contains a high plateau, which can be reached by new trails from Placentia Avenue or from the train area via the bridge over Fairview Channel.

Existing Narrow-Gauge Railroad

The existing railroad operation is a popular feature of the park by providing free train rides to the general public and accommodating private gatherings. The low traffic on the rails and minimal impact upon the landscape, allow for the introduction of other low-impact activities such as walking, bicycle riding and a small picnic area. These added activities can share parking facilities with the train area and enhance the train experience as well as function alone in this area.

Existing Park Facilities and Parking

The existing 13 acres of lawn and trees with parking for 106 cars represents an open space asset for the Costa Mesa community. These facilities are able to accommodate picnicking and passive recreational activities as well as orientation and a trailhead to locations throughout the park. A centralized interpretive area for the entire park can be located within the developed park area.

Vernal Pools

The vernal pool watershed is a rare and sensitive biological area and is a constraint to park management and recreational activities. When viewed in the context of a passive park they can become an opportunity in that their restoration and protection as rare natural features offer unusual possibilities for observation and interpretation by the public. While the pools require protection from human disturbance, consolidated trails along their perimeter provide access and interpretive opportunities and enjoyment of these unique and interesting ecosystems.

Grades allow Placentia Avenue Crossing

North of the existing western entrance Placentia Avenue begins to descend in elevation. Approximately 300 feet north of the intersection adjoining grades in the park are 16 feet higher than the roadway. A pedestrian bridge was constructed in 2006 to connect the east and west portions of the park.



Photo by Robert A. Hamilton

Habitat Restoration

Fairview Park supports a remarkable array of special-status plant and wildlife species, several of which are listed as threatened or endangered by state and/or federal governments. The park's combination of riparian habitats, coastal scrub, grasslands, and vernal pools is unique in Orange County, and rare anywhere in Southern California. The most significant threats to sensitive biological resources in Fairview Park come from human actions that destroy, degrade, and fragment the park's natural communities. However, this Master Plan Update provides the tremendous opportunity to reverse those threats and conserve, restore, and enhance the astounding diversity and abundance that remains through strategic habitat restoration management and planning. Restoration efforts have been occurring on this site for decades and have made substantial positive impact on the people and plant and animal species that call Costa Mesa home.



Habitat Restoration Opportunities

Facing page photo by Robert A. Hamilton.


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05 Design Objectives

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Photo by City of Costa Mesa

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The overall master planning goals and objectives are drawn from the writings, minutes and statements of the Fairview Park Steering Committee, the physical analysis of the site and current planning conditions, and from citizen comment during the Master Planning process. The overwhelming consensus is to continue a park for passive use by individuals and small groups and to enhance the natural environment of the park for those uses and as a habitat preserve.

Fairview Park is unusual in that even though the major portion of the site is undeveloped, it has been open to the public for many years. Thus, the public image of the park as being expansive, open, and natural is well defined. The work of the Fairview Park Steering Committee, biological and archaeological consultants and the master planning consulting team has developed scientific information about the site, documenting its valuable resources and its potential for habitat restoration. The conclusions of the research are in accord with the desires of the public for an open, natural site. The Master Plan Update chronicles the scientific basis for a naturally restored park, but in addition, a critical function of the Master Plan Update is to define ways of providing for public uses that are compatible with and complement the restored park concept. The following summarizes goals and objectives developed during the Master Plan process:



RESTORATION



PUBLIC USE



BIOLOGICAL

Public Use

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1. **Allow the park visitor to interact with a natural landscape and to experience a level of solitude, which is rare in the urban environment.**

   - Provide opportunities for walking or bicycling throughout the site to experience a variety of landscapes and habitat areas.
   - Provide for visual continuity and continued openness so that the totality of the park site can be readily experienced.
   - Design park features to be subtle and low impact, so as not to distract from the natural setting.

2. **Inspire and educate the public regarding the historical, archaeological, and biological significance of the site.**

   - Develop an interpretive program including signing, docents, programs for schools, and the public.
   - Encourage the development of a continuing non-profit support group.
   - Provide interpretive signing in key areas of the park.
   - Provide a central interpretive area as an introduction to major park features.

3. **Provide for access, public facilities, and developed park areas in a manner, which is compatible with the natural habitat restoration and archaeological preservation to occur in the major portion of the site.**

   - Utilize the size and configuration of the site to separate developed recreational amenities and uses from the more natural portions of the site.
   - Provide features for more intensive public use (such as lawn, picnic, and nature play areas) within the existing developed park site or existing more developed uses (such as the model railroad site).
   - Provide for the continuation of the organized uses that have historically occurred on the site, including model railroading, model airplane, and model glider flying in accordance with resource agency recommendations for the protection and preservation of biological and cultural and Tribal cultural resources.
   - Provide for walking, running, and bicycling along defined trails.
   - Utilize and improve existing trails as much as possible.
   - Consolidate and define walking trails to minimize fragmentation of natural habitat communities and restrict public access and the establishment of user defined trails within the vernal pool watershed.

4. **Provide additional opportunities and services for low-impact park use.**

   - Provide an enhanced setting for the model railroad area and model gliders.
   - Provide a landscaped setting on the eastern area of the park that will enhance ecologically appropriate habitat and support conservation of biological species throughout the park and enhance the visitor experience.
   - Enhance existing picnic areas and provide additional picnic facilities for small groups and on the eastern portion of the site within the footprint of exiting developed landscape areas.
   - Provide nature play areas.

5. **Provide for public safety.**

   - Provide trail access for public safety and emergency vehicles.
   - Stabilize the bluffs and provide safer access across them.
   - Provide buffer areas for fire-wise planting adjacent to residential areas.
   - Provide increased opportunities for walking and bicycling away from vehicular roadways.
   - Maintain the open quality of the park that allows for visibility over the park area for observation of any public safety problems.
   - Design park improvements in conformance with public safety codes and Americans with Disabilities Act requirements.

Cultural, Tribal Cultural & Restoration

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01 Remove existing artificial fill with minimal damage to the resources underneath.

02 Protect archaeological sites from unauthorized collecting and damage. Enhance and re-establish habitat for native plants and wildlife.

03 Base restoration plans on scientific recommendations related to the existing site characteristics and the best available information on pre-existing natural habitat areas.

04 Conform to the federal and state restrictions concerning existing ecological resources.

05 Coordinate restoration plans with regional and adjacent restoration and preservation efforts, in order to provide continuity of habitat and address endangered habitat concerns.

06 Protect restoration areas from damage and intrusion.



Photo by Robert A. Hamilton.

06 The Master Plan

DRAFT



The Master Plan presents a park for a multitude of passive recreational uses, and continued enhancement of the site's unique natural features. The large size of the park allows for multiple passive recreational uses. The landscape includes lawn areas for recreational play activities and picnicking, and large areas of restored native plant communities. The Master Plan provides designated areas for organized user groups (i.e. model gliders and trains) to allow the continuation of uses in accordance with current Resource Agency recommendations. A trail system will provide access by foot, bicycle, wheelchair, park maintenance vehicle, and emergency and security vehicles. Interpretive opportunities are to be subtly provided as part of the trail system. Defined trails offer the possibility for a roaming walk among undeveloped nature for those seeking solitude or to explore the varied terrain of the mesa, bluffs, and low alluvial plain. Natural areas will contain extensive areas of restored local native plant communities.

The Master Plan Update is intended to provide a framework for the habitat restoration and enhancement and improved trails and signage system. Completion of the recommendations of the Master Plan Update will undoubtedly be by phases. Some change in anticipated uses may be expected, however, the overall policy direction for passive, natural habitat preservation and restoration is to guide all detail development decisions. The Master Plan Update will guide the creation of a rich and varied park which will serve the residents of Costa Mesa for generations to come.

The following pages provides detail to the Master Plan Update by geographic section of the park.



Park Entrance & Parking

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The main vehicular entrance to Fairview Park is located on the west side of Placentia Avenue near the north end of the lawn area, and can be accessed from northbound or southbound Placentia Avenue. This existing entrance to Fairview Park is currently controlled by a traffic signal. Parking for 106 cars is currently provided in the existing 13-acre park area west of Placentia Avenue. These spaces are to be retained. Existing parking for 26 cars opposite Waldorf School is to be retained.

The eastern vehicular entrance connects to informal parking for approximately 110 cars. This parking area will serve the train area, picnic areas, and trail system in the eastern park. This parking area is controlled by the traffic signal in the southeastern corner of the park at the Estancia High School intersection.

Buses unload in the paved parking areas near the interpretive area or near the train station. Buses park in car spaces or stage in nearby circulation areas. In order to make efficient use of parking and paving areas, no “bus only” parking is provided.

Park entrances and parking areas will be enhanced through the use of native vegetation, pollinator patches, and signage to reflect the unique identity of Fairview Park. Removing invasive ornamental species, such as Pride-of-Madeira, and replacing these areas with native species representative of the vegetation communities found within the park and applying a strong aesthetic composition will serve to enhance the street appeal of the park and entice exploration.











Photos by MIG Inc.

West of Placentia Avenue

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Existing Park Improvements

The thirteen acres of existing lawn, trees, and parking are to remain. As funding or volunteers are available, additional trees should be planted to shade the parking lot to enhance human comfort. The addition of trees is not encouraged outside the parking areas west of Placentia. Trees are only to be replaced if removed at a one-to-one ratio. Open and unobstructed lawn is to be maintained for play activities and gathering spaces. The western edge of the existing lawn is to be bordered with native vegetation and delineated trailheads to create a sense of exploration and orientation to the park trails system.

Group Picnic Site and Restroom Facilities

This location serves the existing developed park area and users of the trail system, small group gathering spaces and the play lawn. Proposed nature play features, enhanced site amenities, and a central interpretive area will enhance and expand the educational and conservation goals of the Master Plan Update. Consolidating program spaces for passive recreational and educational activities in this area will focus energy and connection, while limiting the footprint of these activities.

A large picnic shelter provides shade and rain protection. Restroom facilities are also provided in this area of the park located near the central interpretive area on the route to and from parking. This location serves the existing developed park area, the trail system and visitors to the central interpretive area.

Central Interpretive Area

The proposed central interpretive area is located west of the existing park lawn, near the existing restroom and picnic shelter. This area is to serve as a starting point for learning about the Native American Tribes cultural history, European settlement history, ecology, archaeology and biological resources of the site. The center is not to contain buildings or other structures. The story of the site can be told through creative and low-profile signage elements. The site will allow for self-guided discovery suitable to children and adults. Additional signage should be located at key locations around the site to explain the life of the vernal pools, the various plant communities and habitats, the shell midden, the prehistoric river setting, and the Spanish Mission use of the site.

Glider Launching Sites

The existing fly field activity, currently located within the vernal pool watershed should be relocated due to detrimental impacts to sensitive biological resources associated with the activity and required maintenance of the fly field.

The Master Plan Update recommends moving the current site to another portion of the park to comply with resource agency recommendations. To avoid regular mowing and prevent colonization by ground-dwelling species, a compacted and stabilized decomposed granite paving area should be provided for the relocated launch site. Proposed improvements for the relocation site include an approximately 300-by-50-foot runway (partially surfaced with decomposed granite), pilot stations and pit area, a storage shed, an information kiosk, and installation of a low post-and-cable barrier.

Vernal Pools

The vernal pools are discussed in depth in Appendix B. The pools and basins are to be retained, restored, and protected. Protection involves prohibiting pedestrian and bicycle traffic from entering the seasonal boundary of the pool or basin with fencing and signage, while making only a limited visual intrusion. The plan calls for a fence to be located at the trail edge to keep visitors on established trails.

Archaeological Site CA-ORA 58

The very rich deposit of evidence of early human use of the site adds an exciting and interesting element to the Fairview Park story. The core area covers 14 acres of the northwestern bluff edge and yet many pass by without any knowledge of culture which once flourished here. A program of signage and display at the interpretive center is to make this story part of the Fairview Park experience.

Appendix D discusses the treatment of this important site in detail. Due to the mixing of construction debris and other contaminants in the fill cap, the existing fill deposits are to be removed. Restoration of the native vegetation to the site will not require the replacement of the protective cap fill soils. Access to the general area of the site is to be discouraged in order to protect cultural and Tribal cultural resources.

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Trail Delineation

To protect sensitive cultural and biological resources within the park, large areas of the park will require enhanced protection from bike and pedestrian traffic. Where trails pass through habitat restoration areas the route is to be defined by post and rope, or post and rail fencing. This delineation system should be held back from the trail edge approximately two feet in order to recede into the planting as much as possible. All pet animals brought to the park are to remain on leashes at all times.

Access to Talbert Nature Preserve

Trail access is provided to Talbert Nature Preserve at two points along the western boundary of the site. At the north a pedestrian trail passes through the Sandbar Willow habitat to join the Talbert trail near the Greenville-Banning Channel. A constructed staircase located at northwestern portion of the Mesa connects Fairview Park to Talbert Nature Preserve across the existing bluff.

Bluff Erosion and Access

Improper use of the bluff face for recreational riding of wheeled vehicles and climbing has created numerous areas of erosion and defoliation. The short-term enjoyment which some derive from this destructive activity does not outweigh the need to restore and protect the remnants of sensitive coastal bluff scrub and the landform itself. Existing fencing along the bluff trail should be repaired and educational signage enhanced to further preserve and protect this unique natural feature.



Photos by MIG Inc.

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Section 07 discusses structural management measures, which may be employed to control bluff erosion. The use of a "geoweb" or small check structure system will provide a measure of control without visual intrusion or heavy grading. The goal is to stabilize the bluffs at the current condition and allow for a vegetation cover and root systems to return.

Coastal Bluff Scrub Restoration on the Bluffs and Central Canyon

The slopes of the west facing bluffs are to be restored with Coastal Bluff Scrub and the north facing bluffs are to be restored as Black Sage Scrub. These plant communities reflect the natural vegetation for this soil, topography and exposure and is valuable habitat for the endangered California gnatcatcher. As a sensitive habitat area, and with respect to the erosion conditions on the bluffs, this is a sensitive area and is to be protected from erosion and further degradation.

Mesa Restoration

The southern portion of the Mesa from the bluffs to the existing developed park retains many species of the native grassland. This area is to be restored, as is the northern part of the mesa after the fill soil removal. The overall appearance of the restored area will retain the open flower-field-like feel of a broad open wild area. A portion of the Mesa Restoration includes the Coastal Sage Scrub (CSS) and Flower Fields Restoration Project, which the City of Costa Mesa, in partnership with Orange County Transportation Authority (OCTA), will restore 15.35 acres of critical habitat on the northern mesa. This initiative will fulfill mitigation obligations, improve conditions for native wildlife, and reinforce the City's commitment to the Master Plan. The project includes 11.91 acres of habitat restoration, 1.27 acres of habitat enhancement, and 2.17 acres of revegetation and weed management buffers to protect and improve ecological integrity. Restoration will focus on native plant communities such as Black Sage Scrub (6.78 acres), Fiddleneck–Phacelia Fields (7.3 acres), California Sagebrush–California Buckwheat Scrub (0.1 acre), and Purple Sage Scrub (1.17 acres), while ensuring protection of biological and cultural resources during implementation.



Photos by MIG Inc.

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Although part of the site lies within the historic vernal pool watershed, decades of farming, grading, and improper fill placement have disrupted the hardpan soils, preventing seasonal ponding and vernal pool formation. Restoration of the watershed through fill removal is identified in this master plan as a key long-term goal. Surveys conducted in 2017 (Glenn Lukos Associates) and 2023 (Hamilton Biological) confirmed no ponding, rare plants, or fairy shrimp within the project footprint, though these species persist in nearby natural-grade ponding areas where openings in the fill allow for water to collect.

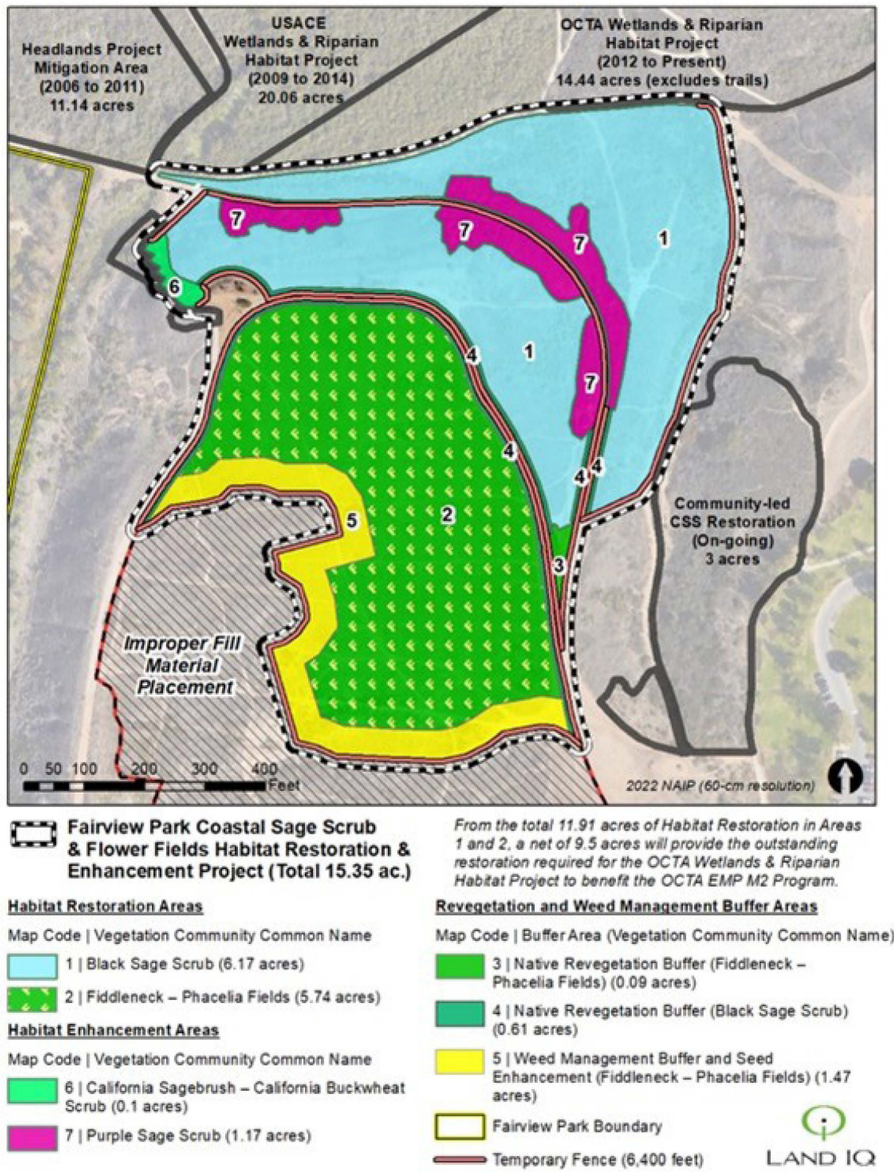
Execution of this project will contribute significantly to the conservation and restoration of critical habitats within Fairview Park. It is also a significant step toward park stewardship benefiting local wildlife, protecting Tribal cultural and biological resources and providing visitors a restored place to connect with nature.



Example of Native Common Fiddleneck on the Northern Mesa in Late Winter 2023.



Example of Nonnative Shortpod Mustard, Black Mustard, and Tocalote on the Northern Mesa in Spring 2023.



East of Placentia Avenue

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Canary Drive Access and Facilities

The area of the park, which lies east of Placentia Avenue, is further divided by the Fairview Channel, a concrete-lined storm drain, which isolates the northern area of 9.8 acres. A trail connection to the end of Canary Drive provides for local community access to Fairview Park. Facilities in this area must be kept very limited in scope in order not to attract vehicular traffic for which there will be no suitable parking. Benches are to be provided which allow for enjoyment of the expansive views available from this site. No play equipment, restrooms or group picnic facilities are planned for this area. The trail system will connect three points: the point where Placentia Avenue crosses the Fairview Channel, the end of Canary Drive, and the bridge over the Fairview Channel. The northern boundary is to be connected to a water source providing irrigation within 100 feet into the park and following defensible space guidelines established by the Orange County Fire Authority and The California Department of Forestry and Fire Protection (Cal Fire) .

Narrow-Gauge Railroad Operations

South of the Fairview Channel and east of Placentia is the site of the existing narrow-gauge model railroad operations. Over three miles of narrow-gauge track, bridges, station paving and a work area (steaming bay) are in place. The railroad is operated by the Orange County Model Engineers, Inc., a club consisting of enthusiasts who own the trains and have constructed all of the facilities at no cost to the City of Costa Mesa. The railroad is to be retained with its track system in its current location. The station area of the model railroad has been expanded to include permanent toilet facilities and a gift shop. Space is available for minimal expansion of the station, which provides shade for waiting passengers and small group gatherings. An additional rail line planned to be north of the existing northern extension of the railroad will complete the track layout on the east side of Placentia Avenue. The train tracks are not to extend their footprint into existing, or proposed habitat restoration areas. Development and implementation of an interpretive program is encouraged for the train operations offering passengers the opportunity to learn about the early human occupation of the site, the historic ecology and the native plant communities and wildlife of Fairview Park.

Bridge over Placentia Avenue

By connecting the east and west portions of the park with a pedestrian bridge, an iconic view and safe passage for pedestrians and bicyclists is created; overcoming some of the park fragmentation created by Placentia Avenue.

Trails for Cyclists and Pedestrians

Trails east of Placentia and south of the Fairview Channel link five points: Placentia Avenue at the point of crossing the Channel, the bridge over the Fairview Channel, the main pedestrian entrance and street level crossing to the western area of the park, the pedestrian bridge, and the Placentia Avenue, Estancia High School entrance at the southern tip of the site. Multi-purpose and pedestrian trails are indicated on the Trails Plan.

Archaeological Site CA-ORA 506

Approximately, 5/8 of the northern portion of the eastern site is identified as a registered archaeological site. This site has been the subject of less detailed study than CA-ORA 58, which lies west of Placentia Avenue. Any active development of the site would require environmental work in conformance with the City of Costa Mesa, County of Orange Public Facilities and Resources, Historical Programs, and CEQA. This plan calls for no active development in this site. Any ground disturbing activities require archaeological monitoring.

The Northwestern Lowlands

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The Fairview Channel and Park Land to the North

The Fairview Channel has been the subject of studies to remove the existing concrete lining and create a more natural drainage (Project Report Fairview Channel Facility No. D04 from Greenville Banning Channel to Upstream Terminus, County of Orange EMA, August 1991). This project was not carried out after the raising of the bank of the channel, eliminating the threat of flooding to the north. The removal of the channel would be an expense, which is not necessary for the success of Fairview Park.

The northern park boundary lies approximately 50 feet from the protective fence of the Fairview Channel. This strip of land 50 feet by 1600 feet has no appropriate public use other than a visual barrier for the residences. An existing heavily used dirt path on the south side of the channel is included in the plan as a 3 feet wide pedestrian trail.

Sandbar Willow adjoining Talbert Nature Preserve

The permanent ponds in the northern lowlands of Fairview Park provide important habitat for wildlife associated with open water and emergent vegetation, supporting species such as the Mexican Amberwing damselfly, Western Toad, Baja California Tree Frog, Mallard, Ruddy Duck, Pied-billed Grebe, Common Gallinule, American Coot, Double-crested Cormorant, Great Blue Heron, White-faced Ibis, Belted Kingfisher, Clark's Marsh Wren, and Great-tailed Grackle.

The retention pond receives water that circulates through this wetland system, with riprap channels connecting the ponds. Vegetation such as bulrush, cattails, pondweed, and algae frequently obstructs flow between ponds, reducing conveyance below design levels. To address this, the City annually removes emergent vegetation under a CDFW permit to prevent stagnant water and mosquito breeding, as required by the Orange County Mosquito and Vector Control District.

Additionally, a drain at the base of the bluff carries surface water from the southwestern detention pond, shaded by willow and blue elderberry. Further south, sediment accumulation forces water below the surface, creating subsurface flow.

The northern boundary where Talbert Nature Preserve meets Fairview Park contains Sandbar Willow and Sandbar Willow-Blue Elderberry Thicket plant communities. At the western boundary at the base of the bluff and along the naturalized drainage path and floodplain terrace is California Bulrush - Cattail Marsh and Poison Hemlock or Fennel Patches.



Photo by Land IQ.

Passive Uses & Circulation Trails

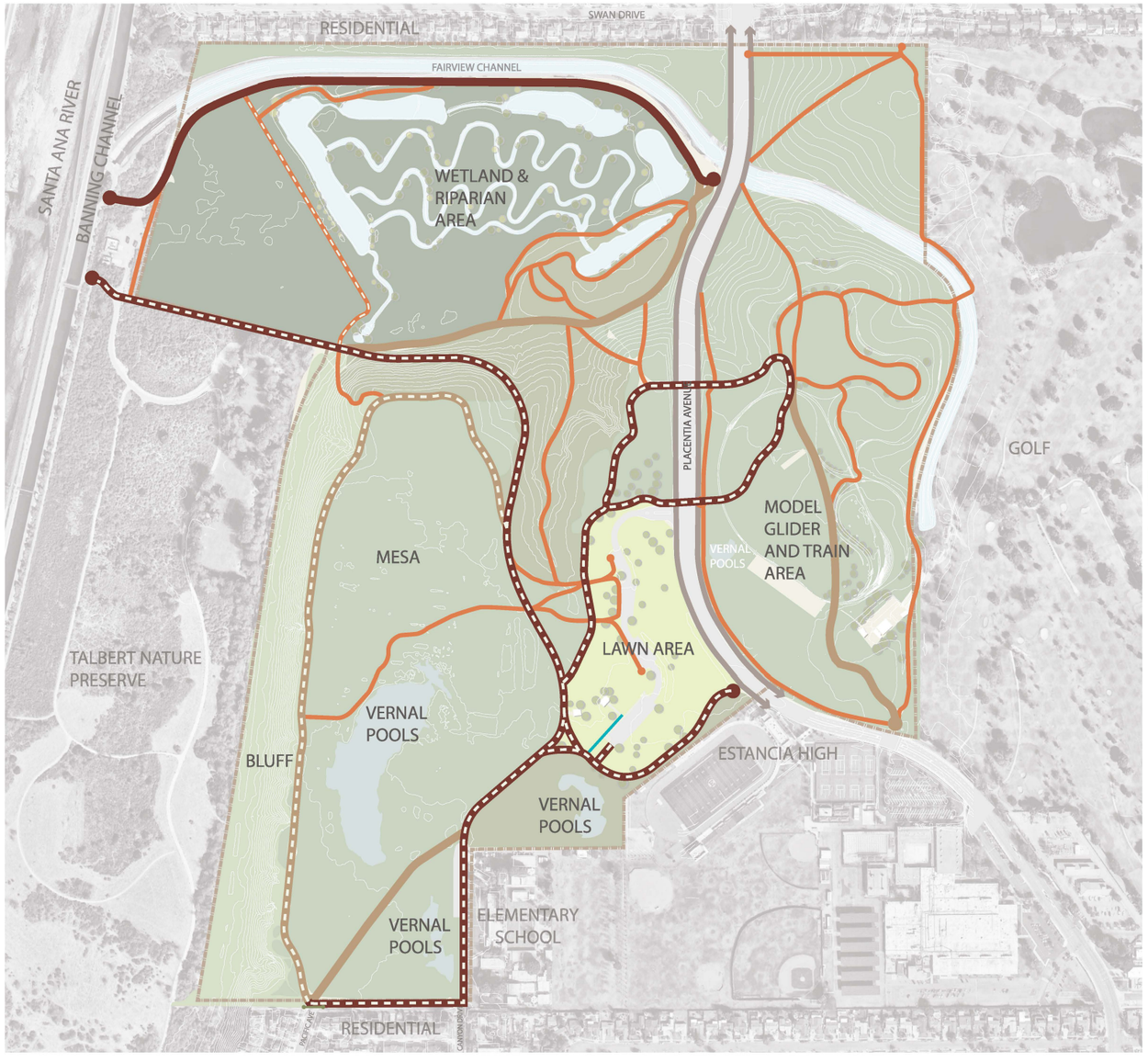
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Passive uses of the park include walking, running, walking of leashed dogs, flying glider planes, model railroading, flying kites, picnics, and other small group functions. Organized team sports requiring formal facilities or sports operated as a concession are not included. The natural areas of the park are reserved for running, walking, limited bicycle trails, and interpretive uses. Trails in the natural areas are planned to offer access to each habitat type, in quantity and variety for frequent park visiting, but limited in order to provide large blocks of habitat undivided by trails or the interruption of human use.

The Trails Plan is a park-wide trail system intended to achieve the following:

- Provide clearly defined trails and establish a designated hierarchy of trails for the park.
- Developed design standards for the trail system, including widths, materials, and designated modes of travel by trail type.
- Removal of unauthorized user-defined trails that have formed through the vernal pool watersheds.
- Establish functional and pedestrian pathways allowing for pedestrian access in both wet and dry seasons for approved trails.

The diagram on the right illustrates the Trails Plan and the hierarchy of trails which are multi-purpose trails, designated maintenance and vehicular access routes, primary and secondary pedestrian trails. Multi-purpose trails are to accommodate both bicycle and pedestrian traffic. The maintenance and vehicular access routes occur on both multi-purpose trails and primary and secondary pedestrian trails. These routes are only to be used by vehicles for emergency access and approved maintenance activities. Primary



FAIRVIEW PARK
CITY OF COSTA MESA

Trails Plan

LEGEND

- Multi-Purpose Trail
- Maintenance/Vehicular Access
- Primary Pedestrian Trail
- Secondary Pedestrian Trail
- Existing ADA* Access Path
- Existing Sidewalk

*ADA : Americans For Disabilities Act

NORTH

0' 75' 150' 300' 450' 750'

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pedestrian trails accommodate the highest use pedestrian routes and are designed to accommodate people walking side-by-side while secondary pedestrian routes are more meandering, less frequently used and designed for a single pedestrian. Primary pedestrian trails are surfaced with compacted soil, or decomposed granite. An existing boardwalk, located near the largest vernal pool, provides pedestrian access to this area while protecting biological resources. A proposed boardwalk along a portion of the existing trail running diagonally from the north terminus of Canyon Drive southwest to Pacific Avenue, allowing for pedestrian access in both wet and dry seasons is recommended. This will facilitate public access to the bluff and the Mesa trail loop. This pathway is periodically closed during the rainy season due to ponding water and shall be planned and designed in a manner that protects the integrity of the vernal pools and the vernal pool watersheds.

The bluff top trail is a primary pedestrian trail and does not accommodate bicycle traffic. The multi-purpose trails focus on connecting bicycle circulation through the park to adjacent destinations leaving pedestrian trails for exploration and meandering. Bicycle traffic should be limited to asphalt or concrete surfaces only to protect damage and degradation of site.

One overlook with one or two benches is recommended to be provided along the bluff trail. See also the Design Guidelines in Chapter 07 Implementation. No additional paved trails are proposed.

The hours of operation of the park are to be from dawn to dusk. No artificial lighting is to be provided in the restoration areas.



Photo by MIG Inc.

Interpretive Program

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The Interpretive program for Fairview Park offers a unique opportunity to highlight the park's historical, ecological, and cultural and Tribal cultural significance in the region. The Master Plan Update recommends enhancing visitor understanding through updated interpretive signage and materials conveying the park's exceptional conservation value, its role in protecting local and global biodiversity, and its deep cultural history. Signage and interpretive elements should also recognize the site's significance to Tribal nations and native ecology.

Interpretive programming should emphasize the connection between ecological health, conservation of natural open space, and human well-being, fostering community awareness and stewardship. Partnerships with organizations invested in environmental conservation can be strengthened through involvement with the interpretive program. The design of interpretive features should be subtle and integrated into the landscape, following the guidance in Section 07, with signage that is simple, low to the ground, and informative. The central interpretive area can provide a broad overview while encouraging visitors to explore trails for deeper learning. Programs prioritizing self-directed discovery, and docent-led group tours are recommended. Given the size and diversity of the site, visitors should expect that multiple visits will be required to fully engage with all interpretive elements.

Interpretive content should convey the natural river setting prior to flood control projects and its influence on prehistoric and historic uses, including prehistoric village sites and areas listed on the National Register of Historic Places. The history of Spanish exploration and Mission and Rancho-era land use, the location of the Diego Sepulveda Adobe, the diverse native plant communities, resident wildlife species, and the history of archaeological research on the site should also be included. These measures will collectively enrich the educational, cultural, and ecological value of Fairview Park, providing visitors with a meaningful, multi-layered experience of the park's history and biodiversity.







Photos by MIG Inc.

Habitat Restoration & Enhancement

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The City of Costa Mesa is a steward of Fairview Park. Restoration and enhancement of the park's diverse natural communities, and protection of the area's native wildlife populations, are the community's top priorities for this public resource. The habitat restoration and enhancement goals for Fairview Park are:

- Conserve natural vegetation communities and native wildlife populations.
- Protect archaeological and culturally significant materials (e.g., indigenous village use area, including two nationally recognized cultural resource historic sites).
- Restore ecologically appropriate and sustainable native habitat to benefit special-status plant and wildlife species.
- Provide low-impact recreational opportunities that promote human wellness and connecting with nature.



Photo by City of Costa Mesa.

Habitat Restoration & Enhancement Targets

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Utilizing the 2023 vegetation map and field observations conducted in 2023, ecologically suitable habitat restoration (Figure 6-1) and enhancement (Figure 6-2) targets for various locations within Fairview Park were identified. These targets were identified for vegetation map units that were highly degraded and in need of habitat restoration or would benefit from habitat enhancement, such as weed management and/or native seed addition.

The selection of ecologically appropriate restoration targets was based on a thorough assessment of several factors including:

- Environmental characteristics (e.g., soil, landscape position, slope aspect, slope angle) in each location;
- Physiological or ecological relationships of the dominant or co-dominant species in each map unit;
- The identity of nearby vegetation communities, expert opinion based on habitat restoration experience; and
- A review of potential vegetation modeling outputs from the Nature Reserve of Orange County Habitat Restoration and Enhancement Plan Update (Brooks et al. 2019).

Based on this analysis, a total of 80.17 acres of habitat restoration opportunities and 14.52 acres of habitat enhancement opportunities have been identified within Fairview Park (Table 6-1). By focusing on these targeted areas and implementing suitable restoration strategies, the ecological health and biodiversity of Fairview Park can be significantly improved and maintained for the long term.

Habitat Restoration Guidelines for Fairview Park are provided in Appendix C.



Figure 6-1 - 2023 Vegetation Map and Habitat Restoration Opportunities for Fairview Park

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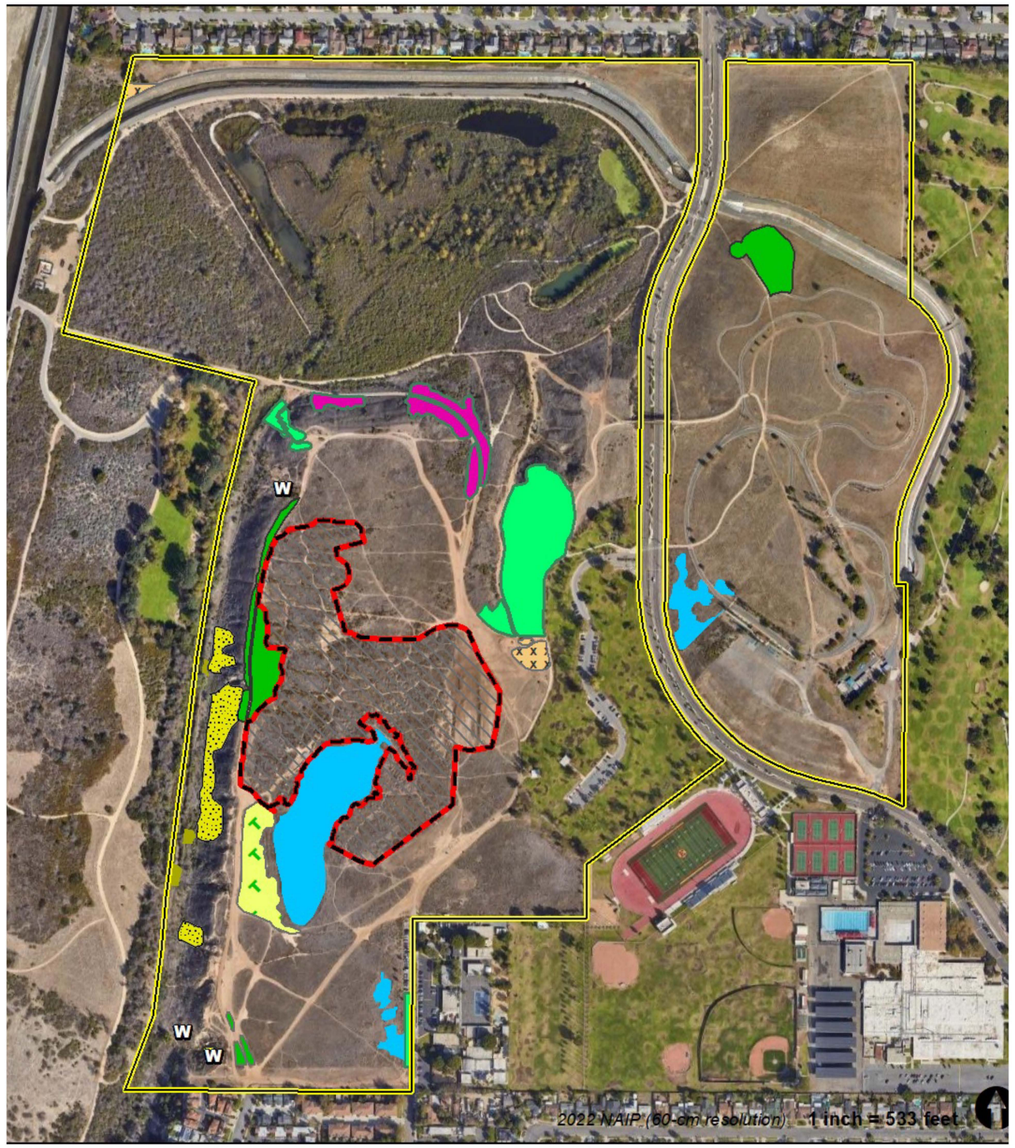


Figure 6-2 - Habitat Enhancement Targets of Fairview Park

Summary of Habitat Restoration and Enhancement Opportunities in Fairview Park

Scientific Vegetation Map Unit Name	Map Code	Common Map Unit Name	Restoration or Enhancement Opportunities
Southwestern North American Riparian/Wash Scrub Group			
Baccharis salicifolia Shrubland Alliance	1810	Mulefat Thickets	3.5 acres of Restoration
Salix lasiolepis Shrubland Alliance	1820	Arroyo Willow Thickets	0.16 acres of Enhancement
Californian Broadleaf Forest and Woodland Group			
Juglans californica Forest & Woodland Alliance	1830	Southern California Walnut Groves	0.04 acres of Enhancement; 0.04 acres of Restoration
California Coastal Evergreen Bluff and Dune Scrub Group			
Baccharis pilularis Shrubland Alliance	2310	Coyote Brush Scrub	0.39 acres of Enhancement
Central and South Coastal Californian Coastal Sage Scrub Group			
Artemisia californica – Eriogonum fasciculatum Association	3120	California Sagebrush – California Buckwheat Scrub	3.48 acres of Enhancement; 22.46 acres of Restoration
Encelia californica – Eriogonum cinereum Shrubland Alliance	3140	California Sunflower Bush – Ashy Buckwheat Scrub	7.38 acres of Restoration
Artemisia californica – Opuntia littoralis Association	3190	California Sagebrush – Coast Prickly Pear Scrub	1.02 acres of Restoration
Salvia leucophylla Association (Introduced Vegetation Community/Restoration Area)	3195	Purple Sage Scrub (Introduced Vegetation Community/Restoration Area)	1.17 acres of Enhancement
Salvia mellifera Shrubland Alliance	3210	Black sage scrub	9.89 acres of Restoration
Isocoma menziesii Shrubland Alliance	3330	Coast Goldenbush Scrub	2.01 acres of Enhancement
California Annual Herb/Grass Group			
Amsinckia (menziesii, tessellata) – Phacelia spp. Herbaceous Alliance	4310	Fiddleneck – Phacelia Fields	0.13 acres of Enhancement; 7.64 acres of Restoration
Californian Mixed Annual/Perennial Freshwater Vernal Pool/Swale Bottomland Group			
Deinandra fasciculata Herbaceous Alliance	6500	Clustered Tarplant Fields	1.18 acres of Enhancement; 28.24 acres of Restoration
Eleocharis macrostachya Herbaceous Association	6600	Pale Spike Rush Vernal Pool Bottoms	4.5 acres of Enhancement
Coastal Baja California Norte Maritime Succulent Scrub Group			
Opuntia littoralis – Opuntia oricola – Cylindropuntia prolifera Shrubland Alliance	8120	Coast Prickly Pear Scrub	1.46 acres of Enhancement

Other Management Opportunities

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In areas that would benefit from enhancement from higher native cover and diversity but are not suitable for habitat restoration (e.g., fuel modification areas, smaller areas, or areas mowed regularly, such as in the immediate vicinity of the narrow-gauge railroad tracks), other management opportunities have been identified (Figure 4-3).

Other Management Opportunity 1

To protect the resources in Fairview Park, highly invasive plants need to be controlled in perpetuity by the City. As an urban park with significant cultural and sensitive biological resources, new introductions of invasive plants and reintroductions of existing invasive plants will always pose ongoing threats. This includes areas that have already been restored or will be restored in the future.

The long-term management of the park should include control of high-priority invasive species following an adaptive management approach, as presented in Appendix C.

Other Management Opportunity 2

Prepare long-term management guidelines and actions to protect the vernal pools and vernal pool watersheds as described in this report, and as requested by the USFWS (2014) to conserve the San Diego fairy shrimp in compliance with the federal Endangered Species Act.

Other Management Opportunity 3

Approximately six acres of land within the 100-ft fuel modification zone are currently maintained along property lines with neighboring properties to the north and south of Fairview Park. Working with the local fire authorities, a fuel modification plan can be developed that will allow for increased native diversity and habitat structure while still achieving the fuel modification goals for fire safety.

Other Management Opportunity 4

Approximately 24 acres within the narrow-gauge railroad network east of Placentia Avenue that are not suitable for habitat restoration because of the current use and maintenance of the associated open space. These areas could be (a) enhanced with higher native cover and diversity using plants that are tolerant of periodic mowing, and (b) managed for highly invasive weeds, especially larger stature perennial weeds, such as black mustard, wild radish, fennel, and poison hemlock, to establish and maintain suitable habitat for grassland birds, including winter occupancy by burrowing owls.

Other Management Opportunity 5

There are about 11 acres of manicured lawn and landscaping trees, a small portion of which could be repurposed to create an area for "nature play" (e.g., soil mounds that can be manipulated for sensory and spontaneous, creative play) to maintain this activity at the Park, while moving it out of the vernal pool watershed where that use is not compatible with the protection of biological and cultural resources.



Other Management Opportunities

1 | High-Priority Invasive Plant Management (Entire Park Area)
2 | Long-Term Management Plan for Vernal Pool Habitat
3 | Fuel Modification Zone (FMZ) Plan that Anticipates Native Plant Palette Tolerant of Annual Summer Mowing
4 | Native Vegetation Enhancement, Including Wintering Burrowing Owl Habitat
5 | Nature Play Programming for Portions of the Manicured Lawn Area

Strategic Habitat Restoration Project Opportunities

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Based on the assessed constraints and opportunities, nine strategic projects were identified to achieve the habitat restoration and enhancement goals (Section 1). These projects are categorized into three main groups: habitat restoration (Projects 1 to 4), habitat enhancement (Project 5), and wetland and riparian habitat remediation (Projects 6 and 7), along with two projects dedicated to long-term habitat management (Projects 8 and 9).

The following objectives encompass the nine strategic project opportunities, each targeting multiple benefits and prospects to accomplish the habitat restoration and enhancement goals for Fairview Park:

- Habitat Restoration (Projects 1-4): These projects aim to restore degraded habitats, emphasizing improved ecological function and promotion of native biodiversity.
- Native Plant Enhancement (Project 5): This project focuses on boosting native plant species presence across the park, prioritizing species that are rare or that have distinctive ecological roles.
- Wetlands and Riparian Habitat Remediation (Projects 6-7): These projects address restoration and improvement of wetland and riparian habitats, supporting native species and ecosystem services.
- Long-Term Habitat Management (Projects 8-9): These projects will establish sustainable management practices, including monitoring and adaptive strategies, to ensure the success of restoration efforts and preservation of the park's ecological health in the long term.

By implementing these strategic projects, the City can make significant progress towards achieving its habitat restoration and enhancement goals in Fairview Park, ensuring the conservation of its unique biological and cultural resources for future generations.

Project 1. Mesa Habitat Restoration and Indigenous Village Site Protection

Objective 1a: Collaborate with tribal representatives on the development and implementation of the project plan.

Objective 1b: Remove the improper fill material to expose the natural soils and restore the historic viewshed of the Mesa without damage to the soil biota or archaeological resources (CA-ORA-58).

Objective 1c: Eliminate incompatible uses of the vernal pool watershed, including maintenance mowing of the fly field, to protect the hydrological connection and upland nutrient supply for the conservation of the federally protected San Diego fairy shrimp in the vernal pool complex of Fairview Park.

Objective 1d: Do not disturb the native soil on the Mesa by tilling, unnecessary grading, or digging, other than related to the removal of the improper fill material and to maintain the hydrological function of the vernal pool features.

Objective 1e: Provide appropriate fencing, educational signage, and trail improvements to organize human movement around the perimeter of the Mesa, with a suitable connection to the existing boardwalk and viewing platform adjacent to the large vernal pool.

Objective 1f: Design Mesa trail improvements to protect archaeological resources with an appropriate trail surface that can both adequately cap the natural soil and prevent further trail erosion (e.g., super-stabilized decomposed granite product).

Objective 1g: Construct an elevated vernal pool boardwalk with fencing to preserve the trail connecting the lawn area to the southwest corner of the Mesa while safeguarding the vernal pool watershed. The boardwalk will be raised above the grade of the vernal pool basins, and its supports will not have footings excavated in natural soils, thus preventing disruption of the underlying impermeable soil layer essential for the ponds' formation.

Objective 1h: Deplete the weed soil seed bank with a consistent, multi-year adaptive weed management program prior to installing new native seed material.

Objective 1i: Restore the native flower fields and vernal pool watershed habitat that were covered by the improper fill material with diverse, ecologically appropriate seed mixes, approved by USFWS and CDFW.

Objective 1j: Enhance the native annual herbaceous plant diversity of the remainder of the Mesa not directly impacted by the improper fill material.

Objective 1k: Assess and implement enhancements to the function and diversity of the vernal pool features, including east of Placentia Avenue, which is part of the historic extent of the Mesa.

Project 2. Bluff Stabilization and Habitat Restoration Project

Objective 2a: Develop and implement an engineering solution (see, e.g., Dudek 2003) to stabilize highly erosive features along the bluff, including restoration of ecologically appropriate native perennial plants in drainages (e.g., southern California walnut, blue elderberry). Prioritize the use of native plants and stabilizers that allow native plants to grow to stabilize the bluffs, rather than engineering solutions that eliminate habitat (e.g., use of shotcrete and concrete channels).

Objective 2b: Deplete the weed soil seed bank with a consistent, multi-year adaptive weed management program prior to installing new native seed material.

Objective 2c: Restore cactus scrub and maritime succulent scrub on the slopes using diverse, ecologically appropriate seed mixes together with container plantings of selected species (e.g., cactus cuttings, California boxthorn).

Objective 2d: Restore ecologically appropriate habitat along the drain at the base of the bluff, including mulefat scrub, willow scrub, and sandbar willow – blue elderberry thickets.

Project 3. California Coastal Sage Scrub Slopes Restoration Project (Slopes North of the Mesa and East of Placentia)

Objective 3a: Deplete the weed soil seed bank with a consistent, multi-year adaptive weed management program prior to installing new native seed material.

Objective 3b: Restore CSS on the slopes with diverse, ecologically appropriate seed mixes with the goal of providing sufficient resources to support a California Gnatcatcher population in the park and adjacent natural areas along the lower Santa Ana River that will be viable over the long term.

Objective 3c: Use limited container plantings and/or cactus cuttings to establish faster shrub cover to close informal trails, to manage erosive features, or to increase the frequency of plants that do not establish easily from seed and are either underrepresented in the community or provide an essential ecological service for wildlife.

Project 4: Community-Supported California Coastal Sage Scrub (CSS) Restoration in the Canyon

Objective 4a: Restore the native soil biota by consistent, multiyear weeding efforts led by the City, or an identified community organization, and supported by community volunteer events.

Objective 4b: Increase the diversity and cover of natives from seed and nursery grown container plants that are installed and maintained by the City, or an identified community organization, and supported by community volunteer events.

Objective 4c: Maintain the existing plantings by hand weeding around natives prior to significant seed set of the weeds.

Photo by Robert A. Hamilton



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Project 5. Native Plant Enhancement of the Railroad Mesa

While the railroad improvements and the fragmentation of the open space precludes complete restoration of this area, the habitat can be improved by controlling non-natives and enhancing native diversity and cover with species that are tolerant of mowing.

Objective 5a: Deplete the weed soil seed bank with a consistent, multi-year adaptive weed management program prior to installing new native seed material.

Objective 5b: Seed the area with a native seed mix with primarily native herbaceous life-forms (e.g., perennial grass, annual forbs) that are compatible with burrowing owls and other grassland birds, along with low rates of native shrubs that can tolerate periodic mowing during summer dormancy (e.g., coast goldenbush, California bush sunflower).

Project 6. Wetlands and Riparian Habitat-Phase 2 (OCTA) 9.5-acre CSS/Grassland Restoration Project

Objective 6a: From the opportunities described above, identify 9.5 acres of habitat restoration to satisfy the outstanding obligation to OCTA, focused on CSS and flower field habitat restoration that is ecologically appropriate for Fairview Park.

Objective 6b: Prepare a Habitat Restoration and Monitoring Plan for approval by OCTA, CDFW and USFWS, which includes at least 3 years of natural rainfall-driven weed grow-and-kill prior to native seed installation (or at least, two years of weed grow-and-kill with a temporary overhead irrigation system, if feasible), followed by installation of a diverse locally collected seed mix following habitat restoration best practices described in Appendix B.

Objective 6c: Implement the Plan, and monitor post-seeding establishment for five years, or until all the success criteria have been met.

Objective 6d: Place the successfully completed habitat restoration areas in a conservation easement to benefit OCTA.

Project 7. Wetlands and Riparian Habitat-Phase 2 (OCTA) Water Conveyance Remediation Project

Objective 7a: Follow engineering recommendations to remediate flow through the pond and channel system to minimize maintenance costs for the City to annually remove emergent vegetation from the ponds to meet vector control requirements.

Project 8. Fuel Modification Plan

Objective 8a: Consult with the Orange County Fire Authority (OCFA) and the Costa Mesa Fire and Rescue (CMFR) to develop a fuel modification plan for the existing fuel modification zones (FMZs) (i.e., 100-ft zones from the property lines of habitable structures) that balance the need for fire risk reduction and managed vegetation that complements the surrounding native habitat.

Objective 8b: Prioritize control of invasive plants, such as crown daisy, to meet fuel modification objectives for the Fuel Modification Zone (FMZ).

Objective 8c: Develop plant palettes of ecologically suitable large native shrubs that tolerate pruning (i.e., removal of lower limbs to create vertical fuel breaks on larger plants), and native grasses and forbs that tolerate annual summer mowing.

Objective 8d: Develop a typical planting plan that allows for groupings of native shrubs that are interspaced with native plantings (e.g., needlegrasses, Stipa spp.) that are mowed to within 6 inches of the ground to create at least 50 percent cover of horizontal fuel breaks in the FMZ.

Project 9. Long-Term Habitat Maintenance Plan

Objective 9a: Implement a weed management program to maintain the function and habitat quality of the natural communities in the park, as well as the visitor experience.

Objective 9b: Follow the approved Fuel Modification Plan.

Objective 9c: Provide patrols to manage impacts from off-trail activity and unpermitted uses of the park.

Objective 9d: Maintain conservation easements (e.g., Headlands Dana Point Project Mitigation Area, Wetlands and Riparian Habitat Project – Phase 1 and 2) by implementing an Early Detection Rapid Response (EDRR) management program in Fairview Park to maintain the quality of the habitat and to manage costs by controlling invasive plant populations when they are small.

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Objective 9e: Coordinate weed maintenance and biological monitoring with regional reserve and open space managers (e.g., Nature Reserve of Orange County, Randall Reserve, Talbert Nature Preserve, City of Costa Mesa Golf Course) to leverage resources and knowledge.

Objective 9f: Conform to federal and state environmental and wildlife laws.

Objective 9g: Prepare long-term management guidelines and actions to protect the vernal pools and vernal pool watersheds as described in this report, requested by USFWS (2014) to the San Diego fairy shrimp, and summarized in Appendix E.

Photo by Robert A. Hamilton



Long-term Invasive Plant Management Plan

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To protect the sensitive vegetation communities, rare plant populations, and important wildlife habitats in Fairview Park, it is crucial to implement a sustained control program for high-priority invasive plants. These invasive species have significant negative impacts on the park's biological resources and should be a primary focus of ongoing maintenance efforts. While numerous non-native plants are present in Fairview Park, prioritizing the control of highly invasive species is essential for effective biological resource protection. Some invasive plants may require only one treatment per year while others may necessitate repeated treatments, depending on factors such as plant traits, phenology, weather, and suitable treatment methods. Any constraints, such as avoiding herbicide use in vernal pool inundation areas, must also be considered.

Consistency and appropriate timing of invasive plant treatments are key factors in successful control and the protection of native habitats. The primary goals are 1) to prevent excessive biomass production from invasive plants that could displace native species, and 2) to control invasive plant populations before they produce viable seeds, ensuring their long-term management. By prioritizing the control of high-priority invasive plants, the City can work toward maintaining and restoring the ecological health of Fairview Park. A Long-Term Invasive Plant Management Plan is presented in Appendix E.



High-Priority Invasive Plant Control Priority Areas

Existing Fill Soil Removal

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Fill Placement on the Mesa

With the intent of capping the archaeological site on the Mesa (CA-ORA-58), prior to construction of new park amenities, fill material was placed on the Mesa in 1987 and 1988 (see Figure 2-14). The fill material did not, however, meet standards for capping an archaeological site, and included chemically active construction and paving debris that can degrade archaeological artifacts instead of preserving them (City of Costa Mesa 2008).

Not only was the fill material improper for the protection of indigenous cultural resources, but it also created three new threats to biological resources on the Mesa. First, the fill material covers and takes away habitat for native flower fields and fairy shrimp. Second, the fill material impairs the hydrologic function of the vernal pool watershed by reducing the amount of precipitation that would feed the vernal pool complex, which is especially critical in below-average rainfall years when the pools do not typically form. Third, the fill material creates an unnatural state of low soil microorganism and plant diversity, which sustains large infestations of invasive plants (e.g., black mustard, poison hemlock) that produce large quantities of seed, which is then transported into other locations in the park, threatening the diversity and function of native habitat.

In 1993, The Keith Companies dug east/west-trending strips in the fill to allow study of the archaeological site limits, resulting in the topography of the fill area today (see Figure 2-16) (City of Costa Mesa 2008). Between 1996 and 2009, improper fill material that covered a significant portion of Vernal Pool 1 was removed as part of two restoration efforts. It is not well documented whether this fill material was disposed of offsite or moved to another location on the Mesa. Today, significant portions of the historic vernal pool watershed remain covered by the improper fill material, degrading significant cultural and biological resources in Fairview Park (Figure 2-21).

The hydrological function, biodiversity, and extent of the Mesa vernal pool watershed and the vernal pools would be significantly improved with the removal of the improper fill material. Remove the improper fill material to the natural soil grade with special attention to not disturbing the natural soil and protecting the cultural resources. Fill removal should be completed in combination with native habitat restoration efforts as described in Strategic Habitat Restoration Project Opportunities.

Fill material may be compatible for re-use in the creation of natural play features, or soil mounds that can be manipulated for sensory and spontaneous, creative play within the footprint of the narrow-gauge railroad track located outside of culturally and biologically sensitive areas.

Fill Placement in the Canyon

During the construction of the Fairview Park Wetlands and Riparian Project, the bottom of the canyon was filled with material excavated to create the wetland features. The material used to fill the bottom of the canyon has not been analyzed but is presumed to be natural alluvial soil material. The fill areas are primarily dominated by nonnative plants with some recruitment of native vegetation, including from the adjacent community-led CSS habitat restoration work. Habitat restoration targets for this area are identified in Section 04.



Photos by MIG Inc.

Drainage Issues

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The site contains two areas where erosion is a concern. Both areas are discussed in Chapter 03. The bluff erosion can be addressed by discouraging park users from walking on the bluff faces at points other than stairs or trails (e.g. by using fencing and signage), and by implementing a combination of engineered bluff stabilization and natural revegetation methods in areas showing persistent erosion issues.

The flooding of the southern boundary of the west side is addressed by installing a drain at the base of the bluff, or to Canyon Drive where it may be drained off of the site. Care must be taken in any drainage measure to study possible effects upon the vernal pools and their drainage and watershed.



Photo by City of Costa Mesa.



Photo by City of Costa Mesa.



Photos by MIG Inc.

Erosion Control Measures

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Bluff Erosion

The erosion of the bluff face is a natural process, which has been accelerated through public use and activities within the park. The characteristics of the bluff affecting erosion include the soil type and topography. Additional runoff tributary to the bluff face will also accelerate the development of erosion features. The exposed face of the bluff area is naturally susceptible to (1) sheet erosion, (2) rill erosion, and (3) gully erosion. Pedestrian traffic along the bluff face and mountain bikes have caused additional aggravation of the erosion process, mechanically dislodging the material of the bluff face.

Erosion Control Measures and Suggested Recommendations

Erosion control features can be installed as part of the park master plan implementation, which will assist in minimizing the amount of erosion of the bluff, bluff canyons or arroyos, and the natural canyon areas. The bluffs are important natural features to be preserved. The amount of erosion, which occurs to the bluffs, is partially dependent upon the amount of runoff which discharges over the bluff face or tributary to the bluff erosion features. Runoff over the bluffs is partially a natural feature of the site and is unavoidable. Restoration of the site to its historical grade elevations will relieve existing drainage patterns caused by the placement of fill soils. A management measure is to minimize public access to the bluff face and direct foot traffic to specific access point down the face of the bluffs. This is accomplished through defining the trail along the top of the bluff and by the addition of wooden stairway systems. Vegetation of exposed earthen areas and slopes will greatly assist in maintaining the natural areas, which are experiencing, surface erosion. In addition, the vegetation can also be reestablished within the arroyos or bluff erosion features to provide ground cover and reduce the velocity. A summary of the management principles associated with erosion control for the site include:

- Retain the natural vegetation
- Minimize grading
- Vegetate denuded areas
- Divert runoff away from exposed slopes where consistent with natural grade
- Keep runoff velocities low
- Prepare drainage systems to handle the concentrated flow

The existing natural arroyos, which have eroded within the bluff areas, can be protected through structural management measures in order to prevent continued erosion. Two different treatments are recommended which will have a low visual impact upon the site. These control measures include:

Geoweb: This is a material which can be utilized to stabilize the bluff face and the bluff erosion features. The material is a plastic interlocking web consisting of diamond shapes, which are about 8 inches square, creating large connected cells.

The material is placed on the slope or drainage courses to provide a flexible revetment. The cells are then filled with soil or gravel and then vegetation is established in the cells. This material has recently been applied on a large slope failure in the Newport Beach back bay area adjacent to the bike trail. After completion,



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it is not possible to see the material, however, it provides an excellent stabilization system, which would also integrate well with the natural park setting.

Check Structures: A "check" is a small grade control structure placed across the stream, which slows the water velocity and creates a permanent stream elevation at that location which cannot be eroded. A series of checks can be constructed along these drainage features to maintain a low velocity. A new material, which has been implemented to construct the checks, is a vinyl interlocking sheet pile. The vinyl material is lightweight, which allows the material to be installed by hand, and is inert so that it has a high longevity. The checks can also be constructed of rock, timbers, or other material.



Photos by MIG Inc.

Developed Park Drainage & Hydrology

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Proposed or Modified Drainage Patterns

The park master plan proposes to perform minimal grading to implement the proposed facilities and maintain the existing topographic/drainage patterns as much as possible. One of the primary considerations for maintaining the natural drainage patterns is associated with the bluff top area and the existing vernal pools. The vernal pool habitat is extremely sensitive to surface drainage and is dependent upon this runoff to sustain itself. It is critical within this area that the natural drainage boundaries, which have been identified, be maintained to the maximum amount possible. There are some disturbed areas of deposited fill soils within these areas. It is proposed as part of the grading for the park that these areas would be returned to the original historic condition with the natural drainage patterns.

The only significant change through the grading involves the establishment of the riparian area in the location of the existing Placentia Drain. This earthen ditch drain was created during agricultural uses of the site collecting water from the northern low areas and draining south along the bluff face to what is now the south end of Talbert Nature Preserve. The drain has not been maintained and is filled at several trail crossings. A riparian area in the drain is to be enhanced in the south and created in the north by connecting the drain to a constant water source in the Fairview Channel, and restoring the flow line of the Placentia Drain.

Existing Identified Drainage Deficiencies

The primary drainage deficiency, which has been identified through this qualitative evaluation, is an area located in the southern portion of the site, near the existing residential area at Pacific Avenue. The runoff generated from a 16-acre portion of the bluff top area drains toward the residential area at Pacific Avenue. The natural topography within this area causes the runoff to be directed towards a low point near Canyon Drive and Pacific Avenue. This area does not have any direct outlet and has caused flooding problems for the adjacent buildings, which appear to have been constructed below the grade of the park.

The remainder of the park site appears to be adequately drained through the natural topography. The vernal pools are self-contained drainage catchments and do not have outlets, but this is an integral part of this natural feature. Regional flood protection for the area is provided through the Fairview Channel and the County of Orange has prepared a preliminary design study, dated August 1991, which has evaluated the flood protection levels provided by the channel. The projects contemplated in this report have been permanently shelved due to the fact that flooding in the area of the Channel is not a high risk and not related to channel capacity, but to backing up in the Greenville Banning at times of maximum flow.

Recommended Drainage Features

Proposed permanent public facilities constructed as part of implementing the park master plan should investigate the local drainage requirements and ensure that the proposed grading provides positive drainage. The fill removal activities should maintain the natural drainage patterns and reduce the potential for erosion. Any large proposed impervious areas, such as parking lots, should include appropriate surface drainage collection facilities which may only require curb and gutters. New active park areas, which are grassed for public use, such as picnic areas, should be graded to ensure positive drainage and should have a slope greater than 2%. Erosion control features and best management practices should be applied during the construction period in order to minimize the sedimentation impacts.

It is recommended that the existing surface drainage deficiency be corrected that has been identified as part of this evaluation. Construction of an underground storm drain is feasible to achieve the desired level of flood protection, and should prove to be desirable in consideration of the vernal pools.

Security & Fire Prevention

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Security

Designated trails are wide enough to allow for patrol vehicles to reach most areas of the park. All trails are accessible by foot and bicycle patrol. The hours of the park are to be from dawn to dusk, and security lighting is not to be provided with the exception of the train station and maintenance yard, and museum facilities.

Fire Prevention

Fire vehicles will be able to utilize the designated wide trails in the event of medical aid or fire emergencies. Gates are to be placed at intervals in the trails delineation system for emergency fire access to restoration areas. At the time of detail design of the infrastructure water system, hydrants are to be provided over mains.

The plan calls for irrigated zones to join the residential interface at Canary Drive, Swan Circle and at Pacific Avenue and Canyon Drive. The strip of land between the Fairview Channel and Swan Drive is to be disked periodically to prevent the growth of seasonally dry vegetation in the vicinity of the residential community on Swan Drive. The trail system breaks the restoration areas into segments that will replace the current practice of disking bands of vegetation





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Facing page photo by City of Costa Mesa.

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07 Implementation

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The detailed design decisions are critical to implementing the Master Plan Objectives and assuring that the vision of Fairview Park is fully realized. The following guidelines are intended to serve as parameters for future designers and City decision makers during implementing phases of the park plan. They are both reminders of the types of features discussed to be included in the park during the Master Plan process, and further elaboration from a design standpoint on methods for achieving the intent of the Master Plan. The overriding factor to be considered in the design is the desired natural, low-key character of the park. The man-made features and improvements should, as much as possible, allow nature to speak for herself. The recommended materials and design suggestions are intended to allow the designed features to blend with the natural areas, to be substantial and functional while providing a consistent, quality appearance. In laying out trail routes, the existing pathways are to be utilized wherever possible.



Facing Page Photo by City of Costa Mesa.

Design Guidelines

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Trails

Trails facilitate movement around Fairview Park and are extensively used by the public to enjoy the unique resources and features of the park. Preserving and enhancing passive use recreation is a central goal of the Master Plan Update and trails are the primary method for accommodating park access. During public outreach activities conducted during the Master Plan Update process, consensus was generally formed around a desire for well maintained and clearly defined trails along with the removal of excess trails on the Mesa to protect sensitive biological and cultural resources. Additional desires were expressed to utilize natural materials to define trails and the prioritization of enforcement to control use by motorized vehicles were emphasized.

Key Master Plan Update recommendations regarding trails are the following:

- Provide clearly defined trails and establish a designated trail system for the park.
- Develop and adopt design standards for the designated trail system, including widths, materials, and designated modes of travel by trail type.
- Establish functional and pedestrian pathways allowing for pedestrian access in both wet and dry seasons for approved trails, including from the north end of Pacific Avenue to the north end of Canyon Drive.
- Pathways shall be planned and designed in a manner that protects the integrity of the vernal pools and the vernal pool watersheds.
- Provide for long-term preservation of the vernal pools and their associated watersheds by using suitable fencing, interpretive displays, and the removal of unauthorized user-defined trails that have formed through the vernal pool watersheds.
- Provide ADA-accessible pathway(s) from the main parking lot to the existing paved multi-purpose path west of the main parking lot.
- Provide an emergency and service vehicular access point into the park from Pacific Avenue. Develop protocol guidelines for vehicular use of this access point. See Attachment # for reference.
- Remove excess trails on the Mesa.
- Include multi-use, possibly separated trails.
- Ensure wide trails for loop, narrow trails for others.
- Utilize natural materials for trail rather than synthetic.
- Prioritize enforcement or prohibition of motorized bikes on park trails.
- Create improved connectivity to key adjacent sites such as the Santa Ana River.
- Ensure regular maintenance to trails.

Trail design varies depending on type and intensity of use and location.

Trail Delineation/Fencing

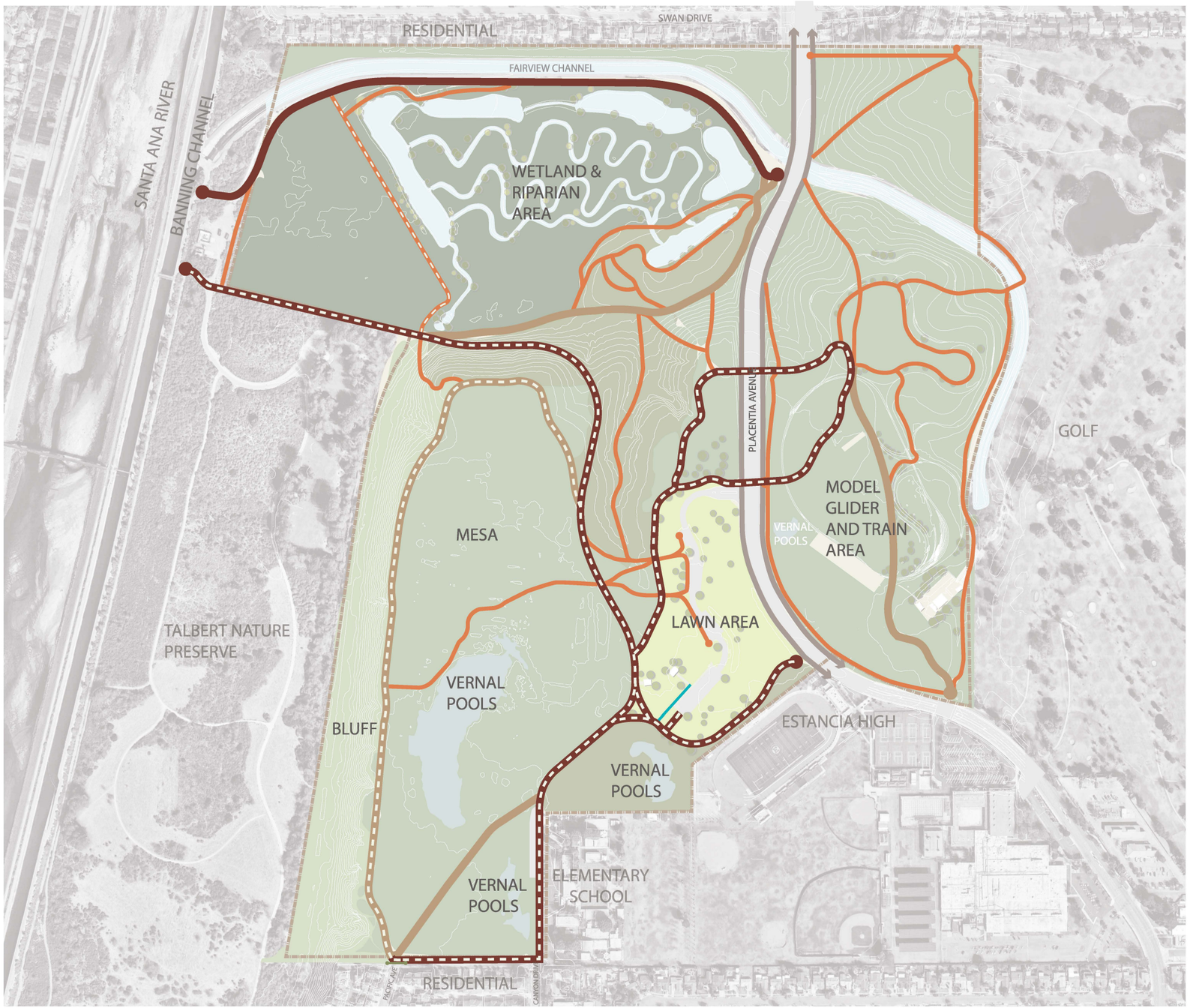
Trail delineators shall be utilized to protect and preserve sensitive cultural and biological resources by directing human movement around these areas. Because of the dynamic nature and seasonal movement of vegetation and sensitive wildlife species, trail delineation locations should be regularly evaluated for effectiveness in protecting resources.

Key Master Plan Update recommendations regarding trails are the following:

- Incorporate natural materials for fencing.
- Apply research-informed strategies for locating fences across the park.
- Fence-off biologically sensitive areas.
- Provide wildlife-friendly fencing.
- Ensure fencing allows for natural plant growth.

Trail delineators should be constructed of natural materials such as post and rope, or post wire materials. Wood post and rail fencing may be required in high traffic areas. To limit ground disturbing activities, posts are to be driven into undisturbed soil and not excavated or placed in concrete footings. When trails cross the vernal pool, alternative trail delineation is to be used that does not penetrate the soil including gabion baskets, or stacked wood fencing design.

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FAIRVIEW PARK
CITY OF COSTA MESA

Trails Plan

LEGEND

- Multi-Purpose Trail
- Maintenance/Vehicular Acces
- Primary Pedestrian Trail
- Secondary Pedestrian Trail
- Existing ADA* Access Path
- Existing Sidewalk

*ADA : Americans For Disabilities Act

NORTH

0' 75' 150' 300' 450' 750'

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Trail delineators are to be placed two feet off the edge of trails. If no significant intrusion is apparent into the restoration areas, vernal pool areas, archaeological areas, vernal basins, or sensitive restoration areas, the delineators may be removed. Annual monitoring of intrusion into restoration areas should be implemented by the City of Costa Mesa with a biologist in order to evaluate the need for trail delineation. Each year sections of the delineator may be removed on a trial basis. The goal for this program is to maintain vigorous vegetation, stop erosion, and protect the vernal basins and archaeological sites with as little physical intrusion on the natural environment by way of delineators as is possible.

Park Furniture

Benches and picnic tables should be rustic in character and should be able to be installed without concrete footings, in order to avoid excavation into the archaeological remains. Wood and concrete should be the predominant materials. Wood should have a stained rather than painted surface. The same furniture should be used throughout the park. Trash receptacles should be simple metal trash cans with restraints. Drinking fountains should be sandblasted exposed aggregate concrete.

Key Master Plan Update recommendations regarding park furniture are the following:

- Use natural materials for park furniture.
- Retain and repair existing park furniture.
- Provide additional trash and dog waste receptacles.
- Ensure ADA accessible furniture.
- Install bike racks at park.
- Include benches to enhance the experience of views at the bluffs.
- Concentrate most furniture in the lawn area.

Lighting

Pedestrian scale security lighting should occur only in the developed parts of the park site (the entrance and picnic areas on the west side, and the parking lot and train station area on the

Trail Type / Mode of Travel	Width	Material
Pedestrian Trails / Walking and running	3’-4’	Compacted earth, decomposed granite
Multi-purpose Trail / Walking, running and non-motorized bicycle riding	8’	Compacted earth, decomposed granite, concrete or asphalt
Bike / Safety / Maintenance Trail / Walking and running and non-motorized bicycle riding and maintenance vehicles	8’ paved trail with markings separating movement /	Concrete, or asphalt
Separated Bike / Safety / Maintenance Trail / Walking and running and non-motorized bicycle riding and maintenance vehicles	8’ paved trail with 4’ vegetated separation and 4’ wide pedestrian trail	Compacted earth, decomposed granite, concrete, asphalt
Boardwalk / Walking and running and non-motorized bicycle riding and maintenance vehicles	8’ wide	Wood or composite boards
ADA Accessible Pathways	6’ wide paved trail	Stabilized decomposed granite, asphalt or concrete

east side). The remainder of the park should not be lighted and should be closed to the public after dark. Light fixtures should be chosen which repeat the sandblasted exposed aggregate concrete and wood materials of the other park furniture.

Stairways

Existing stairway down the bluff should be repaired and maintained in good condition to match original design intent. Signage and adjacent trails should be designed to discourage use of informal trails on the bluff surface.

Nature Play

Play areas at the park should enhance the educational goals of the park and develop future community stewardship and appreciation of the unique features of the park. Traditional structured playground features are not desired at the park.

Key Master Plan Update recommendations regarding nature play are the following:

- Locate nature play features on the lawn or on the east side of the park.
- Create a centralized natural and educational play area.
- Utilize the site to enhance community education about the nexus between (1) human health and (2) ecological health and (3) conservation of natural open spaces.



Site Activity and Uses

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Interpretive Area and Signing

The central interpretive area is intended to serve as a starting point for learning about the archaeological and natural features of the site. This area is not to contain buildings or tall structures. It is intended that the interpretive information be conveyed through low-level signage, castings at ground level and limited modeling. These components should be integrated into a flowing sculptural design that will draw visitors easily through the space. It should provide seating and provide space sufficient for small classes to gather and listen to a docent or experience the features being displayed. Signing throughout the site should be low level, visible, but inconspicuous. Low tilted bases of sandblasted concrete with brass or porcelain enamel signing should be considered.

Park Structures

No new park structures are planned on the west side of the park. Instead of a park structure, a centralized outdoor area can serve the educational and orientation program function for education and interpretation on numerous topics related to the park.

On the east side, provide for a potential native plant growing space in a location that avoids impacts to native habitat. The growing space shall be planned and designed in consultation with a qualified restoration ecologist. Additionally, provide for an on-site maintenance and storage facility, or designated area for efficient storage and use of Fairview Park restoration tools and equipment, and to support the operations of the native plant growing space.

Entrance

The design vocabulary of park entrances should be further refined to highlight the unique features of the park. The entrances, both to east and west should be designed to echo the other designed elements such as signage and site furnishings. Ornamental planting areas around the entrances and the developed portions of the site, on both the east and west, should be replanted with a variety of Southern California native and pollinator plant species. Introduce plantings that will occur in the naturally occurring habitats of the rest of the site. Priority should be given to removing invasive species, such as Pride of Madeira, from these high visibility areas.

Parking lots

No new parking is proposed in this Master Plan Update, but the character of the parking lots should be maintained as rustic as their function will allow. For example, existing railroad tie boundaries should be replaced in kind. In the parking areas on the west side bordering the lawn, new trees should be incorporated to relieve the urban appearance and to mitigate the urban heat island effect. This is an ideal location for donated trees to be planted as all other locations of the site are not appropriate for tree donations.

Irrigation

Temporary irrigation systems will be needed to establish the native habitat areas.

These systems should be installed with pipe on grade so that excavation in the archaeological area will not be needed, and so that the piping can be removed without damaging the plants when the growth is established. Where permanent irrigation system is to be installed, monitoring of the trenching should occur per the recommendations of the archaeological report. The City standards for irrigation equipment and installation will be applied.

Erosion and Drainage Control

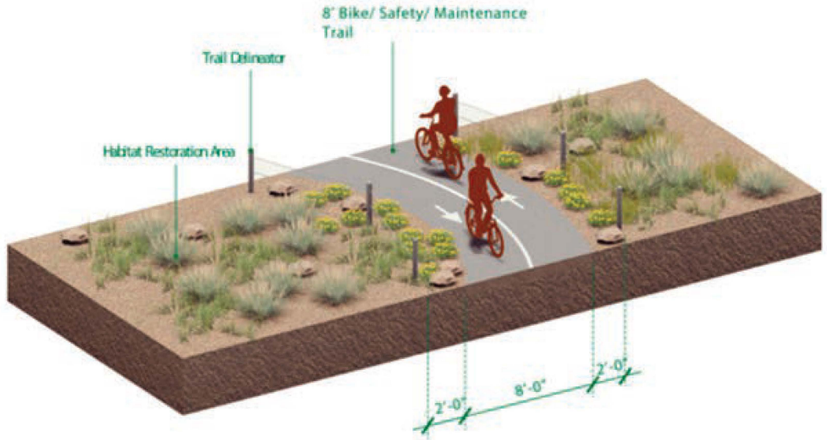
Construct erosion control measures along the western bluff. This measure will arrest the deteriorating land area and protect the CAL ORA-58 archaeological site.

Construct the proposed drain in the area of Pacific Avenue. This improvement will relieve the flooding which occurs in the southern portion of the site, which is periodically affecting adjoining property.

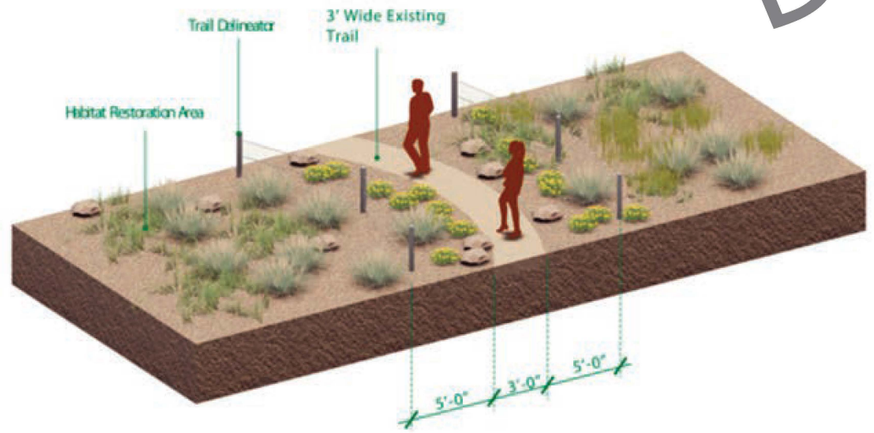
Removal of Improper Fill Soils

Remove the fill material that was deposited as a cap for the CAL ORA-58 archaeological site. This material contains asphalt, concrete, and other foreign material, which may further degrade the site. The removal of this material will be necessary before any restoration may begin in this area. Prior to the removal of the debris, a phasing plan is to be developed, which is to develop methods for preserving species of wildlife currently occupying the uneven terrain. Once the fill is removed, the area should be re-vegetated.

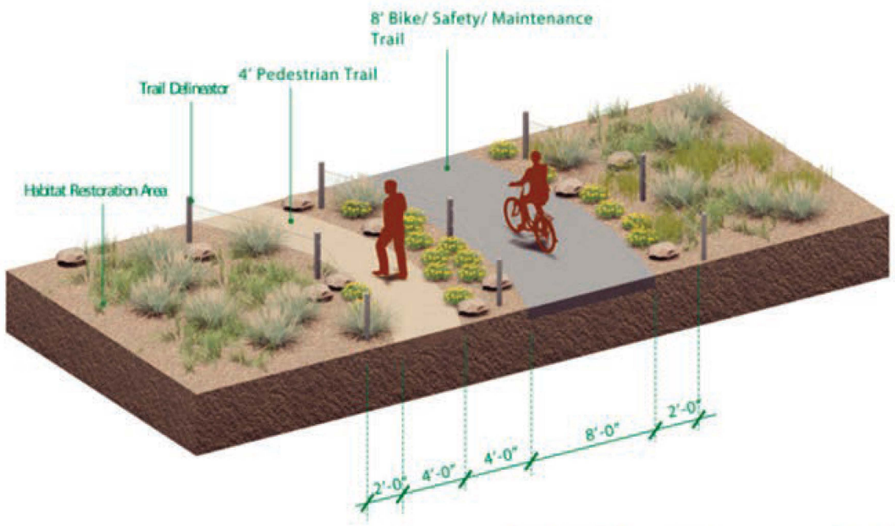
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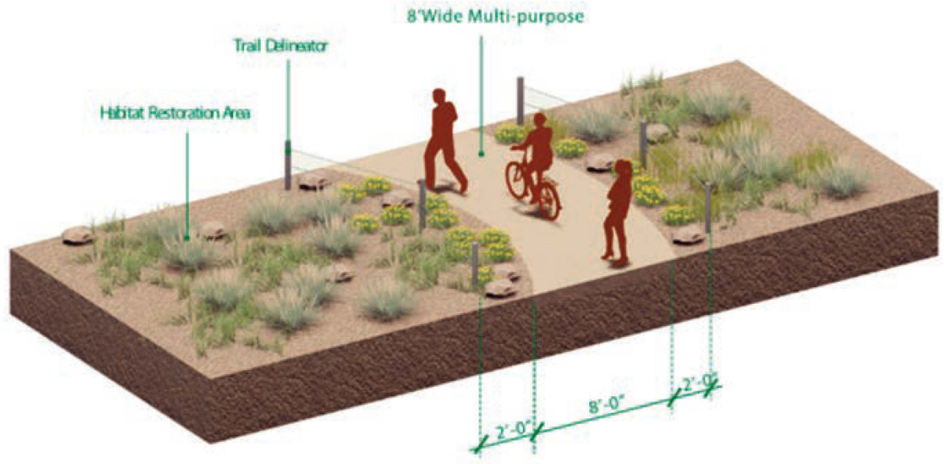
8' Wide Bike/ Safety/ Maintenance Trail



3' Wide Pedestrian Trail



Separated Bike/ Safety/ Maintenance Trail



8' Wide Multi-Purpose Trail

DRAFT

Mesa and Bluffs

This area includes the vernal pools, coastal bluff scrub, and large areas of native grassland restoration. These are among the most sensitive areas in terms of important and unique habitat. This area would establish a firm direction for the total project, create interpretive opportunities, and offer important bluff top trails for public use. At the time of the fill soil removal from the area of the archaeological site, restoration of the native grasslands must be started. Due to the presence of vernal pools, this area may also offer the greatest opportunity for attracting outside financial participation.

Northwestern Lowlands

This area also offers large areas of sensitive habitat restoration, as it will contain alluvial scrub, and coastal strand. The area also will serve as the link to Talbert Nature Preserve to the west and south. With the completion of this segment, the major portion of the western park area will be completed as a contiguous habitat.

Group Picnic Area – Lawn Area

Improvements to gathering and picnic areas, as well as centralized education, interpretation and nature play features, will be located within the developed lawn area. Additionally, revegetation of bare and denuded areas along with new trail delineation and signage linking trail connections can be completed along with trial overlooks allowing views to the Pacific Ocean, Catalina and the restored northwestern lowlands.

East Side and Model Railroad Area

In addition to landscape enhancements and improvements to the picnicking sites, it is recommended that an on-site maintenance and storage facility, or designated area is incorporated for efficient storage and use of Fairview Park restoration tools and equipment. Additionally, proposed enhancements for the east side include a native plant growing space on the east side of Fairview Park in a location that avoids impacts to sensitive habitat. The growing space shall be planned and designed in consultation with a qualified restoration ecologist. The on-site maintenance and storage facility will also complement the operation of the native plant growing space.


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Biological Resources Technical Report
Fairview Park, City of Costa Mesa

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May 8, 2025

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A: Plant and Wildlife Species Recorded in Fairview Park

INTRODUCTION

Under contract to MIG, Inc., Hamilton Biological, Inc. has prepared this biological technical report in support of an update to a Master Plan for Fairview Park, located in the City of Costa Mesa (the City) in Orange County, California (Figures 1, 2). Fairview Park consists of 208 acres of mostly natural open space that provides important habitat for many native species of plants and wildlife, some of which are listed as threatened or endangered by state or federal governments, or that are otherwise considered to be of conservation concern. In addition to protected biological resources, Fairview Park supports important archaeological resources that pose their own constraints. Fairview Park serves many residents from Costa Mesa and surrounding areas, who use the park mainly for such passive recreational uses as nature study, walking, biking, picnicking, and family gatherings. More active uses include a narrow-gauge railroad on the east side of the park and flying of model airplanes on the west side of the park. The intent of this biological technical report is to assist the City in managing Fairview Park in a way that will preserve the integrity of sensitive habitat areas in order to maintain stable, healthy populations of the many listed and otherwise "special-status" plant and wildlife populations that occur, or potentially occur, within the park.

METHODS

Literature Review

This report builds upon several biological reports prepared for the City, dating back to the 1990s, including:

- Hamilton, R. A. 1995. *Biological constraints and opportunities analysis, Fairview Park, Costa Mesa.* Report dated October 9, 1995, prepared for City of Costa Mesa, Community Services Department.

- LSA Associates, Inc. 2007. Update to the biological constraints and information for the Fairview Park Master Plan, City of Costa Mesa, County of Orange, California. Letter report to City of Costa Mesa dated June 28, 2007, providing a general update to previous biological studies and the results of focused surveys for southern tarweed, Burrowing Owl, and California Gnatcatcher conducted in 2005/2006.

- Sea and Sage Audubon Society. October 2020 to Autumn 2022. Seven periodic reports prepared by volunteers and submitted to the City of Costa Mesa to document the birdlife in different parts of Fairview Park at different times of the year.

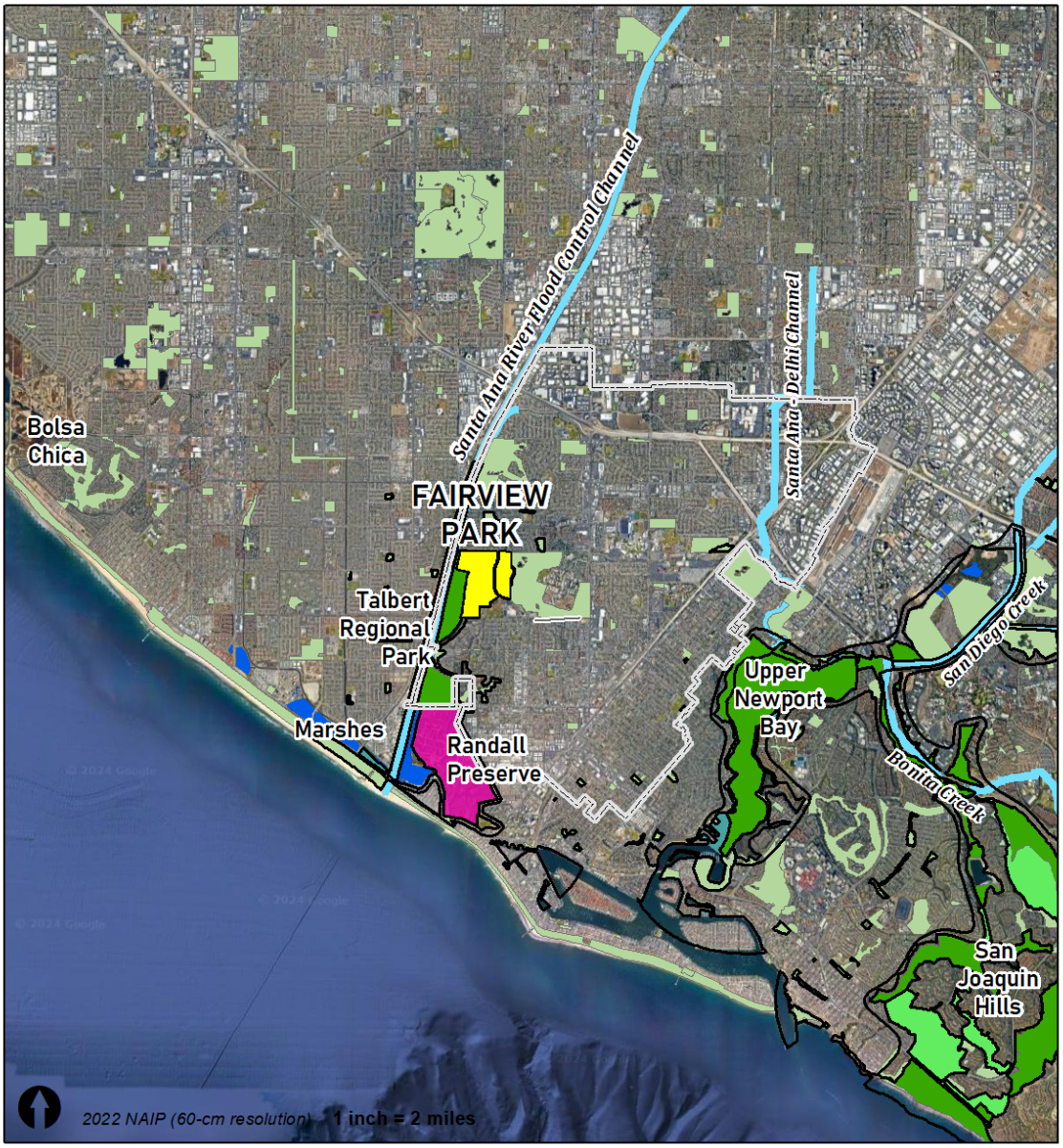


Figure 1, Regional Location of Fairview Park **Source: Land IQ (2024)**



Figure 2, Fairview Park Boundary **Source: Land IQ (2024)**

- Endemic Environmental Services. 2024. Crotch's Bumble Bee photo-only survey report for the Fairview Park Wetland and Riparian Habitat Project – Phase 2 Project located in the City of Costa Mesa, California. Technical report submitted to the California Department of Fish and Wildlife.

- Endemic Environmental Services. 2025. Western Burrowing Owl (*Athene cunicularia hypugaea*) monitoring program report. Undated report prepared for the City of Costa Mesa.

Numerous other park-specific reports reviewed as part of this effort are listed in the Literature Cited section. The California Natural Diversity Data Base (2025a) was queried for information on special-status plant and wildlife taxa recorded on the Newport Beach 7.5' USGS topographic quadrangle and adjacent quadrangles.

Field Visits in 2023

Botanical investigations were completed by botanist James Bailey on April 28, May 21, and June 8, 2023, to develop a comprehensive list of plants in the park and to search all communities for special-status species potentially present. Each botanical survey lasted seven to eight hours, and covered the western side of the park, focusing on the vernal pools, grasslands, and scrub-covered bluff. The northern riparian lowlands were visited on April 28 and the area east of Placentia Avenue was visited on June 8. Plant species taxonomy and nomenclature follow iNaturalist (2025) except that special-status species follow the CNDDB (2023a). Scientific names are specified for all plant species discussed in the report, and they are also provided in the species list included as Appendix A.

Apparently due to an extended rainy season, many plants flowered about a month later than usual during the first half of 2023. The earliest vernal pool indicator species detected was slender woolly-marbles (*Psilocarphus brevissimus*), and the latest was mud fiddleleaf (*Nama stenocarpa*). During the more typical year of 2017, James Bailey observed that these two species had reached maturity and produced inflorescences by early March and mid April respectively. In 2023, however, these milestones were pushed back to mid April for *Psilocarphus* and mid June for *Nama*. Specifically, late-season showers on May 3, 4, and 5 refilled the vernal pools with nearly 1 inch of water. While early season species had already developed by this time, later season species were stalled by repeated submergence, until the ponds dried again in mid to late May.

Biologist Robert Hamilton conducted wildlife investigations on nine dates between February 10 and June 8, 2023, as summarized in Table A, on the following page.

Table A: 2023 Wildlife Survey Summary

Date	Times	Temps (°F)	Sky Conditions	Wind (mph)
2/10/23	1615–1700	66	80% overcast	2–3
3/28/23	1330–1730	58–59	50% overcast	3–5
3/31/23	1520–1700	62	90% overcast	4–8
4/7/23	1530–1700	64	20% overcast	4–6
4/14/23	1555–1645	63–61	40–80% overcast	2–5
4/28/23	0805–1205	57–65	100% overcast	1–4
5/19/23	1530–1655	64	100% overcast	3–5
5/28/23	0700–10:20	59–63	100% overcast	1–3
6/8/23	0905–1115	65	60% overcast to hazy	1–6

The purpose of the wildlife visits in 2023 was to collect current information on the distribution of plant and wildlife species across Fairview Park. Nearly all of the survey effort was expended west of Placentia Avenue, with an emphasis on attempting to detect (a) special-status species potentially present and (b) species detectable only when the vernal pools have water (as they did during and after the exceptionally wet rainy season of 2022/2023). Taxonomy and nomenclature for wildlife follow iNaturalist (2025) except that special-status species follow the CNDDB (2025b). Scientific names are given for wildlife species discussed in the report except for birds, which have familiar and standardized common names. Scientific names for all vertebrate, fairy shrimp, and butterfly taxa are provided in the species list included as Appendix A.

Field Visit in 2025

Biologist Robert Hamilton conducted a field visit on March 25, 2025, from 8:25 a.m. to 12:45 p.m. Skies were foggy to hazy; winds were in the range of 1–5 miles per hour; and the temperature was 56–62° F. The survey in 2025 was to observe current habitat conditions and to potentially record any additional species that may have arrived since 2023.

RESULTS

Vegetation

In recent years, 222 species of vascular plants have been recorded in the park, including several special-status species, most of which are associated with vernal pools.

Apart from 13 acres of turf and developed areas, vegetation at Fairview Park comprises 195 acres of natural communities and vegetation associations, each hosting a suite of characteristic plant species. See Figure 3, on the next page.

Grasslands, which occupy the flatter upland portions of the park on either side of Placentia Avenue, consist mainly of non-native grass and forb species. A handful of native species are represented, however, including clustered tarweed (*Deinandra fasciculata*), great valley gumweed (*Grindelia camporum*), coast goldenbush (*Isocoma menziesii*), fiddleneck (*Amsinckia menziesii* ssp. *intermedia*), small-flowered microseris (*Microseris douglasii* var. *platycarpha*), and purple needlegrass (*Nassella pulchra*).

Scattered across the southern grasslands are vernal pools, the species composition and ratio of which varies considerably from pond to pond and month to month during the time of year when the soil is moist. All of the roughly 18 vernal pool indicator species previously recorded at Fairview Park were recorded during the 2023 field visits. The more widespread of these indicator species include low woolly-marbles (*Psilocarphus brevissimus*), common spike-rush (*Eleocharis palustris*), bigbract verbena (*Verbena bracteata*), water clover (*Marsilea vestita*), golden dock (*Rumex fueginus*), flowering quillwort (*Trigochlin scilloides*), California waterwort (*Elatine californica*), shortseed waterwort (*Elatine brachysperma*), pygmyweed (*Crassula aquatica*), Virginia cress (*Planodes virginicum*), American pillwort (*Pilularia americana*), and water starwort (*Callitriche* sp.). Rarer indicators of this sensitive habitat include San Diego button-celery (*Eryngium aristulatum* var. *parishii*), California Orcutt grass (*Orcuttia californica*), mud nama (*Nama stenocarpa*), little mousetail (*Myosurus minimus* ssp. *apus*), and prostrate vernal pool navarretia (*Navarretia prostrata*). Fairview Park supports the only Orange County population of several of these rare species.

Coastal bluff scrub, most of which shows signs of disturbance and invasion by non-native weeds, occurs on the west-facing slope above Talbert Regional Park. Characteristic native plants in this association include California boxthorn (*Lycium californicum*), bladderpod (*Cleomella arborea*), coast prickly-pear (*Opuntia littoralis*), and wishbone bush (*Mirabilis laevis*). Chilicothe (*Marah macrocarpa*) formed an extensive blanket over large areas of bluff scrub on this bluff in response to wet conditions in 2023. A few southern California black walnuts (*Juglans californica*) occur on the bluff in the southeastern corner of the park.

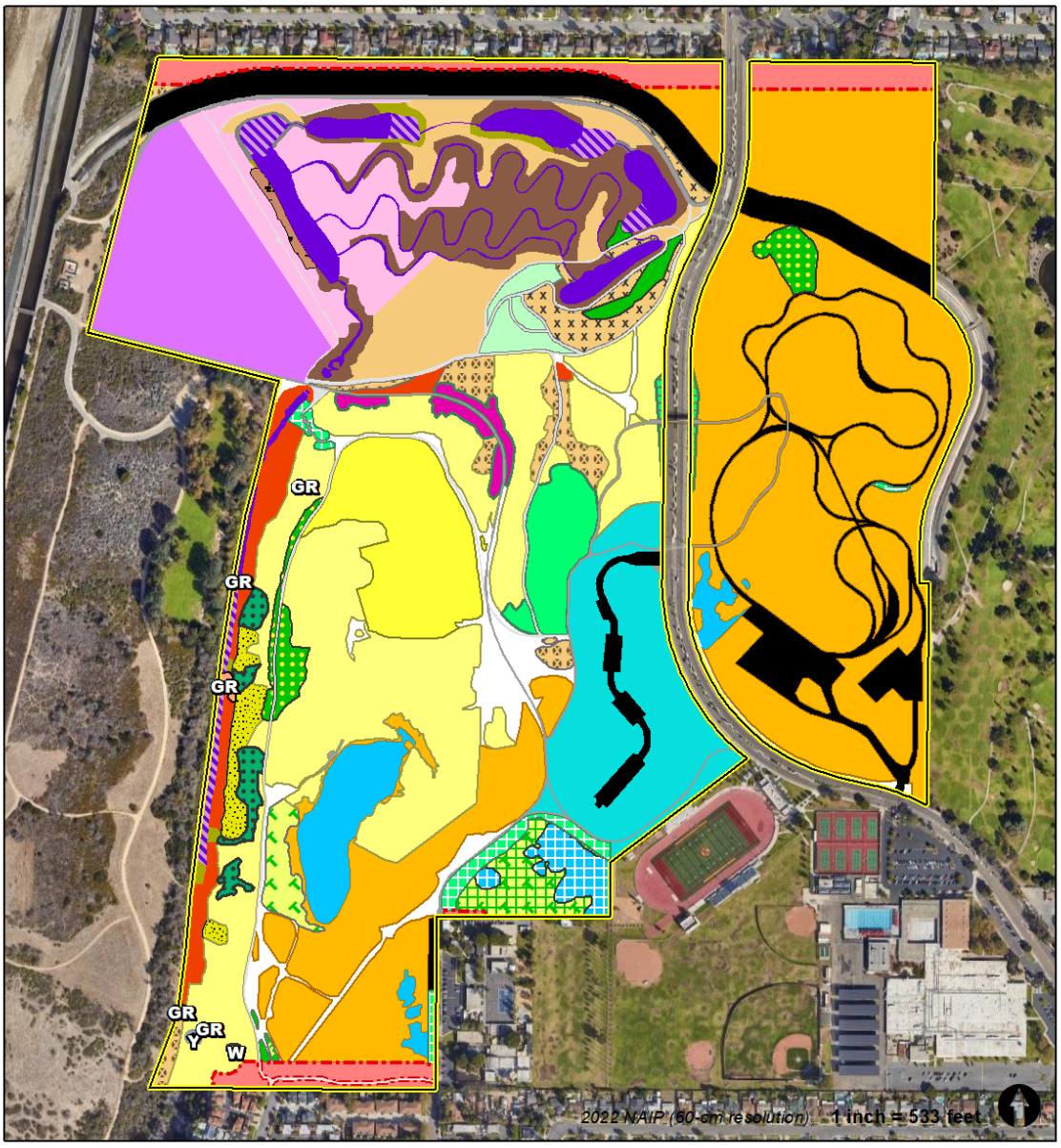
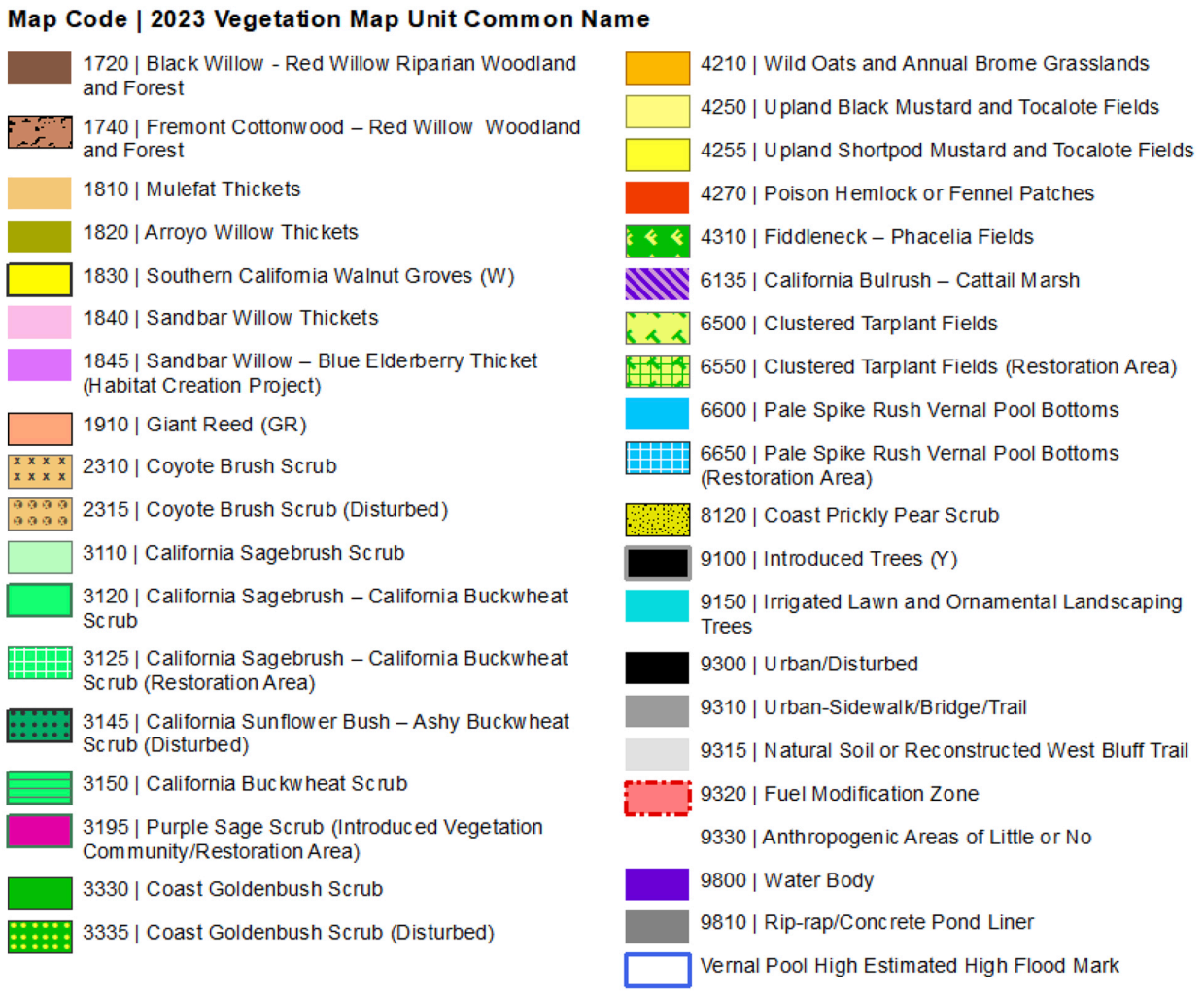


Figure 3. Vegetation Map **Source: Land IQ (2024)**

See following page for map legend.



Alluvial scrub formerly occurred widely across the sandy northern lowlands of Fairview Park, prior to conversion of most of this area to created ponds and associated riparian scrub and woodland. Remnants of the alluvial scrub remain in the northwestern corner of the park, represented by sandbar willow (*Salix exigua* ssp. *hindsiana*), California evening-primrose (*Oenothera californica*), California croton (*Croton californicus*), Lewis's evening-primrose (*Camissoniopsis lewisii*), and coyote brush.

The riparian woodlands and scrub established around the ponds created in the northern lowlands include several species of willow (*Salix lasiolepis, S. laevigata* and S. *gooddingii*), yerba mansa (*Anemopsis californica*), California wild rose (*Rosa californica*), California bulrush (*Schoenoplectus californica*), California mugwort (*Artemisia douglasiana*), western sycamore (*Platanus racemosa*), marsh fleabane (*Pluchea odorata*), trailing blackberry (*Rubus ursinus*), and mule fat (*Baccharis salicifolia*).

Coastal sage scrub vegetation has been restored in the dry canyon north and west of the main park entrance off Placentia Avenue. Dominant species in this community include California Sagebrush (*Artemisia californica*), California buckwheat (*Eriogonum fasciculatum*), black sage (*Salvia mellifera*), purple sage (*Salvia leucophylla*), white sage (*Salvia apiana*), lemonade berry (*Rhus integrifolia*), coyote brush (*Baccharis pilularis*), coastal brittlebush (*Encelia californica*), and laurel sumac (*Malosma laurina*).

Expanses of non-native, invasive weed species effectively exclude most native plants from parts of the park. These include black mustard (*Brassica nigra*), devil's thorn (*Emex spinosus*), crown daisy (*Glebionis coronaria*), Hoary Cress (*Lepidium*), and Sweet Fennel (*Foeniculum vulgare*).

Wildlife

Two federally listed invertebrates, San Diego fairy shrimp (*Branchinecta sandiegonensis*) and Riverside fairy shrimp (*Streptocephalus woottoni*), have been documented in some of the park's vernal pools. Their more common relative, the versatile fairy shrimp (*Branchinecta lindahli*), occurs more widely in pools and small depressions. San Diego fairy shrimp were recorded during the last focused surveys in 2024 (Glen Lukos Associates 2024), but Riverside fairy shrimp were last documented at the park in 2017 (Glen Lukos Associates 2017).

In June and July, 2024, focused surveys were conducted for Crotch's Bumble Bee (*Bombas crotchii*), a candidate for listing under the California Endangered Species Act, across 16.5 acres planned for habitat restoration in Fairview Park (Endemic Environmental Services 2024). These surveys produced photographic records of 13 Crotch's Bumble Bees utilizing a variety of native and non-native shrubs and forbs.

Twenty species of butterfly were seen in Fairview Park during 2023, including the monarch (*Danaus plexippus*), a candidate for listing by the federal government. Another special-status species, the wandering skipper (*Panoquina errans*), is distributed locally in nearby Talbert Regional Park on alkali soils where its host plant, salt grass (*Distichlis spicata*), occurs more widely. A single individual of this species was observed in the northern lowlands of Fairview Park. Other invertebrates found in vernal pools at Fairview include unknown species of ostracods (*Ostracoda* spp.) and at least one species of Copepod (*Copepoda* spp.).

Five native species of amphibian have been reported in Fairview Park: Western toad (*Anaxyrus boreas*), California tree frog (*Pseudacris cadaverina*), Baja California tree frog (*Pseudacris hypochondriaca*), black-bellied slender salamander (*Batrachoseps nigriventris*), and southern California slender salamander (*Batrachoseps major*). The addition of permanent ponds to the park has facilitated invasion by one non-native amphibian, the American Bullfrog (*Lithobates catesbeianus*), and one non-native turtle, the Red-eared Slider (*Trachemys scripta*). Three species of snake and five species of lizard have been reported in Fairview Park: California kingsnake (*Lampropeltis californiae*), gopher

snake (*Pituophis catenifer*), southern pacific rattlesnake (*Crotalus oreganus*), southern alligator lizard (*Elgaria multicarinata*), western fence lizard (*Sceloperus occidentalis*), common side-blotched lizard (*Uta stansburiana*), western skink (*Plestiodon skiltonianus*), and western whiptail (*Aspidoscelis tigris*).

Birds are the most conspicuous forms of wildlife at Fairview Park, where approximately 223 species have been recorded. With the establishment of permanent ponds in the northern lowlands, various waterfowl have become regular there. Year-round residents include the Canada Goose, Mallard, Ruddy Duck, Pied-billed Grebe, various herons and egrets, Common Gallinule, and American Coot. Small numbers of White-faced Ibis, a special-status species, have nested in the created wetlands in recent years. Riparian scrub and woodland provide habitat for many species, including such special-status species as the Least Bell's Vireo, Yellow-breasted Chat, and Yellow Warbler.

During wet winters and springs, an array of waterfowl and shorebirds rely on the park's vernal pools for foraging and as resting areas. Ducks that use the pools include Blue-winged Teal, Cinnamon Teal, Gadwalls, American Wigeon, and Mallards. Shorebirds observed using the pools include Black-necked Stilts, American Avocets, Long-billed Curlews, Long-billed Dowitchers, Greater Yellowlegs, and Lesser Yellowlegs. Large flocks of swallows forage over the pools, including Barn, Tree, Cliff, Northern Rough-winged, and Violet-green.

Grasslands on either side of Placentia Avenue provide foraging habitat for several species of raptor, including Burrowing Owls (up to three wintering in 2024/2025; Endemic Environmental Services 2025), Northern Harriers, White-tailed Kites, Red-shouldered Hawks, and Red-tailed Hawks. Insectivores found in the park include Vermilion Flycatchers, Ash-throated Flycatchers, Western Kingbirds, Cassin's Kingbirds, Black Phoebes, and Say's Phoebes. Wintering species include various sparrows, such as White-crowned and Savannah, along with American Pipits, Western Meadowlarks, and other open-country species. Stands of non-native mustard that have developed on the mesa provide nesting habitat for Red-winged Blackbirds and Song Sparrows.

Coastal bluff scrub and coastal sage scrub in the park support small numbers of resident California Gnatcatchers, along with more widespread species, such as Song Sparrows, California Towhees, Spotted Towhees, Common Yellowthroats, and Orange-crowned Warblers.

Turf and trees in the developed parts of the park provide habitat for a number of species tolerant of humans, including Western Bluebirds, House Finches, Lesser and American Goldfinches, and wintering Yellow-rumped Warblers.

Mammals found in Fairview Park are species adapted to human presence, such as the Virginia Opossum (*Didelphus virginiana*), Desert Cottontail (*Sylvilagus audubonii*), California Ground Squirrel (*Otospermophilus beecheyi*), Coyote (*Canis latrans*), and Northern Raccoon (*Procyon lotor*), and fossorial species, such as Botta's Pocket Gopher (*Thomomys bottae*) and California Vole (*Microtis californicus*). The Black-tailed Jackrabbit (*Lepus californicus*), a California Species of Special Concern that requires large open areas to persist, occurred historically (Hamilton 1995) but appears to have been extirpated from the park and other areas along the lower Santa Ana River.

Sensitive Biological Resources

Federal, state, and local regulations exist to protect and conserve sensitive biological resources. For purposes of this report, a biologically sensitive resource refers to any of the following:

- A natural community recognized as having special-status by federal, State, and/or local governments, and requiring a permit or agreement prior to its disturbance.
- A plant or animal species identified by federal or state governments as endangered, threatened, rare, protected, sensitive, vulnerable, or a Species of Special Concern.
- A plant or animal that listed by a state or federal agency as a candidate species or proposed for state or federal listing.

Sensitive Natural Communities

The State of California (CDFW 2023) identifies as "Sensitive" the following natural communities that occur in Fairview Park:

- Vernal Pools/Native Grasslands.
- Coastal Bluff Scrub.
- Coastal Sage Scrub.
- Riparian Scrub and Woodland.

Special-Status Species

In the following Table B, special-status plants and wildlife that occur in Fairview Park, or that have realistic potential to occur there, are identified and briefly discussed.

Table B uses the following abbreviations:

- **C** **Candidate** for Listing (State or Federal governments).

- **E** **Endangered** (listed by State or Federal governments). "Take" of the species or disturbance of occupied habitat are prohibited unless specifically authorized.

- **FP** **Fully Protected** by the State of California. These species may not be taken or possessed at any time, although take may be authorized for necessary scientific research.

- **T** **Threatened** (listed by State or Federal governments). "Take" of the species or disturbance of occupied habitat are prohibited unless specifically authorized.

- **PT** **Proposed Threatened**. Species recently proposed to be listed as threatened by State or Federal governments.

- **SSC** **Species of Special Concern**. The California Department of Fish and Wildlife has designated certain vertebrate species as Species of Special Concern because declining population levels, limited ranges, and/or continuing threats have made them vulnerable to extinction. The goal of designating species as Species of Special Concern is to halt or reverse their decline by calling attention to their plight and addressing the issues of concern early enough to secure their long term viability.

Some wildlife species are considered "sensitive" only during certain parts of their annual cycle—usually on the nesting grounds. Such species are considered "sensitive" at Fairview Park only if they have potential to occur at the park during that specific time of the year (e.g., those occurring strictly as migrants would not be included).

California Native Plant Society (CNPS). Table B includes plant taxa assigned the following ranks by CNPS:

- **1A**, referring to taxa CNPS presumes to be extirpated in California and either rare or extinct elsewhere.

- **1B.1**, referring to taxa CNPS considers to be rare, threatened, or endangered in California and elsewhere; seriously threatened in California (over 80% of occurrences threatened / high degree and immediacy of threat).

- **1B.2**, referring to taxa CNPS considers to be rare, threatened, or endangered in California and elsewhere; moderately threatened in California (20-80% of occurrences threatened / moderate degree and immediacy of threat).

- **1B.3**, referring to taxa CNPS considers to be rare, threatened, or endangered in California and elsewhere; not very threatened in California (less than 20% of occurrences threatened / moderate degree and immediacy of threat).

- **2B.2**, referring to taxa CNPS considers to be rare, threatened, or endangered in California, but more common elsewhere; moderately threatened in California (20-80% occurrences threatened / moderate degree and immediacy of threat).

- **3.1**, referring to taxa for which CNPS lacks the necessary information to assign them to one of the other ranks or to reject them; taxonomy is typically uncertain.

- **4.1**, referring to taxa of limited distribution or infrequent throughout a broader area in California, whose status should be monitored regularly; moderately threatened in California (>80% occurrences threatened / moderate degree and immediacy of threat).

- **4.2**, referring to taxa of limited distribution or infrequent throughout a broader area in California, whose status should be monitored regularly; moderately threatened in California (20-80% occurrences threatened / moderate degree and immediacy of threat).

- **4.3**, referring to taxa of limited distribution or infrequent throughout a broader area in California, whose status should be monitored regularly; not very threatened in California (less than 20% of occurrences threatened / low degree and immediacy of threat or no current threats known).

NatureServe Element Rankings. In some cases, species have not been granted special status by state or federal agencies, but they may be recognized as ecologically sensitive by the California Natural Diversity Database (CNDDB), which uses a ranking methodology maintained by NatureServe. Species are given a Global rank (G-rank) that applies to the taxon's entire distribution, and a State rank (S-rank) that applies to the taxon's state distribution. For subspecies and varieties, there is also a "T" rank describing the global rank for the subspecies or variety, and "TX" refers to a subspecies or variety presumed to be extinct. "Q" denotes questionable taxonomy. Taxa with rankings of G1, G2, G3, S1, S2, or S3 may be considered "sensitive" and potentially worthy of special consideration in resource planning. Taxa with higher rankings (G4, G5, S4, S5) are considered "apparently secure" or "secure" and therefore are not considered "sensitive" for purposes of this report. NatureServe Element Rankings are identified in Table B only for taxa that have no other federal or state special status. NatureServe Ranks:

- **G1, Critically Imperiled,** referring to taxa at very high risk of extinction due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors.

- **G2, Imperiled,** referring to taxa at high risk of extinction due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors.

- **G3, Vulnerable,** referring to taxa at moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors.

- **S1, Critically Imperiled,** referring to taxa critically imperiled in the state because of extreme rarity (often 5 or fewer populations) or because of factor(s) such as very steep declines making it especially vulnerable to extirpation from the state.

- **S2, Imperiled,** referring to taxa imperiled in the state because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the state.

- **S3, Vulnerable,** referring to taxa vulnerable in the state due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation from the state.

Potential to Occur Criteria. The last column of Table B indicates the perceived likelihood of the species occurring in Fairview Park:

- **Present.** Species reliably recorded in Fairview Park during the current survey effort or previous survey efforts, or reported in credible online sources, such as Calflora (www.calflora.org), eBird (www.ebird.org), or iNaturalist (www.inaturalist.org); if the local population is no longer believed to be extant, the potential to occur is stated as **Extirpated** or **Possibly Extirpated**, with explanation.

- **High.** Species considered likely to occur at Fairview Park based upon the pattern of records in surrounding areas and the presence of suitable habitat resources at the park. Species may be inconspicuous and/or little-studied, and therefore subject to being overlooked even when present.

- **Moderate.** Species considered neither likely nor highly unlikely to occur at Fairview Park, because the park lies within the species' known range and adequate suitable habitat is present. Species may be inconspicuous and/or little-studied, and therefore subject to being overlooked even when present.

- **Low.** Species not known from Fairview Park, and considered highly unlikely to occur there, except as a rare transient, because the park lies outside of the species' known range and/or required habitat is of marginal or low quality.

- **None.** Fairview Park lies well outside of the species' range, but potential for confusion exists due to changes in taxonomy, erroneous reports, etc.

Table B. Special-Status Species

Latin name Common name	Fed.	Global/ State	CNPS	Habitat/Regional Status	Potential to Occur in Fairview Park
Plants					
Abronia villosa var. *aurita* Chaparral Sand-Verbena	—	G5T2/ S2	1B.1	Open sandy soils in alluvial washes, chaparral, and coastal sage scrub. Mainly in Riverside and San Diego Counties. Last extant Orange County population is at Fairview Park.	**Possibly Extirpated.** Small numbers found in northern lowlands in recent years; not detected in 2023, possibly due to brush clearance in area.
Atriplex coulteri Coulter's Saltbush	—	G3/S1S2	1B.2	Clay soils on bluffs, mesas and open coastal areas. San Luis Obispo County south.	**Moderate.** Occurs within 5-10 miles of park.
Atriplex pacifica South Coast Saltscale	—	G4/S2	1B.2	Clay soils on bluffs, mesas and open coastal areas. Santa Barbara County south.	**Moderate.** Historically occurred within 5-10 miles of park.
Atriplex serenana var. *davidsonii* Davidson's Saltscale	—	G5T1/S1	1B.2	Coastal cliff faces and bluffs. Santa Barbara County south to Orange County.	**Moderate.** Historical records within 5-10 miles of park.
Calystegia sepium ssp. *binghamiae* Santa Barbara Morning-Glory	—	G5TXQ/ SX	1A	Coastal saltmarshes and stream banks. Localized populations in western Central Valley and southern California.	**None.** Name misapplied erroneously to plants in Orange County.
Camissoniopsis lewisii Lewis's Evening-Primrose	—	G4/S4	3	Sandy or clay soils on bluffs, mesas, and open coastal areas. San Luis Obispo County south.	**Present.** Scattered small populations along trail margins and other open areas.
Centromadia parryi ssp. *australis* Southern Tarplant	—	G3T2/S2	1B.1	Disturbed ground in saltmarshes and coastal sage scrub. Santa Barbara County south.	**Present.** Occurs along disturbed margins of trails; numbers fluctuate from year to year; more abundant in the park before creation of ponds in the northern lowlands.
Chaenactis glabriuscula var. *orcuttiana* Orcutt's Pincushion	—	G5T1/S1	1B.1	Coastal dunes, bluffs, and mesas. Ventura County south; mostly in San Diego County.	**Low.** Potentially suitable habitat present, but species not known to occur within 15 miles of the site.
Dudleya multicaulis Many-stemmed Dudleya	—	G2/S2	1B.2	Clay banks, slopes, and sandstone outcrops. Kern County south to northwestern San Diego County.	**Moderate.** Occurs within 5-10 miles of the park.

Latin name **Common name**	**Fed.**	**Global/ State**	**CNPS**	**Habitat/Regional Status**	**Potential to Occur in Fairview Park**
Eryngium aristulatum var. *parishii* San Diego Button-Celery	E	E	1B.1	Vernal pools. Mainly in San Diego County; the only Orange County population is at Fairview Park.	**Present.** Found in Ponds 4a, 4b, 4c. Numbers have declined over time; in recent years, plants appear to have been intentionally removed.
Hordeum intercedens Vernal Barley	—	G3G4/ S3S4	3.2	Grasslands and vernal pools. Santa Barbara County south; scattered populations in the Central Valley.	**Present.** Occurs in grasslands and vernal pools; numbers in 2023 greatly reduced from previous years, probably due to increasing competition from non-native species.
Horkelia cuneata var. *puberula* Mesa Horkelia	—	G4T1/S1	1B.1	Sheltered coastal chaparral. San Luis Obispo County south to northwestern San Diego County.	**Low.** Occurs within 5-10 miles, but park lacks coastal chaparral habitat.
Lasthenia glabrata ssp. *coulteri* Coulter's Goldfields	—	G4T2/S2	1B.1	Alkali soils and vernal pools. San Luis Obispo County south; scattered populations in the Central Valley.	**Present.** Pools 5 and 6 hold the County's largest population, with 100s to 1000s of plants; smaller numbers occur in a vernally wet half-pipe feature in the central mesa, adjacent to a large disturbed area.
Lycium californicum California Boxthorn	—	G4/S4	4.2	Scrub habitats, mainly along the coast. Los Angeles County south.	**Present.** Occurs in coastal bluff scrub on the park's western slope.
Microseris douglasii ssp. *platycarpha* Small-flowered Microseris	—	G4T4/S4	4.2	Vernal pools and seasonally wet plains. Los Angeles County south; one record from southern Central Valley.	**Present.** Occurs in vernal pools and grasslands in the park on both sides of Placentia Avenue.
Myosurus minimus ssp. *apus* Little Mousetail	—	G5T2Q/ S2	3.1	Alkali soils and vernal pools. Mainly in the Central Valley and western Riverside County; the only Orange County population is at Fairview Park.	**Present.** Occurs around the margins of Pool 1; very few plants recorded in 2023, apparently due to competition from non-native plants and trampling.
Nama stenocarpa Mud Nama	—	G4G5/ S1S2	2B.2	Vernal pools and seasonally wet plains. Los Angeles County south; one record from southern Central Valley.	**Present.** Occurs in deepest parts of Pool 1.
Nasturtium gambelii Gambel's Watercress	E	T	1B.1	Freshwater marshes, streams, and drainage areas. San Luis Obispo County south to Orange County.	**Low.** Potentially suitable habitat present, but no extant populations known in Orange County.

Latin name Common name	Fed.	Global/ State	CNPS	Habitat/Regional Status	Potential to Occur in Fairview Park
Navarretia prostrata Prostrate Vernal Pool Navarretia	—	G2/S2	1B.2	Seasonally wet alkali soil and vernal pools. Central Valley; coastal slope from Alameda County south; one of two Orange County populations is at Fairview Park.	**Present.** Occurs around the margins of Pool 1, but fewer plants than expected were recorded in 2023, apparently due to competition from non-native plants and trampling.
Orcuttia californica California Orcutt Grass	E	E	1B.1	Vernal pools. Ventura County south; scattered populations in the Central Valley; the only Orange County population is at Fairview Park.	**Present.** Found in Pool 4a; several dozen plants emerged in 2023 after exceptional rains.
Pentachaeta aurea ssp. *alleni* Allen's Daisy	—	G4T1/S1	4.3	Clay grasslands and openings in coastal sage scrub. Known from San Joaquin Hills and Santa Ana Mountains of Orange County.	**Low.** Occurs in within 5-10 miles of the park, but suitable habitat may not be present.
Saltspring Checkerbloom *Sidalcea neomexicana*	—	G4/S2	2B.2	Alkali springs and marshes. Ventura County south.	**Low.** Potentially suitable habitat present, but species not known to occur within 15 miles of park.
Invertebrates					
San Diego Fairy Shrimp *Branchinecta sandiegonensis*	E	G2/S1		Vernal pools and other ephemeral wetlands. Orange County south.	**Present.** Documented in seasonal pools on both sides of Placentia Avenue.
Riverside Fairy Shrimp *Streptocephalus woottoni*	E	G1G2/ S2		Vernal pools and other ephemeral wetlands. Ventura County south.	**Present.** Documented in seasonal pools on west side of Placentia Avenue.
Bombas crotchii Crotch's Bumble Bee	—	C/S1S2	—	Many habitats. California and northwestern Baja California; most records from southern California.	**Present.** Uses native and non-native flowering habitats in the park (Endemic Environmental Services 2024). Nests in burrows, tufts of vegetation, cavities, rock piles, etc.
Danaus plexippus Monarch	C	G4T1T2 Q/S2	—	Breeds in areas with milkweed from Mendocino County south. In southern California, overwinters mainly in large stands of eucalyptus near the coast.	**Present.** Occurs as a transient; not known to breed or overwinter in the park.
Panoquina errans Wandering Skipper	—	G4G5/ S2	—	Coastal salt marsh with the required food plant, salt grass (*Distichlis spicata*). Santa Barbara County south.	**Present.** James Bailey observed one in the northern lowlands, but scarcity of salt grass in the park may preclude the species from becoming established.

Latin name Common name	Fed.	Global/ State	CNPS	Habitat/Regional Status	Potential to Occur in Fairview Park
Helminthoglypta traskii traskii Trask Shoulderband	—	G1G2T1 /S2S3	—	Many habitats. Coastal slope from Ventura County south.	**High.** Likely occurs in the less disturbed parts of the park.
Amphibians					
Spea hammondii Western Spadefoot	PT	SSC	—	Seasonal pools with nearby uplands suitable for aestivation. Shasta County south, excluding deserts.	**Low.** The species likely occurred at Fairview Park historically, because suitable habitat is present, but no records exist.
Reptiles					
Actinemys pallida Southwestern Pond Turtle	PT	SSC	—	Expansive natural areas that include permanent water and generally lack non-native turtles or exotic predators. Alameda County south, excluding deserts.	**Present.** One reported in Pond D in the northern lowlands (Endemic Environmental 2021).
Phrynosoma blainvillii Coast Horned Lizard	—	SSC	—	Expansive natural areas with sandy openings and native harvester ants. Shasta County south, excluding deserts.	**Low.** Unlikely to occur due to degradation and fragmentation of habitat, including presence of Argentine ants.
Aspidoscelis tigris stejnegeri Coastal Whiptail	—	SSC	—	Widespread, in various habitats. Coastal slope from Santa Barbara County south.	**Present.** One reported at base of the park's western slope (Dudek 2003).
Anniella stebbinsi Southern California Legless Lizard	—	SSC	—	Various habitats with sandy soil or deep leaf-litter. Coastal slope from Ventura and Kern Counties south.	**Moderate.** May occur in areas with loose soils.
Arizona elegans occidentalis California Glossy Snake	—	SSC	—	Widespread, but uncommon, in habitats with loose soil. Coastal slope from Contra Costa County south.	**Moderate.** May occur in areas with loose soils.
Salvadora hexalepis virgultea Coast Patch-nosed Snake	—	SSC	—	Brushy and rocky habitats. Coastal slope from San Luis Obispo County south.	**Low.** Unlikely to occur due to degradation and fragmentation of habitat.
Thamnophis hammondii Two-striped Garter Snake	—	SSC	—	Widespread in the region, in and around perennial water.	**Moderate.** May occur in and around perennial water.
Crotalus ruber Red Diamond Rattlesnake	—	SSC	—	Various rocky habitats. Coastal slope from Los Angeles County south.	**Low.** Along the coast, not recorded west of the San Joaquin Hills. Records from Seal Beach area reportedly involve released animal(s).
Birds					
Aythya americana Redhead	—	SSC	—	Nests in various freshwater habitats; winters on lakes and bays. Range includes most of North America.	**Present.** A few have been recorded during winter. Some potential exists for nesting in the northern lowland ponds.

Latin name Common name	Fed.	Global/ State	CNPS	Habitat/Regional Status	Potential to Occur in Fairview Park
Plegadis chihi White-faced Ibis	—	G5/S3S4	—	Various freshwater habitats. Breeding range includes most of western North America; winters south to Central America.	**Present.** Up to several dozen non-breeders occur in the park in fall, winter, spring; small numbers have been recorded breeding in the northern lowland ponds.
Sternula antillarum browni California Least Tern	E	E	—	Breeds on sandy beaches, and in similar open coastal habitats, from Solano County south. Winters in western Mexico.	**Present.** Not expected to nest in the park, but local breeders occasionally forage in ponds in the northern lowlands.
Nannopterum auritum Double-crested Cormorant	—	G5/S2	—	Freshwater and nearshore marine environments across most of North America. Nests in trees and snags near water.	**Present.** Non-breeders regularly forage in ponds in the northern lowlands. Could nest there as trees around the ponds mature.
Ixobrychus exilis Least Bittern	—	SSC	—	Resident of freshwater marshes with extensive emergent vegetation across large parts of North and South America.	**Present.** Small number of records from ponds in the northern lowlands; may nest in tules.
Elanus leucurus White-tailed Kite	—	FP	—	Nests in trees within expansive open space areas; more widespread during migration and winter. Forages in rangelands and marshy areas. Range includes large parts of North and South America.	**Present.** Forages regularly in the park. Could potentially nest in riparian woodlands.
Aquila chrysaetos Golden Eagle	—	FP	—	Extensive open areas across a cosmopolitan range; nests on cliffs and in tall trees away from settlements. In Orange County, occurs mainly in the foothills and mountains.	**Low.** Transients could occur rarely.
Circus hudsonius Northern Harrier	—	SSC	—	Nests on the ground in expansive open space areas; more widespread during migration and winter. Range includes most of North America.	**Present.** Small numbers regularly forage in the park's grassland and scrub habitats in fall, winter, and spring. Could possibly nest in the local area.
Haliaeetus leucocephalus Bald Eagle	—	E	—	Nests in tall trees, usually near water; forages in lakes, rivers, and marine environments. Range includes most of North America.	**Present.** Occurs rarely as a transient.
Buteo regalis Ferruginous Hawk	—	G4/S3S4	—	Breeds in central North America and winters mainly in expansive rangelands and agricultural areas to the south.	**Present.** Occurs rarely as a transient.

Latin name **Common name**	**Fed.**	**Global/ State**	**CNPS**	**Habitat/Regional Status**	**Potential to Occur in Fairview Park**
Buteo swainsoni Swainson's Hawk	—	G5/S4	—	Breeds in Canada and western North America and winters from western Mexico to southern South America.	**Present.** Occurs rarely as a transient.
Athene cunicularia Burrowing Owl	—	C/SSC	—	Occurs across large parts of North America; nesting population west of the deserts nearly extirpated. Rare winter visitor in coastal southern California.	**Present.** Up to three often winter in Fairview Park, using open habitats on either side of Placentia Avenue. Not known to nest in the park.
Asio flammeus Short-eared Owl	—	SSC	—	Extensive open areas across a cosmopolitan range; nests in northern North America. Very rare fall/winter visitor across most of southern California.	**Present.** Occurs rarely as a transient.
Empidonax traillii extimus Southwestern Willow Flycatcher	E	E	—	Formerly a widespread breeder in southern California but now highly localized in areas of extensive riparian woodlands. Uncommon during migration.	**Low (as a breeder).** Habitat is marginal; no recent nesting records from Orange County. Occurs regularly, but uncommonly, as a transient.
Pyrocephalus rubinus Vermilion Flycatcher	—	SSC	—	Open country with trees. Formerly nested in the desert Southwest and into Mexico; now nests sparingly across southern California, including Orange County.	**Present.** Now apparently resident in small numbers; courtship behavior by a pair on 3/25/25.
Vireo bellii bellii Least Bell's Vireo	E	E	—	Nests uncommonly in riparian scrub and woodlands from Ventura County south; winters in western Mexico.	**Present.** Small numbers nest in riparian habitats in Fairview Park and elsewhere along the lower Santa Ana River.
Lanius ludovicianus Loggerhead Shrike	—	SSC	—	Occurs in open habitats across most of North America; nesting population on coastal slope of southern California nearly extirpated. Rare winter visitor in coastal southern California.	**Present.** Occurs rarely in fall and winter; does not nest.
Polioptila californica californica Coastal California Gnatcatcher	T	SSC	—	Resident of coastal sage scrub habitat, favoring shallow slopes and elevations below 1,500 feet; Ventura County south.	**Present.** Small numbers resident in scrub habitats in Fairview Park and elsewhere along the lower Santa Ana River.
Campylorhynchus brunneicapillus Cactus Wren, coastal populations	—	SSC	—	Rare and declining resident of cactus scrub habitat on the coastal slope from Ventura County south.	**Extirpated.** Small numbers formerly resident along the western bluff and elsewhere along the lower Santa Ana River have died out in recent years.

Latin name Common name	Fed.	Global/ State	CNPS	Habitat/Regional Status	Potential to Occur in Fairview Park
Cistothorus palustris clarkae Clark's Marsh Wren	—	SSC	—	Resident of marshes with extensive emergent vegetation; Los Angeles County to San Diego County.	**High.** A few late spring and summer records of Marsh Wren in the lowland ponds likely refer to *C. p. clarkae*, the local breeder. Records of Marsh Wren in fall and winter may involve migrant subspecies from elsewhere.
Ammodramus savannarum Grasshopper Sparrow	—	SSC	—	Nests in expansive grasslands and rangelands across most of North America. In Orange County, breeds mainly in the San Joaquin Hills and Lomas de Santiago; occurs rarely in fall and winter.	**Low (as a breeder).** Occurs rarely as a transient or winter visitor. Nesting unlikely, but possible, east of Placentia Avenue.
Pooecetes gramineus affinis Oregon Vesper Sparrow	—	SSC	—	Breeds in the Pacific Northwest and winters mainly in expansive open areas on the coastal slope of California.	**High.** Vesper Sparrows of unknown subspecies recorded in the park; *P. g. affinis* likely to occur occasionally in fall and winter.
Passerculus sandwichensis rostratus Large-billed Savannah Sparrow	—	SSC	—	Breeds in the northern Gulf of California; winters on the coast of southern California.	**Present.** Occurs rarely in fall and winter.
Icteria virens Yellow-breasted Chat	—	SSC	—	Nests uncommonly and locally in riparian woodlands with dense tangles across most of North America.	**Present.** Small numbers nest in riparian habitats in Fairview Park and elsewhere along the lower Santa Ana River.
Agelaius tricolor Tricolored Blackbird	—	T	—	Nests in wetlands near expansive grasslands and rangelands required for foraging, mainly in California. Winters in rangelands and parks.	**Low (as a breeder).** Occurs rarely as a transient or winter visitor. Nesting unlikely, but possible.
Xanthocephalus xanthocephalus Yellow-headed Blackbird	—	SSC	—	Nests in wetlands with tall emergent vegetation across much of central and western North America. Winters mainly in Mexico.	**Low (as a breeder).** Occurs rarely as a transient or winter visitor. Nesting unlikely, but possible.
Setophaga petechia Yellow Warbler	—	SSC	—	Nests in woodlands across most of North America. Winters mainly from Mexico to South America.	**Present.** Small numbers nest in riparian habitats in Fairview Park and elsewhere along the lower Santa Ana River.
Mammals					
Microtus californicus stephensi South Coast Marsh Vole	—	SSC	—	Wetland communities and associated grasslands along the coast from southern Ventura County to northern Orange County (Sunset Beach).	**None.** Fairview Park lies seven miles southeast of the described range of this taxon; voles along the Santa Ana River should be *M. c. sanctidiegi* (Hall 1981).

Latin name Common name	Fed.	Global/ State	CNPS	Habitat/Regional Status	Potential to Occur in Fairview Park
Perognathus longimembris pacificus Pacific Pocket Mouse	E	SSC	—	Shrublands, coastal dunes, coastal sage scrub, and river alluvium habitats with loose, sandy soil. Coastal areas from Los Angeles County to San Diego County.	**Low.** Not recorded in Fairview Park or elsewhere along the Santa Ana River, but may have occurred there historically. Very little sandy habitat potentially suitable for this species remains in the northern lowlands.
Sorex ornatus salicornicus Southern California Salt Marsh Shrew	—	SSC	—	Coastal salt marshes, and nearby freshwater wetlands, from Ventura County to Orange County.	**Low.** Fairview Park lacks the coastal salt marsh habitat with which this species is most closely associated.
Neotoma lepida intermedia San Diego Desert Woodrat	—	SSC	—	Widespread in scrub habitats, especially those with cactus, but sensitive to habitat fragmentation. Coastal slope from Monterey County south.	**Moderate.** Suitable cactus scrub habitat occurs in the park, but this species may not be present due to fragmentation of the habitat.
Lepus californicus bennettii San Diego Black-tailed Jackrabbit	—	SSC	—	Occurs in various open settings, usually in expansive open space areas, from Santa Barbara County south.	**Extirpated.** Formerly recorded in the park (Hamilton 1995) and elsewhere along the lower Santa Ana River, but no recent observations known.
Choeronycteris mexicana Mexican Long-tongued Bat	—	SSC	—	Ventura County south to Central America, often in coastal areas. Roosts in caves, crevices, under tree roots, and in man-made structures. Forages on nectar and pollen of agaves.	**Low.** Fairview Park generally lacks suitable roosting habitat and the agaves associated with this species.
Eumops perotis californicus Western Mastiff Bat	—	SSC	—	Roosts in crevices in cliffs and in tall buildings; feeds aerially. Widely distributed in California and Desert Southwest.	**Low.** The species may occasionally fly over the site while foraging, but suitable roosting is absent.
Lasiurus frantzii Western Red Bat	—	SSC	—	Roosts in foliage of many types of tree; feeds over a wide variety of habitats, often close to water in coastal lowlands. Widespread from western North America south to northern South America.	**High.** Riparian woodlands in the park appear suitable for roosting, and the park contains ample water and suitable foraging habitat.
Lasiurus xanthinus Western Yellow Bat	—	SSC	—	Roosts primarily or entirely in palms; often forages over water but also grasslands and scrub habitats. Southwestern United States south to Central America.	**Moderate.** Fairview Park lacks the palm trees most closely associated with this species, but Western Yellow Bats could roost in riparian woodlands and/or forage in the park.

Latin name Common name	Fed.	Global/ State	CNPS	Habitat/Regional Status	Potential to Occur in Fairview Park
Antrozous pallidus Pallid Bat	—	SSC	—	Widespread in western North America, in chaparral and similar habitats. Forages on the ground and in vegetation. Roosts in rock crevices and under tree bark.	**Low.** Fairview Park lacks extensive rocky areas or oak woodlands that would provide suitable roosting habitat, but Pallid Bats from other areas could potentially forage in the park.
Taxidea taxus American Badger	—	SSC	—	Occurs in expansive open space areas across most of western and central North America. In Orange County, recent records from the mountains and foothills.	**Low.** American Badgers have not been recorded at Fairview Park or elsewhere along the lower Santa Ana River. It is likely that the natural habitat is too reduced and fragmented to support a population.

RESOURCE PROTECTION RECOMMENDATIONS

These recommendations do not extend to the ponds, channels, wetlands, and riparian habitat that occupy approximately 43-acre area of the park's lowlands, which serve as mitigation sites that are subject to conservation requirements and other considerations that lie outside the scope of this report (see, e.g., Dudek 2020).

As summarized in Table B, Fairview Park supports a remarkable array of special-status plant and wildlife species, several of which are listed as threatened or endangered by state and/or federal governments. The park's combination of riparian habitats, coastal scrub, grasslands, and vernal pools is unique in Orange County, and rare anywhere in southern California. Special-status species that have become established in the park in the last 15 years, in response to habitat creation efforts and/or expansion of their ranges, include the White-faced Ibis, Least Bell's Vireo, Vermilion Flycatcher, Yellow-breasted Chat, and Yellow Warbler. Crotch's Bumble Bee, a native species that has received greatly increased attention since becoming a candidate for State listing in 2021, was recently found using native and non-native vegetation in the park. As encouraging as these positive changes are, recent decades have also seen the loss of at least two special-status species from the park, the Cactus Wren and San Diego black-tailed jackrabbit, and chaparral sand-verbena may also have died out. Several species are hanging on in small numbers and/or in very limited patches of suitable habitat. The park's many visitors are drawn there for a variety of reasons, and some current uses, whether informal or organized, appear to be incompatible with maintaining the park's high diversity of special-status species diversity through responsible planning and management practices.

The most important threats to sensitive biological resources in Fairview Park come from human actions that destroy, degrade, and fragment the park's natural communities. The placement of numerous piles of fill dirt across the western mesa during the late 1980s, with the goal of capping archeological resources prior to establishment of sports fields

that were never built, created an "ecological limbo" for natural resources on the mesa. Approximately two acres of this fill were later removed to restore a large vernal pool that had been buried, but this left more than 20 acres of disturbed, weedy habitat, crisscrossed by an extensive lattice of informal trails. Not only do the dense weeds in this area persist and spread to other parts of the park, but survey observations indicate that many members of the public have come to perceive the entire northern half of the mesa as a no-man's-land that lacks effective maintenance or resource management policies. In recent years, cyclists, e-bike riders, dirt bike riders, and remote-controlled vehicle enthusiasts have expanded their areas of use into a barren area that has long existed on the east side of the mesa, and the bikers have also established a new riding track farther west, in the middle of the fill-pile area. An imperative of the Master Plan Update is to develop a feasible approach to restoring and managing the disturbed portions of the mesa.

A corollary problem resulting from the placement of fill across the northern half of the mesa was described by Asef (2019:4):

> The majority of the pooling within the study area was associated with depressions in disturbed areas. Many of these pools are associated with existing trails, which experience heavy foot-traffic. It is recommended that dry season surveys for listed large branchiopods are conducted to determine presence of listed fairy shrimp and their hybrids. Simovich et al. (2013) indicated that hybrids of San Diego fairy shrimp and versatile fairy shrimp are associated with degraded vernal pool habitat. Hybridization of these species could hinder the recovery of the San Diego fairy shrimp species. Therefore, protecting and restoring the degraded vernal pool features may lead to providing higher quality habitat for the San Diego fairy shrimp, which are hydrologically connected to the features surveyed in this report. Habitat protection and restoration of the degraded vernal pool features may promote recovery of the San Diego fairy shrimp.

Glenn Lukos Associates (2017:8) raised the same issue of degraded habitats increasing the potential of hybridization, and recommended potentially removing any small depressions that support only the common, non-listed, versatile fairy shrimp:

> In cases where the versatile fairy shrimp has been identified, it is recommended that future habitat management programs consider the removal of the ponded feature to prevent hybridization of listed fairy shrimp species that occur in Fairview Park (Simovich et al. 2013).

On the southern half of the mesa, Fairview Park's unique vernal pools and associated grasslands are threatened by the spread of several non-native, invasive plant species that now occupy most of the mesa. The most dominant of these, black mustard (*Brassica nigra*) and ripgut brome (*Bromus diandrus*), thrive on the clayish soils that make up much of the mesa habitat, forming single-species monocultures impenetrable to other plants. Both of these species readily outcompete native plant species and reduce soil quality. Since 2017, several of the smaller vernal pools have been overtaken by these species, reducing the total area of viable vernal pool habitat in the park. Other weed species of concern at Fairview Park include crown daisy (*Glebionis coronaria*), artichoke thistle (*Cynara cardunculus* ssp. *flavescens*), buffalo bur (*Solanum rostratum*), and southern

Russian thistle (*Salsola australis*), all of which contribute to ongoing degradation of the vernal pools and grasslands in the southern half of the mesa. A high priority of the Master Plan Update should be to develop and implement an aggressive program to map and control these destructive species wherever they occur in the park.

Barry Nerhus, President of Endemic Environmental Services, investigated the issue of the model airplane flying field located in the southern half of the mesa. In an email to the City of Costa Mesa dated February 24, 2023, he wrote:

> In summary, I believe the fly field impacts Fairview Park's natural resources by changing the watershed of the vernal pools, trespassing into sensitive habitat and off trail, creating loud noise above the acceptable limit for the federally-listed California gnatcatcher, and impacting general avian behavior.
>
> As an airplane pilot, I have a passion for aviation and the continued growth of the aviation community (even as a tool for conservation). However, I do not think the recreational activities at the fly field is a part of the mission of managing Fairview Park for the natural resources and recovery of endangered species.

Periodic grading of the soil to maintain a level takeoff strip, and mowing required to keep the strip open, may potentially result in "take" of Crotch's Bumble Bee, a candidate for State listing, through (a) killing or injuring queen bees or larvae when they are in a dormant or immobile state and/or (b) removing nectar sources utilized by adult bees. Grading and mowing also increase erosion and the spread of non-native weeds, with potential impacts to vernal pool habitats required by listed/special-status plant and fairy shrimp species. Finally, the landing of planes on the mesa results in people going off trails to retrieve planes, which (a) tramples vegetation in and around the vernal pools; (b) potentially causes "take" of the Burrowing Owl, a candidate for State listing that regularly winters in the park; and (c) potentially disrupts birds attempting to nest on the mesa. For these reasons, continued operation of the model airplane field on the southern mesa would conflict with the resource management objectives of the Master Plan Update. If the City nevertheless determines that the flying field should remain in operation, this should be done in consultation with the US Fish and Wildlife Service and California Department of Fish and Wildlife to ensure compliance with all applicable federal and State regulations.

During the very wet winter of 2022/2023, Hamilton Biological personnel observed that restrictions on the areas where the public was allowed to walk through the vernal pools in the southern mesa had some unforeseen consequences. The heavy rains resulted in thick growth of some non-native weedy species, which crowded out some rare native plants, including prostrate navarretia (*Navarretia prostrata*) and Little Mousetail (*Myosurus minimus* ssp. *apus*), species normally found around the edges of the vernal pools. Where the native plants did occur, along the edges of trails through the pools, the concentration of traffic by bicyclists and walkers along the narrow pathways resulted in excessive trampling of the natives. In developing public-access policies, the Master Plan

Update should consider ways to reduce these types of impacts to special-status plants and listed fairy shrimp.

Finally, Hamilton Biological personnel have documented evidence of intentional destruction of listed plant species in some of the vernal pools at Fairview Park. The Master Plan should incorporate specific protections against such malicious actions. Such protections could include permanent fencing around vernal pool watersheds and/or signage educating the public about the federal and state Endangered Species Acts and potential consequences of violating these strict resource-protection laws.

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APPENDIX A

PLANT AND WILDLIFE SPECIES RECORDED IN FAIRVIEW PARK

The following lists identifies plant and wildlife species detected in Fairview Park by Hamilton Biological during the 2023–2025 field effort, or that have been reported in other credible sources (i.e., iNaturalist, eBird, or previous biological studies of Fairview Park). Citations are provided next to entries of species not observed during the 2023–2025 survey effort and not reported to either iNaturalist (www.inaturalist.org) or eBird (www.ebird.org).

Non-sensitive plant species reported during previous survey efforts are not included in this list unless they were observed during the 2023–2025 survey effort.

Wildlife taxa include selected invertebrates (fairy shrimp, butterflies) and all vertebrates reported from the park.

Taxonomy and nomenclature follow iNaturalist.

* Denotes taxon not native to the study area.

† Denotes special-status species.

VASCULAR PLANTS

SECTION: POLYPODIOPHYTA

Marsileaceae – Waterfern Family

Marsilea vestita, Water Clover
Pilularia americana, American Pillwort

SECTION: MAGNOLIIDS

Saururaceae – Lizardtail Family

Anemopsis californica, Yerba Mansa

SECTION: EUDICOTS

Anacardiaceae – Cashew Family

Malosma laurina, Laurel Sumac
Rhus integrifolia, Lemonade Berry
* *Schinus terebinthifolius*, Brazilian Peppertree

Apiaceae – Parsley Family

* *Conium maculatum*, Poison Hemlock
† *Eryngium aristulatum* var. *parishii*, San Diego Button-Celery
* *Foeniculum vulgare*, Sweet Fennel
* *Torilis arvensis*, Common Hedge Parsley

Araceae – Arum Family

Lemna minuta, Least Duckweed

Asteraceae – Sunflower Family

Achillea millefolium, Common Yarrow
Ambrosia acanthicarpa, Annual Bursage
Ambrosia psilostachya, Western Ragweed
Artemisia californica, California Sagebrush
Artemisia douglasiana, California Mugwort
Artemisia dracunculus, Tarragon
Baccharis pilularis, Coyote Brush
Baccharis salicifolia, Mule Fat
* *Carduus pycnocephalus*, Italian Thistle
* *Carduus tenuiflorus*, Slenderflower Thistle
Centaurea melitensis, Tocalote
† *Centromadia parryi* ssp. *australis*, Southern Tarplant
* *Cirsium vulgare*, Bull Thistle
Corethrogyne filaginifolia, California Sand Aster
* *Cotula australis*, Australian Brassbuttons
* *Cynara cardunculus* ssp. *flavescens*, Artichoke Thistle
Deinandra fasciculata, Clustered Tarweed
Encelia californica, California Brittlebush
* *Erigeron bonariensis,* Argentine Fleabane
Erigeron canadensis, Canadian Horseweed
* *Erigeron sumatrensis,* Tropical Horseweed
Eriophyllum confertiflorum, Golden Yarrow
* *Gaillardia pulchella,* Indian Blanket
* *Glebionis coronaria*, Crown Daisy
Grindelia camporum, Great Valley Gumweed
* *Hedypnois rhagadioloides*, Creteweed
Helianthus annuus, Common Sunflower
* *Helminthotheca echioides*, Bristly Oxtongue
Heterotheca grandiflora, Telegraphweed
Isocoma menziesii, Coast Goldenbush
* *Lactuca seligna*, Willowleaf Lettuce
* *Lactuca serriola*, Prickly Wild Lettuce
† *Lasthenia glabrata* ssp. *coulteri*, Coulter's Goldfields
Lasthenia gracilis, Common Goldfields
Matricaria discoidea, Pineappleweed
† *Microseris douglasii* ssp. *platycarpha,* Small-flowered Microseris
* *Oncosiphon pilulifer*, Stinknet
Pluchea odorata, Marsh Fleabane
Pseudognaphalium californicum, California Rabbit-Tobacco
Pseudognaphalium microcephalum, Feltleaf Everlasting
Psilocarphus brevissimus, Low Woolly-Marbles
* *Rudbeckia hirta*, Black-eyed Susan

* *Silybum marianum*, Milk Thistle
* *Sonchus asper*, Prickly Sowthistle
* *Sonchus oleraceus*, Smooth Sowthistle
  Stephanomeria diegensis, San Diego Wirelettuce
* *Taraxacum* sp., Dandelion species

Boraginaceae – Borage Family
  Amsinckia menziesii ssp. *intermedia*, Common Fiddleneck
  Echium candicans, Pride of Madeira
  Phacelia cicutaria, Caterpillar Scorpionweed
  Phacelia distans, Common Scorpionweed
  Phacelia ramosissima, Branching Scorpionweed
  Phacelia tanacetifolia, Lacy Scorpionweed
  Plagiobothrys acanthocarpus, Adobe Popcornflower
  Plagiobothrys collinus, Cooper's Popcornflower

Brassicaceae – Mustard Family
* *Brassica nigra*, Black Mustard
* *Hirschfeldia incana*, Shortpod Mustard
* *Lepidium didymum,* Lesser Swinecress
* *Lepidium draba,* Hoary Cress
* *Lepidium latifolium,* Perennial Pepperweed
  Lepidium nitidum, Shining Pepperweed
* *Lepidium strictum,* Upright Pepperweed
  Planodes virginicum, Virginia Cress
* *Raphanus sativus,* Garden Radish
* *Sisymbrium irio,* London Rocket
* *Sisymbrium orientale,* Oriental Mustard

Cactaceae – Cactus Family
  Cylindropuntia prolifera, Coast Cholla
  Opuntia littoralis, Coastal Prickly-pear

Caryophyllaceae – Pink Family
* *Polycarpon tetraphyllum,* Fourleaf Allseed
* *Silene gallica,* Windmill Pink
* *Spergularia villosa*, Hairy Sandspurrey

Chenopodiaceae – Goosefoot Family
  Atriplex lentiformis, Big Saltbush
* *Atriplex semibaccata*, Berry Saltbush
* *Atriplex suberecta*, Sprawling Saltbush
* *Bassia hyssopifolia,* Five-horn Smotherweed
* *Beta vulgaris* ssp. *maritima*, Sea Beet
* *Chenopodiastrum murale*, Nettleleaf Goosefoot
* *Chenopodium album*, Lamb's Quarter

Extriplex californica, California Orache
* *Salsola australis*, Southern Russian Thistle

Cleomaceae – Spiderflower Family
Cleomella arborea, Bladderpod

Convolvulaceae – Morning-Glory Family
Calystegia macrostegia, Island Morning-Glory
* *Convolvulus arvensis*, Field Bindweed
Cressa truxillensis, Alkali Weed

Crassulaceae – Stonecrop Family
Crassula aquatica, Water Pygmyweed
Crassula connata, Sand Pygmyweed

Cucurbitaceae – Gourd Family
Cucurbita foetidissima, Buffalo Gourd
Marah macrocarpa, Chilicothe

Elatinaceae – Waterwort Family
Elatine brachysperma, California Waterwort
Elatine californica, California Waterwort

Euphorbiaceae – Spurge Family
Croton californicus, California Croton
Croton setiger, Turkey Mullein
* *Ricinus communis*, Castor Bean

Fabaceae – Pea Family
Lupinus bicolor, Miniature Lupine
* *Lupinus albifrons*, Silver Bush Lupine
Lupinus microcarpus, Chick Lupine
Lupinus succulentus, Arroyo Lupine
* *Medicago polymorpha*, Burclover
* *Melilotus indicus*, Annual Sweetclover
Trifolium depauperatum, Cowbag Clover
* *Trifolium fragiferum*, Strawberry Clover
* *Trifolium repens*, White Clover

Fagaceae – Oak Family
Quercus agrifolia, Coast Live Oak

Frankeniaceae – Seaheath Family
Frankenia salina, Alkali Seaheath

Geraniaceae – Geranium Family
* *Erodium botrys,* Longbeak Filaree
* *Erodium brachycarpum,* Shortbeak Filaree
* *Erodium cicutarium,* Redstem Filaree
* *Erodium moschatum,* Musk Filaree

Heliotropiaceae – Heliotrope Family
Heliotropium curassivicum, Seaside Heliotrope

Juglandaceae – Walnut Family
Juglans californica, Southern Californian Walnut

Juncaceae – Rush Family
Juncus bufonius, Toad Rush

Lamiaceae – Mint Family
* *Marrubium vulgare,* White Horehound
Salvia apiana, White Sage
Salvia leucophylla, Purple Sage
Salvia mellifera, Black Sage

Lythraceae – Loosestrife Family
* *Lythrum hyssopifolia,* Hyssop Loosestrife

Malvaceae – Mallow Family
Malacothamnus fasciculatus, Lax-flowered Bushmallow
* *Malva multiflora,* Cretan Mallow
* *Malva parviflora,* Cheeseweed
Malvella leprosa, Alkali Mallow

Montiaceae – Miner's Lettuce Family
Calandrinia menziesii, California Redmaids

Myrsinaceae – Pimpernel Family
* *Lysimachia arvensis*, Scarlet Pimpernel
* *Lysimachia loeflingii*, Blue Scarlet Pimpernel

Namaceae – Fiddleleaf Family
† *Nama stenocarpa*, Mud Nama

Nyctaginaceae – Four-o-Clock Family
* *Mirabilis jalapa*, Marvel of Peru
Mirabilis laevis, Wishbone Bush

Onagraceae – Willowherb Family
Camissoniopsis cheiranthifolia, Beach Evening-Primrose
† *Camissoniopsis lewisii,* Lewis's Evening-Primrose
Camissoniopsis micrantha, Spencer Primrose
Epilobium campestre, Smooth Boisduvalia
Epilobium ciliatum, American Willowherb
Oenothera californica, California Evening-Primrose
Oenothera elata, Tall Evening-Primrose

Oxalidaceae – Woodsorrel Family
* *Oxalis pes-caprae*, Bermuda Buttercup

Papaveraceae – Poppy Family
* *Eschscholzia californica*, California Poppy
* *Romneya coulteri*, Coulter's Matilija Poppy

Phrymaceae – Monkeyflower Family
Diplacus × *australis*, Southern Bush Monkeyflower

Polemoniaceae – Phlox Family
† *Navarretia prostrata,* Prostrate Vernal Pool Navarretia

Polygonaceae – Buckwheat Family
Eriogonum fasciculatum, California Buckwheat
* *Eriogonum giganteum,* St. Catherine's Lace
Eriogonum gracile, Slender Wooly Buckwheat
Persicaria lapathifolia, Pale Smartweed
* *Polygonum aviculare,* Common Knotweed
* *Rumex crispus,* Crispy Dock
Rumex fueginus, Golden Dock

Plantaginaceae – Plantain Family
Callitriche sp., Water Starwort species
Collinsia heterophylla, Purple Chinese-Houses
Nuttallanthus texanus, Texas Blue Toadlfax
Plantago elongata, Slender Plantain
Plantago erecta, Dotseed Plantain
* *Plantago major*, Greater Plantain
* *Veronica anagallis-aquatica*, Blue Water-Speedwell
Veronica peregrina ssp. *xalapensis*, Hairy Peregrine Speedwell

Platanaceae – Plane Family
Platanus racemosa, Western Sycamore

Plumbinaceae – Sea Lavender Family
* *Limonium perezii,* Perez's Sea Lavender

Ranunculaceae – Buttercup Family
† *Myosurus minimus* ssp. *apus*, Little Mousetail

Rosaceae – Rose Family
Heteromeles arbutifolia, Toyon
* *Prunus ilicifolia* ssp. *lyonii,* Catalina Cherry
Rosa californicus, California Wild Rose
Rubus ursinus, Trailing Blackberry

Rutaceae – Citrus Family
* *Bacopa monnieri,* Herb-of-grace

Salicaceae – Willow Family
Salix exigua, Narrowleaf Willow
Salix gooddingii, Black Willow
Salix lasiolepis, Arroyo Willow

Sapindaceae – Soapberry Family
* *Cupaniopsis anacardioides,* Carrotwood Tree

Scrophulariaceae – Figwort Family
* *Buddleja davidii,* Butterfly Bush

Solanaceae – Nightshade Family
Datura wrightii, Sacred Datura
† *Lycium californicum,* California Boxthorn
* *Nicotiana glauca,* Tree Tobacco
Solanum douglasii, Greenspot Nightshade
* *Solanum rostratum,* Buffalo-Bur

Tropaeolaceae – Nasturtium Family
* *Tropaeolum majus,* Wild Nasturtium

Urticaceae – Nettle Family
Urtica gracilis, Slender Nettle
* *Urtica urens,* Small Nettle

Verbenaceae – Verbena Family
Verbena bracteata, Bigbract Vervain
Verbena lasiostachys, Western Vervain

Viburnaceae – Viburnum Family
Sambucus cerulea, Blue Elderberry

SECTION: MONOCOTS

Asparagaceae – Lizardtail Family

* *Agave americana*, American Centuryplant
* *Yucca gigantea*, Spineless Yucca

Cyperaceae – Sedge Family

* *Cyperus eragrostis*, Tall Flatsedge
Eleocharis acicularis, Needle Spikerush
Eleocharis palustris, Common Spikerush
Schoenoplectus californicus, California Bulrush

Juncaginaceae – Flowering Quillwort Family

Trigochlin scilloides, Flowering Quillwort

Poaceae – Grass Family

Alopecurus saccatus, Pacific Foxtail
* *Arundo donax*, Giant Reed
* *Avena fatua*, Wild Oats
* *Brachypodium distachyon*, Purple Falsebrome
* *Bromus diandrus*, Ripgut Brome
* *Bromus hordeaceus*, Soft Brome
* *Bromus rubens*, Foxtail Brome
* *Cenchrus setaceus*, Fountain Grass
Distichlis spicata, Salt Grass
* *Festuca myuros*, Rattail Fescue
Hordeum intercedens, Bobtail Barley
* *Hordeum marinum*, Sea Barley
* *Hordeum murinum*, Wall Barley
* *Lamarckia aurea*, Goldentop Grass
Leymus condensatus, Giant Wild Rye
* *Lolium multiflorum*, Italian Ryegrass
Melica imperfecta, Smallflower Melicgrass
Nassella pulchra, Purple Needlegrass
† *Orcuttia californica*, California Orcutt Grass
* *Paspalum dilatatum*, Dallis Grass
Phalaris lemmonii, Lemmon's Canarygrass
* *Phalaris minor*, Small Canarygrass
* *Phalaris paradoxa*, Awned Canarygrass
* *Poa annua*, Annual Meadowgrass
* *Polypogon monspeliensis*, Rabbitfoot Grass

Themidaceae – Brodiaea Family

Dipterostemon capitatus, Blue Dicks

Typhaceae – Cattail Family

Typha domingensis, Southern Cattail

INVERTEBRATE WILDLIFE (FAIRY SHRIMP, BUTTERFLIES)

Branchinectidae – Branchinectid Fairy Shrimp Family

Branchinecta lindahli, Versatile Fairy Shrimp
† *Branchinecta sandiegonensis*, San Diego Fairy Shrimp

Streptocephalidae – Streptocephalid Fairy Shrimp Family

† *Streptocephalus woottoni*, Riverside Fairy Shrimp

Danaidae – Milkweed Butterfly Family

† *Danaus plexippus*, Monarch

Hesperiidae – Skipper Butterfly Family

Burnsius albezens, White Checkered-Skipper
Erynnis funeralis, Funeral Duskywing
Hylephila phyleus, Fiery Skipper
Lon mealne, Umber Skipper
† *Panoquina errans*, Wandering Skipper

Lycaenidae – Gossamer Butterfly Family

Brephidium exilis, Western Pygmy-Blue
Echinargus isola, Reakirt's Blue
Leptoptes marina, Marine Blue
Strymon melinus, Gray Hairstreak

Nymphalidae – Brushfoot Butterfly Family

Limenitis lorquini, Lorquin's Admiral
Nymphalis antiopa, Mourning Cloak
Vanessa annabella, West Coast Lady
Vanessa atalanta, Red Admiral
Vanessa cardui, Painted Lady
Vanessa virginiensis, American Lady

Papilionidae – Swallowtail Butterfly Family

Papilio rumiko, Western Giant Swallowtail
Papilio rutulus, Western Tiger Swallowtail
Papilio zelicaon, Anise Swallowtail

Pieridae – White Butterfly Family

Pontia protodice, Checkered White

VERTEBRATE WILDLIFE

Plethodontidae – Lungless Salamander Family

Batrachoseps major, Southern California Slender Salamander
Batrachoseps nigriventris, Black-bellied Slender Salamander (LSA 2007)

Bufonidae – True Toad Family
Anaxyrus boreas, Western Toad

Hylidae – Treefrog and Ally Family
Pseudacris cadaverina, California Tree Frog (Asef 2019)
Pseudacris hypochondriaca, Baja California Chorus Frog

Ranidae – True Frog Family
* *Lithobates catesbeianus*, American Bullfrog

Colubridae – Colubrid Snake Family
Lampropeltis californiae, California Kingsnake
Pituophis catenifer, Gopher Snake

Viperidae – Viper Family
Crotalus oreganus, Southern Pacific Rattlesnake

Anguidae – Alligator Lizard and Ally Family
Elgaria multicarinata, Southern Alligator Lizard

Emydidae – Pond and Box Turtle Family
* *Trachemys scripta*, Red-eared Slider

Phrynosomatidae – North American Spiny Lizard Family
Sceloperus occidentalis, Western Fence Lizard
Uta stansburiana, Common Side-blotched Lizard

Scincidae – Skink Family
Plestiodon skiltonianus, Western Skink

Teiidae – Whiptail Family
† *Aspidoscelis tigris*, Western Whiptail (Dudek 2003)

Anatidae – Swan, Goose, and Duck Family
Anser caerulescens, Snow Goose
Anser albifrons, Greater White-fronted Goose (Sea & Sage Audubon 2022b)
Branta bernicla, Brant
Branta canadensis, Canada Goose
* *Alopochen aegyptiaca*, Egyptian Goose
Aix sponsa, Wood Duck (Sea & Sage Audubon 2022b)
Spatula discors, Blue-winged Teal
Spatula cyanoptera, Cinnamon Teal
Spatula clypeata, Northern Shoveler
Mareca strepera, Gadwall
Mareca americana, American Wigeon

Anas platyrhynchos, Mallard
Anas acuta, Northern Pintail
Anas crecca, Green-winged Teal
Aythya americana, Canvasback
Aythya collaris, Ring-necked Duck
Aythya marila, Greater Scaup
Aythya affinis, Lesser Scaup
Bucephala albeola, Bufflehead
Mergus serrator, Red-breasted Merganser
Oxyura jamaicensis, Ruddy Duck

Odontophoridae – New World Quail Family
Callipepla californica, California Quail

Podicipedidae – Grebe Family
Podilymbus podiceps, Pied-billed Grebe
Podiceps nigricollis, Eared Grebe
Aechmophorus occidentalis, Western Grebe

Columbidae – Pigeon and Dove Family
* *Columba livia*, Rock Pigeon
Patagioenas fasciata, Band-tailed Pigeon
* *Streptopelia decaocto*, Eurasian Collared-Dove
Columbina passerina, Common Ground Dove
Zenaida asiatica, White-winged Dove
Zenaida macroura, Mourning Dove

Apodidae – Swift Family
Cypseloides niger, Black Swift (Sea & Sage Audubon 2021c)
Chaetura vauxi, Vaux's Swift
Aeronautes saxatalis, White-throated Swift

Trochilidae – Hummingbird Family
Archilochus alexandri, Black-chinned Hummingbird
Calypte anna, Anna's Hummingbird
Calypte costae, Costa's Hummingbird
Selasphorus rufus, Rufous Hummingbird
Selasphorus sasin, Allen's Hummingbird

Rallidae – Rail Family
Rallus limicola, Virginia Rail
Porzana carolina, Sora
Gallinula galeata, Common Gallinule
Fulica americana, American Coot

Recurvirostridae – Avocet and Stilt Family
Himantopus mexicanus, Black-necked Stilt
Recurvirostra americana, American Avocet

Charadriidae – Plover, Dotterel, and Lapwing Family
Pluvialis squatarola, Black-bellied Plover
Charadrius semipalmatus, Semipalmated Plover
Charadrius vociferans, Killdeer

Scolopacidae – Sandpiper Family
Numenius phaeopus, Whimbrel
Numenius americanus, Long-billed Curlew
Limosa fedoa, Marbled Godwit
Calidris minutilla, Least Sandpiper
Calidris mauri, Western Sandpiper
Limnodromus griseus, Short-billed Dowitcher
Limnodromus scolopaceus, Long-billed Dowitcher
Gallinago delicata, Wilson's Snipe
Actitis macularius, Spotted Sandpiper
Tringa melanoleuca, Greater Yellowlegs
Tringa semipalmata, Willet
Tringa flavipes, Lesser Yellowlegs

Laridae – Gull, Tern, Noddy, Skimmer, and Kittiwake Family
Chroicocephalus philadelphia, Bonaparte's Gull
Larus delawarensis, Ring-billed Gull
Larus occidentalis, Western Gull
Larus smithsonianus, American Herring Gull
Larus californicus, California Gull
† *Sternula antillarum*, Least Tern
Sterna forsteri, Forster's Tern
Thalasseus maximus, Royal Tern
Rynchops niger, Black Skimmer (Sea & Sage Audubon 2021c)

Gaviidae – Loon Family
Gavia stellata, Red-throated Loon

Phalacrocoracidae – Cormorant and Shag Family
† *Nannopterum auritum*, Double-crested Cormorant

Pelecanidae – Pelican Family
Pelecanus erythrorhynchos, American White Pelican
Pelecanus occidentalis, Brown Pelican

Ardeidae – Heron Family

Botaurus lentiginosus, American Bittern
Ixobrychus exilis, Least Bittern
Ardea herodias, Great Blue Heron
Ardea alba, Great Egret
Egretta thula, Snowy Egret
Egretta rufescens, Reddish Egret
Bubulcus ibis, Cattle Egret
Butorides virescens, Green Heron
Nycticorax nycticorax, Black-crowned Night-Heron

Threskiornithidae – Ibis and Spoonbill Family

† *Plegadis chihi*, White-faced Ibis

Accipitridae – Vulture, Hawk, and Ally Family

Cathartes aura, Turkey Vulture
Pandion haliaetus, Osprey
† *Elanus leucurus,* White-tailed Kite
† *Circus hudsonius,* Northern Harrier
Accipiter striatus, Sharp-shinned Hawk
Accipiter cooperii, Cooper's Hawk
† *Haliaeetus leucocephalus*, Bald Eagle
Buteo lineatus, Red-shouldered Hawk
† *Buteo swainsoni*, Swainson's Hawk (Sea & Sage Audubon 2021b)
Buteo jamaicensis, Red-tailed Hawk
† *Buteo regalis,* Ferruginous Hawk

Tytonidae – Barn-owl Family

Tyto alba, Barn Owl

Strigidae – True Owl Family

Bubo virginianus, Great Horned Owl
† *Athene cunicularia*, Burrowing Owl
† *Asio flammeus*, Short-eared Owl

Caprimulgidae – Goatsucker Family

Chordeiles acutipennis, Lesser Nighthawk (Dudek 2003)

Alcedinidae – Kingfisher Family

Megaceryle alcyon, Belted Kingfisher

Picidae – Woodpecker Family

Sphyrapicus nuchalis, Red-naped Sapsucker
Melanerpes formicivorus, Acorn Woodpecker
Dryobates pubescens, Downy Woodpecker

Dryobates nuttallii, Nuttall's Woodpecker
Colaptes auratus, Northern Flicker

Falconidae – Falcon and Caracara Family
Falco sparverius, American Kestrel
Falco columbarius, Merlin
Falco peregrinus, Peregrine Falcon

Psittacidae – Holotropical Parrot Family
* *Psittacara mitratus,* Mitred Parakeet

Tyrannidae – Tyrant Flycatcher Family
Contopus cooperi, Olive-sided Flycatcher
Contopus sordidulus, Western Wood-Pewee
† *Empidonax traillii*, Willow Flycatcher
Empidonax hammondii, Hammond's Flycatcher
Empidonax wrightii, Gray Flycatcher (Sea & Sage Audubon 2021c)
Empidonax difficilis, Pacific-slope Flycatcher
Sayornis nigricans, Black Phoebe
Sayornis saya, Say's Phoebe
† *Pyrocephalus rubinus*, Vermilion Flycatcher
Myiarchus cinerascens, Ash-throated Flycatcher
Tyrannus melancholicus, Tropical Kingbird
Tyrannus vociferans, Cassin's Kingbird
Tyrannus verticalis, Western Kingbird

Vireonidae – Vireo Family
† *Vireo bellii*, Bell's Vireo
Vireo huttoni, Hutton's Vireo
Vireo cassinii, Cassin's Vireo
Vireo gilvus, Warbling Vireo

Laniidae – Shrike Family
† *Lanius ludovicianus*, Loggerhead Shrike

Corvidae – Jay and Crow Family
Aphelocoma californica, California Scrub-Jay
Corvus brachyrhynchos, American Crow
Corvus corax, Common Raven

Alaudidae – Lark Family
Eremophila alpestris, Horned Lark

Hirundinidae – Swallow, Martin, and Saw-wing Family
Stelgidopteryx serripennis, Northern Rough-winged Swallow
Tachycineta bicolor, Tree Swallow
Tachycineta thalassina, Violet-green Swallow
Riparia riparia, Bank Swallow
Hirundo rustica, Barn Swallow
Petrochelidon pyrrhonota, Cliff Swallow

Aegthalidae – Bushtit Family
Psaltriparus minimus, Bushtit

Paradoxornithidae - Parrotbill Family
Chamaea fasciata, Wrentit

Zosteropidae – White-eye Family
* *Zosterops simplex*, Swinhoe's White-eye

Regulidae – Kinglet Family
Regulus calendula, Ruby-crowned Kinglet

Sittidae – Nuthatch Family
Sitta canadensis, Red-breasted Nuthatch

Polioptilidae – Gnatcatcher Family
Polioptila caerulea, Blue-gray Gnatcatcher
† *Polioptila californica*, California Gnatcatcher

Troglodytidae – Wren Family
Salpinctes obsoletus, Rock Wren
Troglodytes aedon, Northern House Wren
† *Cistothorus palustris*, Marsh Wren
Thryomanes bewickii, Bewick's Wren
† *Campylorhynchus brunneicapillus*, Cactus Wren (LSA 2007)

Sturnidae – Starling Family
* *Sturnus vulgaris*, European Starling

Mimidae – Thrasher and Mockingbird Family
Toxostoma bendirei, Bendire's Thrasher
Toxostoma redivivum, California Thrasher
Oreoscoptes montanus, Sage Thrasher
Mimus polyglottos, Northern Mockingbird

Turdidae – Thrush Family
Sialia mexicana, Western Bluebird
Sialia currucoides, Mountain Bluebird
Catharus ustulatus, Swainson's Thrush
Catharus guttatus, Hermit Thrush
Turdus migratorius, American Robin

Bombycillidae – Waxwing Family
Bombycilla cedrorum, Cedar Waxwing

Ptiliogonatidae – Silky-flycatcher Family
Phainopepla nitens, Phainopepla

Estrildidae – Estrildid Finch Family
* *Lonchura punctulata*, Scaly-breasted Munia
* *Estrilda melpoda*, Orange-cheeked Waxbill

Passeridae – Old World Sparrow Family
* *Passer domesticus*, House Sparrow

Motacillidae – Wagtail, Longclaw, and Pipit Family
Anthus rubescens, American Pipit

Fringillidae – True Finch Family
Haemorhous mexicanus, House Finch
Haemorhous purpureus, Purple Finch
Spinus pinus, Pine Siskin
Spinus psaltria, Lesser Goldfinch
Spinus lawrencei, Lawrence's Goldfinch
Spinus tristis, American Goldfinch

Calcariidae – Longspur and Snow Bunting Family
Calcarius lapponicus, Lapland Longspur
Calcarius ornatus, Chestnut-collared Longspur

Passerellidae – New World Sparrow Family
† *Ammodramus savannarum*, Grasshopper Sparrow
Spizella passerina, Chipping Sparrow
Spizella pallida, Clay-colored Sparrow
Amphispiza bilineata, Black-throated Sparrow
Chondestes grammacus, Lark Sparrow
Passerella iliaca, Fox Sparrow
Junco hyemalis, Dark-eyed Junco
Zonotrichia leucophrys, White-crowned Sparrow
Zonotrichia atricapilla, Golden-crowned Sparrow

† *Poocetes gramineus,* Vesper Sparrow
Passerculus sandwichensis, Savannah Sparrow
Melospiza melodia, Song Sparrow
Melospiza lincolnii, Lincoln's Sparrow
Melozone crissalis, California Towhee
Pipilo chlorurus, Green-tailed Towhee
Pipilo maculatus, Spotted Towhee

Emberizoidae – New World Nine-primaried Oscine Family
† *Icteria virens*, Yellow-breasted Chat

Icteridae – New World Blackbirds
† *Xanthocephalus xanthocephalus,* Yellow-headed Blackbird
Sturnella neglecta, Western Meadowlark
Icterus cucullatus, Hooded Oriole
Icterus bullockii, Bullock's Oriole
Agelaius phoeniceus, Red-winged Blackbird
† *Agelaius tricolor,* Tricolored Blackbird
Molothrus aeneus, Bronzed Cowbird (Endemic Environmental 2018)
Molothrus ater, Brown-headed Cowbird
Euphagus cyanocephalus, Brewer's Blackbird
Quiscalus mexicanus, Great-tailed Grackle

Parulidae – Wood-Warbler Family
Mniotilta varia, Black-and-white Warbler
Protonotaria citrea, Prothonotary Warbler
Leiothlypis celata, Orange-crowned Warbler
Leiothlypis ruficapilla, Nashville Warbler
Geothlypis tolmiei, MacGillivray's Warbler
Geothlypis trichas, Common Yellowthroat
† *Setophaga petechia*, Yellow Warbler
Setophaga palmarum, Palm Warbler
Setophaga coronata, Yellow-rumped Warbler
Setophaga nigrescens, Black-throated Gray Warbler
Setophaga townsendi, Townsend's Warbler
Setophaga occidentalis, Hermit Warbler
Cardellina pusilla, Wilson's Warbler

Cardinalidae – Cardinal, Grosbeak, and Bunting Family
Piranga rubra, Summer Tanager
Piranga ludoviciana, Western Tanager
Pheucticus melanocephalus, Black-headed Grosbeak
Passerina caerulea, Blue Grosbeak
Passerina amoena, Lazuli Bunting

Ploceidae – Weaver and Bishop Family
* *Euplectes franciscanus*, Northern Red Bishop

Viduidae – Indigobird, Whydah, and Cuckoo-finch Family
* *Vidua macroura*, Pin-tailed Whydah

CLASS MAMMALIA – MAMMALS
Didelphidae – New World Opossum Family
* *Didelphus virginiana*, Virginia Opossum

Leporidae – Hare and Rabbit Family
Sylvilagus audubonii, Desert Cottontail
Sylvilagus bachmani, Brush Rabbit (Dudek 2003)
† *Lepus californicus*, Black-tailed Jackrabbit (LSA 2007)

Sciuridae – Squirrel Family
Otospermophilus beecheyi, California Ground Squirrel

Geomyidae – Pocket Gopher Family
Thomomys bottae, Botta's Pocket Gopher

Muridae – Rat and Mouse Family
Microtis californicus, California Vole (Dudek 2003)
* *Rattus rattus*, Black Rat

Canidae – Dog Family
Canis latrans, Coyote

Procyonidae – Raccoon Family
Procyon lotor, Northern Raccoon

Mustelidae – Weasel, Skunk, and Otter Family
Mephitis mephitis, Striped Skunk

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State of California – Natural Resources Agency
DEPARTMENT OF FISH AND WILDLIFE
South Coast Region
3883 Ruffin Road
San Diego, CA 92123
www.wildlife.ca.gov

GAVIN NEWSOM, Governor
CHARLTON H. BONHAM, Director

November 13, 2025

Brenda Green
City Clerk's Office
77 Fair Drive
Costa Mesa, CA 92626
brenda.green@costamesaca.gov

Subject: DRAFT FAIRVIEW PARK MASTER PLAN UPDATE, COSTA MESA, CA

Dear Brenda Green:

The California Department of Fish and Wildlife (CDFW) has reviewed the Draft Fairview Park Master Plan Update (Plan) and associated technical reports from the City of Costa Mesa (City). Thank you for the opportunity to provide comments and recommendations to the City Council regarding those activities that may affect California fish and wildlife. Likewise, CDFW appreciates the opportunity to provide comments regarding those aspects of the Plan that CDFW, by law, may be required to carry out or approve through the exercise of its own regulatory authority under the Fish and Game Code.

CDFW ROLE

CDFW is California's Trustee Agency for fish and wildlife resources and holds those resources in trust by statute for all the people of the State, pursuant to the California Environmental Quality Act (CEQA) and CEQA Guidelines[1](Fish & Game Code, §§ 711.7, subd. (a) & 1802; Pub. Resources Code, § 21070; CEQA Guidelines § 15386, subd. (a)). CDFW, in its trustee capacity, has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants, and habitat necessary for biologically sustainable populations of those species (Fish & G. Code, § 1802). Similarly, for purposes of CEQA, CDFW is charged by law to provide, as available, biological expertise during public agency environmental review efforts, focusing specifically on projects and related activities that have the potential to adversely affect fish and wildlife resources.

CDFW may also act as a Responsible Agency under CEQA. (Pub. Resources Code, § 21069; CEQA Guidelines, § 15381). CDFW expects that it may need to exercise regulatory authority as provided by the Fish and Game Code. As proposed, for example, the Project may be subject to CDFW's lake and streambed alteration regulatory authority (Fish & G. Code, § 1600 *et seq*.). Likewise, to the extent

[1] CEQA is codified in the California Public Resources Code in section 21000 et seq. The "CEQA Guidelines" are found in Title 14 of the California Code of Regulations, commencing with section 15000.

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implementation of the Project as proposed may result in "take" as defined by State law[2] of any species protected under the California Endangered Species Act (CESA; Fish & G. Code, § 2050 et seq.) or the Native Plant Protection Act (NPPA; Fish & G. Code, §1900 et seq.), the City may seek related take authorization as provided by the Fish and Game Code.

CDFW also administers the Natural Community Conservation Planning (NCCP) program, a California regional habitat conservation planning program (Fish & G. Code, § 2800 et seq.). The City is a participating landowner under the Central/Coastal Orange County NCCP/Habitat Conservation Plan (HCP).

PLAN DESCRIPTION SUMMARY

Objective: According to the Fairview Park Master Plan Update (Plan), the essential purpose of updating the Plan is to reflect the vested interests of the community and the City to balance resource protection and public use. The Plan update aims to address critical needs for a Long-term Management Plan that conserves cultural and biological resources, including rare vernal pool habitats. It outlines goals to protect, preserve, and enhance natural resources through community education, stewardship, and management of the park for passive recreational uses (i.e. walking, running, walking of leashed dogs, flying glider planes, model railroading, flying kites, picnics, and other small group functions). From a natural resources perspective, the Plan will incorporate updated biological assessments with an assessment of current land uses considering recent changes in state environmental regulations/policies. It will be a foundational document for planning, habitat restoration, wetland and riparian habitat remediation, and long-term habitat management. A Trails Plan will also be adopted in association with the Plan.

Location: Fairview Park is in the City, and its address is 2525 Placentia Avenue. It is bordered by residential areas to the north and east, Talbert Regional Park to the south, and the Santa Ana River to the west. The park itself is bisected by Placentia Avenue, which runs north/south.

Biological Setting: The regional biological significance of Fairview Park cannot be overstated. The Park is the northernmost parcel of a rare, contiguous undeveloped natural open space, which stretches from Fairview Park southward through Talbert Regional Park and terminates at the Randall Preserve. The 208-acre, topographically diverse Park contains a multitude of habitat types and micro-habitats, including one of the last coastal terrace vernal pools complexes in Orange County (USFWS 2007) on its mesa. Vernal pools in Fairview Park also support several plant species that are locally rare (City 2008 and Chung 2010). The artificial ponds in the lowlands provide nesting and foraging habitat for riparian species. Other natural and sensitive habitats include

[2] "Take" is defined in Section 86 of the Fish and Game Code as "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill."

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native grasslands, coastal bluff scrub, alluvial scrub, riparian woodlands, and coastal sage scrub. These habitats serve as foraging and reproductive habitat, providing refugia for many sensitive species in an otherwise developed watershed. Approximately 12-acres of the Park are landscaped.

According to the Biological Technical Report (BTR; Hamilton Biological 2025), 222 vascular plants and over 262 wildlife species have been documented in the Park, a remarkable number of flora and fauna for an area with just under 200 acres of habitat. Several listed species have been observed on site or have high or moderate potential to occur on site which include:

Invertebrates

- San Diego fairy shrimp (*Branchinecta sandiegonensis*; Endangered Species Act
- (ESA)-listed endangered),
- Crotch's bumble bee (*Bombus crotchii*; CESA Candidate for Threatened or
- Endangered Listing; CBB),

Birds

- Coastal California gnatcatcher [*Polioptila californica californica*; ESA- listed
- threatened; CDFW Species of Special Concern (SSC); gnatcatcher],
- Least Bell's vireo (*Vireo bellii pusillus*; ESA-listed endangered; CESA-listed
- endangered; vireo),
- White-tailed kite (*Elanus leucurus*; CDFW Fully Protected Species),
- Belding's Savannah sparrow (*Passerculus sandwichensis beldingi*; CESA-listed
- endangered),
- Western burrowing owl (*Athene cunicularia*; SSC; CESA Candidate for
- Threatened or Endangered Listing),
- Coastal cactus wren (Campylorhynchus brunneicapillus sandiegensis; SSC),
- Coopers hawk (*Astur cooperii*; SSC),

Plants

- San Diego button celery (*Eryngium aristulatum var. parishii*; CESA-listed Endangered, California Native Plant Society Rare Plant Rank 1B.1), and,
- Southern tarplant (*Centromadia parrryi ssp. australis*; California Native Plant Society Rare Plant Rank 1B.1).

Prior CDFW Engagement: CDFW has a long history of engaging with the City on natural resources matters at Fairview Park, most notably vernal pool complex management issues, historic violations, and ongoing impacts to areas subject to Fish and Game Code 1600 et seq. Additionally, fulfillment of outstanding mitigation obligations regarding compensatory mitigation obligations at Fairview Park for off-site projects with the Orange County Transportation Authority (OCTA), the U.S. Army Corps of Engineers (ACOE), and the Department of Toxic Substances Control continue to languish and remain incomplete (OCTA 2018 and CDFW 2019). While we appreciate that our working partnership appears to be gradually improving, our attempts to

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partner with the City on these outstanding issues have been largely ineffective. As outlined below, many of these obligations are incomplete or their status is unknown.

In 2014, CDFW partnered with the U.S. Fish and Wildlife Service (USFWS) to provide comments on vernal pool restoration after the installation of a path in the Park that was routed within and adjacent to vernal pools occupied by the federally endangered San Diego fairy shrimp (USFWS 2014). Impacts to these pools from the installation of paths and parking areas, improvements to Estancia High School stadium, and the operation of motorized vehicles during the wet season were mitigated through restoration efforts at pools 2, 5, 6, and 7 (Glen Lukos Associates 2015). It is unclear to CDFW and the USFWS (hereafter referred to as the Wildlife Agencies) as to whether the stated mitigation and restoration efforts were achieved in full.

In 2016, CDFW investigated the City's fill of Little Canyon as a possible violation of Fish and Game Code, section 1602, when soil stockpiles from the artificial pond creation were used to fill Little Canyon for purposes of trail creation and realignment. CDFW concluded the unauthorized activities were subject to Fish and Game Code; however, the statute of limitations to issue a Notice of Violation had passed and no action was taken (City 2015).

In 2018, the City contacted CDFW regarding clearing of vegetation in and around the artificial pond complex during the nesting season for coastal California gnatcatcher. At that time, CDFW communicated that a Routine Maintenance Lake and Streambed Alteration Agreement (LSAA) per our Lake and Streambed Alteration program was required to move forward with the clearing. To date the City does not have a Lake and Streambed Alteration Agreement to authorize the work in those areas (Comment 3). On October 8, 2025, after CDFW issued a comment letter on the Plan Update's technical documents (CDFW 2025), the City and CDFW met to discuss the City's progress regarding their Incomplete notification for a Routine Maintenance LSAA. In that meeting, the City reaffirmed their commitment to providing a complete notification for their LSAA in early 2026.

In 2019, the Wildlife Agencies and OCTA met with the City several times to discuss their outstanding mitigation obligations to OCTA and ACOE (OCTA 2018). Since our comment letter on the Plan Update's technical documents (CDFW 2025) was issued, the City has adopted the Flower Fields Restoration Project, which will restore habitat and satisfy outstanding mitigation obligations to OCTA (Comment 7).

COMMENTS AND RECOMMENDATIONS

CDFW offers the comments and recommendations below to assist the City in finalizing the Plan and strengthening the stated goals; namely, aligning the existing Plan with current biological assessments, land uses, and environmental regulations and policies, while adequately identifying and/or mitigating the Plan's significant, or potentially significant, direct and indirect impacts on fish and wildlife (biological) resources.

1. **Fly Field Relocation.** In alignment with the Wildlife Agencies' recommendation, and the recommendations of many other natural resources-focused entities, the fly field

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relocation represents a well-considered and balanced approach to habitat protection and recreation. CDFW strongly supports the relocation because it places fly field and glider operations within an already developed and actively used recreation area, well separated from the highly rare and sensitive vernal pool complex. This will substantially reduce the potential for unauthorized trail creation, fully avoid vernal pool habitat degradation, and minimize likelihood unauthorized take of state and/or federally listed species that reside on the Mesa.

The relocation and reduced maintenance activities within the vernal pool complex are a proactive step toward long-term species and habitat protection, regulatory compliance, and responsible recreation planning; this is in part because the Plan commits to restoring vernal pools and removing fill soils from the northern part of the Mesa. A portion of the Mesa restoration will include coastal sage scrub and flower fields to fulfill mitigation obligations, improve conditions for native wildlife, and reinforce the City's commitment to the Master Plan (at pp. 71, City of Costa Mesa, 2025). Importantly, the Plan's objectives for *Strategic Habitat Restoration Project 1. Mesa Habitat Restoration and Indigenous Village Site Protection* (pp. 82, City of Costa Mesa, 2025) specifically call for elimination of incompatible uses such as mowing within the vernal pool complex. Relocation of the fly field directly supports these objectives by removing maintenance activities that currently threaten and degrade sensitive vernal pool habitat.

2. **CESA Candidate Species.** CDFW emphasizes that the fly field relocation is the biologically superior option and represents a dramatically lower regulatory burden for the City, in that impacts to CESA-listed and CESA candidate species would be smaller, and mitigation requirements associated with authorized incidental take would be significantly lower. Additionally, relocation would avoid the necessity to notify CDFW under Fish and Game Code section 1600 *et seq*. and avoid the need for consultation with the USFWS for San Diego fairy shrimp. However, based on recent survey data brought to CDFW's attention, operation and maintenance of the fly field in its new location may still require take authorization under CESA.

   a. Western burrowing owl. According to the California Natural Diversity Database (CNDDB, Online Field Survey Form), there is a 2020 occurrence record of a western burrowing owl adjacent to the proposed fly field. Creation, use, and maintenance of the new fly field location may disturb, distress, or lead to take of individual western burrowing owls.

      On October 15, 2024, the Fish and Game Commission published a Notice of Findings that designates western burrowing owl as a CESA candidate species. As a candidate species, western burrowing owls are granted full protection of a threatened or endangered species under CESA. If any activities could result in take, appropriate CESA authorization (i.e., Incidental Take Permit under Fish and Game Code section 2081 or Restoration Management Permit under Fish and Game Code section 1670 *et seq*.) should be obtained prior to commencement of Project activities. Take of any endangered, threatened, or candidate species that results from the Project is prohibited, except as authorized by State law (Fish &

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G. Code, §§ 86, 1670, 2062, 2067, 2068, 2080, 2085; Cal. Code Regs., tit. 14, § 786.9). Take of individual burrowing owls and their nests is defined by Fish and Game Code section 86, and prohibited by sections 3503, 3503.5 and 3513.

b. Crotch's bumble bee. Creation, use, and maintenance of the fly field could also impact Crotch's bumble bee or floristic resources upon which the species relies. Crotch's bumble bee often nests underground, sometimes occupying abandoned rodent burrows along with many other microhabitats (Hatfield et al., 2015). If Crotch's bumble bee are using burrows on the relocation site for nesting, direct impacts could result from ground-disturbing activities, which could lead to death or injury of adults, eggs, and larva, burrow collapse, nest abandonment, and reduced nest success. Indirect impacts may occur from loss of foraging resources.

   The California Fish and Game Commission accepted a petition to list the Crotch's bumble bee as threatened or endangered under CESA, determining the listing "may be warranted" and advancing the species to the candidacy stage of the CESA listing process. Crotch's bumble bee is granted full protection under CESA. Take of any endangered, threatened, candidate species that results from the Project is prohibited, except as authorized by State law (Fish & G. Code, §§ 86, 2062, 2067, 2068, 2080, 2085; Cal. Code Regs., tit. 14, § 786.9). In addition, Crotch's bumble bee has a State ranking of S1/S2. This means that Crotch's bumble bee is considered critically imperiled or imperiled and is extremely rare (often five or fewer populations). Crotch's bumble bee is also listed as an invertebrate of conservation priority under the California Terrestrial and Vernal Pool Invertebrates of Conservation Priority List (CDFW 2024).

CDFW welcomes coordination with the City to determine if take authorization can be circumvented at the relocation site through modifications in the proposed design, based upon avoidance of suitable habitat.

3. **CESA-Listed Species.** Fairview Park contains multiple records of CESA-listed species, including least Bell's vireo, Belding's savannah sparrow, and San Diego button celery. CDFW considers adverse impacts to a species protected by CESA to be significant. Take of any endangered, threatened, candidate species, or NPPA-listed plant species that results from the Project is prohibited, except as authorized by state law (Fish & G. Code §§ 1670, 2080, 2085; Cal. Code Regs., tit. 14, §786.9). Consequently, if the Project or any Project-related activity will result in take of a species designated as endangered or threatened, or a candidate for listing under CESA, CDFW recommends that the Project proponent seek appropriate take authorization under CESA prior to implementing the Project. Appropriate authorization from CDFW may include an Incidental Take Permit (ITP), Restoration Management Permit (RMP) or a consistency determination in certain circumstances, among other options (Fish & G. Code, §§ 1670, 2080.1, 2081, subds. (b) and (c)). Early consultation is encouraged, as significant modification to a future project and mitigation measures may be required to obtain a CESA Permit. To ensure CDFW will be able to use the Master Plan and associated CEQA document for the issuance

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of any CESA-issued permits, the Plan's CEQA document should address all future project impacts to CESA-listed species and specify a mitigation, monitoring, and reporting program that will meet the requirements of an ITP or RMP.

4. **Cutting the Green Tape Program.** CDFW acknowledges the City's continued work to restore and manage natural resources within Fairview Park and recognizes the City's efforts to advance several restoration initiatives under the draft Master Plan Update. As such, we encourage the City to leverage our Cutting the Green Tape Program where appropriate. A Restoration Management Permit (RMP) issued through the Cutting the Green Tape Program provides a unified, efficient CDFW permitting mechanism for restoration, enhancement, and species recovery projects that simplifies the permitting process while maintaining strong species and habitat protection measures. The RMP provides up to five separate CDFW authorizations in a single permit designed for beneficial management, recovery, and restoration activities: 1) take of CESA threatened, endangered, or candidate species; 2) take of Fully Protected Species; 3) take of plant species designated as "rare" under the NPPA; 4) take of other species including mammals, birds, fish, amphibians, or reptiles; and 5) authorization of impacts to rivers, streams, and lakes that would otherwise be subject to a Lake or Streambed Alteration Agreement. More information on this program can be found at Cutting the Green Tape[3].

5. **Wetland Impacts.** CDFW appreciates the efforts to include the vernal pool complex as subject to Fish and Game Code section 1600 *et seq.* (pp. 27, City of Costa Mesa, 2025). For any such activities, the Project applicant (or "entity") must provide written notification to CDFW pursuant to section 1600 et seq. of the Fish and Game Code. Based on this notification and other information, CDFW determines whether a Lake and Streambed Alteration Agreement (LSAA) with the applicant is required prior to conducting the proposed activities. CDFW's issuance of an LSAA for a Project that is subject to CEQA will require CEQA compliance actions by CDFW as a Responsible Agency. To minimize additional requirements by CDFW pursuant to section 1600 et seq. and/or under CEQA, the Plan should fully identify the potential impacts to the stream or riparian resources and provide adequate avoidance, mitigation, monitoring, and reporting commitments for issuance of the LSAA. CDFW recommends the Applicant submit a Lake and Streambed Alteration Notification to CDFW. Notifications can be submitted through CDFW's Environmental Permit Information Management System (EPIMS)[4].

6. **Trail Design.** The Trails Plan provided in the larger Plan Update appropriately emphasizes connected habitats, removing unauthorized trails, and reducing human intrusion within sensitive habitats. It also distinguishes between primary and secondary pedestrian trails. These secondary pedestrian trails are redundant recreation paths that further fragment the sensitive habitats throughout the park.

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[3] https://wildlife.ca.gov/Conservation/Cutting-Green-Tape
[4] https://epims.wildlife.ca.gov/index.do

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CDFW recommends the following items in the Trails Plan are resolved prior to adopting the Plan Update:

a. The Trails Plan proposes constructing an elevated boardwalk along the existing trail that runs diagonally from the north terminus of Canyon Drive southwest to Pacific Avenue. While CDFW agrees that an elevated boardwalk could provide protection for the vernal pool complex, the Trails Plan figure does not delineate where the proposed boardwalk would be located, nor does it clearly correspond with the Trail Type/Mode of Travel table (pp. 97-98, City of Costa Mesa, 2025). Based on the text description, the boardwalk appears to have a “primary pedestrian trail” designation, but this is not clearly depicted in the figure. Per the Habitat Restoration Opportunities figure (pp. 60, City of Costa Mesa, 2025), the proposed boardwalk would overlap the Vernal Pool 4 Restoration (2002 to 2009).

b. A secondary pedestrian trail is currently proposed to bisect the vernal pool complex immediately adjacent to Vernal Pool 1 Restoration, per the Habitat Restoration Opportunities figure (pp. 60, City of Costa Mesa, 2025). It can be assumed that this specific trail would be fenced using low-disturbance methods such as gabion baskets or stacked wood fencing to minimize ground disturbance and prevent soil penetration within the vernal pool watershed. However, these fencing methods provide less certainty in keeping trail users on designated paths and out of sensitive habitats. Additionally, the table does not specify the materials nor surface treatments for this specific trail. If the trail is not struck from the Trails Plan, these specifics should be added.

c. Given the sensitivity of the vernal pool complex and the potential for off-trail intrusion, CDFW recommends that the secondary pedestrian trail bisecting the Mesa be eliminated from the Trail Plan and that other secondary trails be reduced to the greatest extent possible. Secondary pedestrian trails are also sited throughout the Wetlands and Riparian Phase 2 (OCTA) (2012 to Present) site and the Community-Led Coastal Sage Scrub (CSS) Restoration (On-going) site, per the Habitat Restoration Opportunities figure (pp. 60, City of Costa Mesa, 2025).

d. Wildlife Agency approved Fairview Park CSS and Flower Fields Habitat Restoration and Monitoring Plan. The Trail Plan as currently designed may authorize trails that will significantly bisect and cause indirect effects to the future CSS and Flower Fields Restoration Project (Land IQ, 2024). In the absence of a clearly defined and enforceable public access management program, the potential for habitat disturbance remains high. The City should provide further discussion of the proposed means to enforce pedestrian access restrictions and ensure long-term protection of sensitive biological resources.

e. The Trails Plan should include an inventory and mapping of all existing authorized and unauthorized trails, access points, and areas of sensitive biological resources.

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7. **Enforcement.** CDFW appreciates that the Plan discusses the need for increased park ranger presence and enforcement efforts; however, the Plan does not reference specific regulations, enforcement mechanisms, nor management actions that will achieve this objective. Without clearly defined operation protocols, staffing commitments, or regulatory measures (such as posted restrictions, penalties, or monitoring programs), it remains uncertain how the City intends to ensure compliance and effectively deter unauthorized trail creation and unauthorized vehicle access. The Plan should include a more detailed description of enforcement strategies and corresponding resources allocations to demonstrate the City's capacity to maintain long-term protection of sensitive habitats and recreational infrastructure.

8. **OCTA Mitigation Obligations.** The Fairview Park Mesa Restoration Project was nominated by the City in 2010 for funding consideration from the OCTA. Upon completion and Wildlife Agency approval, the restored habitat will be eligible for use by OCTA as mitigation credits under the OCTA Measure 2 NCCP/HCP, contingent upon establishment of a recorded conservation easement or other approved conservation mechanism to ensure the long-term protection of the site.

   The Plan's current objectives for the *Strategic Habitat Restoration Projects* (pp. 84, City of Costa Mesa, 2025) directly advance fulfillment of the City's outstanding obligations to OCTA and demonstrate renewed commitment to successful restoration outcomes. Notably, the City's adoption of the CSS and Flower Fields Restoration Project represents meaningful progress in implementing the City's restoration vision. CDFW acknowledges the City's coordination with the Cutting the Green Tape initiative to streamline permitting and regulatory alignment for these efforts. We look forward to working with the City to complete a conservation easement to fulfill the City's obligations under the original Restoration Project. Establishing this instrument will ensure the perpetual protection and management of restored habitats and allow OCTA to apply the resulting credits toward their mitigation obligations.

   CDFW remains committed to working collaboratively with the City and OCTA to authorize restoration projects that demonstrate sustained ecological uplift, consistent with state conservation priorities and the goals of the existing OCTA Measure 2 NCCP/HCP. We look forward to advancing a complete Restoration Management Permit application package to facilitate timely implementation of these future projects.

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CONCLUSION

CDFW appreciates the opportunity to comment on the Draft Fairview Park Master Plan Update to advise the City of Costa Mesa in identifying and mitigating the Master Plan's impacts on biological resources. Questions regarding this letter or further coordination should be directed to Paola Perez[5], Environmental Scientist.

Sincerely,

Signed by:
Glen Lubcke
AD7D070BCB66466...

Glen M. Lubcke
Environmental Program Manager
South Coast Region

ec: California Department of Fish and Wildlife
Jennifer Turner, Senior Environmental Scientist (Supervisory)
Cindy Hailey, Staff Services Analyst

U.S. Fish and Wildlife Service
Christine Medak

Office of Planning and Research
State.Clearinghouse@opr.ca.gov

City of Costa Mesa Council Members
fvpmp@costamesaca.gov

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[5] Paola.Perez@wildlife.ca.gov

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HAMILTON BIOLOGICAL

May 13, 2025

Ms. Jennifer Zell
MIG
360 East Second Street, Suite 675
Los Angeles, California 90012

SUBJECT: BIOLOGICAL TECHNICAL MEMORANDUM
CEQA ANALYSIS, HSS FLYING FIELD RELOCATION PROJECT
CITY OF COSTA MESA, ORANGE COUNTY, CALIFORNIA

Dear Ms. Zell,

At your request, Robert Hamilton, President of Hamilton Biological, Inc., has prepared this biological technical memorandum for a project proposed by the City of Costa Mesa (the City) that consists of relocating the existing Harbor Soaring Society (HSS) flying field from the west side of Fairview Park to the east side of the park, with the goal of reducing ongoing impacts to sensitive biological resources, most of which occur on the west side of the park. Figures 1–3 on the following pages show the location of Fairview Park as well as the existing and proposed flying field locations.

The proposed actions involve establishing new facilities, including a glider launch area and runway; pilot stations/pit area; storage shed; information kiosk; power requirements; and a low post-and-cable barrier around the northern portion of the east-side vernal pool watershed, consistent with the existing barrier that protects the southern portion of this watershed. The relocated flying field impact footprint will be approximately 0.5 acre, compared with 1.62 acres for the existing flying field.

This technical memorandum has the following goals:

1. To describe the existing conditions at the current flying field location and at the selected relocation site, including the vegetation present in each area and the existing uses of these areas.
2. To identify the plant and wildlife species present, or potentially occurring, in the current and proposed flying field sites, including listed and otherwise sensitive species.

316 Monrovia Avenue Long Beach, CA 90803 562-477-2181 robb@hamiltonbiological.com

3. To analyze the potential effects of the proposed relocation project on biological resources, with an understanding that the City will utilize this analysis as part of its CEQA review process for the project.

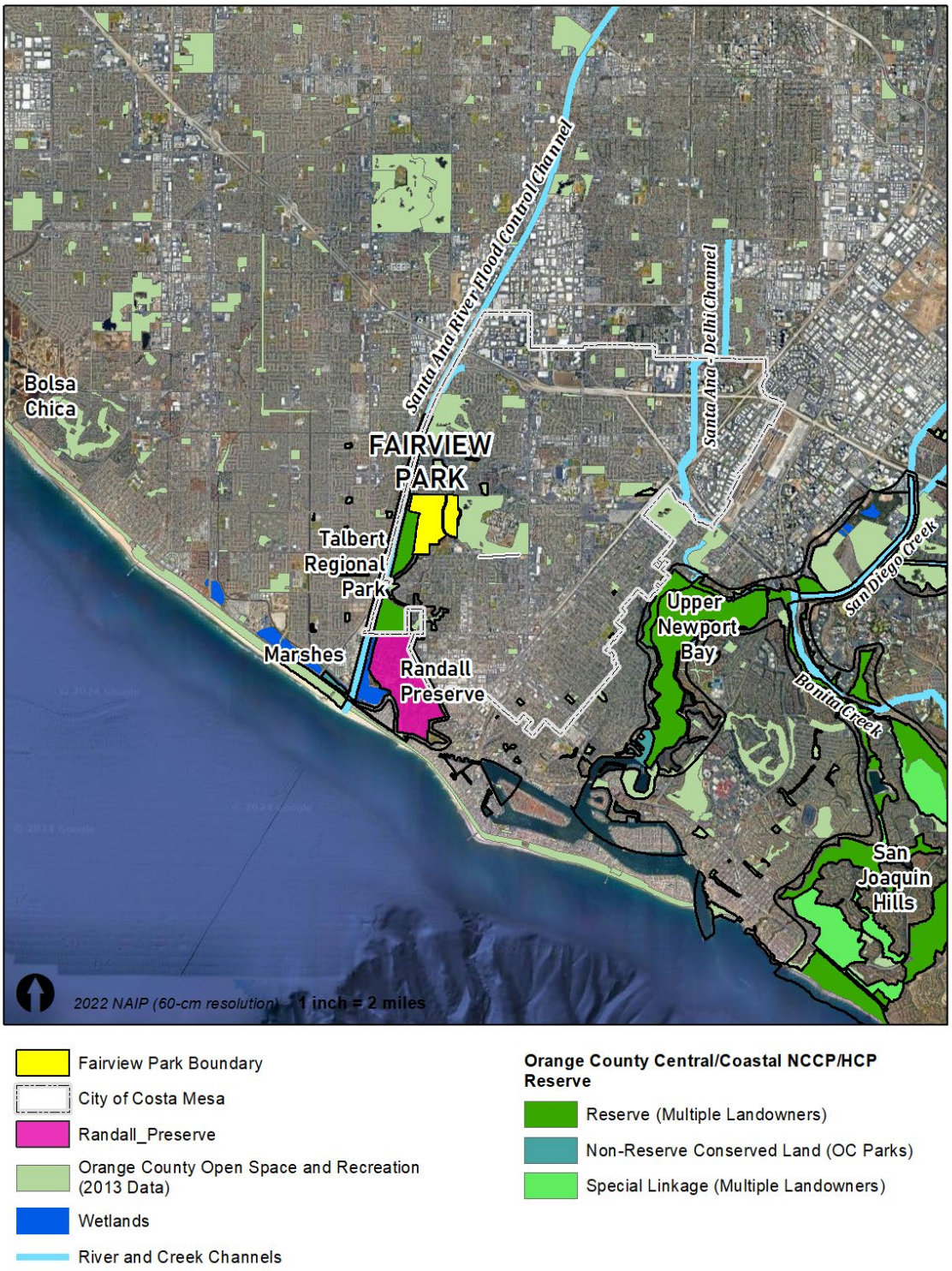


Figure 1, Regional Location of Fairview Park **Source: Land IQ (2024)**



Figure 2, Fairview Park Boundary **Source: Land IQ (2024)**

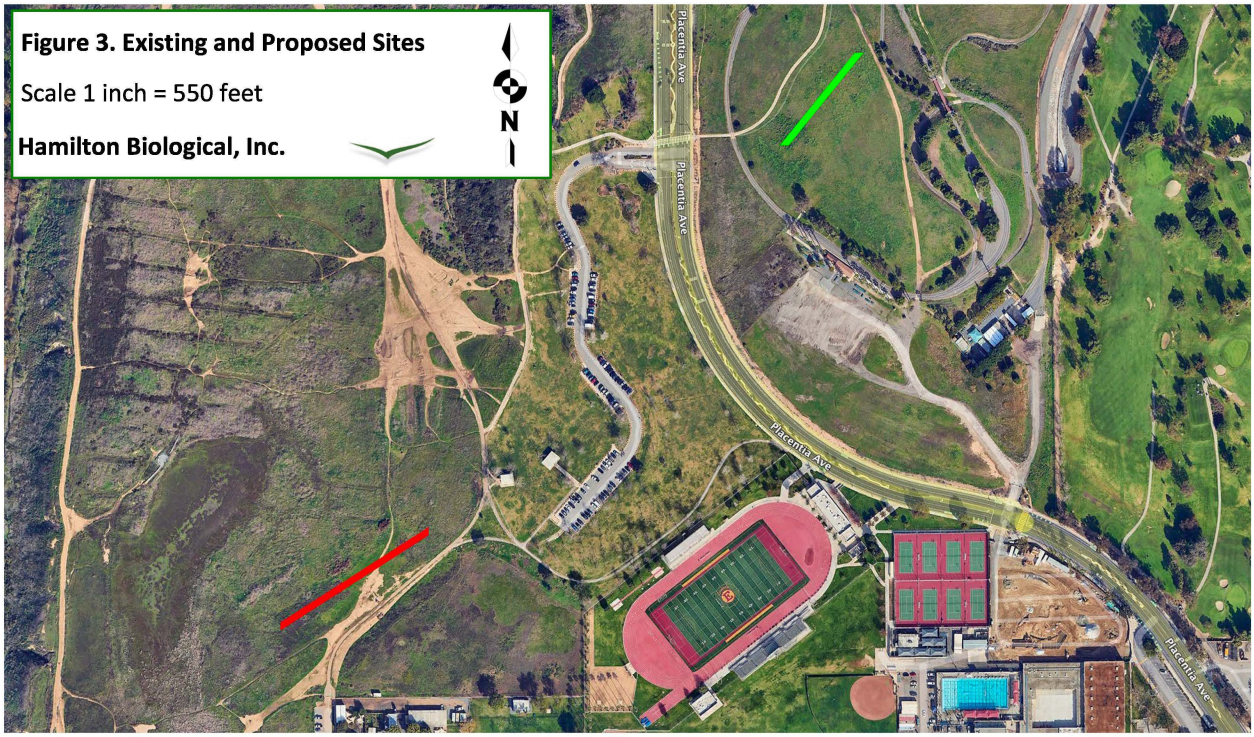


Figure 3. Showing the general locations of the existing flying field site, west of Placentia Avenue, in red, and the proposed flying field site, east of Placentia Avenue, in green. The actual location of the existing flying field shifts somewhat from year to year. NOTE: For detailed depiction of proposed actions at the relocation site, see Figure 10 on page 22. Aerial imagery dated January 22, 2020. *Imagery Source: Google Earth Pro.*

METHODS

As part of this analysis, I reviewed two recent biological reports prepared part of the current update to the Fairview Park Master Plan, incorporating relevant information into this technical memorandum:

- Land IQ. 2024. *2023 Vegetation map and habitat restoration opportunities for Fairview Park, Costa Mesa, California*. Report dated March 22, 2024, prepared for MIG.
- Hamilton Biological, Inc. 2025. *Biological Resources Technical Report, Fairview Park, City of Costa Mesa*. Report dated May 8, 2025, prepared for MIG.

On April 30, 2025, I conducted a field visit from 7:05 to 9:30 a.m. The temperature was 58–61° F, skies were 100 percent overcast, and winds were 1–3 miles per hour. I walked both the existing and proposed flying field sites and recorded the dominant plant species present in each area. I also recorded all wildlife species detected in and around these areas.

On May 11, 2025, I reviewed the State of California's *Special Vascular Plants, Bryophytes, and Lichens List* and *Special Animals List*, as well as a list of sensitive species recorded in

the U.S. Geologic Survey's Newport Beach 7.5' topographic quadrangle (California Natural Diversity Data Base (2025a, 2025b, 2025c).

RESULTS

Topography and Soils

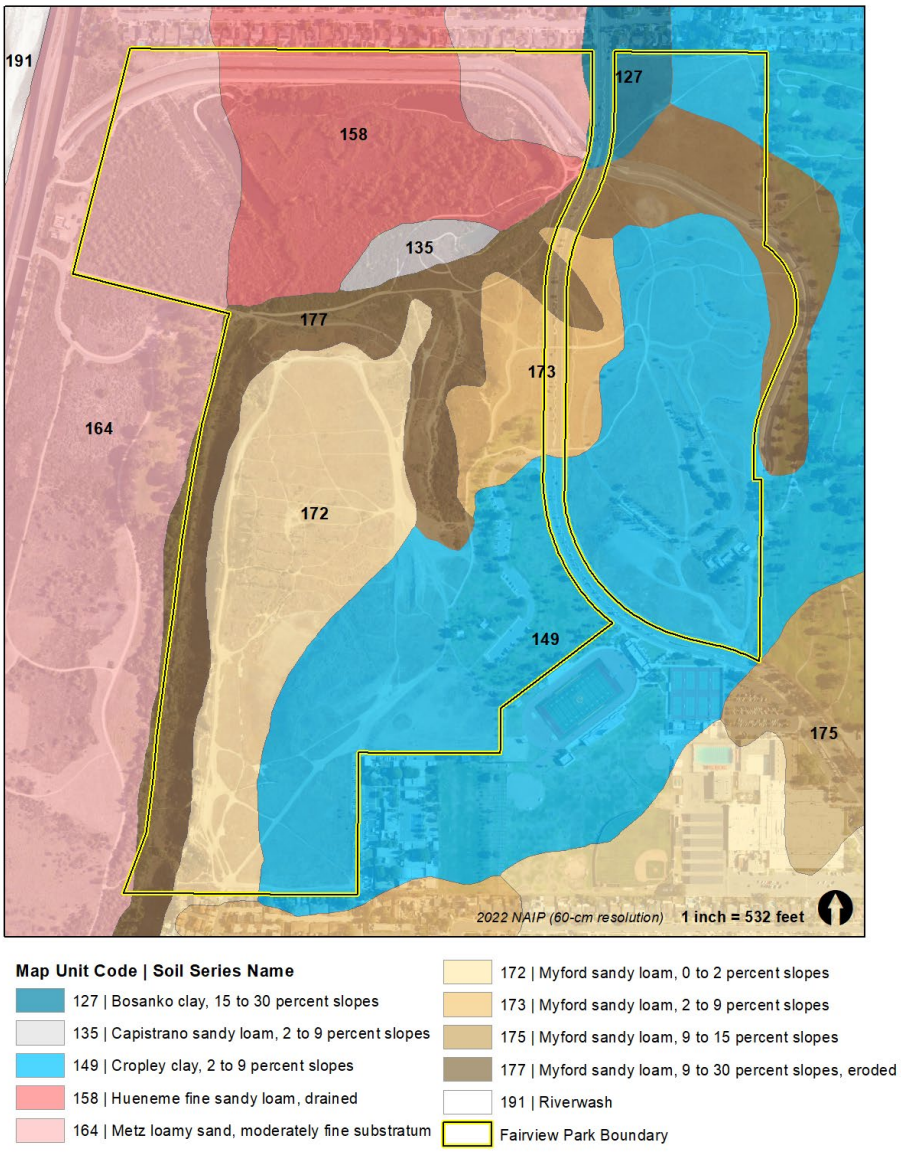
Both the existing flying field and the proposed relocation site occupy nearly flat, open ground at elevations of approximately 75 to 85 feet above mean sea level. As shown in Figure 4, below, the existing flying field is in the southern part of the western mesa, along the edge of a large area where fill soils were placed during the 1980s, and entirely within the watershed of the park's largest vernal pool, with smaller pools to the east and south. The proposed flying field site, east of Placentia Avenue, is in another area where fill appears to have been placed in the past (but not mapped). This determination was made in the field by noting a rise in the ground level of approximately 1–3 feet accompanied by an abrupt shift in vegetation from annual grassland to dense mustard.



Figure 4. Existing and proposed flying field sites in relation to vernal pools and the mapped area of improper fill material on the western mesa. The existing flying field is at the edge of the mapped fill area, and within the mapped watershed of the main vernal pool. Smaller vernal pool features are located to the east and south. The proposed flying field, east of Placentia Avenue, is in another area where fill appears to have been placed in the past (but not mapped). The proposed flying field avoids the mapped watershed of the vernal pool complex on the

east side of the park. NOTE: For detailed depiction of proposed actions at the relocation site, see Figure 10 on page 22. *Base Map Source: Land IQ 2023 (Figure 2-21).*

As shown on Figure 5, on the following page, native soils at both the existing and proposed flying field sites are mapped as **Cropley Clay, 2 to 9 percent slopes**. The Cropley Clay series is found on alluvial fans, floodplains, and small basins with smooth slopes at elevations of 10 to 2,100 feet. They are moderately well-drained to well-drained, with medium to very high runoff and slow permeability. Carbonate masses are found at depths of 32 to 51 inches, and the mean annual soil temperature at 20 inches is 59 to 64°F. Cropley soils contain 40 to 60% clay and 0 to 10% rock fragments. Smectitic mineralogy is present, and organic matter ranges from 1 to 3% in the top 10 inches. The soil moisture control zone is typically dry from May to October. These soils exhibit reversible surface cracks up to 2 inches wide and slickensides in the Bss horizon, ranging from



10 to 40 inches or more. Slopes are simple, ranging from 0 to 15%.

Figure 5. Soil Series Mapped in Fairview Park (USDA 1978). Soils at the existing and proposed flying field sites are mapped as Cropley Clay, 2 to 9 percent slopes. Because the soil survey was completed in 1978, the soils map does

not show areas of fill placed in subsequent years. *Source: Land IQ 2023 (Figure 2-27).*

Plant Communities

Figure 6, below, shows Fairview Park's plant communities, as recently mapped by Land IQ (2023).

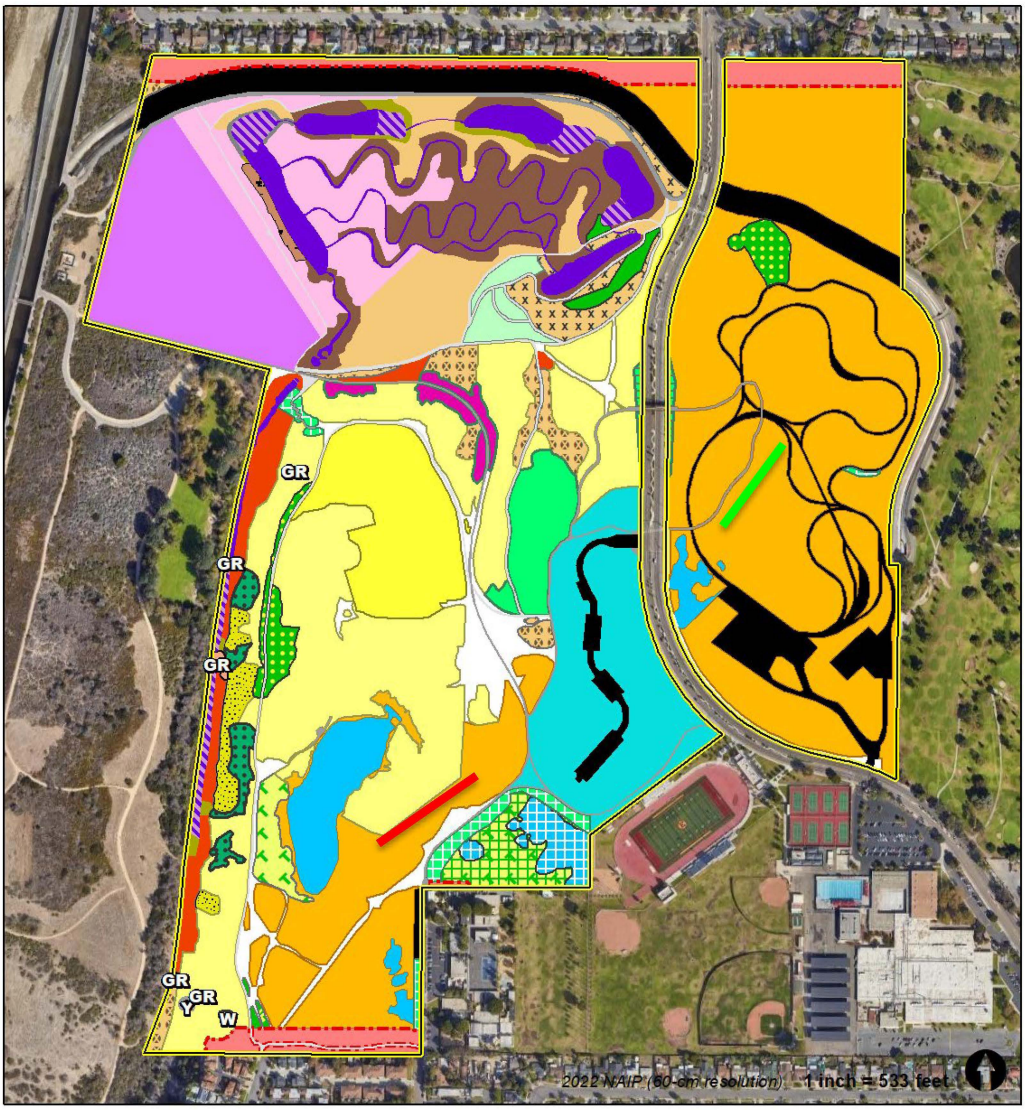


Figure 6. Plant Communities Mapped in Fairview Park (Land IQ 2023). The existing (red line) and proposed (green line) flying field sites are both in areas mapped as Wild Oats and Annual Brome Grasslands (a form of non-native annual grassland). As determined in the field in April 2025, the proposed site currently matches the description of Upland Black Mustard and Tocalote Fields, a ruderal (weedy) association established in parts of the park where fill was placed in the past. *Source: Land IQ 2023 (Figure 3-1).*

When Land IQ mapped the park's plant communities in 2023, the prevalence of black mustard (*Brassica nigra*) in the area proposed for the flying field may have been

obscured by mowing for weed control, which the City regularly undertakes on the east side of the park.

The following plant community descriptions are adapted from those provided by Land IQ (2023).

Wild Oats and Annual Brome Grasslands: *Avena* spp. – *Bromus* spp. Herbaceous Semi-Natural Alliance

On the mesa west of Placentia Avenue, including the area of the existing flying field, nonnative grasslands occur on soils that have been historically disturbed, including areas impacted by grading for the fly field and numerous informal paths. Nonnative cover exceeds 75 percent, with wild oats, annual bromes, and redstem filaree (*Erodium cicutarium*) being dominant throughout. Nonnative weeds occurring in patches include fennel (*Foeniculum vulgare*), black mustard (*Brassica nigra*), wild radish (*Raphanus sativus*), cheeseweed mallow (*Malva parviflora*), and tocalote (*Centaurea melitensis*). Clustered tarplant (*Deinandra fasciculata*), a disturbance-tolerant native herb, also occurs commonly in these grasslands with scattered shrubs of coast goldenbush (*Isocoma menziesii*), big saltbush (*Atriplex lentiformis*), mulefat (*Baccharis salicifolia*), and California buckwheat (*Eriogonum fasciculatum*).

Curly dock (*Rumex crispus*), a perennial broadleaf weed, is locally common, especially in areas with soils that become seasonally saturated or ponded during winter rainfall events. The native species that characterize these ephemeral ponding features include neckweed (*Veronica peregrina* ssp. *xalapensis*), Cooper's popcorn flower *(Plagiobothrys collinus)*, clustered tarweed, mulefat, pale spike rush (*Eleocharis macrostachya*), American pillwort (*Pilularia americana*), and common fiddleneck *(Amsinckia intermedia*).

The extent of the existing flying field varies over time, but for purposes of this report is taken to measure approximately 470′ × 150′ (Land IQ 2023; 99), which equates to approximately 1.62 acres of Wild Oats and Annual Brome Grasslands.

Upland Black Mustard and Tocalote Fields: *Brassica nigra – Centaurea melitensis* Herbaceous Semi-Natural Alliance

Where fill material has been placed on relatively flat ground, west and east of Placentia Avenue, vegetation is dominated by invasive herbaceous weeds, including black mustard, tocalote, crown daisy (*Glebionis coronata*), nonnative grasses (*Bromus* spp. and *Avena* spp.), and devil's thorn (*Emex spinosa*). Patches of invasive perennial weeds, such as fennel and tree tobacco (*Nicotiana glauca*), may also be present. Very low cover of natives occurs, including low wooly marbles (*Psilocarphus brevissimus*), clustered tarplant, coyote brush (*Baccharis pilularis*), coast goldenbush, California buckwheat, and big saltbush.

The proposed flying field (which for purposes of this report is taken to measure approximately 300′ × 50′), plus associated improvements (e.g., pilot stations/pit area), would

occupy approximately 0.5 acre on the east side of the park that currently supports Upland Black Mustard and Tocalote Fields.

Wildlife

The following discussions of wildlife known or likely to utilize the existing and proposed flying field areas are adapted from those provided by Hamilton Biological (2025).

In June and July, 2024, focused surveys were conducted for Crotch's Bumble Bee (*Bombas crotchii*), a candidate for listing under the California Endangered Species Act, across 16.5 acres planned for habitat restoration in Fairview Park (Endemic Environmental Services 2024). These surveys produced photographic records of 13 Crotch's Bumble Bees utilizing a variety of native and non-native shrubs and forbs. Although these surveys did not include the sites of the existing or proposed flying fields, the results showed that the species occurs widely across Fairview Park, including areas of the western mesa dominated by mustards and other non-native vegetation. As such, it is expected that Crotch's Bumble Bee forages in both the existing and proposed sites, with potential to overwinter and nest at both sites (e.g. in rodent holes).

Twenty species of butterfly were seen in Fairview Park during 2023, including the monarch (*Danaus plexippus*), a candidate for listing by the federal government. Given that the sites of the existing and proposed flying fields lack milkweeds (*Asclepias* spp.) they are not expected to provide important habitat for the monarch.

Five native species of amphibian have been reported in Fairview Park: Western toad (*Anaxyrus boreas*), California tree frog (*Pseudacris cadaverina*), Baja California tree frog (*Pseudacris hypochondriaca*), black-bellied slender salamander (*Batrachoseps nigriventris*), and southern California slender salamander (*Batrachoseps major*). These species could occur at existing and proposed flying field sites.

Three species of snake and five species of lizard have been reported in Fairview Park: California kingsnake (*Lampropeltis californiae*), gopher snake (*Pituophis catenifer*), southern pacific rattlesnake (*Crotalus oreganus*), southern alligator lizard (*Elgaria multicarinata*), western fence lizard (*Sceloperus occidentalis*), common side-blotched lizard (*Uta stansburiana*), western skink (*Plestiodon skiltonianus*), and western whiptail (*Aspidoscelis tigris*). These species could occur at existing and proposed flying field sites.

Birds are the most conspicuous forms of wildlife at Fairview Park. Grasslands and mustard stands on either side of Placentia Avenue, including the existing and proposed flying field sites, provide foraging habitat for several species of raptor, including Burrowing Owls (up to three wintering in 2024/2025; Endemic Environmental Services 2025), Northern Harriers, White-tailed Kites, Red-shouldered Hawks, and Red-tailed Hawks. Insectivores using these habitats include Vermilion Flycatchers, Ash-throated Flycatchers, Western Kingbirds, Cassin's Kingbirds, Black Phoebes, and Say's Phoebes. Wintering species include various sparrows, such as White-crowned and Savannah, along with American Pipits, Western Meadowlarks, and other open-country species. Stands of non-native mustard provide

nesting habitat for such species as Red-winged Blackbirds, Song Sparrows, and Common Yellowthroats.

Mammals found in Fairview Park are species adapted to human presence, such as the Virginia Opossum (*Didelphus virginiana*), Desert Cottontail (*Sylvilagus audubonii*), California Ground Squirrel (*Otospermophilus beecheyi*), Coyote (*Canis latrans*), and Northern Raccoon (*Procyon lotor*), and fossorial species, such as Botta's Pocket Gopher (*Thomomys bottae*) and California Vole (*Microtis californicus*). The Black-tailed Jackrabbit (*Lepus californicus*), a California Species of Special Concern that requires large open areas to persist, occurred historically but appears to have been extirpated from the park and other areas along the lower Santa Ana River.

SENSITIVE SPECIES

Sensitive Biological Resources

Federal, state, and local regulations exist to protect and conserve sensitive biological resources. For purposes of this report, a biologically sensitive resource refers to any of the following:

- A natural community recognized as having special-status by federal, State, and/or local governments, and requiring a permit or agreement prior to its disturbance.
- A plant or animal species identified by federal or state governments as endangered, threatened, rare, protected, sensitive, vulnerable, or a Species of Special Concern.
- A plant or animal that listed by a state or federal agency as a candidate species or proposed for state or federal listing.

Sensitive Natural Communities

The State of California (CDFW 2023) identifies vernal pools as a "Sensitive" natural community that occurs in the portions of Fairview Park potentially affected by the proposed relocation of the flying field. The project has been designed to remove the existing flying field from the large vernal pool watershed on the west side of the park and to completely avoid the vernal pool watershed on the east side of the park.

Special-Status Species

In the following Table B, special-status plants and wildlife that occur in Fairview Park's open grasslands and/or mustard stands, or that have realistic potential to occur there, are identified and briefly discussed. Table B indicates whether the species could occur at the existing flying field site, the proposed relocation site, or both sites. Table B uses the following abbreviations:

- **C** **Candidate** for Listing (State or Federal governments).
- **E** **Endangered** (listed by State or Federal governments). "Take" of the species

or disturbance of occupied habitat are prohibited unless authorized.

- **FP** **Fully Protected** by the State of California. These species may not be taken or possessed at any time, although take may be authorized for necessary scientific research.

- **T** **Threatened** (listed by State or Federal governments). "Take" of the species or disturbance of occupied habitat are prohibited unless authorized.

- **PT** **Proposed Threatened**. Species recently proposed to be listed as threatened by State or Federal governments.

- **SSC** **Species of Special Concern**. The California Department of Fish and Wildlife has designated certain vertebrate species as Species of Special Concern because declining population levels, limited ranges, and/or continuing threats have made them vulnerable to extinction. The goal of designating species as Species of Special Concern is to halt or reverse their decline by calling attention to their plight and addressing the issues of concern early enough to secure their long term viability.

Some wildlife species are considered "sensitive" only during certain parts of their annual cycle—usually on the nesting grounds. Such species are considered "sensitive" at Fairview Park only if they have potential to occur at the park during that specific time of the year (e.g., those occurring strictly as migrants would not be included).

California Native Plant Society (CNPS). Table B includes plant taxa assigned the following ranks by CNPS:

- **1A**, referring to taxa CNPS presumes to be extirpated in California and either rare or extinct elsewhere.

- **1B.1**, referring to taxa CNPS considers to be rare, threatened, or endangered in California and elsewhere; seriously threatened in California (over 80% of occurrences threatened / high degree and immediacy of threat).

- **1B.2**, referring to taxa CNPS considers to be rare, threatened, or endangered in California and elsewhere; moderately threatened in California (20-80% of occurrences threatened / moderate degree and immediacy of threat).

- **1B.3**, referring to taxa CNPS considers to be rare, threatened, or endangered in California and elsewhere; not very threatened in California (less than 20% of occurrences threatened / moderate degree and immediacy of threat).

- **2B.2**, referring to taxa CNPS considers to be rare, threatened, or endangered in California, but more common elsewhere; moderately threatened in California (20-80% occurrences threatened / moderate degree and immediacy of threat).

- **3.1**, referring to taxa for which CNPS lacks the necessary information to assign them to one of the other ranks or to reject them; taxonomy is typically uncertain.

- **4.1**, referring to taxa of limited distribution or infrequent throughout a broader area in California, whose status should be monitored regularly; moderately threatened in California (>80% occurrences threatened / moderate degree and immediacy of threat).

- **4.2**, referring to taxa of limited distribution or infrequent throughout a broader area in California, whose status should be monitored regularly; moderately threatened in California (20-80% occurrences threatened / moderate degree and immediacy of threat).

- **4.3**, referring to taxa of limited distribution or infrequent throughout a broader area in California, whose status should be monitored regularly; not very threatened in California (less than 20% of occurrences threatened / low degree and immediacy of threat or no current threats known).

NatureServe Element Rankings. In some cases, species have not been granted special status by state or federal agencies, but they may be recognized as ecologically sensitive by the California Natural Diversity Database (CNDDB), which uses a ranking methodology maintained by NatureServe. Species are given a Global rank (G-rank) that applies to the taxon's entire distribution, and a State rank (S-rank) that applies to the taxon's state distribution. For subspecies and varieties, there is also a "T" rank describing the global rank for the subspecies or variety, and "TX" refers to a subspecies or variety presumed to be extinct. "Q" denotes questionable taxonomy. Taxa with rankings of G1, G2, G3, S1, S2, or S3 may be considered "sensitive" and potentially worthy of special consideration in resource planning. Taxa with higher rankings (G4, G5, S4, S5) are considered "apparently secure" or "secure" and therefore are not considered "sensitive" for purposes of this report. NatureServe Element Rankings are identified in Table B only for taxa that have no other federal or state special status. NatureServe Ranks:

- **G1, Critically Imperiled,** referring to taxa at very high risk of extinction due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors.

- **G2, Imperiled,** referring to taxa at high risk of extinction due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors.

- **G3, Vulnerable,** referring to taxa at moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors.

- **S1, Critically Imperiled,** referring to taxa critically imperiled in the state because of extreme rarity (often 5 or fewer populations) or because of factor(s) such as very steep declines making it especially vulnerable to extirpation from the state.

- **S2, Imperiled,** referring to taxa imperiled in the state because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the state.

- **S3, Vulnerable,** referring to taxa vulnerable in the state due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation from the state.

Potential to Occur Criteria. The last column of Table B indicates the perceived likelihood of the species occurring in Fairview Park:

- **Present.** Species reliably recorded in Fairview Park during the current survey effort or previous survey efforts, or reported in credible online sources, such as Calflora (www.calflora.org), eBird (www.ebird.org), or iNaturalist (www.inaturalist.org); if the local population is no longer believed to be extant, the potential to occur is stated as **Extirpated** or **Possibly Extirpated**, with explanation.

- **High.** Species considered likely to occur at Fairview Park based upon the pattern of records in surrounding areas and the presence of suitable habitat resources at the park. Species may be inconspicuous and/or little-studied, and therefore subject to being overlooked even when present.

- **Moderate.** Species considered neither likely nor highly unlikely to occur at Fairview Park, because the park lies within the species' known range and adequate suitable habitat is present. Species may be inconspicuous and/or little-studied, and therefore subject to being overlooked even when present.

- **Low.** Species not known from Fairview Park, and considered highly unlikely to occur there, except as a rare transient, because the park lies outside of the species' known range and/or required habitat is of marginal or low quality.

- **None.** Fairview Park lies well outside of the species' range, but potential for confusion exists due to changes in taxonomy, erroneous reports, etc.

Table B. Special-Status Species

Latin name Common name	Fed.	Global/ State	CNPS	Habitat/Regional Status	Potential to Occur, Existing or Proposed Sites
Plants					
Atriplex coulteri Coulter's Saltbush	—	G3/S1S2	1B.2	Clay soils on bluffs, mesas and open coastal areas. San Luis Obispo County south.	**Low (existing site only).** Occurs within 5-10 miles of park; suitable habitat present at the existing flying field, but occurrence very unlikely due to extensive disturbance.
Atriplex pacifica South Coast Saltscale	—	G4/S2	1B.2	Clay soils on bluffs, mesas and open coastal areas. Santa Barbara County south.	**Low (existing site only).** Historically occurred within 5-10 miles of park; suitable habitat present at the existing flying field, but occurrence very unlikely due to extensive disturbance.
Camissoniopsis lewisii Lewis's Evening-Primrose	—	G4/S4	3	Sandy or clay soils on bluffs, mesas, and open coastal areas. San Luis Obispo County south.	**Low (existing site only).** Scattered small populations occur in Fairview Park, along trail margins and other open areas. Suitable habitat present at the existing flying field, but occurrence unlikely due to extensive disturbance.
Centromadia parryi ssp. *australis* Southern Tarplant	—	G3T2/S2	1B.1	Disturbed ground in saltmarshes and coastal sage scrub. Santa Barbara County south.	**Low (either site).** Occurs in Fairview Park along disturbed margins of trails. Potentially suitable habitat present at either site, but this plant has not been recorded at either site.
Hordeum intercedens Vernal Barley	—	G3G4/ S3S4	3.2	Grasslands and vernal pools. Santa Barbara County south; scattered populations in the Central Valley.	**Moderate (existing site).** Occurs at Fairview Park in grasslands and vernal pools. Moderate potential to occur at the existing flying field site.
Lasthenia glabrata ssp. *coulteri* Coulter's Goldfields	—	G4T2/S2	1B.1	Alkali soils and vernal pools. San Luis Obispo County south; scattered populations in the Central Valley.	**Moderate (existing site).** Pools 5 and 6 in the western par hold the County's largest population, with 100s to 1000s of plants; smaller numbers occur in a vernally wet half-pipe feature in the central mesa, adjacent to a large disturbed area. Scattered plants could occur in the area of the existing flying field, especially during wet winters.
Microseris douglasii ssp. *platycarpha* Small-flowered Microseris	—	G4T4/S4	4.2	Vernal pools and seasonally wet plains. Los Angeles County south; one record from southern Central Valley.	**High (either site).** Occurs in vernal pools and grasslands on both sides of Placentia Avenue. More likely at the existing site.

Latin name Common name	Fed.	Global/ State	CNPS	Habitat/Regional Status	Potential to Occur, Existing or Proposed Sites
Navarretia prostrata Prostrate Vernal Pool Navarretia	—	G2/S2	1B.2	Seasonally wet alkali soil and vernal pools. Central Valley; coastal slope from Alameda County south; one of two Orange County populations is at Fairview Park.	**Moderate (existing site).** Occurs around the margins of Pool 1 and could occur at the flying field site, especially during wet winters.
Invertebrates					
San Diego Fairy Shrimp *Branchinecta sandiegonensis*	E	G2/S1		Vernal pools and other ephemeral wetlands. Orange County south.	**Present (existing site).** Documented in seasonal pools on both sides of Placentia Avenue. Actions affecting runoff into occupied pools could affect this listed species. Relocation project avoids the vernal pool watershed on the east side.
Riverside Fairy Shrimp *Streptocephalus woottoni*	E	G1G2/ S2		Vernal pools and other ephemeral wetlands. Ventura County south.	**Present (existing site).** Documented in seasonal pools on west side of Placentia Avenue. Actions affecting runoff into occupied pools could affect this listed species.
Bombus crotchii Crotch's Bumble Bee	—	C/S1S2	—	Many habitats. California and northwestern Baja California; most records from southern California.	**High (both sites).** Uses native and non-native flowering habitats in the park. Nests in burrows, tufts of vegetation, cavities, rock piles, etc. Could forage and/or nest at either site.
Danaus plexippus Monarch	C	G4T1T2Q /S2	—	Breeds in areas with milkweed from Mendocino County south. In southern California, overwinters mainly in large stands of eucalyptus near the coast.	**Present (both sites).** Occurs as a transient; not known to breed or overwinter in the park.
Helminthoglypta traskii traskii Trask Shoulderband	—	G1G2T1/ S2S3	—	Many habitats. Coastal slope from Ventura County south.	**Moderate (both sites).** Likely occurs in the less disturbed parts of the park; potential to occur at either site considered moderate due to disturbed conditions.
Amphibians					
Spea hammondii Western Spadefoot	PT	SSC	—	Seasonal pools with nearby uplands suitable for aestivation. Shasta County south, excluding deserts.	**Low (existing site).** The species likely occurred at Fairview Park historically, because suitable habitat is present, but no records exist.

Latin name Common name	Fed.	Global/ State	CNPS	Habitat/Regional Status	Potential to Occur, Existing or Proposed Sites
Birds					
Plegadis chihi White-faced Ibis	—	G5/S3S4	—	Various freshwater habitats. Breeding range includes most of western North America; winters south to Central America.	**High (existing site).** Up to several dozen non-breeders occur in the park in fall, winter, spring. Regularly forages at vernal pools, when full, and could also use the existing flying field under wet conditions.
Elanus leucurus White-tailed Kite	—	FP	—	Nests in trees within expansive open space areas; more widespread during migration and winter. Forages in rangelands and marshy areas. Range includes large parts of North and South America.	**High (both sites).** Forages regularly in the park, and could do so at either the existing or proposed sites.
Aquila chrysaetos Golden Eagle	—	FP	—	Extensive open areas across a cosmopolitan range; nests on cliffs and in tall trees away from settlements. In Orange County, occurs mainly in the foothills and mountains.	**Low (both sites).** Transients could occur rarely.
Circus hudsonius Northern Harrier	—	SSC	—	Nests on the ground in expansive open space areas; more widespread during migration and winter. Range includes most of North America.	**High (both sites).** Small numbers regularly forage in the park's grassland and scrub habitats in fall, winter, and spring. Could possibly nest in the local area.
Haliaeetus leucocephalus Bald Eagle	—	E	—	Nests in tall trees, usually near water; forages in lakes, rivers, and marine environments. Range includes most of North America.	**Present (both sites).** Occurs rarely as a transient.
Buteo regalis Ferruginous Hawk	—	G4/S3S4	—	Breeds in central North America and winters mainly in expansive rangelands and agricultural areas to the south.	**Present (both sites).** Occurs rarely as a transient.
Buteo swainsoni Swainson's Hawk	—	G5/S4	—	Breeds in Canada and western North America and winters from western Mexico to southern South America.	**Present (both sites).** Occurs rarely as a transient.
Athene cunicularia Burrowing Owl	—	C/SSC	—	Occurs across large parts of North America; nesting population west of the deserts nearly extirpated. Rare winter visitor in coastal southern California.	**Present (both sites).** Up to three often winter in Fairview Park, using open habitats on either side of Placentia Avenue. Not known to nest in the park.
Asio flammeus Short-eared Owl	—	SSC	—	Extensive open areas across a cosmopolitan range; nests in northern North America. Very rare fall/winter visitor across most of southern California.	**Present (both sites).** Occurs rarely as a transient.

Latin name Common name	Fed.	Global/ State	CNPS	Habitat/Regional Status	Potential to Occur, Existing or Proposed Sites
Pyrocephalus rubinus Vermilion Flycatcher	—	SSC	—	Open country with trees. Formerly nested in the desert Southwest and into Mexico; now nests sparingly across southern California, including Orange County.	**Present (both sites).** Now apparently resident in small numbers; courtship behavior by a pair near the existing flying field on 3/25/25.
Lanius ludovicianus Loggerhead Shrike	—	SSC	—	Occurs in open habitats across most of North America; nesting population on coastal slope of southern California nearly extirpated. Rare winter visitor in coastal southern California.	**Present (both sites).** Occurs rarely in fall and winter; does not nest.
Ammodramus savannarum Grasshopper Sparrow	—	SSC	—	Nests in expansive grasslands and rangelands across most of North America. In Orange County, breeds mainly in the San Joaquin Hills and Lomas de Santiago; occurs rarely in fall and winter.	**Low (both sites).** Occurs rarely as a transient or winter visitor. Nesting unlikely, but possible, east of Placentia Avenue.
Pooecetes gramineus affinis Oregon Vesper Sparrow	—	SSC	—	Breeds in the Pacific Northwest and winters mainly in expansive open areas on the coastal slope of California.	**High (both sites).** Vesper Sparrows of unknown subspecies recorded in the park; *P. g. affinis* likely to occur occasionally in fall and winter.
Passerculus sandwichensis rostratus Large-billed Savannah Sparrow	—	SSC	—	Breeds in the northern Gulf of California; winters on the coast of southern California.	**Moderate (both sites).** Occurs rarely in fall and winter along the coast; could occur at either site.
Agelaius tricolor Tricolored Blackbird	—	T	—	Nests in wetlands near expansive grasslands and rangelands required for foraging, mainly in California. Winters in rangelands and parks.	**Low (both sites).** Could occur rarely at either site as a transient or winter visitor.
Xanthocephalus xanthocephalus Yellow-headed Blackbird	—	SSC	—	Nests in wetlands with tall emergent vegetation across much of central and western North America. Winters mainly in Mexico.	**Low (both sites).** Could occur rarely at either site as a transient or winter visitor.
Setophaga petechia Yellow Warbler	—	SSC	—	Nests in woodlands across most of North America. Winters mainly from Mexico to South America.	**Present (both sites).** Migrants could occur at either site. Breeding habitat in the park is limited to riparian woodlands.
Mammals					
Lepus californicus bennettii San Diego Black-tailed Jackrabbit	—	SSC	—	Occurs in various open settings, usually in expansive open space areas, from Santa Barbara County south.	**Extirpated (both sites).** Formerly recorded in the park and elsewhere along the lower Santa Ana River, but no recent observations known.

Latin name Common name	Fed.	Global/ State	CNPS	Habitat/Regional Status	Potential to Occur, Existing or Proposed Sites
Lasiurus frantzii Western Red Bat	—	SSC	—	Roosts in foliage of many types of tree; feeds over a wide variety of habitats, often close to water in coastal lowlands. Widespread from western North America south to northern South America.	**Moderate (both sites).** Riparian woodlands in the park appear suitable for roosting; could forage over either site.
Antrozous pallidus Pallid Bat	—	SSC	—	Widespread in western North America, in chaparral and similar habitats. Forages on the ground and in vegetation. Roosts in rock crevices and under tree bark.	**Low (either site).** Fairview Park lacks extensive rocky areas or oak woodlands that would provide suitable roosting habitat, but Pallid Bats from other areas could potentially forage at either site.
Taxidea taxus American Badger	—	SSC	—	Occurs in expansive open space areas across most of western and central North America. In Orange County, recent records from the mountains and foothills.	**Low (both sites).** American Badgers have not been recorded at Fairview Park or elsewhere along the lower Santa Ana River. It is likely that the natural habitat is too reduced and fragmented to support a population.

WILDLIFE MOVEMENT

Both the existing flying field site and the proposed relocation site lie within flat, open areas of the park. Although neither site lies within any identified wildlife movement corridor, the existing flying field site is surrounded by vernal pools and thus may be seen to occupy a habitat linkage for wildlife occupying these ephemeral wetland habitats. Figure 7, below, shows the position of the existing flying field, between the main vernal pool to the west (referred to as Feature 1) and restored vernal pool habitat to the east (referred to as Features 5, 6, 7). The use and maintenance of the fly field compacts the soil, prevents growth and reproduction of native vegetation, decreases biodiversity, and increases bare ground and topsoil erosion in the area between the sensitive vernal pool habitats (Land IQ 2023; 99). Taken together, these ongoing processes of habitat degradation may diminish the capacity of some terrestrial wildlife species to move freely throughout the park's main vernal pool complex.



Figure 7. Existing Flying Field in Relation to Vernal Pools. Oblique drone image taken on March 3, 2023, facing to the southwest. As shown, the existing flying field (red line) occupies a position between the park's main vernal pool (Feature 1, west of the flying field) and restored vernal pool habitat (Features 5, 6, 7, east of the flying field). NOTE: Figure 9 on page 21 shows the appearance of the existing flying field shortly after grading (date unspecified). *Image Source: City of Costa Mesa, Land IQ (2023).*

Figure 8, on the next page, shows the proposed flying field relocation site. This is one of the least ecologically sensitive areas in the park, being located on fill material and surrounded by the model railroad track, with walking paths to west, north, and east. A runway 300 feet long can be accommodated without encroaching on the delineated vernal pool watershed to the south.

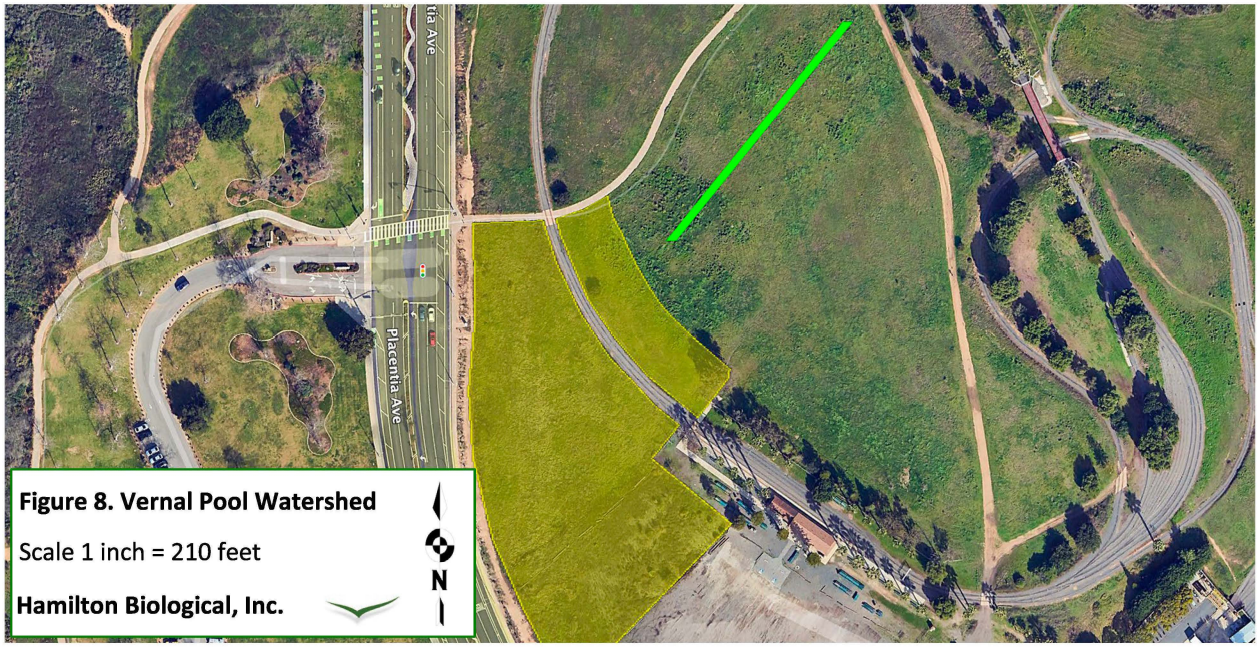


Figure 8. Proposed Flying Field in Relation to East-side Vernal Pool Watershed. As shown, the proposed flying field (green line) would avoid the watershed of a small vernal pool complex on the east side of Placentia (yellow screen). Surrounded by the model railroad track and existing pathways, the flying field would not substantially inhibit movement of wildlife through the area. NOTE: For detailed depiction of proposed actions at the relocation site, see Figure 10 on page 22. *Source: Land IQ 2023 (Figure 2-21).*

USE OF THE EXISTING FLYING FIELD

Model aircraft enthusiasts have been flying model aircraft at Fairview Park since the early 1960s (City of Costa Mesa 2020). Review of historical aerial imagery shows that the area devoted to the flying field has varied considerably from year to year, but has remained in the southern part of the western mesa, as generally depicted in this technical memorandum. As described by the City of Costa Mesa (2020; 7), the flying field was moved away from the bluffs to its current location in 2005, when the City graded an area measuring approximately 470 feet long × 150 feet wide (approximately 1.62 acre of impact to Wild Oats and Annual Brome Grasslands).

The Harbor Soaring Society used the flying field with City's permission until the COVID-19 pandemic led to temporary closure of the park in March of 2020 with the City provisionally re-opening the flying field for use on weekends starting in 2023 (Land IQ 2023; 99). Currently, flying is limited to non-powered gliders on the first and third Saturdays of the month (https://www.harborsoaringsociety.org/hss-airfield). Figure 9, on the next page, is an aerial image showing the existing flying field, freshly graded and chalked, on an unspecified date.

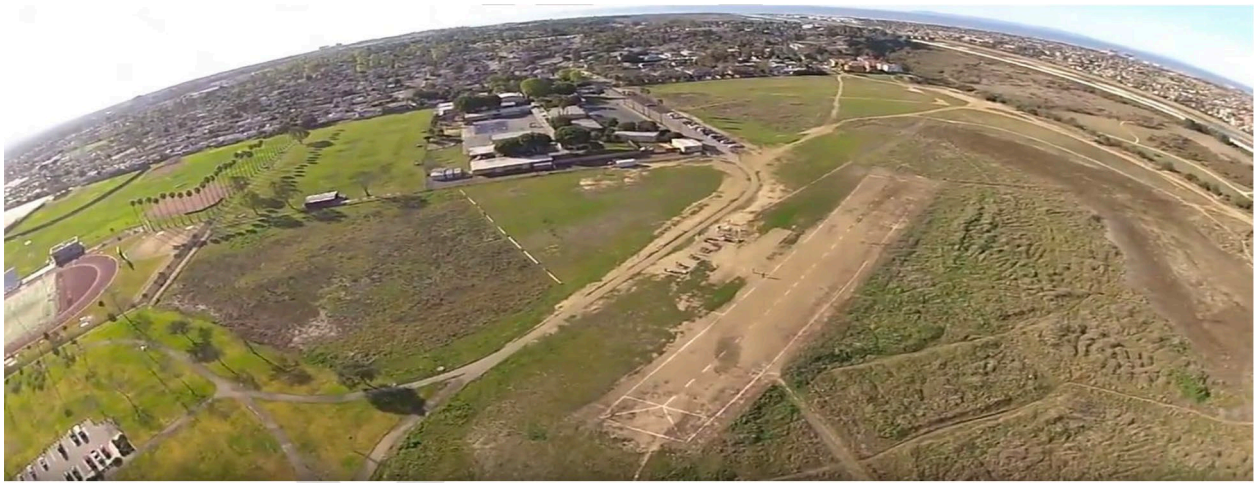


Figure 9. Oblique drone image, date unspecified, showing the existing flying field as viewed facing southwest. The flying field has not been this well-defined in recent years, due largely to concerns about the potential effects of grading within the watershed of the park's largest vernal pool. *Source: City of Costa Mesa (2020; 2).*

CEQA Impact Analysis

For purposes of this analysis, the existing flying field measures approximately 470 feet long by 150 feet wide (1.62 acres) in an area classified as Wild Oats and Annual Brome Grasslands within the watershed of the park's largest vernal pool (i.e., Vernal Pool Feature 1). The proposed actions involve abandoning the existing flying field and establishing a new flying field on the east side of the park. Figure 10, on the next page, shows the components of the relocated flying field:

- Runway measuring approximately 300 feet long × 50 feet wide, 150 feet of which will consist of decomposed granite, with the remainder to be periodically cleared of vegetation.
- Post-and-cable barrier around the northern portion of the east-side vernal pool watershed, consistent with the existing low barrier that protects the southern portion of this watershed.
- Pilot stations/pit area.
- Storage shed.
- Information kiosk.
- Parking would be at the existing lot for the train station.
- Site access would be via an existing maintenance road.

These project actions will impact approximately 0.5 acres of Upland Black Mustard and Tocalote Fields, and a small area of the existing parking lot (for the storage shed and information kiosk). All impacts will be outside of the delineated vernal pool watershed.



KEYNOTES

EXISTING
1. OCME TRAIN STATION.
2. TRACK CROSSING.
3. MODEL TRAIN TRACKS.
4. POST AND CABLE FENCE.
5. PARKING LOT.
6. MAINTENANCE PATH.
7. VERNAL POOL WATERSHED.
8. VERNAL POOL.

PROPOSED
9. TAKEOFF/LANDING FLY PATH.
10. DECOMPOSED GRANITE SURFACE.
11. PILOT STATIONS/PIT AREAS.
12. KIOSK.
13. STORAGE CONTAINER.
14. POST AND CABLE FENCE.

Figure 10. Proposed Actions. As shown, part of the relocated fly path (150' × 25') would consist of decomposed granite; the remainder would be periodically cleared of vegetation. Also shown are the pilot stations and pit areas, information kiosk, and storage container. Access from the existing parking lot would be via an existing maintenance path. As shown, all project components would avoid the vernal pool watershed, which will be delineated with a low, post-and-cable barrier comparable to the existing barrier around the southern vernal pool watershed (next to the parking lot). *Source: MIG.*

This impact analysis identifies the following existing and ongoing biological impacts as baseline conditions:

- Compaction of soil in the west-side vernal pool watershed, which prevents growth and reproduction of native vegetation, including vernal pool-associated plant species, and which may hinder movement of some wildlife species among the vernal pools.

- Periodic grading and clearing of vegetation of the existing flying field increases the prevalence of disturbance-adapted weed species, which can be spread to other parts of the park through various means, including dispersal by people walking into sensitive areas to retrieve model planes.

- Erosion associated with periodic grading, clearing, and trampling of vegetation in and around the existing flying field results in increased siltation of the park's largest vernal pool, with potential adverse effects upon the federally listed San Diego fairy shrimp and Riverside fairy shrimp and multiple rare plant species that occupy this pool and associated grasslands (e.g., prostrate vernal pool navarretia, vernal barley, small-flowered microseris).

- Periodic grading of the existing flying field may result in small, isolated seasonal ponds that can be colonized by the widespread, non-listed versatile fairy shrimp (*Branchinecta lindahli*), a process of homogenization that can lead to the break-down of species boundaries and negatively impact the genetic diversity of the listed San Diego fairy shrimp (Simovich et al. 2013).

- Periodic compaction of soil associated with grading of the existing flying field may result in mortality of wildlife, potentially including nesting individuals of Crotch's bumble bee, a candidate for listing under the California Endangered Species Act.

The proposed actions, involving relocation of the flying field to the proposed site on the east side of the park, will eliminate or substantially reduce these existing, ongoing impacts to biologically sensitive resources on the west side of Fairview Park, and allow for the potential future restoration of the extensive west-side vernal pool complex.

The proposed actions will not exceed the existing flying field's area of impact, and will not impact vernal pools or other sensitive plant communities. The proposed actions will not impact any special-status wildlife species to an extent greater than does the existing flying field, and in most cases will reduce the current level of impact. As such, the proposed actions will not result in any significant impacts to biological resources and no mitigation measures are required.

Any potential restoration of the abandoned flying field on the west side of the park that might be implemented in the future would represent a stand-alone project and not a measure required as mitigation for the current relocation project.

Because the proposed actions involve potential "take" of Crotch's bumble bee, a candidate for State listing, it is recommended that the City consult with the California Department of Fish and Wildlife prior to undertaking any action (e.g., ground disturbance, placement of decomposed granite, vegetation clearance) that may require an incidental take permit to ensure compliance with the California Endangered Species Act. Consultation should take into consideration (a) the permanent loss of approximately 0.1 acre of Upland Black Mustard and Tocalote Fields for placement of decomposed granite and placement of barrier posts, and (b) periodic clearance of approximately 0.4 acre of Black Mustard and Tocalote Fields that will be required to maintain and operate the relocated flying field. Because these potential impacts to the bumble bee represent a reduction from the baseline level of potential impact (i.e., approximately 1.62 acres of ongoing impact to periodically grade, maintain, and operate the existing flying field), the proposed actions do not constitute a significant impact to the species.

CONCLUSION

Thank you for the opportunity to provide this technical memorandum evaluating the potential effects of the proposed flying field relocation project. If you have questions or wish to discuss any matters, please send e-mail to robb@hamiltonbiological.com or call me at 562-477-2181.

Sincerely,



Robert A. Hamilton
President, Hamilton Biological, Inc.

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2023 Vegetation Map and Habitat Restoration Opportunities for Fairview Park, Costa Mesa, California

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ATTACHMENTS

Attachment A Habitat Restoration Guidelines for Fairview Park.

Attachment B Long-Term Invasive Plant Management Plan for Fairview Park.

EXECUTIVE SUMMARY

This technical report supports the Fairview Park Master Plan Update by offering an updated assessment of the park's vegetation communities, identifying appropriate habitat restoration and enhancement opportunities, and providing best practices for restoration projects. The report also presents invasive plant control guidelines to be integrated into the Long-Term Management Plan for the 2024 Fairview Park Master Plan Update. The information presented here synthesizes biological resource findings made since the last Fairview Park Master Plan Update in November 2008, incorporating data from recent biological surveys conducted in winter, spring, and summer of 2023 by MIG, Land IQ, and Hamilton Biological.

Key components of this report include:

1. Description of 2023 vegetation communities in Fairview Park: Section 3 provides an overview of the various plant communities present in the park, including the unique vernal pool habitat, and highlights any changes observed since the previous Master Plan Update.
2. Identification of ecologically appropriate habitat restoration and enhancement opportunities: Section 4 incorporates the vegetation assessment to identify targeted opportunities for habitat restoration and enhancement that will support the conservation of biological resources and protect cultural resources within the park.
3. Best practices for restoration projects: Attachment A offers guidelines and recommendations to promote cost-efficient, high-quality outcomes for restoration projects in Fairview Park.
4. Long-term invasive plant management plan: Attachment B provides recommendations for managing invasive plant species, which are crucial to maintaining the ecological health of the park and protecting its sensitive habitats. This plan should be incorporated into the City’s long-term management planning to ensure the ongoing preservation of the park's resources.

By incorporating the information presented in this report, the Fairview Park Master Plan Update can effectively address the critical need for a Long-Term Management Plan that safeguards cultural resources and conserves biological resources, including the essential vernal pool habitat. This report serves as a valuable tool for informed decision-making and planning to ensure the future preservation and enhancement of Fairview Park's unique ecological features and cultural significance.

1 INTRODUCTION

1.1 BACKGROUND

1.1.1 Location

Fairview Park is located in the City of Costa Mesa (City), in Orange County, California (Figure 1-1 and Figure 1-2) and is adjacent to Talbert Nature Preserve (Talbert Regional Park, which is owned and managed by OC Parks) and the Santa Ana River Channel (owned by Orange County Flood Control District, OCFCD, and administered by OC Public Works, OC Public Works).

1.1.2 Regional Significance of Fairview Park

Spanning more than 208 acres, 195 of which are dedicated to natural open space and wildlife habitat, Fairview Park ranks among the largest urban parks in Orange County. Moreover, several key factors establish Fairview Park as an ecological preserve of regional significance:

1. Habitat diversity: Fairview Park encompasses several distinct habitat types, including wetlands, riparian areas, coastal sage scrub, and flower fields. These habitats support a wide array of plant and animal species, many of which are rare or endangered, such as the Least Bell's Vireo (*Vireo bellii pusillus*; state and federally endangered) and Coastal California Gnatcatcher (*Polioptila californica californica*; federally threatened and a California Species of Special Concern).
2. Vernal pools: The park is home to vernal pools, which are ephemeral wetlands that provide critical habitat for a variety of unique and specialized organisms, including the San Diego fairy shrimp (*Branchinecta sandiegonensis*) and Riverside fairy shrimp (*Streptocephalus woottoni*), both listed as endangered by the federal government.
3. Wildlife corridor: Fairview Park serves as a crucial wildlife corridor, connecting the Santa Ana River system of trails and parks to other open spaces in the region, including the Talbert Nature Preserve, the Randall Preserve (owned and managed by the Mountains and Rivers Conservation Authority) and the Huntington Beach Wetlands (owned and managed by the Huntington Beach Wetlands Conservancy). This connectivity facilitates the movement of species between habitats and promotes genetic diversity.
4. Cultural and historical significance: The park contains two nationally registered cultural resource historic sites, highlighting the area's rich human history and its connection to the natural environment.

It provides a valuable refuge for wildlife amidst the urban landscape and offers a space for people to connect with nature and learn about the importance of preserving biodiversity.

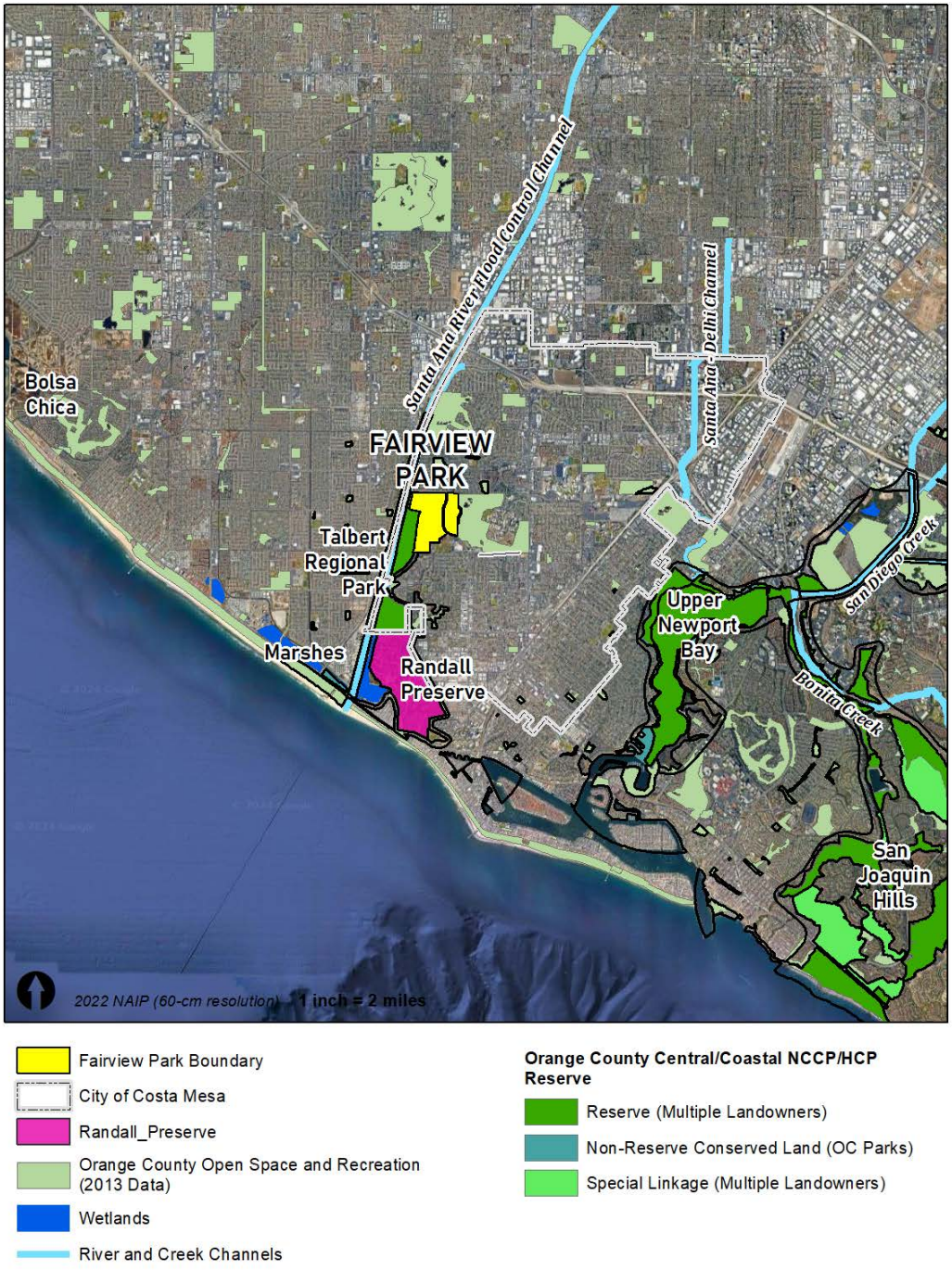


Figure 1-1 Regional Location of Fairview Park.



Figure 1-2 Summer 2022 Aerial of Fairview Park.

1.1.3 Need for the Master Plan Update

The first Fairview Park Master Plan was adopted in March 1998. The Master Plan was revised in February 2001, November 2002, and November 2008 (City of Costa Mesa 2008). The most recent of these predated several changes to resources and management of the Park:

1. The establishment of 35 acres of created wetlands and native scrub habitat in the northwestern portion of the park, named the Fairview Wetlands and Riparian Habitat Project, which has been implemented in two phases according to the Final Habitat Restoration Plan (City of Costa Mesa 2011). Phase 1 was completed in 2014. Phase 2 began in 2012 and is being implemented according to the Plan (City of Costa Mesa 2011) and Orange County Transportation Authority (OCTA) Restoration Funding Guidelines (OCTA 2012). Phase 2 is on-going for two main reasons: (1) the City is obligated to provide the OCTA, the primary sponsor of Phase 2, with 9.5 acres of coastal sage scrub and native grassland habitat restoration that was not completed as part of Phase 2; and (2) the wetland system requires remedial engineering because the annual maintenance cost for removing emergent vegetation to manage for mosquitos has exceeded pre-project estimates by a factor of ten. These areas are managed by the City under binding conservation easements and are under the jurisdiction of several agencies, including US Army Corps of Engineers (USACE), California Department of Fish and Wildlife (CDFW), US Fish and Wildlife Service (USFWS), OCTA, and Orange County Flood Control District (OCFCD).
2. In 2015, a new fly field (approximately 150-ft by 470-ft) was graded within the existing vernal pool watershed, which the HSS used with City's permission until the COVID-19 pandemic led to temporary closure of the park in March of 2020. In 2023, the City provisionally re-opened the fly field for use on weekends.
3. In 2016, Measure AA passed with over 70% of the vote, amending the Costa Mesa Municipal Code to subject certain changes to Fairview Park to voter approval.
4. In 2017, the City created and filled the Fairview Park Administrator staff position to help manage the natural and cultural resources provided within Fairview Park.
5. In 2017, the City created the Fairview Park Steering Committee to provide advice to the City Council on the implementation of the Master Plan and Measure AA. The Committee, which is staffed by the Fairview Park Administrator, complies with the Brown Act, and meets every other month at City Hall.

VERNAL POOL HABITAT PROTECTION MEASURES

A critically important objective of the Master Plan Update is to provide a Long-Term Management Plan that protects cultural resources and conserves biological resources, including the vernal pool habitat.

In 2000, the USFWS designated Fairview Park as critical habitat for the endangered San Diego fairy shrimp. In 2007, USFWS lifted this designation because the Master Plan recommended that the City join the Orange County (Central/Coastal) Natural Communities Conservation Plan/Habitat Conservation Plan (NCCP/HCP) (USFWS 2007). The City did not, however, join the OC Central/Coastal NCCP/HCP, and with no preservation plan in place several impacts occurred to protected fairy shrimp vernal pool habitat, including the construction of a parking lot over Vernal Pools 5, 6, and 7 during 2009/2010.

In 2014, the USFWS notified the City of measures necessary to protect vernal pool habitat at Fairview Park and comply with the Endangered Species Act (ESA), including the following:

1. Vernal pool and vernal pool watershed habitat restoration to correct impacts from the construction of the parking lot and other impacts to vernal pool features 5, 6, and 7.
2. Permanent protection by recording a conservation easement over the vernal pool features and associated watershed.
3. Fencing and public access restrictions to reduce pedestrian and off-road vehicle access in the vernal pool watershed. Fencing should be placed to restrict public access to the vernal pool watershed. Where a path is desired to balance public access and enjoyment of the natural features of the park, the path shall be placed on boardwalks, above the water surface elevation of the vernal pool feature basins including the hydrological connection between features 1 and 4. The boardwalk will minimize changes in hydrology and the introduction of contaminants into the vernal pool watershed.
4. Public education to promote stewardship of one of the last remaining coastal terrace vernal pools in southern California.
5. Minimize trash inputs to the vernal pool watersheds by providing convenient trash receptacles and pet waste stations.
6. Do not mow within vernal pool features or within at least 50 feet of the ponding areas to avoid restored habitat and sensitive plant species. Any mowing within the vernal pool watershed should avoid sensitive plant species. If the City proposes to use herbicides or pesticides within the vernal pool watershed, the City should coordinate with USFWS to ensure chemicals harmful to San Diego fairy shrimp are avoided.
7. Provide on-site employee education for City employees that have duties related to Fairview Park to review the City's management responsibilities to protect sensitive biological resources.
8. Conduct regular patrol to inspect the condition of fencing and education signage, and to report evidence of encroachment into the vernal pool watershed.

9. Regular biological monitoring including annual watershed inspection and periodic surveys for San Diego fairy shrimp. The annual inspection should be conducted by a qualified biologist who has experience with San Diego fairy shrimp and its habitat. A brief annual report should be prepared on the status of the habitat and a list of any additional management actions needed to protect and/or restore damages to the vernal pool habitat. The City should conduct periodic surveys once every 5 years when there is sufficient rainfall to document the status of the San Diego fairy shrimp in each of the vernal pools.
10. Apply adaptive management principles to protect San Diego fairy shrimp and their vernal pool habitat from harm by conducting an annual review of the effectiveness of management actions to determine if any new measures are required.
11. Conduct protocol surveys of the vernal pool features east of Placentia Avenue for the presence of San Diego fairy shrimp and/or sensitive vernal pool plants.
12. In an update to the Fairview Park Master Plan, include specific and ongoing management actions that will be implemented to ensure that high quality habitat for San Diego fairy shrimp is maintained, and that the species is protected.

The City has implemented several of these measures already, and the current Fairview Park Master Plan Update is an opportunity to provide guidelines for the City to fully implement the USFWS (2014) restoration, measurement, and protection measures for vernal pool habitat.

To partially implement Item 1 of the USFWS's list, the City is currently implementing a habitat restoration plan prepared by Glenn Lukos Associates (2018). A goal of the existing Master Plan (City of Costa Mesa 2008) is to conduct habitat restoration on the Mesa by removing fill material that was improperly placed in the vernal pool watershed (identified as a habitat restoration opportunity in this report).

To protect the entire vernal pool watershed while still providing the public with an approved access path, protective fencing should be installed along the perimeter of the Mesa rather than around individual pools. A carefully designed boardwalk should be constructed to allow the public to cross the watershed. The boardwalk should be built without footings to prevent any disruption to the hydrology of the watershed and potential damage to the subsurface clay restrictive layer that is essential to the formation of rain-fed pools. By implementing these measures, the park can better preserve the sensitive vernal pool ecosystem while still accommodating visitor access and enjoyment.

Even with improved fencing and educational signage, regular patrols by the City will likely be necessary to ensure that the public does not encroach into the sensitive vernal pool habitat.

In 2017, Glenn Lukos Associates (2017) conducted updated protocol surveys of the vernal pools documenting San Diego fairy shrimp and Riverside fairy shrimp.

The fly field graded and maintained by the City for the Harbor Soaring Society (HSS) is in the vernal pool watershed. While launching planes from the Mesa is an existing public use of the park, the maintenance of the fly field (e.g., mowing vegetation and fine grading) is in direct conflict with the City's stewardship of vernal pool habitat and mandate to protect two endangered species, San Diego fairy shrimp and Riverside fairy shrimp, and rare vernal pool plants. The City should stop maintaining the fly field and control high priority invasive plant species in that area, per the guidelines in this report, until the area can be assessed as part of future habitat restoration projects on the Mesa.

1.1.4 Existing Habitat Restoration Projects

Habitat restoration efforts completed to date include the following (Figure 1-3):

1. **Purple Sage Scrub Creation**: 1.17 acres; the first native revegetation effort dates to the 1990s, when portions of the north facing slope were hydroseeded with a mix of California buckwheat (*Eriogonum fasciculatum*) and purple sage (*Salvia leucophylla*) (City of Costa Mesa 2008). While purple sage is native to California, the historic distribution of purple sage likely did not include coastal Orange County, although it has been introduced through native revegetation efforts.
2. **Headlands Dana Point Project Mitigation Area**: 11.14 acres; implemented between 2006 to 2011; Conservation Easement recorded to benefit OCFCD.
3. **Cut Slope Coastal Sage Scrub (CSS) Restoration**: 0.39 acres; installed in 2006 on the cut slopes north and south of the pedestrian bridge that spans Placentia Avenue.
4. **Wetlands and Riparian Habitat—Phase 1**: 20.06 acres; implemented between 2009 to 2014; Conservation Easement recorded to benefit OCFCD.
5. **CSS Revegetation**: 0.05 acres; CSS revegetation area adjacent to the narrow-gauge railroad tracks, installed circa 2010s.
6. **Staircase CSS Restoration**: 0.26 acres; installed in 2009 as part of construction of the staircase linking the Mesa in Fairview Park to Talbert Nature Preserve.
7. **Vernal Pool 1 Restoration**: 2.45 acres; restoration of the estimated historic extent of Vernal Pool 1 by removal of the improper fill material (placed circa 1987 to 1988), protection of the natural soils, and revegetation between 1996 to 2009.
8. **Vernal Pool 4 Restoration**: 0.36 acres; enhancement of Vernal Pool 4 (Features 4a, 4b and 4c) by weed management and revegetation between 2002 to 2009.



Figure 1-3 Location of Existing Habitat Restoration Projects.

Habitat restoration efforts that are on-going, as of this year, include the following (Figure 1-3):

1. **Community-led CSS Restoration**: 3.03 acres; community-led restoration of the "Canyon" area referred to as the Vandersloot native planting area, started in 1994, and weed management and re-planting of this area continues through the present.
2. **Wetlands and Riparian Habitat—Phase 2**: 15.26 acres (14.44 acres excluding interior trail improvements); implementation began in 2012 and is ongoing. The restoration plan included 9 acres of CSS, 6 acres of wetland, and 5 acres of grassland, and was paid for by several funding sources, the largest of which was the OCTA M2 Environmental Mitigation Fund, but the project is deficient 9.5 acres of CSS and grassland habitat. The City intends to restore 9.5 acres elsewhere in Fairview Park to meet its obligation to OCTA.
3. **Vernal Pool Restoration Project**: 4.4 acres in vernal pool features 5, 6, and 7, plus a CSS buffer along the trail; implementation began in 2022 and is ongoing; required as mitigation for the City's earlier unpermitted construction of a gravel parking lot in these vernal pools.

1.2 HABITAT RESTORATION AND ENHANCEMENT GOALS

The City of Costa Mesa is a steward of Fairview Park. Restoration and enhancement of the park's diverse natural communities, and protection of the area's native wildlife populations, are the community's top priorities for this public resource. The habitat restoration and enhancement goals for Fairview Park are:

1. Conserve natural vegetation communities and native wildlife populations.
2. Protect archaeological and culturally significant materials (e.g., indigenous village use area, including two nationally recognized cultural resource historic sites).
3. Restore ecologically appropriate and sustainable native habitat to benefit special-status plant and wildlife species.
4. Provide low-impact recreational opportunities that promote human wellness and connecting with nature.

1.3 LONG-TERM INVASIVE PLANT MANAGEMENT PLAN

To protect the sensitive vegetation communities, rare plant populations, and important wildlife habitats in Fairview Park, it is crucial to implement a sustained control program for high-priority invasive plants. These invasive species have significant negative impacts on the park's biological resources and should be a primary focus of ongoing maintenance efforts.

While numerous nonnative plants are present in Fairview Park, prioritizing the control of highly invasive species is essential for effective biological resource protection. Some invasive plants may require only one treatment per year while others may necessitate

repeated treatments, depending on factors such as plant traits, phenology, weather, and suitable treatment methods. Any constraints, such as avoiding herbicide use in vernal pool inundation areas, must also be considered.

Consistency and appropriate timing of invasive plant treatments are key factors in successful control and the protection of native habitats. The primary goals are 1) to prevent excessive biomass production from invasive plants that could displace native species, and 2) to control invasive plant populations before they produce viable seeds, ensuring their long-term management. By prioritizing the control of high-priority invasive plants, the City can work toward maintaining and restoring the ecological health of Fairview Park. A Long-Term Invasive Plant Management Plan is presented in Attachment B.

2 EXISTING CONDITIONS

This section provides a summary of conditions that have influenced the current composition and distribution of vegetation communities at Fairview Park. For the current Master Plan Update, Hamilton Biological (2023) reported on the status of special-status plant and wildlife species known or potentially occurring in the park, and MIG evaluated the hydrology of the park's vernal pools and other waters of the state (i.e., water features under the jurisdiction of state and regional water quality control boards and CDFW).

2.1 INDIGENOUS LANDSCAPE, COLONIZATION, AGRICULTURAL HISTORY, AND URBAN DEVELOPMENT

INDIGENOUS LANDSCAPE

For thousands of years, indigenous peoples inhabited coastal southern California, establishing a complex network of groups and villages. Their settlements were strategically situated near freshwater sources and ecosystems that provided essential resources, such as food and fuel (Anderson 2007). By the time Spanish explorers arrived, the region was already home to a well-established and thriving indigenous society. This historical context underscores the importance of considering long-standing human relationships with the natural environment when planning management and conservation of Fairview Park.

Prior to the Spanish Mission Colonization Period, which began in 1769 (Mooney and Zavaleta 2016), the Greater Los Angeles Basin, which extends to the San Joaquin Hills east of Fairview Park, exhibited a rich tapestry of diverse ecosystem types. These included coastal dunes and estuaries, fast-flowing and highly seasonal rivers, expansive flower fields, and southern California walnut (*Juglans californica*) and oak (*Quercus* spp.) woodlands (Ethington et al. 2020, Longcore and Ethington 2023). The varied landscape was shaped by the array of abiotic and biotic conditions characteristic of coastal southern California (Stein et al. 2007). Referring to the pre-colonial setting as the "Indigenous Landscape," Longcore and Ethington (2023) emphasized the role of humans in manipulating the region's natural communities during the long period that predated large-scale introduction of nonnative plants and animals from Europe and elsewhere. This historical context serves as a reminder of the region's ecological diversity and the importance of human-environment interactions in shaping the landscape of Fairview Park and its surroundings.

GENGA

Fairview Park has two Nationally Registered Cultural Resource Historic Sites (CA-ORA-58 and CA-ORA-506), which are thought to be part of an indigenous village on the coastal mesa called Genga (also referred to as Kengaa, Gengaa, or Gengara) (Koerper and Hedges 1996). Genga was arguably a major cultural and cultural center, at a trade cross-roads, based on artifacts found at the site, including items that were traded from the Colorado River to Catalina Island (Koerper and Desautels 2002). The Genga village was

part of an extensive indigenous trade network across southern California and the Southwest (e.g., Longcore and Ethington 2023). Records of the Mission San Juan Capistrano suggest that Genga may have been occupied as late as 1829 or 1830 (Bowers Museum of Santa Ana 2002).

The village of Genga, including the Banning Ranch area, is an important historic and cultural site for ancestors of the Juaneño (Acjachemen) and the Gabrieliño (Tongva and/or Kizh). At the time of Spanish exploration, the people of the Greater Los Angeles Basin (Tovaangar) were what the Spanish called the Gabrieliño, an ocean-going people that built canoes called Ti'at. Tovaangar supported about 5,000 people in nearly 100 independent and interconnected villages. Historically, Aliso Creek, located south of Genga, served as a significant territorial boundary between the two indigenous tribes: the Tongva/Kizh to the north and the Acjachemen to the south (Cameron 1999). This natural landmark played a crucial role in defining the territories of these indigenous peoples, marking the extent of their respective lands and cultural influences. It is important to note, however, that boundaries between tribes were not fixed and could fluctuate over time due to such factors as migration, cultural interactions, and environmental changes. Furthermore, during the relocation and assimilation years of colonization, many found refuge with other tribes.

Tribes that still reside in Los Angeles and Orange Counties continue to maintain their history and culture. These tribes include five Gabrieleño (Tongva or Kizh) and three Juaneño-Acjachemen groups that are recognized by the state through the Native American Heritage Commission as California Native American tribes: Gabrieleño Band of Mission Indians – Kizh Nation; Gabrieliño Tongva Indians of California Tribal Council; Gabrieleño-Tongva San Gabriel Band of Mission Indians; Gabrieliño -Tongva Tribe; Gabrieliño /Tongva Nation; Juaneño Band of Mission Indians, Acjachemen Nation – Belardes; Juaneño Band of Mission Indians, Acjachemen Nation – Lucero; Juaneño Band of Mission Indians, Acjachemen Nation – Acuna. These tribes are living communities that actively participate in the preservation of their culture and lifeways. The tribes are the authority on their cultural history.

COLONIZATION OF ALTA CALIFORNIA

The arrival of the Spanish Mission System brought about profound changes to the lives of the indigenous peoples in the region. The imposition of colonial rule, coupled with the introduction of novel diseases by early Spanish explorers, led to the near-complete destruction of indigenous political and familial systems. As a result, many indigenous communities were forcibly removed from their ancestral lands, disrupting their traditional land management practices, and severing their deep connection to the environment. Indoctrination into Catholicism further eroded indigenous cultural practices and belief systems.

Following Mexico's independence from Spain in 1822, Alta California came under the control of the Mexican government. During the Mexican era (1822 to 1846), Mexican authorities secularized the Spanish mission system, effectively dismantling it and redistributing the lands through land grants to Mexican citizens. These expansive land

grants established ranch boundaries that would become the foundation for California's land survey system.

The treatment of indigenous people during the 19th Century was marked by injustice and oppression. In 1850, the California legislature passed the Act for the Government and Protection of Indians, which, despite its seemingly benevolent name, subjected indigenous people to forced labor if they were deemed to be loitering or orphaned. The law also strictly regulated their employment and created a distinct category of "Indian crimes" with specific punishments, further marginalizing and exploiting indigenous peoples. Madley (2016) argues that the United States government, along with state and local authorities, played an active role in the genocide of indigenous people, by either directly participating in, or turning a blind eye to, their forcible removal from their ancestral lands, and by subjecting them to violence and exploitation.

In the context of Fairview Park, it is essential to acknowledge this history of dispossession and injustice, as it helps to shed light on the complex and often painful interactions between different groups that have shaped the landscape and the lives of those who inhabit it. Recognizing this past can contribute to more inclusive and equitable approaches to managing and conserving the park's natural and cultural resources.

RANCHO SANTIAGO DE SANTA ANA

In 1810, José Joaquín de Arrillaga, the Spanish Governor of Alta California, granted a 63,000-acre tract named "Santiago de Santa Ana" to José Antonio Yorba and his nephew, Juan Pablo Peralta (US Department of the Interior 1866). The land was primarily used for cattle production, as beef was in high demand during the California Gold Rush (1848 to 1855) and the American Civil War (1861 to 1865). However, the combination of high stocking rates of cattle and a severe drought between 1863 and 1864 led to widespread cattle deaths on California rangeland. As a result, many rancheros, including the heirs of Yorba and Peralta, faced significant debt.

To settle their financial obligations, Rancho Santiago de Santa Ana was surveyed, subdivided, and sold. This marked a significant turning point in the history of the land, as it transitioned from a large, unified ranch to a patchwork of smaller holdings. The sale of Rancho Santiago de Santa Ana ultimately paved the way for the development and urbanization of the area, which would later become parts of modern-day Orange County, including the City of Costa Mesa.

The 1868 Survey of Rancho Santiago de Santa Ana records the location of vegetated areas important to cattle production on the ranch, including “clover” (California burclover, *Medicago polymorpha*; introduced during the Spanish/Mission Period, 1769 to 1824), “alfileria” (redstem filaree, *Erodium cicutarium*; introduced prior to 1769, Robbins 1940) and mustard (e.g., black mustard, *Brassica nigra*) (Figure 2-1). All three are introduced Eurasian plants. California burclover and redstem filaree are common California rangeland winter annual broadleaf plants that are tolerant of slightly alkaline conditions and heavy soils (i.e., soils with high clay content) and were preferred cattle

forage (Reynolds 1868). While cattle will occasionally browse on mustard leaves, they are not preferred forage or a significant part of their diet, and so a feature on the survey map labeled the "Southern Line of Mustard" is notable. The line of mustard runs roughly northwest to southeast, north of present-day Fairview Park. It has been reported that north of the mustard line it was difficult for cattle to find edible forage amongst the mustard patches, but south of the line mustard was not as dense (Martelle 2003).

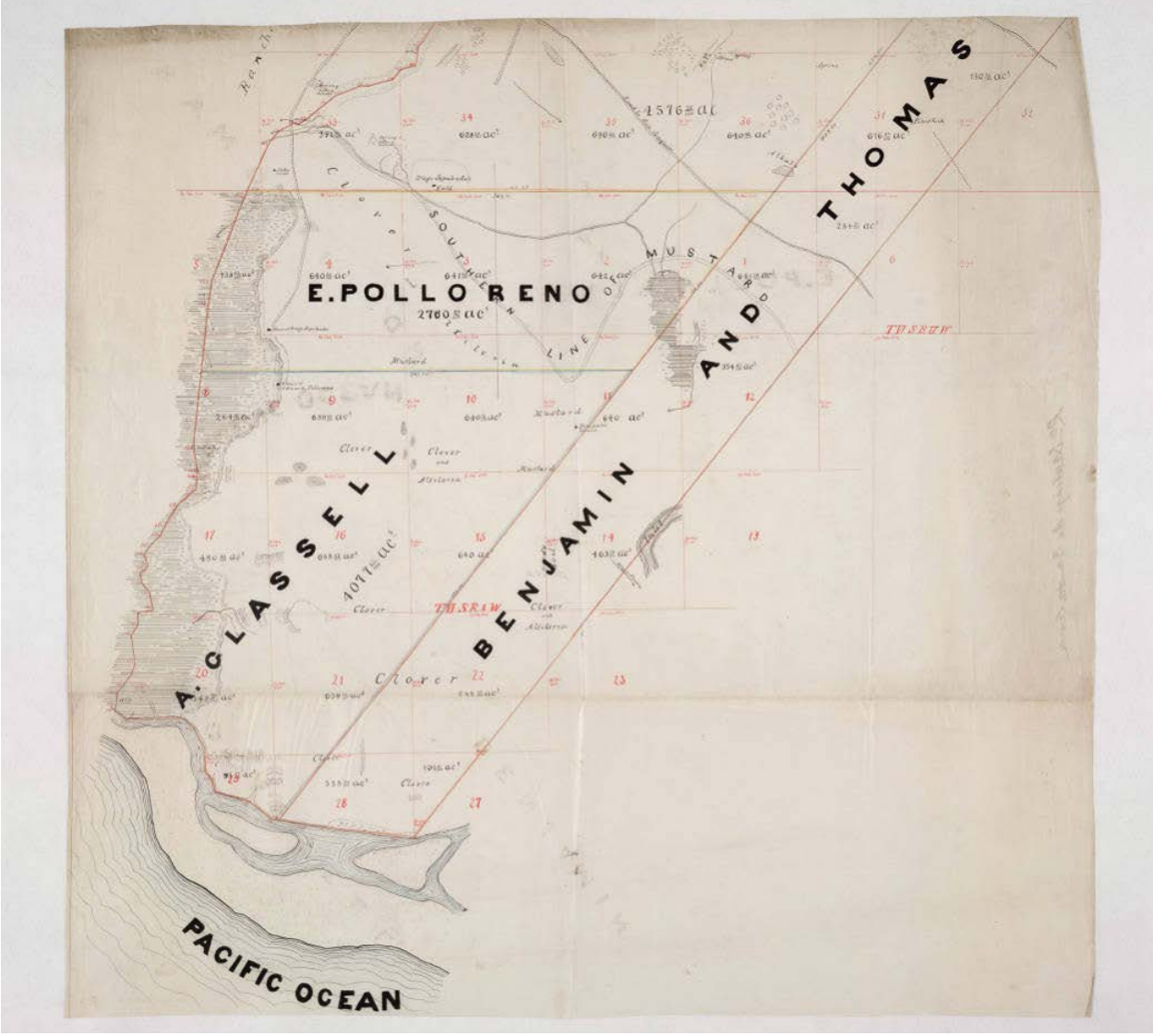


Figure 2-1 *Reynolds (1868) Survey of a Portion of Rancho Santiago de Santa Ana.*

The survey includes the locations of "clover" (California burclover, *Medicago polymorpha*), "alfileria" (redstem filaree, *Erodium cicutarium*), and mustard dominance in the area surrounding present day Fairview Park.

On soil survey maps produced in 1978 by the USDA, the area north of the 1868 mustard line was classified as Omni Clay, a poorly drained, calcareous, high shrink-swell-clay. Invasive Eurasian mustards (e.g., *Brassica nigra*, *Hirschfeldia incana*) are common in these soil conditions, especially those that retain soil moisture for longer periods, such as high-clay content soils, which are known to extend the effects of root allelochemicals. Mustards exude root allelochemicals that inhibit germination and growth of competing plants, such as nonnative annual grasses (e.g., *Avena* spp. and *Hordeum* spp.) (e.g., Turk and Al Tawaha 2003, Al Tawaha et al. 2003), reduce soil microbial abundances by more than 50 percent, and alter soil fungal assemblages that are beneficial to native plants (Wakefield et al. 2023). However, the mustard allelochemicals do not persist long in the soil, especially in drier upland soils, making the timing and duration of soil moisture a significant factor in how much impact mustard allelopathy has on competing plants (i.e., interspecific competition) (Marfori 2019).

South of the mustard line are two common soils mapped by the USDA in Orange County (1978): Myford soils, which are loamy sand, some with a clay hardpan layer, such as on the Mesa at Fairview Park; and Cropley Clay, which is moderately well-drained with high clay content. Comparing the 1978 soil maps to the 1868 survey maps, it appears that these soils supported high cover of both California burclover and redstem filaree, with occasional patches of mustard.

The Myford soils on the Mesa have a strongly developed clay hardpan subsoil, rendering them unsuitable for agricultural row crops due in part to poor drainage (USDA 1978). This may explain why only the northern portion of the Mesa in present-day Fairview Park was put into row crops, including tilling or plowing of the soil, as seen in historic aerials from 1927 to 1955 (see Figure 2-2 to Figure 2-4).

In the late 1800s, the land that would become Fairview Park was part of a larger tract subdivided by Banning and was eventually owned by the state. In the 1970s, the state sold the land to the County of Orange. However, due to financial difficulties in the 1980s, the County sold the land to the City of Costa Mesa, which dedicated it as Fairview Park on April 21, 1990.

LEGACY OF CULTIVATION AND THE INTRODUCTION OF EURASIAN PLANTS

European colonization of the region, beginning in the 1700s, introduced grazing by livestock primarily sheep and cattle. To enhance forage for these animals, Eurasian grasses and forbs were intentionally introduced to the rangeland, which was previously an indigenous village. Many other nonnative grasses and forbs were accidentally introduced and have since become common in southern California. These Eurasian plants, originating from the Fertile Crescent region (present-day Iraq, Syria, Israel, Lebanon, Egypt, and Jordan), evolved alongside agricultural practices in a Mediterranean-type climate like California's cismontane climate, characterized by cool, wet winters and warm, dry summers (Feldman et al. 2019).

While the introduced Eurasian plants were well-adapted to the southern California climate and European agricultural practices, the native California flora was not suited to

the intense livestock grazing, land clearing, plowing, and tilling associated with these new methods. Indigenous peoples had previously managed the land through different practices, including cultural burning, foraging, hunting, and fishing. These practices helped shape the pre-European "Indigenous Landscape," but had a smaller detrimental impact on the native ecosystems than did European agriculture.

The lasting effects of this change in land management include drastically altered soil profiles, the introduction of Eurasian grasses and forbs that outcompete native vegetation in disturbed soils, and the invasion of intact native plant communities by highly invasive Eurasian weeds (D'Antonio et al. 2007). As a result, it is crucial to consider the ecological impacts of past and present land management practices when planning for the conservation and restoration of Fairview Park's natural habitats.

2.2 ARCHAEOLOGICAL SITE, IMPROPER FILL PLACEMENT, AND VERNAL POOL IMPACTS

As discussed in Section 2.1, Fairview Park's two nationally registered archaeological sites (CA-ORA-58; CA-ORA-506) comprise part of a larger village site referred to as Genga. Indigenous people occupied these areas from the 1800s back to at least 1500 B.C. In 1926, tilling of the soil for farming (e.g., see Figure 2-2) exposed the first documented archaeological remains from this important site. Formal archaeological excavations began in the 1930s (Dudek and Associates 2003). Keith Dixon studied the site from 1959 to 1966. The boundaries of the archaeological site were further defined by The Keith Companies in 1993 (City of Costa Mesa 2008).

With the intent of capping the archaeological site on the Mesa (CA-ORA-58), prior to construction of new park amenities, fill material was placed on the Mesa in 1987 and 1988 (see Figure 2-14). The fill material did not, however, meet standards for capping an archaeological site, and included chemically active construction and paving debris that can degrade archaeological artifacts instead of preserving them (City of Costa Mesa 2008).

Not only was the fill material improper for the protection of indigenous cultural resources, but it also created three new threats to biological resources on the Mesa. First, the fill material covers and takes away habitat for native flower fields and fairy shrimp. Second, the fill material impairs the hydrologic function of the vernal pool watershed by reducing the amount of precipitation that would feed the vernal pool complex, which is especially critical in below-average rainfall years when the pools do not typically form. According to the long-term weather record for the City of Los Angeles (1877 to 2023) provided by the National Weather Service, 60% of the water years were below the long-term average. And there is high confidence in climate change projections for California that even if precipitation remains stable or increases, drought severity and the number of dry years will increase, even as more extreme precipitation events may occur (AghaKouchak et al. 2018). Third, the fill material creates an unnatural state of low soil microorganism and plant diversity, which sustains large infestations of invasive plants (e.g., black mustard, poison hemlock) that produce large quantities of

seed, which is then transported into other locations in the park by wildlife and humans along trails and roads (e.g., Auffret and Cousins 2019, Kowarik and von der Lippe 2011), threatening the diversity and function of native habitat (e.g., Bossard et al. 2000, van Hengstum et al. 2014, Lazzasro et al. 2000).

In 1993, The Keith Companies dug east/west-trending strips in the fill to allow study of the archaeological site limits, resulting in the topography of the fill area today (see Figure 2-16) (City of Costa Mesa 2008). Between 1996 and 2009, improper fill material that covered a significant portion of Vernal Pool 1 was removed as part of two restoration efforts. It is not well documented whether this fill material was disposed of offsite or moved to another location on the Mesa. Today, significant portions of the historic vernal pool watershed remain covered by the improper fill material, degrading significant cultural and biological resources in Fairview Park (Figure 2-21).

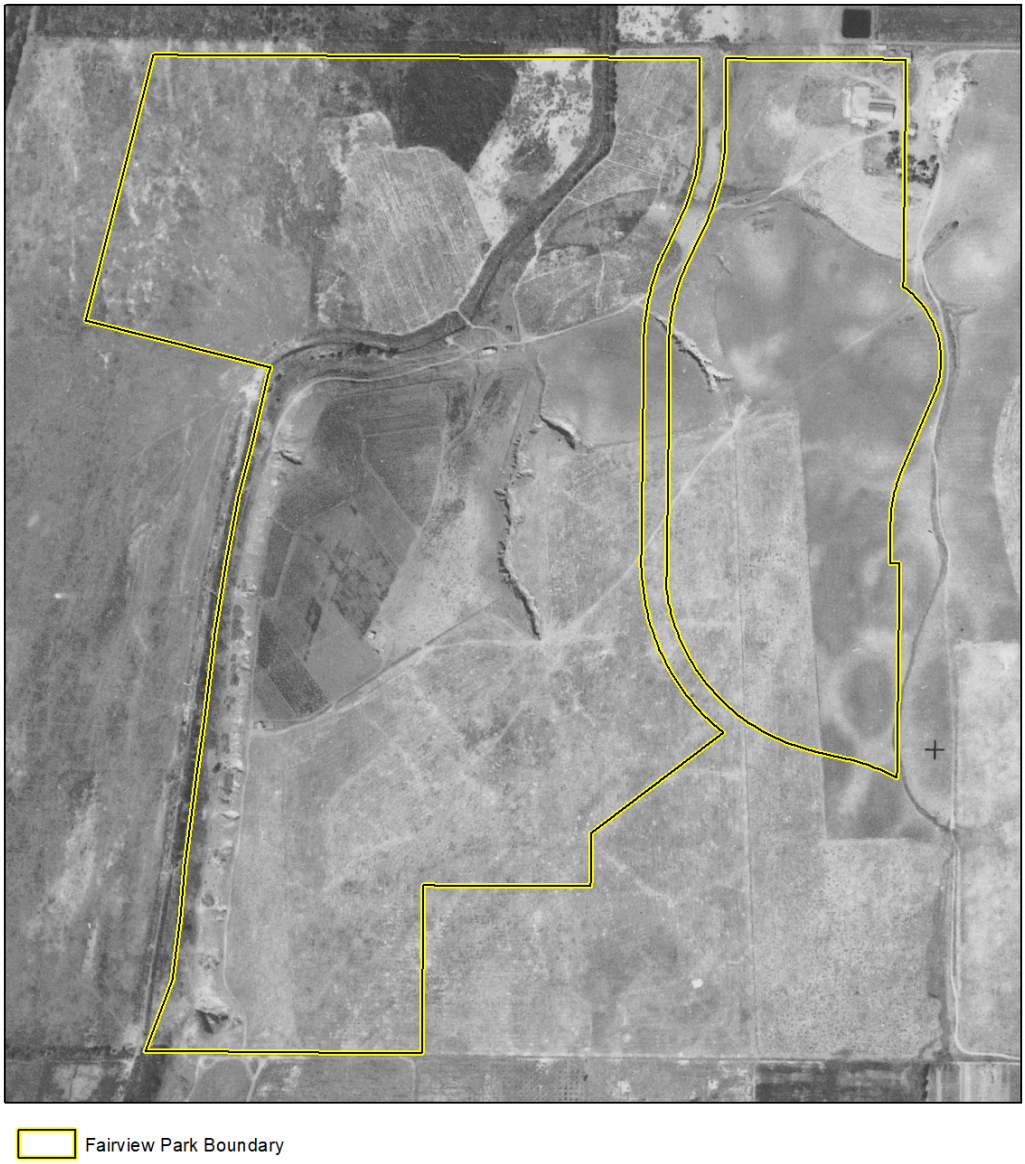


Figure 2-2 *November 1927 Aerial Image Showing Row Crops, Hay Fields, and the Santa Ana River Floodplain.*

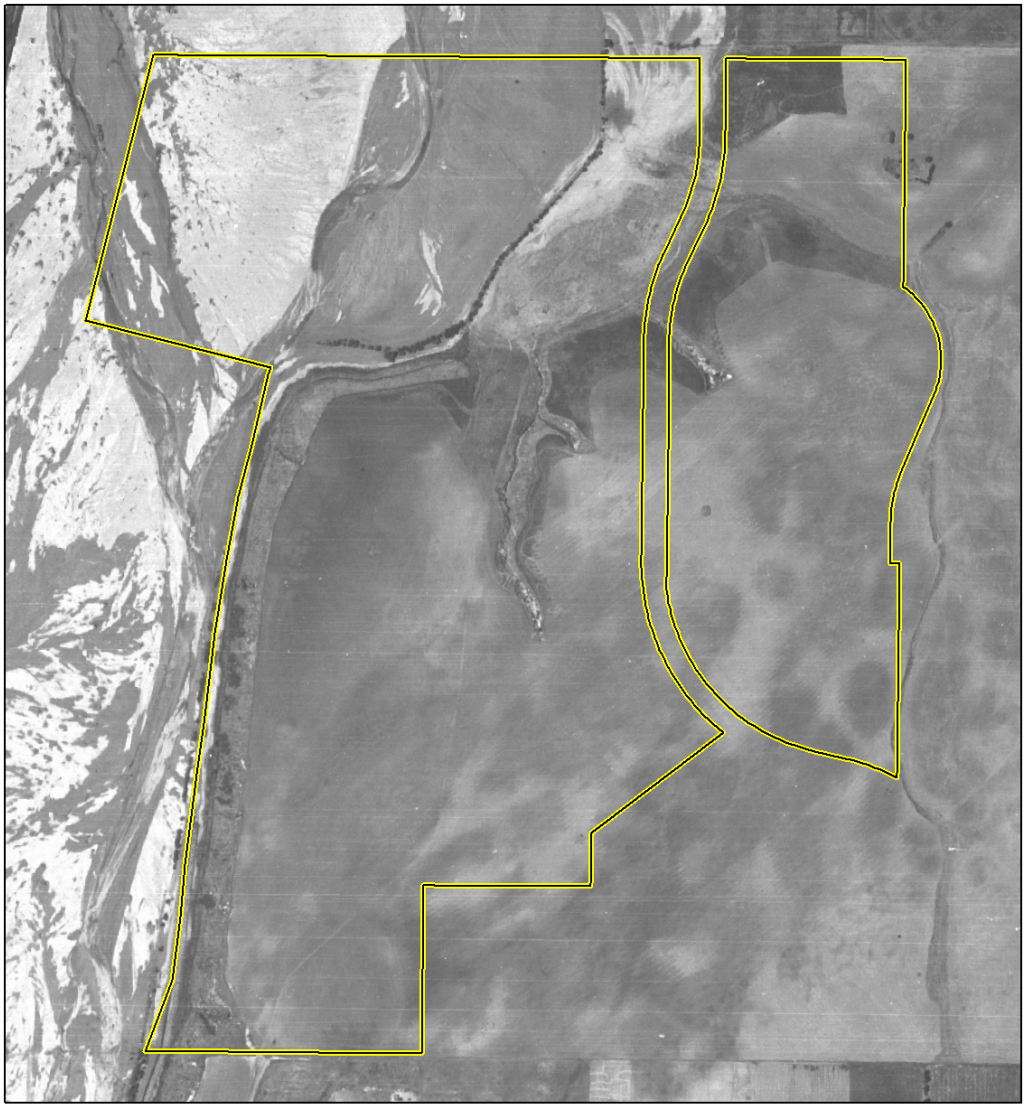


Figure 2-3 *May 1938 Aerial Image Showing Santa Ana River Floodplain After 1938 Floods, Row Crops and Hay Fields.*

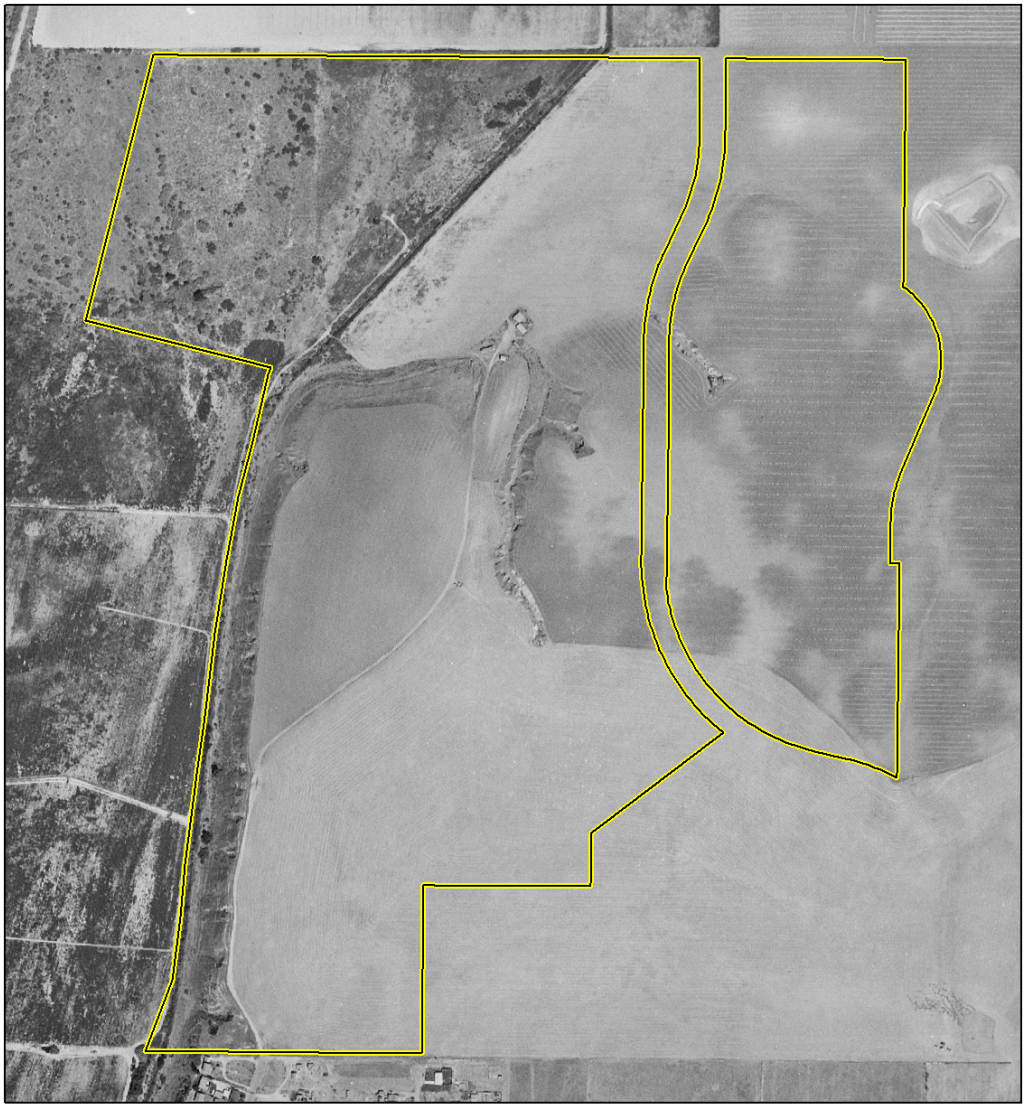


Figure 2-4 *September 1955 Aerial Image Showing Row Crops, Hay Fields, and Development of the Floodplain.*



Figure 2-5 *May 1960 Aerial Image Showing Crop Fields, Rangeland, Fairview Channel, and Development of the Floodplain.*

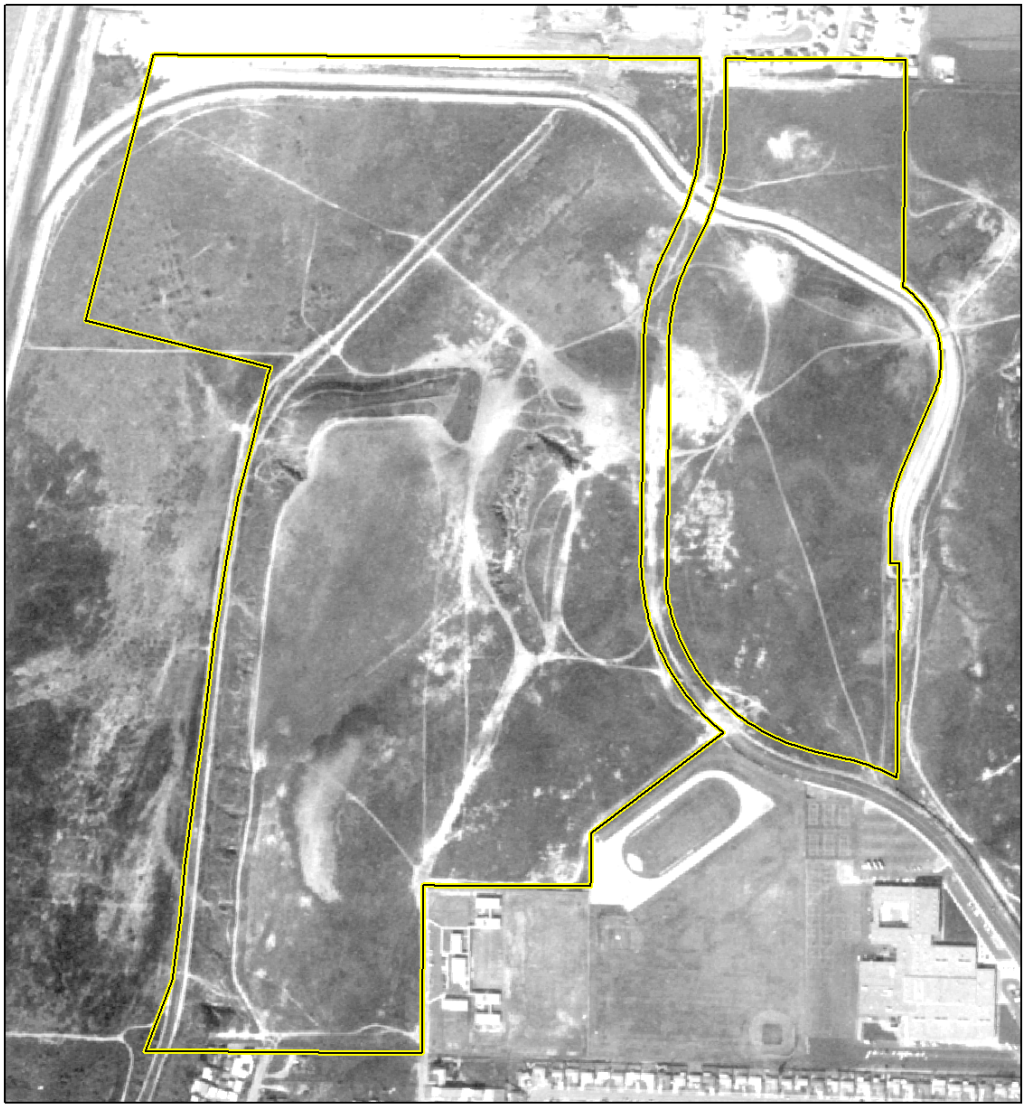


Figure 2-6 *January 1966 Aerial Image Showing Ponded Water in Vernal Pool 1, Extensive Trails/Roads, and Urban Development of the Surrounding Area.*

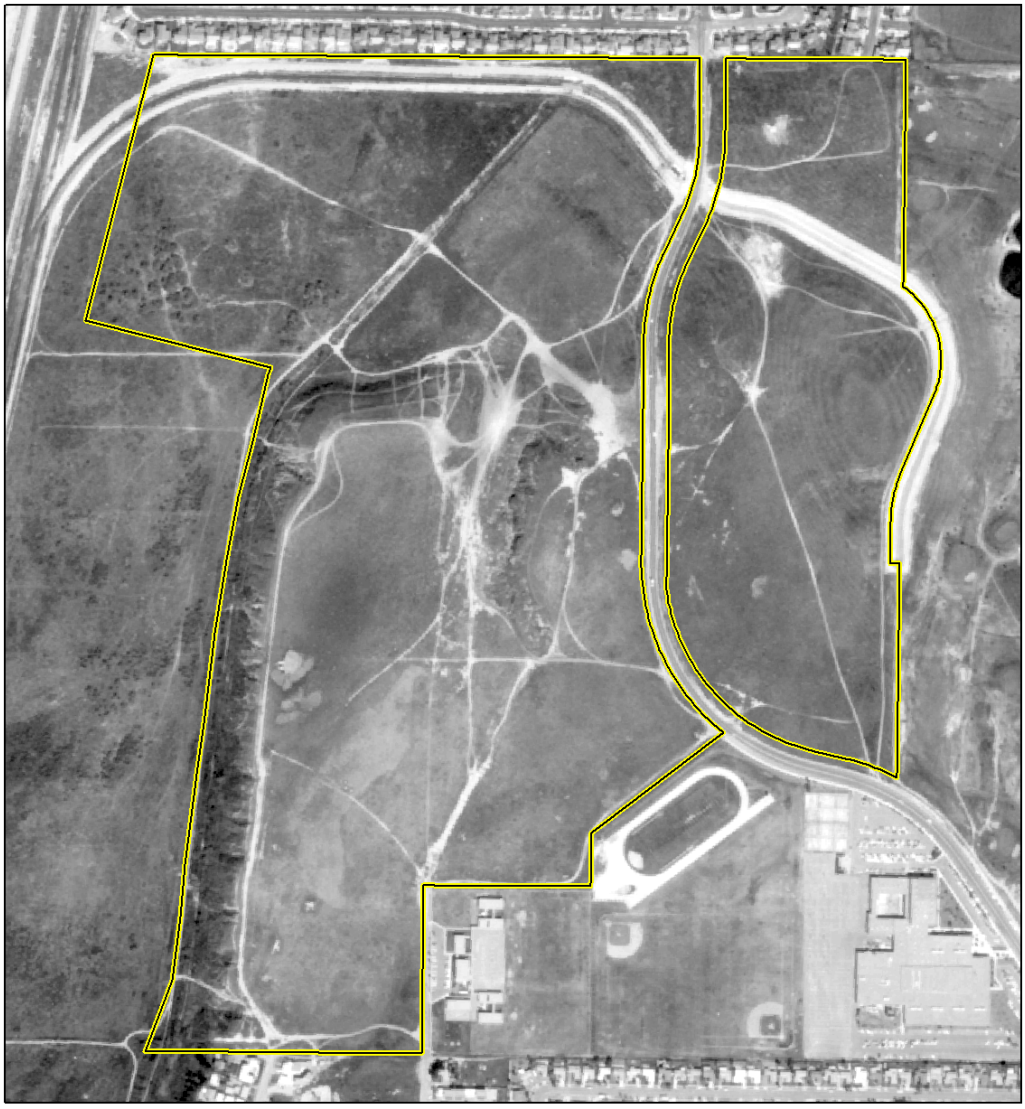


Figure 2-7 *1970 Aerial Image Showing Dry Season Extent of the Vernal Pool Bottom (Feature 1), Extensive Trails/Roads, Placentia Avenue, and Urban Development of the Surrounding Area.*

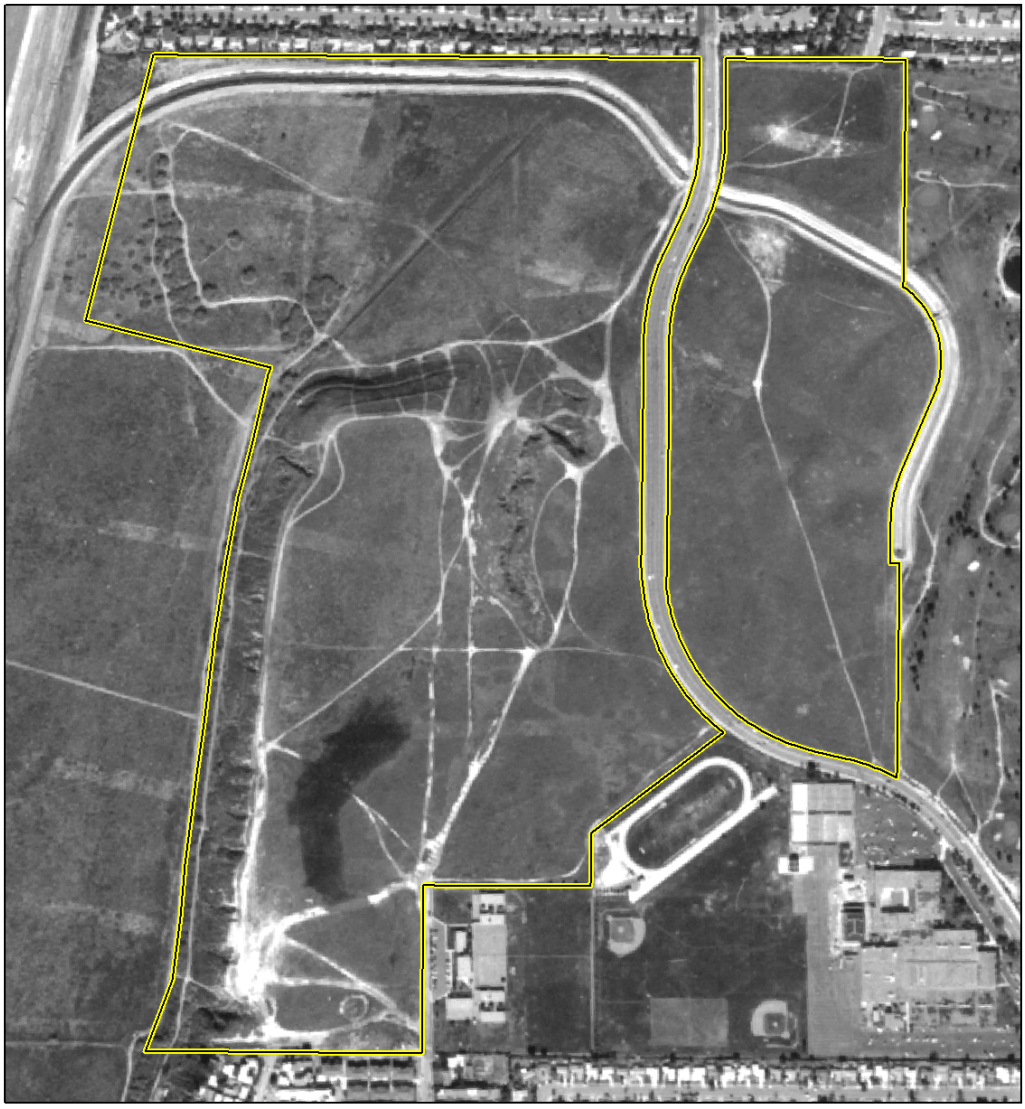


Figure 2-8 *January 1978 Aerial Image Showing Winter Extent of Vernal Pool 1 and Hydrological Connection Across the Trail to Vernal Pool 4, and Smaller Vernal Pool Features in the Area that is now Lawn and Parking Lot.*



Figure 2-9 *August 1980 Color Infrared Aerial Image Showing Extent of Vernal Pool 1, Extensive Trails/Roads, and Urban Development of the Surrounding Area.*



Figure 2-10 *March 1982 Aerial Image Showing Extent of Vernal Pool 1, Extensive Trails/Roads, and Urban Development of the Surrounding Area.*



Figure 2-11 April 1983 Aerial Image Showing Vernal Pool Features East and West of Placentia Avenue on the Mesa.

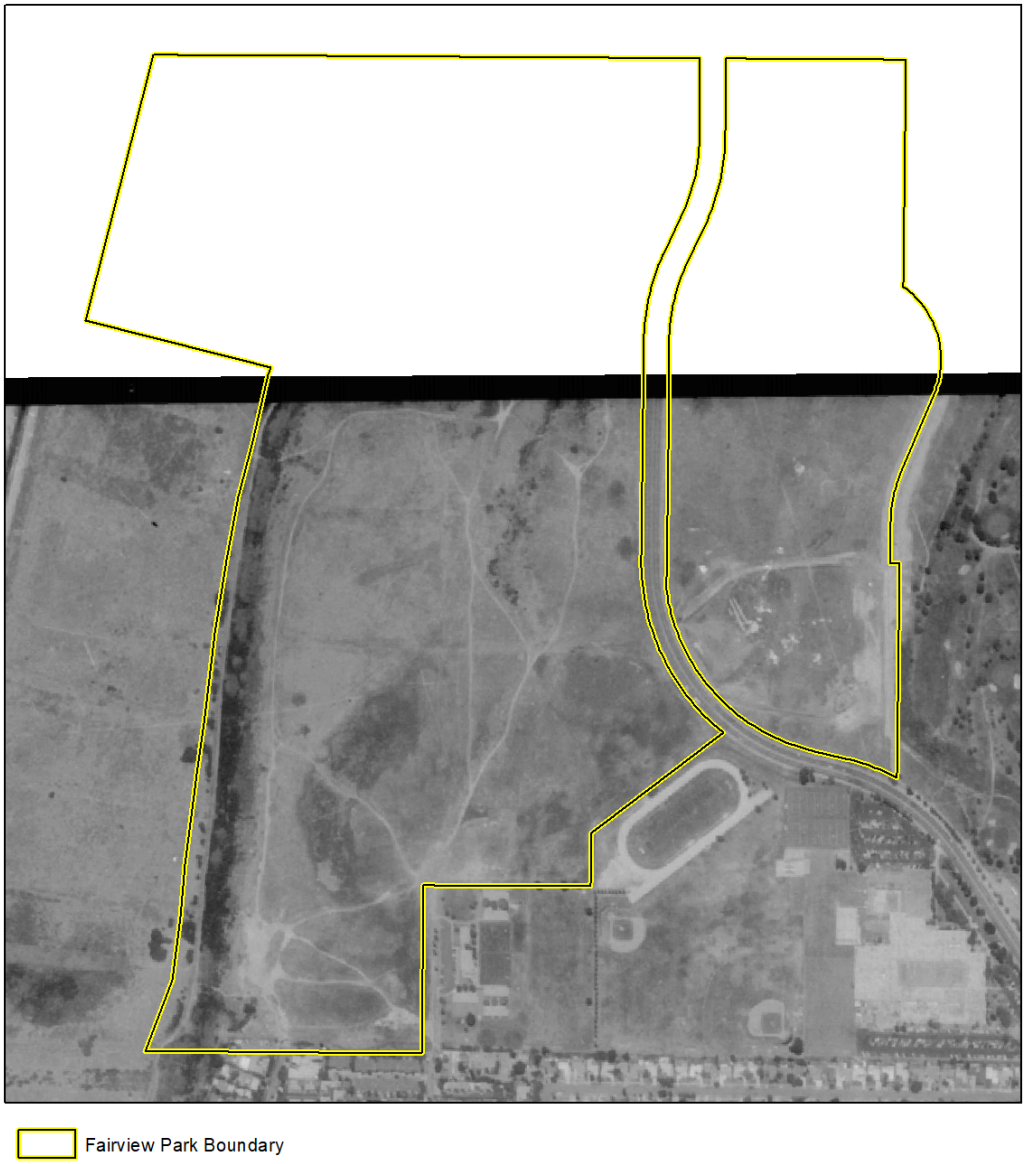


Figure 2-12 *May 1986 Aerial Image Showing Vernal Pool Features East and West of Placentia Avenue on the Mesa.*



Figure 2-13 March 1987 Color Infrared Aerial Image.

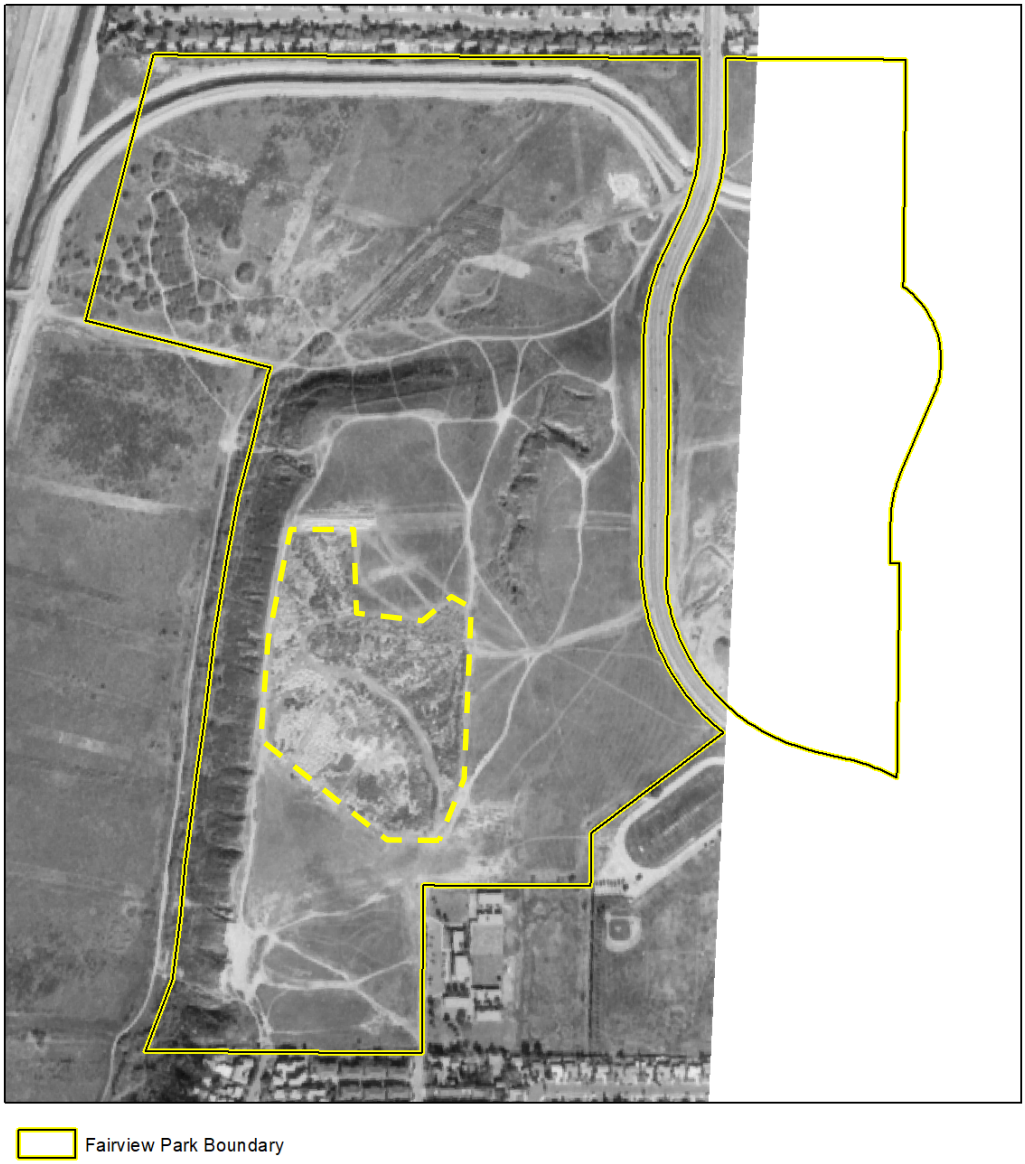


Figure 2-14 *January 1989 Aerial Image Showing Placement of Improper Fill Material (Dashed Yellow Line) on Mesa Partially Covering Archaeological Site (ORA-CA-58) and Vernal Pool 1.*



Figure 2-15 *September 1990 Aerial Image Showing Development of Parking Lot and Manicured Lawn Area on Historic Mesa, and Construction of Narrow-Gauge Railroad East of Placentia Ave.*



Figure 2-16 *September 2001 Aerial Image Showing East-West Rows in Fill Material Created in 1993, Partial Restoration of Vernal Pool 1, and Development of the Narrow-Gauge Railroad East of Placentia Ave.*



Figure 2-17 Summer 2005 Aerial Image Showing Restoration of Vernal Pool 1.



Figure 2-18 *Summer 2009 Aerial Image Showing Headlands Project Mitigation Area (Northwest Corner; Started in 2006) and Grading for Phase 1 of the Wetlands and Riparian Habitat Creation Project.*



Figure 2-19 *Summer 2012 Aerial Image Showing the Wetlands and Riparian Habitat Creation Project: Phase 1 in progress; Phase 2 Initial Grading and Construction.*



Figure 2-20 Summer 2019 Aerial Image Showing Development of the Wetlands and Riparian Habitat Creation Project.



Figure 2-21 Location of Improper Fill Material in 2023 Compared to the Vernal Pool Watershed and Vernal Pools.

2.3 FILL PLACEMENT IN THE CANYON

The natural drainage feature referred to in this report as the "Canyon" is visible on the earliest available aerial image, from 1927 (Figure 2-2). During the construction of the Fairview Park Wetlands and Riparian Project, identified on Figure 1-3, the bottom of the canyon was filled with material excavated to create the wetland features, as seen in the series of aerial images, Figure 2-22 to Figure 2-24, and also Figure 2-17 to Figure 2-20. The material used to fill the bottom of the canyon has not been analyzed but is presumed to be natural alluvial soil material. The fill areas are primarily dominated by nonnative plants with some recruitment of native vegetation, including from the adjacent community-led CSS habitat restoration work. Habitat restoration targets for this area are identified in Section 4.

2.4 TOPOGRAPHY

Fairview Park is defined by four geomorphic features: the floodplain terrace, bluffs, mesa, and eroded slopes (Figure 2-25). Each of these features has been partially developed to either create wetland and riparian habitat, improve public access, or provide active recreational opportunities.

The floodplain terrace was formed as part of the historic active floodplain of the Santa Ana River (e.g., see Figure 2-3) and includes the portion of Fairview Park below the bluffs (~20-ft elevation above mean sea level), including the Headlands Dana Point Project Mitigation Area, the Wetlands and Riparian Habitat Project – Phases 1 and 2 (Figure 1-3). The County-owned Talbert Nature Preserve occupies the remainder of the floodplain terrace below the bluffs.

Prior to channelization, floodwaters would have spread freely throughout the Upper Santa Ana River Watershed, recharging the groundwater, and forming temporary inland lakes. The surface flows that reached the coast were confined at the coast by a shallow sand bar barrier complex in most years, instead of directly flowing out to the sea (Jacobs et al. 2011). These waters formed a large freshwater riparian area below Newport Mesa (including Fairview Park Mesa), which was labeled as the "Willow Swamp" on coastal T-Sheets from 1875. The Willow Swamp extended from coastal Huntington Beach to the Randall Preserve (Banning Ranch), as seen on the 1896 Santa Ana 1:62,500 Topographic Map (Figure 2-26). The Willow Swamp formed a sequence of riparian vegetation communities, including bulrush-cattail marshes, braided channels, salt flats (saline wet meadows), ephemeral pools, vernal wetlands, and lagoons (Jacobs et al. 2011).

The bluffs were carved by the Santa Ana River, prior to its confinement in a flood control channel following catastrophic 1938 floods, from an upper marine terrace referred to as the Mesa. This marine terrace stands at an elevation ranging from approximately 70 to 80 feet above mean sea level (msl) in Fairview Park. Its formation dates to the Pleistocene epoch, about 2.58 million to 11,700 years ago (California Geological Survey 2024). This significant geological period played a crucial role in shaping the contemporary landscape of the Greater Los Angeles Basin, including the notable features found in Fairview Park.

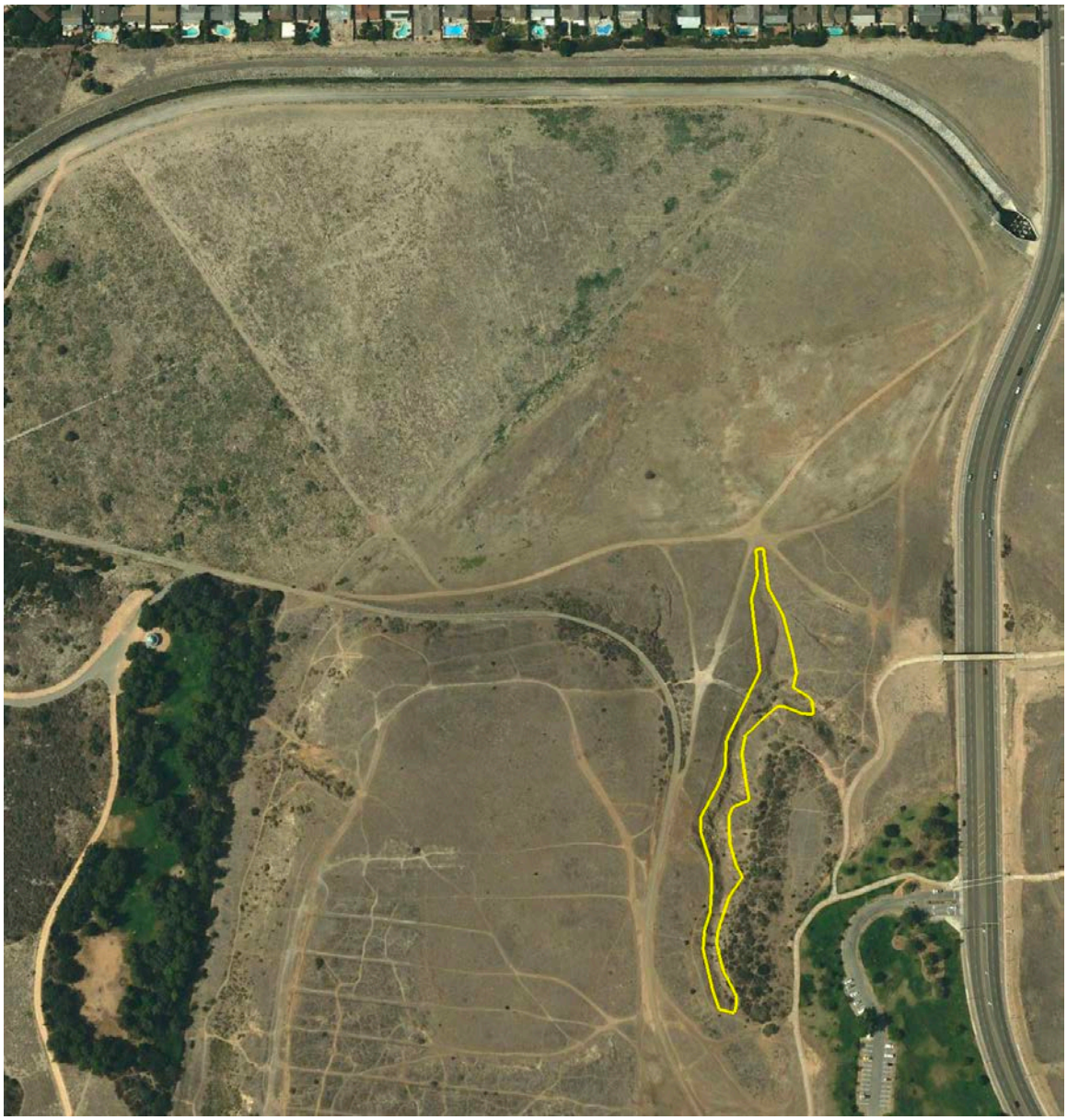


Figure 2-22 *Location of Natural Canyon Filled (Approximately 1.2 acres) in 2007 During Construction of the Fairview Park Wetlands and Riparian Habitat Project.*

Source: *Google Earth Pro October 2007 Aerial. Yellow Outline is the approximately 1.2-acre area filled during construction of the Fairview Park Wetlands and Riparian Habitat Project.*

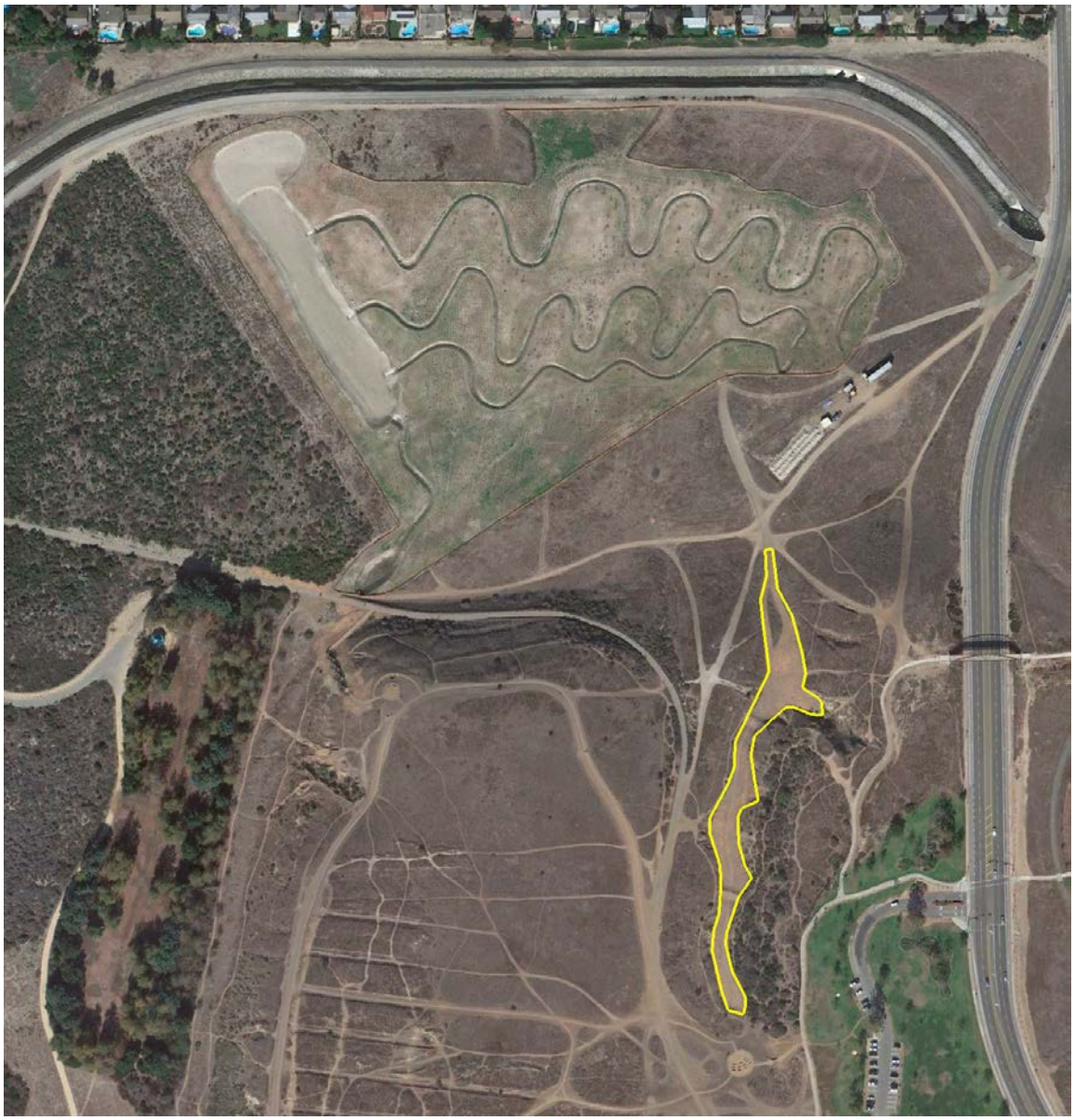


Figure 2-23 *Location of Natural Canyon Filled (Approximately 1.2 acres) in 2009 During Construction of the Fairview Park Wetlands and Riparian Habitat Project.*

Source: *Google Earth Pro November 2009 Aerial. Yellow Outline is the approximately 1.2-acre area filled during construction of the Fairview Park Wetlands and Riparian Habitat Project.*



Figure 2-24 *Location of Natural Canyon Filled (Approximately 1.2 acres) in 2013 During Construction of the Fairview Park Wetlands and Riparian Habitat Project.*

Source: *Google Earth Pro April 2013 Aerial. Yellow Outline is the approximately 1.2-acre area filled during construction of the Fairview Park Wetlands and Riparian Habitat Project.*

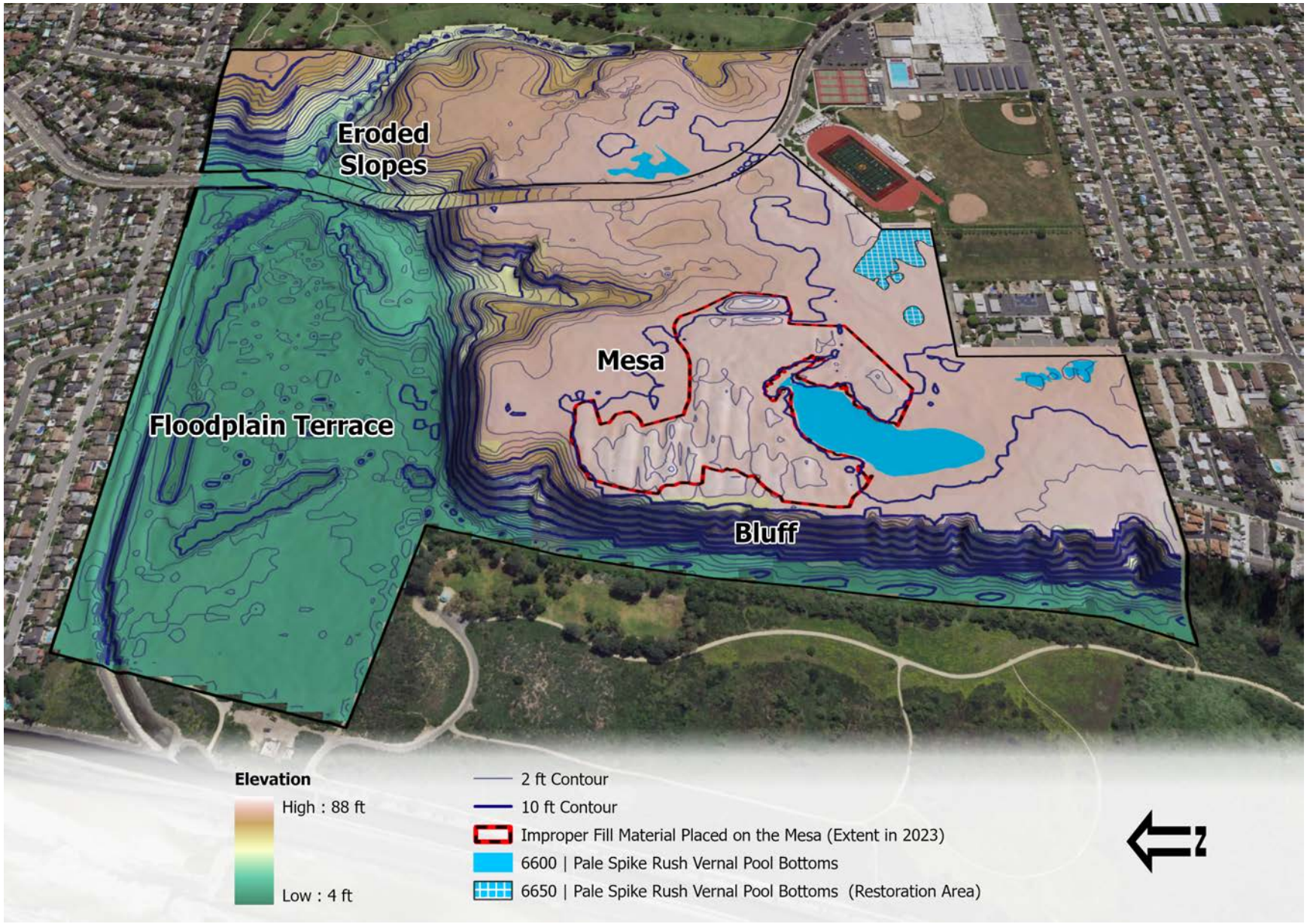


Figure 2-25 Geomorphic Features of Fairview Park.

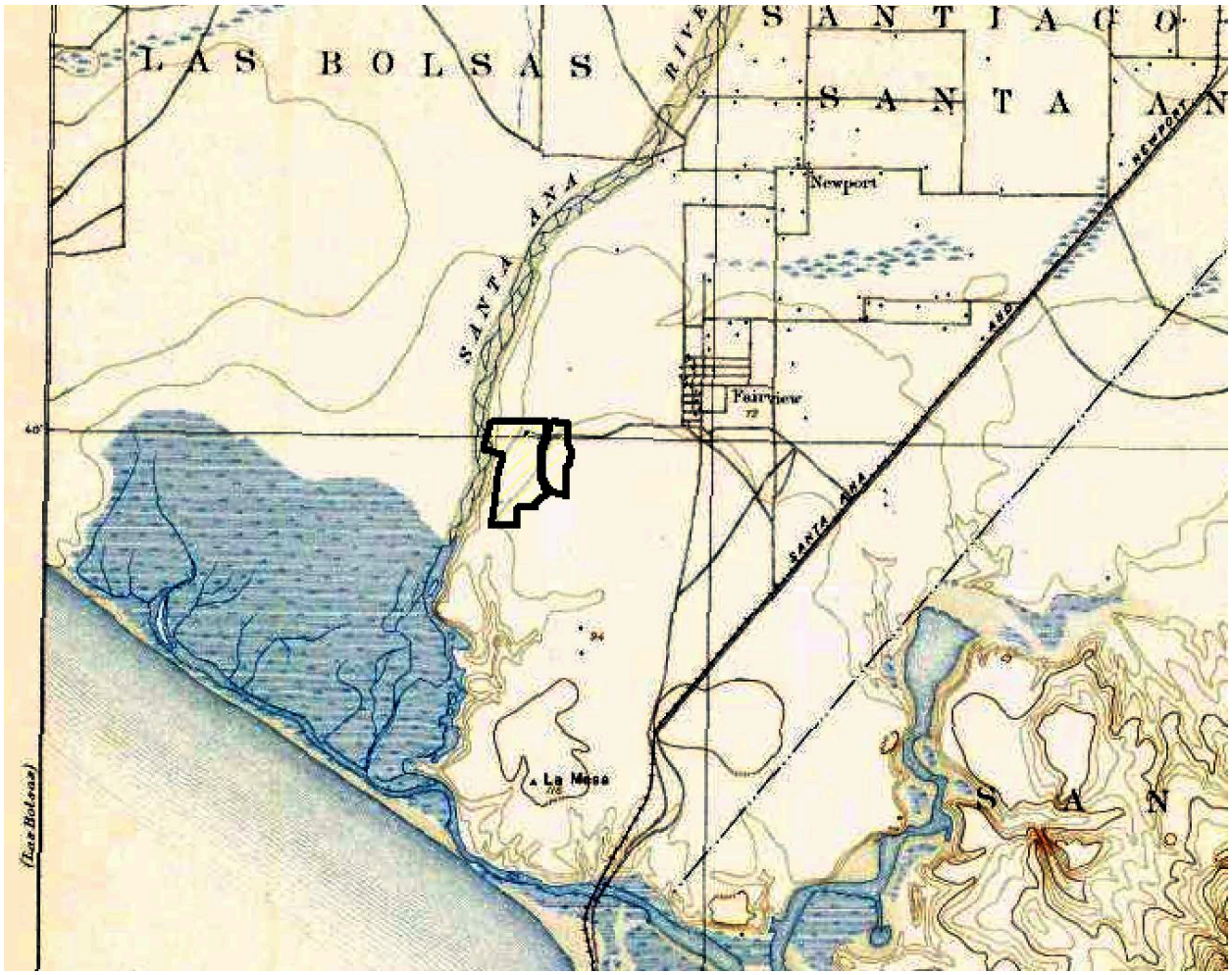


Figure 2-26 1896 USGS Historic Topographic Map (Santa Ana, 1:62,500).

The eroded slopes formed in place by chemical and physical weathering of parent materials. Unlike the bluffs, which were formed largely by erosive river stormwater flows, the eroded slopes were formed by overland flow of precipitation creating gentle to moderately steep slopes.

2.5 SOILS

The soil types in Fairview Park were described in 1978 as part of the greater soil survey of Orange County by the Natural Resources Conservation Service (USDA 1978). The soil survey mapping units are not deterministic and often include the description of several other soil types that can occur within the map unit, but it provides excellent information about general soil conditions in the park. Further field investigation should be conducted when soil conditions are being used to guide park management, such as the development of habitat restoration plans. Six soil series and a total of nine soil mapping units occur in the three geomorphic areas of Fairview Park, as described in this section.

2.5.1 Floodplain Terrace

The **METZ** soil series (Entisol Soil Order) consists of very deep, somewhat excessively drained soils derived mainly from sedimentary alluvial materials. Found on floodplains and alluvial fans with 0 to 15% slopes, Metz soils have a mean annual soil temperature of 59 to 64°F. These soils are typically dry between depths of 10 and 30 inches from late April or May to November or early December, and moist during the remaining months. The 10 to 40-inch control section has a loamy sand texture, with individual strata ranging from sand to loam. Organic matter content decreases irregularly with depth, averaging less than 1%. Metz soils are usually moderately alkaline, with noncalcareous to calcareous individual strata. Gravel content ranges from 0 to 15%, with occasional strata reaching 35%. Relics of deposition, such as mottles, may be present in some pedons, particularly in finer textures.

One Metz soil mapping unit present on the Fairview Park floodplain terrace: Metz loamy sand, moderately fine substratum (Map Unit Code 164).

The **HUENEME** soil series (Entisol Soil Order) is stratified alluvium derived from sedimentary rock. It features grayish-brown, loamy fine sand to light sandy loam moderately alkaline A horizons. Stratified, grayish-brown, light brownish-gray, and light gray calcareous C horizons contain sandy loams through sands, with thin silt layers, mottling, and segregated gypsum. Organic matter darkens A horizons but decreases irregularly with depth, and rock fragments are minimal, with typically less than 10% gravel. Unless drained, Hueneme soils become saturated within 20 to 40 inches of the surface during winter, spring, or longer. Some mottling may be found above 40 inches, with possible gypsum segregations and small brown concretions. Soils are usually moist from early December to mid-May and dry from June to November unless irrigated. The mean summer, winter, and annual soil temperatures are approximately 67°F, 56°F, and 64°F, respectively. A horizons exhibit grayish-brown or light brownish-gray hues (10YR or 2.5Y), with mild to moderate alkalinity. Calcareous or noncalcareous surface layers give way to calcareous subsurface layers. A horizons may harden and become massive

when dry. C horizons display light gray, light brownish-gray, or light olive-gray hues (10YR or 2.5Y) and stratified sandy loam or loamy sand textures, averaging sandy loam in the 10 to 40-inch section with 10 to 15% clay, often containing thin silty or sandy strata.

One Hueneme soil mapping unit present on the Fairview Park floodplain terrace: Hueneme fine sandy loam (Map Unit Code 158).

The **CAPISTRANO** soil series (Mollisols Soil Order) consist of very deep, well-drained soils found on alluvial fans and floodplains in small valleys. They formed in alluvium derived from sedimentary or granitic sources, with a mean annual soil temperature of 60 to 65°F at a depth of 20 inches. These soils typically do not experience temperatures below 47°F. Capistrano soils are dry at depths between 8 and 25 inches from late April or May to late October and are moist for the remainder of the year. Soil composition ranges from sandy loam to coarse sandy loam or fine sandy loam, with clay content below 18% and combined silt, very fine sand, and clay content assumed to be less than 50%. The control section has 0 to 3% rock fragments by volume, typically less than 3 inches in diameter.

One Capistrano soil mapping unit present on the Fairview Park floodplain terrace: Capistrano sandy loam (Map Unit Code 135).

2.5.2 Bluff

The **MYFORD SANDY LOAM** soil series (Alfisols Soil Order) is found on terraces below 1,500 feet. This moderately well-drained soil has medium to rapid runoff and very slow permeability. The solum is 45 to 75 inches thick, and the soil temperature at 20 inches depth averages 60 to 63°F. Moisture levels vary seasonally, with consistent dry periods. Myford soil's composition includes various sandy loam types, with A and Bt horizons displaying different colors and clay contents. Exchangeable sodium increases at depths beyond one meter.

One Myford soil mapping unit on the Fairview Park bluff: Myford sandy loam, 9 to 30 percent slopes, eroded (Map Unit Code 177).

2.5.3 Mesa

The **MYFORD SANDY LOAM** soil series, as described above for the bluff.

Two Myford soil mapping units on the Fairview Park Mesa: Myford sandy loam, 0 to 2 percent slopes (Map Unit Code 172) and Myford sandy loam, 2 to 9 percent slopes (Map Unit Code 173).

The **CROPLEY CLAY** soil series (Vertisols Soil Order) is found on alluvial fans, floodplains, and small basins with smooth slopes at elevations of 10 to 2,100 feet. They are moderately well-drained to well-drained, with medium to very high runoff and slow permeability. Carbonate masses are found at depths of 32 to 51 inches, and the mean annual soil temperature at 20 inches is 59 to 64°F. Cropley soils contain 40 to 60% clay and 0 to 10% rock fragments. Smectitic mineralogy is present, and organic matter ranges from 1 to 3% in the top 10 inches. The soil moisture control zone is typically dry

from May to October. These soils exhibit reversible surface cracks up to 2 inches wide and slickensides in the Bss horizon, ranging from 10 to 40 inches or more. Slopes are simple, ranging from 0 to 15%.

One Cropley Clay soil mapping unit on the Fairview Park Mesa: Cropley Clay, 2 to 9 percent slopes (Map Unit Code 149).

2.5.4 Eroded Slopes

The **MYFORD SANDY LOAM** soil series, as described above for the bluff.

One Myford soil mapping unit on Fairview Park's eroded slopes: Myford sandy loam, 9 to 30 percent slopes, eroded (Map Unit Code 177).

The **BOSANKO** soil series (Vertisols Soil Order) consists of gray, slightly acidic to moderately alkaline clay A horizons and brown, calcareous, sandy clay loam C horizons over weathered rock at approximately 30 inches depth. The paralithic contact with weathered igneous and sedimentary rock occurs at around 40 inches. With a mean annual soil temperature of about 65°F at 20 inches depth, Bosanko soils are moist between 4- and 12-inches depth from December to May and dry the rest of the year. During the dry period, cracks ranging from 3/8 to 1 inch wide extend from the surface to 20 to 40 inches depth. Rock fragments comprise 1 to 5% of upper horizons and up to 15% of lower horizons, with most measuring 2 mm to 3/4 inches in diameter. Some pedons feature cobblestones and large stones near the surface, while slickensides are present from 5 inches to 20 inches depth or the top of the C horizon. A horizons exhibit gray or dark gray hues (10YR), with some featuring grayish-brown or dark grayish-brown lower sections. Clay content averages 30 to 45%, with mild to moderate alkalinity in the upper part and neutral to moderately alkaline lower sections. C horizons are brown, grayish-brown, pale olive, or olive-brown, with clay loam, sandy clay loam, clay, or sandy clay textures. Moderately alkaline C horizons may contain segregated lime in powder or soft masses and blotches. Some pedons feature AC or ACca transitional horizons between A and C layers.

One Bosanko soil mapping unit on Fairview Park's eroded slopes: Bosanko clay, 15 to 30 percent slopes (Map Unit Code 127).

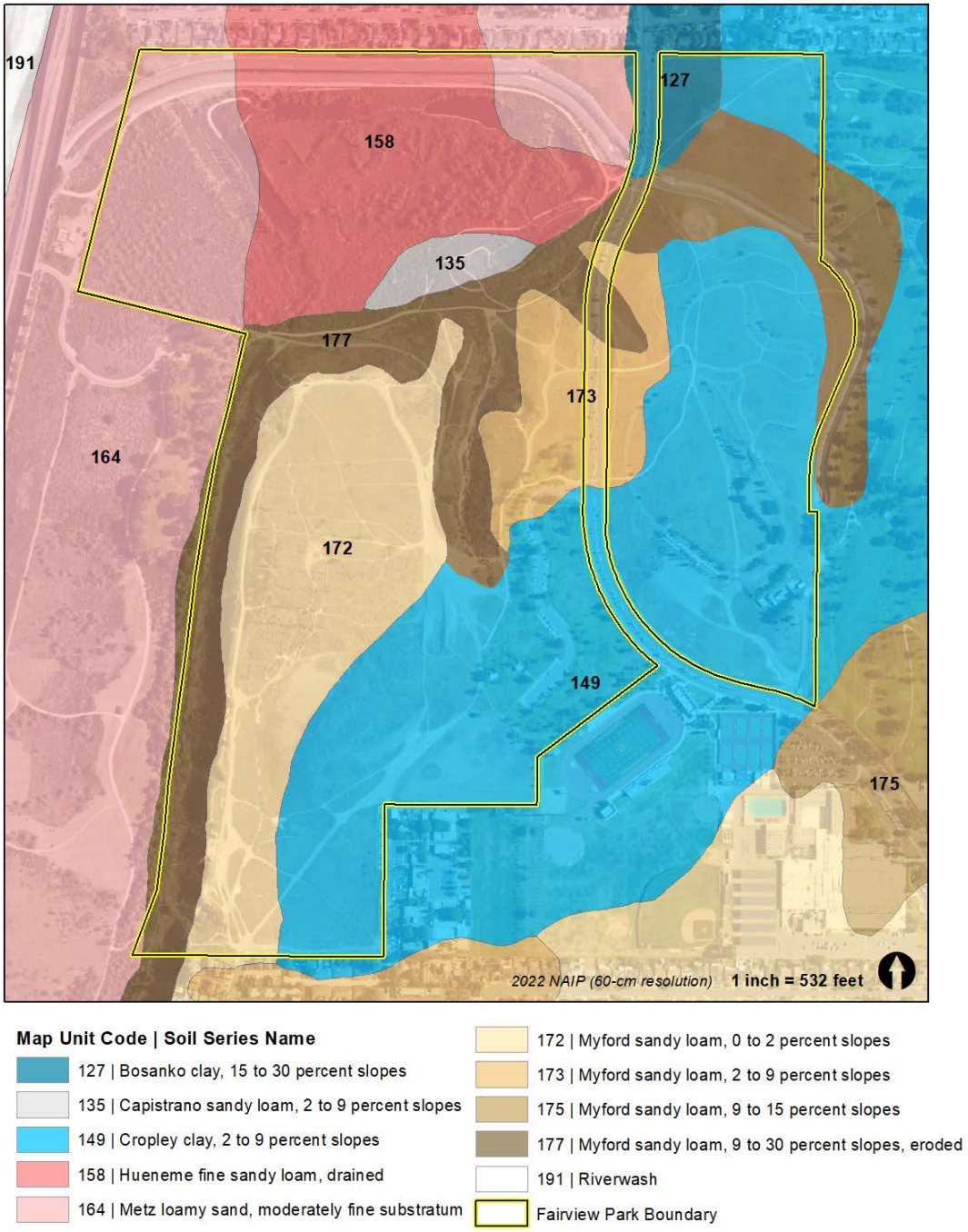


Figure 2-27 Soil Series Mapped in Fairview Park (USDA 1978)

3 2023 VEGETATION MAP

A 2023 vegetation map was created to document existing vegetation communities (see Figure 3-1 and Table 3-1) and to help identify ecologically appropriate habitat restoration and enhancement targets, which are presented in Section 4.

Completed restoration totals approximately 35.87 acres: 2.8 acres of vernal pool restoration (Vernal Pool Features 1 and 4) from 1996 to 2009; creation of 1.17 acres of purple sage scrub on the north-facing slopes in the 1990s; 0.26 acres of CSS restoration associated with the 2009 staircase project; 0.39 acres of cut slope restoration with CSS related to Placentia Avenue pedestrian bridge installation in 2006; 20.06 acres associated with Phase 1 of the Wetlands and Riparian Habitat Project (OCFCD Conservation Easement) completed in 2014; 11.14 acres for the Headlands Dana Point Project Mitigation Area (OCFCD Conservation Easement) completed in 2011; and 0.05 of CSS revegetation near the narrow-gauge railroad east of Placentia (Figure 1-3).

Ongoing habitat restoration totals 22.69 acres: 15.26 acres of Wetlands and Riparian Habitat Creation in Phase 2 (not including the deficiency of 9.5 acres of upland scrub and grassland/forbland habitat that must be restored elsewhere in the Park to satisfy mitigation obligations to OCTA): 4.4 acres of vernal pool restoration (including features 5, 6 ,and 7; vernal pool watershed; CSS buffer area); and 3.03 acres of community-led CSS restoration in the Canyon (this includes on-going weed control in revegetated areas, such as the Vandersloot native planting area) (Figure 1-3).

METHODS

Prior to going into the field, homogenous vegetation units were drawn using as a base map an aerial with 60-cm resolution from the 2022 National Agriculture Imagery Program (NAIP) and “heads-up” delineation. Other geospatial layers reviewed include topography (2-ft. contour lines) historical aerials (Figure 2-2 to Figure 2-20), and maps in the Fairview Park Master Plan (City of Costa Mesa 2008).

In 2023, field visits to field-check the mapping polygons were completed on March 8, March 29, April 27, June 6, August 31, and September 24. Revisiting the areas from late winter through early fall allowed for better characterization of the range of annual plant diversity and cover, more accurate descriptions of the dominant species cover, and more refined delineation of map units. Each vegetation map unit was classified into a vegetation community, at either the Alliance or Association level, following the nomenclature and class rules provided in the second edition of the Manual of California Vegetation (Sawyer et al. 2009). The online version of the manual was cross-referenced for updated information, and the results were published in a geodatabase provided to the City. Finally, representative photos of each vegetation community were obtained.

In this report, the map units for the 2023 Fairview Park Vegetation Map are described and organized into similar classes based on their hierarchical relationship in the Manual of California Vegetation (i.e., all CSS vegetation communities are grouped together for presentation in the report). Habitat restoration, enhancement, or other management

opportunities are identified for appropriate vegetation classifications and discussed further in Section 4.

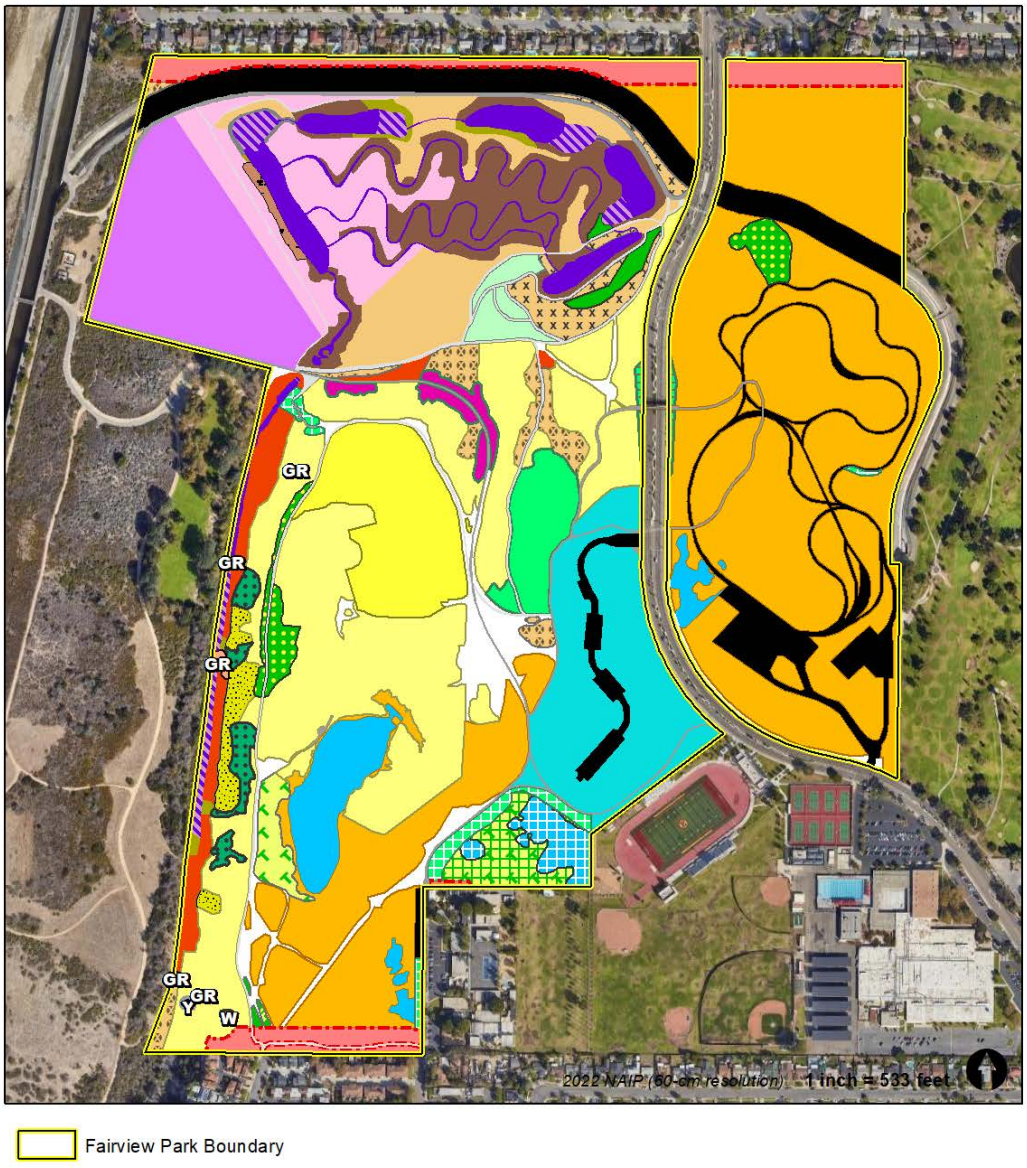


Figure 3-1 *2023 Vegetation Map for Fairview Park, Costa Mesa, CA*

The Vegetation Map Legend and a 3D version of the map are on the following pages.

Map Code | 2023 Vegetation Map Unit Common Name



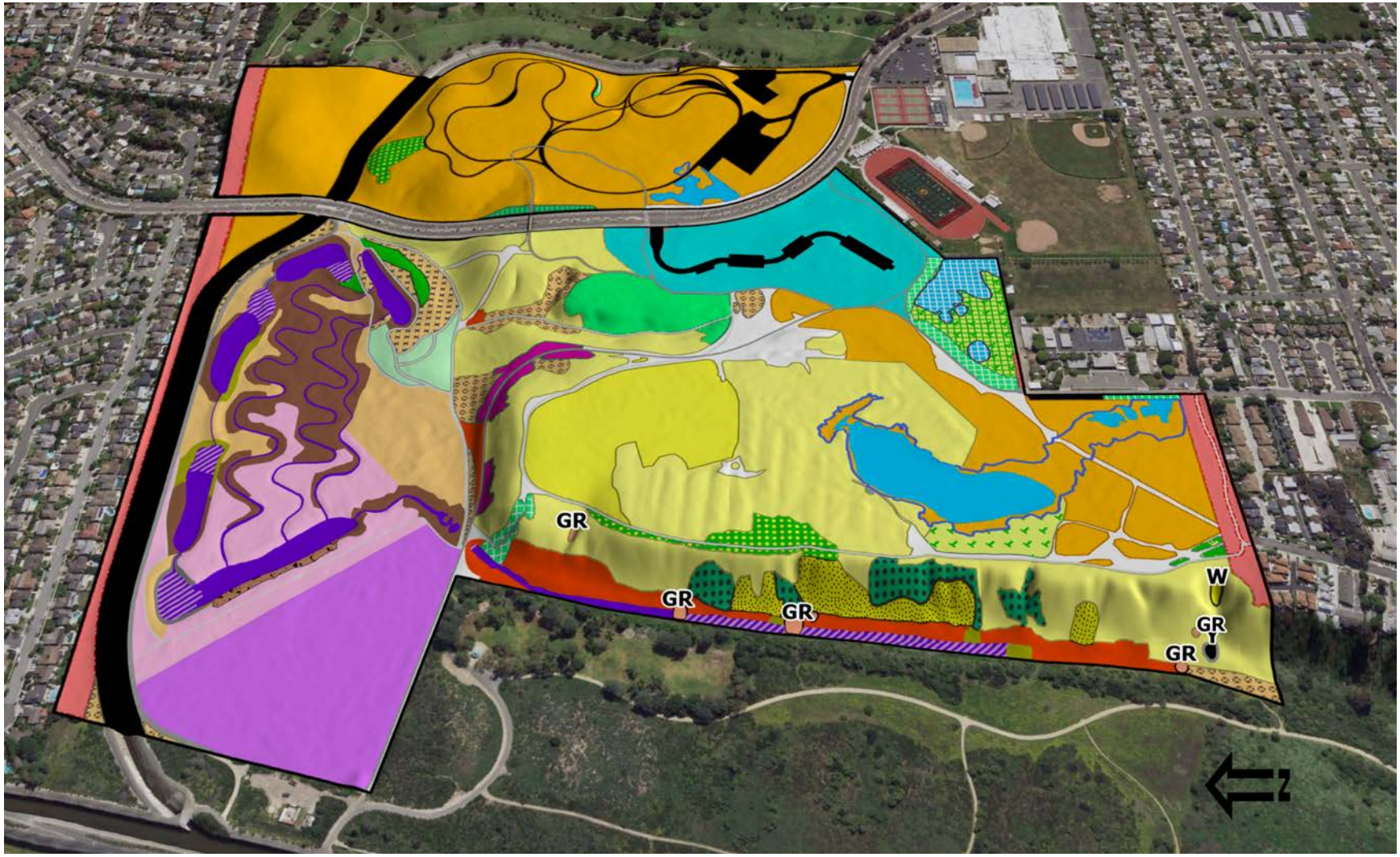

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Table 3-1 Summary of 2023 Vegetation Map Units in Fairview Park.

Scientific Vegetation Map Unit Name	Map Code	Common Map Unit Name
Southwestern North American Riparian Evergreen and Deciduous Woodland Group		
Salix gooddingii – Salix laevigata Forest & Woodland Alliance	1720	Black Willow - Red Willow Riparian Woodland and Forest
Populus fremontii – Salix laevigata Association	1740	Fremont Cottonwood – Red Willow Woodland and Forest
Southwestern North American Riparian/Wash Scrub Group		
Baccharis salicifolia Shrubland Alliance	1810	Mulefat Thickets
Salix lasiolepis Shrubland Alliance	1820	Arroyo Willow Thickets
Salix exigua Shrubland Alliance	1840	Sandbar Willow Thickets
Salix exigua – Sambucus mexicana Shrubland Association (Habitat Creation Project)	1845	Sandbar Willow – Blue Elderberry Thicket (Habitat Creation Project)
Californian Broadleaf Forest and Woodland Group		
Juglans californica Forest & Woodland Alliance	1830	Southern California Walnut Groves
Naturalized Warm-Temperate Riparian and Wetland Group		
Phragmites australis – Arundo donax Herbaceous Semi-Natural Alliance	1910	Giant Reed
California Coastal Evergreen Bluff and Dune Scrub Group		
Baccharis pilularis Shrubland Alliance	2310	Coyote Brush Scrub
Baccharis pilularis Shrubland Alliance (Disturbed)	2315	Coyote Brush Scrub (Disturbed)
Central and South Coastal Californian Coastal Sage Scrub Group		
Artemisia californica Shrubland Alliance	3110	California Sagebrush Scrub
Artemisia californica – Eriogonum fasciculatum Association	3120	California Sagebrush – California Buckwheat Scrub
Artemisia californica – Eriogonum fasciculatum Association (Restoration Area)	3125	California Sagebrush – California Buckwheat Scrub (Restoration Area)
Encelia californica – Eriogonum cinereum Shrubland Alliance (Disturbed)	3145	California Sunflower Bush – Ashy Buckwheat Scrub (Disturbed)
Eriogonum fasciculatum Shrubland Alliance	3150	California buckwheat scrub
Salvia leucophylla Association (Introduced Vegetation Community/Restoration Area)	3195	Purple Sage Scrub (Introduced Vegetation Community/Restoration Area)
Isocoma menziesii Shrubland Alliance	3330	Coast Goldenbush Scrub
Isocoma menziesii Shrubland Alliance (Disturbed)	3335	Coast Goldenbush Scrub (Disturbed)
Mediterranean California Naturalized Annual and Perennial Grassland Group		
Avena spp. – *Bromus* spp. Herbaceous Semi-Natural Alliance	4210	Wild Oats and Annual Brome Grasslands
Brassica nigra – Centaurea melitensis Herbaceous Semi-Natural Association	4250	Upland Black Mustard and Tocalote Fields
Hirschfeldia incana – Centaurea melitensis Herbaceous Semi-Natural Association	4255	Upland Shortpod Mustard and Tocalote Fields

Table 3-1 Summary of 2023 Vegetation Map Units in Fairview Park.

Scientific Vegetation Map Unit Name	Map Code	Common Map Unit Name
Conium maculatum – Foeniculum vulgare Herbaceous Semi-Natural Alliance	4270	Poison Hemlock or Fennel Patches
California Annual Herb/Grass Group		
Amsinckia (menziesii, tessellata) – Phacelia spp. Herbaceous Alliance	4310	Fiddleneck – Phacelia Fields
Arid West Freshwater Emergent Marsh Group		
Schoenoplectus californicus – Typha spp. (*angustifolia, latifolia*) Association	6135	California Bulrush – Cattail Marsh
Californian Mixed Annual/Perennial Freshwater Vernal Pool/Swale Bottomland Group		
Deinandra fasciculata Herbaceous Alliance	6500	Clustered Tarplant Fields
Deinandra fasciculata Herbaceous Alliance (Restoration Area)	6550	Clustered Tarplant Fields (Restoration Area)
Eleocharis macrostachya Herbaceous Association	6600	Pale Spike Rush Vernal Pool Bottoms
Eleocharis macrostachya Herbaceous Association (Restoration Area)	6650	Pale Spike Rush Vernal Pool Bottoms (Restoration Area)
Coastal Baja California Norte Maritime Succulent Scrub Group		
Opuntia littoralis – Opuntia oricola – Cylindropuntia prolifera Shrubland Alliance	8120	Coast Prickly Pear Scrub
Urban/Disturbed/Other		
Introduced Trees	9100	Introduced Trees
Irrigated Lawn and Ornamental Landscaping Trees	9150	Irrigated Lawn and Ornamental Landscaping Trees
Urban/Disturbed	9300	Urban/Disturbed
Urban-Sidewalk/Bridge/Trail	9310	Urban-Sidewalk/Bridge/Trail
Natural Soil or Decomposed Granite (DG) Trail	9315	Natural Soil or Reconstructed West Bluff Trail
Fuel Modification Zone	9320	Fuel Modification Zone
Anthropogenic Areas of Little or No Vegetation	9330	Anthropogenic Areas of Little or No Vegetation
Rip-rap/Concrete Pond Liner	9810	Rip-rap/Concrete Pond Liner
Water Body	9800	Water Body

3.1 SOUTHWESTERN NORTH AMERICAN RIPARIAN EVERGREEN AND DECIDUOUS WOODLAND GROUP

These tall, densely vegetated riparian communities occur in the wetland creation area in the northern lowlands and in the riparian strip along the base of the western bluff. Wildlife known or likely to use these communities at the park include Lorquin's Admiral, Southern California Slender Salamander, Southern Alligator Lizard, Anna's Hummingbird, White-tailed Kite, Red-shouldered Hawk, Yellow-breasted Chat, Common Yellowthroat, Yellow Warbler, Northern Raccoon, and Western Red Bat.

3.1.1 Black Willow - Red Willow Riparian Woodland and Forest | *Salix gooddingii - Salix laevigata* Forest & Woodland Alliance (Map Code 1720)

Commonly, the perimeters of the ponds and the channels have dominant tree canopy from a mix of willows (*Salix gooddingii, S. laevigata, S. lasiolepis*) (Figure 3-2). The midstory is dominated by mulefat (*Baccharis salicifolia*), and where the overstory canopy is more open, coast goldenbush (*Isocoma menziesii*). Other native trees that occur are western sycamore (*Platanus racemosa*) and Fremont cottonwood (*Populus fremontii*).



Figure 3-2 *Example of Black Willow – Red Willow Riparian Woodland and Forest in the Created Wetlands and Riparian Habitat Project Area.*

Photo Taken September 24, 2023.

3.1.2 Fremont Cottonwood – Red Willow Woodland and Forest | *Populus fremontii - Salix laevigata* Association (Map Code 1740)

Fremont Cottonwood is the dominant overstory tree, with a midstory formed by red willow. Other willows include sandbar willow and Arroyo willow. Mulefat and tarragon (*Artemisia dracunculus*) are common in the shrub layer.



Figure 3-3 *Example of Fremont Cottonwood – Red Willow in the Created Wetlands and Riparian Habitat Project Area.*

Photo Taken September 24, 2023

3.2 SOUTHWESTERN NORTH AMERICAN RIPARIAN/WASH SCRUB GROUP

Densely vegetated riparian thickets dominated by mulefat, and scrubby willows occur around the edges of the taller woodlands and forests in the northern and western lowlands. Wildlife known or likely to use these communities at the park include the Baja California Chorus Frog, Gopher Snake, Allen's Hummingbird, Downy Woodpecker, Least Bell's Vireo, Bushtit, Song Sparrow, Spotted Towhee, Orange-crowned Warbler, Brush Rabbit, and Coyote.

3.2.1 Mulefat Thickets | *Baccharis salicifolia* Shrubland Alliance (Map Code 1810)

This vegetation community occurs in both Phases of the Wetlands and Riparian Habitat Project (OCTA Measure M2 NCCP/HCP Mitigation Area; OCFCD Conservation Easement). Mulefat is co-dominant with coyote brush and coast goldenbush (Figure 3-4). Other native shrubs include California bush sunflower (*Encelia californica*), black sage (*Salvia mellifera*), California buckwheat, and California sagebrush (*Artemisia californica*). In the southern part of the OCTA Measure M2 Mitigation Area, blue elderberry (*Sambucus mexicana*) is a common shrub in the overstory.



Figure 3-4 *Example of Mulefat Thickets in the Created Wetlands and Riparian Habitat Project Area.*

Photo Taken September 24, 2023

3.2.2 Arroyo Willow Thickets | *Salix lasiolepis* Shrubland Alliance (Map Code 1820)

Arroyo willow (*Salix lasiolepis*) co-occurs with mulefat, coyote brush, and blue elderberry. Other natives include cattail (*Typha* spp.), bulrush (*Schoenoplectus californicus*), slender stinging nettle (*Urtica gracilis*), and marsh fleabane (*Pluchea odorata*). Patches of invasive poison hemlock (*Conium maculatum*) and castor bean (*Ricinus communis*) occur throughout.



Figure 3-5 *Example of Arroyo Willow Thickets in the Created Wetlands and Riparian Habitat Project Area.*

Photo Taken September 24, 2023

3.2.3 Sandbar Willow Thickets | *Salix exigua* Shrubland Alliance (Map Code 1840)

This area is part of the Fairview Park Wetlands and Riparian Habitat Project (Phase 2) to provide offsite mitigation credits for the OCTA Measure M2 NCCP/HCP. Implementation of this project began in 2012 and is ongoing as of 2024. It also occurs in Phase 1, which is complete and has a conservation easement benefiting OCFCD.

Sandbar willow (*Salix exigua*) and coyote brush (*Baccharis pilularis*) co-dominate the shrub canopy, with scattered other tree species and patches of mulefat (Figure 3-6). Bare ground is common with sandy loam texture and common herbaceous cover from tarragon that is the dominant cover in patches. Along the northern boundary of the Phase 2 Project area, a population of southern tarplant (*Centromadia parryi* ssp. *australis*), a special-status species, persists in openings in the canopy maintained by weeding and the sandy soil conditions.

Sandbar willows typically recruit in recently disturbed alluvial soils in the floodplain after a scouring and depositional storm event. Because their seeds require light to germinate and will not typically recruit in the understory of an established willow thicket or

woodland, sandbar willows become less common along river courses or waterbodies over time as they become displaced by larger willow and woodland trees. Although considered a short-lived species, sandbar willow can also grow clonally, spreading through suckering from lateral roots, and the clones established in suitable locationscan reportedly live at least 100 years (Uchytil 1989, Vaghait 2003). Thus, while the natural recruitment of new sandbar willows will be limited in the future by the stabilization of the natural floodplain soils, clones of this species will likely remain stable for many decades. Over longer time horizons, transition to other plant assemblages in this area is likely, as sandbar willow clones are eventually lost to drought, disease, and/or intense fire events that consume the root ball.



Figure 3-6 *Example of Sandbar Willow Thickets in the Created Wetlands and Riparian Habitat Project Area.*

Photo Taken September 24, 2023

3.2.4 Sandbar Willow – Blue Elderberry Thickets | *Salix exigua* – *Sambucus mexicana* Shrubland Association (Habitat Creation) (Map Code 1845)

This association occupies the 11-acre habitat creation site in the historic floodplain of the Santa Ana River (see, e.g., Figure 2-3) that was installed as CSS mitigation for the Headlands Dana Point Project, in compliance with a Coastal Development Permit from

the California Coastal Commission per the Coastal Act. A mitigation plan prepared by Glenn Lukos Associates (2005) was implemented by Natures Image and URS from 2006 to 2011. The City granted OCFCD a conservation easement over this area in 2008.

Sandbar willow is co-dominant with blue elderberry, with an understory of coyote brush and tarragon (Figure 3-7 and Figure 3-8). Other CSS shrubs were installed in 2006 as part of the mitigation plan, but they were not prevalent in 2023, because the site conditions (alluvial soil and high groundwater table) promote vegetation more typical of a riparian or floodplain terrace. Sandbar willow-blue elderberry is not a typical assemblage of vegetation, as sandbar willow is typically dominant in active floodplains and managed flood basins that are subject to periodic flooding and disturbance while blue elderberry normally occurs on higher floodplain terraces. In the absence of natural flooding or other major mechanical disturbances over a period of decades this vegetation community may transition to one dominated by other tree or shrub species.



Figure 3-7 *View of the Sandbar Willow – Blue Elderberry Thickets in the Headlands Dana Point Project Area.*

Photo Taken March 8, 2023



Figure 3-8 *Example of Sandbar Willow – Blue Elderberry Thickets in the Headlands Dana Point Project Area.*

Photo Taken September 24, 2023

3.3 CALIFORNIAN BROADLEAF FOREST AND WOODLAND GROUP

3.3.1 Southern California Walnut Groves | *Juglans californica* Forest & Woodland Alliance (Map Code 1830)

A small isolated southern California walnut grove occurs in an eroded drainage at the southern end of the West Bluff (Figure 3-9).

Habitat Enhancement Opportunity:

Southern California Walnut Groves | *Juglans californica* Forest & Woodland Alliance

The understory of the walnut grove can be enhanced by reducing the nonnative weed seedbank in the surrounding areas and planting new walnuts to help stabilize the erosive feature in which the walnuts currently grow.



Figure 3-9 *Isolated Southern California Walnut Grove on the West Bluff.*
Photo Taken September 24, 2023

3.4 NATURALIZED WARM-TEMPERATE RIPARIAN AND WETLAND GROUP

3.4.1 Giant Reed | *Arundo donax* (Giant Reed) Association (Map Code 1910)

Patches of giant reed (*Arundo donax*) occur in steep, eroded drainages on the west bluff and in the drain at the base of the bluff (Figure 3-10). This nonnative vegetation community consists ofmonocultures of giant reed that spread vegetatively by rhizomes (i.e., below-ground stems that can produces shoots and roots).

Habitat Restoration Opportunity:

The populations of giant reed are generally small and isolated in Fairview Park and have a high likelihood of eradication with appropriate invasive plant control methods. The giant reed patches would be best restored to the vegetation communities immediately adjacent to it, or to the restoration target of the surrounding restoration area. The the upper drainages are appropriate for plantings of southern California walnut.



Figure 3-10 Example of Giant Reed on the West Bluff.
Photo Taken September 24, 2023

3.5 California Coastal Evergreen Bluff and Dune Scrub Group

3.5.1 Coyote Brush Scrub | *Baccharis pilularis* Shrubland Alliance (Map Code 2310)

This vegetation community occurs at the edge of the trail system and willow woodland in the Fairview Park Wetlands and Riparian Habitat Project (Phase 2). Coyote brush is co-dominant with coast goldenbush (Figure 3-11). Other common native shrubs are mulefat, California bush sunflower, toyon (*Heteromeles arbutifolia*), and laurel sumac (*Malosma laurina*). These plants produce abundant leaf litter that limits the herbaceous understory. Most gaps in the canopy are occupied by nonnative weeds, including shortpod mustard (*Hirschfeldia incana*), black mustard, and patches of poision hemlock. Small numbers of scattered western sycamores and arroyo willow trees are present. Sandy openings support tarragon and a small, remnant population of Southern tarplant, a special-status species. Along the trail leading to Placentia Avenue and the Fairview Channel, monitoring reports document largely unsuccessful attempts to establish a stand of coast live oaks (*Quercus agrifolia*).



Figure 3-11 *Example of Coyote Brush Scrub.*
Photo Taken September 24, 2023

3.5.2 Coyote Brush Scrub (Disturbed) | *Baccharis pilularis* Shrubland Alliance (Disturbed) (Map Code 2315)

This vegetation community is primarily the result of coyote brush and other native shrubs recruiting into areas that would otherwise be classified as mustard and tocalote (*Centaurea melitensis*) fields because the herbaceous layer is entirely dominated by nonnative weeds (Figure 3-12). The dominant shrub is coyote brush, which can be very dense in patches. Other native shrubs that occur at low frequency include coast goldenbush, tarragon, and California bush sunflower. The herbaceous layer is dominated by such nonnative species as shortpod mustard, tocalote, and various annual grasses (*Bromus* spp. and *Avena* spp.), with poison hemlock and black mustard forming more extensive stands in some areas.

Coyote brush also dominates a small area northwest of Fairview Channel that lies outside the Fuel Modification Zone (FMZ) and the southern portion of a silted drain at the base of the bluff. A small area just south of the Canyon that has been partially revegetated supports coyote brush and coast goldenbush, with patches of bare ground and stands of nonnative tocalote and mustard.

Habitat Restoration Opportunity:

Black sage scrub | *Salvia mellifera* Shrubland Alliance

Restoration Target on north-facing slopes, especially those with relatively high cover of coyote brush recruitment. The habitat restoration plant palette can target common to co-dominant shrubs with black sage, California sagebrush, and coyote brush. Other species that could occur include orange bush monkeyflower (*Diplacus aurantiacus*), California bush sunflower, California buckwheat, deerweed (*Acmispon glaber*), lemonade berry (*Rhus integrifolia*), coast prickly pear (*Opuntia littoralis*), and white sage (*Salvia apiana*).



Figure 3-12 Example of Disturbed Coyote Brush Scrub.
Photo Taken September 24, 2023

3.6 CENTRAL AND SOUTH COASTAL CALIFORNIAN COASTAL SAGE SCRUB GROUP

Upland scrub plant associations growing on the park's slopes support such wildlife species as California Kingsnake, Southern Pacific Rattlesnake, Western Skink, Allen's Hummingbird, California Gnatcatcher, Bewick's Wren, California Thrasher, White-crowned Sparrow, California Towhee, and Desert Cottontail. In the past, a few pairs of

Cactus Wren (*Campylorhynchus brunneicapillus*), a special-status species, occupied cactus scrub in the park (see Section 3.11), but in recent decades this species appears to have been extirpated from the entire lower Santa Ana River ecosystem.

3.6.1 California Sagebrush Scrub | *Artemisia californica* Shrubland Alliance (Map Code 3110)

This vegetation community occurs in the Wetlands and Riparian Habitat Project – Phase 2. California sagebrush is the dominant shrub (Figure 3-13). Other common native shrubs include laurel sumac, coyote brush, coast goldenbush, mulefat, California bush sunflower, California buckwheat, and giant wild rye (*Elymus condensatus*). Occurring within this mapped community are substantial patches of invasive mustards (e.g., *Hirschfeldia incana, Brassica nigra*) and tocalote that require regular control efforts by the City (Figure 3-14).



Figure 3-13 Example of California Sagebrush Scrub.
Photo Taken September 24, 2023



Figure 3-14 *Example of Mustard Patch (Dead Annual Growth Pictured) in the California Sagebrush Scrub.*

Photo Taken September 24, 2023

3.6.2 California Sagebrush – California Buckwheat Scrub | *Artemisia californica - Eriogonum fasciculatum* Association (Map Code 3120)

Beginning with the Vandersloot native planting area inthe Canyon portion of the park, the community took the lead in bringing restoration of locally native CSS to the park. That effort has created suitable habitat for California gnatcatcher, a federally listed species that has nested in this area during some years.

The vegetation in the Canyon is dominated by California sagebrush and California buckwheat, mixed with California sunflower bush, coyote brush, coast goldenbush, white sage, coast prickly pear, and giant wild rye (Figure 3-15). Scattered larger shrubs include toyon and lemonade berry. Native clustered tarweed (*Deinandra fasciculata*) is common in openings between shrubs and along the edge of the trail along the bottom of the drainage, an area that also supports patches of big saltbush (*Atriplex lentiformis*) and nonnative shortpod mustard. Periodic maintenance is required to control outbreaks of black mustard, tocalote and fennel that can overtop and displace the native plants in this restoration area.

Habitat Enhancement Opportunity:

California sagebrush – California Buckwheat Scrub | *Artemisia californica - Eriogonum fasciculatum* Association

Community-based weed control and addition of native seeds to enhance the vegetation community, with an emphasis on increasing the diversity and cover of native herbaceous plants.



Figure 3-15 Example of California Sagebrush – California Buckwheat Scrub.
Photo Taken September 24, 2023

3.6.3 California Sagebrush – California Buckwheat Scrub (Restoration Area) | *Artemisia californica - Eriogonum fasciculatum* Association (Restoration Area) (Map Code 3125)

Several locations in the park have recently been restored to this plant community, and most of these areas require ongoing weed management to deplete the deep nonnative seed bank that remains.

STAIRCASE CSS RESTORATION AREA

Areas adjacent to the staircase from the Mesa to Talbert Nature Preserve (constructed in 2009) have been restored to California sagebrush – California Buckwheat Scrub (Figure 3-16). In addition to the co-dominants, California bush sunflower, coast prickly pear, coyote brush, and coast goldenbush occur. Patches of black mustard and tree tobacco (*Nicotiana glauca*) have invaded some of the spacesbetween the native shrubs.

Habitat Enhancement Opportunity:

California sagebrush – California Buckwheat Scrub | *Artemisia californica - Eriogonum fasciculatum* Association

Weed control to enhance the vegetation community.



Figure 3-16 *Example of California Sagebrush – California Buckwheat Scrub Restoration Adjacent to the Staircase.*

Photo Taken April 27, 2023

CSS Buffer for Vernal Pool 5, 6, and 7 Restoration Area

Starting in 2022, community planting events have implemented a plan by Glenn Lukos Associates (2018) to establish a buffer of California sagebrush – California Buckwheat Scrub between the trail along the top of the bluff and the vernal pool complex to the

east (Figure 3-17). Part of this area had been improperly graded in the past, including construction of a parking lot, and placement of a utility pole in the historic location of a vernal pool (Feature 7).

Species planted and seeded in the CSS buffer include California buckwheat, California sagebrush, California bush sunflower, coast goldenbush, miniature lupine, (*Lupinus bicolor*), foothill needlegrass (*Stipa lepida*), purple needlegrass (*Stipa pulchra*), and California melic (*Melica imperfecta*). The extent to which these native plants can become established over the long term will be influenced by such factors as soil conditions (including microorganism diversity), weather conditions in the first few years, and the use of supplemental irrigation, any of which may favor some native species at the expense of others, or which may give a competitive advantage to nonnative, invasive weeds.



Figure 3-17 *Example of California Sagebrush – California Buckwheat Scrub Restoration to Buffer the Vernal Pool Complex Restoration Project.*

Photo Taken March 8, 2023

SMALL CSS REVEGETATION AREA ALONG NARROW-GAUGE RAILROAD

A small-scale restoration project has been undertaken adjacent to the narrow-gauge railroad track east of Placentia (Figure 3-18).



Figure 3-18 *Example of a Small Area of California Sagebrush – California Buckwheat Scrub Restoration Next to the Narrow-Gauge Railroad Track.*

Photo Taken March 8, 2023

VERNAL POOL 4 BERM AND CSS VEGETATION BUFFER

This classification refers to a strip of land in the southeast corner of the Mesa, adjacent to Canyon Drive, that has been used as a parking lot before 2018, when it was fenced off to protect the adjacent vernal pools and vernal marsh. A berm was constructed and revegetated with native plantings including California buckwheat and coast prickly pear (Figure 3-19).



Figure 3-19 *Example of California Sagebrush – California Buckwheat Scrub Restoration on Berm Between Vernal Pool Feature 4 and Canyon Drive.*

Photo Taken March 8, 2023

3.6.4 California Sunflower Bush – Ashy Buckwheat Scrub (Disturbed) | *Encelia californica - Eriogonum cinereum* Shrubland Alliance (Disturbed) (Map Code 3145)

This classification refers to California bush sunflower and Ashy buckwheat (*Eriogonum cinereum*) on the West Bluff (Figure 3-20). Ashy buckwheat is mainly a species of the Santa Monica Mountains and Palos Verdes Peninsula; it occurs only sparingly in Orange County, where the few small populations may have been introduced (e.g., Allen and Roberts 2013). Other native species in this vegetation community include coast goldenbush, coyote brush, coast prickly pear, bladderpod, and wishbone bush (*Mirabilis laevis*). The herbaceous layer is dominated by nonnative species, including black mustard, fennel (*Foeniculum vulgare*), and annual grasses (e.g., *Bromus* spp.).

Habitat Restoration Opportunity:

California Sunflower Bush – Ashy Buckwheat Scrub | *Encelia californica - Eriogonum cinereum* Shrubland Alliance

These areas would benefit from weed management and native seed enhancement.



Figure 3-20 *Example of Disturbed California Sunflower Bush – Ashy Buckwheat Scrub on West Bluff in the Foreground.*

Photo Taken March 8, 2023

3.6.5 California Buckwheat Scrub | *Eriogonum fasciculatum* Shrubland Alliance (Map Code 3150)

This vegetation community, dominated by California buckwheat, occurs on the revegetated cut slopes to the north and south of the pedestrian bridge constructed in 2006. Also present is scattered coast goldenbush, along with nonnative black mustard and a few plants of the invasive fountaingrass (*Pennisetum setaceum*).

> **Other Management Opportunity:** This area would benefit from control of highly invasive weeds, such as fountaingrass and mustard.



Figure 3-21 *Example of California Buckwheat Scrub on the Cut Slopes Adjacent to the Placentia Pedestrian Bridge (Photo Taken September 24, 2023).*

Photo Taken September 24, 2023

3.6.6 Purple Sage Scrub (Introduced Vegetation Community/Restoration Area) | *Salvia leucophylla* Association (Introduced Vegetation Community/Restoration Area) (Map Code 3195)

In the 1990s, this area on the north bluff slope was hydroseeded with California buckwheat and purple sage (City of Costa Mesa 2008). Today purple sage is dominant, along with coyote brush and California bush sunflower (Figure 3-22). The natural range of purple sage in Orange County includes only the Santa Ana Mountains and associated foothills (Allen and Roberts 2013); see also Figure 3-23.Contemporary observations in the coastal region of Orange County are likely introductions and the result of native revegetation and landscaping projects. Nonnative cover in this vegetation community includes black mustard, fennel, poison hemlock, and nonnative annual grass (*Bromus* spp. and *Avena* spp.).

Habitat Enhancement Opportunity:

Purple Sage Scrub (Introduced Vegetation Community/Restoration Area) | *Salvia leucophylla* Association (Introduced Vegetation Community/Restoration Area)

Although purple sage need not be removed where it has become established, the species should not be introduced in any new areas of the Park. Black sage and white sage both occur naturally in coastal Orange County. White sage would be appropriate to be included in the scrub on the west-facing slope, and black sage would be appropriate to be included in scrub on north-facing slopes and in the Canyon area. Weed management is needed to control mustard and poison hemlock patches.



Figure 3-22 Example of Introduced Purple Sage Scrub in the Foreground.
Photo Taken April 27, 2023

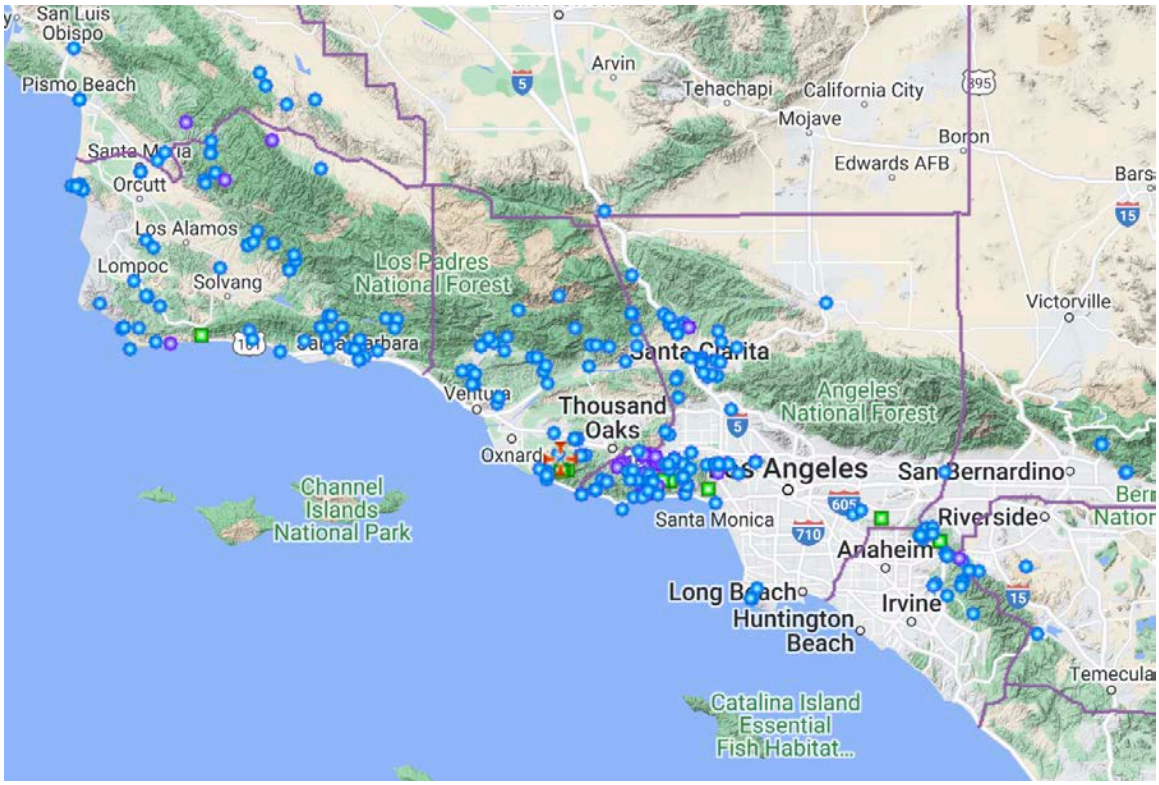


Figure 3-23 *Distribution of Purple Sage (Salvia leucophylla) From Herbarium records Before 1990 (blue dots on map).*

Calflora.org records accessed online on October 9, 2023.

3.6.7 Coast Goldenbush Bush Scrub | *Isocoma menziesii* Shrubland Alliance (Map Code 3330)

This vegetation community occurs in the Wetlands and Riparian Habitat Project (Phase 2). Coast goldenbush is the dominant shrub, occurring with coyote brush and mulefat (Figure 3-24). The openings between shrubs are dominated by mustards (e.g., *Hirschfeldia incana, Brassica nigra*).



Figure 3-24 Example of Coast Goldenbush Scrub.
Photo Taken September 24, 2023

3.6.8 Coast Goldenbush Scrub (Disturbed) | *Isocoma menziesii* Shrubland Alliance (Disturbed) (Map Code 3335)

This vegetation community has low diversity of both native and nonnative plants. Coast goldenbush is dominant, with scattered California bush sunflower (Figure 3-25). The understory primarily consists of nonnative annuals, including tocalote, nonnative grasses (*Bromus* spp.) and patches of mustard (e.g., *Brassica nigra, Hirschfeldia incana*).

The largest expanse of coast goldenbush scrub occupies the northern portion of the Mesa, which was historically cultivated for crops in early 1900s, including plowing or tilling. Imported fill material that was placed on this area in the late 1980s was removed in 2019 as part of an emergency bluff protection project (discussed further in Section 3.12.5). The remaining fill material on the Mesa keeps the large patch of goldenbush scrub hydraulically disconnected from the intact vernal pool watershed, which would likely change the natural composition of this area because ponding would exclude woody shrubs.

A much smaller patch of coast goldenbush scrub occurs on a northwest-facing hillside east of Placentia, just south of Fairview Channel. This scrub is characterized by scattered coast goldenbush growing with purple needlegrass and telegraph weed (*Heterotheca grandiflora*) (Figure 3-26).

Habitat Enhancement Opportunity:

Coast Goldenbush Scrub| *Isocoma menziesii* Shrubland Alliance

Enhance the current vegetation community by managing the nonnative seedbank and increasing native diversity with hand-broadcast seeding of a diverse native seed mix.



Figure 3-25 Example of Disturbed Coast Goldenbush Scrub on the Mesa.

Photo Taken September 24, 2023



Figure 3-26 *Example of Disturbed Coast Goldenbush Scrub in the Middle Ground, East of Placentia.*

Photo Taken September 24, 2023

3.7 MEDITERRANEAN CALIFORNIA NATURALIZED ANNUAL AND PERENNIAL GRASSLAND GROUP

The Fairview Park Mesa, and nearly all of the park east of Placentia Avenue, support mainly nonnative grasslands and forb fields (see Section 3.8, Section 3.10.1, and Section 3.10.2). Wildlife found in these open, grassy, and weedy areas, include the West Coast Lady and Checkered White butterflies, Common Side-blotched Lizard, Mourning Dove, Northern Harrier, Red-tailed Hawk, Burrowing Owl (fall/winter), Say's Phoebe, Western Kingbird, American Pipit, Savannah Sparrow, Red-winged Blackbird, Blue Grosbeak, Desert Cottontail, and Botta's Pocket Gopher. In the past, San Diego Black-tailed Jackrabbits could be found using open habitats in the park, but this species appears to have been extirpated from all the lower Santa Ana River ecosystem in re- cent decades.

3.7.1 Wild Oats and Annual Brome Grasslands | *Avena* spp. - *Bromus* spp. Herbaceous Semi-Natural Alliance (Map Code 4210)

Nonnative grasslands dominated by wild oats and annual bromes occur in three locations: west of Placentia Avenue and north of the Fairview Channel; east of Placentia

Avenue on the rolling hills that are mowed annually; and on the southern part of the Mesa outside of the vernal pool complex and the area of improper fill material.

WEST OF PLACENTIA AVENUE AND NORTH OF FAIRVIEW CHANNEL

A small part of the historical floodplain of the Santa Ana River, now isolated and stabilized, supports oat/brome annual grasslands with patches of broadleaved weeds, including fennel, black mustard, wild radish (*Raphanus sativus*), Cheeseweed mallow (*Malva parviflora*), and tocalote (Figure 3-27).

Habitat Restoration Opportunity:

California sagebrush – Coast Prickly Pear Scrub | *Artemisia californica - Opuntia littoralis* Association

Sandy alluvial soils west of Placentia Avenue may have historically provided habitat for southern tarplant, a special-status species (CNPS List 1B species) found in alkaline floodplains, coastal salt marsh margins, and vernally mesic grasslands, often in very dense stands (City of Costa Mesa 2008). Southern tarplant would be appropriate to include in seed mixes to restore this area.



Figure 3-27 *Example of Wild Oats and Annual Brome Grassland West of Placentia Avenue and North of Fairview Channel.*

Photo Taken September 24, 2023

EAST OF PLACENTIA AVENUE

Rolling hills in the eastern part of Fairview Park, an area designated an Archaeological Low-Density Area (CA-ORA-506), support oat/brome annual grasslands. Evidence of the historical indigenous village still visible in this area takes the form of surface middens—exposed mounds of shell fragments created by indigenous people processing shellfish for food. These hills were mowed repeatedly during the last century as part of hay production for livestock feed (see, e.g., Figure 2-2 to Figure 2-5), and the City continues to mow them annually, an important factor in maintaining the dominance of nonnative annual vegetation in this part of Fairview Park.

Nonnative cover exceeds 75 percent, with wild oats and annual bromes being dominant throughout; locally dominant nonnative weeds include fennel, black mustard, wild radish, cheeseweed mallow, and tocalote (Figure 3-28). Other nonnatives include annual yellow sweetclover (*Melilotus indicus*), white sweet clover (*Melilotus albus*), London rocket (*Sisymbrium irio*), and goosefoots (*Chenopodium album, C. berlandieri*). A few nonnative trees have been planted, such as olive (*Olea europaea*).

Among the nonnative annual grasses, primarily on north-facing exposures, are low-density patches of native purple needlegrass. Scattered native shrubs include coyote brush and coast goldenbush.

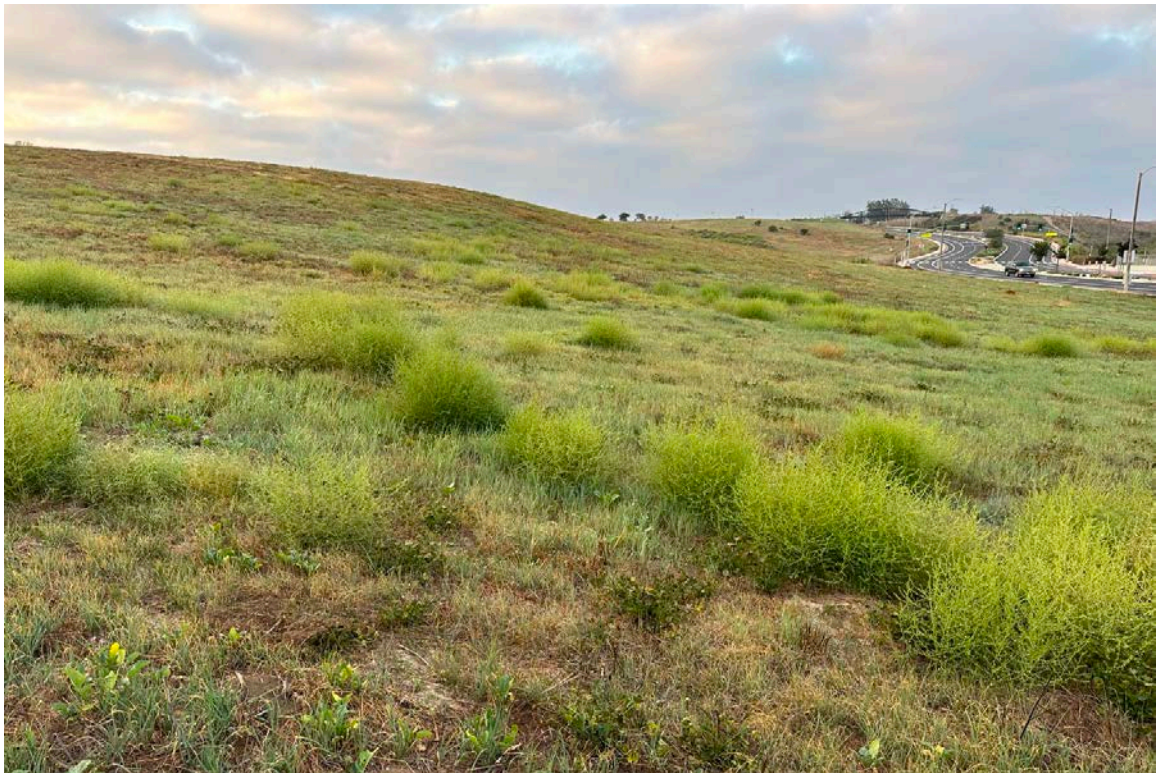


Figure 3-28 *Example of Wild Oats and Annual Brome Grassland East of Placentia Avenue.*
Photo Taken September 24, 2023

In the area within the perimeter of the narrow-gauge railroad tracks, there are several coast live oak that were planted, perhaps as shade trees along trails. Coast live oak is not suitable for this site condition and not recommended for future plantings that are focused on providing shade for humans. Shade structures may be more effective at providing shade at select locations for seating than native trees in this area. There are also several nonnative landscaping trees that have been planted adjacent to the railroad tracks.

Habitat Restoration Opportunity:

For areas East of Placentia Avenue, outside of the perimeter of the narrow-gauge railroad tracks.

California sagebrush – California Buckwheat Scrub | *Artemisia californica - Eriogonum fasciculatum* Association

This vegetation community is well adapted to the eroded soils that were formerly cultivated, but the extensive nonnative seed bank will need to first be depleted.

On south-facing slopes or in areas where trails need to be closed, small patches of cactus (e.g., 10 to 15 feet in diameter) can be established. Suitable cactus species include coast prickly pear, chaparral prickly pear (*Opuntia oricola*), and coast cholla (*Cylindropuntia prolifera*).

North-facing slopes and drainages can support a higher density of perennial native shrubs, such as toyon and blue elderberry, to increase the diversity of native scrub habitats in this part of the park.

Other Management Opportunity:

For areas East of Placentia Avenue, inside the perimeter of the narrow-gauge railroad tracks.

California sagebrush – California Buckwheat Scrub | *Artemisia californica - Eriogonum fasciculatum* Association

The railroad improvements and associated fragmentation of the open space precludes complete restoration of this area, but the habitat can be improved by controlling nonnatives and enhancing native diversity and cover with species that are tolerant of mowing. Seed the area with high rates of perennial grasses and annual forbs, and low rates of native shrubs tolerant of mowing (e.g., coast goldenbush and California bush sunflower) to provide suitable habitat for burrowing owls and other grassland birds.

MESA

Nonnative grasslands on the Mesa occur on soils that have been historically disturbed, including areas impacted by grading for the fly field and numerous informal paths. Nonnative cover exceeds 75 percent, with wild oats, annual bromes, and redstem filaree being dominant throughout (Figure 3-29). Nonnative weeds occurring in patches include fennel, black mustard, wild radish, cheeseweed mallow, and tocalote. Clustered tarplant, a disturbance-tolerant native herb, also occurs commonly in these grasslands scattered shrubs coast goldenbush shrubs. big saltbush, mulefat, and California buckwheat.

Curly dock (*Rumex crispus*), a perennial broadleaf weed, is locally common, especially in areas with soils that become seasonally saturated or ponded during winter rainfall events. The native species that characterize these ephemeral ponding features include neckweed (*Veronica peregrina* ssp. *xalapensis*), Cooper's popcorn flower *(Plagiobothrys collinus)*, clustered tarweed, mulefat, pale spike rush (*Eleocharis macrostachya*), American pillwort (*Pilularia americana*), and common fiddleneck *(Amsinckia intermedia*).



Figure 3-29 Example of Wild Oats and Annual Brome Grassland on the Mesa.
Photo Taken September 24, 2023

Habitat Restoration Opportunity:

Clustered Tarplant Fields | *Deinandra fasciculata* Herbaceous Alliance

This Restoration Area will also benefit from the inclusion of low rates of coast goldenbush in the seed mix to help colonize areas that have been significantly impacted by past soil disturbance.

3.7.2 Upland Black Mustard and Tocalote Fields | *Brassica nigra - Centaurea melitensis* Herbaceous Semi-Natural Association (Map Code 4250)

This community occurs in three types of soil-landscape conditions: disturbed northerly-facing slopes; disturbed/eroded west-facing bluff slopes; and improper fill placed on the Mesa vernal pool watershed.

DISTURBED NORTHERLY-FACING SLOPES

Invasive tocalote and/or mustards (e.g., *Brassica nigra*, *Hirschfeldia incana*) are dominant in the herbaceous layer (Figure 3-30).



Figure 3-30 Example of Upland Black Mustard and Tocalote Fields on North Bluff Slope.
Photo Taken April 27, 2023

Some areas have high cover of nonnative annual grasses (*Bromus* spp. and *Avena* spp.) or wild radish. Patches of fennel, castor bean, and tree tobacco occur more frequently in drainages. White horehound (*Marrubium vulgare*) occurs occasionally and typically on the edges of trails and in other frequently disturbed areas. Scattered individual native shrubs, including coast goldenbush, California sagebrush, California bush sunflower, and coyote brush, may be present, as well as the herbaceous natives clustered tarplant and tarragon. Denser patches of coyote brush occur, but typically in a monoculture and with an understory of nonnative grasses and forbs, limiting the habitat value of these stands for native wildlife species. Giant wild rye occurs occasionally on north-facing slopes and in drainages. A few areas have planted coast prickly pear, although most of the north-facing slopes are unsuitable for cactus. These areas have highly disturbed soils resulting from past agriculture, construction of park facilities (e.g., fences, sidewalks), vegetation clearance, and erosion of topsoil.

Habitat Restoration Opportunity:

Black sage scrub | *Salvia mellifera* Shrubland Alliance

This vegetation community is well adapted to the eroded soils that were formerly cultivated, but the extensive nonnative seed bank will need to first be depleted. Mimics soils in the soil Order of Entisols and is suitable for some associations of California sage scrub (also, referred to as coastal sage scrub).

On slopes or in areas where trails need to be closed, patches of cactus, including prickly pear cactus, chaparral prickly pear, and coast cholla, can be established on south- and west-facing slopes.

North-facing slopes can support a higher density of perennial native shrubs, such as toyon and blue elderberry, to increase the diversity of native scrub habitats in this part of the park.

DISTURBED/ERODED WEST-FACING BLUFF SLOPES

The west-facing slopes are dominated by nonnative herbaceous cover, such as black mustard and tocalote (Figure 3-31). Other common nonnatives include annual grass (e.g., *Bromus* spp.) and shortpod mustard. There is bare soil on steep erosive cliff features with occasional tumbleweeds (*Salsola tragus*). Castor bean, wild radish, fennel, and poison hemlock occur in patches and are more common in drainages and erosive features. Tree tobacco occurs sporadically, including amongst native shrubs. White horehound is locally common, especially along the trail at the base of the cliff. Crown daisy (*Glebionis coronaria*) is co-dominant along the top edge of the bluff in the southwestern corner of the Mesa. Common natives include clustered tarplant, California sunflower bush, coast goldenbush, prickly pear cactus, and bladderpod (*Peritoma arborea*). Giant wild rye occurs in the southernmost drainage in association with the southern California walnut grove. Adjacent to this area is a stand of the invasive tree coastal wattle (*Acacia cyclops*). One large California boxthorn (*Lycium californicum*), a rare southern California/Baja California endemic, survives on the bluff (Figure 3-32). The boxthorn is an indicator of maritime succulent scrub, a vegetation community that has become rare due to development on the mainland and invasive ungulate browsing on the Channel Islands.

Habitat Restoration Opportunity:

California Sunflower Bush – Ashy Buckwheat Scrub | *Encelia californica - Eriogonum cinereum* Shrubland Alliance

The habitat restoration plant palette can be designed with California bush sunflower as co-dominant in the shrub canopy with California sagebrush, bladderpod, and coast prickly pear.

Other native shrubs can include California boxthorn, ashy buckwheat, California buckwheat, coast goldenbush, coast cholla, chaparral prickly pear, deerweed, lemonade berry, black sage, chaparral bush mallow (*Malacothamnus fasciculatus*), and wishbone bush. Common fiddleneck and four species of *Phacelia* (*cicutaria, distans, ramosissima, tanacetifolia*) are common herbs. Southern California walnut and blue elderberry are suitable to plant in drainages to help manage erosion (e.g., in place of giant reed patches that are removed). Big saltbush is also appropriate at low frequency, planted in drainages to help stabilize erosive features.



Figure 3-31 Example of Upland Black Mustard and Tocalote Fields on West Bluff Slope.
Photo Taken April 27, 2023



Figure 3-32 California Boxthorn Plant on West Bluff Slope.
Photo Taken September 24, 2023

IMPROPER FILL MATERIAL PLACED ON MESA VERNAL POOL WATERSHED

The improper fill material, containing chemically active construction and paving debris, was placed (circa 1987 to 1988) on the vernal pool watershed and supports an infestation of invasive plants (Figure 2-21). The natural grade of the Mesa soil surface is exposed in narrow east-west channels (e.g., see Figure 3-33) that were excavated by The Keith Companies in 1993 to determine the limits of the archaeological site (CA-ORA-58). Where the native soil on the Mesa is exposed, rainfall accumulates due to the natural clay hardpan layer creating wetland habitat (e.g., see Figure 3-33 and Figure 3-34) for amphibians (e.g., California tree frogs [*Pseudacris cadaverina*] and western toads [*Anaxyrus boreas*]; Asef 2019), numerous invertebrates (e.g., versatile fairy shrimp [*Branchinecta lindahli*]; Glenn Lukos Associates 2017), and vernal pool related plants (e.g., low wooly marbles, *Psilocarphus brevissimus*).

Before the improper placement of the fill, precipitation on this watershed would feed the large vernal pool (Feature 1) and create localized ephemeral ponding in very small depressions. Today, the location of these depressional features in this area is the result of the placement of improper fill material, with the underlying native hardpan soil continuing to provide the same ecological function of creating ephemeral pool habitat.

The improper fill material is dominated by invasive herbaceous weeds, including black mustard, tocalote, nonnative grasses (*Bromus* spp. and *Avena* spp.) and devil's thorn (*Emex spinosa*) (Figure 3-35). Patches of invasive perennial weeds, such as fennel and tree tobacco, occur throughout the fill area. Very low cover of natives occurs, including low wooly marbles (*Psilocarphus brevissimus*), clustered tarplant, coyote brush, coast goldenbush, California buckwheat, and big saltbush (Asef 2019).

The artificially created depressions support a mix of native plants tolerant of short-term inundation and invasive plants that are more common in disturbed wetland conditions. Nonnatives form most of the cover, including seaside barley (*Hordeum marinum*), hyssop loosestrife (*Lythrum hyssopifolia*), redstem filaree, poison hemlock, and curly dock.

Native plants within the artificial depressions include neckweed, Cooper's popcorn flower, clustered tarweed, mulefat, pale spike rush, American pillwort, and common fiddleneck (Asef 2019).



Figure 3-33 *Example of East-West Facing Channels Created in Improper Fill Placement During 1993 Archaeological Site Investigation.*

Provided by City of Costa Mesa; Photo Taken March 3, 2023



Figure 3-34 *Example of Wetlands at the Natural Surface Level In Between Improper Fill Placement on the Vernal Pool Watershed.*

Provided by City of Costa Mesa; Photo Taken March 3, 2023



Figure 3-35 *Example of Upland Black Mustard and Tocalote Fields on the Improper Fill Material on the Mesa.*

Photo Taken April 27, 2023

Habitat Restoration Opportunity for Areas Not Historically Tilled

Clustered Tarplant Fields | *Deinandra fasciculata* Herbaceous Alliance

The hydrological function, biodiversity, and extent of the Mesa vernal pool watershed and the vernal pools would be significantly improved with the removal of the improper fill material as part of a Mesa flower fields and vernal pool watershed habitat restoration project, which also includes sustained weed management and native seed addition.

Remove the improper fill material to the natural soil grade with special attention to not disturbing the natural soil to protect cultural resources. In addition to diverse native flower fields sed mixes, this Restoration Area will also benefit from the inclusion of low rates of coast goldenbush in the seed mix to help colonize areas that have been significantly impacted by past soil disturbance.

Habitat Restoration Opportunity for Areas that were Tilled for Crop Fields:

Fiddleneck - Phacelia Fields | *Amsinckia* (*menziesii, tessellata*) - *Phacelia* spp. Herbaceous Alliance

Weed management and the addition of a native herbaceous flower field seed mix with low rates of native shrubs (e.g., coast goldenbush).

3.7.3 Upland Shortpod Mustard and Tocalote Fields | *Hirschfeldia incana - Centaurea melitensis* Herbaceous Semi-Natural Association (Map Code 4255)

CULTIVATED MESA SOIL NORTH OF VERNAL POOL WATERSHED

This community occurs on the northern portion of the Mesa that was historically cultivated for crops in the early 1900s, including plowing or tilling (e.g., Figure 2-2 and Figure 2-4). This area may have been selected for cultivation because it did not exhibit the clay hardpan soils, which have poor value for agricultural crops due in part to poor drainage (USDA 1978). Alternatively, farmers may have actively broken up the clay hardpan layer to improve drainage for farming. Because of this agricultural history and irrevocable change to the natural soil condition, it is less likely that this portion of the Mesa will support vegetation communities in the Californian Mixed Annual/Perennial Freshwater Vernal Pool/Swale Bottomland Group, such as Clustered Tarplant Fields. The low frequency of woody shrubs (nonnative or native) in this area, and the dominance by annual life-forms, such as the native common fiddleneck and popcorn flower (*Plagiobothrys* sp.) in the late winter and early spring (e.g., Figure 3-36), followed by high vegetative cover of shortpod mustard and tocalote in late spring and summer (Figure 3-37), indicate that is appropriately classified in the California Annual Herb/Grass Group (e.g., Figure 3-38). In areas with more bare ground on the northern Mesa, the native annual forb turkey-mullein (*Croton setiger*) can be common.

Herbaceous cover is also provided by nonnative annual grasses (primarily *Bromus* spp.). There is low cover of black mustard and fennel, but these species are more prevalent in the drainage swale in the northwest portion of the Mesa. There is scattered cover from occasional dense patches of coast goldenbush.

Scarcity of black mustard and general lack of native shrubs or perennial weeds are two factors that help to distinguish the Upland Shortpod Mustard and Tocalote Fields vegetation association from the Upland Mustards and Tocalote Fields association described previously as occurring within the improper fill material placement area. The exception to this rule is provided by the nonnative perennial weed curly dock, which is common in disturbed areas with poor drainage (DiTomaso et al. 2013).

Most of this vegetation type occurs in areas that are part of the registered archaeological site identified as CA-ORA-58.

Habitat Restoration Opportunity:

Fiddleneck - Phacelia Fields | *Amsinckia* (*menziesii, tessellata*) - *Phacelia* spp. Herbaceous Alliance

Selective weed control and native herbaceous seed addition to increase the native herb component. Because the weed seed bank is so large, the level of effort required to achieve dominance by native species will be equivalent to expectations for a typical restoration project.



Figure 3-36 *Example of Native Common Fiddleneck on the Northern Mesa in Late Winter 2023.*

Photo Taken March 8, 2023



Figure 3-37 *Example of Nonnative Shortpod Mustard, Black Mustard, and Tocalote on the Northern Mesa in Spring 2023.*

Photo Taken April 27, 2023

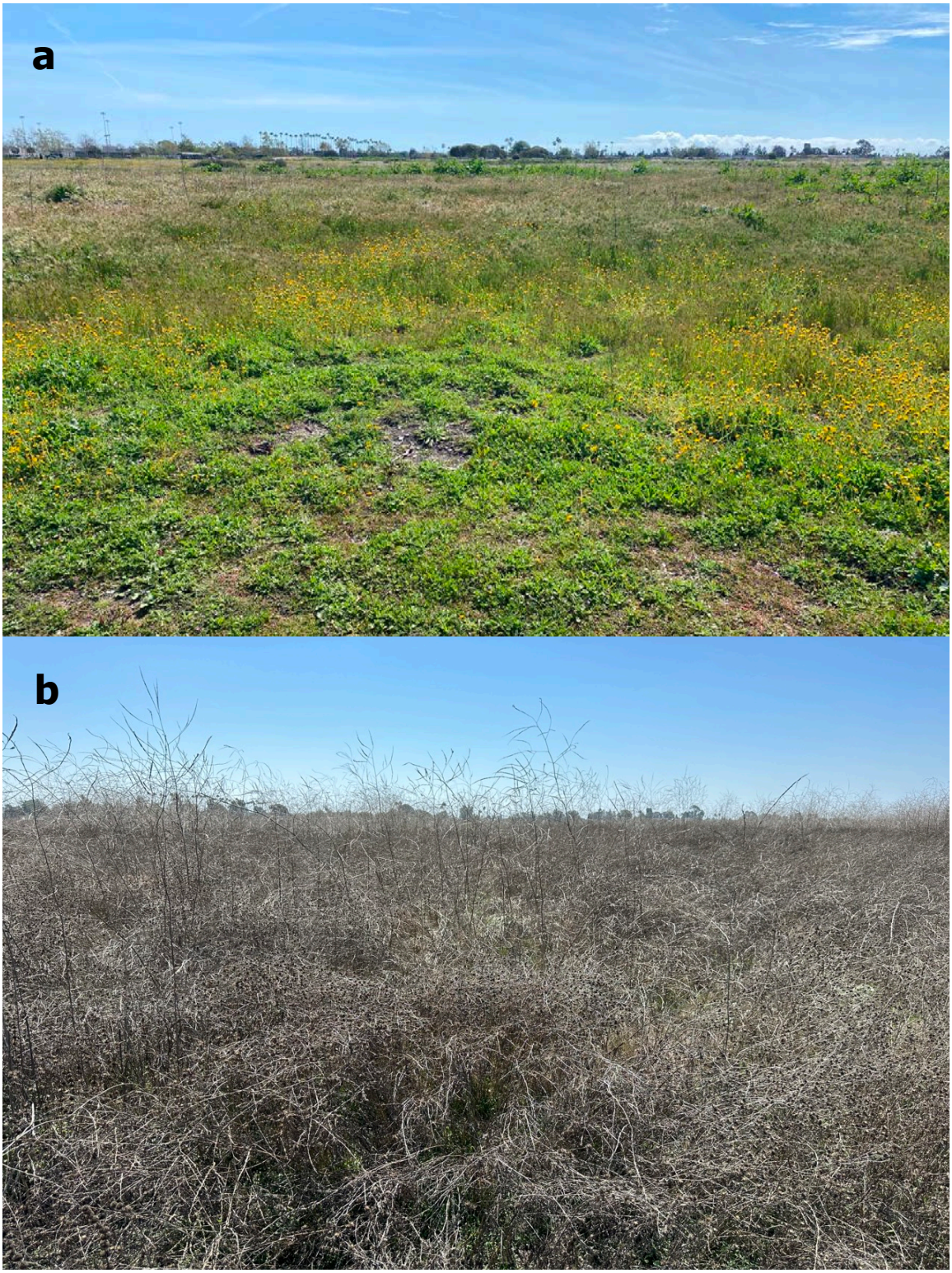


Figure 3-38 Example of Shortpod Mustard and Tocalote Fields on the Mesa in (a) Late Winter, March 8, 2023, and (b) Summer, September 24, 2023.

3.7.4 Poison Hemlock or Fennel Patches | *Conium maculatum - Foeniculum vulgare* Herbaceous Semi-Natural Alliance (Map Code 4270)

Poison hemlock patches occurs in two places: 1) in and around the drain along base of the West Bluffs at the western edge of Fairview Park and adjacent to Talbert Regional Park; and 2) in dense patches at the base of the north-facing slopes and south of the Wetlands and Riparian Creation Areas.

DRAIN AT BASE OF THE WEST BLUFF

The drain at the base of the bluff, a manmade feature that was created in alluvial soils of the Santa Ana River floodplain, has become silted in sections due to erosion. The Santa Ana River was placed in a concrete channel for flood protection following flood flows in 1938 that impacted farmland and is adjacent to Talbert Nature Preserve (OC Parks).

Poison hemlock is dominant, occurring with various other nonnative weeds, including black mustard, ripgut brome, Italian thistle (*Carduus pycnocephalus*), tocalote, fennel, tree tobacco and wild radish; some areas include patches of white horehound or castor bean. Co-occurring natives include giant wild rye, cliff aster (*Malacothrix saxatilis*), and slender stinging nettle (Figure 3-39). Native shrubs, such as coyote brush and blue elderberry, provide only sparse cover.

Habitat Restoration Opportunity:

Mulefat thickets | *Baccharis salicifolia* Shrubland Alliance

Mulefat co-dominant in the shrub canopy with blue elderberry, sandbar willow, California sagebrush, and coyote brush. There may be low cover of other willow trees (*S. lasiolepis, S. laevigata*).

Blue elderberry represents a potentially important habitat resource for Cactus Wrens, if they recolonize the area, by providing a preferred food source (berries in late summer) and high perching opportunities.



Figure 3-39 Example of Poison Hemlock or Fennel Patches at Base of West Bluff.
Photo Taken September 24, 2023

NORTH-FACING SLOPES

The dense patches of poison hemlock at the base of the north-facing slope also include nonnative annual grasses (*Bromus* spp. and *Avena* spp.), black mustard, and scattered coyote brush.

Habitat Restoration Opportunity:

Black sage scrub | *Salvia mellifera* Shrubland Alliance

This area is contiguous with Upland Black Mustard and Tocalote Fields that can be restored to coastal sage scrub with a dominant black sage component. The north-facing slopes will also support co-dominant cover from perennial native shrubs, such as toyon and lemonade berry.

3.8 CALIFORNIA ANNUAL HERB/GRASS GROUP

3.8.1 Fiddleneck - Phacelia Fields (Disturbed) | *Amsinckia* (*menziesii, tessellata*) - *Phacelia* spp. Herbaceous Alliance (Disturbed) (Map Code 4310)

This vegetation type occurs in small patches in the southwestern portion of the Mesa that have been highly disturbed by grading, vegetation clearing, and informal trails (Figure 3-40). Native herbaceous cover is provided by common fiddleneck, clustered tarweed, popcorn flower, and nonnative herbaceous cover is provided by crown daisy. Occasional patches of invasive mustards (e.g., *Brassica nigra*, *Hirschfeldia incana*), wild radish, and tocalote.

Habitat Enhancement Opportunity:

Fiddleneck - Phacelia Fields | *Amsinckia* (*menziesii, tessellata*) - *Phacelia* spp. Herbaceous Alliance

Selective weed control and native herbaceous seed addition to increase the native herb component.



Figure 3-40 *Example Fiddleneck - Phacelia Field in Southwestern Corner of the Mesa.*
Photo Taken March 3, 2023

3.9 ARID WEST FRESHWATER EMERGENT MARSH GROUP

3.9.1 California Bulrush – Cattail Marsh | *Schoenoplectus californicus* – *Typha* spp. (angustifolia, latifolia) Association (Map Code 6135)

This marsh habitat occurs primarily in the created Wetlands and Riparian Habitat Project Area (Phase 1 and 2) in the northern part of Fairview Park, associated with four created ponds (Ponds B to E) (Figure 3-41). It also occurs at the upper end of the western drain that runs along the edge of the Bluff, adjacent to the staircase, where it occurs with marsh fleabane (Figure 3-42). California bulrush is co-dominant with cattails (*Typha* spp.) in freshwater marsh along the edges of the ponds in the Wetlands and Riparian Habitat Project Area.

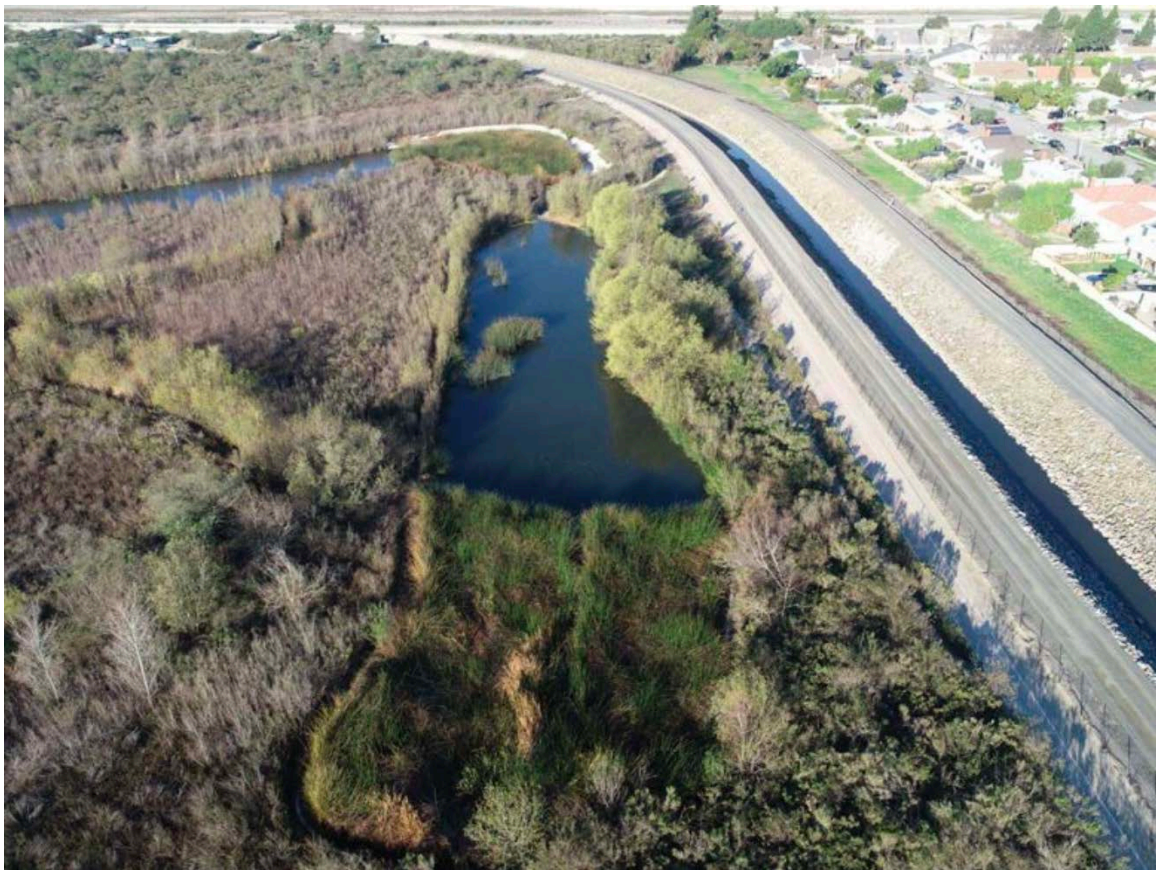


Figure 3-41 Example California Bulrush – Cattail Marsh in Ponds D and E.

Source: *Fairview Park Riparian and Wetlands Restoration Project – Annual Report 2021*



Figure 3-42 *Example of California Bulrush – Cattail Marsh in Drain at Base of West Bluff.*

Surface Water Covered with Green Algae in the Drain at Base of Bluff Immediately After the Outfall of the Last Detention Basin in the Created Wetlands and Riparian Habitat Project Area (Photo Taken September 24, 2023).

3.10 Californian Mixed Annual/Perennial Freshwater Vernal Pool/Swale Bottomland Group

3.10.1 Clustered Tarplant Fields | *Deinandra fasciculata* Herbaceous Alliance (Map Code 6500)

Clustered tarplant fields occur in portions of the vernal pool watershed on the Mesa. The vernal pool watershed shares the unique soil conditions (i.e., soils with a clay hardpan layer that retains water throughout some portion of the year) that both directs precipitation to fill the vernal pools on the mesa and can pond locally in small depressions that support wetland flora and fauna. The clay hardpan not only results in poorly drained soils, but it comprises a physical barrier to any plant with a prominent taproot, two conditions that limit the cover provided by larger woody plants on the Mesa.

Clustered tarplant is the most dominant native herbaceous species, co-occurring with common fiddleneck, popcorn flower, and other native forbs (Figure 3-43). Nonnative species prevalent in this community include crown daisy, foxtail brome, tocalote, scarlet pimpernel (*Lysimachia arvensis*), curly dock, tumbleweed, and London rocket. Because

this vegetation community is defined by annual plants, it looks significantly different in summer after the flowering plants have set seed and senesced (Figure 3-43).

While clustered tarplant is a common understory plant in California coastal sage scrub, especially in the bare clearings around shrubs that are maintained by herbivory (Bartholomew 1970, DeSimone and Zedler 1999, Halligan 1973), the Mesa's unique soils preclude most woody shrubs from becoming established. Consequently, the clustered tarplant fields are dominated by annual herbaceous vegetation, with only occasional shrubs, such as coast goldenbush. Although the goldenbush may be killed off by extended periods of ponding during high-rainfall winters, the species is also quick to recolonize the same areas when conditions dry out, the fast-growing shrubs becoming established from wind-blown seeds.

Glider plane enthusiasts of the Harbor Soaring Society (HSS) have used the Mesa as a launching pad since the early 1960s, before the State sold the land to the County in the 1970s and before the area became a City park in the 1980s (dedicated on April 21, 1990). By the 2000s electric powered aircraft became more common. In 2005, the City of Costa Mesa graded a 150-ft wide by 470-ft strip in the southwestern portion of the park, which became the new takeoff and landing area for the HSS (e.g., Figure 2-18, Figure 2-19).

The fly field is in the vernal pool watershed, which is not compatible with the goal of protecting the vernal pools, the protected fairy shrimp species that occur in the pools, or the unique vegetation communities of the vernal pool watershed. The use and maintenance of the fly field compacts the soil, prevents the growth and reproduction of the native vegetation, decreases biodiversity, and increases bare ground and topsoil erosion. The initial grading and on-going maintenance and use of the fly field increases topsoil erosion in the vernal pool watershed, maintains unnaturally high levels of bare ground, and decreases cover of native plants that would otherwise colonize this area, including wetland and vernal pool associated species.

Habitat Enhancement Opportunity:

Clustered Tarplant Fields | *Deinandra fasciculata* Herbaceous Alliance

Selective weed control and native herbaceous seed addition to increase the native herb component.

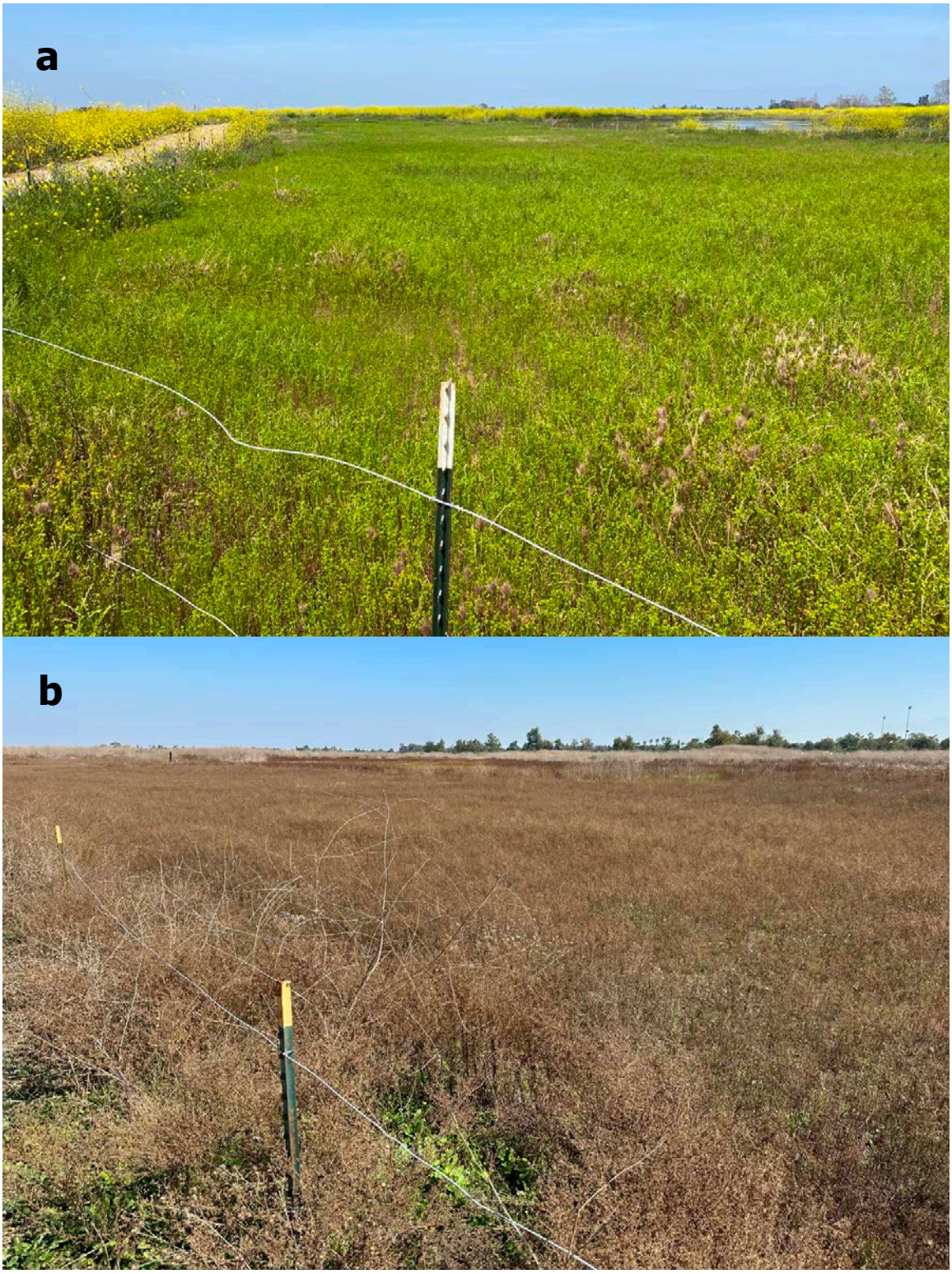


Figure 3-43 Example of Clustered Tarplant Fields Next to the Large Vernal Pool in (a) Spring, April 27, 2023, and (b) Summer, September 24, 2023.

Continued use of the fly field in its current location precludes restoring the vernal pool complex to the optimal level. Because the fly field sits in the middle of a disturbed vernal pool watershed, and because improper fill material remains in place decades after it was dumped on the Mesa, the hydrology of the vernal pool watershed remains impaired. The optimum restoration of the entire Mesa hydrology is contingent upon the ending maintenance of the fly field (e.g., mowing vegetation, compacting, and grading the soil flat), and the removal of the remainder of the improper fill material to reconnect the vernal pools to the historical vernal pool watershed.

3.10.2 Clustered Tarplant Fields (Restoration Area) | *Deinandra fasciculata* Herbaceous Alliance (Restoration Area) (Map Code 6550)

Clustered tarplant field restoration occurs in the vernal pool complex restoration area for vernal pool features 5, 6 and 7, which began in 2022 (see Glenn Lukos Associates Plan dated June 8, 2018) (Figure 3-44).



Figure 3-44 *Example of Clustered Tarplant Fields Restoration in the Background, Around Vernal Pool Features 5, 6, and 7.*

Photo Taken April 27, 2023

The vernal pools were inoculated with soil material containing seeds and invertebrates from vernal pool feature 1. The vernal pool watershed area is described as a form of "grassland restoration" in the Plan (Glenn Lukos Associates 2018), but we describe the same area as "Clustered Tarplant Fields (Restoration Area)" based on the dominance of native annuals that are establishing from seed, and the existing vegetation cover in less disturbed areas of the vernal pool watershed. Species planted in this area include coast goldenbush, foothill needlegrass, purple needlegrass, California melic, and narrow-leaf bedstraw (*Galium angustifolium*). Species seeded include California sunflower bush, clustered tarplant, miniature lupine, and California goldfields (*Lasthenia californica*). Long-term establishment and frequency of these populations will be determined by the interaction between competition with weeds, soil conditions (including microorganism diversity), weather conditions in the first few years, and the use of supplemental irrigation.

3.10.3 Pale Spike Rush Vernal Pool Bottoms | *Eleocharis macrostachya* Herbaceous Association (Map Code 6600)

Fairview Park is home to one of the last remaining coastal terrace vernal pool complexes in Orange County, which supports the endangered San Diego fairy shrimp (USFWS 2007), and endangered Riverside fairy shrimp. Conservation and management of the vernal pools in Fairview Park are essential components of the recovery plan for the San Diego fairy shrimp, as outlined in the Service's Recovery Plan for Vernal Pools of Southern California (USFWS 1998). During 2016/2017 surveys, the San Diego fairy shrimp was detected in vernal pool feature A, east of Placentia, and west of Placentia in the restored large vernal pool feature 1, as well as vernal pool features 4, 5, and 6. Furthermore, Riverside fairy shrimp were observed in vernal pool features 1 and 4 (Figure 3-45) (Glenn Lukos Associates 2017).

In addition to supporting the San Diego fairy shrimp and Riverside fairy shrimp, the vernal pools in Fairview Park are also home to several locally rare plant species. According to Hamilton (2023) and the City (2008), plants that occur in the vernal pools include needlespikerush (*Eleocharis acicularis*), vernal barley (*Hordeum intercedens*), red maids (*Calandrinia menziesii*), smooth boisduvilia (*Epilobium campestre*), Cooper's popcorn flower, low woolly marbles, plantain (*Plantago* spp.), common goldfields (*Lasthenia gracilis*), Coulter's goldfields (*Lasthenia glabrata* ssp. *coulteri*), alkali weed (*Cressa truxillensis*), waterworts (*Elatine brachysperma, E. californica*), common rockcress (*Planodes virginicum*), water starwort (*Callitriche* spp.), hairy waterclover (*Marsilea vestita*), flowering-quilwort (*triglochin scilloides*), shortseed waterwort (*Elatine brachysperma*), upright pepperweed (*Lepidium strictum*), peppergrass (*Lepidium nitidum*), water pygmyweed (*Crassula aquatica*), sand pygmy weed (*Crassula connata*), water clover (*Marsilea vestita*), American pillwort, little mouse tail (*Myosurus minimus* ssp. *apus*), coastal plantain (*Plantago elongata*), California plantain (*Plantago erecta*), ambrosia (*Ambrosia psilostachya*), neckweed (*Veronica peregrina* ssp. *xalapensis*), water speedwell (*Veronica anagallis-aquatica*), pale sack clover (*Trifolium*

depauperatum), toad rush (*Juncus bufonius*), alkali mallow (*Malvella leprosa*), adobe popcorn flower (*Plagiobothrys acanthocarpus*), and Cooper's popcorn flower.

The state and federally endangered San Diego button-celery (*Eryngium aristulatum* var. *parishii*) and California orcutt grass (*Orcuttia californica*) both have limited populations in the vernal pools that should be a focus of conservation, along with the other rare vernal pool plants that support a diverse and functional habitat for the San Diego and Riverside fairy shrimp.

Rare native species normally found around the edges of the vernal pools include prostrate vernal pool navarretia (*Navarretia prostrata*, California endemic plant), small-flowered microseris (*Microseris douglasii* ssp. *platycarpha*), salt grass (*Distichilis spicata*) and little mousetail (*Myosurus minimus* ssp. *apus*).

Nonnative plants that occur in the vernal pools include wild oats, ripgut brome, foxtail brome, foxtail barley, seaside barley, hyssop loosestrife, canary grass (*Phalaris minor*), red-stemmed filaree, scarlet pimpernel, cheeseweed mallow, bur clover, tumbleweed, pineapple weed (*Matricaria discoidea*), curly dock, windmill pink (*Silene gallica*), London rocket, five-horn smotherweed (*Bassia hyssopifolia*), scarlet pimpernel (*Lysimachia arvensis*), common plantain (*Plantago major*), and Boccone's sand spurry (*Spergularia bocconi*).

The vernal pools function largely as grasslands except during late winter and spring of years with sufficient rainfall, when they fill with water for several weeks to months. When water is present, the pools provide habitat for amphibians, such as the Western Toad, and foraging and resting habitat for a great variety of waterfowl and shorebirds, such as the Blue-winged Teal, Cinnamon Teal, Northern Shoveler, Northern Pintail, Black-necked Stilt, Whimbrel, Long-billed Dowitcher, Greater Yellowlegs, Snowy Egret, and White-faced Ibis. Large flocks of swallows forage over the pools, including Northern Rough-winged, Tree, Barn, and Cliff, often mixed with White-throated Swifts.

This unique habitat is a valuable resource for both biodiversity conservation and scientific research. Consequently, the USFWS has directed the City to implement management strategies that protect and enhance the ecological integrity of these vernal pool ecosystems in Fairview Park, thereby contributing to the recovery of the San Diego fairy shrimp and the preservation of rare plant species (USFWS 2014).

COMMON VERSATILE FAIRY SHRIMP IS A THREAT TO ENDANGERED FAIRY SHRIMP SPECIES

Common versatile fairy shrimp also occur in some of the ephemeral ponds that are formed on the Mesa by the Improper Fill Material. These ponds have a different hydrologic function than the natural vernal pools that support San Diego fairy shrimp and Riverside fairy shrimp. The water ponding is typically deeper than the natural vernal pools, which provides habitat for common versatile fairy shrimp.

The common versatile fairy shrimp poses a threat to the Riverside and San Diego fairy shrimp primarily due to its potential to outcompete and hybridize with these endangered species (USFWS 2007). As a widespread and adaptable species, the

common versatile fairy shrimp can tolerate a wide range of environmental conditions, allowing it to thrive in various habitats, including vernal pools.

In California's vernal pools, the common versatile fairy shrimp has been found to invade the habitats of the endangered Riverside and San Diego fairy shrimp. This invasion leads to increased competition for resources, such as food and space, which can negatively impact the growth, reproduction, and survival of the endangered species.

Furthermore, the common versatile fairy shrimp is capable of hybridizing with the Riverside and San Diego fairy shrimp. Hybridization can lead to the loss of genetic diversity and the dilution of the gene pool of the endangered species, potentially reducing their ability to adapt to changing environmental conditions. This can further jeopardize the long-term survival of these endangered species.

Overall, the introduction and spread of the common versatile fairy shrimp in the habitats of the Riverside and San Diego fairy shrimp pose significant threats to their survival and recovery efforts. And disturbance of the vernal pool watershed, including the improper fill material, informal trails and the HSS fly field contribute to the homogenization of vernal pool habitats. This homogenization can lead to the breakdown of species boundaries and negatively impact the genetic diversity of the San Diego fairy shrimp (Simovich et al. 2013).

The threat at Fairview Park can be managed by removal of the improper fill material as part of habitat restoration on the Mesa, with special attention to fine grading of the natural soil surface to drain towards the large vernal pool without creating deep impressions that might support common versatile fairy shrimp in the vernal pool watershed.

RESTORATION AND ENHANCEMENT OF VERNAL POOL FEATURES 1 AND 4

The vernal pool habitat was first formally documented in August 1994, by biologist Tony Bomkamp of Glenn Lukos Associates, who went on to initiate biological surveys of the vernal pool complex the following year This involved surveying the pools and reviewing a 1927 historical aerial photograph, which depicted the historical extent of vernal pool feature 1. Based on the comparison between the 1927 extent (3.9 acres) and the 1995 extent (2.1 acres), Mr. Bomkamp determined that 1.8 acres of fill material had been placed in this largest pool in 1987/1988.

In 1996, restoration within portions of vernal pool 1 began. The Irvine Company implemented the project in cooperation with the City to mitigate for impacts at the University Research Park site (Glenn Lukos Associates 2002). A total of 0.95 acre of vernal pool basin was restored by carefully removing the improper fill material and preserving the natural soil surface. To mitigate impacts associated with the IKEA portion of the Home Ranch Project, an additional 0.85 acre was restored by again carefully removing the fill, and 0.16 acre of vernal pool feature 4 was enhanced (e.g., see Figure 3-46) (Glenn Lukos Associates 2002). Vernal pool feature 4 includes features that have been identified separately in past reports as features 4a, 4b, and 4c. It is not well documented whether the fill material removed for the restoration of vernal pool 1 was

disposed of offsite or was simply moved to another location on the Mesa. Final monitoring demonstrating successful implementation of the plan was completed in 2009.

Vernal pool features 1 and 4, and the hydraulic connection between these areas during average to above average rainfall years, can be seen in Figure 3-47.

RESTORATION OF VERNAL POOL FEATURES 5, 6, AND 7

In 2014, USFWS (2014) directed the City to restore vernal pool features 5, 6 and 7 and the associated watershed after the City graded the area for a parking lot in 2009. The USFWS (2014) also required several vernal pool watershed protection measures, including preparation of a long-term management plan to ensure high quality habitat for the protection of San Diego Fairy Shrimp in an update to the Fairview Park Master Plan.

CONSERVATION OF THE VERNAL POOL WATERSHED IS CRITICAL

The integrity of both the vernal pool and the surrounding watershed is crucial to the long-term survival and conservation of the San Diego fairy shrimp (USFWS 2007). The USFWS (2014) directed the City to protect the vernal pool watershed to comply with the Endangered Species Act.

The quality of the habitat surrounding vernal pools significantly influences their function (e.g., the amount and chemistry of the pooled water each winter/spring), with a direct impact on conservation of San Diego fairy shrimp and Riverside Fairy Shrimp at Fairview Park. Upland areas within vernal pool watersheds are also an important source of nutrients to vernal pool organisms. Vernal pool habitats derive most of their nutrients from detritus, which is washed into the pools from adjacent uplands, and these nutrients provide the foundation for the vernal pool aquatic community food chain (Eriksen and Belk 1999).

Figure 2-21 shows the vernal pool watershed, including the portion covered by improper fill material, which should be removed as part of habitat restoration of the Mesa. Once restored, the vernal pool watershed should be managed by the City in perpetuity, to ensure high-quality habitat for the protection of San Diego Fairy Shrimp, as required by USFWS (2014).

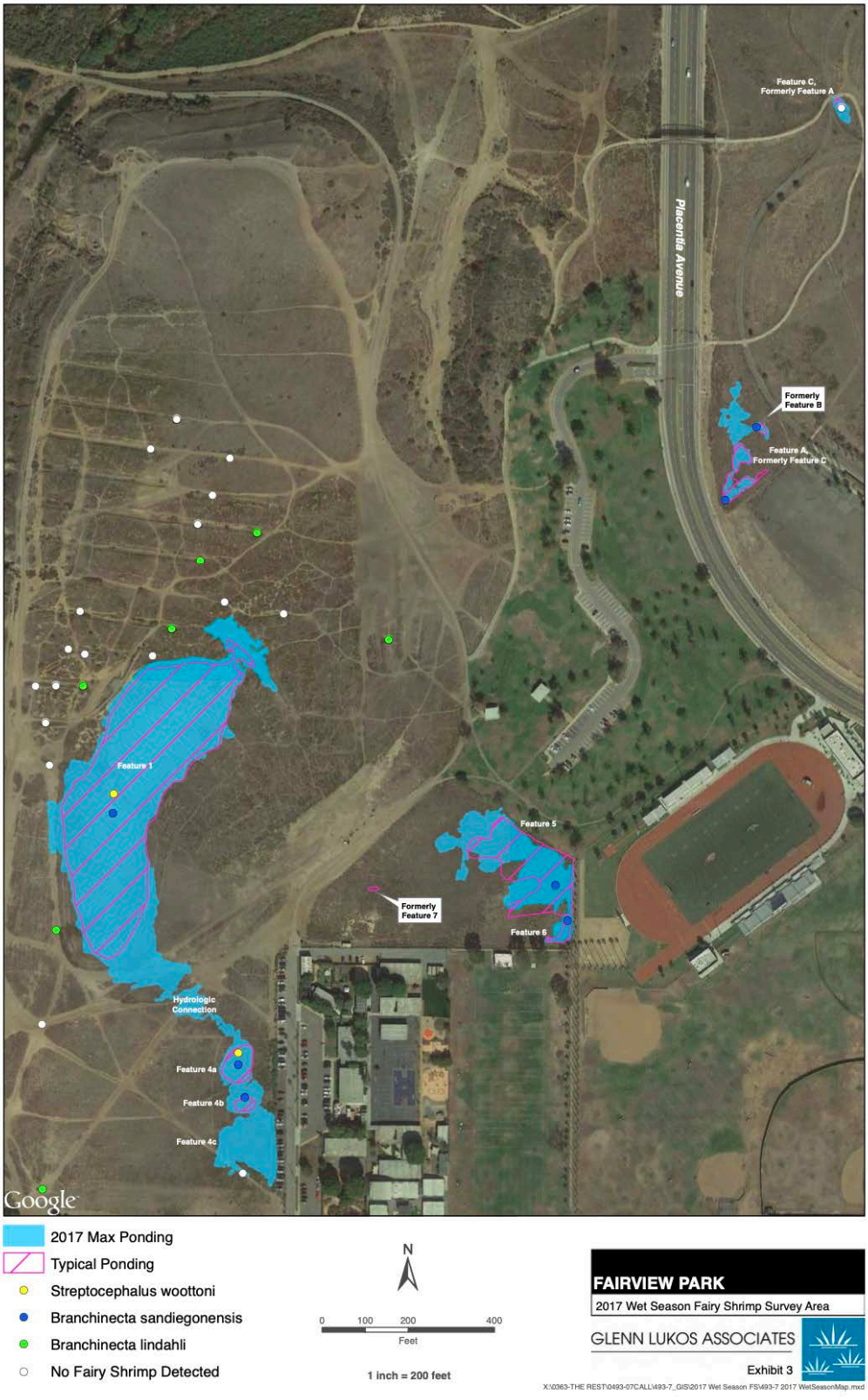


Figure 3-45 Exhibit 3 from Glenn Lukos Associates 2017 Wet Season Fairy Shrimp Survey.



Figure 3-46 View of Vernal Pool Feature 4c.
Photo Taken March 8, 2023



Figure 3-47 *Examples of Hydrologic Connection Between the Large Vernal Pool 1 and Vernal Pools 4a, 4b, and 4c South of the Trail Bisecting the Vernal Pool Watershed (Provided by City of Costa Mesa; Photo Taken March 3, 2023).*

Provided by City of Costa Mesa; Photo Taken March 3, 2023

3.10.4 Pale Spike Rush Vernal Pool Bottoms (Restoration Area) | *Eleocharis macrostachya* Herbaceous Association (Restoration Area) (Map Code 6650)

As required by USFWS (2014), the City began restoration of vernal pool features 5, 6 and 7 (Figure 3-48) in 2022 following the plan prepared by Glenn Lukos Associates (2018). The vernal pools were inoculated with soil material containing seeds and invertebrates from vernal pool 1, and maintenance of this habitat is ongoing. The vernal pool watershed is also being restored (see Section 3.10.2) and a buffer of native scrub was planted along a fenced perimeter (see Section 3.6.3).



Figure 3-48 *View of Vernal Pool Restoration Project for Vernal Pool Features 5, 6, and 7 (Initiated in 2022).*

Provided by City of Costa Mesa; Photo Taken March 3, 2023

3.11 COASTAL BAJA CALIFORNIA NORTE MARITIME SUCCULENT SCRUB GROUP

3.11.1 Coast Prickly Pear Scrub | Opuntia littoralis - Opuntia oricola - Cylindropuntia prolifera Shrubland Alliance (Map Code 8120)

Large patches of coast prickly pear occur on the West Bluff, and these historically provided nesting habitat for Cactus Wrens. Native shrubs that co-occur with the cactus patches include California bush sunflower and bladderpod (Figure 3-49). Between cactus

plants and in larger patches interspersed with larger groups of cacti, three nonnatives are common: tree tobacco, black mustard, and castor bean.

> **Habitat Enhancement Opportunity:**
>
> **Coast Prickly Pear Scrub** | *Opuntia littoralis - Opuntia oricola - Cylindropuntia prolifera* Shrubland Alliance
>
> Selective weed control for accessible areas, and native herbaceous seed addition to increase the native herb component of the patches and compete with larger invasive weeds that can overtop the cactus.



Figure 3-49 *Example of Coast Prickly Pear Scrub on West Bluff Slope.*
Photo Taken September 24, 2023

3.12 URBAN/DISTURBED/OTHER GROUP

The developed parts of Fairview Park support wildlife adapted to landscaped areas with conspicuous human presence. Typical species found in developed areas include the Mourning Cloak butterfly, Canada Goose, Rock Pigeon, Nuttall's Woodpecker, Black Phoebe, Cassin's Kingbird, American Crow, Western Bluebird, House Finch, American Gold- finch, Hooded Oriole, and Yellow-rumped Warbler.

3.12.1 Introduced Trees (Map Code 9100)

This classification is used for one tree, the nonnative spineless yucca (*Yucca gigantea*), which grows at the base of the Bluff near the southern boundary of the park.



Figure 3-50 Nonnative Tree, Spinless Yucca, at base of the Bluff.
Photo Taken September 24, 2023

3.12.2 Irrigated Lawn and Ornamental Landscaping Trees (Map Code 9150)

Areas of irrigated lawn and ornamental nonnative trees intensively maintained for aesthetics and active human recreation (Figure 3-51).

These areas were historically part of the vernal pool watershed and vernal pool complex on the Newport Mesa (see historical aerials Figure 2-2 to Figure 2-14). They extend outside of the park boundaries to include areas that are now residential neighborhoods and commercial development. They were selected for development in part because they were flat, in a desirable coastal zone, and were not valuable farmland soils.



Figure 3-51 Example of Irrigated Lawn and Ornamental Landscaping Trees at Fairview Park.
Photo Taken September 24, 2023

Other Management Opportunity: While these areas are not currently the focus of habitat restoration effort because of the past development of these park features, there may be opportunities to repurpose some of these areas with updated programming consistent with needs of the public. This may include the following concepts:

- Low water-use and native landscaping with a plant palette and maintenance schedule that is complementary to the native habitat areas in the park.
- Recreating the opportunities for "natural play" (e.g., soil mounds that can be manipulated for sensory and spontaneous, creative play) that currently occur in locations that are incompatible with natural and cultural resources (i.e., use of these areas causes erosion, reduces water quality, spreads invasive plants, degrades archaeological artifacts) that must be protected-in-place (e.g., vernal pool watershed, indigenous people village archaeological areas)

3.12.3 Urban/Disturbed (Map Code 9300)

Includes the following features in Fairview Park:

- **Fairview Channel**—a concrete lined trapezoidal flood control channel (Figure 3-52) operated by the Orange County Flood Control District (OCFCD). The channel conveys urban runoff and storm water from outside of Fairview Park to the Greenville-Banning Channel, which parallels the Santa Ana River Channel.
- **Parking Lot**
- **Railroad Tracks**—narrow-gauge railway tracks, including gravel base, and associated managed vegetation area adjacent to the tracks (Figure 3-53).
- **Train Yard** (Figure 3-54)
- **Train Station** (Goathill Junction) (Figure 3-55)



Figure 3-52 View of Fairview Channel from Placentia Avenue.
Photo Taken September 24, 2023



Figure 3-53 *View of Narrow-Gauge Railway Track.*

Photo Taken March 8, 2023



Figure 3-54 *View of Train Yard.*

Photo Taken September 24, 2023



Figure 3-55 *View of Goathill Junction Train Station.*
Photo Taken March 8, 2023

3.12.4 Urban-Sidewalk/Bridge/Trail (Map Code 9310)

These are hardscaping features that facilitate human movement through the park, including existing concrete sidewalks (Figure 3-56), asphalt access roads/sidewalks (Figure 3-57), the pedestrian bridge over Placentia (constructed in 2006) (Figure 3-58), the staircase from the Mesa to Talbert Nature Preserve (constructed in 2009) (Figure 3-59), and the boardwalk/wildlife viewing platform built in 2010 adjacent to the large vernal pool (Figure 3-60).

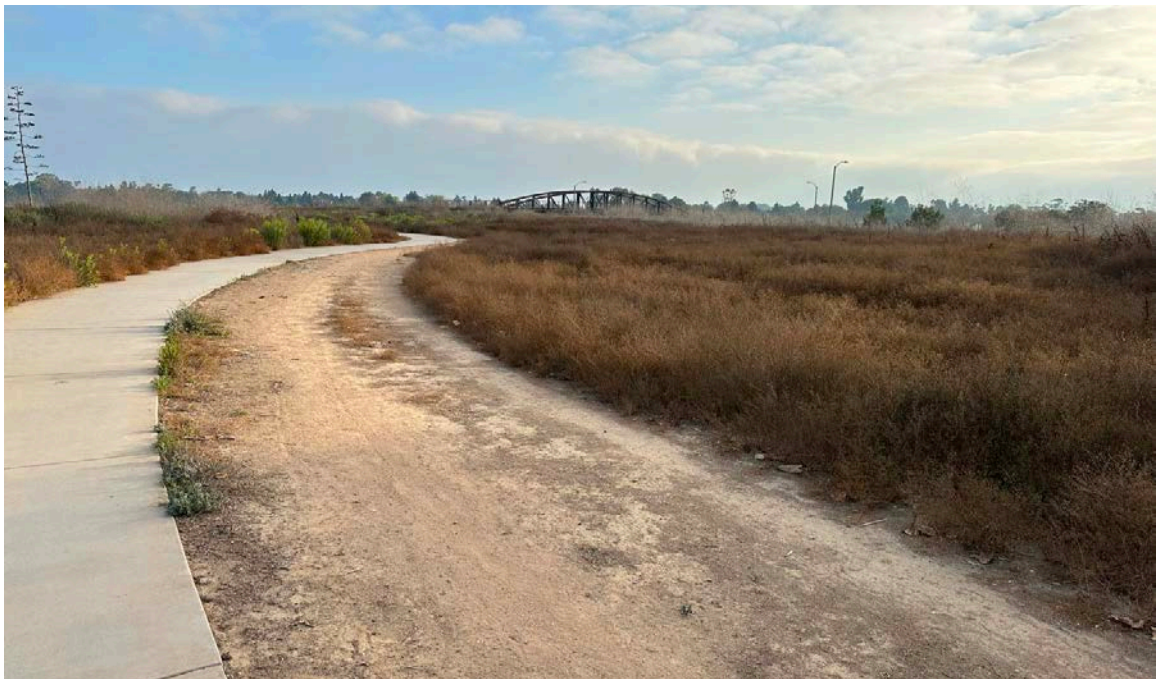


Figure 3-56 *Example of Concrete Walkway.*

Photo Taken September 24, 2023



Figure 3-57 *Example of Asphalt Access Road on Norther Bluff Leading to Talbert Nature Preserve.*

Photo Taken April 27, 2023



Figure 3-58 *Pedestrian Bridge Connecting the Park Across Placentia Avenue.*
Photo Taken September 24, 2023



Figure 3-59 *Staircase from the Mesa to Talbert Nature Preserve.*
Photo Taken April 27, 2023



Figure 3-60 Aerial View of the Wildlife Viewing Platform Next to the Large Vernal Pool.
Provided by City of Costa Mesa; Photo Taken March 3, 2023.

3.12.5 Natural Soil or Reconstructed West Bluff Trail (Map Code 9315)

These are primary trails that are on natural soils or decomposed granite for some trails associated with the Wetlands and Riparian Habitat Project (Figure 3-61).

The City implemented an emergency project in spring 2019 to address erosion of th West Bluff. The City took improper fill material from the Mesa (see Figure 3-62 for the donor material location) to regrade most of the wester perimeter trail on the Mesa, along the edge of the Bluff (Figure 3-63). See Section 2.2 for further discussion of the improper fill material placed on the Mesa. The reconstructed trail with the fill material has a slight (2%) grade perpendicular to the path, directing water towards the Mesa and away from the Bluff, which is prone to erosion.



Figure 3-61 Example of Mesa Perimeter Trail on Natural Soil Grade.

Photo Taken March 8, 2023



Figure 3-62 *View of Donor Material Location for Reconstructed Trail on Western Bluff in February 2019 (Left) and May 2019 (Right) Outlined in Yellow.*

Source: Google Earth Pro

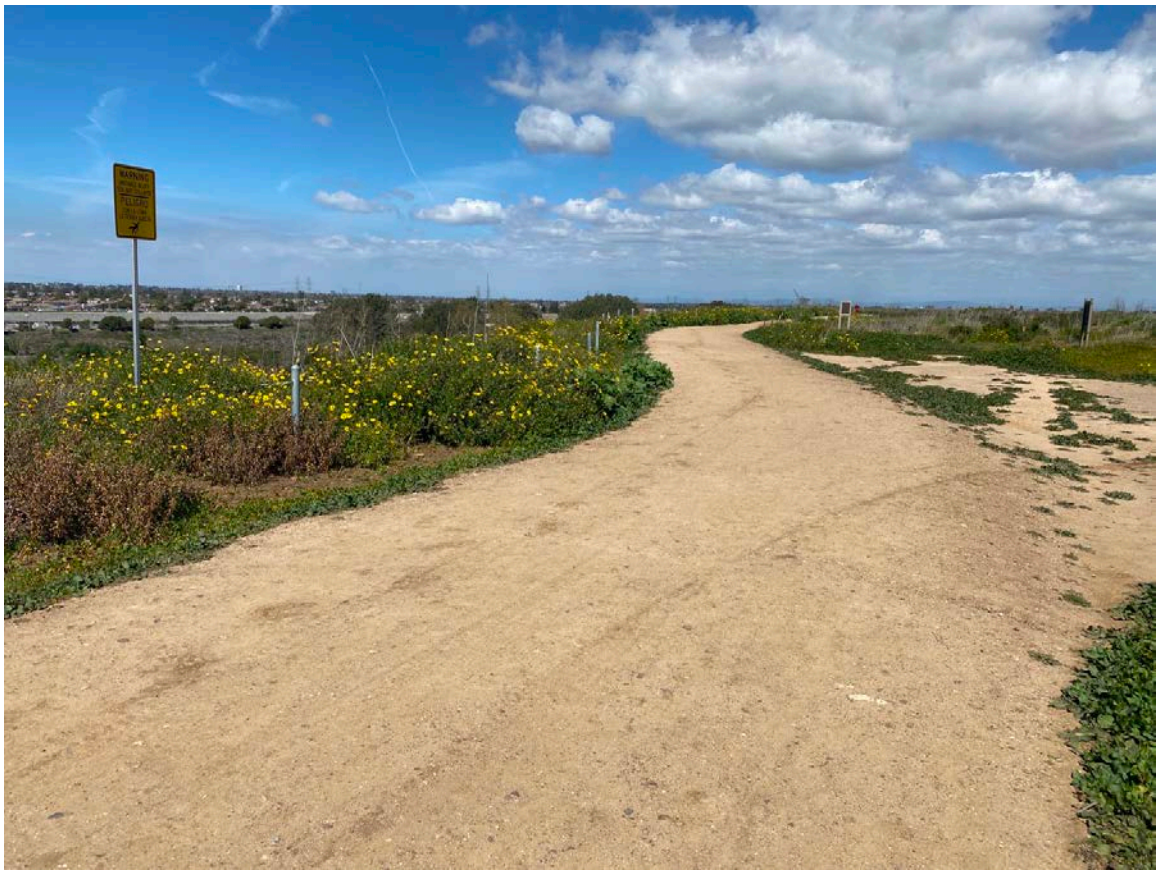


Figure 3-63 *Example of Reconstructed Trail along Western Perimeter of the Mesa Designed to Reduce Bluff Erosion.*

Photo Taken March 8, 2023

3.12.6 Fuel Modification Zone (Map Code 9320)

These areas are managed to reduce fire risk to buildings and to provide a defensible space buffer for fire fighters to work during a fire event. The Orange County Fire Authority (OCFA) generally requires that a 100-ft fuel modification zone (FMZ) be maintained around habitable structures, following the requirements of the state resource code. Although the distance measurement is technically required to be made from the nearest structure, often the 100-ft FMZ is maintained from the property line, which is the existing standard of practice in Fairview Park for areas adjacent to habitable structures.

FMZ's are primarily dominated by nonnative annual grasses and forbs due to past disturbance from agriculture, construction, and other earthwork to modify stormflow. Annual mowing during the summer season, prior to the height of the fire season, maintains dominance by nonnative plants. Common nonnatives include annual grasses (e.g., *Bromus* spp., *Avena* spp.) and mustards (e.g., *Brassica* nigra, *Hirschfeldia incana, Raphanus sativus*). Nonnative landscaping trees (e.g., *Pinus* spp.) form part of the

overstory due to branches that encroach across the property line from neighboring properties (e.g., Figure 3-64)

The FMZ along the southern border of the park includes a large population of crown daisy (e.g, Figure 3-65).

> **Other Management Opportunity:** While these areas are not suitable for habitat restoration due to the FMZ requirements, there are opportunities to work with OCFA to develop plant palettes and fuel modification strategies that will achieve the fuel modification objectives (e.g., horizontal and vertical fuel breaks, trimming of dead standing vegetation), reduce the spread of invasive weeds in the park, and increase the quality of the habitat for native wildlife in the FMZ.



Figure 3-64 *Example of Fuel Modification Zone East of Placentia Avenue*
Photo Taken September 24, 2023



Figure 3-65 *Example of Fuel Modification Zone in the Southwest Mesa Adjacent to Houses on Pacific Avenue.*

Photo Taken September 24, 2023

3.12.7 Anthropogenic Areas of Little or No Vegetation (Map Code 9330)

These are denuded areas caused by human use (e.g., informal trails, bike riding, informal play) that have led to high bare ground cover, erosional features, and topsoil erosion (e.g., Figure 3-66). Areas that are excessively denuded and/or eroded due to low definition of the public trail system have a negative impact on habitat quality and preservation of archaeological resources. In general, the vegetation map calls out these areas if they are large enough to meet the minimum mapping unit. However, there are numerous volunteer trails that form a spiderweb of bare ground on the Mesa, and the cumulative impact on habitat quality and preservation of archaeological resources from these smaller trails are just as significant. Depressions in these areas on the Mesa will saturate and even pond in higher rainfall years. Some ponding areas recruit plants that are wetland indicators and could support protected fairy shrimp species.

Habitat Restoration Opportunity: These areas are best restored to the restoration target of a similar landscape position and soil type contiguous with the bare area.



Figure 3-66 Example of Highly Denuded Area Caused by Human Use on the Mesa.
Provided by City of Costa Mesa; Photo Taken March 3, 2023

3.12.8 Water Body (Map Code 9800)

Permanent ponds created in the northern lowlands of Fairview Park provide habitat for wildlife associated with open water and emergent vegetation. These include the Mexican Amberwing damselfly, Western Toad, Baja California Tree Frog, Mallard, Ruddy Duck, Pied- billed Grebe, Common Gallinule, American Coot, Double-crested Cormorant, Great Blue Heron, White-faced Ibis, Belted Kingfisher, Clark's Marsh Wren, and Great-tailed Grackle.

Pond E was created in Phase 1 of the Wetlands and Riparian Habitat Project (completed in 2009; OCFCD mitigation). Ponds A, B, C, and D were created in Phase 2 of the Wetlands and Riparian Habitat Project (on-going; OCTA mitigation) (Figure 3-67). The Retention Pond receives the water that has circulated through the wetland system.

Channels constructed of riprap convey water between the ponds.

Bulrush, cattails, pondweed (*Potamogeton* spp.), and algae grow in the ponds and channels, which impedes conveyance between the water bodies below the designed flow levels. The City annually mechanically removes this emergent vegetation under a

permit with CDFW to manage the risk of stagnate waters harboring mosquito production, as required by County vector control.

The drain that runs at the base of the Bluff, leading from the southwestern detention pond in the created Wetlands and Riparian Habitat, has surface water for a portion of the drain with an overstory of willow (*Salix* spp.) and blue elderberry trees (Figure 3-42). Further south the drain is silted, and the water is subsurface.



Figure 3-67 Open Water in Pond A (Photo Taken September 24, 2023).

Photo Taken September 24, 2023

3.12.9 Rip-rap/Concrete Pond Liner (Map Code 9810)

Areas of the created ponds and channels that are not vegetated or covered by water in the created Wetlands and Riparian Habitat.

4 HABITAT RESTORATION OPPORTUNITIES

4.1 HABITAT RESTORATION AND ENHANCEMENT TARGETS

Utilizing the 2023 vegetation map and field observations conducted in 2023, Land IQ has identified ecologically suitable habitat restoration (Figure 4-1) and enhancement (Figure 4-2) targets for various locations within Fairview Park. These targets were identified for vegetation map units that were highly degraded and in need of habitat restoration or would benefit from habitat enhancement, such as weed management and/or native seed addition.

The selection of ecologically appropriate restoration targets was based on a thorough assessment of several factors:

- environmental characteristics (e.g., soil, landscape position, slope aspect, slope angle) in each location;
- physiological or ecological relationships of the dominant or co-dominant species in each map unit;
- the identity of nearby vegetation communities, expert opinion based on habitat restoration experience; and
- a review of potential vegetation modeling outputs from the Nature Reserve of Orange County Habitat Restoration and Enhancement Plan Update (Brooks et al. 2019).

Based on this analysis, a total of 80.17 acres of habitat restoration opportunities and 14.52 acres of habitat enhancement opportunities have been identified within Fairview Park (Table 4-1). By focusing on these targeted areas and implementing suitable restoration strategies, the ecological health and biodiversity of Fairview Park can be significantly improved and maintained for the long term.

Habitat Restoration Guidelines for Fairview Park are provided in Attachment A.

4.2 OTHER MANAGEMENT OPPORTUNITIES

In areas that would benefit from enhancement from higher native cover and diversity but are not suitable for habitat restoration (e.g., fuel modification areas, smaller areas, or areas mowed regularly, such as in the immediate vicinity of the narrow gauge railroad tracks), other management opportunities have been identified (Figure 4-3).

OTHER MANAGEMENT OPPORTUNITY 1

To protect the resources in Fairview Park, highly invasive plants need to be controlled in perpetuity by the City. As an urban park with significant cultural and sensitive biological resources, new introductions of invasive plants and reintroductions of existing invasive plants will always pose ongoing threats. This includes areas that have already been restored or will be restored in the future. The long-term management of the park should include control of high-priority invasive species following an adaptive management approach, as presented in Section **Error! Reference source not found.**.

OTHER MANAGEMENT OPPORTUNITY 2

Prepare long-term management guidelines and actions to protect the vernal pools and vernal pool watersheds as described in this report, and as requested by the USFWS (2014) to conserve the San Diego fairy shrimp in compliance with the federal Endangered Species Act.Please refer to Section 1.1.3 (Need for the Master Plan Update).

OTHER MANAGEMENT OPPORTUNITY 3

Approximately six acres of land within the 100-ft fuel modification zone are currently maintained along property lines with neighboring properties to the north and south of Fairview Park. Working with the local fire authorities, a fuel modification plan can be developed that will allow for increased native diversity and habitat structure while still achieving the fuel modification goals for fire safety.

OTHER MANAGEMENT OPPORTUNITY 4

Approximately 24 acres within the narrow-gauge railroad network east of Placentia Avenue that are not suitable for habitat restoration because of the current use and maintenance of the associated open space. These areas could be (a) enhanced with higher native cover and diversity using plants that are tolerant of periodic mowing, and (b) managed for highly invasive weeds, especially larger stature perennial weeds, such as black mustard, wild radish, fennel, and poison hemlock, to establish and maintain suitable habitat for grassland birds, including winter occupancy by burrowing owls.

OTHER MANAGEMENT OPPORTUNITY 5

There are about 11 acres of manicured lawn and landscaping trees, a small portion of which could be repurposed to create an area for “nature play” (e.g., soil mounds that can be manipulated for sensory and spontaneous, creative play) to maintain this activity at the Park, while moving it out of the vernal pool watershed where that use is not compatible with the protection of biological and cultural resources.

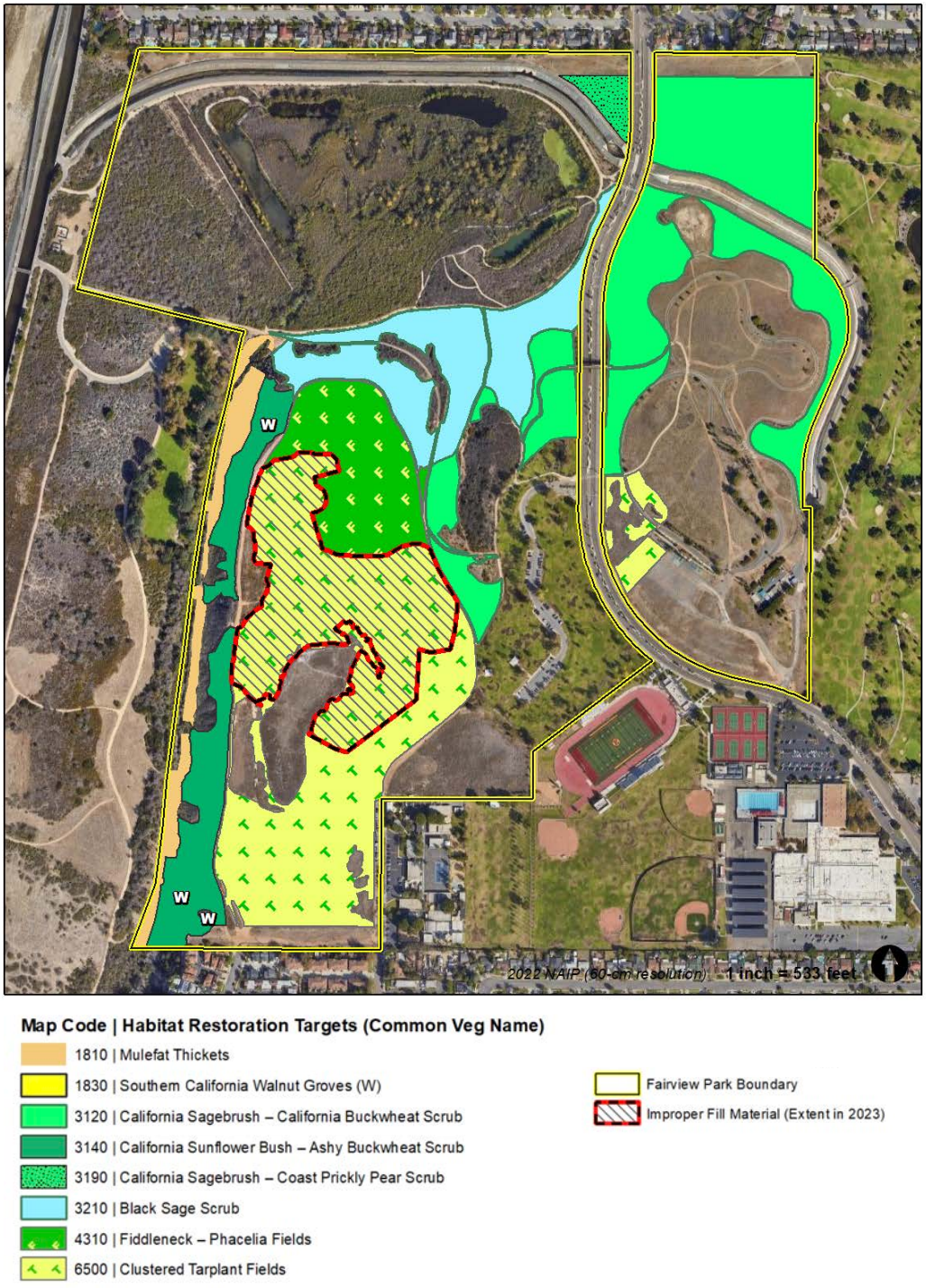


Figure 4-1 Habitat Restoration Opportunities in Fairview Park

The 3D version of the Habitat Restoration Opportunities Map is on the following page.


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Figure 4-2 Habitat Enhancement Opportunities in Fairview Park

The 3D version of the Habitat Enhancement Opportunities Map is on the following page.



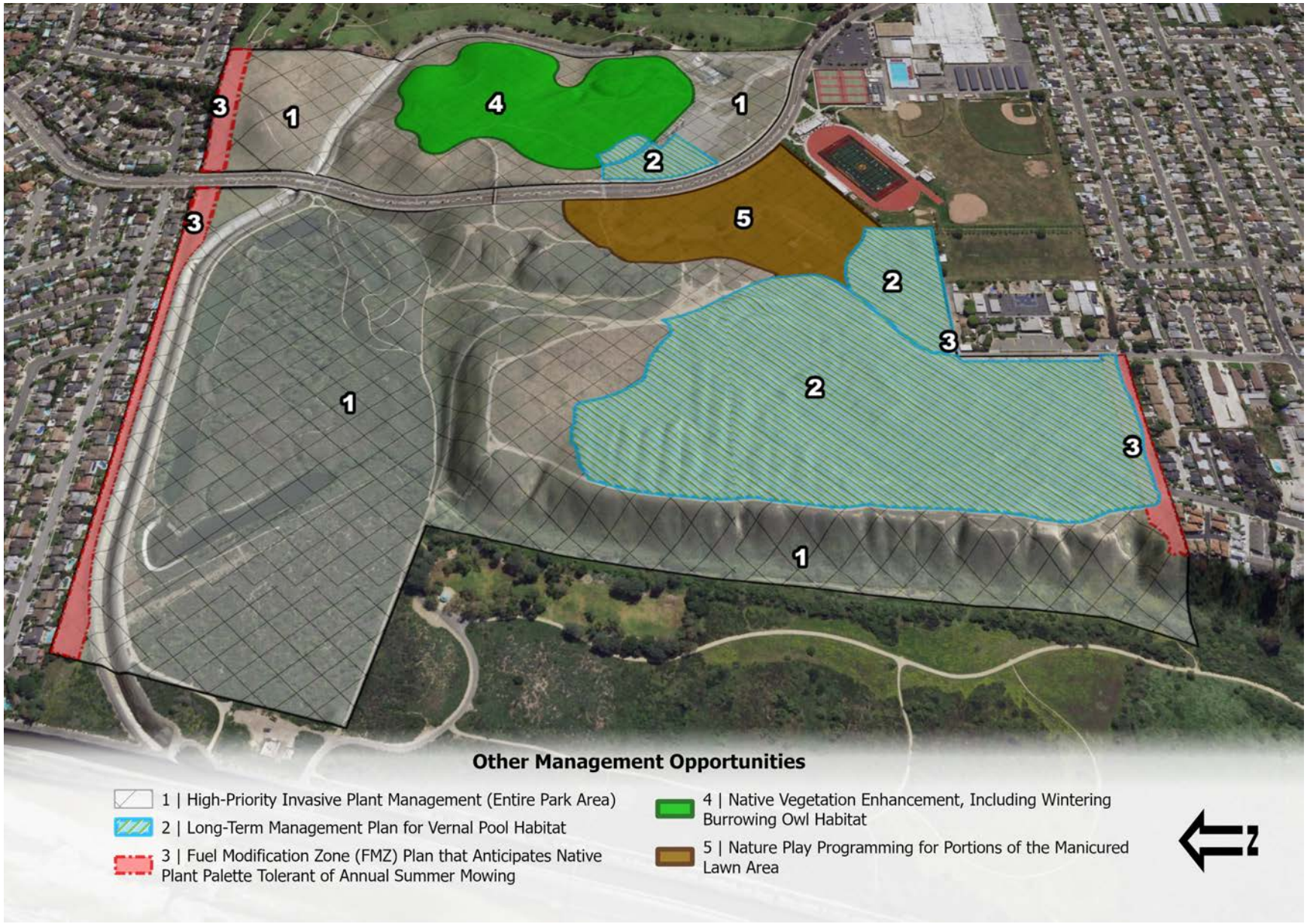
Table 4-1 Summary of Habitat Restoration and Enhancement Opportunities in Fairview Park.

Scientific Vegetation Map Unit Name	Map Code	Common Map Unit Name	Restoration or Enhancement Opportunities
Southwestern North American Riparian/Wash Scrub Group			
Baccharis salicifolia Shrubland Alliance	1810	Mulefat Thickets	3.5 acres of Restoration
Salix lasiolepis Shrubland Alliance	1820	Arroyo Willow Thickets	0.16 acres of Enhancement
Californian Broadleaf Forest and Woodland Group			
Juglans californica Forest & Woodland Alliance	1830	Southern California Walnut Groves	0.04 acres of Enhancement; 0.04 acres of Restoration
California Coastal Evergreen Bluff and Dune Scrub Group			
Baccharis pilularis Shrubland Alliance	2310	Coyote Brush Scrub	0.39 acres of Enhancement
Central and South Coastal Californian Coastal Sage Scrub Group			
Artemisia californica – Eriogonum fasciculatum Association	3120	California Sagebrush – California Buckwheat Scrub	3.48 acres of Enhancement; 22.46 acres of Restoration
Encelia californica – Eriogonum cinereum Shrubland Alliance	3140	California Sunflower Bush – Ashy Buckwheat Scrub	7.38 acres of Restoration
Artemisia californica – Opuntia littoralis Association	3190	California Sagebrush – Coast Prickly Pear Scrub	1.02 acres of Restoration
Salvia leucophylla Association (Introduced Vegetation Community/Restoration Area)	3195	Purple Sage Scrub (Introduced Vegetation Community/Restoration Area)	1.17 acres of Enhancement
Salvia mellifera Shrubland Alliance	3210	Black sage scrub	9.89 acres of Restoration
Isocoma menziesii Shrubland Alliance	3330	Coast Goldenbush Scrub	2.01 acres of Enhancement
California Annual Herb/Grass Group			
Amsinckia (menziesii, tessellata) – Phacelia spp. Herbaceous Alliance	4310	Fiddleneck – Phacelia Fields	0.13 acres of Enhancement; 7.64 acres of Restoration
Californian Mixed Annual/Perennial Freshwater Vernal Pool/Swale Bottomland Group			
Deinandra fasciculata Herbaceous Alliance	6500	Clustered Tarplant Fields	1.18 acres of Enhancement; 28.24 acres of Restoration
Eleocharis macrostachya Herbaceous Association	6600	Pale Spike Rush Vernal Pool Bottoms	4.5 acres of Enhancement
Coastal Baja California Norte Maritime Succulent Scrub Group			
Opuntia littoralis – Opuntia oricola – Cylindropuntia prolifera Shrubland Alliance	8120	Coast Prickly Pear Scrub	1.46 acres of Enhancement



Figure 4-3 *Other Management Opportunities in Fairview Park.*

The 3D version of the Other Management Opportunities Map is on the following page.


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Other Management Opportunities
1 | High-Priority Invasive Plant Management (Entire Park Area)
2 | Long-Term Management Plan for Vernal Pool Habitat
3 | Fuel Modification Zone (FMZ) Plan that Anticipates Native Plant Palette Tolerant of Annual Summer Mowing
4 | Native Vegetation Enhancement, Including Wintering Burrowing Owl Habitat
5 | Nature Play Programming for Portions of the Manicured Lawn Area

4.3 STRATEGIC HABITAT RESTORATION PROJECT OPPORTUNITIES

Based on the assessed constraints and opportunities, nine strategic projects were identified to achieve the habitat restoration and enhancement goals (Section 1). These projects are categorized into three main groups: habitat restoration (Projects 1 to 4), habitat enhancement (Project 5), and wetland and riparian habitat remediation (Projects 6 and 7), along with two projects dedicated to long-term habitat management (Projects 8 and 9).

The following objectives encompass the nine strategic project opportunities, each targeting multiple benefits and prospects to accomplish the habitat restoration and enhancement goals for Fairview Park:

1. Habitat Restoration (Projects 1-4): These projects aim to restore degraded habitats, emphasizing improved ecological function and promotion of native biodiversity.
2. Native Plant Enhancement (Project 5): This project focuses on boosting native plant species presence across the park, prioritizing species that are rare or that have distinctive ecological roles.
3. Wetlands and Riparian Habitat Remediation (Projects 6-7): These projects address restoration and improvement of wetland and riparian habitats, supporting native species and ecosystem services.
4. Long-Term Habitat Management (Projects 8-9): These projects will establish sustainable management practices, including monitoring and adaptive strategies, to ensure the success of restoration efforts and preservation of the park's ecological health in the long term.

By implementing these strategic projects, the City can make significant progress towards achieving its habitat restoration and enhancement goals in Fairview Park, ensuring the conservation of its unique biological and cultural resources for future generations.

4.3.1 Project 1. Mesa Habitat Restoration and Indigenous Village Site Protection

Objective 1a. Collaborate with tribal representatives on the development and implementation of the project plan.

Objective 1b: Remove the improper fill material to expose the natural soils and restore the historic viewshed of the Mesa without damage to the soil biota or archaeological resources (CA-ORA-58).

Objective 1c: Eliminate incompatible uses of the vernal pool watershed, including maintenance mowing of the fly field, to protect the hydrological connection and upland nutrient supply for the conservation of the federally protected San Diego fairy shrimp in the vernal pool complex of Fairview Park.

Objective 1d: Do not disturb the native soil on the Mesa by tilling, unnecessary grading, or digging, other than related to the removal of the improper fill material and to maintain the hydrological function of the vernal pool features.

Objective 1e: Provide appropriate fencing, educational signage, and trail improvements to organize human movement around the perimeter of the Mesa, with a suitable connection to the existing boardwalk and viewing platform adjacent to the large vernal pool.

Objective 1f: Design Mesa trail improvements to protect archaeological resources with an appropriate trail surface that can both adequately cap the natural soil and prevent further trail erosion (e.g., super-stabilized decomposed granite product).

Objective 1g: Construct an elevated vernal pool boardwalk with fencing to preserve the trail connecting the lawn area to the southwest corner of the Mesa while safeguarding the vernal pool watershed. The boardwalk will be raised above the grade of the vernal pool basins, and its supports will not have footings excavated in natural soils, thus preventing disruption of the underlying impermeable soil layer essential for the ponds' formation.

Objective 1h: Deplete the weed soil seed bank with a consistent, multi-year adaptive weed management program prior to installing new native seed material.

Objective 1i: Restore the native flower fields and vernal pool watershed habitat that were covered by the improper fill material with diverse, ecologically appropriate seed mixes, approved by USFWS and CDFW.

Objective 1j: Enhance the native annual herbaceous plant diversity of the remainder of the Mesa not directly impacted by the improper fill material.

Objective 1k: Assess and implement enhancements to the function and diversity of the vernal pool features, including east of Placentia Avenue, which is part of the historic extent of the Mesa.

4.3.2 Project 2. Bluff Stabilization and Habitat Restoration Project

Objective 2a. Develop and implement an engineering solution (see, e.g., Dudek 2003) to stabilize highly erosive features along the bluff, including restoration of ecologically appropriate native perennial plants in drainages (e.g., southern California walnut, blue elderberry). Prioritize the use of native plants and stabilizers that allow native plants to grow to stabilize the bluffs, rather than engineering solutions that eliminate habitat (e.g., use of shotcrete and concrete channels).

Objective 2b: Deplete the weed soil seed bank with a consistent, multi-year adaptive weed management program prior to installing new native seed material.

Objective 2c: Restore cactus scrub and maritime succulent scrub on the slopes using diverse, ecologically appropriate seed mixes together with container plantings of selected species (e.g., cactus cuttings, California boxthorn).

Objective 2d: Restore ecologically appropriate habitat along the drain at the base of the bluff, including mulefat scrub, willow scrub, and sandbar willow – blue elderberry thickets.

4.3.3 Project 3. California Coastal Sage Scrub Slopes Restoration Project (Slopes North of the Mesa and East of Placentia)

Objective 3a. Deplete the weed soil seed bank with a consistent, multi-year adaptive weed management program prior to installing new native seed material.

Objective 3b. Restore CSS on the slopes with diverse, ecologically appropriate seed mixes with the goal of providing sufficient resources to support a California Gnatcatcher population in the park and adjacent natural areas along the lower Santa Ana River that will be viable over the long term.

Objective 3c. Use limited container plantings and/or cactus cuttings to establish faster shrub cover to close informal trails, to manage erosive features, or to increase the frequency of plants that do not establish easily from seed and are either underrepresented in the community or provide an essential ecological service for wildlife.

4.3.4 Project 4. Community-Supported California Coastal Sage Scrub (CSS) Restoration in the Canyon

Objective 4a. Restore the native soil biota by consistent, multiyear weeding efforts led by the City, or an identified community organization, and supported by community volunteer events.

Objective 4b. Increase the diversity and cover of natives from seed and nursery grown container plants that are installed and maintained by the City, or an identified community organization, and supported by community volunteer events.

Objective 4c. Maintain the existing plantings by hand weeding around natives prior to significant seed set of the weeds.

4.3.5 Project 5. Native Plant Enhancement of the Railroad Mesa

While the railroad improvements and the fragmentation of the open space precludes complete restoration of this area, the habitat can be improved by controlling nonnatives and enhancing native diversity and cover with species that are tolerant of mowing.

Objective 5a. Deplete the weed soil seed bank with a consistent, multi-year adaptive weed management program prior to installing new native seed material.

Objective 5b. Seed the area with a native seed mix with primarily native herbaceous life-forms (e.g., perennial grass, annual forbs) that are compatible with burrowing owls and other grassland birds, along with low rates of native shrubs that can tolerate periodic mowing when during summer dormancy (e.g., coast goldenbush, California bush sunflower).

4.3.6 Project 6. Wetlands and Riparian Habitat-Phase 2 (OCTA) 9.5-acre CSS/Grassland Restoration Project

Objective 6a. From the opportunities described above, identify 9.5 acres of habitat restoration to satisfy the outstanding obligation to OCTA, focused on CSS and flower field habitat restoration that is ecologically appropriate for Fairview Park.

Objective 6b. Prepare a Habitat Restoration and Monitoring Plan for approval by OCTA, CDFW and USFWS, which includes at least 3 years of natural rainfall-driven weed grow-and-kill prior to native seed installation (or at least, two years of weed grow-and-kill with a temporary overhead irrigation system, if feasible), followed by installation of a diverse locally collected seed mix following habitat restoration best practices (Attachment A).

Objective 6c. Implement the Plan, and monitor post-seeding establishment for five years, or until all the success criteria have been met.

Objective 6d. Place the successfully completed habitat restoration areas in a conservation easement to benefit OCTA.

4.3.7 Project 7. Wetlands and Riparian Habitat-Phase 2 (OCTA) Water Conveyance Remediation Project

Objective 7a. Follow engineering recommendations to remediate flow through the pond and channel system to minimize maintenance costs for the City to annually remove emergent vegetation from the ponds to meet vector control requirements.

4.3.8 Project 8. Fuel Modification Plan

Objective 8a. Consult with the Orange County Fire Authority (OCFA) and the Costa Mesa Fire and Rescue (CMFR) to develop a fuel modification plan for the existing fuel modification zones (FMZs) (i.e., 100-ft zones from the property lines of habitable structures) that balance the need for fire risk reduction and managed vegetation that complements the surrounding native habitat.

Objective 8b. Prioritize control of invasive plants, such as crown daisy, to meet fuel modification objectives for the FMZ.

Objective 8c. Develop plant palettes of ecologically suitable large native shrubs that tolerate pruning (i.e., removal of lower limbs to create vertical fuel breaks on larger plants), and native grasses and forbs that tolerate annual summer mowing.

Objective 8d. Develop a typical planting plan that allows for groupings of native shrubs that are interspaced with native plantings (e.g., needlegrasses, *Stipa* spp.) that are mowed to within 6 inches of the ground to create at least 50 percent cover of horizontal fuel breaks in the FMZ.

4.3.9 Project 9. Long-Term Habitat Maintenance Plan

Objective 9a. Implement a weed management program to maintain the function and habitat quality of the natural communities in the park, as well as the visitor experience.

Objective 9b. Follow the approved Fuel Modification Plan.

Objective 9c. Provide patrols to manage impacts from off-trail activity and unpermitted uses of the park.

Objective 9d. Maintain conservation easements (e.g., Headlands Dana Point Project Mitigation Area, Wetlands and Riparian Habitat Project – Phase 1 and 2) by implementing an Early Detection Rapid Response (EDRR) management program in Fairview Park to maintain the quality of the habitat and to manage costs by controlling invasive plant populations when they are small.

Objective 9e. Coordinate weed maintenance and biological monitoring with regional reserve and open space managers (e.g., Nature Reserve of Orange County, Randall Reserve, Talbert Nature Preserve, City of Costa Mesa Golf Course) to leverage resources and knowledge.

Objective 9f. Conform to federal and state environmental and wildlife laws.

Objective 9g. Prepare long-term management guidelines and actions to protect the vernal pools and vernal pool watersheds as described in this report, requested by USFWS (2014) to the San Diego fairy shrimp, and summarized in Section 1.1.3, Need for the Master Plan Update.

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ATTACHMENT A

HABITAT RESTORATION GUIDELINES FOR FAIRVIEW PARK

Attachment A

Habitat Restoration Guidelines for Fairview Park

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1 INTRODUCTION

The following specifications are provided as a general reference to assist the City of Costa Mesa Parks and Community staff and restoration specialists with the development of site-specific habitat enhancement and restoration plans for Fairview Park (Park) in Costa Mesa, California.

It is important to be mindful that the weed management and native plant material installation methods that are selected for a particular restoration project should be based on "getting to know your site" from field observations, review of existing documentation, and the goals of the project. There may be methods other than those presented in this document that are more appropriate for a particular project or site. The selection of habitat restoration methods will initially be made during the planning phase of the project, but they may change adaptively during implementation of the project after consideration of monitoring observations made during implementation of the project.

2 BIOLOGICAL AND CULTURAL RESOURCE PROTECTION

Protection of Fairview Park's biological resources is of upmost importance and protective measures shall be incorporated into all restoration and enhancement plans that are developed for the Park. Specific resource protection measures are not included in these restoration guidelines as measures will be project and site specific. Restoration plans shall clearly describe any sensitive biological resources that occur within or adjacent to the project and all protective measures that will be implemented to avoid and minimize impacts.

Of particular importance is protection of the vernal pools and their watershed that support rare plants and sensitive aquatic resources like the federally endangered San Diego fairy shrimp (*Branchinecta sandiegonensis*) and Riverside fairy shrimp (*Streptocephalus woottoni*). The United States Fish and Wildlife Service (USFWS) shall be consulted with for the use of herbicides within the vernal pool watershed to ensure that chemicals that are harmful to fairy shrimp are avoided. The use of mechanical equipment including mowers shall not be used in the vernal pool watershed to prevent negative impacts to the soil, such as ruts, and the potential crushing of fairy shrimp cysts (i.e., eggs).

Protection of cultural resources present within in the Park shall be addressed and protective measures incorporated into a habitat restoration and enhancement plan. The plan should describe measures to be implemented for the protection of archaeological and culturally significant materials (e.g., indigenous village use area, including two nationally recognized cultural resource historic sites) within and adjacent to the project. The City should collaborate with tribal representatives on the development and implementation of a project plan.

Measures to protect cultural resources will include avoidance of ground disturbance in culturally sensitive areas or always require the use of an on-site cultural monitor during ground disturbance activities. Ground disturbance can occur during site preparation weeding activities from mechanical equipment or during installation activities such as hole digging for container plantings or drill seeding.

3 WEED MANAGEMENT

For most habitat enhancement and restoration efforts in southern California, it is recommended to manage the existing weed seed bank of the degraded area prior to installation of native plant material. Adequately controlling the weed seed bank first allows for the use of more cost-effective weed management methods and increases the likelihood that the native plant material added in the form of seed, cuttings, or nursery container transplants will successfully establish.

Adequate management of the nonnative seed bank may take several years to achieve, depending on the size of the nonnative seed population and the number of "grow-and-kill" events that occur each year. The grow-and-kill method is used to treat (kill) nonnative seedlings and new growth prior to seed set, to deplete the existing weed seed bank and prevent new weed seed from entering the seed bank.

Generally, it is more cost-effective and feasible for the management of large areas to rely solely on natural rainfall-driven grow-and-kill; however, project implementation is at the mercy of unpredictable weather patterns from year-to-year. This necessitates an adaptive weed management approach, which allows for flexibility in the timing and intensity of grow-and-kill events each year. Adaptive weed management is also a necessity because it is difficult and impractical to quantify the size of the nonnative seed bank in the project site during the planning phase; and rather the amount of weed management effort can only be estimated based on prior biological monitoring and experience with similar habitat restoration efforts.

In circumstances where it is important to reduce the amount of time necessary to implement the habitat restoration project, the years needed to manage the nonnative seed bank can be reduced with supplemental irrigation. Supplemental water from a temporary irrigation system can "force" more grow-and-kill events than can be achieved with natural rainfall alone. For example, if three or four grow-and-kill events can be achieved throughout the year with supplemental irrigation instead of only one or two with natural rainfall alone, then weed management can be completed in two to three years in a project site that ultimately needs eight grow-and-kill cycles completed prior to seed addition, instead of four to five years with natural rainfall alone. However, the use of a temporary irrigation system to reduce the number of years of pre-seeding weed management, also commonly referred to as "site preparation" in habitat restoration projects, must be feasible (e.g., a water source is accessible to the project site) and justified by need given the significant cost for the purchase of water and installation of the temporary irrigation system (Brooks et al. 2019).

While most degraded areas targeted for habitat enhancement and restoration in Fairview Park have long histories of disturbance by agriculture, construction, and other earthwork to modify stormflow, and occupation by nonnative plant populations, there are circumstances where there is little to no nonnative seed bank in the soil prior to native plant material addition (e.g., revegetation of a newly cut slope where virgin soil has been exposed). In these cases, weed management prior to native material addition may not be necessary.

Often coinciding with a history of disturbance (e.g., agriculture or unnatural fire frequency) and nonnative plant introduction, many degraded areas within the Park are also native seed-limited, meaning that even with adequate weed management there is not sufficient viable native seed populations and/or diversity to restore sustainable native habitat. Therefore, native plant material addition is a necessary second phase in habitat restoration projects, following adequate management of the nonnative plant population.

Even in habitat restoration projects where natural recruitment from existing native seed banks and/or adjacent natural areas is sufficient—adequate weed management remains critical to the successful establishment of native habitat. While it is invaluable to have existing native material and successful natural recruitment on site, the budget for the weed management program must incorporate the additional labor and expertise required to weed around desirable native vegetation. Working around natives in a project site often requires more hand methods (e.g., hand cutting or pulling) and has fewer opportunities for time efficiencies afforded using mechanized equipment, like mowers.

The initial step in weed management typically begins in the fall with a dethatching event, as necessary for an individual site, to allow good germination of the weed seed bank with the first winter rains. The number of years required for weed management will be site-specific and depend on weed density, the type of weed species to control, annual weather patterns, and site-specific variables such as landscape position and soil type. At minimum, for most sites without supplemental irrigation, three consecutive years of site preparation activities should be planned to manage the weed population prior to installing native plant material.

The selection of weed management methods will depend on the type and density of weed species present, the density of native species, and accessibility. Control methods can include the following, as appropriate:

- Mowing/Cutting – mechanical equipment or hand tools
- Raking/Windrowing – mechanical equipment or hand tools for removal of cut material
- Hand pulling/cutting seedlings/saplings where feasible
- Herbicide application

Each weed control method has advantages and disadvantages, with considerations for the timing of application, the availability of equipment and trained staff, and limitations to site access for equipment. Nonnative seedlings and flowering plants should be controlled prior to the production of viable weed seeds to reduce contributions back to the weed seed bank. If weeding is delayed until after seed development has already occurred, seed material should be cut, bagged, and removed from the site.

Soil disruption should be kept to a minimum to reduce the germination of new weed individuals, injury to native species, and disturbance to biological soil crusts. However, during the weed management phase (i.e., site preparation), in areas with no biological crusts and low native cover, the limited disturbance of the topsoil that occurs from mechanical equipment, such as mowers, can accelerate the germination of weed seed and increase weed control efficiency. Care should be taken to not disturb deep soil layers that would bring up buried weed seed that would not otherwise express itself in the absence of disturbance.

Careful weeding needs to be done by trained crews to avoid damage to native species in areas with significant native cover or sensitive species. Adaptive management is key to success and includes regular monitoring to guide the scheduling and selection of weed control methods.

3.1 PHYSICAL CONTROL METHODS

3.1.1 MOWING/LINE TRIMMING

Mowing with mechanical equipment, such as a rotary mower, flail mower, or mulcher attached to a tractor or skid steer, or hand-operated motorized cutting tools such as line trimmers are generally the most efficient and least disruptive site preparation methods to use in areas dominated by annual grasses and weedy herbaceous species. Mowing is appropriate in larger areas that are flat to moderately sloped. Careful mowing should be implemented to limit injury to native species when cutting. In areas with a steeper slope or with a higher density of natives, walk behind, hand-operated mowers or line trimmers should be used. Line trimming can be accomplished with a gas-powered, hand-operated line trimmer fitted with a string, brush blade, or similar instrument in areas inaccessible to larger equipment. Mowing with mechanical equipment shall not be implemented in the vernal pool watershed.

Like line trimming, a gas-powered, hand-operate, shafted hedge trimmer with an articulating blade can be used to trim weeds above the soil surface from a standing position. Shafted hedge trimmers can be effective for cutting denser patches of broadleaf weeds after they have flowered, such as nonnative filaree (*Erodium* spp.). Line trimmers are more effective for control of nonnative annual grasses than hedge trimmers. Hedge trimmers are most effective in areas that are inaccessible to larger equipment, or when working around dense, existing native vegetation that excludes the use of larger equipment.

Fire prevention measures must also be taken to avoid accidental fires from sparks during machinery operation or line trimming with blades. These measures may include always having a water truck on site near the mowing activity, shovels carried on the mower and water truck, and water fire extinguishers. The weed material should be cut as close to the ground as possible to limit re-sprouting of herbaceous species and ensure removal of bolting crowns of grasses. Care should be taken to not damage biological soil crusts where present.

3.1.2 HAND/MECHANICAL PULLING OR CUTTING

Hand-pulling or cutting of weeds is also one of the least disruptive methods of site preparation but is an inefficient method of weed control in dense stands of weed species. Hand-pulling or cutting should be reserved for controlling isolated individuals, targeted control of high priority invasive species, controlling small infestations in areas that are inaccessible to equipment, or where high densities of native or sensitive species are present. Hand-pulling is a very useful manual technique to use on young plants and small patches of weeds.

Hand-cutting can be used to remove the flowering stalks of weeds prior to seed development with tools such as sickles or vinyl knives. The cut material can be left in place if it does not build a significant layer of thatch or placed in a mulch pile. If cut material contains viable seed, then it should be disposed of off-site or placed in a mulch pile that is actively managed for germinating weed species. Target invasive species seed material should always be removed from the site and not left in mulch piles to stop the spread into new areas.

When hand-pulling weeds, the plants should be grasped near the base pulling in the direction the plant is growing to be able to better pull most of the roots out of the ground. Short tugs work better than one long pull to prevent breaking the plant before the main roots are removed. For larger plants, it may be helpful for multiple people to hand-pull simultaneously.

Isolated individuals of select invasive species can be pulled by hand or with a tool such as the Weed Wrench™. Using hand garden tools such as picks, cultivators, weeders, specialized hoes, mattocks, and trowels, can help to loosen the soil around the roots. After loosening the soil, pull vertically from the ground to remove as much of the root system as possible, especially weed species with a long tap root. When using a weed wrench, the clamp should be placed on the lowest point on the trunk as much as possible. The base of the weed wrench should be on the ground, but if it is not touching, rocks or branches can be placed underneath to improve leverage. Using your weight the weed wrench should be pulled toward you and not pushed away or injury could occur.

3.1.3 CUT-AND-DIG

Larger mature invasive species such as castor bean (*Ricinus communis*) or Pride of Madeira (*Echium candicans*) can be controlled by cutting the upper foliage of the plant and digging out the root system. Plant foliage can be cut with a handsaw, loppers, axe, or similar tools and removed to allow for better access to the roots. The root material

can be dug out and removed with a shovel, mattock, Pulaski, or similar tool. As much of the root material should be removed as possible for effective control. Many plants can readily resprout from remaining roots. Removed plant material should be properly disposed of to prevent resprouting. For example, the roots, rhizomes, and stems with nodes of giant reed (*Arundo donax*) can resprout if the plant material is touching wet soil.

3.1.4 MECHANICAL RAKING/WINDROWING

Following the initial mowing and clearing event of a site, the site should be dethatched by raking the cut material and removing it from the site. Raking and removal of cut material is not necessary in subsequent mowing events unless a significant amount of the weed species has set seed, or it is determined the thickness of the thatch will prevent germination of the next crop of weeds. Additionally, a final removal of thatch material may be necessary prior to seeding activities to ensure good seed-to-soil contact, depending on the seeding method used. For instance, drill seeding and hand-broadcast seeding can be accomplished over mowed plant stubble if the thatch is not too thick. For hydroseeding, it is best to have minimal thatch present on the ground.

Material should be mechanically raked into windrows and the placed into mulch piles within the restoration area, placed in adjacent buffer areas, or removed from the site if necessary. After the dethatching event, there may be a significant amount of weed seed present, in which case, it would be preferable to remove the thatch from the restoration area, either off-site or in buffer areas where it can be further managed during implementation of the restoration project.

An exception to leaving cut biomass in place is when an herbicide that retains the active ingredient in the dead plant material (e.g., clopyralid) is used. In this case, collect and mulch the biomass in a buffer area or remove and properly dispose of the material from the site since this could inadvertently damage native species present.

3.2 CHEMICAL CONTROL METHODS

Herbicide treatment is specified mainly for dense weed areas with low densities of native species and for control of high priority invasive species that are perennial or may re-sprout from taproots and rhizomes. For effective control of weed populations, these weeds must be controlled before they produce viable seed. Most herbicides are not selective for weeds only (i.e., these herbicides must be applied with the least harmful effect to non-target native species). In general, post-emergent herbicides, which kill plants after they have germinated and are actively growing, are recommended. Prior to using herbicides in the vernal pool watershed, USFWS shall be consulted with to ensure herbicides that are harmful to fairy shrimp are avoided.

Only herbicides registered for use in California and in wildlands should be used judiciously for the control of target invasive species. Herbicides that are registered for use in California natural areas are recommended to be used at rates specified on the herbicide labels for the target invasive species. The recommended herbicides registered

for use in California that are proposed in these guidelines are glyphosate, a non-specific broad-spectrum herbicide registered for use on almost all weed species, fluazifop-p-butyl for the control of weedy grasses, clopyralid for the treatment of thistles in the rosette stage, and triclopyr for the treatment of herbaceous invasive plant species.

A state licensed Pest Control Advisor (PCA) shall be consulted to provide written herbicide recommendations for species specific control methods for the Park. The herbicide applicator must have a pest control business license that requires at least one individual employed by the business be in possession of a qualified applicator's license. All licenses must be issued by the State of California and be currently registered in the county of work. If a qualified applicator is not present during the herbicide treatment, all applicators must have undergone documented herbicide training.

Personnel must wear all Personal Protective Equipment (PPE) required by law and follow all herbicide label directions and precautions. PPE includes but is not limited to chemical-resistant nitrile gloves, eye protection, chemical protective suits, e.g., Tyvek®, and protective footwear. All re-entry times specified on an herbicide label must be observed and posted. Herbicide preparation must be conducted only in approved staging areas more than 100 feet from a stream course or any body of water. Only herbicides and surfactants approved for aquatic use should be used within 100 feet of a stream course or any body of water.

A colorant or marking dye is recommended to ensure even coverage of herbicide. The material should be a non-toxic material such as Blazon®, Turf Mark®, or equivalent. The dye should be mixed with the herbicide at no more than half the rate specified on the label as it can reduce product performance, especially at lower herbicide application rates.

Herbicide treatment should be conducted only when weather conditions are conducive to effective uptake of the herbicide by target species when plants are at the specified growth stage. Optimal weather includes sunny and dry conditions with ambient temperatures of at least 65 degrees Fahrenheit. Wind conditions should be five miles per hour or less for herbicide applications that can be subject to drift, e.g., foliar spray methods, to minimize herbicide drift for worker protection and to prevent damage to desirable vegetation. Treated plants shall not be disturbed until the applied herbicide has had time to take effect per the manufacturer's instruction.

3.2.1 FOLIAR SPRAY TREATMENT

Foliar spray treatment involves applying a select herbicide at a specified concentration directly to the exposed foliage of the plant to thoroughly wet all leaves. For the foliar spray treatment to be effective, the exposed foliage needs a thorough coating of herbicide, and the plant should be actively growing. The green or photosynthesizing parts of the plant should be sprayed for uptake of the herbicide by the plant. Typically, the foliar spray treatment is best used on smaller plants to ensure adequate cover of the herbicide.

The disadvantage of the foliar spray treatment is the damage that may be caused to desirable species in the localized area where spraying occurs, especially if a non-selective herbicide like glyphosate is being used. Additionally, the foliar application method is generally ineffective on invasive plants with thick waxy cuticles.

Foliar spray shall be by low pressure hand operated sprayers only and broadcast herbicide shall not be done anywhere in the Park. For backpack or hand-held application of herbicide, a low-pressure regulated sprayer with a coarse droplet size and single-nozzle wand shall be used. For this type of application use either spray-to-wet applications, or low volume directed spray.

Prior to use of hand-held herbicide applicators, the equipment should be checked to make sure it is fully functional and does not have any leaks. After filling the closure cap should be securely screwed on and not-cross threaded to prevent any spills or leakage. For backpack sprayers, the rubber gasket and nipple in the sprayer lid should be regularly lubricated for proper functioning. The applicator should not bend over or lean too far forward to prevent any spills onto their person or on to desirable vegetation. Prior to use, the pump of the backpack sprayer should be primed with 10 to 20 pumps. When traveling between spraying points, the applicator shall keep their hand off the lever to avoid any inadvertent spraying of herbicide.

To decrease the chances of spraying nontarget plants, preparation before spraying may be needed in areas where weeds are mixed in with native plants. The target invasive plant for control should be separated from natives and if the plant is tall, the plant should be carefully bent downward, away from natives, and the herbicide solution applied. After spraying, the plant should be released slowly and carefully to avoid any herbicide drips or runoff. The herbicide applicator should be sure to observe what is behind and around the target invasive species for control and be mindful of wind speed and direction. Nozzle adjustments may be necessary to get the mist pattern for best coverage of the target invasive plant. Larger plants should be sprayed from multiple angles to ensure adequate coverage of the plant with herbicide for effective control.

For application to small weeds (e.g., seedling stage) amongst dense native plants, if herbicide application is deemed necessary, the herbicide can be applied by backpack sprayer with a low-pressure regulated wand with the nozzle directed to the weed foliage, thereby avoiding overspray. However, nozzle-to-plant application is time intensive and requires highly trained applicators that can differentiate between native and nonnative plants at the seedling stage; and therefore, it is typically not the most cost-effective weed management method.

3.2.2 Stump Cut and Herbicide Treatment

Treatment of larger and well-established individuals, including high priority invasive species that may re-sprout from taproots or rhizomes, is best accomplished by using the stump cut and herbicide application method. Advantages of the stump-cut treatment compared with foliar application for larger individuals, includes the following:

- Lower quantity of herbicides required to treat the invasive species; and

- Localized application of the herbicides reduces the likelihood of herbicide contact with non-target native species, during application.

Typically, the stump cut and herbicide treatment is used in late summer and early fall when plants are translocating energy reserves to the rootstock and when seed dispersal is not enhanced by weeding activities optimal timing though is dependent on the weed species being treated.

The stump cut treatment method process involves cutting the stump of an invasive species flat at about 8 to 10 inches in height, then **immediately** (within 2 minutes or less) treating the exposed cambium of the cut stump with a select herbicide at a specified concentration. The stump cut treatment should be implemented in the following steps:

Step 1. Plants will be cleanly cut, horizontally, close to the ground (using a saw, rotary brush cutter or similar tool).

- The cut vegetation will be removed from the project area the same day it is cut and properly disposed of off-site or in a designated buffer area.

Step 2. The stumps or stems will be re-cut, cleared of sawdust and immediately painted with the specified herbicide within two minutes of cutting, before the cut surface begins to congeal, to ensure penetration of the herbicide. The herbicide should be applied to the cambium in 60 seconds or less after cutting.

- Apply the herbicide on the cut stump (the percent solution will be dependent on the weed species treated and herbicide used). Apply carefully to avoid any drips or damage to surrounding native species.

Plants generally should be checked about one month after application to determine the success of the herbicide treatment. Any re-growth from the treated stumps should be treated with the foliar herbicide application method in the same growing season or as re-growth appears in the next growing season. Any new seedlings and small saplings observed during follow-up treatments can be hand-pulled, ensuring that the root system is removed. The pulled material should be removed from the project area or chipped and stockpiled for composting, as some species can regenerate when moisture is available.

3.2.3 Recommended Herbicides for the Control of Nonnative Species

The following subsections provide information and application rates for specific herbicides recommended for use in the restoration and enhancement areas.

Categories of herbicides include pre-emergent and post-emergent. Pre-emergent herbicides are applied to the soil and work by either disrupting plant germination or kill newly germinated weed species and do not harm established plants. Post-emergent herbicides work on established and actively growing weed species. Only post-emergent herbicides are recommended for use in the restoration and enhancement areas. Pre-emergent herbicides should not be used for habitat restoration since they may also

affect newly germinated native species preventing natural recruitment or establishment of an applied seed mix. The soil residual life of herbicides, or the amount of time it remains active in the soil, varies by herbicide and can be anywhere from several months to several years before breaking down into inert compounds.

Only herbicides registered for use in wildlands should be used judiciously within the Conservation Easement. Herbicides that are registered for use in California for natural areas are recommended for weed species at specific rates noted on the labels. Pre-emergent chemicals are not recommended for use at any time during. The following herbicides are recommended herbicides to implement this plan:

- Fluazifop-P-butyl (e.g., Fusilade®; EPA Toxicity Class III, low toxicity) will be specified for foliar applications, at application rates recommended on the label, for grasses.
- Glyphosate (e.g., Round-up®; EPA Toxicity Class III, low toxicity) will be specified for foliar and stump cut applications, at application rates recommended on the label, for most target invasive species.
- Clopyralid (e.g., Transline®; EPA Toxicity Class III, low toxicity), will be specified for foliar spray applications, at application rates recommended on the label, for thistle control.
- Triclopyr (e.g., Garlon 4 ultra®; EPA Toxicity Class III, low toxicity) will be specified for foliar spray applications and stump-cut application, at rates recommended on the label, for woody species, sweet fennel, and other target invasive herbaceous species.

Post-emergent herbicides are either selective (kills specific types of weeds such as grasses or broadleaves) or non-selective (works on all plants). Grass-selective herbicides include Fusilade® DX and Envoy®. Broadleaf-selective herbicides include Clopyralid. Non-selective herbicides include glyphosate and triclopyr.

Post-emergent herbicides can be broadcast sprayed in areas with a low density of native species or applied with backpack sprayers in areas with a higher density of native species. Selective herbicides can be broadcast sprayed to control the desired weed type with little to no impact on natives of a different plant type. Non-selective herbicides can be more efficient in areas with a mix of grass and broadleaf weed species since they can treat all the weed species present at the site. However, non-selective herbicides can cause the most harm to desirable native species and should only be broadcast sprayed in areas with a low density of natives.

Caution should be taken to prevent overspray and herbicide drift onto the foliage of native species as they can damage or kill the plant(s). Prior to selection and use, the label of each herbicide should be read to determine if the active ingredient can translocate through the soil and cause potential damage to the root system of native species. For example, imazapyr translocates through the soil and its use should be primarily limited to the stump cut treatment method or used sparingly for foliar

treatment of hard to treat highly invasive species to reduce the amount of herbicide introduced into the soil and limit herbicide drift.

Fluazifop (Fluazifop-p-butyl Fusilade® DX)

The active ingredient in Fusilade® DX is fluazifop-p-butyl. Fusilade® DX is a selective post-emergent herbicide used for the control of annual and perennial weed grasses. The herbicide is systemic i.e., it is absorbed and moves from the foliage to the roots, rhizomes, stolons, shoots, and meristematic regions of the grasses.

Application Rate

Fusilade® DX application rates for annual and perennial grasses are 16-24 ounces (oz) per acre (4 to 6 oz of active ingredient [a.i.] per acre). For control of seedlings the rate is 8 oz per acre (2 oz a.i. per acre). Add the following spray additives to the herbicide mixture for optimum effectiveness:

- Crop oil concentrate containing 15-20% approved emulsifier at 0.5-1% volume/volume (v/v) (0.5-1 gallon [gal]/100 gal)
- Nonionic surfactant containing at least 75% surface-active agent at 0.25-0.5% v/v (1-2 quarts/100 gal)
- A non-toxic colorant or marking dye to insure even coverage of herbicide. The dye should be mixed with the herbicide at no more than half the rate specified on the label of the dye as it can reduce product performance, especially at lower herbicide application rates.

Weedy grass species should be treated at the appropriate growth stage for optimum effectiveness. Grasses that have tillered (sprouted a shoot from its base), formed seed heads, or exceeded the growth stages listed on the label should not be treated. Target weed grasses should not be under stress (e.g., from moisture, temperature, low soil fertility) for optimum control.

If the treatment area has a mix of weedy grasses, Fusilade application should be implemented when the first grass reaches the specified growth stage for treatment using the highest application rate for the grasses in the mixed population. The optimum growth stage for treatment of annual grasses is when grasses are 2–8 inches tall, but prior to tillering and/or seed head formation. It is important to note that in drought years when available water is limited, nonnative grasses can flower early when plants are less than 8 inches tall. Monitoring of flower production is critical to determine the optimum time for weed control. Thoroughly coat the foliage with herbicide during foliar application, but not to the point of runoff of the herbicide.

No more than 72 fluid ounces of Fusilade per acre a year should be applied to a treatment area. It should not be applied if rainfall is expected within 1 hour of application. Fusilade should not be applied directly to water, where surface water is present, or where runoff into water bodies could occur. To reduce herbicide runoff, avoid applications of herbicide within 48 hours of rainfall. Restrict entry into treated areas as specified on the label.

Visual observations of control can be seen within one week of treatment; however, it is dependent on the grass species and environmental conditions. Growth of treated grasses typically stops soon after application. Signs of herbicide control include loss of vigor, yellowing, reddening, and eventual death.

Glyphosate

Glyphosate (e.g., Roundup Pro® Concentrate or Roundup Pro® Max) is a broad-spectrum post-emergence herbicide for the control of annual, perennial, and woody weed species. The herbicide is systemic and moves from the treated foliage to the root system.

Foliar application should be implemented when the target species are at the appropriate growth stage for optimum effectiveness. Target annual and perennial species should be actively growing. Application to annual species should be prior to seed head formation of grasses and before bud formation in broadleaf weeds. Perennial weeds should be treated after they reach the reproductive stage of growth (e.g., seed head formation in grasses and bud formation for broadleaf species). If treatment is necessary prior to perennials reaching the reproductive stage, the higher label application rate should be used.

Application Rate

Most annual and perennial weed species can be effectively treated with a 2% solution of glyphosate when applied during the appropriate growth stage. Follow label directions of the glyphosate product used to mix a 2% solution. Add colorant or marking dyes to the spray solution to aid the applicator in achieving good coverage of target species. The dye should be mixed with the herbicide at no more than half the rate specified on the label as the amount of dye can reduce product performance, especially at lower herbicide application rates.

Most glyphosate products contain a surfactant, and no additional surfactant is needed or recommended to add to the mix except for glyphosate products registered for aquatic use. Aquatic glyphosate formulations do not contain a surfactant in the herbicide product. If using an aquatic formulation and a surfactant is added to the mix, follow the directions on the herbicide label. However, it should be noted that in some cases, specific project permits and conditions may not allow use of a surfactant for aquatic applications.

Except where specified on the label, no more than 8 pounds (lbs) of glyphosate acid per acre per year should be applied to a treatment area in California. The total glyphosate acid amount is additive for all glyphosate products used in a given area, so it is important to keep a record of the amount of all glyphosate acid used in a given area per year. Glyphosate products have different acid concentrations and acid equivalents are provided on all product labels.

Herbicide application should not occur if heavy rainfall is expected soon after application. Herbicide should not be applied directly to water or to areas where surface water is present. Restrict entry into treated areas as specified on the label.

Visual observations of control on annual weeds can be seen within 2 to 4 days and 7 days or more for perennial weeds. Signs of herbicide control include wilting and yellowing of foliage advancing to complete browning of above-ground growth and deterioration of root material.

Glyphosate can also be used for the stump cut and drill and frill methods. For the stump cut method, generally a 50% solution is used for treatment. Label directions should be followed for each method and for the species targeted for control.

Clopyralid

Clopyralid is a post-emergence selective broadleaf herbicide. It is particularly effective for the control of thistle and clover species and is considered safe to use with established native grass species. However, immature native grasses prior to tillering and development of a secondary root system may be negatively affected by clopyralid. Clopyralid is the active ingredient in the herbicide Transline®.

Application Rate

Clopyralid should be applied at ¼ to ⅔ pint per acre, depending on the weed species being treated and associated growth stage. Add the following spray additives to the herbicide mixture for optimum effectiveness:

- A non-ionic surfactant at a rate of 1 to 2 gal/100 gal of herbicide mixture.
- A non-toxic colorant or marking dye to insure even coverage of herbicide. The dye should be mixed with the herbicide at no more than half the rate specified on the label of the dye as it can reduce product performance, especially at lower herbicide application rates.

In general, the herbicide is most effective when weeds are small and actively growing. The lower rate should be used only during highly favorable growing conditions and when plants are 3 to 6 inches tall. The higher rates should be used if the plants are stressed or in areas with high weed density. The foliage should be thoroughly coated for effective control.

Application during extreme growing conditions such as drought, freezing conditions, or wet foliage at the time of application may reduce the effectiveness of the herbicide. Herbicide is rainfast within 2 hours of application. Avoid injury to non-target plants by avoiding spray drift. Non-target plants can be affected by direct spray on plant foliage or indirectly by root uptake through the soil. The maximum application rate per year in California during the growing season is ⅔ pint per acre.

Clopyralid should not be applied directly to water, where surface water is present or where runoff into water bodies could occur. Clopyralid should not be used in areas

where movement through the soil could contaminate ground water, such as loamy sand, sandy soils or in areas with a shallow water table.

Sprayed material should not be used for composting or mulch as clopyralid may remain for long periods in dead plant tissue and negatively affect future growth and development of non-target species in treated areas.

Triclopyr

Triclopyr (e.g., Garlon 3A, Garlon 4, or Pathfinder® II) is a systemic herbicide used for the control of broadleaf species and grasses. Triclopyr can be used at any time during the growing season and is most effective when used to treat actively growing plants.

Application Rate

For the control of broadleaf species triclopyr should be applied at 1 to 4.5 lbs acid equivalent (a.e.) per acre in a total volume of 20 to 100 gallons of water. The herbicide mixture can be applied at any time of the growing season. Add the following spray additives to the herbicide mixture for optimum effectiveness:

- A non-ionic surfactant at the rate specified on the label of the surfactant. Use the higher recommended concentrations of surfactant when applying lower spray volumes per acre.
- A non-toxic colorant or marking dye to insure even coverage of herbicide. The dye should be mixed with the herbicide at no more than half the rate specified on the label of the dye as it can reduce product performance, especially at lower herbicide application rates.

The maximum application rate of triclopyr is 9 lbs a.e. per acre per year for Garlon 4 and 8 lbs a.e. per year for Pathfinder® II.

3.2.4 Herbicides Approved for Aquatic Use

Only herbicides and surfactants approved for aquatic use should be used in riparian habitats or within 100 feet of a stream course or body of water for treatment of weed species. It is important to note that permits may not allow the use of a surfactant in riparian habitats. The purpose of a surfactant is to provide more uniform coverage and improve penetration of the herbicide into the plant. Approved aquatic herbicides include Round-up® Custom (active ingredient glyphosate), Habitat® (active ingredient imazapyr), and Renovate® 3 (active ingredient triclopyr). Only non-ionic surfactants should be used that are approved for aquatic use. Non-ionic surfactants approved for aquatic use include Liberate® and Rainier®.

3.3 Weed Seed Handling, Resprout Reduction, and Plant Matter Disposal

While the physical removal and chemical treatment of invasive species is a key part of weed management, care must also be taken to reduce the chances of seed spreading, resprouting, and other undesirable consequences of weed control. Preventing the

future propagation of weeds will increase the effectiveness of current practices and reduce the severity of later infestation.

Though it is recommended to control weeds before seeds mature, there may be situations where this is not possible. For example, if the weed can seed year-round and monitoring each individual's life stage is too difficult. It is important then to be mindful of the presence of seeds during control events. While the plant itself may be removed, seeds left behind at the site or stuck to clothing or equipment can reduce the effect of management and spread the infestation to other areas.

To reduce the spread of seed, remove any flowering parts or seeds found on plants before cutting, hand-pulling, or herbicide application and place the material in appropriate containers for disposal. Pick up all seeds that remain on the ground and place in containers. After each treatment, ensure that all seeds are removed from clothing and equipment and placed in the disposal containers before leaving the area. Any storage bin or vehicle used during treatment and for transport of weeded material shall be inspected and all seeds, flower, and root material removed.

In many cases it is possible to leave treated plant matter on site to dry out and decompose. If no flowers or seeds are present, pull the plant and place it on the ground to dry out only if the species is not rhizomatous and there is no potential for re-sprouting. In such cases, it will be important to completely remove all root matter through digging out the roots when mechanical methods are being used, and properly removing and disposing of cut matter off-site. Thatch of plants treated with herbicides that remain in the dead plant material, such as clopyralid and imazapyr should not be used as mulch and if treating large areas, the material should be removed from the site.

If the plant thatch material is to be removed from the site and the conditions are met where there is not seed material present and weeded material is not able to resprout from root material, the thatch can be left to dry out on site for a few days to a week, making it easier for removal since the material will be lighter and easier to work with.

3.4 BIOSECURITY PROCEDURES TO PREVENT THE SPREAD OF INVASIVE PLANT SPECIES

Implementing biosecurity procedures is essential to prevent the unintentional spread of target invasive plant species during control activities and to mitigate the introduction of new invasive species to the park. Biosecurity measures include cleaning clothing and equipment, ensuring that equipment used on-site is free of any invasive plant species reproductive material, and verifying materials used in the park, such as erosion control devices, are weed seed-free.

Preventing the spread of invasive species is the first line of defense and a cost-effective approach to controlling their impact. Consistent measures to ensure that seeds and reproductive material of invasive plant species are not spread to new areas will help avoid costly future efforts and potential ecological damage. By safeguarding sensitive

habitats from infestation, their ecological functions can be preserved, promoting the overall health and resilience of the park's ecosystem.

3.4.1 Biosecurity Measures During Control Activities

Effective weed management not only involves the physical removal and chemical treatment of invasive species but also requires careful attention to minimizing seed dispersal, resprouting, and other unintended consequences of control measures. By taking steps to prevent the future propagation of weeds, the effectiveness of current practices can be enhanced while reducing the severity of subsequent infestations.

Although it is advisable to control weeds before seeds mature, this may not always be feasible, such as when a weed can seed year-round, and monitoring each life stage is challenging. In these situations, it is crucial to be aware of the presence of seeds during control sessions. Even if the plant itself is removed, seeds left behind at the site or on clothing, equipment, vehicles, or waste containers can undermine management efforts and spread the infestation to new areas.

To reduce seed spread, follow these practices:

1. Remove seeds found on plants before cutting, hand-pulling, or herbicide application, placing the material in appropriate disposal containers.
2. Collect seeds from the ground and place them in containers.
3. After each treatment, remove seeds from clothing and equipment, placing them in disposal containers before leaving the area.
4. Thoroughly inspect and clean clothing, equipment, bags, etc., using a brush or other tool, paying close attention to laces, socks, cuffs, pockets, etc.
5. Remove dirt from shoe treads to eliminate embedded seed material.

Vehicles should only be driven on approved pathways to limit contact with potential invasive weed species seed material. Despite minimal contact, vehicles should be inspected and cleaned of all weed seeds before leaving the site, focusing on tire treads, bumpers, radiators, and undercarriages. If waste disposal containers are brought on-site from other locations, inspect, and remove any weed seeds before using them in the park.

Crews shall be trained by the qualified plant biologist on the Best Management Practices (BMP) for cleaning equipment and clothing to prevent the spread of invasive species. As an alternative, already developed sources for training crews is available online such as from Cal-IPC video that can be found here Training Video: Training Video: Best Management Practices for Preventing the Spread of Invasive Plants – California Invasive Plant Council (cal-ipc.org).

By implementing these measures, the spread of invasive species can be mitigated, promoting a more effective and sustainable approach to weed management.

3.4.2 Biosecurity Measures for Project Materials Used in Fairview Park

To minimize the introduction of invasive species, all materials used within the park should be certified weed-free. This includes, but is not limited to, mulch materials, erosion control products (e.g., straw wattles, hay bales), container plants, soil, and aggregate (topsoil, sand, gravel, fill), and landscape materials such as plants, seeds, sod, mulch, and soil amendments. Prior to use, all materials shall be inspected, and confirmation of their weed seed-free status shall be obtained from the vendor.

For seed material used in restoration projects, the seed must be tested for the presence of noxious weeds and the results provided to the City and project restoration specialist for the specific restoration project upon request. The seed vendor shall be guaranteed and be required to provide proof that the seed is free of noxious weeds. Any container plants used for a restoration project must be inspected at the nursery to observe the facility conditions and to ensure that the container plants are free of any noxious weeds and are kept in an environment where noxious weeds are unable to contaminate the container plants.

3.5 Management Methods for Target Invasive Species in Fairview Park

While use of the weed management methods presented above are effective for most nonnative plants, some invasive plant species may require more focused control effort within a habitat restoration area. Many of these invasive species are naturalized, with established populations in the areas under weed management. The goal for a typical habitat restoration project is to control their spread and to reduce their population size to the point where self-sustaining native vegetation communities can be restored. Absolute control is often not feasible or necessary in all cases.

Separate consideration should be made for control of those invasive plant species that have yet to become common in Fairview Park. These less common invasive plant populations should be managed with an early detection and rapid response (EDRR) management approach, as advocated by the California Invasive Plant Council (Cal-IPC). An EDRR plan for natural areas associated with a habitat restoration project is outside of the scope of this plan but should be considered as a complementary land management activity to habitat restoration efforts.

Table 3-1 shows the selected invasive species and their relative threat to California's natural areas as ranked by Cal-IPC. The Cal-IPC ranking is for the statewide threat; however, keep in mind that in Fairview Park, some of these species may pose a greater or lesser threat. The table also presents species deemed invasive in Fairview Park that are not ranked by Cal-IPC and shall be actively controlled. Table 3-2 shows the recommended control treatments and general timing for effective control for the target invasive species.

Table 3-1 High-Priority Invasive Plants to Control in Fairview Park.

Scientific Name	Common Name	Cal-IPC Rating*	Bloom Period	Lifeform	Duration	Methods of Reproduction
Arundo donax	Giant reed	High	May to June	Grass	Perennial	Vegetative; roots, rhizomes, stems with nodes
Atriplex semibaccata	Australian saltbush	Moderate	April to Dec.	Subshrub	Perennial	Seed
Bassia hyssopifolia	Five horn bassia	Limited	June to July	Herbaceous	Annual	Seed
Brachypodium distachyon	Purple false brome	Moderate	April to July	Grass	Annual/Perennial	Seed
Brassica nigra	Black mustard	Moderate	April to July	Herbaceous	Annual	Seed
Bromus diandrus	Ripgut brome	Moderate	April to June	Grass	Annual	Seed
Carduus pycnocephalus	Italian thistle	Moderate	Feb. to July	Herbaceous	Annual	Seed
Carduus tenuiflorus	Slender flowered thistle	Limited	April to Aug.	Herbaceous	Annual	Seed
Cirsium vulgare	Bull thistle	Moderate	July to Sep.	Herbaceous	Perennial	Seed
Conium maculatum	Poison hemlock	Moderate	April to Se.	Herbaceous	Biennial	Seed
Cynara cardunculus	Artichoke thistle	Moderate	April to July	Herbaceous	Perennial	Seed
Echium candicans	Pride of Madeira	Limited	Feb. to Oct.	Shrub	Perennial	Seed
Foeniculum vulgare	Sweet fennel	Moderate	May to Sep.	Herbaceous	Perennial	Primarily seed; occasionally vegetatively from root and crown fragments
Glebionis coronaria	Crown daisy	Limited	March to July	Herbaceous	Annual	Seed
Hirschfeldia incana	Shortpod mustard	Moderate	Year Round	Herbaceous	Perennial	Seed
Oncosiphon pilulifer	Stinknet	High	March to July	Herbaceous	Annual	Seed
Pennisetum setaceum	Fountaingrass	Moderate	July to Aug.	Grass	Perennial	Seed
Raphanus sativus	Wild radish	Limited	Feb. to July	Herbaceous	Annual/Biennial	Seed
Ricinus communis	Castor bean	Limited	Year Round	Shrub	Perennial	Primarily seed; occasionally vegetatively from root and stem fragments
Rumex crispus	Curly dock	Limited	Year Round	Herbaceous	Perennial	Seed
Salsola australis	Russian thistle	Locally Invasive	March to Jan.	Herbaceous	Annual	Seed
Silybum marianum	Milk thistle	Limited	April to July	Herbaceous	Annual/Biennial	Seed
Sisymbrium irio	London rocket	Limited	Jan. to April	Herbaceous	Annual	Seed
Solanum rostratum	Buffalobur	Locally Invasive	May to Sep.	Herbaceous	Annual	Seed

** "Locally Invasive" is not a Cal-IPC rating, but Land IQ has identified these species as locally invasive with ecological impacts on sensitive biological resources in Fairview Park.*

Table 3-2 Timing and Method of Treatment for High-Priority Invasive Plants Parkwide or in Sensitive Habitat Areas: Vernal Pool Watershed (VPW) and Wetlands, Coastal Sage Scrub (CSS), and Riparian Habitat Areas (WRA).

Scientific Name	Common Name	Physical/Mechanical Treatment Method (P)	Chemical Treatment Method (C)	Control Event 1 (Jan. to Feb. 15)			Control Event 2 (Spring to Early Summer)			Control Event 3 (Summer to Fall)		
				VPW	WRA/CSS	Parkwide	VPW	WRA/CSS	Parkwide	VPW	WRA/CSS	Parkwide
Arundo donax	Giant reed	Cut and dig out plant removing all plant material	Foliar herbicide application – glyphosate	---	P/C	P/C	---	P/C	P/C	---	P/C	P/C
Atriplex semibaccata	Australian saltbush	Hand-pull removing all rooting material	Foliar herbicide application - glyphosate	P	P/C	P/C	P	P/C	P/C	P	P/C	P/C
Bassia hyssopifolia	Five horn bassia	Hand-pull removing all rooting material	N/A	P	---	---	P	---	---	P	---	---
Brachypodium distachyon	Purple false brome	Hand-pull small patches; or mow before viable seed production but after soil moisture depleted	Foliar herbicide application - fluazifop	P	P/C	P/C	P	P/C	P/C	P	P	P
Brassica nigra	Black mustard	Hand-pull removing all rooting material; or mow after flowering but before viable seed production cutting close to the ground to prevent resprouting (this may require removal of thick plant thatch in sensitive habitat areas); remove viable seeds from mature plants	Foliar herbicide application - glyphosate	P	P/C	P/C	P	P/C	P/C	P	P	P
Bromus diandrus	Ripgut brome	Hand-pull small patches; or mow before viable seed production close to the ground removing bolting stems (this may require removal of thick plant thatch in sensitive habitat areas)	Foliar herbicide application - fluazifop	P	---	---	P	---	---	P	---	---
Carduus pycnocephalus	Italian thistle	Hand-pull removing all rooting material; remove viable seeds from mature plants	Foliar herbicide application – glyphosate or clopyralid	P	P/C	P/C	P	P/C	P/C	P	P	P
Carduus tenuiflorus	Slender flowered thistle	Hand-pull removing all rooting material; remove viable seeds from mature plants	Foliar herbicide application – glyphosate or clopyralid	P	P/C	P/C	P	P/C	P/C	P	P	P

Scientific Name	Common Name	Physical/Mechanical Treatment Method (P)	Chemical Treatment Method (C)	Control Event 1 (Jan. to Feb. 15)			Control Event 2 (Spring to Early Summer)			Control Event 3 (Summer to Fall)		
				VPW	WRA/CSS	Parkwide	VPW	WRA/CSS	Parkwide	VPW	WRA/CSS	Parkwide
Cirsium vulgare	Bull thistle	Hand-pull removing as much of the tap root as possible; remove viable seeds from mature plants	Foliar herbicide application - clopyralid	P	P/C	P/C	P	P/C	P/C	P	P/C	P/C
Conium maculatum	Poison hemlock	Hand-pull removing all rooting material; remove viable seeds from mature plants	Foliar herbicide application - glyphosate	P	P/C	P/C	P	P/C	P/C	P	P/C	P/C
Cynara cardunculus	Artichoke thistle	Hand-pull removing as much of the tap root as possible; remove viable seeds from mature plants	Foliar herbicide application - clopyralid	P	P/C	P/C	P	P/C	P/C	P	P/C	P/C
Echium candicans	Pride of Madeira	Cut and dig out plant removing all plant material	Foliar herbicide application; or Stump cut herbicide application (requires follow-up treatment of resprouts)	---	P/C	P/C	---	P/C	P/C	---	P/C	P/C
Foeniculum vulgare	Sweet fennel	Cut and dig out plant removing at least 3 to 6" of the root crown; remove viable seeds from mature plants	Foliar herbicide application – triclopyr in winter; glyphosate all other times most effective before flowering	P	P/C	P/C	P	P/C	P/C	P	P/C	P/C
Glebionis coronaria	Crown daisy	Hand-pull removing all rooting material including any viable seed	Foliar herbicide application - glyphosate	P	P/C	P/C	P	P/C	P/C	P	P	P
Hirschfeldia incana	Shortpod mustard	Hand-pull removing all rooting material; or mow after flowering but before viable seed production cutting close to the ground to prevent resprouting; remove viable seeds from mature plants	Foliar herbicide application - glyphosate	P	P/C	P/C	P	P/C	P/C	P	P/C	P/C
Oncosiphon pilulifer	Stinknet	Hand-pull removing all rooting material; remove viable seeds from mature plants	Foliar herbicide application – glyphosate most effective in the bolting stage	P	P/C	P/C	P	P/C	P/C	P	P/C	P/C

Scientific Name	Common Name	Physical/Mechanical Treatment Method (P)	Chemical Treatment Method (C)	Control Event 1 (Jan. to Feb. 15)			Control Event 2 (Spring to Early Summer)			Control Event 3 (Summer to Fall)		
				VPW	WRA/CSS	Parkwide	VPW	WRA/CSS	Parkwide	VPW	WRA/CSS	Parkwide
Pennisetum setaceum	Fountaingrass	Hand-pull seedlings; Cut and dig out mature plants removing all plant material; remove viable seeds from mature plants	Foliar herbicide application – fluazifop; or glyphosate best control when applied during flowering stage	P	P	P	P	P/C	P/C	P	P/C	P/C
Raphanus sativus	Wild radish	Hand-pull removing all rooting material; mow after flowering but before viable seed production cutting close to the ground to prevent resprouting	Foliar herbicide application - glyphosate	P	P/C	P/C	P	P/C	P/C	P	P	P
Ricinus communis	Castor bean	Hand-pull seedlings; cut and dig out mature plants removing all plant material; remove viable seeds from mature plants	Foliar herbicide application or Stump cut herbicide application (requires follow-up treatments to foliar spray any resprouts)	P	P/C	P/C	P	P/C	P/C	P	P/C	P/C
Rumex crispus	Curly dock	Hand-pull removing as much as the tap root (minimum of 2 inches) as possible to prevent resprouting	Foliar herbicide application – glyphosate or clopyralid	P	P/C	P/C	P	P/C	P/C	P	P/C	P/C
Salsola australis	Russian thistle	Hand-pull removing as much of the root as possible before seed set	Foliar herbicide application – glyphosate before seed set; triclopyr most effective on young plants	P	P/C	P/C	P	P/C	P/C	P	P/C	P/C
Silybum marianum	Milk thistle	Hand-pull removing as much of the root as possible; remove viable seeds from mature plants	Foliar herbicide application – clopyralid from seedling to bud stage	P	P/C	P/C	P	P/C	P/C	P	P/C	P/C

Scientific Name	Common Name	Physical/Mechanical Treatment Method (P)	Chemical Treatment Method (C)	Control Event 1 (Jan. to Feb. 15)			Control Event 2 (Late Spring to Early Summer)			Control Event 3 (Late Summer to Fall)		
				VPW	WRA/CSS	Other	VPW	WRA/CSS	Other	VPW	WRA/CSS	Other
Sisymbrium irio	London rocket	Hand-pull removing all rooting material; or mow after flowering but before viable seed production cutting close to the ground to prevent resprouting; remove viable seeds from mature plants	Foliar herbicide application - glyphosate	P	P/C	P/C	P	P/C	P/C	P	P	P
Solanum rostratum	Buffalobur	Hand-pull removing as much of the root as possible	Foliar herbicide application - glyphosate	P	---	---	P	---	---	P	---	---

Notes:

1. *Sensitive Habitat Areas = CSS Areas that have potential for nesting coastal California gnatcatcher nesting, and all riparian and wetland areas, including vernal pools.*
2. *P = Physical or mechanical control method appropriate for the life stage of the invasive plant. C = Chemical control method. "---" = Species does not currently or is not expected to occur in an area, or species is not a target for control in this portion of the Park, and no control method is provided.*
3. *The number of weed control events per year will be dependent on weed growth throughout the season, annual weather conditions, incidence of standing water and saturated soil conditions in the vernal pool areas, and ability to do nesting bird surveys during the bird nesting season.*
4. *Treatments during the nesting seasons will require pre-work biological surveys and monitoring around active nests: CAGN nesting season 2/15 to 8/31; LBV 3/15 to9/15; Raptors 1/15 to 8/15; CRBB 4/1 to Oct 15; MBTA Protected Birds 2/15 to 8/31.*
5. *The City shall provide a cultural monitor to protect culturally significant materials if significant digging is required in areas with protected cultural resources. Cutting or pulling out the roots of the plant from the topsoil does not require a cultural monitor.*
6. *All treatments shall occur before viable seed production when possible; if control cannot occur before viable seed production all seed material shall be cut, bagged, removed, and properly disposed of off-site.*
7. *No weed control treatments shall occur in the vernal pool watershed when there is standing water or while the soil is saturated—until the surface is dry enough to walk on without disturbing the soil surface.*
8. *No herbicide treatment of any kind shall be conducted in the vernal pool watershed—except for the improper fill material soil that was placed on the mesa.*
9. *No mowing with mechanical equipment shall occur in the vernal pool watershed*
10. *Only aquatic approved herbicides shall be used within 100 feet of water.*
11. *A state licensed Pest Control Advisor (PCA) shall be consulted to provide written herbicide recommendations for species specific herbicide control methods for the Park.*

3.5.1 ARTICHOKE THISTLE

The type of herbicide used for artichoke thistle (*Cynara cardunculus*) control is dependent on its growth stage. In the seedling to rosette stage in winter to early spring, clopyralid (e.g., Transline®) should be applied at 1.5 to 4 oz a.e. per acre. Foliage should be thoroughly coated for effective control. The higher rates should be used if the plants are stressed or in areas with high weed density. Physical control methods include hand pulling seedlings and cutting plants in the rosette stage. When using physical methods, as much of the root system should be removed as possible to limit resprouting (DiTomaso et al. 2013). It should be noted that while physical control methods can effectively control artichoke thistle, it may take longer than chemical control methods with more treatments per year and more years of control.

For mature, bolting artichoke thistle plants, a foliar application of 2% glyphosate should be used. Glyphosate treatments should be done after bolting when the plants are actively translocating fluids to the root system. If sprayed before bolting, the above-ground material may die back, but many of the plants will resprout from the roots later in the season (Bossard et al. 2000).

Physical methods include cutting the mature plant and removing as much of the upper taproot as possible to prevent resprouting. Plants can be cut with a mower, line trimmer or hoe. The most effective cutting method is the use of a hoe to cut down below the soil to remove part of the upper tap root system. Mowers and brush cutters can be used to deplete mature plants of their resources. Repeat mowing will be necessary during the growing season prior to seed set over multiple seasons for effective control.

3.5.2 AUSTRALIAN SALTBUSH

Australian saltbush (*Atriplex semibaccata*) is a perennial subshrub that can be controlled by hand-pulling, removing as much of the root material as possible. While plants are easy to hand-pull, they are brittle, and care should be taken not to break the mainstem when pulling to ensure as much of the root material is removed as possible. Chemical methods of control include foliar application of glyphosate that can be used from postemergence to mature plants that are rapidly growing. If seeds are present before treatment, seeds should be carefully cut and removed from the plant and properly disposed of off-site.

3.5.3 CROWN DAISY

Crown daisy (*Glebionis coronaria*) is an annual herb that reproduces from seed that can be controlled by hand-pulling removing as much of the root material as possible. Line trimming is most effective after the plant has flowered or produced fruits, cutting the plants as close to the base as possible. Follow-up treatments will likely be required if line trimming is the method used. Foliar application of glyphosate is most effective when the plant is mature but prior to seed set. If seed set has already occurred, line trimming should be the method used. If seeds are present before treatment, seeds should be carefully cut and removed from the plant and properly disposed of off-site.

3.5.4 CASTOR BEAN

Castor bean (*Ricinus communis*) can be either a summer annual, perennial, shrub, or even a small tree up to 10 feet tall. The seeds are highly poisonous as well as to a lesser degree the foliage. Protective gloves should be worn during hand-pulling activities since all plant parts are toxic to humans. Hands should be thoroughly washed after working with castor bean.

Seedlings and smaller castor bean individuals should be hand-pulled, removing as much of the root system as possible to prevent resprouting. Medium sized individuals can be pulled with hand-held tools such as a weed wrench. Hand-pulling can be best accomplished in soils that are wet and even larger individuals can be hand-pulled in wet sandy soils. Hand-pulling is more difficult when soil conditions are dry and should not be the method used if most of the root system cannot be removed. If plants are broken during hand-pulling, they will readily resprout with multiple shoots from the root crown.

Mature plants should be treated with a foliar herbicide application of a 2% solution of glyphosate. Foliar herbicide application can occur at any life stage of the castor bean from seedlings to large mature plants. Control is optimum between seedling to bloom stage and is most effective at flower bud and flowering stage. Herbicide control should be done before seed production has started.

For larger individuals, the stump cut method as described above can be used. The cut stumps should be treated with a 25% solution of glyphosate applied to the cut stump. The stump cut treatment can be done on mature plants at any time of the year. Smaller plants can be cut with loppers while hand saws or chain saws may be required for larger plants.

If seed production has occurred prior to any treatment, seeds should be cut from the plant, bagged, and removed from the site to prevent the seeds from entering the weed seed bank.

3.5.5 FOUNTAINGRASS

Fountaingrass (*Pennisetum setaceum*) is a perennial grass that reproduces by seed. Small populations can be effectively controlled by digging up the plant removing as much of the root system as possible. Roots of mature plants can be dug out of the ground with a pick, shovel, or mattock. Flowers shall be cut and removed prior to digging out the plant and the material bagged and removed from the site. Mowing is not an effective control method for fountaingrass.

Herbicide control methods included foliar application. Plants can be treated with fluazifop from postemergence to rapidly growing plants. Foliar application of glyphosate with a 1 to 2% solution is effective from postemergence to rapidly growing plants from mid-summer to fall. The most effective treatment timing for foliar application of glyphosate is during the flowering stage in the summer.

3.5.6 GIANT REED

Giant reed (*Arundo donax*) is a perennial grass that is bamboo-like with hollow cane-like stems that can grow upwards to 25 feet tall. Giant reed does not produce by seed but can readily reproduce from roots, rhizomes, and stem material.

Foliar herbicide spray should consist of spraying giant reed with an 8% solution of Roundup Custom™ (a glyphosate herbicide approved for aquatic use), and the surfactant Liberate® (approved for aquatic use) directly to exposed green foliage. The green foliage should be thoroughly wetted with herbicide with a minimum of 75% of the plant treated. Since the root and rhizomes of giant reed are so substantial sufficient herbicide needs to be translocated to the roots for effective control. Tall stalks shall be carefully bent downward, and herbicide solution applied, being careful to avoid spraying any adjacent native species. Similarly, giant reed in that is in or near standing water should be carefully bent so that the foliage is over land and not water for spraying.

Treatment shall occur when giant reed is actively growing starting early spring and is most effective at the end of summer or beginning of the fall season when it is actively translocating resources to its root system. Herbicide control is least effective during the winter months when temperatures are colder and giant reed is primarily dormant. Control of mature well-established stands of giant reed can take between 3 and 7 years to control where hydrologic conditions favor the regrowth of giant reed.

For large, dense giant reed stands with a lot of standing biomass, it may be necessary to cut the canes prior to herbicide treatments. When cutting is done, all cut cane material should be removed from the Park or mulched in place. Mulched in place canes should be thoroughly shredded to prevent potential resprouting from stem nodes. The initial cutting should be in the late fall/early winter. Follow-up herbicide treatment of giant reed resprouts as described above during the growing season will be necessary. It is recommended the resprouts are a minimum of three feet tall for there to be sufficient foliage to treat.

Giant reed can be removed by cutting the canes and digging up the roots, culms, and rhizomes. As much of the roots and rhizomes need to be removed as possible to prevent resprouting. Hand-removal is most efficient and effective for smaller infestations or in areas previously treated with herbicides and only a few viable giant reed canes remain. All plant material should be collected and properly disposed of off-site.

3.5.7 MILK THISTLE AND ITALIAN THISTLE

Milk thistle (*Silybum marianum*) is an annual or biennial species and typically emerges during the fall after first rains. Italian thistle (*Carduus pycnocephalus*) and slender flowered thistle (*Carduus tenuiflorus*) are annual species and seedlings emerge after the first rains.

Physical control methods include hand pulling seedlings, cutting with hand tools, or mowing. When using hand tools such as grubbing hoes, plants should be cut a minimum of 2 to 4 inches below the ground to prevent resprouting. Mowing is most effective

when done after the plants have bolted and are about to flower, as plants will regrow if plants are cut before fully bolted. Plants should be cut or mowed prior to seed production.

The type of herbicide used for control is dependent on their growth stages. In the seedling to bud stage, clopyralid (e.g., Transline®) should be applied at 1.5 to 6 oz a.e. per acre for control of milk thistle and 1.5 to 8 oz a.e. per acre for Italian thistle and slender flowered thistle (DiTomaso et al. 2013). However, it should be noted that the maximum application rate for clopyralid in California is ⅔ pint per acre per annual growing season. Foliage should be thoroughly coated for effective control. The higher rates should be used if the plants are stressed or in areas with high weed density. A foliar application of 2% glyphosate for milk thistle and glyphosate at a rate of 1.5 to 3 lbs a.e. per acre for Italian thistle and slender flowered thistle can be used at any time during the growth stage for effective control.

3.5.8 Pride of Madeira

Pride of Madeira (*Echium candicans*) can be controlled by hand-pulling seedlings and younger plants. Larger mature plants can be controlled by cutting the upper foliage of the plant and digging out the root system. Plant foliage can be cut with a handsaw, loppers, axe, or similar tools and removed to allow for better access to the roots. The root material can be dug out and removed with a shovel, mattock, Pulaski, or similar tool. As much of the root material should be removed as possible for effective control since Pride of Madeira can readily resprout from remaining roots.

Foliar herbicide application of a 1 to 2% solution of glyphosate is most effective from late spring to summer and should be timed before seed production. Stump cut treatments can also be effective using glyphosate. If seed production has occurred prior to any treatment, seeds should be cut from the plant, bagged, and removed from the site to prevent the seeds from entering the weed seed bank.

3.5.9 Purple False Brome

Purple false brome (*Brachypodium distachyon*) is a fast growing annual or perennial grass with a short life cycle that allows for multiple life cycles during a growing season (Bakker et al. 2009). First emergence is typically during the fall after the first rains however, emergence can occur any time following a rain event. Purple false brome produces a dense thatch that inhibits germination of many native species and the first step for control is to eliminate the dense thatch in a restoration area. Initial mowing and dethatching will allow for natural recruitment of natives; however, other nonnative herbaceous species can invade after clearing.

Treatment methods for the control of purple false brome include mowing, mechanized or line trimming and foliar herbicide application. When mowing, the plants should be cut as close to the ground as possible. Effective herbicide treatments include fluazifop at 4 to 6 oz a.i./acre from post-emergence to prior to the boot stage or 0.56 to 1.1 lb a.i. per acre of glyphosate from post-emergence application to rapidly growing, non-stressed plants (DiTomaso et al. 2013). Given the fast-growing nature of purple false

brome and its ability to have multiple life cycles in a growing season, multiple treatments during a growing season are optimal for increased control. Treatments must be implemented prior to seed set to limit seed banking. Typical timing for treatments is to implement the first control event in winter after emergence with follow-up treatment(s) in spring for later germinating populations and resprouts.

Growth and flower production are dependent on annual rainfall and subsequent soil moisture availability. Monitoring growth and development is important particularly during drought years to plan treatment accordingly for effective control. For example, the flowering height of purple false brome in treatment areas was observed at only a height of 1 to 2 inches in response to the 2015 drought conditions. As a result, physical control methods, such as mowing required more time than usual to ensure that the tractor, or skid steer, mounted mower stayed close enough to the ground to cut the flowering parts of the grass. The low flowering height required the use of a flail mower, instead of a rotary mower, mounted to a hydraulically driven skid steer so the grass could be mowed at the soil surface. The additional time and equipment for the physical control of purple false brome control in dry years increases the cost of control. An alternative option for treating low stature plants is broadcast herbicide application of fluazifop or glyphosate.

3.5.10 MUSTARD SPECIES

Control methods for mustard species such as black mustard (*Brassica nigra*), shortpod mustard (*Hirschfeldia incana*), and London rocket (*Sisymbrium irio*) consist of mowing, hand pulling, and foliar herbicide application. Mowing or hand cutting treatments are most effective for actively growing plants that have flowered but prior to setting seed to limit contributions back to the weed seed bank. Cutting is most effective for the annual mustard species black mustard and London rocket compared to the perennial shortpod mustard; however, follow-up treatments will likely be necessary for all the mustard species since resprouting can occur. Foliar herbicide application of a 2% solution of glyphosate is most effective when plants are younger prior to flowering, particularly for black mustard. When hand pulling, as much of the taproot as possible should be removed (DiTomaso et al. 2013).

Treatment times depend on annual weather, but typical treatment times are in the winter after emergence from rainfall and a follow-up treatment(s) in spring before seed set. Shortpod mustard can germinate and grow at any time of the year conditions are right and follow-up treatments may be needed in the summer. Several years of control are necessary to eliminate mustard species.

3.5.11 NONNATIVE GRASS CONTROL

Ripgut brome (*Bromus diandrus*) is a nonnative annual grass that typically emerges after the first rains. Growth and development are dependent upon rainfall events, with flower production earlier in the season during drought years along with a decrease in biomass and height of the plants. Nonnative annual grasses are typically the first nonnative species to germinate after rains. Control methods include, hand pulling,

cutting, mowing, and herbicide application. Timing for control of nonnative grasses is typically in winter with follow-up treatments in spring for later-germinating individuals.

Smaller infestations can be controlled with hand pulling before seed development. Mowing can reduce seed production when timed right after flowering but before seeds mature. Plants cut earlier than this stage will grow back. When mowing, the material should be cut to about 2 inches to remove the bolting stems (DiTomaso et al. 2013). If mowing is the only option for control, mowing should be repeated every 3 weeks, as needed.

Ripgut brome can be controlled with a 0.375 to 1.1 lbs a.e. per acre of glyphosate at postemergence in early spring to rapidly growing plants that are not stressed. Fluazifop at a rate of 4 to 6 oz a.i. per acre for mature plants and 2 oz a.i. per acre for seedlings can also be used with the most effective treatment time before the boot stage.

3.5.12 POISON HEMLOCK

Poison hemlock (*Conium maculatum*) is a biennial species that reproduces by seed. For small infestations, hand-pulling is the recommended method for control. When hand-pulling, the entire taproot should be removed to prevent resprouting. Care should be taken when handling poison hemlock as all plant parts are toxic to humans. Gloves should be worn during control activities and hands should be thoroughly washed after working with poison hemlock. This includes handling of dried material since it takes several years for the toxins present to dissipate. Foliar application of a 1 to 1.5% glyphosate solution is most effective from postemergence to rapidly growing plants prior to bolting. Higher rates of glyphosate can be used for control of plants from bud to full bloom stage. If seed production has occurred prior to any treatment, seeds should be cut from the plant, bagged, and removed from the site to prevent the seeds from entering the weed seed bank.

3.5.13 STINKNET

Stinknet (*Oncosiphon pilulifer*) is an annual species that reproduces from seed that can be controlled by physical methods or chemical methods. Hand-pulling removing all the root material is the best method and is recommended for smaller infestations. Larger populations can be controlled with line trimming once plants reach the bud stage. If viable seed has already formed, line trimming is not recommended since the seed can be easily dispersed, unless the seed material can be removed before cutting. Follow-up control will be needed if cutting is the method used. Care should be taken when handling stinknet as it can cause contact dermatitis for some individuals. Protective gear includes long sleeve shirts, pants, and gloves to prevent skin contact. Chemical control methods include foliar application of glyphosate. Timing of chemical control methods is critical, and plants should be treated in the rosette stage up to bolting stage but before flowering. Once the plants have flowered, chemical control efficacy diminishes (McDonald, 2023).

3.5.14 SWEET FENNEL

Sweet fennel (*Foeniculum vulgare*) is a perennial species that typically emerges in mid-winter to early spring. Control methods include slashing, hand pulling, and herbicide application. Slashing is best used just before the flowering stage of fennel plants, but repeated slashing of new growth is likely required to kill the plant. Hand pulling is best for seedlings and younger, smaller plants as the root system needs to be removed for effective control. When cutting or digging out plants a minimum of 3 to 6 inches of the taproot should be removed for effective control. Physical methods for control of sweet fennel are very labor intensive. It is important to note that digging up plants causes soil disturbance that can lead to increased germination of exposed seeds therefore, digging should be limited to less dense populations (DiTomaso et al. 2013).

Foliar herbicide application of a 2 to 5% solution of glyphosate is most effective from post-emergence to prior to flowering stage. Control with glyphosate is less effective after fennel has bolted (DiTomaso et al. 2013). A 0.5 to 1% solution of triclopyr is most effective during the wet season from late February to early March (DiTomaso. et al. 2013) but can be used from post emergence but prior to flowering. The stump cut method can be used for larger mature plants using a 100% solution of glyphosate.

Timing for treatments is dependent on weather with the first treatment typically in late winter with follow-up treatments in spring. Populations should be checked after using any treatment method to check for resprouts and new seedlings.

4 EROSION CONTROL

Erosion control measures may be needed for restoration areas on steep slopes or next to roadways or facilities. Erosion control measures include biodegradable straw wattles, erosion control fiber mats, check dams with hay bales, hydraulically applied soil binders, etc.

In the cases where construction activities will trigger the need for a Construction General Permit for Stormwater Discharges that requires the development of a Storm Water Pollution Prevention Plan (SWPPP), in California the SWPPP must be prepared by a certified Qualified SWPPP Developer (QSD) to ensure compliance with the National Discharge Elimination System Permit (NPDES). The SWPPP will provide detailed information on Best Management Practices (BMPs) that will be used in specific instances for erosion control and provides a monitoring plan to track compliance with permit conditions to be conducted under the supervision of a Qualified SWPPP Practitioner (QSP). A Construction general permit is required when there will be ground disturbance totaling one or more acres in size.

In instances where erosion control is needed but not subject to permit conditions, the following presents general guidelines for erosion control BMPs that could be used for restoration and enhancement projects. For optimum erosion control, a combination of the following erosion control measures may be needed.

4.1 STRAW WATTLES

Straw wattles are an effective erosion control measure to use on steep slopes that are lacking vegetation that will prevent erosion of bare soil surfaces. The wattles interrupt and slow down water flow on steep slopes and capture sediment that may be within the sheet flow. Biodegradable natural wattles of straw or coir rolls, if needed, should be used, and the netting of the wattles should be of non-plastic, biodegradable material that will break down in the environment over time, such as burlap wrap. Plastic netting can be an entanglement hazard for wildlife. General guidelines for straw wattle spacing are as follows:

- 50-feet apart on slopes flatter than 10:1
- 20 feet apart on slopes that are between 4:1 to 10:1
- 15 feet apart for slopes from 2:1 to 4:1
- 10 feet apart for slopes steeper than 2:1

The wattles should be trenched into the ground at a depth of 2 to 4 inches deep and aligned with slope contours. No daylight should be seen under the wattle if installed properly. Ends of the wattles shall be overlapped by 12 inches and not butted end to end to prevent rilling. Wood stakes that are at least 18 inches long and at least one inch in diameter should be placed at each end and every 4 feet on center, driven in the center of the wattle to anchor the wattle to the slope. Two to three inches of the stake should be left protruding above the wattle. Stakes should be driven perpendicular to the slope.

Straw wattles should be inspected regularly after significant rain events and maintained as needed to ensure adequate sediment holding capacity. Generally, removal of accumulated sediment should occur when the accumulated sediment reaches ¾ of the barrier height. Any damaged or missing wattles should be replaced.

4.2 FIBER MAT

A fiber mat, or rolled erosion control netting, is an erosion control measure to use on bare steep slopes to prevent topsoil and sediment movement until vegetation can establish for slope stabilization. It might be best used with other erosion control measures such as straw wattles on steep slopes. If seeding is planned in areas where the fiber mats are placed, the mat should have an open area percentage of 65 percent so that seed may be applied after the netting is put in place. If a product with less open area must be used (e.g., for increased erosion control protection) then a netting with no less than 50 percent open area should be used.

The fiber mat should be made of 100 percent natural biodegradable fiber woven into a matrix (no synthetic materials), a minimum roll width of 6 feet, and weight of about 11.8 ounces per square yard (e.g., BioD-Mat® 40 or Coir Mat 480). The open area percentage of the mat to use will depend on the amount of erosion protection needed with the less open space providing increased erosion control protection.

Fiber mats work best in areas with bare soil that have been graded. The mats need to fit snug to the ground surface to be most effective. If application of seed is to occur in combination with the fiber mat, the seed bed should be prepared which might include loosening the upper couple of inches prior to installation if the soil is compacted. Seeding should occur before installation of the netting. Reseeding in areas that were disturbed during installation may need to occur.

Installation of the fiber mat should begin at the top of the slope and the mat anchored into a 12-inch anchor trench. The mat should be placed in the trench and the trench backfilled and the soil tamped down firmly. The mat should then be rolled down the slope. Adjacent parallel rolls should overlap by 6 inches and anchored with 6-inch-long staples that are degradable (e.g., 11-guage steel wire staple). When the mat must be spliced, the rolls should be placed end over end (shingle style) with 12 inches overlapping. The overlapped area should be secured with two staggard rows of staples 6 inches on center. For slopes that are 2:1 and steeper, a minimum of 2 staples per every square yard is recommended. The end of the mat at the downslope end should be anchored into the ground in a 12 by 6-inch anchor trench. The mat should be placed in the trench, backfilled with soil, and tamped into the ground.

4.3 SILT FENCES

A silt fence is a temporary erosion control measure that is used for capture of sediment on site by intercepting and slowing down the flow of sheet flow runoff. It is made of permeable fabric that captures sediment behind the fence. Silt fences should be placed below areas where sheet flows discharge from the site. Silt fences are most applicable around the perimeter of the project, below the toe of or downslope of exposed and erodible soils, along streams, or around temporary spoil or stockpiles. Silt fences are not appropriate for protection against concentrated flows and are only applicable for sheet flow.

For most effective erosion control silt fences should be used in combination with other erosion control devices, such as straw wattles on steep slopes. The silt fence should be installed offset 3 feet from the toe of slope to be most effective. A trench should be excavated approximately 6 inches wide and 6 inches deep along a level contour. The bottom of the silt fence should be keyed in a minimum of 12 inches, 6 inches deep and 6 inches horizontally in the bottom of the trench. After placing the silt fence fabric material in the trench, it should be backfilled with soil and tamped into the ground.

The silt fence should be secured with posts that are a minimum of 12 to 18 inches below the bottom of the trench and placed a maximum of 6 feet apart. The stakes should be placed on the downslope side of the trench. When fence lengths need to be joined together, the silt fence fabric should be spliced together only at a support post with a minimum of 6 inches of overlap and both ends secured to the post. The fabric should be folded around the stake one full turn for each section and the two stakes placed together and driven tightly together to prevent potential flow through of sediment at the joint. The tops of the stakes should be secured with wire. The fence material should

be stapled to the posts and with staples that are 1.75 inches long and be 0.6 inch or heavier wire. The staples used for joining two sections of fence together should be 0.12 inches or heavier wire. A minimum of 4 staples should be used to secure the fabric to the stakes. The end stake should have two stakes and the fabric folded around one full turn and secured with 4 staples. The last 8 feet of the fence should be turned upslope to prevent stormwater from flowing around the fence.

Inspection of silt fences should occur before and after rain events. Repairs should be done as needed, e.g., torn, or weathered fabric should be replaced, and broken posts should be replaced. Inspection after rains should be done to see if sediment removal is necessary to continue to provide adequate sediment holding capacity of the fence. Sediment removal should occur when sediment reaches 1/3 of the barrier height.

4.4 STRAW HAY BALE CHECK DAM

Check dams can be a useful temporary erosion control tool in smaller drainages or deep erosion gullies. They should not be used in flowing channels or streams and are not intended for protection against large storm events. They are designed to reduce debris flow, scour, and erosion. The check dam can prevent undercutting from occurring if installed correctly and can slow down the velocity of water flow in the channel or gully. The general guidelines for design limits of the straw hay bale check dam are the following:

- Slopes 0 to 15% - the maximum drainage area between check dams is 1 acre and maximum slope length is 200 feet
- Slope 15 to 20% - the maximum drainage area between check dams is ½ acre and maximum slope length is 100 feet
- Slope >20% - not recommended

The hay bales should be made of natural material that is certified weed-free that meet the State requirements for noxious and invasive weeds. For more durable straw hay bales, the bale should be bound with either wire or nylon string. Twine binding will break down quicker thereby reducing the integrity of the hay bale. The bales should be placed in rows with the bale ends tightly abutting the adjacent bales. Depending on the size of the erosion control area, multiple straw check dams may be necessary. The number needed will depend on the size of the drainage or gully.

Two rows of hay bales should be installed with the downstream hay bales trenched into the ground so that the top of the row of bales placed on their long, wide side are level with the ground. The top of the bales across the center of the drainage or gully should all be level and set at the same elevation. A trench should be dug immediately upstream of this row so at least 6 inches of each bale is below ground and wide enough to accommodate a row of bales set vertically on their long edge. The trench and the tops of the bales across the center of the channel should be as level as possible so that water will evenly flow across the top. This trench should be continued up slope on either side of the channel so that the last bales are higher than the top of the bales in the center of the channel (USDA 2012).

The hay bales should be anchored in with wooden stakes or #4 rebar that are driven through the bales and into the ground 1 ½ to 2 feet into the ground. The stakes should be angled to drive towards the adjacent previously laid bale, so they are driven towards each other.

For further protection, an energy dissipater of rocks and/or logs can be constructed at the base of the spillway bales. Logs can be anchored in front of the hay bales with bent rebar or rocks can be piled at least two deep against the bales. The energy dissipator should be large enough to receive all the flowing water over the hay bale check dam (USFS 2006).

Monitoring of the check dams should occur before and after rain events and maintenance conducted as needed. The check dam can quickly fill up with sediment after a storm and if the sediment accumulation is one-third of the bale height, it should be cleaned out. Straw hay bales will degrade quickly and may need to be replaced every 3 months, depending on the site conditions and weather. The buildup of sediment over time behind the check dam can allow for establishment of desirable native habitats that can further provide erosion stabilization.

Alternative materials can be used for the construction of check dams that may be preferred, provide greater stabilization and last longer. Other materials include fiber rolls, gravel filled bags, rocks, or logs. The advantage of using alternative materials are they will last longer in the environment since hay bales can quickly degrade and last less than 3 months, especially in areas with high rainfall.

4.5 HYDRAULICALLY APPLIED SOIL STABILIZERS

Hydromulch with soil stabilizers can be an effective erosion control measure on bare erodible slopes, including steep slopes that are between 25 to 50%. It can be used as a temporary measure until vegetation can reestablish on the bare slopes and can be used in combination with seed application to jump start the vegetation recovery process. The mulch will protect the slope from rain drop impact and can reduce sheet flow that might otherwise occur on steep, bare slopes. The mulch can provide favorable conditions for seed germination and establishment by trapping moisture and providing temperature regulation.

Erosion control effectiveness of hydromulch appears to be mainly during the first few months after application and erosion control protection is diminished by higher rainfall amounts and or/intensity (Hubbert et al. 2011). Hydromulch is most effective on slopes with a shorter run length such as road cuts where concentrated flow is diminished (USFS 2006). When using hydromulch, it is recommended to have erosion control measures in place at the toe of the slope such as silt fence.

There are currently products on the market that can be applied that includes the hydromulch and soil stabilizers all into one, e.g., EarthGuard® Pellets or EarthGuard® Fiber Matrix. If seeding is to be done with hydromulch application, it is recommended to use the Fiber Matrix material. In general, the recommended application rate of the hydromulch is 2,000 pounds per acre. Depending on the steepness of the slope, the

manufacturer recommended application rates should be used which depends on slope steepness and annual average rainfall amounts.

5 SEED MATERIALS

Conventionally, we attempt to source the wildland collection of seed for a habitat restoration project from local stands of native species, local watershed, or from an area with a similar bioclimatic envelope or climatic niche (similar climatic conditions in a geographic region that are associated with the presence of the same species or form a species). The premise for this approach is that local genotypes are best adapted to local environmental conditions and outperform non-local genotypes in those conditions (e.g., Keller et al. 2000). However, local populations for some species may not necessarily have sufficient genetic diversity to adjust to a changing climate (Breed et al. 2013) and inbreeding depression is generally considered a greater potential threat to population fitness in plantings than outbreeding depression from crosses between genetically distant individuals (Frankham et al. 2004). As a result, there are currently efforts to develop modeling tools that support the selection of climate-adjusted seed sources using web-based map interfaces and predictive species distribution models (e.g., see Ramalho et al. 2017). In contrast, Montalvo and Ellstrand (2001) found direct evidence for outbreeding depression for a common California subshrub, deerweed (*Acmispon glaber*).

While most seed for restoration projects can be collected from wildlands, supply can vary regionally by species and by year. For some species, the existing stands that are on property accessible for seed collection cannot be relied upon as a seed source because they are too small to provide the amount of viable seed required. Additionally, the viability of seed can be influenced by annual rainfall amounts, which can result in collections with low germination rates during periods of drought.

To improve the availability of wildland collected seed for restoration projects, seed for a specific project can be collected and stored over multiple years for installation later, such as seeding after a multi-year weed management effort. Or a regional native seed bank could be established, through coordination between seed suppliers and/or land managers with a need for local native seed, to increase the number and amount of seed species available for native revegetation projects.

Because it is not feasible to supply all the species in the quantities needed for restoration projects from wildland collections, another source of seed is commercially grown seed. Commercially grown seed is either cultivated in fields or in nursery containers to augment or “bulk” seed. Commercially grown seed is often selected for species with broad geographical distributions in southern California but would be prohibitively expensive to wild collect (e.g., California plantain [*Plantago erecta*]) or are locally rare (e.g., purple needlegrass).

5.1 SEED BULKING

Seed bulking, also known as seed increase, involves collecting seeds from a target wild population of plants and growing these seeds in a controlled nursery setting. Seed bulking is done if a project calls for quantities of seed that are not obtainable in the wild or if it is not desirable to impact the habitat to collect the seed. Qualified nurseries can bulk wild seed collections of rare or endemic species to produce first generation (F1) and second generation (F2) seed. Collections from local populations should be properly identified and bulked separately.

The seed bulked for the project can then be installed back into the local collection sites to enhance existing populations or create new populations in suitable sites. However, without guidance from species experts, caution should be exercised if mixing local populations of rare, sensitive, or protected species that are geographically isolated to avoid the potential for outbreeding depression.

By managing competing weeds in areas with known or expected rare plant populations, the reduced competition can allow the desired rare plant to germinate with higher frequency, grow larger and invest more resources into flowering and produce viable seed that will be contributed back to the native seed bank (i.e., “seed bulk in-place”). The seed bulk in-place approach can be much more cost effective than nursery seed bulking programs that require wild seed collection, growing plants in the nursery, collecting the first-generation seed (F1), and adding the seed back to the wild population.

5.2 SEED SOURCE GUIDELINES FOR FAIRVIEW PARK

To the extent possible, all plant material collected for seed application and container plant production for a restoration project shall be obtained from native plant communities growing within or near Fairview Park or in similar microclimatic regime in Orange County, California. In general, seed material should be wild collected in the Orange County Seed Collection Zone as described in the Orange County Native Seed Partnership Strategic Plan (AECOM 2023).

In some instances, there may not be enough wild seed available from appropriate Orange County sources for projects that require large quantities of seed. For those species that function as erosion control or nurse crop species or do not exist in large enough quantities it will be necessary to either (a) use seed stock from a seed collector/supplier that can be verified as collected within Orange County and of similar microclimate regime, or (b) extend the collection area on a species-by-species basis from appropriate sources within Orange County or other appropriate microclimatic regions in Southern California. The seed collection firm shall certify all seed collection locations. Sources for all species and any adjustments to the seeding rate should be approved by the project restoration specialist/biologist.

Special collection of seed material shall be done by a qualified native seed collection firm that has a minimum of five years of experience and holds all the necessary licenses

and permits through the term of the project. The selected firm must be approved by the project restoration specialist/biologist and the City of Costa Mesa.

5.2.1 SEED TESTING

Prior to use, the seed should be tested for germination and purity to assure the pure live seed (PLS) pounds (lbs) for each species. Individual seed lots (seed collection in one location or in different years) must be tested for seed viability and purity by a registered seed technologist (RST) or similar qualification from the Society of Commercial Seed Technologists (SCST) or by an independent seed-testing laboratory certified by the Association of Official Seed Analysis (AOSA) and tested according to the rules and procedures of the AOSA.

The seed tests should include the following information for each species: botanical name, seed lot number, percent purity, percent germination, percent total viable seed, percent by weight of inert matter, percent by weight other crop seed (not to exceed 1.5 percent), and percent weight weed seed (not to exceed 1.0 percent and 0.0 percent Noxious or Restricted weed allowed). Seed tests shall not contain any weed species listed as noxious or restricted in the State of California. For more information regarding laws and regulations for invasive species, see the following CDFW website: www.wildlife.ca.gov/Conservation/Invasives/Regulations.

Seed tests should be available to the land manager upon request. Seed tests should be performed no more than 12 months before seed application. Retesting for germination may be required if the seeding schedule is delayed and the latest available test date is beyond 12 months.

A sample seed test result is shown in Figure 5-1 for a seed lot of purple needlegrass. The observed germination rate is 82% and the purity rate is 97.43%, and the calculated target PLS is 79.89% excluding the contribution of dormant seed to viability.

It should be noted that in this case testing determined 10% of the seed was dormant. The PLS in the seed report was 89.64% when calculated based on total viability, 92% (82% germination + 10% dormant), and purity, 97.43%.

Report Of Seed Analysis

Account No.	Date Received	Date Completed	Lab Number
	10/27/14	11/20/14	14-14107

Sender's Information*

Kind: STIPA PULCHRA
Variety: --
Lot Number: 8/20/14
Other: (NASSELLA)

*The information above is provided by the sender.

Purity Analysis			Viability Analysis				
Pure Seed Components		Purity	Days Tested	Germination %	Dormant %	Hard %	Total Viable
STIPA PULCHRA		97.43%	21	82	10	-N-	92
	Crop Seed	0.08%					
	Inert Matter	2.40%					
	Weed Seed	0.09%					

Other Crop Seeds: In 100 grams	# per lb
BROMUS CARINATUS	68

Noxious Weed Seeds: In 100 grams — None Found
(C) California Noxious, (O) Other Noxious

Other Weed Seeds: In 100 grams	# per lb
BROMUS CATHARTICUS	41
HORDEUM SP.	9
VULPIA MYUROS	9
CHENOPODIUM SP.	5
MELICA SP.	5

Other Determinations:	
Live Seed Per Pound	84,651
P.L.S.	89.64 %

Germination Remarks
DORMANT SEED: 10% GERMINATED WHEN PRECHILLED AND GA3 ADDED

Purity Remarks
INERT MATTER: BROKEN SEED, PLANT MATERIAL, SOIL

Tests Requested: Purity, Germination, P.L.S., Live Seed Per Pound. No other tests requested.

WARRANTY: We warrant that the purity and germination test results reported on this form have been carried out in accordance with Association of Official Seed Analysts (AOSA) rules unless otherwise specified. Test results reflect the condition of the submitted sample and may not reflect the condition of the seed lot from which the sample was taken.
DISCLAIMER OF WARRANTIES: WE MAKE NO OTHER WARRANTIES OF ANY KIND, EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Signature:

SOCIETY OF COMMERCIAL SEED TECHNOLOGISTS AUTHORIZED REGISTERED SEED TECHNOLOGIST 067 *1922*

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Aleta Meyr, RST; Michael Aberle, RST

Figure 5-1 Sample Seed Test Report for Purple Needlegrass (*Stipa pulchra*)

6 SEED ADDITION

Native plant material will be primarily added to the habitat restoration area by seed after it has achieved weed management thresholds. Restoration success is in large part dependent upon proper site preparation during the weed management step. It is very important to gain adequate control of nonnative species prior to installation. Weed management should continue until the weed management threshold is achieved rather than installing plant material too soon.

Seed installation can be achieved by several methods, including drill seeding, imprint seeding, broadcast seeding, hydroseeding, and the seed ball technique. The determination of seeding method will be dependent upon site conditions and accessibility. Larger sites that are accessible by equipment can be efficiently seeded mechanically with a drill seeder, imprint seeder, hydroseeder, or broadcast seeder. Smaller sites, sites with a high density of native species, or with unavoidable populations

of sensitive species can be seeded (optimally during the fall season) by hand broadcast or the seed ball technique.

An effective method for seed application on very steep slopes (≥1.5:1) is the hydroseed method as the mulch provides an erosion control blanket when using materials such as Flexterra® FGM™ or EarthGuard® Fiber Matrix™.

6.1 SEED MIX DESIGN

A well-designed seed mix is essential to the establishment of a diverse and sustainable native vegetation community. Seed species should be selected to include the appropriate level of diversity for the target vegetation community and based on the site conditions (e.g., soil type, hydrology, slope, aspect, landscape position). Seed mixes can also be augmented with additional species that are typical of the vegetation communities predicted to be suitable in the future (e.g., Riordan et al. 2018), which will help facilitate potential future shifts in plant assembly.

6.1.1 PLANT FUNCTIONAL GROUPS

Seed mixes can be developed by first identifying the key plant functional groups that are ecologically relevant for the target vegetation community, which may include some of the following:

- Early establishment nurse crop
- Erosion control annuals
- Early successional shrub species
- Mid-story mature shrub canopy species
- Native grasses
- Native herbaceous species (annuals and perennials)
- Native trees

It is important to include species that may not be common in the mature, established vegetation community (such as those observed in reference stands) but are common in the community following a natural disturbance, such as wildfire. These species may be found in any of the plant functional groups but are particularly represented in the early establishment nurse crop and early successional shrub species groups. Including these species not only fortifies the seed bank with components necessary for post-disturbance recovery, but they also provide the same function in the habitat restoration seed mix. In the case of restoration from seed, the disturbance is artificially created by the weed management efforts, which allows the seeded natives to establish from a low thatch, higher bare ground cover condition.

Fast germinating erosion control annuals are often included, especially on slopes to provide a cover crop that will help stabilize erodible soils, compete with annual weeds during the early establishment period, and provide time for the native seed mix to germinate and establish. Erosion control annuals may be selected that are not locally native, but native to California or the western United States, because they readily germinate and quickly mature. However, care must be taken to select species that will

not compete with the rest of the native seed mix. Erosion control annuals should be selected that will eventually diminish from the restoration area by year two or three, due to their life history traits.

Native annuals, such as California plantain (*Plantago erecta*) and small fescue *(Festuca microstachys)*, can be effective erosion control species, but factors of site (e.g., soil substrate) and year (e.g., rainfall amounts) will influence germination rates, density, and plant size of species (e.g., Espeland and Rice 2007) and, consequently their relative effectiveness for early erosion control. *Plantago erecta* is a widespread and common species in California, but it can be difficult to make sufficient local wild collections for restoration projects; however, *P. erecta* is available from seed suppliers with commercially bulked seed production fields at reasonable costs. We recommend consulting with species experts to determine if the use of any commercially bulked seed is a threat to local wildlife—and if so, identify a suitable alternative species to perform a similar function in the seed mix.

6.1.2 CRITERIA FOR SPECIES SELECTION

Consider the following factors when selecting the appropriate species to include in the seed mix for each relevant plant functional group:

- Site conditions
- Species traits
- Seed sources
- Seed availability from wild collection, seed farm, or commercial sources
- Seed cost for production or purchase from seed vendor

Site conditions to consider include the following: soil type, soil moisture conditions, hydrology, slope, aspect, landscape position and microclimate of the site. Every plant species has a set of unique traits that determine the environmental conditions needed for survival (i.e., species ecological niche). Selecting species that have suitable traits for the range of environmental conditions at the site will help ensure successful establishment. For example, soil type, including soil texture and organic matter content, are important in determining the available rooting depth, capacity of soil to hold water that is available to plants (i.e., available water capacity), the rate at which water drains through the soil profile (i.e., infiltration rate), and soil chemistry (e.g., pH, nutrient availability, salinity). Depending on soil type and other site conditions (e.g., landscape position, hydrology, slope, aspect, and rainfall), the soil moisture of a site may be classified as hydric (wet), mesic (moderate moisture) or xeric (dry). Hydric soils are poorly drained with standing water for at least part of the growing season and are usually associated with wetland plant species.

The aspect of a slope (i.e., direction it faces) and its slope (i.e., how steep it is) affect the soil moisture as well by influencing how well drained a soil is and the amount of solar radiation it receives. The upper part of a slope is typically drier than the lower part of the slope. South and west facing aspects are relatively more xeric than north and east facing aspects at the same elevation (for the Northern Hemisphere). Consequently,

aspect and slope form soil moisture gradients that influence species distribution and assemblages.

Species traits to consider after characterizing the site conditions may include the following: geographic range and the population distribution within that range, seed dormancy, life span, growth form, plant height, root morphology, resprouting capacity after disturbance, nutrient requirements (e.g., phosphorus, lime [calcium carbonate]), pH and salinity tolerance, light requirements, and phenology, such as the seasonal timing of seedling emergence and flowering.

Phenology of the species is important to consider. Some plants germinate, grow and flower in fall and spring (i.e., cool-season plants), while others germinate in spring, grow and later flower in summer (i.e., warm-season plants). The lifespan of a plant can be classified as annual, biennial, or perennial. Many of the annuals in a seed mix will be common in the first few years after seed addition, which will provide cover, reduce weed abundance by competing for resources and make contributions to the native seed bank to help facilitate recovery following a future disturbance (e.g., wildfire). As the perennial species germinate and grow, there will be a shift in dominance to perennial species that will provide longer-term structural stability and persistence in the vegetation community. Components from both annuals/biennials and perennials are essential to sustainable habitat restoration, which is why life span is included in the classification of plant functional groups used to design seed mixes (see above).

Identifying appropriate seed sources is an on-going challenge for land managers and restoration specialists. In general, seed from local wild populations in the same bioclimatic region as the restoration site is preferred. In addition to local wildland collection, seed can be obtained from the following sources: a wildland collection from a broader geographic range within a similar bioclimatic profile, first- (F1) or second-generation (F2) nursery bulked seed from special local collections, or commercial seed production fields. Special collections of seed from local wildland can take multiple years, depending on the availability of the specified species each year; therefore, once the seed mix is designed, the seed collection program should start concurrently with the first years of weed management of a restoration site, to ensure that the seed collection is ready and a sufficient amount has been collected (especially for the key target species) by the time installation is planned (e.g., in the fall of year 3 of a project).

Sources of seed for rare, sensitive, or protected species, or such species that have critical ecological relationships with wildlife (e.g., food plant species for butterflies) must be selected carefully to maintain the fitness of the plant population based on best available information. Species experts and wildlife agencies should be consulted for guidance on appropriate seed sources in these circumstances.

In general, it is advisable to maximize the diversity of seed mixes within each plant functional group included in the seed mix design to increase the resiliency of the restored habitat to future uncertainties, such as climate change. However, seed availability ultimately controls the number of species that can be included in a seed mix. The cost of commercial seed will also be a factor. The commercial price of seed varies

based on its annual availability and difficulty to collect, effort to clean and test, viability in storage (e.g., some species lose most of their viability after less than one year in storage) and demand in the marketplace. Deciding on which species to include depends on the goals of the habitat restoration project, planned native vegetation communities, and the balance of seed mix diversity with target seed application rates.

6.1.3 PURE LIVE SEED (PLS) SEEDING RATES

After species have been selected to represent each plant functional group in the seed mix, then seeding rates for each species need to be specified. The amount of pure live seed (PLS) must consider seed loss to predators and various time for germination of types of seed. An example of seed mix design is presented in Table 6-1 for the Californian coastal scrub vegetation type. Five plant functional groups have been selected, with a range of species diversity (i.e., number of species) recommended for each plant functional group. For each species, the desired abundance in the area to be seeded (e.g., common, occasional) can be stated to guide seeding rates, which will be specified as PLS per unit area. PLS is the viable seed in a seed collection lot that will readily germinate, excluding inert matter, other crop seed species, weed seed species, and non-viable seed. In the following example, square feet (sqft) are the area used for designing the seed mix, because it is easier to imagine than a larger area, such as an acre of land. It is helpful to determine the amount of seed that will germinate in the first season or two by excluding dormant seed and hard seed from the live seed total for PLS determination. Table 6-1 shows the amount of PLS per sqft using the two different calculations.

Table 6-1 Example of Californian Coastal Scrub Seed Mix Design Target Ranges

Plant Functional Groups	Number of Species	Abundance[1]	PLS/sqft[2]	PLS/sqft[3] +dormant seed
1. Early Establishment Nurse Crop & Erosion Control Annuals	2 or more	Common in First Year, Occasional in Future Years	75–125	75–150
2. Early Successional Shrub Species	1-2 or more	Common in Second Year, Occasional in Future Years	5–10	5–25
3. Mid-story Mature Shrub Canopy	5 or more	Common	10–25	10–50
4. Native Grasses	3 or more	Occasional to Common	10–25	10–35
5. Native Herbaceous Species (Annuals and Perennials)	4 or more	Common in Two Years, Occasional in Future Years	50–75	50–100
TOTAL[4]	**15–20 or more**		**150–260**	**150–350**

1. *Target abundance in the habitat restoration site.*
2. *PLS = Pure Live Seed, as determined by seed testing of purity and germination rate of collected seed species. sqft = square feet*
3. *Includes the contribution of dormant and hard seed, as determined by seed testing.*
4. *Final seed mix amount depends on factors such as species availability, collection cost, seed germination rates, site conditions and weather during the collection period. Poor seed collections can increase costs significantly.*

The seeding rate, expressed as PLS/sqft, is the number of seeds determined to achieve a desired plant density. It is important to note that not all the seed will necessarily germinate in the same season or in the same year. The recommended seeding rate range (PLS/sqft) shown by plant functional group for Californian coastal scrub in Table 6-1 is the sum of the seeding rates for each species selected for that group. The sum of seeding rates (PLS/sqft) for individual species by plant functional group and the sum of seeding rates for all the plant functional groups is the total seeding rate for the seed mix. In Table 6-1 the total recommended seeding rate is a range of 150 to 260 PLS/sqft which will achieve the desired plant density. Establishing the appropriate plant density is important. Excessively high plant densities could cause some species to suffer from higher competition for essential nutrients and water; and, conversely, if plant densities are very low, then there may be insufficient plant densities to compete with weeds and create adequate wildlife habitat. Additionally, if planting densities are high, then overseeding occurred which is a "wasting" of valuable limited seed resources.

Seeding rate recommendations are also provided in Table 6-1 that include the contribution from dormant and hard seeds. Some species will only germinate with specific environmental cues, in which case, they will require some pretreatment (e.g., cold stratification, gibberellic acid application) to intentionally "break" the dormancy

before they are seeded—unless these environmental cues are known to exist or can be found in the area to be seeded. Most other seeds readily germinate under typical conditions, assuming the seed is ecologically suitable for the site; however, it is common for a small fraction of the total seed (e.g., 5–10%) to have a higher dormancy. The amount of dormant seed in a seed lot can be quantified by the germination seed test. Dormant seed may need more physical scarification of the seed coat or a more extreme cold stratification to break dormancy, in which case, it may germinate in the future, but it may take more time or unique conditions to occur before doing so. Depending on the species and its role in the seed mix, consider planning for the contribution of dormant seed.

PLS seeding rates can be converted into PLS/acres for each species by multiplying the seeding rate in PLS/sqft by the conversion for acres (43,560 sqft in 1 acre).

$$\frac{Target\ Species\ \#\ of\ PLS}{sqft} \times \frac{43{,}560\ sqft}{1\ acre} = PLS\ per\ acre$$

Total PLS quantities for the restoration area can be calculated by the product of the seeding rate in PLS/acre and the size of the area to be seeded in acres.

$$\frac{Target\ Species\ \#\ of\ PLS}{acre} \times\ Size\ of\ Area\ to\ be\ seeded\ (acre) = Total\ \#\ of\ PLS\ Required$$

To calculate the seeding rate in weight (lbs) of PLS per acre, the number of seeds per pound must be known from previously published information. The number of seeds in one pound will vary significantly by species. For example, there are 5,500,000 seeds of California sagebrush in one pound, compared with 450,000 seeds of California buckwheat (*Eriogonum fasciculatum*) in one pound.

$$\frac{Target\ Species\ \#\ of\ PLS}{sqft} \times \frac{43{,}560\ sqft}{1\ acre} \times \frac{1\ lbs}{Known\ \#\ of\ seeds\ per\ lbs} = lbs\ PLS\ per\ acre$$

For example, based on previously reported data, the average number of purple needlegrass seeds per pound is 110,000. If the target seeding rate is 17 PLS per sqft, then the pounds of PLS per acre would be 6.7, as shown here:

$$\frac{17\ PLS\ of\ Stipa\ pulchra}{sqft} \times \frac{43{,}560\ sqft}{1\ acre} \times \frac{1\ lbs}{110{,}000\ seeds\ per\ lbs} = 6.7\ lbs\ PLS\ per\ acre$$

6.1.4 Bulk Seeding Rates

Actual seed collection lots, even after they have been processed and cleaned, are not entirely composed of live seed. Therefore, we need to be able to calculate bulk seed amounts and bulk seed rates. Bulk seed is composed of the seed collected and cleaned, with a small fraction of crop seed (other, non-weed species), weed seed, and inert

matter. And the seed collected is not entirely viable, as some of it will not germinate. These amounts are determined from a seed test. Note that the amount of seed material collected in the field, prior to processing and cleaning, will be greater than the cleaned bulk seed amount.

When we need to determine the amount of cleaned bulk seed to be collected for a project, estimates can be made based on the specified PLS seeding rates and past published values for the seed for the following:

- Purity rate (%)
- Germination rate (%)
- Average known number of seeds per bulk pound

For example, based on past seed collection records of purple needlegrass, the typical minimum purity rate is 80% and the minimum germination rate is 90%. PLS is a product of purity and germination (as determined from seed test results) divided by 100.

$$\frac{Purity\ (\%)\ \times\ Germination\ (\%)}{100} = PLS\ (\%)$$

Therefore, the minimum PLS of a purple needlegrass collection is estimated to be 72% or 0.72 in fraction form, as shown here:

$$\frac{80\%\ Purity\ \times\ 90\%\ Germination}{100} = 72\%\ PLS = 0.72\ PLS$$

To calculate the bulk seeding rate, divide the PLS seeding rate in pounds per acre by the PLS percent.

$$\frac{lbs\ PLS\ per\ acre}{PLS\ Fraction} = Bulk\ seeding\ rate\ per\ acre$$

If the specified seeding rate for purple needlegrass is 6.7 PLS pounds per acre and an estimated PLS of 72%, then the bulk seeding rate would be calculated as follows:

$$\frac{6.7\ lbs\ PLS\ per\ acre}{0.72} = 9.3\ lbs\ of\ bulk\ seed\ per\ acre$$

The total bulk seed quantities required after cleaning can be calculated by the product of the bulk seeding rate in PLS/acre and the size of the area to be seeded in acres.

$$\frac{lbs\ bulk\ seed}{acre} \times\ Size\ of\ Area\ to\ be\ seeded\ (acre) = Total\ lbs\ of\ bulk\ seed\ required$$

For the example of purple needlegrass seeded at a bulk rate of 9.3 lbs per acre for a 10-acre site, the total cleaned bulk seed required is estimated to be 93.0 lbs, as shown here:

$$\frac{9.3\ lbs\ bulk\ seed}{acre} \times\ 10\ acres = 93.0\ lbs\ of\ bulk\ seed\ required$$

These calculations should be repeated for each species in the seed mix to determine the total amount of seed to be collected. However, these values are estimates based on past seed collection lots, and the actual germination rate for new seed collection rates can vary significantly. Variance in seed viability (changes in germination rate) from year-to-year is most often seen in wildland collections, as many semi-arid plants exhibit plasticity in reproductive effort in response to rainfall variations (e.g., Ruiru et al. 2015). Commercially farmed seed tends to have consistent germination rates because the plants are grown under a more controlled environment. Therefore, seed should be tested for seed viability and purity to determine the actual percent PLS.

6.1.5 MONITORING FOR SEED MIX DESIGN

After the habitat restoration plan has been prepared, implementation of the project will begin. Concurrent with the seed collection and production process, weeds will be treated in the restoration area for multiple years as part of the adaptive weed management step. During biological and horticultural monitoring activity that is being conducted to inform the timing and method of weed treatment, the restoration specialist and/or field biologist should take note of conditions at the site, updating observations made during the planning stage that informed seed mix design, as discussed above.

These new observations will provide updated site information to help inform final seed mix specifications for installation at the end of weed management. The information collected during the planning stage may have been limited to field visits during one season prior to manipulation of the vegetation cover therefore, the extended weed management period, which may last three or more years, provides the opportunity to better "know-your-site". The response of the seed bank and existing perennial species to weed treatments, weather and other dynamic site conditions will better inform our understanding of the ecologically appropriate targets for restoration, including the suitable distribution and diversity of vegetation communities and plant species.

Observations of the emergence of any existing native seed bank can both further inform appropriate restoration targets and be used to adjust seed mix diversity and seeding rates. For example, if during thatch removal and weed management, a restoration area seed bank expresses a sufficient density of an early successional annual herb, such as clustered tarplant (*Deinandra fasciculata*), which was previously specified in the restoration seed mix, then it may be dropped from the mix. Removing the species from the seed mix may reduce seed supply costs, make that seed available for use in another area, and/or provide the opportunity to add another complementary annual herb to increase biodiversity (if the adjustment allows enough lead time to collect or grow the additional species).

This is a significant advantage of implementing longer weed management periods and seed-based restoration because it provides the flexibility to adjust and optimize seed mixes for the restoration area based on observations made over multiple seasons and years.

6.1.6 SEED MIX ADJUSTMENTS

Seed mix species and/or application rates can be adjusted based on the results of seed testing and/or seed availability, as appropriate, to achieve the desired seed mix performance.

Adjustments to the seed mix and the seed collection/production program can be made, as necessary, throughout the weed management implementation period to best match the conditions in the restoration area. This information comes from the monitoring program that is conducted as part of the feedback loop in the adaptive management process. Other adjustments that will need to be made to the seed mix will be based on the following:

- Seed test results, which indicate the actual percent PLS of the seed lots, versus the estimated PLS rates from the initial planned seed mix; and,
- Seed availability.

Using the sample seed test result for purple needlegrass Figure 5-1 it was determined that the percent PLS of this seed lot is 79.89% (excluding the contribution of dormant seed) based on actual, tested purity and germination rates. This is different than the estimate of a minimum of purple needlegrass collection of 72% PLS calculated during seed mix design using published purity and germination rates (see above). Therefore, to achieve the same design goal of 17 PLS per sqft in the seeded area, less bulk seed will be required. An estimated rate of 9.3 lbs of bulk seed per acre was based on the estimated minimum PLS of 72%.

With an actual PLS of 79.89%, the bulk seeding rate should be adjusted to 8.4 bulk lbs per acre, as shown here:

(6.7 lbs PLS per acre)/0.7989 = 8.4 lbs of bulk seed per acre

This adjustment based on actual PLS from seed test results should be made for each species in the seed mix.

Typically, however, not all the specified seed material is available, and adjustments must be made with available seed. The seed collector may have collected additional suitable seed material that was not included in the specified seed mix that can be used to replace or augment shortfalls in the required seed amounts. Or, for species that are in the same plant functional group in the seed mix design, it may be appropriate to increase the rate of one species to supplement shortfalls in the collection of another species.

6.1.7 TIMING OF SEED INSTALLATION

Guidelines for determining when a restoration site is ready for seeding after weed management (Brooks et al. 2019):

1. After three to five or more years of weed management, including at least two average to above-average rainfall years, assess the site's readiness for seeding.

2. Evaluate the extent of natural recruitment and determine if seeding is necessary.
3. If seeding is required to achieve project goals, ensure that absolute weed cover is around 10% or less in the spring of an average to above-average rainfall year before seeding in the following fall. Weed management can be concluded once this threshold is met.
4. High priority invasive species should generally be controlled to less than 5% cover prior to seeding or planting, depending on what is feasible, the habitat restoration goals of the project, and the resource management priorities.

The weed seed bank management timeline is important to consider, as it involves a significant "site preparation phase" before introducing native materials. This approach is analogous to preparing weathered wood siding for painting, where most of the work involves scraping, repairing, and sanding before applying paint. Similarly, successful landscape-scale revegetation programs demand a long-term commitment to weed management (typically 3+ years) to achieve optimal outcomes from subsequent seeding and planting efforts.

A one- or two-year weed management effort may not yield sustainable benefits due to the following reasons:

1. Short-term efforts may manage nonnative annual grass populations and associated thatch, but other weed seed bank components, such as broadleaf weeds, may become dominant, requiring further management.
2. Weed seeds, including Mediterranean annual grasses, have longer soil seed bank viability than often reported. Some seeds have thicker seed coats requiring more scarification to germinate, while others remain viable due to low decomposition rates during periods of low rainfall.
3. Shorter control periods are less likely to coincide with weather conditions that stimulate germination of a significant portion of the seed bank.

Seed installation should occur in the fall after sites have met the appropriate focal weed thresholds to take advantage of the entire rainy season which is particularly important for non-irrigated restoration sites and at the beginning of the active growing season for vegetation communities in Southern California, except for riparian plant communities. For non-irrigated restoration sites, if seed installation cannot occur by the end of December, then it is recommended to postpone seeding until the following fall. While the applied seed mix can remain viable in the soil for several years for most species, it is important to time seeding to capture most of the rainfall in the first season to allow for germination of the seed mix and a sufficient establishment period prior to dry hot summer conditions.

Sites that are ready to be seeded should have little to no thatch. If significant thatch is present, land managers should rake, collect, and remove it prior to seeding because it will inhibit seed-to-soil contact, required for optimal germination rates.

The installation of native plant material will generally be accomplished by seeding the habitat restoration area following adequate control of weed populations through the weed management phase (i.e., site preparation). Restoration success is, in large part, dependent on adequate weed management prior to the addition of native plant material. Weed management should continue until the weed management threshold is achieved rather than installing plant material too soon because weed management after the addition of seed is much more difficult and labor intensive.

7 SEEDING METHODS

The installation of native plant material will be accomplished by seeding the habitat restoration area following adequate control of weed populations during the weed management phase (i.e., site preparation). Restoration success is, in large part, dependent on adequate weed management prior to the addition of native plant material. Additional weed management events should be conducted as necessary, even if it delays seeding to a subsequent year, because weed management after the addition of seed is much more difficult and labor intensive.

For restoration of native habitats, the following seeding methods are options for installation:

- Drill seeding
- Hydroseeding
- Mechanical broadcast seeding
- Hand broadcast seeding
- Imprint seeding
- Seed ball broadcast seeding

Determination of the appropriate seeding method will depend on site conditions and accessibility. Larger sites that are accessible by equipment can be mechanically seeded with a drill seeder or broadcast seeder. Smaller sites, sites with a high density of native species or sensitive species present can be seeded by hand broadcast or the seed ball broadcast method.

Other seeding methods may be appropriate for a particular habitat restoration project, including hydroseeding and imprint seeding. Hydroseeding requires a water source and is a significantly more expensive method than drill seeding. Imprint seeding is best used in areas where few to no native species are already present. Steep topography, areas of shallow soil and the presence of medium size rocks will limit the use of imprinting. Imprint seeding generally requires the soil to be cleared of thatch and disked prior to imprinting to allow the imprinter to make the specified imprints in the soil. Disking the soil will encourage the germination of weed seed that would not otherwise have germinated. Disking is more appropriate in a condition where there is not a significant weed seed bank, whereas drill seeding is less disruptive to the soil.

Seeding method will also be determined by the location in the Park as seeding methods that would cause ground disturbance, such as drill or imprint seeding, may not be appropriate in areas where there are in situ culturally significant materials, unless a cultural monitor is present.

7.1 DRILL SEEDING

Range drill seeding is the optimum seeding method for many restoration areas. Drill seeding is efficient, has the highest reliability for applying the seed mix at the desired rate with proper calibration of the equipment and provides good seed-to-soil contact. With a range drill seeder, seed material can be installed with minimal soil disturbance and implemented over mowed plant thatch and equipment can be maneuvered around existing native species to avoid impacts.

Drill seeding is better than broadcast seeding in several ways. Drill seeding provides better seed to soil contact, as the seeds are sown directly into the ground and covered with soil more efficiently than with broadcast seeding methods. Drill seeding applies seed at a more consistently uniform seeding rate and reduces seed loss due to predation and wind scatter. Less seed per acre is required compared to hand-seeding methods thus reducing seed costs and resulting in less "waste" of seed.

However, drill seeding may not be practical in all habitat restoration sites because of the presence of a higher density of native or sensitive species, the presence of cultural resources, access limitations for equipment, and incompatible site conditions. For example, if a restoration site has many large rocks on the soil surface, it may not be possible to maneuver the drill seed equipment within the site to seed at a uniform rate. When the drill seeder runs over rocks, it can bounce and not properly create the planting furrows or evenly apply seed.

7.1.1 DRILL SEEDING IMPLEMENTATION

Drill seeding can be used in many habitat restoration projects, where the equipment is able to maneuver based on the slope and where the occurrence of woody native species is relatively low. Range drill seeding can be accomplished over mowed stubble if the thatch is not too thick. In some cases, the thatch may be broken down with light disking prior to drill seeding. A thick thatch may need to be removed prior to seeding (e.g., by mechanical raking and windrowing Section 3.1.4).

One- or Two-Way Drill Seeding

Depending on the terrain of the restoration area, drill seeding can be accomplished in two passes or in a single pass. For drill seeding in two passes, divide the seed mix into two equal parts and apply each half of the seed mix in perpendicular passes across the site forming a grid pattern. Drill seeding with two passes is generally used on flat to very gentle slopes. For steeper slopes, the one pass method should be used and seeding direction is along the contour of the slope such that erosion rills are not encouraged to form following seed application. Seeds should be planted at a depth of not less than ¼

inch and no greater than ½ inch. Drill seeding equipment should be maneuvered around groups of dense native or sensitive species.

Drill seeding will apply the specified seed mix at the same time through separate seed boxes, with light seeds and heavy seeds divided into separate seed boxes. Wheat bran will be added to facilitate seeding. The bran helps to keep the seeds evenly dispersed in the seed box and produce uniform seeding of different sized seeds (St. John et al. 2012).

Materials to be applied during drill seeding include:

- Specified seed mixes.
- Bran at ¼ the weight of the specified bulk seed.
- Soil Amendments, e.g., arbuscular mycorrhiza (AM) fungi

The seed mixes should be supplied in pre-mixed bulk amounts in 50-pound bags and contain the appropriate amount of wheat bran. All bags should have seed tags declaring each species' bulk weight, pure live seed weight, purity and germination, weight of wheat bran, and total weight of contents.

Drill seeding can also incorporate specified AM fungi amendments, if appropriate and specified at the same time through a separate seed box.

MODIFIED DESIMONE METHOD

When seed is limited and it is preferable to distribute seed across the maximum area possible, while maintaining the specified seeding rates for the seeded areas, use of the "modified DeSimone strip method" should be considered. With this method, seeded strips are installed at the width of the drill seeding equipment (e.g., 6 feet wide) and are alternated with an unseeded strip wide enough for access to conduct remedial weed management but also narrow enough to facilitate natural recruitment from adjacent seeded strips as the native vegetation grows and reaches reproductive maturity.

This method would be most appropriate for sites without a significant source of upwind or adjacent, nonnative propagules that would make the additional on-going weed maintenance required in the unseeded strips cost prohibitive. Weed maintenance would need to continue until the plants in the seeded strips reach reproductive maturity and successfully recruit into the unseeded strip. Otherwise, it is usually more efficient to seed the entire habitat restoration area under weed management, and if seed sources are limited, collect seed from the mature restored habitat (no more than 15 percent of the seed of any one plant) to install in a second phase of the project later.

7.1.2 DRILL SEEDING EQUIPMENT

Range drill seeders come in a variety of widths ranging from 6 to 15 feet. Planting row spacing can vary between 8 to 12 inches. Drill seeding equipment consists of seed boxes, seed metering devices, drill tubes that drop the seed and a type of soil opening device such as disk openers followed by an implement such as drag chains or press wheels that covers the seed in the furrow with soil. The press wheels also serve to firm and press the soil over the seed (USDA 2009). Range drill seeders can be mounted to

many types of equipment like a crawler type dozer or rubber-tired tractor with all-wheel drive.

Drill Seeder Calibration

Seeding equipment requires calibration prior to applying the seed mix to ensure that the seed mix is applied uniformly across the site per the specified seeding rate. All equipment should be checked to ensure everything is in proper working order and any maintenance performed, as necessary. Also check the seeding equipment for any impediments to the openers that could inhibit seed flow, clogged tubes, and make sure the tire pressure is adequate. The recommended air pressure of the tires should be set and maintained at the same pressure during calibration and seeding operations. Improper tire inflation will cause inaccuracies in the calibration of the equipment and subsequent inaccuracies in the seeding rates (USDA 2010).

Depending on the type of drill seed equipment, multiple methods are available for calibrating the drill seeder. Refer to the equipment manual for specific guidelines on calibration and how to perform adjustments to the seeder. The following describes general guidelines for drill seeder calibration.

If the specified seed mix is presented in pure live seed (PLS) rates, the rates must be converted to bulk lbs per acre for calibration. Use the following formula for calculating bulk seeding rate per acre.

$$\frac{PLS\ lbs\ per\ acre}{Percent\ PLS} = Bulk\ seeding\ rate\ per\ acre$$

To begin the calibration process, the drill gates should be checked for proper positioning for the type and size of seeds being planted. Calibration of the equipment should start at the widest open position based on the seed sizes in the mix and then closing the drill gates to the proper position. Two commonly used methods for calibration are the seed weight-distance method and the wheel circumference method (USDA 2010).

Some drill seeders have a third seed box for fluffy seed material. If fluffy seeds are incorporated in the seed mix, it is very important to calibrate the drill seeder accordingly. The fluffy seed mix with the carrier should be placed in the fluffy seed box and the drill seeder should be run to calibrate the specified seeding rate. A carrier such as wheat bran or rice hulls, is used to ensure that different sized seeds stay evenly mixed and to improve seed flow. Approximately 1 acre of seed with the carrier should be sufficient for calibration. If the target seeding rate cannot be achieved, then adjust the amount of carrier accordingly until calibration is set (St. John et al. 2008).

Note: When calibrating the equipment, be sure to calibrate the drill seeder accordingly if applying the seed in two separate passes. The seeding rate for calibration should then be divided in half.

Seed Weight-Distance Calibration Method

Step 1. Compute the area of a 100-foot test run that is based on the drill seeder width.

$$\frac{Drill\ width\ (feet) \times\ 100\ foot\ test\ run}{43{,}560\ square\ feet/acre} = Acreage\ of\ test\ run$$

Step 2. Calculate the amount of seed mix needed for test run.

$$Bulk\ pounds\ of\ seed\ per\ acre\ \times\ acreage\ of\ test\ run = Pounds\ of\ seed\ mix\ needed\ for\ test\ run$$

Then calculate:

$$\frac{Pounds\ of\ seed\ mix\ for\ test\ run}{Number\ of\ seeding\ tubes\ on\ drill} = Pounds\ of\ seed\ mix\ per\ seed\ tube$$

Step 3. Mark the 100-foot test run in the field. The drill seeder should be run for at least 6 feet before starting the test run to make sure the seed is dropping uniformly to prime the drill tubes. The drill tubes should be removed from the disk openers and a collecting implement placed under the tube spout to collect the dropped seed. Drive at a constant speed during the test run. Weigh the dropped seed from a minimum of 2 tubes on either side of the drill and compare it to the calculated seed amount. If necessary, adjust the drill openings. This step should be repeated until the weight of the dropped seed is within 10 percent of the calculated amount. Once the calibration is set, repeat the procedure again at least twice to insure proper calibration (USDA 2010).

Wheel Circumference Calibration Method

The wheel circumference calibration method involves measuring the circumference of the drill drive wheel in feet and then determining the number of revolutions the wheel is required to turn for a predetermined length. To use this calibration method, the drive wheel must be able to be turned by hand without the need for pulling the drill.

Step 1. Calculate the area covered for the determined seeding run length.

$$\frac{Drill\ width\ (feet) \times\ 100\ foot\ test\ run}{43{,}560\ square\ feet/acre} = Acreage\ of\ test\ run$$

Step 2. Calculate the number of drive wheel revolutions. Measure the circumference (perimeter) of the drive wheel to determine the number of revolutions.

$$\frac{Distance\ of\ test\ run\ (feet)}{Wheel\ circumference\ (feet)} = Number\ of\ drive\ wheel\ rotations\ for\ test\ run$$

It is important to note that the measurements in Step 1 and Step 2 should be to the nearest tenth of a foot for accuracy.

Step 3. Calculate the amount of seed mix that would be delivered from each tube for the determined test run acreage.

$$Bulk\ pounds\ of\ seed\ per\ acre\ \times\ acreage\ of\ test\ run = Pounds\ of\ seed\ mix\ needed\ for\ test\ run$$

Then calculate:

$$\frac{Pounds\ of\ seed\ mix\ for\ test\ run}{Number\ of\ seeding\ tubes\ on\ drill} = Pounds\ of\ seed\ mix\ per\ seed\ tube$$

Step 4. The drill tubes should be removed from the disk openers. The drive wheel should be turned until seed is dropping uniformly to prime the drop tubes. A collection implement should be placed under the tube spout to collect the dropped seed. Weigh the dropped seed from a minimum of 2 tubes on either side of the drill and compare it to the calculated seed amount. If necessary, adjust the drill openings. This step should be repeated until the weight of the dropped seed is within 10 percent of the calculated amount. Once the calibration is set, repeat the procedure again at least twice to insure proper calibration (USDA 2010).

Drill Seeder Calibration Field Test

Once the equipment is calibrated and prior to seed installation, perform a field test within a plot approximately 100 feet long in distance to demonstrate that the drill seeder is seeding uniformly at the specified seeding depth and that the furrows are properly covered with soil. Check the uniformity of seeding throughout the day, as many variables can affect calibration of the equipment. Changes in weather conditions such as temperature or humidity can have an effect. Different seed lots of the same mix can also behave differently in the equipment.

Travel speed when seeding is important, particularly in rough terrain or in areas with plant thatch present. Higher rates of speed can cause an increase in disk bounce height when hitting objects in the field, causing areas to be missed, improper furrow depth because the seeder may not dig a deep enough furrow for seed placement or soil displacement further away from the furrow leading to inadequate soil coverage of the seed mix in the planting furrows (Kees 2006). In general, travel speeds are typically set to between 3 and 4 miles per hour.

7.2 HYDROSEEDING

Hydroseeding can be used in areas that are not accessible by an imprinter or drill seeder and may be the only seeding method option on steep slopes. Hydroseeding is a planting process that uses a hydraulically applied slurry of ingredients including cellulose wood fiber, the specified seed mix, organic binder and tackifier (e.g., “M-Binder”), and any amendments to be added (e.g., slow-release fertilizer, AM fungi). Hydroseeding equipment has access constraints and there must be a source of water for the batch preparation of slurry. The water source may be near the equipment, or water can be transported to the equipment by water truck for example. The slurry can be applied by a spray nozzle mounted to the equipment or by a nozzle attached to a hose to direct application. Long lengths of hose and/or hard pipe can be designed to allow application at up to 700 feet or more, depending on conditions such as pump pressure and the viscosity of the slurry. Prior to hydroseed application, the site should be cleared of plant thatch to provide good seed-to-soil contact.

Hydroseeding can be applied in a one- or two-step process. The one-step application consists of applying the slurry of ingredients in one step. The two-step application consists of applying the specified seed mix, one-quarter of the cellulose wood fiber, and amendments in the first step. The second step consists of adding and applying the remaining cellulose wood fiber and organic M-binder.

For very steep slopes, the best available method for seed application is the hydroseed method, because specially formulated erosion control products can be added, such as Flexterra® High Performance-Flexible Growth Medium™ (HP-FGM™) or EarthGuard® Fiber Matrix™. Refer to the manufacturer's specifications for application rates when applying seed with products such as HP-FGM™ or Fiber Matrix™.

7.2.1 HYDROSEEDING IMPLEMENTATION

The following are sample one-step and two-step hydroseeding application specifications, which should be modified as necessary for the project site application.

Prior to hydroseed application, the site should be cleared of plant thatch to provide good seed-to-soil contact.

Hydroseed mixing should be done in a clean tank. The hydroseeder must be equipped with a continuous agitation recirculation system to produce a uniform slurry. Once the seed and AM fungi inoculum (if needed) are added to the mixing tank, application must be within one hour of preparation. If AM fungi is used, then commercially available *Rhizophagus intraradices* is recommended for the AM fungi amendment, as it is ubiquitous and will not impede the development of other native mycorrhizae species.

A slow-release organic fertilizer may be used, if appropriate. However, the benefit to encouraging germination and growth of the seeded species must be weighed against the risk of encouraging vigorous growth of any weed species remaining in the seed bank. Many of the upland native vegetation community species have physiological traits and/or symbiotic associations with mycorrhizal fungi that colonize the plant's roots, which allow them to grow in lower nutrient content soils, so fertilization may not be necessary or desired.

One-Step Hydroseeding

The one-step application consists of the hydraulic application of a slurry mixture that contains water, cellulose wood fiber, seed, AM fungi (if needed), and organic soil stabilizer as follows:

- 2,000 lbs per acre of virgin cellulose wood fiber or recycled newsprint paper fiber (Enviro Fiber S-100 Hydroseeding Mulch or comparable product)
- 60 lbs per acre of AM fungi amendment (approximately 3,300,000 live propagules per acre of AM fungi based on the guarantee of the supplier) *
- Specified seed mix
- 160 lbs per acre of organic M-binder (Ecology Control or comparable product).

**If needed (most undisturbed native soils do not require the addition of AM fungi).*

Two-Step Hydroseeding

Step 1 – Hydraulic application of a slurry mixture that combines water with the following components:

- 500 lbs per acre of virgin cellulose wood fiber or recycled newsprint paper fiber (Enviro Fiber S-100 Hydroseeding Mulch or comparable product)
- 60 lbs per acre of AM fungi amendment (approximately 3,500,000 live propagules per acre of AM fungi based on the guarantee of the supplier) *
- Specified seed mix

**If needed (most undisturbed native soils do not require the addition of AM fungi).*

Step 2 – Hydraulic application of a slurry mixture that combines water with the following components:

- 1,500 lbs per acre of virgin cellulose wood fiber or recycled newsprint paper fiber (Enviro Fiber S-100 Hydroseeding Mulch or comparable product); and,
- 160 lbs per acre of organic M-binder (Ecology Control or comparable product).

If the air temperature at the site exceeds 90°F, the second hydroseeding step must be applied within three hours of the application of the first step. Regardless of the air temperature, the second hydroseeding step must be applied the same workday as the first hydroseeding step.

7.3 MECHANICAL BROADCAST SEEDING

In restoration areas that are accessible by mechanical equipment, a broadcast seed spreader can be used. Many types of broadcast seeders are available in a range of sizes and can be mounted to an all-terrain vehicle (ATV), tractor, or similar equipment. Broadcast seeders work by centrifugal force and the weight of the seed material (USDA 2009). Mechanical broadcast seeding works best in large restoration areas that are accessible by equipment but where conditions limit the use of a drill seeder.

Disadvantages of broadcast seeding include higher rates of seed loss from wind or predation, higher potential for uneven distribution of seeds, with dense seeds or overcrowding in one location and sparse seeds or lack of seeds in another location, a decrease in seeding depth precision compared to drill seeding, and calibration inaccuracies inherent in the equipment. Calibration of broadcast spreaders is not as accurate for drill seeders because of the different seed delivery methods of the equipment (USDA 2009). Inaccurate calibration will influence the desired seeding rate causing over- or under-seeding.

7.3.1 MECHANICAL BROADCAST SEEDING IMPLEMENTATION

Prior to broadcast seeding, thatch material should be removed from the site because a well-prepared seedbed is critical for seed- to-soil contact (USDA 2009). Good seed-to-soil contact is key for successful germination of the seed mix.

Wheat bran should be added at ¼ the weight of the specified seed mix bulk weight to facilitate seeding. The bran helps to keep the seeds evenly dispersed in the seeder and produces uniform seeding of different sized seeds (St. John et al. 2012).

Materials to be applied during mechanical broadcast seeding include:

- Specified seed mix for each area
- Bran at ¼ the weight of the specified bulk seed

Prior to broadcast seeding, the surface of the soil should be lightly scarified with a hand rake or a 6-foot wide cultipacker attached to an all-terrain vehicle, crawler type dozer, or tractor. Scarification of the ground before applying the seed mix is important to facilitate seed-to-soil contact.

The materials (seed mix and wheat bran) should be divided into two equal parts. Half of the seed should be broadcast across the entire area in a linear orientation appropriate for the site to ensure even coverage. The remaining half of the seed should be broadcast across the site in a linear orientation perpendicular to the first application.

Following seed broadcast, the seed material should be incorporated into the soil at less than ½ inch deep with a cultipacker pulled by a tractor, ATV, or similar equipment. This will increase seed-to-soil contact to improve germination success and reduce loss of seed to wind, erosion, and seed predation.

Mechanical Broadcast Seeder Calibration

Broadcast seeders require calibration prior to seed installation. Refer to the equipment manual for specific guidelines on calibration and how to perform seeder adjustments. The following are general guidelines for broadcast seeder calibration (USDA 2009).

Note: When calibrating the equipment, be sure to calibrate the broadcast seeder accordingly if applying the seed in two separate passes. The seeding rate for calibration should then be divided in half.

Step 1. Determine the bulk seeding rate per acre and convert to anticipated seed per square foot.

Step 2. Several tarps should be placed at different locations within the test area.

Step 3. Run the broadcast seeder within the test area over the tarps and determine the average seed count per square foot on the tarps.

Step 4. Increase or decrease the seed flow by adjusting the adjustable gate to achieve the desired seeding rate.

7.4 HAND-BROADCAST SEEDING

Broadcast seeding is an all-purpose seeding method that can be used in relatively small areas limited by access or areas with a high density of natives or sensitive species. Hand-broadcast seeding is the best option in areas where sensitive resource protection is required.

The disadvantage of this method is that hand-broadcast seeding will result in the greatest potential for loss of seed due to wind, runoff, and seed predation, higher potential for uneven seed distribution, greater potential for poor seed-to-soil contact and inefficient coverage in large areas (e.g., greater than one or two acres in size).

7.4.1 HAND-BROADCAST SEEDING IMPLEMENTATION

Prior to hand broadcast seeding, thick plant thatch should be removed to accomplish incorporation of seed into the soil because a well-prepared seedbed is critical for seed-to-soil contact (USDA 2009). Good seed-to-soil contact is key for successful germination of the seed mix.

Hand-seeding will be implemented using a small hand-held seed spreader to evenly broadcast the seed mix.

Wheat bran will be added at ¼ the weight of the specified seed mix bulk pounds to facilitate seeding. The bran helps to keep the seeds evenly dispersed in the seeder and produce uniform seeding of different sized seeds (St. John et al. 2012). It is important to note, since there is a high potential for the loss of seed from hand broadcast seeding, that the specified seed mix may need to be doubled.

Materials to be applied during hand-broadcast seeding include:

- Specified seed mix for each area
- Bran at ¼ the weight of the specified bulk seed

Prior to hand-seeding, the surface of the soil should be lightly scarified with a hand rake or a 6-foot wide cultipacker attached to an all-terrain vehicle, crawler type dozer, or tractor. Scarification of the ground before applying the seed mix is important to facilitate seed-to-soil contact.

The materials (seed mix and wheat bran) should be divided into two equal parts. Half of the seed should be hand broadcast by walking across the entire area in a linear orientation appropriate for the site making sure of even coverage. The remaining half of the seed should be hand-broadcast by walking across the site in a linear orientation perpendicular to the first application.

Following seeding, the soil will be scarified either with hand-held rakes or a 6-foot wide cultipacker attached to an ATV, crawler type dozer, or tractor. Scarification of the soil following seeding will aid in seed-to-soil contact and provide a thin covering of soil over the applied seed mix. Seeds should be incorporated into the topsoil no more than ¼ inch and less than ½ inch deep.

The method used for scarification of the soil following seeding will depend on access to the site and the size of the restoration area. If the site is accessible with mechanical equipment, then scarification with mechanical equipment is more efficient than hand raking.

Hand Broadcast Seeder Equipment

A hand broadcast seeder is typically comprised of a seed hopper, agitator, flow gauge, "on-off" lever, hand crank for seed dispersal, and shoulder harness.

Hand Broadcast Seeder Calibration

Prior to seeding, the equipment requires calibration to insure uniform distribution of the seed mix. Refer to the equipment manual for specific guidelines on calibration and how to perform seeder adjustments. The following describes general guidelines for seeder calibration and is based on the EarthWay® hand crank broadcast spreader.

Note: when calibrating the equipment, be sure to calibrate the hand-seeders accordingly if applying the seed in two separate passes. The seeding rate for calibration should then be divided in half.

Step 1. Mark the beginning and end of an area 50 feet in length.

Step 2. Calculate the amount of specified seed mix including the wheat bran to be applied to a 1,000 square foot area.

Step 3. Weigh and record the weight of enough seed mix to fill the seeder at least half full.

Step 4. Select an appropriate Setting Rate position on the seeder for the seed material. In general, start with the setting in the middle if unsure of the appropriate setting rate.

Step 5. Start far enough behind the beginning of the 50-foot test area to achieve the desired walking speed. Use a normal pace and crank the handle so that the crank makes one revolution for each step then stop seeding at the end of the 50 feet.

Step 6. Measure the entire spread width of the broadcast seed.

Step 7. Record the weight of the remaining seed material in the seeder and calculate the amount of seed applied.

Step 8. Calculate the amount of seed mix required for test area.

$$Weight\ of\ seed\ mix\ per\ 1{,}000\ square\ feet \times \frac{Spread\ width\ x\ 50\ feet}{1{,}000\ square\ feet} = Seed\ mix\ required\ for\ test\ area$$

Step 9. Compare the results in Step 7 with the calculation in Step 8. If too little or too much seed was applied in the test area, adjust the rate setting accordingly and repeat the test again until the desired application rate is achieved.

All hand-seeders should be calibrated prior to seeding since variations can occur between equipment and the operator. The calibrated rate setting from one seeder can be used as a guide or starting point for calibration of other seeders.

7.5 IMPRINT SEEDING

Imprint seeding is best used in areas with few to no native species already present. Steep topography, areas of shallow soil, and the presence of medium size rocks will limit the use of imprinting. Imprinters consist of a metal roller with teeth that create v-shaped imprints in the soil (Dixon and Carr 2000). The seed is applied at the same time the imprints are made thereby pressing the seed into the soil for better seed-to-soil contact. The imprints should be at a specified depth and stable so that erosion of the imprints or collapse does not occur. Imprint seeding generally requires the soil to be cleared of thatch and ripping or disking prior to imprinting to allow the imprinter to make the specified imprints in the soil. The specified imprints can be made in areas with "soft" soil without the need for disking or ripping. However, if the soil is too soft, such as areas with coarse soils with a high sand content, the imprints can be too unstable. In these instances, imprinting should not be the seeding method utilized. An unstable imprint is subject to erosion of the imprint or collapse burying the seed too deep.

The purpose of the imprint is to provide a "safe" microclimate protecting the seeds from wind, providing shade to prevent desiccation, and serves to collect water to provide moisture for germination. Imprinting is best done in the fall since rain can help to stabilize the imprints and prevent erosion and/or collapse of the imprint. While imprinting works best if soils are moist, imprinting should not be done in wet soils as the soil can stick to the imprinting teeth and resulting in improper imprints. Imprints can generally last for a couple of years and continue to provide moisture for germinated seedlings and provide wind protection from evaporation. It is important to note, that in instances where the soil requires ripping or disking, this will encourage the germination of weed seed that would not otherwise have germinated. Hence, disking is more appropriate in a condition where there is a limited weed seed bank and few native plants. Disking can also result in collateral death to ground dwelling wildlife (e.g., snakes, gophers). Drill seeding is generally the more appropriate method in settings where imprint seeding may also be an option.

7.6 SEED BALL BROADCAST SEEDING

An alternative method for hand-broadcast seeding is the use of seed balls. Seed balls are mixtures of clay, compost, seed material and water formed into small balls. The benefit of using the seed ball method is the reduction in loss of seed from wind and herbivory and the clay combined with the compost provides a growing medium and nutrients for germinating seeds. The general recipe for making seed balls is as follows:

- 5 parts dry terra cotta clay
- 3 parts dry organic compost
- 1 part seed mix

- Sufficient water to bind the materials and allow for rolling into marble-sized balls.

The seeds in the seed mix are often very small therefore, the seed mix part of the recipe can be increased in volume with an inert material, such as sand, to distribute the seed mix at the desired rate. The amount of seed per seed ball should be adjusted to reach the desired pure live seed (PLS) rate for the restoration area. Too much seed should not be applied to the seed ball so that competition for resources prevents successful establishment of any germinated seeds. Generally, spacing of the seed balls 1-2 feet on-center between will ensure good coverage. Seed balls can be pressed gently into the soil so that approximately half of the seed ball is in the ground.

The seed balls should be allowed to thoroughly dry before storage or placement to prevent premature germination of the seed material.

7.7 SEED MIX ESTABLISHMENT

The health, development, and cover of native vegetative should be estimated visually by site walk overs, performed regularly during the post seed addition maintenance period.

For purposes of evaluating whether remedial seeding may be required to achieve the project success criteria, the project restoration specialist/biologist shall use the following general guidance for establishment of native cover. Observations will typically be made in spring, but the actual timing of native cover estimates will depend on the phenology of plant growth each year with respect to factors such as weather. The target values for absolute cover of the native vegetation will be as follows:

- **Seed Mix Establishment Monitoring Year 1.** At least 10 to 15% absolute native cover.
- **Seed Mix Establishment Monitoring Year 2.** At least 15 to 25% absolute native cover.
- **Seed Mix Establishment Monitoring Year 3.** At least 25 to 35% absolute native cover.
- **Seed Mix Establishment Monitoring Year 4.** At least 50 to 75% absolute native cover.

Actual cover values will depend in part on growing conditions (e.g., soil nutrients, humidity, temperature, and rainfall) during the establishment and weed maintenance periods and the habitat restoration type. The established vegetation cover and distribution will likely not be uniform, in response to microvariation and fuel management activities in the project zones. Hence, some level of patchy distribution of vegetation cover is expected and natural. Consequently, the target native cover values shall apply to areas of homogenous vegetation cover and will exclude areas that develop conditions that prevent significant vegetative growth, such as extreme soil conditions that are not practical to amend to promote growth. Bare areas or seasonally bare areas although not vegetated, still provide microsite diversity to the habitat.

8 CONTAINER PLANTS AND CUTTINGS

Cuttings and container plants provide three important functions in habitat restoration: (1) to allow plants that are past the vulnerable seedling stage to be introduced and to establish onsite, (2) to provide the means of introducing species that do not establish

well from seed, and (3) to provide some diversity of plant age to promote natural regeneration earlier in the restoration process.

8.1 PLANTING LAYOUT

Prior to plant installation, the planting locations for container plants and cuttings should be marked onsite using different colored pin flags and under the supervision of the restoration specialist/project biologist. Groups of container plants should be spaced in a natural-looking mosaic to mimic existing habitat and not planted in rows. The spacing should follow the specified spacing on-center for each species from other container planting and existing native plants. The layout should be determined based on micro topographic features, soil conditions, and site conditions, e.g., aspect or slope.

8.2 CUTTINGS

Direct planting of cuttings can be used for some native species and either don't require being grown in container plants or establish better from cuttings compared to container plants. During container plant production, especially for tree species, the long tap roots can quickly become root bound, which can cause long-term health issues for the planting.

Cuttings are typically done for riparian species such as mulefat (*Baccharis salicifolia*) and willow species (*Salix* spp.). Cuttings should be collected from nearby, intact riparian habitat if feasible and ideally harvested no more than 12 hours prior to installation on the restoration site. Cuttings should be collected in the fall during the dormant season and planted during the rainy season.

For sites that will be irrigated, it is recommended cuttings for both willows and mulefat are made from branches between 3/8- and 5/8-inch in diameter and a minimum of 4 feet in length. Proximity to groundwater depth should be kept in mind when determining cutting length to be able to install the cuttings as close to groundwater depth as possible, particularly for willow species. Cuttings should be kept moist until installation, and it is recommended to dip the cuttings in a rooting hormone and vitamin powder immediately prior to planting. No more than 1/3 of the cutting should be above ground once planted. For cuttings that will be installed with no supplemental irrigation, they should be tall enough (eight feet or greater or depending on groundwater depth) to reach the groundwater when planted. Planting should be time to occur during the rainy season and prior to a forecast rain event so the cuttings can be watered in.

8.3 NURSERY-GROWN PLANTS

Contract growing of all container plants should be done by a local nursery that has experience in growing native plants and at least three years of experience growing native plants for the target vegetation communities of the project. The plants should have a well-developed root system and conditioned (prepared to withstand the elements of the natural environment), prior to planting. Mycorrhizal inoculum should be incorporated with the greenhouse soil mix according to the label at the time of transplantation to containers.

The container plants should be inspected by the project restoration specialist/biologist during the growing period. Upon delivery for planting, the restoration specialist should also verify that the plants are the correct species and quantities, are free of weeds, pests, and disease, and show signs of healthy growth. Plants should be grown in the specified container long enough to develop a root system that reaches the bottom of the container and forms a healthy root ball without becoming root bound. Any container plants that are not within these standards should be rejected and replaced. Substitution of plant material at the time of planting depends solely upon the discretion of the project restoration specialist.

It is generally recommended for tree species that deep tree pots are used for large woody shrubs and tree species to allow for healthy development of the deep tap roots and prevent injury. Injury to tap roots of oaks, for example, has been shown to affect the health of the tree in perpetuity.

8.4 PLANT INSTALLATION

Upon delivery of the contract grown plants from a native plant nursery, the container plants should be properly stored in a designated storage location and kept safe from herbivory, vandalism, theft, as well as maintained (watering) while they are in storage.

All container plants and cuttings should be planted to the following specifications:

- Plants shall be planted with the roots untangled. Roots shall be protected from weather exposure during planting.
- Planting holes will be made with the minimum disturbance to accommodate the root ball or cuttings. For container plants, the planting hole shall be no more than 1.5 times the diameter and 2 times the depth of the container species to be planted made to accommodate the root ball. Oak container planting holes shall be augured with a minimum of disturbance and be no more than 2 times the diameter and depth to accommodate the root ball.
- Planting holes should be backfilled 25 percent with excavated native soil, filled with water, and allowed to drain completely prior to planting. Container plants must never be installed in planting holes with standing water; all water shall be allowed to settle and infiltrate through the soil prior to plant installation.
- A fertilizer packet (Bio Pak™ from Reforestation Technologies International) should be added to each planting hole prior to planting—if needed.
- Plantings shall be set in well-drained planting holes with the crown of the root ball no more than 0.5 inches above grade. Under no circumstances shall the plant crown be buried. Cuttings will be planted so that a minimum of two-thirds of the cutting is buried in the ground. The soil around the planting shall be tamped down sufficiently to eliminate any air pockets in the soil.
- A basin around the planting shall be constructed by creating a berm above the existing grade approximately 24 inches in diameter around the planting.

- Each planting shall be sufficiently watered at least once after installation so that water reaches the lower roots. If possible, the plantings should be watered twice on the day of installation.

8.4.1 Soil Amendments

A specially formulated, slow-release fertilizer provided in planting packets can be installed with container plants to aid establishment of the nursery-grown stock. The packets should be buried below the container plant so that their nutrients are available only to the plants and not weedy seedlings that may develop at the soil surface. Specific formulations are available for different plant types, such as shrubs and trees.

For shrub and herbaceous species, each packet (10 grams weight) should contain a blend of 16% total nitrogen, 6% available phosphoric acid, and 8% soluble potash plus minor nutrients. The nitrogen, phosphorous, and potassium should be coated with a polyurethane coating to provide 15.69% coated slow-release nitrogen, 5.09% coated slow-release available phosphate, and 6.80% slowly available soluble potash. For example, Bio Pak™ meeting these specifications are available from Reforestation Technologies International.

For tree species, each packet (30 grams weight) shall contain nitrogen, available phosphoric acid, and soluble potash plus minor nutrients. The nitrogen, phosphorus, and potassium shall be coated with a polyurethane coating to provide 22 percent coated slow-release nitrogen, 10 percent coated slow-release available phosphate, and 7 percent slowly available soluble potash. For example, Booster Pak™ meeting these specifications are available from Reforestation Technologies International.

8.4.2 Plant Protection

Local wildlife such as rabbits, pocket gophers and other rodents are expected to browse on the plantings and seed material. If the project restoration specialist/biologist determines that the plantings are being jeopardized by wildlife, corrective measures such as organic, non-toxic deterrents and fencing/plant cages may be used. No rodenticides should ever be used for a restoration project. Invertebrate pests are rarely a serious problem in this type of habitat restoration project if site conditions are appropriate to the desired habitats.

To protect newly planted trees species in areas where gophers and ground squirrels are present, below ground root protection are recommended to be installed to protect against root herbivory/damage. Root guards should be 18-gauge wire with ¾ inch mesh. The planting basin should be approximately 18” in diameter depending on the number of acorns planted per planting hole. The root guard shall be buried approximately 24 inches below ground and extend above the ground two to four inches. The root guard shall have an open bottom so as not to inhibit plant roots. Power augers can be used to dig the holes to the appropriate depth and width. The root guard material shall not be galvanized so that it breaks down in the environment over time after it is no longer needed for root protection.

If browsing is detected on young saplings, above ground protection can be installed. Wire caging, similar to the root guards can be installed using 18-inch gauge wire with ¾ inch mesh, such as chicken wire. The recommended diameter of the cage is approximately four feet with a height of four feet to protect the sapling from browsing while not inhibiting growth. The wire can be "stitched" together with binding ties and anchored to the ground using two pieces of rebar on opposite sides of the cage. Inspection of the planting cages should occur regularly to ensure tree growth is not inhibited by the cage and damage/girdling is not occurring.

Planting cones or tree shelters are an alternative to the cages; however, they are not recommended. Cones and shelters tend to inhibit lateral expansion of the root crown, do not protect the upper portions of the sapling that extend beyond the top of the shelter from browsing, and can increase the ambient temperature near the tree. Tall tree guards that significantly reduce available light can produce spindly top-heavy young trees that may be too heavy for the trunk to support the tree crown which allows for the tree to be easily damaged from high winds. If planting cones or tree shelters are used, inspect the health of the plant regularly to ensure the tree guards are not inhibiting growth and development of the tree.

Once the above ground plant protection is no longer needed, or if it begins to inhibit the development of the tree, the guards should be carefully removed.

8.5 PLANT SURVIVORSHIP

In at least the first two years of establishment after planting, survivorship of container planted trees and shrubs should be visually assessed during the spring and determined by counting the total number of dead container plants. Survival of container plants within the first two growing seasons should typically be at least 80 percent. Plants should be replaced if survivorship falls below 80 percent in the first season, including loss due to vandalism. Replacements should be planted as previously specified and maintained for one growing season, with hand-irrigation if necessary. Replacement tree species may need more than one year of maintenance before they are established.

After the second year of establishment, container plant survival should be visually estimated. As sites develop, it is very difficult to implement direct counts of all the container plants especially in woodland and riparian habitats. Natural recruitment of trees and shrubs in these habitats should occur and preclude the necessity for plant replacement. Replacement planting after the first season should only be specified if the visual estimate indicates substantial mortality over 60 percent in the second establishment year and the function of these species has not been replaced by seeded material and natural recruitment.

9 TEMPORARY IRRIGATION SYSTEM

When nursery-grown plants or cuttings are used, a temporary irrigation system is often necessary to supplement natural rainfall. There are several types of irrigation systems, as well as alternative watering systems, including the following: overhead, drip, micro-sprinkler, bubbler, hand watering from water truck or reservoir, and biodegradable watering shelters (e.g., Cocoon by Land Life Company).

The advantage of overhead irrigation is that it mimics natural rainfall, provides an even distribution of water across the site and is durable and low maintenance. However, overhead irrigation uses the most amount of water and there is loss through evaporation.

Drip and micro-sprinkler irrigation systems both make more efficient use of water by directing water application, but they can be readily damaged by weathering or animals. Bubbler irrigation systems also are water efficient, direct the application of water with strategically placed bubbler heads, and have the advantage of being more durable.

When a limited number of watering events are required or a limited number of plants need to be irrigated, hand watering can be an effective approach. Plants can be watered by hand using a hose that is attached to a water truck or a reservoir/basin that is filled externally by a water truck, from a well or from a municipal water source, for example. Another option is to install biodegradable watering shelters in which basins are placed in the planting holes, fitted around the plant stem(s), and filled with water by hand. The intent of using the watering shelters is to provide enough water for the first year of establishment.

Water used for irrigation must be of good quality with total dissolved solids (salts) at no greater concentration than 500 parts per million (ppm). Individual chemical constituents should be evaluated against the site soil tests, if available, to avoid salt build-up in the soils.

The following are typical specifications for an overhead irrigation system with impact sprinklers and a bubbler irrigation system.

9.1 OVERHEAD IRRIGATION SYSTEM

A temporary above-ground irrigation system should include the following features, as appropriate:

- The mainline will have lateral lines and gate-valves to separately manage the different areas or habitats, as necessary, depending on soils and landform.
- Sprinkler heads will be tested to accommodate the infiltration rate of the soil and landscape position. The size of the sprinkler heads and application rate will be determined after infiltration is evaluated in each area.
- The system will be laid out so that the wetted area from each sprinkler head has no more than a two- to three-foot overlap with adjacent sprinklers. The final

layout design will depend on the system water pressure and the size of the sprinkler heads (based on the infiltration rate of the soil).

- Separate valves will be installed to manage overhead impact sprinklers. This is important because it may be required to turn off valves where nesting sensitive bird species are present.
- All impact sprinkler stems will be fitted with on/off ball valves to allow for hose connections and hand watering of container plants at installation and during establishment, as necessary. These valves will also allow specific areas to be shut off, as necessary.

The size of the sprinkler heads and application rate should be determined after infiltration is evaluated for the restoration area. Sandy and sandy loam soils typically have high infiltration rates.

For riparian habitat restoration, the system should be flexible and easily disassembled when it runs across waterways for easy removal during periods of high flow. If the irrigation system is in the active floodplain, then it should be portable for removal prior to the onset of heavy rains or other conditions that might result in the loss of the irrigation system.

An overhead irrigation system can also be used to germinate and establish seeded material, as appropriate.

9.2 BUBBLER IRRIGATION SYSTEM

For more direct irrigation of planted trees and large shrubs, a bubbler irrigation system can be used. A temporary bubbler irrigation system should include the following features, as appropriate:

- A mainline with lateral lines will be installed with gate valves to separately manage areas within the restoration site, as necessary depending on site soils and landforms.
- PVC lateral lines will be laid out from the mainline to individual container plants.
- Full circle bubbler nozzles will be installed at each planting location.
- Individual bubbler nozzles will be pressure regulating.
- The irrigation system shall be fitted with on/off ball valves to allow for hose connections and hand watering of container plants at installation and during establishment, as necessary. These valves will also allow areas to be shut off, as necessary.

9.3 IRRIGATION SYSTEM OPERATION

Supplemental irrigation should be timed to mimic natural rainfall patterns to extend the rainy season in the fall and spring. Upon completion of plant installation, irrigation should occur weekly for about the first month in the absence of adequate rainfall to prevent desiccation of the container plants or cut material.

For the establishment of tree species, the container plants should be irrigated once per week in the weeks without sufficient rainfall for the first two months and then monthly for the remainder of the first year of establishment with approximately 10 to 15 gallons of water provided for each container plant. Irrigation in the second year will be applied to mainly supplement or mimic natural rainfall patterns in the spring and fall in such a way that plants develop deep root systems to maximize survival and vigor after irrigation is removed. Irrigation in the third year will only be used as sparingly as possible if drought conditions are severe.

For riparian and woodland habitats, in general, the temporary irrigation system is used for a minimum of two years to establish container plants. Native trees and shrubs may require irrigation in the summer of the first year, as well as several subsequent seasons of irrigation for successful establishment.

The irrigation system should not be operated with any type of controller or automatic timer. The irrigation system should be run manually and only when at least one maintenance person is on site to check the system for leaks and prevent blowouts.

The timing of irrigation events will depend on the amount of evapotranspiration between events and soil moisture. Regarding irrigation, there are only guidelines to follow and no cookbook formula (i.e., step-by-step prescriptive procedures) for successful water management of native vegetation.

The following is a sample irrigation management scheme:

- Irrigate soil to full field capacity to the desired depth (approximately 18 inches during germination and seedling/cutting/plant establishment; and 18-24 inches during subsequent establishment).
- Initially keep seeded areas moist until seeded material has germinated (if applicable).
- Allow soil to dry down to approximately 50-60 percent of field capacity (in the top 6-10 inches after germination and during seedling and plant establishment; and 8-12 inches during plant establishment) before the next irrigation cycle.

Wetting of the full root zone and drying of the soil between irrigation events is essential to the maintenance of the plants and the promotion of a deep root zone that will support the vegetation in the years after establishment. A soil probe or shovel should be used to examine soil moisture and rooting depth directly.

10 ON-GOING MANAGEMENT

One of the goals of a restoration plan is to create native habitats that will be self-sustaining and long term. Initially, maintenance of a project will be necessary to establish the newly seeded and or planted restoration area. To achieve habitat restoration goals, on-going management of the restoration site may be necessary after site preparation (i.e., weed management) and seed addition. There are several reasons that the habitat restoration project may require on-going management, including the following:

- There are portions of the project that have higher weed loads than others and require post-seeding weed maintenance to facilitate the establishment of the native vegetation
- To contain or eradicate the population of a high priority invasive plant species
- Supplemental irrigation for installed container plants or cuttings
- Remedial seeding in areas where germination of the native seed mix failed after at least one season of adequate rainfall
- Replacement of container plantings or cuttings in localized areas with less than 80 percent survival in years one and possibly year two of plant establishment, based on visual assessments of substantial mortality
- Installation of erosion control best management practices (e.g., straw wattles and a native remedial seed mix) following significant erosion requiring repair
- Conservation activities for sensitive species
- Pest and disease control, if necessary (no rodenticides should be used)
- Removal of trash, debris, and litter (Restoration Contractor is only responsible for trash produced as part of this project; Restoration Contractor is not responsible for illegal dumping, trash left by neighbors or the public on the trail system)

The amount of remedial weeding required each year will depend on weather conditions, development of the native habitats and the density and type of weed species in the restoration area. Post-seed installation maintenance period can be up to five years beginning after installation of plant material. In general, the most intense maintenance is in the first two years of establishment and only seasonal spot-weeding activities in the third through fifth years, as needed. Weed control should be as needed to control weed species while minimizing disturbance to the restoration area and should be scheduled as determined by the project restoration specialist/biologist.

Remedial weeding effort can be greatly reduced with an increase in the duration and/or intensity of nonnative weed management prior to seeding. It is very important to wait to add native plant material until after it is determined that adequate weed management has been accomplished.

10.1 POST-SEEDING WEED MANAGEMENT

After seed and plant installation the primary method of weed management should be hand weeding; however, under the direction of the project restoration specialist/biologist, select use of other methods, including targeted spot spray application of herbicide using a low-pressure nozzle for high priority invasive species or perennial weeds, or line trimming of dense stands of weeds, may be allowed. The restoration specialist/biologist must weigh the relative cost-benefit of the effectiveness of weed control with either herbicide or line trimming compared to unavoidable collateral damage to the native plants in the treatment area. Only post-emergent herbicides should be used and applied according to methods and recommendations described in the restoration plan and be consistent with the City's herbicide use policies.

Timing is critical to successful weed management, so the restoration specialist/biologist should conduct phenological monitoring to determine the appropriate timing and method of weed control events.

Post-seeding weed management should be concentrated where nonnative plants inhibit native plant germination and/or growth, as well as to continue the control of high priority invasive species that can readily re-establish in the restoration area. The amount of post-seeding weeding required each year will depend on weather conditions, development of the native habitats, and the density and type of weed species in the restoration area. The objective of post-seeding weed management is to reduce nonnative plants to a threshold level that allows desirable native species to establish and thrive.

Careful weeding shall be done by trained crews to avoid damage to the establishment of the native vegetation. Weeds should be removed on a regular basis, as necessary and if possible, before they set seed and/or reach approximately 12 inches in height. All seed material that has set prior to a weed control event should be carefully collected and removed from the site so as not to be introduced into the weed seed bank. All weeded material should be raked, removed from the site, and properly disposed of.

Adaptive management is key to success and includes regular monitoring to guide the scheduling and selection of control methods. Care should be taken to limit the amount of soil disturbance and trampling of native seedlings from weeding activities. The management of weeds must be balanced with the negative side effects on native plant development (i.e., not all weeds in a site need to be treated). It is important to train the crews to weed by sweeping through a site and target weed control for the weeds that need to be weeded at the stage described above. Other weeds that have not reached the desired control stage should be left to weed later. This will limit the amount of disturbance in each area during a weed control event.

10.1.1 CONTROL OF HIGH PRIORITY INVASIVE SPECIES

Control of the target high priority invasive species should follow the species-specific best management practices (BMPs) of the Fairview Park Master Plan to treat high

priority invasive species that may not be controlled with routine weed management methods. If herbicides are used, great caution should be used with foliar spray application to avoid any drift or overspray to establishing native plants. To limit herbicide drift or overspray, the stump-cut method should be used when possible and appropriate for woody perennial invasives.

10.1.2 REMEDIAL SEEDING

Remedial seeding may be necessary in areas with significant erosion or if native cover is low. Significant erosion areas should be repaired and re-seeded in the first fall seasons after damage. Re-seeding should occur in areas if coverage is less than 20 percent of native species over any contiguous area of 200 square feet. Collecting and storing extra seed for remedial seeding purposes is advised to ensure that seed is available and ready to use at the time needed for remedial seeding.

Remedial seeding is often best accomplished using hand broadcast seeding methods when the area to be repaired is relatively small (e.g., less than one acre). Seed should be applied using the hand broadcast seeding method using a hand-operated device. The ground shall be lightly scarified with a hand rake prior to seeding. Scarification of the ground is important to facilitate seed-to-soil contact. Wheat bran should be added to the seed mix to achieve even dispersal of the seed material. Seed shall be mixed with the carrier stated above and divided into two equal parts. Half of the seed shall be hand-broadcast by walking across the entire area in a linear orientation appropriate for the site making sure of even coverage. The remaining half of the seed shall be broadcast by walking across the site perpendicular to the first application. Materials to be applied during hand broadcast seeding are the following:

- Specified remedial seed mix
- Wheat bran at ¼ the weight of the specified bulk seed
- 60 lbs/acre of AM fungi (commercial variety *Rhizophagus intraradices*)

Following seeding, the soil will be scarified with hand-held rakes. Scarification of the soil following seeding will aid in seed-to-soil contact and provide a thin covering of soil over the applied seed mix. Seeds should be incorporated into the topsoil no less than ¼ inch and no more than ½ inch deep.

10.1.3 CONTAINER PLANT REPLACEMENT

Container plantings and cuttings should be replaced if survivorship falls below 80 percent after the first year of plant establishment. Replacements should be planted as previously specified and maintained for a minimum of one growing season, as necessary. As sites develop, it is impractical to implement direct counts of all the container plants. Replacement planting after the first season shall only be specified if the visual estimate indicates substantial mortality and the function of these species has not been replaced by seeded material and natural recruitment.

10.1.4 EROSION CONTROL

Erosion control measures, including straw wattles, silt fencing, or erosion mats, may be required for protection of the project as wells as any necessary repairs from washouts and rutting that may occur from rain events or irrigation related issues. Erosion control measures and erosion repairs should be as needed and approved by the project restoration specialist/biologist and the City prior to implementation. Erosion control measures and specifications are presented in Section 3.5.1.

10.1.5 PEST AND DISEASE CONTROL

Local wildlife such as rabbits, pocket gophers and other rodents are expected to browse on the plantings and seed material. If the restoration specialist determines that the plantings are being jeopardized by wildlife, corrective measures such as organic, non-toxic deterrents and fencing/plant cages may be used. No rodenticides should ever be used on the project. Invertebrate pests are rarely a serious problem in this type of habitat restoration project if site conditions are appropriate to the desired habitats.

If it is observed that the root systems of coast live oak plantings are being predated upon by pocket gophers, then open bottom protective root guards shall be installed in the planting basins prior to acorn plantings or container plant replacement. Root guards shall consist of using 18-guage gopher wire with ½ inch mesh to protect against gopher herbivory. The root guard material shall not be galvanized. The root guard shall have an open bottom so as not to inhibit plant roots. The root guard shall be buried at a minimum of 24 inches below ground and extend above ground two to four inches.

10.1.6 REMOVAL OF TRASH AND DEBRIS

During project implementation, the restoration area should be kept free of trash and debris. If large trash items are dumped illegally in the project area, the City of Costa Mesa should be responsible for the cost of removing the items.

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OPERATIONS, MAINTENANCE AND MANAGEMENT PLAN

FAIRVIEW PARK



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C. SEASONAL MAINTENANCE QUICK GUIDE

Scientific Name	Common Name	Physical/Mechanical Treatment Method (P)	Chemical Treatment Method (C)	Control Event 1 (Jan. to Feb. 15)			Control Event 2 (Spring to Early Summer)			Control Event 3 (Summer to Fall)		
				VPW	WRA/CSS	Parkwide	VPW	WRA/CSS	Parkwide	VPW	WRA/CSS	Parkwide
Arundo donax	Giant reed	Cut and dig out plant removing all plant material	Foliar herbicide application – glyphosate	---	P/C	P/C	---	P/C	P/C	---	P/C	P/C
Atriplex semibaccata	Australian saltbush	Hand-pull removing all rooting material	Foliar herbicide application - glyphosate	P	P/C	P/C	P	P/C	P/C	P	P/C	P/C
Bassia hyssopifolia	Five horn bassia	Hand-pull removing all rooting material	N/A	P	---	---	P	---	---	P	---	---
Brachypodium distachyon	Purple false brome	Hand-pull small patches; or mow before viable seed production but after soil moisture depleted	Foliar herbicide application - fluazifop	P	P/C	P/C	P	P/C	P/C	P	P	P
Brassica nigra	Black mustard	Hand-pull removing all rooting material; or mow after flowering but before viable seed production cutting close to the ground to prevent resprouting (this may require removal of thick plant thatch in sensitive habitat areas); remove viable seeds from mature plants	Foliar herbicide application - glyphosate	P	P/C	P/C	P	P/C	P/C	P	P	P
Bromus diandrus	Ripgut brome	Hand-pull small patches; or mow before viable seed production close to the ground removing bolting stems (this may require removal of thick plant thatch in sensitive habitat areas)	Foliar herbicide application - fluazifop	P	---	---	P	---	---	P	---	---
Carduus pycnocephalus	Italian thistle	Hand-pull removing all rooting material; remove viable seeds from mature plants	Foliar herbicide application – glyphosate or clopyralid	P	P/C	P/C	P	P/C	P/C	P	P	P
Carduus tenuiflorus	Slender flowered thistle	Hand-pull removing all rooting material; remove viable seeds from mature plants	Foliar herbicide application – glyphosate or clopyralid	P	P/C	P/C	P	P/C	P/C	P	P	P

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C. SEASONAL MAINTENANCE QUICK GUIDE

Scientific Name	Common Name	Physical/Mechanical Treatment Method (P)	Chemical Treatment Method (C)	Control Event 1 (Jan. to Feb. 15)			Control Event 2 (Spring to Early Summer)			Control Event 3 (Summer to Fall)		
				VPW	WRA/CSS	Parkwide	VPW	WRA/CSS	Parkwide	VPW	WRA/CSS	Parkwide
Cirsium vulgare	Bull thistle	Hand-pull removing as much of the tap root as possible; remove viable seeds from mature plants	Foliar herbicide application - clopyralid	P	P/C	P/C	P	P/C	P/C	P	P/C	P/C
Conium maculatum	Poison hemlock	Hand-pull removing all rooting material; remove viable seeds from mature plants	Foliar herbicide application - glyphosate	P	P/C	P/C	P	P/C	P/C	P	P/C	P/C
Cynara cardunculus	Artichoke thistle	Hand-pull removing as much of the tap root as possible; remove viable seeds from mature plants	Foliar herbicide application - clopyralid	P	P/C	P/C	P	P/C	P/C	P	P/C	P/C
Echium candicans	Pride of Madeira	Cut and dig out plant removing all plant material	Foliar herbicide application; or Stump cut herbicide application (requires follow-up treatment of resprouts)	---	P/C	P/C	---	P/C	P/C	---	P/C	P/C
Foeniculum vulgare	Sweet fennel	Cut and dig out plant removing at least 3 to 6" of the root crown; remove viable seeds from mature plants	Foliar herbicide application – triclopyr in winter; glyphosate all other times most effective before flowering	P	P/C	P/C	P	P/C	P/C	P	P/C	P/C
Glebionis coronaria	Crown daisy	Hand-pull removing all rooting material including any viable seed	Foliar herbicide application - glyphosate	P	P/C	P/C	P	P/C	P/C	P	P	P
Hirschfeldia incana	Shortpod mustard	Hand-pull removing all rooting material; or mow after flowering but before viable seed production cutting close to the ground to prevent resprouting; remove viable seeds from mature plants	Foliar herbicide application - glyphosate	P	P/C	P/C	P	P/C	P/C	P	P/C	P/C
Oncosiphon pilulifer	Stinknet	Hand-pull removing all rooting material; remove viable seeds from mature plants	Foliar herbicide application – glyphosate most effective in the bolting stage	P	P/C	P/C	P	P/C	P/C	P	P/C	P/C

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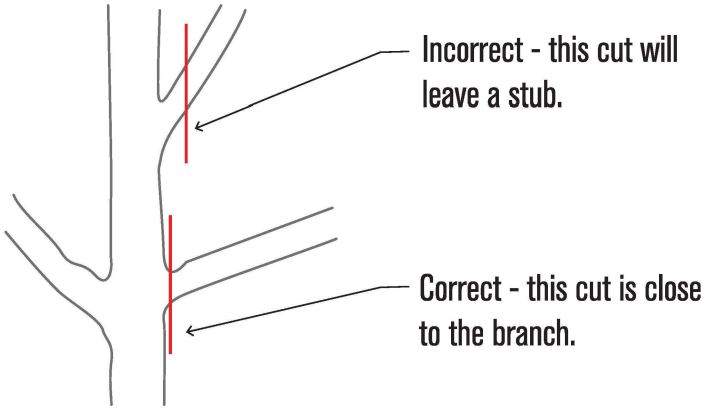
C. SEASONAL MAINTENANCE QUICK GUIDE

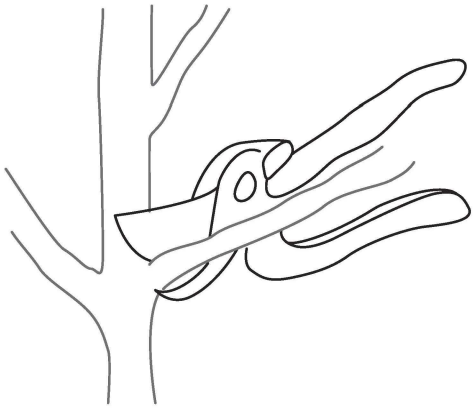
Scientific Name	Common Name	Physical/Mechanical Treatment Method (P)	Chemical Treatment Method (C)	Control Event 1 (Jan. to Feb. 15)			Control Event 2 (Spring to Early Summer)			Control Event 3 (Summer to Fall)		
				VPW	WRA/CSS	Parkwide	VPW	WRA/CSS	Parkwide	VPW	WRA/CSS	Parkwide
Pennisetum setaceum	Fountaingrass	Hand-pull seedlings; Cut and dig out mature plants removing all plant material; remove viable seeds from mature plants	Foliar herbicide application – fluazifop; or glyphosate best control when applied during flowering stage	P	P	P	P	P/C	P/C	P	P/C	P/C
Raphanus sativus	Wild radish	Hand-pull removing all rooting material; mow after flowering but before viable seed production cutting close to the ground to prevent resprouting	Foliar herbicide application - glyphosate	P	P/C	P/C	P	P/C	P/C	P	P	P
Ricinus communis	Castor bean	Hand-pull seedlings; cut and dig out mature plants removing all plant material; remove viable seeds from mature plants	Foliar herbicide application or Stump cut herbicide application (requires follow-up treatments to foliar spray any resprouts)	P	P/C	P/C	P	P/C	P/C	P	P/C	P/C
Rumex crispus	Curly dock	Hand-pull removing as much as the tap root (minimum of 2 inches) as possible to prevent resprouting	Foliar herbicide application – glyphosate or clopyralid	P	P/C	P/C	P	P/C	P/C	P	P/C	P/C
Salsola australis	Russian thistle	Hand-pull removing as much of the root as possible before seed set	Foliar herbicide application – glyphosate before seed set; triclopyr most effective on young plants	P	P/C	P/C	P	P/C	P/C	P	P/C	P/C
Silybum marianum	Milk thistle	Hand-pull removing as much of the root as possible; remove viable seeds from mature plants	Foliar herbicide application – clopyralid from seedling to bud stage	P	P/C	P/C	P	P/C	P/C	P	P/C	P/C
Sisymbrium irio	London rocket	Hand-pull removing all rooting material; or mow after flowering but before viable seed production cutting close to the ground to prevent resprouting; remove viable seeds from mature plants	Foliar herbicide application - glyphosate	P	P/C	P/C	P	P/C	P/C	P	P	P
Solanum rostratum	Buffalobur	Hand-pull removing as much of the root as possible	Foliar herbicide application - glyphosate	P	---	---	P	---	---	P	---	---

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Status	Season	Location
Trees	Winter	Park

TREE PRUNING - PROPER PRUNING CUT

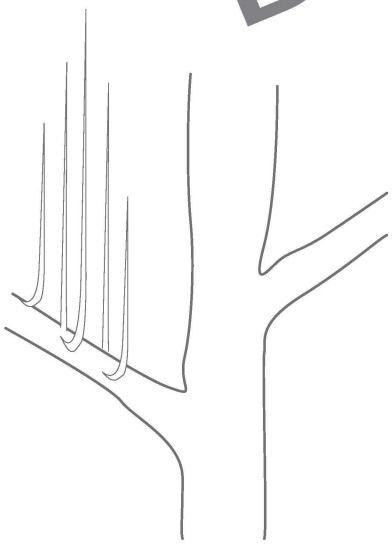


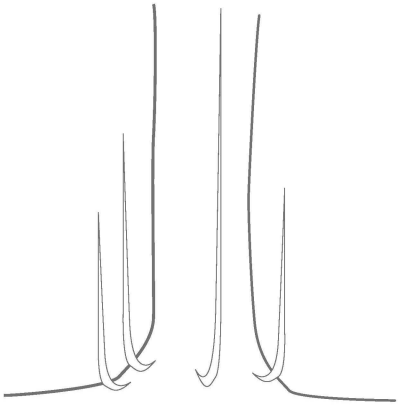


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Watersprouts (suckers)

Heavy pruning or the removal of large trunks or branches may cause upright shoots to rapidly arise from the base of a plant or adjacent major cuts. Poorly pruned watersprouts may cause growth of additional watersprouts that will lead to an unwanted woody mass at, or next to, the plant's trunk.

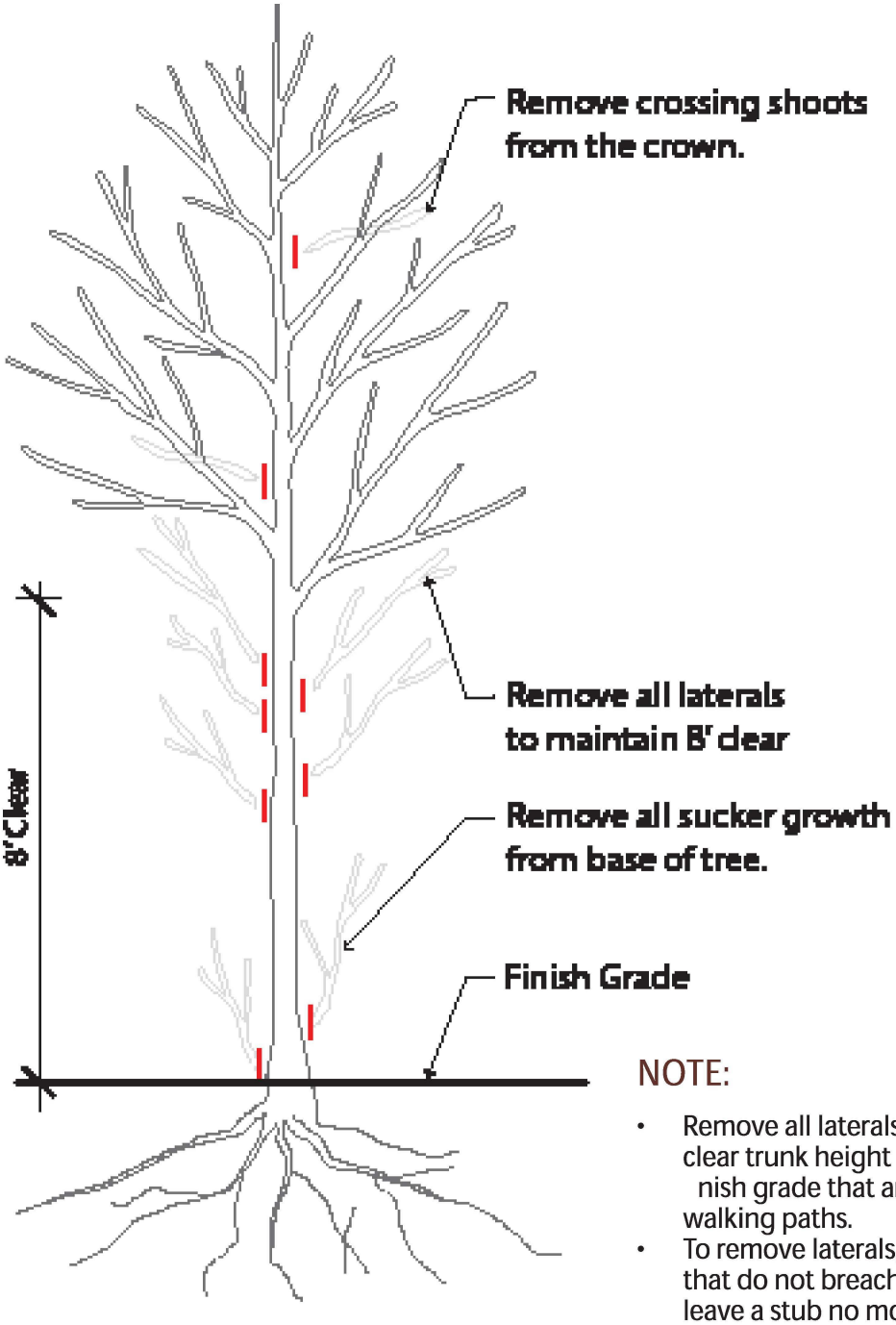




Primary Plant Species:

Status	Season	Location
Trees	November to	Park

TREE PRUNING - STANDARD



SECTION

NOTE:

- Remove all laterals to maintain 8' clear trunk height from adjacent nish grade that are adjacent to walking paths.
- To remove laterals, make small cuts that do not breach the branch collar, leave a stub no more than 1/4".
- For trees with less than 8' clear trunk height, selectively remove closely-spaced trunks and branches that

Primary Plant Species: Alnus rhombifolia (White Alder), Platanus racemosa (Western Sycamore), Quercus agrifolia (Coast Live Oak),

Status	Season	Location
Trees	November to	Site

TREE PRUNING - MULTI-TRUNK AND LOW BRANCHED



SECTION

NOTE:

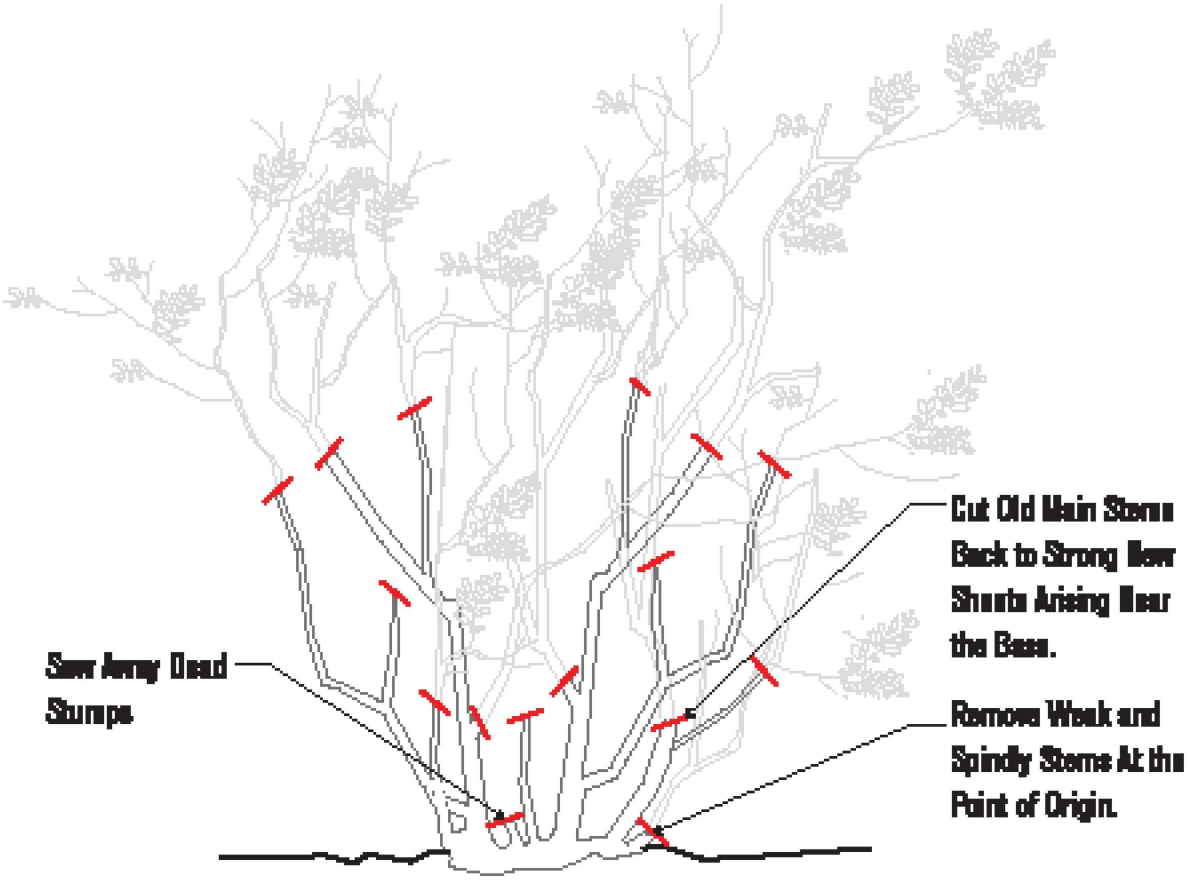
- Reomve dead, dieased, and damaged wood.
- Selectively remove crossing or inward-growing lateral branches.
- Avoid removing more than 1/4 of the tree's total leaf area in a single year.

Primary Plant Species: Platanus racemosa multi-trunk (Western Sycamore)

FAIRVIEW PARK

Native Plant	Season October to	Location California Native

SHRUB PRUNING



NOTE:

- Prune in October, or November during dormancy or as needed to maintain groomed appearance.
- If a bird nest is present, including small hummingbird nests, do

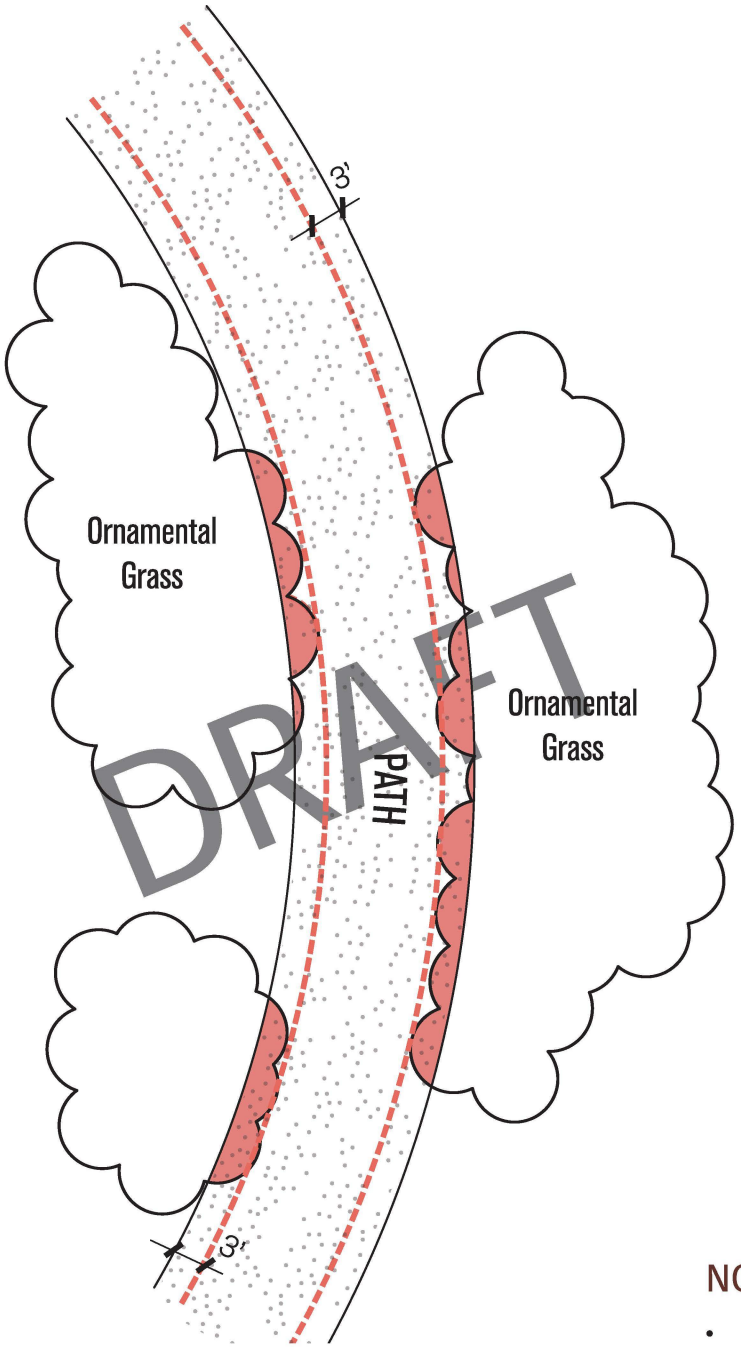
Primary Plant Species:

Eriogonum fasciculatum, Saliva apiana, Salvia clevalandii, Salvia leucophylla, Saliva mellifera

FAIRVIEW PARK

Status	Season	Location
Native Plant	October to	California Native

SHRUB PRUNING AT PATH



NOTE:

- Do not prune in nesting season January to August
- Prune in October, or November during dormancy.

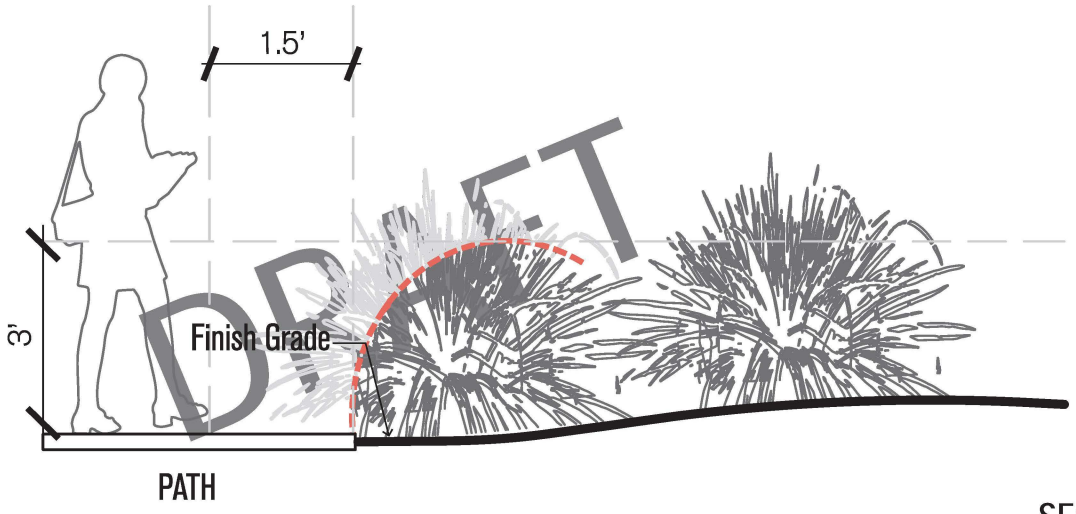
Primary Plant Species:

Eriogonum fasciculatum, Saliva apiana, Salvia clevalandii, Salvia leucophylla, Saliva mellifera

FAIRVIEW PARK

Status	Season	Location
Native Plant	October to	California Native Planting

SHRUB PRUNING AT PATH



SECTION

NOTE:

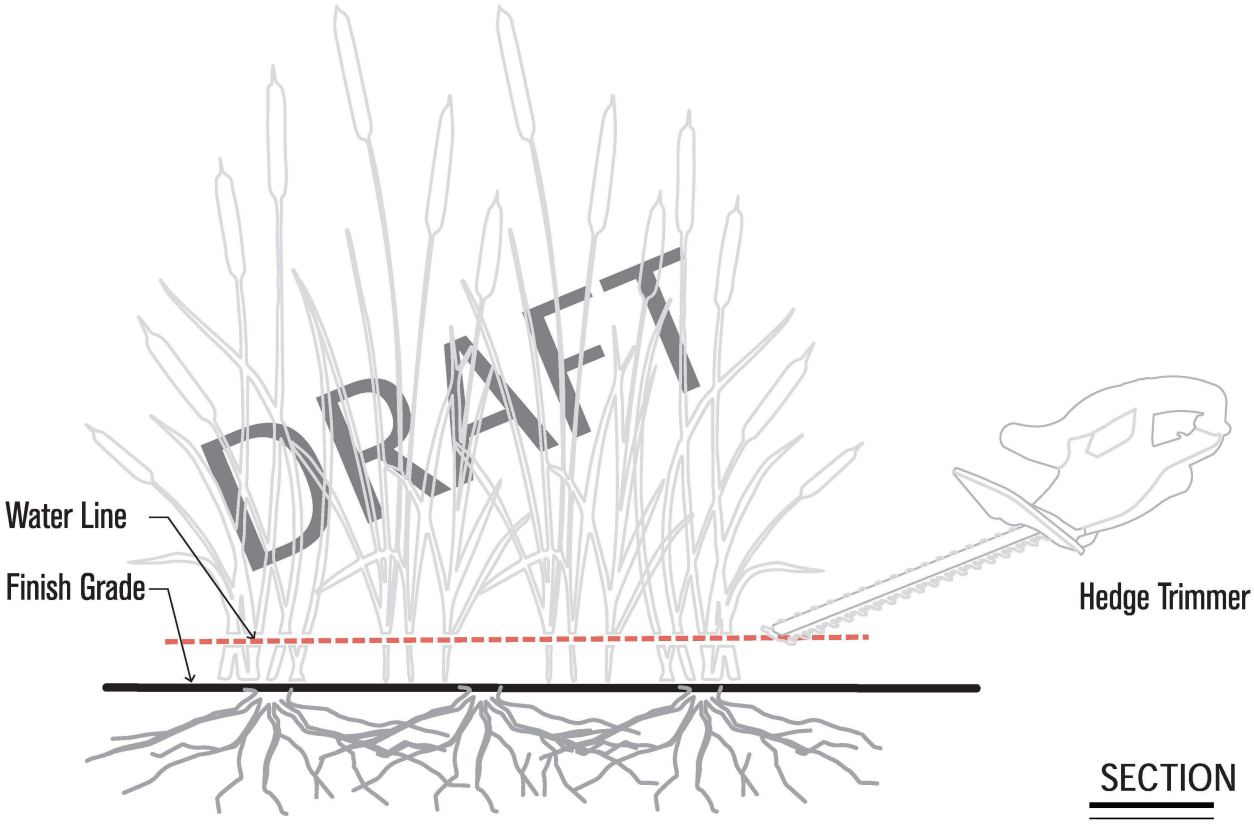
- Do not prume in nesting season January to August
- Prune in October, or November during dormancy.
- Ornamental grasses that impeed walkway areas shall be pruned individually as indicated.

Primary Plant Species:

Eriogonum fasciculatum, Saliva apiana, Salvia clevalandii, Salvia leucophylla, Saliva mellifera

Status	Season	Location
Wetland	Fall	Wetland

CATTAILS TRIMMING



SECTION

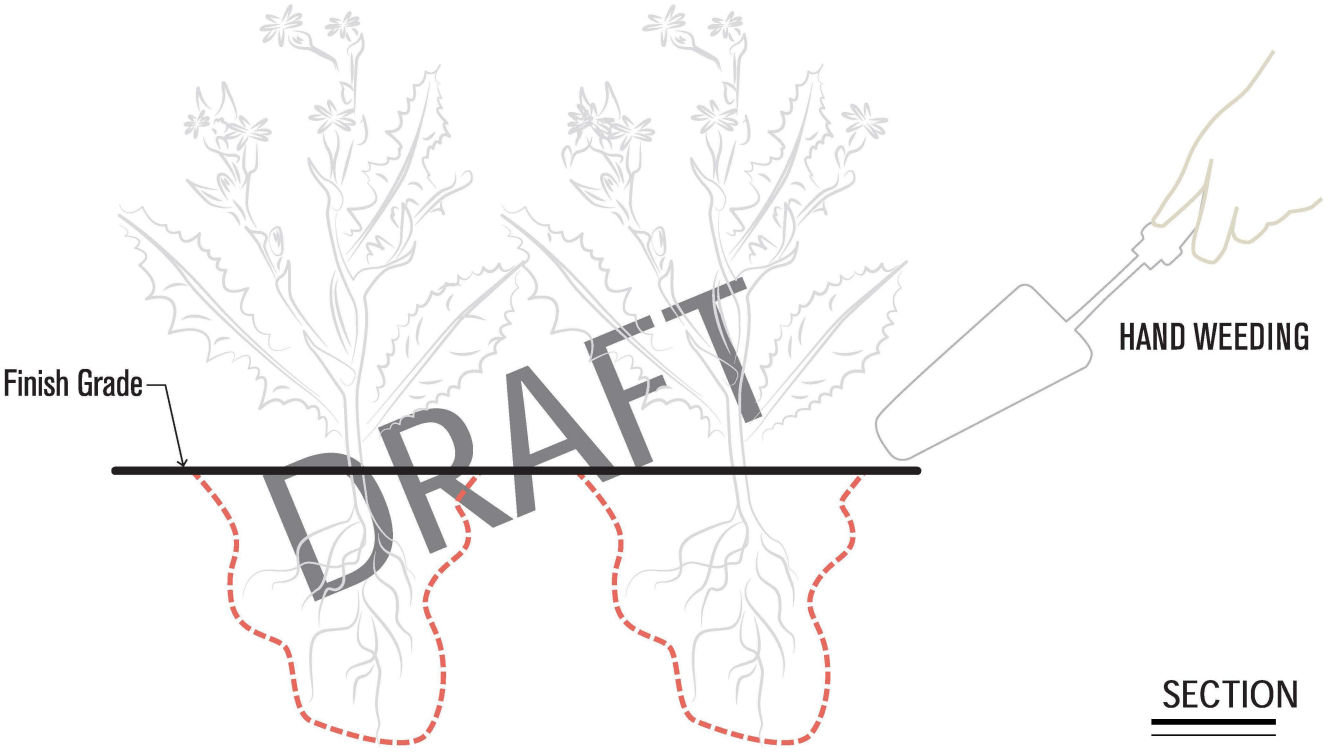
NOTE:

- Trim cattails down to below lake water line with shears or hedge trimmers where needed for visibility and to maintain line of sight. Do not trim back during

Primary Plant Species:
Typha domingensis

Status	Season	Location
All Planting Areas	Year-Round Before	Park

HAND WEEDING



SECTION

NOTE:

- Regularly hand weed as needed to remove common garden weeds before they ower and set seed. As the plants mature and ll in the bare spaces they will out-compete the weeds.
- Prioritize control of all Cal-IPC invasive weeds.
- Remove above ground plant material and most of roots.
- Minimize soil disturbance at root zone.

Primary Plant Species:
Purslane, cheeseweed, bermuda grass, spotted spurge, wild radish, sowthistle, lambsquarters, Australian saltbush, thistle, common groundsel, creeping buttercup, scarlet pimpernel

PART 2. WEED IDENTIFICATION AND REMOVAL

A. Priority Control Areas
B. Weed Identi cation Sheets

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EXHIBIT: PRIORITY CONTROL AREAS
High-Priority Maintenance Areas for Invasive Plant Control



FAIRVIEW PARK

Status	Weed	Season	Location
Weed	Yes	All Seasons	Drainages on the west blu



Landscape Habit



Spikelet



Stem

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giant reed / Arundo donax

PREVENTION

- Cal-IPC Rating: High.
- Remove weeds from site before ower and seed dispersal.
- Regular applications of mulch with a depth of 1-3" will discourage weeds.

TREATMENT SEQUENCE

1. All above ground growth must be removed mechanically to the base with a hedger or chainsaw.
2. Allow sprouts from rhizomes to regrow.
3. Treat sprouts with herbicide.
4. Repeat herbicide treatment until sprouting stops.
5. Herbicides shall be applied by a licensed pest applicator only as directed by a park supervisor.

Mulch will not suppress this plant.
Herbicide is the ONLY way 2. Mature Plant: Prune prior to owers setting seeds.
3. Post-Emergent shall be applied by a licensed pest applicator only in areas with high density weed conditions, and only as directed by a park supervisor.

Plant Category	Leaf	Mature Size
Perennial	Alternate	May grow up to 20' Tall

FAIRVIEW PARK

Status		Season Found	Location
Weed	Yes	Spring to Winter	Nonnative annual grasslands and trail edges



Landscape Habit


Flower


Foliage

Australian saltbush / Atriplex semibaccata

PREVENTION

- Cal-IPC Rating: Moderate
- Remove weeds from site before ower and seed dispersal.
- Regular applications of mulch with a depth of 1-3" will discourage weeds.

TREATMENT SEQUENCE

1. Seedlings: Hand Pull or Trowel Tillage.
2. Mature Plant: Hand dig/remove prior to owers setting seeds.
3. Post-Emergent shall be applied by a licensed pest applicator only in areas with high density weed conditions, and only as directed by a park supervisor.

Plant Category	Leaf	Mature Size
Shubby perennial	Dropping woody stems Leaves smooth-wavy tooth margins	2'H x 6'W

Status	Weed	Season	Location
Weed	Yes	All Seasons	Vernal pool watershed, moist disturbed soils



Landscape Habit



Spikelet



Seedling

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ve horn smotherweed / Bassia hyssopifolia

PREVENTION

- Cal-IPC Rating: Limited
- Remove weeds from site before ower and seed dispersal.
- Regular applications of mulch with a depth of 1-3" will discourage weeds.

TREATMENT SEQUENCE

1. Seedlings: Hand Pull or Trowel Tillage.
2. Mature Plant: Hand dig/remove prior to owers setting seeds.

Plant Category	Leaf	Mature Size
Annual Herb	Alternate	4'Tall x 4'Wide

Status	Weed	Season	Location
Weed	Yes	All Seasons	Vernal pool watershed, nonnative annual grasslands



Landscape Habit



Spikelet



Stem

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purple false brome / Brachypodium distachyon

PREVENTION

- Cal-IPC Rating: Moderate.
- Remove weeds from site before ower and seed dispersal.
- Regular applications of mulch with a depth of 1-3" will discourage weeds.

TREATMENT SEQUENCE

1. Seedlings: Hand Pull or Trowel Tillage.
2. Mature Plant: Hand dig/remove prior to owers setting seeds or mow before viable seed production, but after soil moisture depleted.
3. Post-Emergent shall be applied by a licensed pest applicator only in areas with high density weed conditions, and only as directed by a park supervisor.

Plant Category	Leaf	Mature Size
Annual/Perennial	Grass	2' Tall

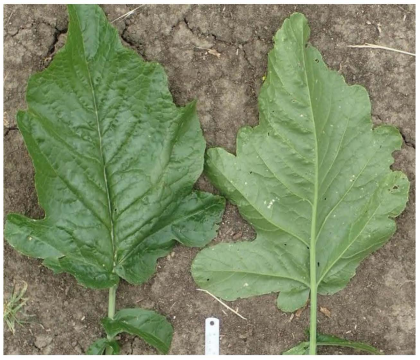
Status	Weed	Season	Location
Weed	Yes	All Seasons	Common on slopes and on imported ll material



Landscape Habit



Spikelet



Stem

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black mustard / Brassica nigra

PREVENTION

- Cal-IPC Rating: Moderate.
- Remove weeds from site before ower and seed dispersal.
- Regular applications of mulch with a depth of 1-3" will discourage weeds.

TREATMENT SEQUENCE

1. Seedlings: Hand Pull or Trowel Tillage.
2. Mature Plant: Hand dig/remove all rooting material prior to owers setting seeds or mow after owering, but before viable seed production cutting close to the ground to prevent resprouting (this may require removal of thick plant thatch in sensitive habitat areas); Remove viable seeds from mature plants.
3. Post-Emergent shall be applied by a licensed pest applicator only in areas with high density weed conditions, and only as directed by a park supervisor.

Plant Category	Leaf	Mature Size
Annual	Pairs of distinct lateral lobes	6' Tall

Status	Weed	Season	Location
Weed	Yes	All Seasons	Nonnative annual grassland, disturbed areas



Landscape Habit



Leaf and Sheath



Leaf

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ripgut brome / Bromus diandrus

PREVENTION

- Cal-IPC Rating: Moderate
- Remove weeds from site before ower and seed dispersal.
- Regular applications of mulch with a depth of 1-3" will discourage weeds.

TREATMENT SEQUENCE

1. Seedlings: Hand Pull or Trowel Tillage.
2. Mature Plant: Hand dig/remove or mow close to the ground removing bolting stems (this may require removal of thick plant thatch in sensitive habitat areas)
3. Post-Emergent shall be applied by a licensed pest applicator only in areas with high density weed conditions, and only as directed by a park supervisor.

Plant Category	Leaf	Mature Size
Annual	Grass	1-3' H

Status		Season Found	Location
Weed	Yes	Winter to Summer	Poison hemlock patches, riparian and wetland areas



Landscape Habit



Flower



Spines

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Italian Thistle / Carduus pycnocephalus

PREVENTION

- Cal IPC Rating: Moderate
- Remove weeds from site before ower and seed dispersal.
- Regular applications of mulch with a depth of 1-3" will discourage weeds.

TREATMENT SEQUENCE

1. Seedlings: Hand Pull or Trowel Tillage. Wear gloves as sap can be a skin-irritant.
2. Mature Plant: Hand dig/remove prior to owers setting seeds.
3. Post-Emergent shall be applied by a licensed pest applicator only in areas with high density weed conditions, and only as directed by a park supervisor.

Plant Category	Leaf	Mature Size
Annual	Dark green leaves coarsely lobed with shaped spines at tips	6' H

Status		Season Found	Location
Weed	Yes	Winter to Summer	Poison hemlock patches, riparian and wetland areas



Landscape Habit



Flower



Flower Buds

DRAFT

Slender Flower Thistle / Carduus tenui orus

PREVENTION

- Cal IPC Rating: Moderate
- Remove weeds from site before ower and seed dispersal.
- Regular applications of mulch with a depth of 1-3" will discourage weeds.

TREATMENT SEQUENCE

1. Seedlings: Hand Pull or Trowel Tillage. Wear gloves as sap can be a skin-irritant.
2. Mature Plant: Hand dig/remove prior to owers setting seeds.
3. Post-Emergent shall be applied by a licensed pest applicator only in areas with high density weed conditions, and only as directed by a park supervisor.

Plant Category	Leaf	Mature Size
Annual	Dark green leaves coarsely lobed with shaped spines at tips	6' H

Status	Weed	Season	Location
Weed	Yes	All Seasons	Riparian and wetland areas, disturbed areas



Landscape Habit



Spikelet

DRAFT

bull thistle / Cirsium vulgare

PREVENTION

- Cal-IPC Rating: Moderate
- Remove weeds from site before ower and seed dispersal.
- Regular applications of mulch with a depth of 1-3" will discourage weeds.

TREATMENT SEQUENCE

1. Seedlings: Hand Pull or Trowel Tillage.
2. Mature Plant: Hand dig/remove as much of tap root as possible. Remove all viable seeds from mature plants.
3. Post-Emergent shall be applied by a licensed pest applicator only in areas with high density weed conditions, and only as directed by a park supervisor.

Plant Category	Leaf	Mature Size
Perennial	Simple, alternate, and deeply lobed	2-6' H x 5' W

Status	Weed	Season	Location
Weed	Yes	All Seasons	North facing blu slopes and west blu drain



Landscape Habit



Leaves



Root

DRAFT

poison hemlock / Conium maculatum

PREVENTION

- Cal-IPC Rating: Moderate
- Remove weeds from site before ower and seed dispersal.
- Regular applications of mulch with a depth of 1-3" will discourage weeds.

TREATMENT SEQUENCE

1. Seedlings: Hand Pull or Trowel Tillage.
2. Mature Plant: Hand dig/remove all plant material. Remove all viable seeds from mature plants.
3. Post-Emergent shall be applied by a licensed pest applicator only in areas with high density weed conditions, and only as directed by a park supervisor.

Plant Category	Leaf	Mature Size
Biennial	Compound, fern-like	6-10' H x 4-5' W

Status	Weed	Season	Location
Weed	Yes	All Seasons	Nonnative annual grassland with clayey soils



Landscape Habit



Spikelet



Stem

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artichoke thistle / Cynara cardunculus

PREVENTION

- Cal-IPC Rating: Moderate
- Remove weeds from site before ower and seed dispersal.
- Regular applications of mulch with a depth of 1-3" will discourage weeds.

TREATMENT SEQUENCE

1. Seedlings: Hand Pull or Trowel Tillage.
2. Mature Plant: Hand dig/remove as much of tap root as possible. Remove all viable seeds from mature plants.
3. Post-Emergent shall be applied by a licensed pest applicator only in areas with high density weed conditions, and only as directed by a park supervisor.

Plant Category	Leaf	Mature Size
Perennial	Large, spiny, deeply lobed	3-6' H x 2-3' W

Status	Weed	Season	Location
Weed	Yes	All Seasons	Landscaped areas



Landscape Habit



Flowers



In orescence

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pride of madeira / Echium candicans

PREVENTION

- Cal-IPC Rating: Limited
- Remove weeds from site before ower and seed dispersal.
- Regular applications of mulch with a depth of 1-3" will discourage weeds.

TREATMENT SEQUENCE

1. Seedlings: Hand Pull or Trowel Tillage.
2. Mature Plant: Hand dig/remove all plant material.
3. Post-Emergent shall be applied by a licensed pest applicator only in areas with high density weed conditions, and only as directed by a park supervisor.

Plant Category	Leaf	Mature Size
Perennial	Lanceolate, hairy, gray-green	5-6' H x 6-10' W

Status	Weed	Season	Location
Weed	Yes	All Seasons	Throughout Park



Landscape Habit



Flower head



Stem

DRAFT

sweet fennel / Foeniculum vulgare

PREVENTION

- Cal-IPC Rating: Moderate
- Remove weeds from site before ower and seed dispersal.
- Regular applications of mulch with a depth of 1-3" will discourage weeds.

TREATMENT SEQUENCE

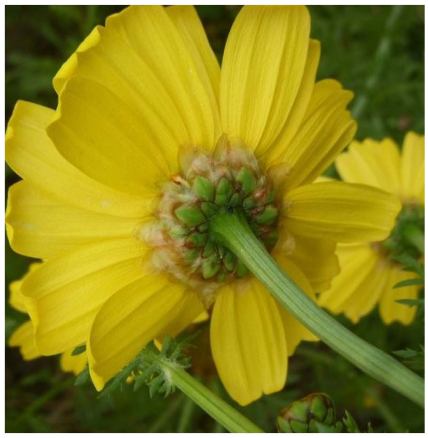
1. Seedlings: Hand Pull or Trowel Tillage.
2. Mature Plant: Hand dig/remove at least 3-6" of the root crown. Remove all viable seeds from mature plants.
3. Post-Emergent shall be applied by a licensed pest applicator only in areas with high density weed conditions, and only as directed by a park supervisor.

Plant Category	Leaf	Mature Size
Perennial	Feathery, compound	3-6' H x 1-3' W

Status	Weed	Season	Location
Weed	Yes	All Seasons	Vernal pool watershed, fuel modi cation zones



Landscape Habit



Back of Flower



Flower

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crown daisy / Glebionis coronaria

PREVENTION

- Cal-IPC Rating: Limited
- Remove weeds from site before ower and seed dispersal.
- Regular applications of mulch with a depth of 1-3" will discourage weeds.

TREATMENT SEQUENCE

1. Seedlings: Hand Pull or Trowel Tillage.
2. Mature Plant: Hand dig/remove as much of the plant material as possible. Remove all viable seeds from mature plants.
3. Post-Emergent shall be applied by a licensed pest applicator only in areas with high density weed conditions, and only as directed by a park supervisor.

Plant Category	Leaf	Mature Size
Annual	Alternate, feathery, aromatic leaves	2 1/2' H x 1-2' W

Status	Weed	Season	Location
Weed	Yes	Winter to Summer	Occurs on mesa



Landscape Habit



Foliage



Flower

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shortpod mustard / Hirschfeldia incana

PREVENTION

- Cal-IPC Rating: Moderate.
- Remove weeds from site before ower and seed dispersal.
- Regular applications of mulch with a depth of 1-3" will discourage weeds.

TREATMENT SEQUENCE

1. Seedlings: Hand Pull or Trowel Tillage.
2. Mature Plant: Weed wack/ remove prior to owers setting seeds. or mow after owering, but before viable seed production cutting close to the ground to prevent resprouting (this may require removal of thick plant thatch in sensitive habitat areas); Remove viable seeds from mature plants.
3. Post-Emergent shall be applied by a licensed pest applicator only in areas with high density weed conditions, and only as directed by a park supervisor.

Plant Category	Leaf	Mature Size
Biennial to Perennial	Basal Rosetted, Pinnately Lobed	3'-3" Tall

Status	Weed	Season	Location
Weed	Yes	All Seasons	Occurs on mesa and along trails



Landscape Habit



Flower Cluster



Flower Bud

DRAFT

stinknet / Oncosiphon pilulifer

PREVENTION

- Cal-IPC Rating: High
- Remove weeds from site before ower and seed dispersal.
- Regular applications of mulch with a depth of 1-3" will discourage weeds.

TREATMENT SEQUENCE

1. Seedlings: Hand Pull or Trowel Tillage.
2. Mature Plant: Hand dig/remove all root material. Remove all viable seeds from mature plants.
3. Post-Emergent shall be applied by a licensed pest applicator only in areas with high density weed conditions, and only as directed by a park supervisor.

Plant Category	Leaf	Mature Size
Annual	Bipinnate or tripinnate	1-2' H x 1-2' W

Status	Weed	Season	Location
Weed	Yes	All Seasons	Disturbed areas, Fairview Park Channel



Landscape Habit



Plumes



Plume Detail

DRAFT

Fountaingrass / Pennisetum setaceum

PREVENTION

- Cal-IPC Rating: Moderate
- Remove weeds from site before ower and seed dispersal.
- Regular applications of mulch with a depth of 1-3" will discourage weeds.

TREATMENT SEQUENCE

1. Seedlings: Hand Pull or Trowel Tillage.
2. Mature Plant: Hand dig/remove as much of the plant material as possible. Remove all viable seeds from mature plants.
3. Post-Emergent shall be applied by a licensed pest applicator only in areas with high density weed conditions, and only as directed by a park supervisor.

Plant Category	Leaf	Mature Size
Perennial	Grass	3-5' H x 2-4' W

Status	Weed	Season	Location
Weed	Yes	Winter or Summer	Common in disturbed soils



Landscape Habit



Foliage



Flower

DRAFT

wild radish / Raphanus sativus

PREVENTION

- Cal-IPC Rating: Limited.
- Remove weeds from site before ower and seed dispersal.
- Regular applications of mulch with a depth of 1-3" will discourage weeds.

TREATMENT SEQUENCE

1. Seedlings: Hand Pull or Trowel Tillage.
2. Mature Plant: Hand dig/remove all rooting material. Weed wack/ remove prior to owers setting seeds.
Mow after owering, but before viable seed production cutting close to the ground to prevent resprouting.
3. Post-Emergent shall be applied by a licensed pest applicator only in areas with high density weed conditions, and only as directed by a park supervisor.

Plant Category	Leaf	Mature Size
Annual or Biennial	Compound, Lobed or unlobed but not separated into lea ets.	2' Tall

Status	Weed	Season	Location
Weed	Yes	All Seasons	Base of the earthen drain west blu area



Landscape Habit



Spikelet



Stem

DRAFT

castor bean / Ricinus communis

PREVENTION

- Cal-IPC Rating: Limited
- Remove weeds from site before ower and seed dispersal.
- Regular applications of mulch with a depth of 1-3" will discourage weeds.

TREATMENT SEQUENCE

1. Seedlings: Hand Pull or Trowel Tillage.
2. Mature Plant: Hand dig/remove all plant material. Remove all viable seeds from mature plants.
3. Post-Emergent shall be applied by a licensed pest applicator only in areas with high density weed conditions, and only as directed by a park supervisor.

Plant Category	Leaf	Mature Size
Perennial	Simple, palmate	6-10' H x 2-4' W

Status	Weed	Season	Location
Weed	Yes	All Seasons	Vernal pool watershed



Landscape Habit



Spikelet



Senescent plant

DRAFT

curly dock / Rumex crispus

PREVENTION

- Cal-IPC Rating: Limited
- Remove weeds from site before ower and seed dispersal.
- Regular applications of mulch with a depth of 1-3" will discourage weeds.

TREATMENT SEQUENCE

1. Seedlings: Hand Pull or Trowel Tillage.
2. Mature Plant: Hand dig/remove as much of the tap root as possible (minimum of 2 inches) to prevent resprouting.
3. Post-Emergent shall be applied by a licensed pest applicator only in areas with high density weed conditions, and only as directed by a park supervisor.

Plant Category	Leaf	Mature Size
Perennial	Alternate, long and narrow	1-5' H x 1-2' W

Status	Weed	Season	Location
Weed	Yes	All Seasons	Vernal pool watershed



Landscape Habit



Spikelet



Stem

DRAFT

tumbleweed / Salsola australis

PREVENTION

- Cal-IPC Rating: Locally invasive
- Remove weeds from site before ower and seed dispersal.
- Regular applications of mulch with a depth of 1-3" will discourage weeds.

TREATMENT SEQUENCE

1. Seedlings: Hand Pull or Trowel Tillage.
2. Mature Plant: Hand dig/remove as much of the tap root as possible before seed set.
3. Post-Emergent shall be applied by a licensed pest applicator only in areas with high density weed conditions, and only as directed by a park supervisor.

Plant Category	Leaf	Mature Size
Annual	Alternate, spine-tipped	1-3'H x 1-3'W

Status	Weed	Season	Location
Weed	Yes	All Seasons	Throughout Park



Landscape Habit



Spikelet



Stem

DRAFT

milk thistle / Silybum marianum

PREVENTION

- Cal-IPC Rating: Limited
- Remove weeds from site before ower and seed dispersal.
- Regular applications of mulch with a depth of 1-3" will discourage weeds.

TREATMENT SEQUENCE

1. Seedlings: Hand Pull or Trowel Tillage.
2. Mature Plant: Hand dig/remove as much of the root as possible. Remove all viable seeds from mature plants.
3. Post-Emergent shall be applied by a licensed pest applicator only in areas with high density weed conditions, and only as directed by a park supervisor.

Plant Category	Leaf	Mature Size
Annual/Biennial	Oblong to lanceolate, typically pinnately lobed	3-5' H x 2-4' W

Status	Weed	Season	Location
Weed	Yes	All Seasons	Common in disturbed soils



Landscape Habit



Spikelet



Stem

DRAFT

london rocket / Sisymbrium irio

PREVENTION

- Cal-IPC Rating: Limited
- Remove weeds from site before ower and seed dispersal.
- Regular applications of mulch with a depth of 1-3" will discourage weeds.

TREATMENT SEQUENCE

1. Seedlings: Hand Pull or Trowel Tillage.
2. Mature Plant: Hand dig/remove all rooting material or mow after owering, but before viable seed production cutting close to the ground to prevent resprouting. Remove all viable seeds from mature plants.
3. Post-Emergent shall be applied by a licensed pest applicator only in areas with high density weed conditions, and only as directed by a park supervisor.

Plant Category	Leaf	Mature Size
Annual	Oblanceolate to oblong basal	2' H x 1'W

Status	Weed	Season	Location
Weed	Yes	All Seasons	Vernal pool watershed



Landscape Habit



Spikes



Leaves

DRAFT

bu alobur / Solanum rostratum

PREVENTION

- Cal-IPC Rating: Locally invasive
- Remove weeds from site before ower and seed dispersal.
- Regular applications of mulch with a depth of 1-3" will discourage weeds.

TREATMENT SEQUENCE

1. Seedlings: Hand Pull or Trowel Tillage.
2. Mature Plant: Hand dig/remove as much of the root as possible.
3. Post-Emergent shall be applied by a licensed pest applicator only in areas with high density weed conditions, and only as directed by a park supervisor.

Plant Category	Leaf	Mature Size
Annual	Pinnately lobed	1-3' H x 1-3' W

Status	Weed	Season	Location
	Yes	Fall and Winter	Park



Landscape Habit



Foliage



Flower and Fruit

DRAFT

cheeseweed / Malva parvi ora

PREVENTION

- Remove weeds from site before ower and seed dispersal.
- Regular applications of mulch with a depth of 1-3" will discourage weeds.

TREATMENT SEQUENCE

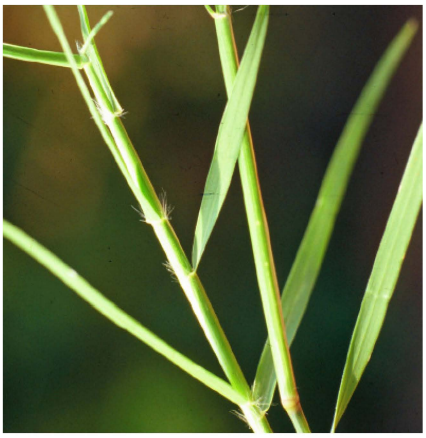
1. Seedlings: Hand Pull or Trowel /Hoe Tillage.
2. Plants rapidly develop long tap root, remove before plant has 4 true leaves.
3. Mature Plant: Weed wack / remove prior to owers setting seeds.
4. Post-Emergent shall be applied by a licensed pest applicator only in areas with high density weed conditions, and only as

Plant Category	Leaf	Mature Size
Annual	Alternate,	1'-8" Tall

Status	Weed	Season	Location
Weed	Yes	All Seasons	Park



Landscape Habit



Stem



Spikelet

DRAFT

Bermuda grass / Cynodon dactylon

PREVENTION

- Cal-IPC Rating: Moderate.
- Remove weeds from site before ower and seed dispersal.

TREATMENT SEQUENCE

1. Herbicide shall be applied by a licensed pest applicator and only as directed by a park supervisor.

Plant Category	Leaf	Mature Size
Perennial	Alternate	Stem 12" Tall, Blades

Status		Season Found	Location
Weed	Yes	Winter to Spring	Park



Landscape Habit


Flower


Foliage

Purslane / Portulaca oleracea

PREVENTION

- Remove weeds from site before ower and seed dispersal.
- Regular applications of mulch with a depth of 1-3" will discourage weeds.

TREATMENT SEQUENCE

1. Seedlings: Hand Pull or Trowel Tillage.
2. Mature Plant: Weed wack/ remove prior to owers setting seeds.
3. Post-Emergent shall be applied by a licensed pest applicator only in areas with high density weed conditions, and only as directed by a park

Plant Category	Leaf	Mature Size
Annual	Prostrate stems, eshy oval leaves	1' x 1'

Status		Season Found	Location
Weed	Yes	Winter to Summer	Park



Landscape Habit



Foliage



Foliage

Spotted spurge / Euphorbia maculata

PREVENTION

- Remove weeds from site before ower and seed dispersal.
- Regular applications of mulch with a depth of 1-3" will discourage weeds.

TREATMENT SEQUENCE

1. Seedlings: Hand Pull or Trowel Tillage. Wear gloves as sap can be a skin-irritant.
2. Mature Plant: Weed wack/ remove prior to owers setting seeds.
3. Post-Emergent shall be applied by a licensed pest applicator only in areas with high density weed conditions,

Plant Category	Leaf	Mature Size
Annual	Red Leaf Spot	3'H

FAIRVIEW PARK

Status		Season Found	Location
Weed	Yes	Year-Round	Park



Landscape Habit


Flower


Foliage

Sow thistle / Sonchus spp.

PREVENTION

- Remove weeds from site before ower and seed dispersal.
- Regular applications of mulch with a depth of 1-3" will discourage weeds.

TREATMENT SEQUENCE

1. Seedlings: Hand Pull or Trowel Tillage. Wear gloves as sap can be a skin-irritant.
2. Mature Plant: Weed wack/ remove prior to owers setting seeds.
3. Post-Emergent shall be applied by a licensed pest applicator only in areas with high density weed conditions,

Plant Category	Leaf	Mature Size
Annual	Leaves blueish -green	3'H

Status		Season Found	Location
Weed	Yes	Spring to Winter	Park



Landscape Habit



Flower



Foliage

DRAFT

Lambsquarters / Chenopodium album

PREVENTION

- Remove weeds from site before ower and seed dispersal.
- Regular applications of mulch with a depth of 1-3" will discourage weeds.

TREATMENT SEQUENCE

1. Seedlings: Hand Pull or Trowel Tillage. Wear gloves as sap can be a skin-irritant.
2. Mature Plant: Weed wack/ remove prior to owers setting seeds.
3. Post-Emergent shall be applied by a licensed pest applicator only in areas with high density weed conditions,

Plant Category	Leaf	Mature Size
Annual	Narrow, Oblong to lance shaped	5' H

Status		Season Found	Location
Weed	Yes	Spring to Summer	Park



Landscape Habit



Flower



Foliage

Creeping buttercup / Ranunculus repens

PREVENTION

Cal-IPC Rating: Limited
- Remove weeds from site before ower and seed dispersal.
- Regular applications of mulch with a depth of 1-3" will discourage weeds.

TREATMENT SEQUENCE

1. Seedlings: Hand Pull or Trowel Tillage. Wear gloves as sap can be a skin-irritant.
2. Mature Plant: Weed wack/ remove prior to owers setting seeds.
3. Post-Emergent shall be applied by a licensed pest applicator only in areas with high density weed conditions,

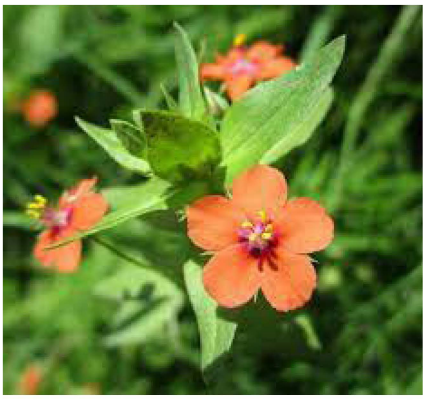
Plant Category	Leaf	Mature Size
Perennial	Edge of leaf blade has lobes/ teeth	1'H x 3'W

FAIRVIEW PARK

Status		Season Found	Location
Weed	Yes	Winter to Summer	Park



Landscape Habit



Flower



Foliage

DRAFT

Scarlet pimpernel / Anagallis arvensis

PREVENTION

- Remove weeds from site before ower and seed dispersal.
- Regular applications of mulch with a depth of 1-3" will discourage weeds.

TREATMENT SEQUENCE

1. Seedlings: Hand Pull or Trowel Tillage. Wear gloves as sap can be a skin-irritant.
2. Mature Plant: Hand dig/remove prior to owers setting seeds.
3. Post-Emergent shall be applied by a licensed pest applicator only in areas with high density weed conditions,

Plant Category	Leaf	Mature Size
Annual	Oval football shaped with	1'H

FAIRVIEW PARK

Status		Season Found	Location
Weed	Yes	Year Round	Park



Landscape Habit



Flower



Foliage

DRAFT

Common groundsel / Senecio vulgaris

PREVENTION

- Remove weeds from site before ower and seed dispersal.
- Regular applications of mulch with a depth of 1-3" will discourage weeds.

TREATMENT SEQUENCE

1. Seedlings: Hand Pull or Trowel Tillage. Wear gloves as sap can be a skin-irritant.
2. Mature Plant: Hand dig/remove prior to owers setting seeds.
3. Post-Emergent shall be applied by a licensed pest applicator only in areas with high density weed conditions,

Plant Category	Leaf	Mature Size
Annual	Deeply lobed with toothed margines	4" to 18" H

FAIRVIEW PARK

PART 3. NATIVE SPECIES IDENTIFICATION AND PROTECTION

A. Sensitive Species Protection
B. Native Plant Species Identi cation

DRAFT

Status	Season Found	Location
Native	All Seasons	Wetlands & South Lake Island



Landscape Habit



landscape Habit



Foliage

DRAFT

Salix lasiolepis / Arroyo Willow

PLANT CARE

Prune any dead or diseased branches as needed.

SUPPLEMENTAL IRRIGATION

None required.

Plant Category	Leaf	Mature Size
Tree: Round		15 - 30' Tall, 5 - 10' Spread

FAIRVIEW PARK

Status	Season Found	Location
Native	All Seasons	Wetlands





Flower



Foliage

DRAFT

Anemopsis california / Yerba Mansa

PLANT CARE

None required.

SUPPLEMENTAL IRRIGATION

None required.

Plant Category	Leaf	Mature Size
Perennial	Deciduous, Flowering in Spring, Summer, Fall	6″Tall, 2″-12″

Status	Season Found	Location
Native	All Seasons	South Lake Island



Landscape Habit



Foliage



Flower

DRAFT

Baccharis salicifolia / Mule Fat

PLANT CARE

None required.

SUPPLEMENTAL IRRIGATION

None required.

Plant Category	Leaf	Mature Size
Shrub	Evergreen	3'-10' Tall and

Status	Season Found	Location
Native	All Seasons	Wetlands



Landscape Habit



Flower



Foliage

DRAFT

Eleocharis macrostachya / Common Spikerush

PLANT CARE

None required.

SUPPLEMENTAL IRRIGATION

None required.

Plant Category	Leaf	Mature Size
Rush	Evergreen	1'Tall and Wide, Will Spread

Status	Season Found	Location
Native	All Seasons	Wetlands and South Lake Island



Landscape Habit



Flower



Foliage

DRAFT

Juncus acutus / Spiny Rush

PLANT CARE

None required.

SUPPLEMENTAL IRRIGATION

None required.

Plant Category	Leaf	Mature Size
Rush	Evergreen	2' Tall, 3' - 5' Spread

Status	Season Found	Location
Native	All Seasons	Wetlands



Landscape Habit



Flower



Foliage

DRAFT

Pluchea odorata / Salt Marsh Flea-bane

PLANT CARE

None required.

SUPPLEMENTAL IRRIGATION

None required.

Plant Category	Leaf	Mature Size
Perennial	Herbaceous, Deciduous	2' - 3' Tall and Wide

Status	Season Found	Location
Native	All Seasons	Wetlands and South Island



Landscape Habit



Flower



Foliage

DRAFT

Juncus e usus / Common Rush

PLANT CARE

None required.

SUPPLEMENTAL IRRIGATION

None required.

Plant Category	Leaf	Mature Size
Rush	Evergreen	2' - 3' Tall and Wide

Status	Season Found	Location
Native	All Seasons	Wetlands



Landscape Habit



Flower



Foliage

DRAFT

Schoenoplectus martimus / Sea-side Bulrush

PLANT CARE

None required.

SUPPLEMENTAL IRRIGATION

Plant Category	Leaf	Mature Size
Ornamental Grass	Evergreen	3 - 6'Tall and Wide

Status	Season Found	Location
Native	All Seasons	Wetlands



Landscape Habit



Landscape Habit



Foliage

DRAFT

Typha domingensis / Southern Cat-tail

PLANT CARE

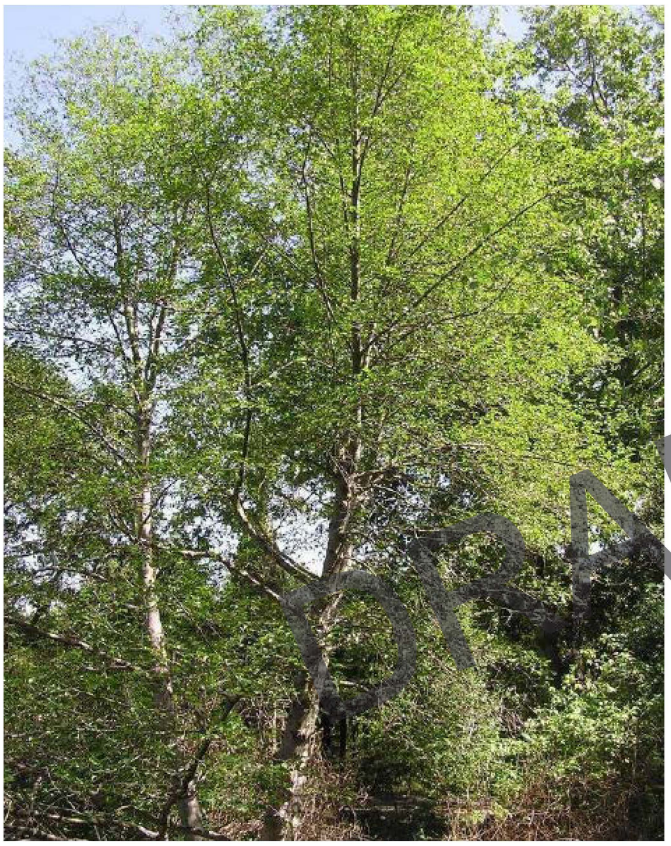
None required.

SUPPLEMENTAL IRRIGATION

None required.

Plant Category	Leaf	Mature Size
Perennial	Evergreen, Flowering in Spring and Summer	6 - 12' Tall & Wide, Will Spread

Status	Season Found	Location
Native	All Seasons	Play Area



Landscape Habit



Foliage



Fruit

DRAFT

Alnus rhombifolia / California White Alder

PLANT CARE

Prune any dead or diseased branches.
Prune any suckers or watersprouts from the base of the tree trunk.

DISEASE AND PEST

Winter: Polyphagous shothole borer - Ambrosia beetle which vectors Fusarium. Check bark for any oozing or tiny holes. Treat as directed.

Spring: Tent Catepillars (Malacosoma) - Check for nesting and treat as directed.

Summer & Fall: Bronze Birch Borer (Agrilus anxius)

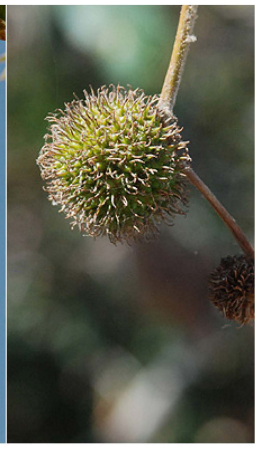
Plant Category	Leaf	Mature Size
Tree, Pyramidal		50'-75' Tall, 30'-

Status	Season Found	Location
Native	All Seasons	Throughout the Park



Landscape Habit





Fruit



Foliage

DRAFT

Platanus racemosa / Western Sycamore

PLANT CARE

Prune any dead or diseased branches.
Prune any suckers or watersprouts from the base of the tree trunk.
Prune lower branches as needed to maintain form and a clear canopy adjacent to walkways. Prune branches per proper pruning techniques to thin canopy for wind resistance.

DISEASE AND PEST

Winter: Polyphagous shothole borer - Ambrosia beetle which vectors Fusarium.
Check bark for any oozing or tiny holes. Treat as directed.

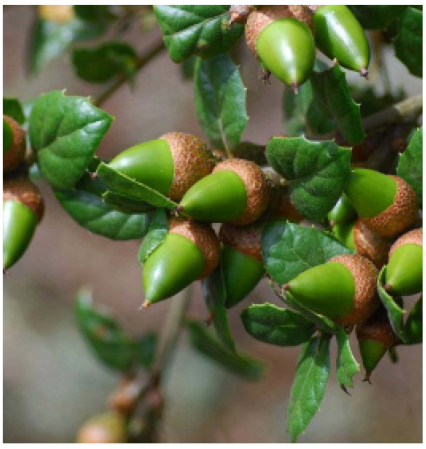
Spring: Anthracnose - Fungal disease that causes early summer browning of foliage. Apply fungicial spray as leaves unfold and per directed. Remove spent leaves to prevent spores from spreading. Clean pruning shears with

Plant Category	Leaf	Mature Size
Tree, Umbrella/ Round/		40'-60' Tall, 30'

Status	Season Found	Location
Native	All Seasons	Throughout the Park



Landscape Habit



Acorn



Foliage

DRAFT

Quercus agrifolia / Coast Live Oak

PLANT CARE

Prune only as required to encourage healthy tree development.

DISEASE AND PEST

Winter: Polyphagous shothole borer - Ambrosia beetle which vectors Fusarium. Check bark for any oozing or tiny holes. Treat as directed.

Spring: Monitor for cankers, beetles, oak moth larvae, and
gall wasps. Treat as needed.

Plant Category	Leaf	Mature Size
Tree: Umbrella, Round		20'-70' Tall and

Status	Season Found	Location
Native	All Seasons	California Native Planting Areas



Landscape Habit



Flower



Foliage

DRAFT

Artemisia californica / California Sagebrush

PLANT CARE

Regularly hand weed as needed to remove common garden weeds before they ower and set seed.

After plants are established, no supplemental irrigation is required during an average or greater rainfall year. During a below-average rainfall year (less than ~15 inches of total annual rainfall), supplemental irrigation can be applied in

DISEASE AND PEST

Pesticides or herbicides is not recommended to be used in California Native planting areas.

Continually monitor and adjust irrigation watering intervals and duration.
Plant disease is typically caused by waterlogged soils or overwatering during summer.

Plant Category	Leaf	Mature Size
Shrub	Semi-Evergreen	1'-4' Tall, 4'

Status	Season Found	Location
Native	All Seasons	California Native Planting Areas



Landscape Habit


Landscape Habit, Summer


Landscape Habit, Winter

Aristida purpurea / Purple Three-awn

PLANT CARE

Regularly hand weed as needed to remove common garden weeds before they ower and set seed.

Plant does not need to be pruned back or trimmed.

After plants are established, no supplemental irrigation is required during an average or greater rainfall year. During a below-average rainfall year (less than ~15 inches of total annual rainfall), supplemental irrigation can be applied in

DISEASE AND PEST

Pesticides or herbicides is not recommended to be used in California Native planting areas.

Continually monitor and adjust irrigation watering intervals and duration.

Plant Category	Leaf	Mature Size
Ornamental Grass: Upright	Deciduous	2' Tall and Wide

FAIRVIEW PARK

Status	Season Found	Location
Native	Spring, Summer,	California Native Planting Areas



Landscape Habit



Flower



Flower

Asclepias speciosa / Showy Milk-weed

PLANT CARE

Regularly hand weed as needed to remove common garden weeds before they ower and set seed.

After plants are established, no supplemental irrigation is required during an average or greater rainfall year. During a below-average rainfall year (less than ~15 inches of total annual rainfall), supplemental irrigation can be applied in

DISEASE AND PEST

Pesticides or herbicides is not recommended to be used in California Native planting areas.

Continually monitor and adjust irrigation watering intervals and duration.
Plant disease is typically caused by waterlogged soils or overwatering during summer.

Plant Category	Leaf	Mature Size
Perennial	Deciduous	3'Tall and Wide

Status	Season Found	Location
Native	All Seasons	California Native Planting Areas



Landscape Habit



Flower



Foliage

DRAFT

Encelia californica / California brittlebush

PLANT CARE

Regularly hand weed as needed to remove common garden weeds before they ower and set seed.

After plants are established, no supplemental irrigation is required during an average or greater rainfall year. During a below-average rainfall year (less than ~15 inches of total annual rainfall), supplemental irrigation can be applied in

DISEASE AND PEST

Pesticides or herbicides is not recommended to be used in California Native planting areas.

Continually monitor and adjust irrigation watering intervals and duration.

Plant Category	Leaf	Mature Size
Perennial	Deciduous, Flowering in Spring	3'-4' Tall and Wide

Status	Season Found	Location
Native	All Seasons	California Native Planting Areas



Landscape Habit



Flower



Foliage

DRAFT

Eriogonum fasciculatum / Eriogonum fasciculatum

PLANT CARE

Dried seed heads in fall can be left on the plant as it's a important food source for wildlife.

Regularly hand weed as needed to remove common garden weeds before they ower and set seed.

After plants are established, no supplemental irrigation is

DISEASE AND PEST

Pesticides or herbicides is not recommended to be used in California Native planting areas.

Continually monitor and adjust irrigation watering intervals and duration.
Plant disease is typically caused by waterlogged soils or overwatering during summer.

Plant Category	Leaf	Mature Size
Shrub	Evergreen, Flowering in Spring and Summer	3'-4' Tall and Wide

FAIRVIEW PARK

Status	Season Found	Location
Native	All Seasons	California Native Planting Areas



Landscape Habit


Flower


Foliage

Isocoma menziesii / Coastal Golden Bush

PLANT CARE

Regularly hand weed as needed to remove common garden weeds before they ower and set seed.

After plants are established, no supplemental irrigation is required during an average or greater rainfall year. During a below-average rainfall year (less than ~15 inches of total annual rainfall), supplemental irrigation can be applied in

DISEASE AND PEST

Pesticides or herbicides is not recommended to be used in California Native planting areas.

Continually monitor and adjust irrigation watering intervals and duration.

Plant Category	Leaf	Mature Size
Shrub	Evergreen, Flowering in Spring through Fall	3'Tall and Wide

Native	Season Found All Seasons	Location Throughout the Park



Landscape Habit



Leaves



Flower Detail

Muhlenbergia rigens / Deer Grass

PLANT CARE

Late Winter (End of February): Pull out any dead stalks or blades with a rake.
Prune hard 6" to 8" from the ground, late winter/early spring.

Plant Category Ornamental Grass	Leaf Evergreen	Mature Size 4'-5' Wide and Tall

FAIRVIEW PARK

Status	Season Found	Location
Native	All Seasons	California Native Planting Areas



Landscape Habit



Flower



Foliage

DRAFT

Peritoma arborea / Bladderpod

PLANT CARE

Regularly hand weed as needed to remove common garden weeds before they ower and set seed.

After plants are established, no supplemental irrigation is required during an average or greater rainfall year. During a below-average rainfall year (less than ~15 inches of total annual rainfall), supplemental irrigation can be applied in

DISEASE AND PEST

Pesticides or herbicides is not recommended to be used in California Native planting areas.

Continually monitor and adjust irrigation watering intervals and duration.

Plant Category	Leaf	Mature Size
Shrub	Evergreen, Flowering in Spring through Fall	3'Tall and Wide

Status	Season Found	Location
Native	All Seasons	California Native Planting Areas



Landscape Habit



Landscape Habit



Foliage

Salvia apiana / White Sage

PLANT CARE

Regularly hand weed as needed to remove common garden weeds before they ower and set seed.

After plants are established, no supplemental irrigation is required during an average or greater rainfall year. During a below-average rainfall year (less than ~15 inches of total annual rainfall), supplemental irrigation can be applied in

DISEASE AND PEST

Pesticides or herbicides is not recommended to be used in California Native planting areas.

Continually monitor and adjust irrigation watering intervals and duration.

Plant Category	Leaf	Mature Size
Perennial	Evergreen, Flowering in Summer	3 - 4'Tall and Spread, 5'Tall

Status	Season Found	Location
Native	All Seasons	California Native Planting Areas



Landscape Habit



Flower



Foliage

Salvia clevelandii / Cleveland Sage

PLANT CARE

Regularly hand weed as needed to remove common garden weeds before they ower and set seed.

After plants are established, no supplemental irrigation is required during an average or greater rainfall year. During a below-average rainfall year (less than ~15 inches of total annual rainfall), supplemental irrigation can be applied in

DISEASE AND PEST

Pesticides or herbicides is not recommended to be used in California Native planting areas.

Continually monitor and adjust irrigation watering intervals and duration.

Plant Category	Leaf	Mature Size
Perennial	Evergreen, Flowering in Spring and Summer	3 - 4'Tall and Wide

Status	Season Found	Location
Native	All Seasons	California Native Planting Areas



Landscape Habit



Flower



Foliage

Salvia leucophylla / Purple Sage

PLANT CARE

Regularly hand weed as needed to remove common garden weeds before they ower and set seed.

After plants are established, no supplemental irrigation is required during an average or greater rainfall year. During a below-average rainfall year (less than ~15 inches of total annual rainfall), supplemental irrigation can be applied in

DISEASE AND PEST

Pesticides or herbicides is not recommended to be used in California Native planting areas.

Continually monitor and adjust irrigation watering intervals and duration.

Plant Category	Leaf	Mature Size
Shrub	Evergreen, Flowering in Spring and Summer	3'-4' Tall and Wide

FAIRVIEW PARK

Status	Season Found	Location
Native	All Seasons	California Native Planting Areas



Landscape Habit


Flower


Foliage

Salvia mellifera / Black Sage

PLANT CARE

Regularly hand weed as needed to remove common garden weeds before they ower and set seed.

After plants are established, no supplemental irrigation is required during an average or greater rainfall year. During a below-average rainfall year (less than ~15 inches of total annual rainfall), supplemental irrigation can be applied in

DISEASE AND PEST

Pesticides or herbicides is not recommended to be used in California Native planting areas.

Continually monitor and adjust irrigation watering intervals and duration.

Plant Category	Leaf	Mature Size
Shrub	Evergreen, Flowering in Spring and Summer	1'-3' Tall, 1'-2'

FAIRVIEW PARK

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Appendix 1

Long-Term Invasive Plant Management Plan for Fairview Park

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1 LONG-TERM INVASIVE PLANT CONTROL PLAN

This Long-Term Invasive Plant Management Plan aims to provide the City of Costa Mesa with a strategic approach to controlling invasive plant species, ensuring the preservation of valuable biological resources within Fairview Park. Numerous nonnative species are present in Fairview Park, but this plan prioritizes the management of high-priority invasive species that pose substantial threats to native habitat functionality and biodiversity. Invasive plants were identified in the park during the 2023 biological surveys and assessments conducted for the development of the Fairview Park Master Plan Update.

Cultural artifacts of significance are present within the soil profile across various areas of the park. The invasive plant control methods outlined in this plan typically do not cause significant soil disturbance. However, in instances where substantial digging is necessary to remove a perennial high-priority invasive weed, the City should consult its records to determine the likelihood of encountering culturally significant materials in the affected area.

In cases where culturally significant materials are likely to be present, the City shall engage an appropriate cultural monitor during all ground-disturbing activities to ensure the protection of in-situ cultural resources. It is important to note that cutting or pulling roots of plants from the topsoil does not require the presence of a cultural monitor.

This approach ensures that our efforts to manage invasive plants are balanced with the preservation of culturally significant materials, promoting responsible stewardship of both natural and cultural resources within the park.

1.1 GOALS AND OBJECTIVES

The primary goal of this plan is to preserve the ecological balance within Fairview Park by focusing on invasive plant management.

Key objectives include:

1. Preventing excessive biomass production from invasive plants to protect native species and maintain biodiversity.
2. Controlling invasive plant populations before they produce viable seeds to ensure long-term control and reduce their negative impact on wildlife habitats and native plant recruitment.
3. Prioritizing management efforts for invasive species that pose the greatest threat to the park's biological resources, given limited resources available for annual control.

Specific goals for controlling high-priority invasive plants in sensitive habitat areas and fuel management zones (FMZ) include:

SENSITIVE HABITAT AREAS

1. In case of limited resources, first prioritize invasive weed control efforts in or near existing sensitive habitat areas.
2. Address smaller infestations of the most invasive weed species before controlling larger, more widespread, and ubiquitous weeds, especially if they risk spreading into high-quality habitats. In general, prioritize the removal of small populations of highly invasive species or species new to the area.
3. Implement management strategies to reduce disturbances (e.g., off-leash dogs, trash dumping, off-trail hiking) within the park.
4. Close unnecessary or unauthorized trails to minimize disturbance frequency and additional avenues for weed invasion into areas with sensitive native habitats.

FUEL MANAGEMENT ZONES

1. Apply weed abatement and fuel management techniques in areas that require wildfire risk reduction, ensuring they align with the protection of sensitive habitats and native-rich areas.
2. Utilize methods outlined in this plan to control target invasive species, taking care to prevent their spread within sensitive habitats and other natural areas of the park.
3. Employ weed abatement methods that do not disturb the soil, avoiding practices like tilling that maintain high disturbance regimes, promoting disturbance-adapted nonnative weeds, which act as dry, flashy fuel sources during summer and fall fire seasons.
4. Time weed abatement efforts to control fuel modification areas before weed seed set, managing fuel loads while simultaneously reducing nonnative weed seed contributions to the soil.

1.2 MANAGEMENT APPROACH

This plan is based on the framework presented in the invasive plant land management guide developed by the USFWS in collaboration with the California Invasive Plant Council (Cal-IPC) in the Land Manager's Guide to Developing and Invasive Plant Management Plan (USFWS, Cal-IPC, 2018). By focusing on high-priority invasive plants and implementing a strategic approach, the plan aims to maintain the park's ecological balance and promote the long-term control of invasive species. This plan consists of eight main steps:

1. Identify target invasive plants present in the park.
2. Prioritize the level of control based on invasive plant location and density to maximize protection of sensitive resources.
3. Follow biological resource protection measures to avoid impacts to sensitive and protected species.

4. Conduct annual invasive plant surveys to guide treatment timing and methods.
5. Time invasive plant control treatments to maximize control and avoid impacts to sensitive habitats and species.
6. Follow biosecurity procedures to prevent the spread of invasive plants.
7. Use the appropriate invasive plant control methods.
8. Conduct effectiveness monitoring and reporting to track invasive plant populations and guide recommendations for the following year.

1.2.1 Adaptive Management

Invasive plant control will be implemented using an adaptive management approach, which enables adjustments in response to observations, site conditions, best available treatment methods, efficacy of previous control measures, and annual weather variations. Adaptive management provides a flexible framework to address the complexities of invasive plant management and respond to feedback from regular monitoring.

Several fluctuating variables can impact the success of invasive plant control programs, including weather, fire events, intense rainfall, nonnative species distribution, and adjacent land management activities. Monitoring is a critical aspect of adaptive management and is necessary for tracking changes over time, assessing the effectiveness of control methods, and ensuring the protection of Fairview Park's sensitive biological resources.

Existing knowledge and experience, combined with new observations, will inform management adjustments while maintaining the plan's overall goals. Factors such as historic disturbance levels, invasive species density, soil complexity, and proximity to native habitats may require adapting strategies accordingly. The methods described in this plan will be used in various combinations, considering field conditions, weather, and monitoring results.

Adaptive management decisions will be based on experience from previous weed control treatments within the park or other relevant areas, new knowledge from reputable sources on alternative effective treatments, and new target invasive species discovered during early detection surveys. Additionally, any invasive plant control methods in this plan may be superseded by approved restoration plans for the park. For instance, opportunistic control species, such as five horn bassia (*Bassia hyssopifolia*), may be better controlled through a holistic weed management approach implemented as part of a restoration project.

The described invasive plant control methods can be amended as needed to accommodate improved methods or opportunities.

1.2.2 Access

The existing network of trails and fire roads can be used to access most of Fairview Park and shall be used for access to the invasive plant populations targeted for control. In

general, access within the invasive plant control areas for weed control shall be by foot. This is to protect sensitive resources to prevent harm to native plant and animal species, damaging impacts to the soil such as compaction, and to prevent the unintentional spread of invasive and nonnative weed seed that can be moved around by vehicles.

Some areas have difficult access due to steep terrain or dense vegetation. Park crews shall be used for invasive species control in these areas as well as during sensitive times of the year, such as the bird breeding season, to ensure that necessary biological protection measures are followed (Section 1.5). As opportunities arise for volunteer weeding events that may include control of the target invasive species recommended for control in this plan, areas for volunteer weeding efforts should be carefully selected to safeguard the safety of participants.

1.2.3 Volunteer Opportunities

Volunteer participation in mechanical control techniques that do not require heavy equipment, such as chainsaws or mowers, can be facilitated through organized events supervised by a trained "weed management leader." These leaders should be knowledgeable in identifying target weeds and common native species in the area, as well as experienced in effective mechanical treatment methods to demonstrate proper weeding techniques for volunteers.

To maximize the effectiveness of these events, selected sites should be easily accessible, located near existing trails or roads, and have manageable slopes. Focusing on a single target species per event can simplify identification, enabling volunteers to contribute more effectively to invasive plant control efforts.

1.3 HIGH-PRIORITY INVASIVE PLANTS

Due to limited resources, management efforts should focus on controlling invasive species that pose the greatest threat to the park's biological resources. Priority should be given to protecting sensitive habitat areas and high investment areas, such as restoration sites or locations where extensive efforts have already been made to control invasive species. Continued efforts in these areas will likely be necessary until invasive species are eradicated, and habitat restoration goals for the area are met.

Plant species list generated during surveys and assessments for the Fairview Park Master Plan Update were the basis for determining the high-priority invasive species targeted for control. The species are all Cal-IPC rated invasive plants species or locally invasive plants that are a threat to sensitive habitat areas in Fairview Park. Table 1-1 presents the high-priority invasive plants, Cal-IPC rating, and growth characteristics. Table 1-2 presents the general location where the high-priority invasive plants occur and the level of control targeted.

Table 1-1 High-Priority Invasive Plants for Long-Term Management

Scientific Name	Common Name	Cal-IPC Rating*	Bloom Period	Lifeform	Duration	Methods of Reproduction
Arundo donax	Giant reed	High	May to June	Grass	Perennial	Vegetative; roots, rhizomes, stems with nodes
Atriplex semibaccata	Australian saltbush	Moderate	April to Dec.	Subshrub	Perennial	Seed
Bassia hyssopifolia	Five horn bassia	Limited	June to July	Herbaceous	Annual	Seed
Brachypodium distachyon	Purple false brome	Moderate	April to July	Grass	Annual/Perennial	Seed
Brassica nigra	Black mustard	Moderate	April to July	Herbaceous	Annual	Seed
Bromus diandrus	Ripgut brome	Moderate	April to June	Grass	Annual	Seed
Carduus pycnocephalus	Italian thistle	Moderate	Feb. to July	Herbaceous	Annual	Seed
Carduus tenuiflorus	Slender flowered thistle	Limited	April to Aug.	Herbaceous	Annual	Seed
Cirsium vulgare	Bull thistle	Moderate	July to Sep.	Herbaceous	Perennial	Seed
Conium maculatum	Poison hemlock	Moderate	April to Se.	Herbaceous	Biennial	Seed
Cynara cardunculus	Artichoke thistle	Moderate	April to July	Herbaceous	Perennial	Seed
Echium candicans	Pride of Madeira	Limited	Feb. to Oct.	Shrub	Perennial	Seed
Foeniculum vulgare	Sweet fennel	Moderate	May to Sep.	Herbaceous	Perennial	Primarily seed; occasionally vegetatively from root and crown fragments
Glebionis coronaria	Crown daisy	Limited	March to July	Herbaceous	Annual	Seed
Hirschfeldia incana	Shortpod mustard	Moderate	Year Round	Herbaceous	Perennial	Seed
Oncosiphon pilulifer	Stinknet	High	March to July	Herbaceous	Annual	Seed
Pennisetum setaceum	Fountaingrass	Moderate	July to Aug.	Grass	Perennial	Seed
Raphanus sativus	Wild radish	Limited	Feb. to July	Herbaceous	Annual/Biennial	Seed
Ricinus communis	Castor bean	Limited	Year Round	Shrub	Perennial	Primarily seed; occasionally vegetatively from root and stem fragments
Rumex crispus	Curly dock	Limited	Year Round	Herbaceous	Perennial	Seed
Salsola australis	Russian thistle	Locally Invasive	March to Jan.	Herbaceous	Annual	Seed
Silybum marianum	Milk thistle	Limited	April to July	Herbaceous	Annual/Biennial	Seed
Sisymbrium irio	London rocket	Limited	Jan. to April	Herbaceous	Annual	Seed
Solanum rostratum	Buffalobur	Locally Invasive	May to Sep.	Herbaceous	Annual	Seed

** "Locally Invasive" is not a Cal-IPC rating, but Land IQ has identified these species as locally invasive with ecological impacts on sensitive biological resources in Fairview Park.*

Table 1-2 High-Priority Invasive Plant Eradication or Containment Priorities Parkwide or in Sensitive Habitat Areas: Vernal Pool Watershed (VPW) and Wetlands, Coastal Sage Scrub (CSS), and Riparian Habitat Areas (WRA).

Scientific Name	Common Name	General Location in Fairview Park	ERADICATE			CONTAIN	
			VPW	WRA/CSS	Parkwide	VPW	Parkwide
Arundo donax	Giant reed	Drainages on the west bluff		X	X		
Atriplex semibaccata	Australian saltbush	Nonnative annual grasslands and trail edges	X				X
Bassia hyssopifolia	Five horn smotherweed	Vernal pool watershed, moist disturbed soils				X	
Brachypodium distachyon	Purple false brome	Vernal pool watershed, nonnative annual grasslands	X	X	X		
Brassica nigra	Black mustard	Common on slopes and on imported fill material	X				X
Bromus diandrus	Ripgut brome	Nonnative annual grassland, disturbed areas	X				
Carduus pycnocephalus	Italian thistle	Poison hemlock patches, riparian and wetland areas	X	X	X		
Carduus tenuiflorus	Slender flowered thistle	Poison hemlock patches, riparian and wetland areas	X	X	X		
Cirsium vulgare	Bull thistle	Riparian and wetland areas, disturbed areas	X	X	X		
Conium maculatum	Poison hemlock	North facing bluff slopes and west bluff drain		X	X		
Cynara cardunculus	Artichoke thistle	Nonnative annual grassland with clayey soils			X		
Echium candicans	Pride of Madeira	Landscaped areas			X		
Foeniculum vulgare	Sweet fennel	Throughout Park	X	X	X		
Glebionis coronaria	Crown daisy	Vernal pool watershed, fuel modification zones	X				X
Hirschfeldia incana	Shortpod mustard	Occurs on mesa	X				X
Oncosiphon pilulifer	Stinknet	Occurs on mesa and along trails	X				X
Pennisetum setaceum	Fountaingrass	Disturbed areas, Fairview Park Channel			X		
Raphanus sativus	Wild radish	Common in disturbed soils	X				X
Ricinus communis	Castor bean	Base of the earthen drain west bluff area			X		
Rumex crispus	Curly dock	Vernal pool watershed	X				X
Salsola australis	Tumbleweed	Vernal pool watershed	X				X
Silybum marianum	Milk thistle	Throughout Park			X		
Sisymbrium irio	London rocket	Common in disturbed soils	X				X
Solanum rostratum	Buffalobur	Vernal pool watershed	X				

ERADICATE = Complete removal of the invasive plant population and monitoring to ensure that is does not reestablish.
CONTAIN = Eradication is not practical, feasible, or necessary but the invasive plant population should be managed to contain its current population size until the habitat can be restored or otherwise enhanced, and to prevent the spread of the invasive plant to another sensitive habitat in Fairview Park.
Sensitive Habitat Areas = CSS Areas that have potential for nesting coastal California gnatcatcher nesting, and all riparian and wetland areas, including vernal pools.

1.3.1 Level of Control

The key to effective management is consistent and structured approaches for prioritizing monitoring, control, and eradication of invasive species. The approach for invasive species control presented in this plan is based on the knowledge that not all invasive species can be eradicated from the Park but may only be controllable in portions of the Park, such as sensitive habitats, or localized small populations, and larger more established populations may only feasibly be controlled to stop their spread.

The plan identifies three levels of control effort for target invasive species to ensure efficient management and protection of sensitive habitats and species. These levels include:

- **Parkwide Eradication**: High-priority invasive species with the most significant potential to harm sensitive habitats and species are targeted for complete eradication from the park. Feasibility assessments consider the extent of the species' spread, and the costs associated with control efforts.
- **Containment Control**: For well-established and ubiquitous invasive species, complete eradication may be challenging and cost prohibitive. Control efforts should focus on areas susceptible to species spread, such as access trails, roads, and locations subject to annual disturbances like fuel modification zones or grassy areas near Placentia Avenue.
- **Opportunistic Control**: Invasive species rated by Cal-IPC that are present within the park but may be costly to eradicate or contain fall under opportunistic control. Control measures for these species should be implemented when populations overlap with treatment areas for other high-priority species and resources permit.

1.4 PRIORITIZATION OF INVASIVE PLANT CONTROL AREAS

Control of high-priority invasive plants will be carried out in a phased approach, with the highest priority given to sensitive habitat areas (Priority 1 Control Areas). As time and resources permit, control efforts will expand to all other natural areas within the park, designated as Priority 2 Control Areas (Figure 1-1).



Figure 1-1 High-Priority Invasive Plant Control Priority Areas.

1.4.1 Priority 1 Control Areas

Priority 1 Control Areas encompass the following sensitive habitat areas:

1. Vernal pool watersheds, including vernal pools, which support rare plants and sensitive aquatic resources like the federally endangered San Diego fairy shrimp (*Branchinecta sandiegonensis*) and Riverside fairy shrimp (*Streptocephalus woottoni*)
2. Suitable coastal sage scrub habitat for the federally threatened and state Species of Special Concern, coastal California gnatcatcher (*Polioptila californica californica)* (CAGN)
3. Suitable riparian habitat for the state and federally endangered, Least Bell's vireo (*Vireo bellii pusillus*) (LBV)

1.4.2 Priority 2 Control Areas

Priority 2 Control Areas include:

1. Fuel Modification Zones
2. Areas within the historic vernal pool watershed that are covered by improper fill material or disconnected hydrologically from the vernal pools by the improper fill material; these areas are identified for future habitat restoration, including removal of the fill material to restore the historic vernal pool watershed
3. All other natural areas within the park

Control efforts should initially target Priority 1 Control Areas, with the primary goal of eradicating specified target invasive plant species. Once treatment in Priority 1 areas is complete, remaining resources should be allocated to managing invasive species in Priority 2 Control Areas.

In cases where target invasive species populations are small or pose a significant threat to the park's natural areas and sensitive biological resources, parkwide eradication is the goal. If eradication is not feasible or necessary, such as when populations are widespread within the park and surrounding areas, containment and long-term control are the primary objectives.

FUEL MODIFICATION ZONES

Fuel Modification Zones (FMZ) are managed to minimize fire risk to buildings and provide firefighters with a defensible space during fire events. The 100-ft FMZ requirement set by OCFA is primarily maintained along the park's property line adjacent to habitable structures. Currently, these areas are dominated by nonnative annual grasses and forbs, with annual mowing during the summer season to manage fire risk while preserving nonnative plant dominance.

Several high-priority invasive plants are present within the FMZs, including black mustard (*Brassica nigra*), short pod mustard (*Hirschfeldia incana*), and crown daisy (*Glebionis coronaria*). These species should be controlled at the appropriate time of the

year, as outlined in Section 1.7, to ensure effective management. This may necessitate conducting control efforts at different times than fuel modification activities. If control is not feasible during the optimal treatment periods due to resource constraints, the seed and vegetative reproductive material of invasive species should be carefully bagged and removed from the FMZs to prevent their spread into adjacent natural areas of the park.

Annual surveys conducted by a qualified plant biologist during treatment, monitoring, or early detection efforts should include FMZs to identify any new invasive species requiring control or known invasive species that are encroaching on the FMZs.

Opportunities may arise to collaborate with OCFA on alternative fuel modification strategies that fulfill fuel reduction objectives, such as horizontal and vertical fuel breaks or trimming of dead standing vegetation. These strategies could incorporate desirable native species to replace current nonnative species, thereby enhancing wildlife habitat quality and reducing the spread of undesirable invasive species within the park.

1.5 BIOLOGICAL RESOURCE PROTECTION

The primary goal of the invasive plant control plan is to protect the natural resources within the park. This section outlines measures to minimize potential adverse impacts on:

1. Protected, sensitive, or locally rare plant and wildlife species
2. Nesting birds in or near treatment areas

When feasible, conduct invasive species control, including physical and chemical methods, outside the avian breeding season to limit impacts on sensitive species and biological resources in Fairview Park.

Although it is recommended to implement control measures outside the nesting season whenever possible, certain high-priority invasive plants may require control during the nesting season for effective management. The following resource protection measures should be implemented during the nesting season:

1. Schedule vegetation removal outside the nesting season (nesting seasons are as follows: February 15 to August 15 for songbirds; January 15 to August 15 for raptors; February 15 to August 31 for CAGN; and March 1 to September 15 for LBV) when possible.
2. If vegetation removal must occur during the nesting season, conduct thorough surveys for nesting birds in all suitable habitats prior to vegetation clearing activities. Surveys should be performed by a permitted and approved biologist. Raptor nesting surveys are only necessary in potential raptor nesting habitats, such as the park's existing riparian areas.

Successful implementation of the invasive plant management plan will enhance the quality and availability of nesting habitat for native and migratory birds. However, precautions must be taken to protect nesting birds throughout the process.

1.5.1 General Protective Measures

The following are general protective measures that shall be implemented during invasive weed control activities.

Weed Control Hours: Weed control activities will be limited to daylight hours.

Work Area and Staging: Equipment staging, such as for vehicle parking, equipment storage, or waste bin storage, will be restricted to the smallest area practicable in designated work areas, routes, temporary interior access, or the limits of existing roadways/pathways.

Environmentally Sensitive Areas and/or Exclusion: Where appropriate, fencing, flagging, or biological monitoring will be used to minimize or avoid disturbance to environmentally sensitive areas and listed species habitat which will include patches of coastal sage scrub, the vernal pool watershed, riparian, and other sensitive habitats.

Invasive Species: The spread or introduction of nonnative, invasive species will be avoided. Invasive plant material will be removed using approved protocols and disposed of at an appropriate upland disposal or compost area in a manner that will not promote their spread. The project will use weed free erosion control materials such as burlap rice straw wattles and certified weed-free mulch, if needed.

Equipment Maintenance and Materials Storage: Vehicle traffic will be confined to existing roads and trailways. All machinery must be in good working condition, showing no signs of fuel or oil leaks. Oil, grease, or other fluids will be washed off at off-site designated wash stations prior to entering the site. Inspection and evaluation for the potential for fluid leakage will be performed daily prior to use. All fuel and chemical storage, servicing, and refueling will be done in the designated staging area or other suitable location with secondary containment to prevent spills from traveling to surface water or drainages.

Herbicide Handling: All herbicide mixing shall occur in designated work staging areas and conducted in such a manner as all potential spills shall be captured in containment bins. Herbicide mixing shall not occur within 100 feet of an open body of water. Filling of spray backpacks shall be done in containment bin to collect any potential spills. Park crews shall have spill kits in their vehicles and all spills shall be cleaned up immediately and all contaminated material properly disposed of off-site.

Trash Removed Daily: All trash, especially food-related refuse that may attract potential predators or scavengers, will be properly contained in sealed containers or bags, removed from the work site, and disposed of daily.

1.5.2 Qualifications for Biologist

The following definitions describe a qualified biologist and an agency approved biologist for purposes of conducting surveys and biological monitoring:

Qualified Biologist: The minimum qualifications for the Qualified Biologist include a bachelor's degree in biological or environmental science, natural resources

management, or related discipline; field experience in the habitat types that occur at the project site; familiarity with the listed species (or closely related species) that may occur at the project site; and prior preconstruction survey, construction monitoring, or construction oversight experience.

Approved Biologist: For listed species, such as the coastal California gnatcatcher, least Bell's vireo, and Crotch's bumble bee, additional qualifications are required for biologists who would be responsible for species surveying. For this plan, the Approved Biologist will have the following qualifications:

- A federal section 10(a)(1)(A) recovery permit for coastal California gnatcatcher surveys
- At least five years' direct experience with least Bell's vireo to survey for this species
- Approved by CDFW to survey for Crotch's bumble bee on the project site

Because the qualifications for the Approved Biologist exceed those for the Qualified Biologist, any activity indicated as appropriate for the Qualified Biologist below may also be completed by an Approved Biologist. Where sensitive species may be directly or indirectly impacted by project implementation, the following species protection measures shall be implemented, as appropriate.

1.5.3 Environmental Training

Prior to involving new or existing personnel in restoration activities, all new restoration personnel will undergo environmental awareness training led by a Qualified Biologist. This training will cover the identification, habitat requirements, legal protections, avoidance and minimization measures, and applicable protection measures for special-status species and nesting birds that may be present in or near the project site. Personnel will be informed of the procedures to follow if a special-status species or nesting bird is encountered during project activities.

Training may be conducted in an online or virtual meeting format. For extended projects requiring multiple training events, a training video developed under the supervision of the Qualified Biologist may be used to educate new personnel, provided that a Qualified Biologist is available by phone to address questions about the training or any concerns that may arise during project activities.

1.5.4 Sensitive Species Protection

Surveys shall be conducted for the following threatened, rare, or endangered species that are known to or have the potential to occur at Fairview Park. The following are recommended survey guidelines. All existing resources to be protected will be identified by the required biologist and flagged prior to any project disturbance.

COASTAL CALIFORNIA GNATCATCHER

Habitat Avoidance: Invasive plant treatment impacts will be avoided or minimized in coastal sage scrub and other vegetation communities suitable for the coastal California

gnatcatcher (CAGN) during the breeding season. If surveys determine that the habitat is occupied or that impacts to these habitats cannot be avoided, any possible incidental "take" of CAGN individuals will be avoided or minimized through implementation of the measures listed below.

Work Window: To avoid or minimize impacts to nesting CAGN, all clearing of vegetation in CAGN suitable habitat will occur outside of the breeding season (September 1 through February 14). If the breeding season cannot be avoided, a United States Fish and Wildlife Service (USFWS) Approved Biologist will conduct pre-work nesting bird surveys prior to weed treatments. A minimum of 3 surveys are recommended to be conducted during the nesting season prior to the start of work activities with the third and final survey within 5 days of initiating the start of work. If no active CAGN nests are found, project activities may proceed.

Work Restrictions Near Active Nests: If an active CAGN nest is detected during the surveys, work will be suspended until the end of the nesting season (August 31), or until the young have fledged; alternatively, the following conditions will apply:

- A USFWS-Approved Biologist will establish a 100-foot disturbance buffer distance between noise-generating project activities and CAGN nest(s). Noise-buffer distances may be modified in coordination with the USFWS Field Office based on project-specific characteristics or the City may choose to submit their own analysis and buffer recommendations for USFWS's consideration.
- Once the buffer is established, a Qualified Biologist will monitor the nest during treatment activities for signs of adverse effects, including distress/disturbance. If adverse effects are detected, the Qualified Biologist will have the authority to stop all treatment activities in the vicinity of the nest and implement additional protection measures. If no work is to occur within or near the buffer, and no adverse impacts were detected during any previous monitoring activities, work can proceed outside the buffer without the need for a monitor being present.
- A Qualified Biologist will continue to monitor the nest and will determine when young have fledged (in coordination with a USFWS-Approved Biologist). Once the USFWS-Approved Biologist has confirmed that the young have left the nest, the protective buffer may be removed, and treatment activities within these areas may resume.

LEAST BELL'S VIREO

Habitat Avoidance: Invasive plant treatment impacts will be avoided or minimized in areas suitable for least Bell's vireo (LBV) habitat during the breeding season (March 15 through September 15). If surveys determine that the habitat is occupied or that impacts to these habitats cannot be avoided, any possible incidental "take" of LBV individuals will be avoided or minimized through implementation of the measures listed below.

Work Window: To avoid or minimize impacts to nesting LBV, all clearing of vegetation in occupied habitat or suitable habitat will occur outside the breeding season (September 16 through March 14). If the breeding season cannot be avoided, a USFWS-Approved Biologist will conduct pre-work nesting bird surveys prior to weed treatments. A minimum of 3 surveys are recommended to be conducted during the nesting season prior to the start of work activities with the third and final survey within 5 days of the start of work. If no active LBV nests are found, project activities may proceed.

Work Restrictions Near Active Nests: If an active LBV nest is detected during the survey, work will be suspended until the end of the nesting season (September 15), or until the young have fledged; alternatively, the following conditions will apply:

- A USFWS-Approved Biologist will establish a 100-foot disturbance buffer distance between noise-generating project activities and LBV nest(s). Noise-buffer distances may be modified in coordination with the USFWS Field Office based on project-specific characteristics or the City may choose to submit their own analysis and buffer recommendations for USFWS's consideration.
- Once the buffer is established, a Qualified Biologist will monitor the nest during treatment activities for signs of adverse effects, including distress/disturbance. If adverse effects are detected, the Qualified Biologist will have the authority to stop all treatment activities in the vicinity of the nest and implement additional protection measures. If no work is to occur within or near the buffer, and no adverse impacts were detected during any previous monitoring activities, work can proceed outside the buffer without the need for a monitor being present.
- A Qualified Biologist will continue to monitor the nest and will determine when young have fledged (in coordination with a USFWS-Approved Biologist). Once the USFWS-Approved Biologist has confirmed that the young have left the nest, the protective buffer may be removed, and treatment activities within these areas may resume.

CROTCH'S BUMBLE BEE

Habitat Avoidance: Impacts to burrows/nests occupied by Crotch's bumble bee (CRBB) (*Bombus crotchii*), candidate species for state endangered status, will be avoided. If CRBB are observed, the area shall be considered occupied, and work shall not occur until the end of the flight season.

Surveys shall be performed by a CDFW-Approved Biologist or entomologist familiar with CRBB behavior and life history. Surveys shall be conducted during the flying season (April through mid-October), when the species is most likely to be detected above ground and include a minimum of 3 surveys with a 3-week space between surveys. If no CRBB are found within the work area, project activities may proceed. If Crotch's bumble bee is found within the work area, the City may propose site-specific measures in coordination with CDFW to avoid take or obtain an Incidental Take Permit.

BURROWING OWL

Avoidance: Burrowing owls (*Athene cunicularia*) (BUOW), state Species of Special Concern, are not known to nest at Fairview Park but are known to occupy the Park in the winter. The restoration activities shall avoid impacts to nesting BUOW and known overwintering locations. If a BUOW is observed on the project site, work shall be suspended, and the Qualified Biologist shall immediately contact CDFW to develop a plan for avoidance prior to initiating any ground disturbance on the project site.

BREEDING / NESTING BIRDS

Avoidance: To the extent feasible, weed control activities should be scheduled to avoid the bird nesting season (February 15 through August 31 for songbirds; January 15 to August 15 for raptors). If it is not possible to schedule weed control activities between September 1 and February 14, or January 14 in suitable raptor nesting areas, then pre-work surveys for nesting birds will be conducted by a Qualified Biologist to avoid impacts to nesting birds.

Pre-work breeding/nesting bird surveys will be conducted during the bird nesting season (February 15 through August 31 for songbirds; January 15 to August 15 for raptors) if vegetation removal or other activities are planned that could violate the California Fish and Game Code and/or the Migratory Bird Treaty Act (MBTA). A Qualified Biologist will conduct pre-work breeding/nesting bird surveys no more than 5 days prior to the initiation of any site-disturbance activities that may impact nesting birds. During this survey, the biologist will inspect all vegetation and other potential nesting habitats in the work area for nests. Active nesting is present if a bird is building a nest or sitting in a nest, if a nest has eggs or chicks in it, or if adults are observed carrying food to the nest. If no breeding/nesting birds are observed, work activities may begin. If breeding/nesting birds are observed, the measures described below shall be implemented.

Work Restrictions Near Active Nests: If an active nest is detected, work will be suspended until the young have fledged or until the end of the nesting season (August 31); alternatively, the following conditions will apply:

- A Qualified Biologist will establish a disturbance buffer distance between noise-generating project activities and the nest. Noise buffer distances (typically up to 300 feet for raptors and up to 100 feet for other species) will be determined by the Qualified Biologist based upon consideration of the bird species and the nature of the planned project activity.
- If a buffer is established, a Qualified Biologist will monitor the nest during weed control activities for signs of adverse effects, including distress/disturbance. If adverse effects are detected, the Qualified Biologist will have the authority to stop all weed control activities in the vicinity of the nest and implement additional protection or avoidance measures. If no work is to occur within or near the buffer, and no adverse impacts were detected during any previous

monitoring activities, work can proceed outside the buffer without the need for a monitor being present.

- A Qualified Biologist will continue to monitor the nest and will determine when the young have fledged. Once the Biologist has confirmed that the young have left the nest, the buffer and exclusion zone may be removed, and weed control activities within these areas may resume.

1.5.5 Protective Buffers

All buffers shall be clearly marked in the field sufficiently to prevent the crew from entering the buffers with the minimal amount of flagging to prevent drawing the attention of the nest to predators. The buffer locations shall be shown in the field to the crews that will be working in the area along with a map provided of all nest locations and associated buffers. The crew shall be informed of all restrictions to work activities within the buffer as well as any access information that may be required for avoidance of the buffer. For instance, access points shall be determined to prevent repeated travel near a buffer during the workday.

1.6 INVASIVE PLANT SURVEYS AND EDRR

A brief high-priority invasive plant control plan will be developed annually by a qualified biologist possessing the necessary expertise in native and nonnative plants of California. The minimum qualifications for the qualified biologist include:

1. A bachelor's degree in biological or environmental science, natural resources management, botany, or a related discipline.
2. Field experience in the park's habitat types.
3. Familiarity with sensitive or rare plant species that are present or may occur at the park.
4. Knowledge of invasive plant species found in the park.

The qualified biologist will survey the park at the appropriate time to identify and assess the location, density, and phenology of target invasive species. Survey data should encompass the following:

1. Invasive plant population coordinates.
2. Invasive plant species.
3. Population size.
4. Phenology or life stage of most of the invasive plant population.
5. General location description.

Based on the most up-to-date best practices, the qualified biologist will provide the park maintenance crews with recommended treatment methods for each target invasive species. The plan should include:

1. The phenological stage of the target invasive plants for treatment.
2. Recommended treatment methods.
3. Necessary follow-up treatments and their anticipated timing.
4. A map of the location, including information on population size.
5. The number and timing of treatments throughout the year.
6. Protective measures for sensitive species or habitats to be implemented before treatments.

By following these guidelines, the park's invasive weed management plan will be effectively developed and implemented, ensuring the preservation of the park's diverse ecosystems.

1.6.1 Invasive Plant Surveys

To determine appropriate timing and control methods, initial weed surveys for annual treatment should be conducted during winter, ensuring that weed treatment can take place before the start of the earliest bird nesting season, which begins on January 15 for raptor species. If additional weed control is required during the growing season, subsequent surveys by the qualified plant biologist will identify optimal timing and methods for follow-up treatments. Surveys should be timed to prevent significant seed set, ensuring that treatment can effectively control the population before viable seeds are produced.

Follow-up surveys may be needed at appropriate times depending on the weed treatment method used. For example, after stump cut treatments, populations should generally be checked about one month after treatment to address any emerging resprouts or seedlings that may have germinated around the treated mature plant.

For invasive species that can sustain their life cycle throughout the year and emerge under favorable conditions, species-specific surveys may be necessary to determine multiple follow-up treatments. An example of such a species is castor bean (*Ricinus communis*), which can flower and germinate year-round when adequate soil moisture is available, including during summer months.

1.6.2 Early Detection and Rapid Response

Alongside managing known high-priority invasive species populations, it is crucial to continually assess the park for newly introduced invasive species or populations in previously undetected areas. Implementing an Early Detection and Rapid Response (EDRR) management approach is the most cost-effective method for detecting invasive plants before they become a widespread problem.

EDRR efforts should focus on:

- Detecting new invasive plants requiring control
- Identifying new populations of known invasive species for inclusion in subsequent treatment events

Annual focused surveys, conducted by a qualified plant biologist, should be supplemented by documenting incidental findings during other park activities. Surveys should prioritize areas susceptible to new infestations, such as trails, landscaped areas, fuel modification zones, or potential vector corridors.

Preventing invasive species introduction is the primary and most cost-effective long-term defense. Prevention measures include restricting invasive plant installation in landscaped park areas. Promptly treating new infestations while eradication remains feasible is the next line of defense. If eradication is not possible due to cost or feasibility constraints, containment efforts may be necessary to protect sensitive park resources. Containment typically requires long-term or indefinite control.

By systematically surveying for new populations of known invasive plants and detecting new invasive species annually, the goal is to eradicate these species before they cause ecological harm or become uncontrollable (USFWS 2015). Early control is key, as the chances of successful eradication diminish, and control efforts increase once the species are established and mature.

SURVEYS FOR NEW INVASIVE SPECIES

Detection of new invasive species can be integrated with other invasive plant surveys conducted throughout the year. However, it is recommended to perform at least one targeted early detection survey during the optimal time for detecting most invasive species within the park. Spring is the most suitable season for this survey, as most plants are actively growing, allowing for treatment of newly detected invasive species during subsequent control events.

Prior to early detection surveys, gather and review background information to guide detection and control prioritization:

- Review invasive plant species occurrences in the surrounding area (e.g., within 50 miles). Information on invasive plant species in the area can be obtained from many web-based sources including CalWeedMapper, Calflora, Biodiversity Serving Our Nation (BISON), EDDMapS, and iNaturalist.
- Consult with local invasive plant experts and land managers to see if there are any additional species that should be considered for early detection.
- Lists of invasive plant species from other available sources including the U. S. Department of Agriculture, from the local Santa Ana River and Orange Weed Management Area (WMA), or other conservation management partnerships or collectives.

Surveys for detecting new invasive species populations should be conducted annually, using a systematic and repeatable approach. Focus on areas with a higher likelihood of invasion, such as trails, roads, access points, and areas subject to regular disturbance like fuel modification zones and annually mowed nonnative grasslands. Additionally, assess areas adjacent to residential properties for invasive plants potentially introduced from yards and escaped landscaping plants.

The City could collaborate with residents and property owners to educate the public on avoiding the use of invasive target plant species in their yards, minimizing the potential for degradation of native park habitats. By working together and implementing these strategies, the park's ecosystem can be better protected from the harmful effects of invasive species.

1.7 TIMING OF INVASIVE PLANT CONTROL TREATMENTS

Successful control and protection of native habitats rely on consistent and well-timed invasive plant treatments. Annual control efforts should be adjusted to each species' requirements, such as the number of treatments needed, and consider any constraints like avoiding herbicide use in sensitive areas (e.g., vernal pools and vernal pool watershed).

The treatments shall be primarily focused outside of any sensitive times for sensitive species, such as when there is standing water in the vernal pools, the breeding season for bird species that are sensitive or protected under the MBTA, or during the flight season of Crotch’s bumble bee. If work outside these sensitive periods cannot be avoided, the appropriate protective measures, including biological surveying and monitoring needs to be conducted during the breeding season to detect breeding activity. If breeding activity is observed, appropriate protective buffers shall be placed around sensitive areas, such as an active bird nest, and no work shall occur in these areas until the nests are no longer active. Monitoring by a biologist with appropriate requirements, approvals, and permits may be necessary. Protective measures are described in more detail in Section 1.5.

Multiple control events using the most effective control strategies for the target invasive species shall be anticipated during a control year for effective control. Table 1-3 shows the control timing and strategies for the target invasive species.

The following provides timing for the different habitat areas of the Park along with important management notes for control activities.

Table 1-3 Timing and Method of Treatment for High-Priority Invasive Plants Parkwide or in Sensitive Habitat Areas: Vernal Pool Watershed (VPW) and Wetlands, Coastal Sage Scrub (CSS), and Riparian Habitat Areas (WRA).

Scientific Name	Common Name	Physical/Mechanical Treatment Method (P)	Chemical Treatment Method (C)	Control Event 1 (Jan. to Feb. 15)			Control Event 2 (Spring to Early Summer)			Control Event 3 (Summer to Fall)		
				VPW	WRA/CSS	Parkwide	VPW	WRA/CSS	Parkwide	VPW	WRA/CSS	Parkwide
Arundo donax	Giant reed	Cut and dig out plant removing all plant material	Foliar herbicide application – glyphosate	---	P/C	P/C	---	P/C	P/C	---	P/C	P/C
Atriplex semibaccata	Australian saltbush	Hand-pull removing all rooting material	Foliar herbicide application - glyphosate	P	P/C	P/C	P	P/C	P/C	P	P/C	P/C
Bassia hyssopifolia	Five horn bassia	Hand-pull removing all rooting material	N/A	P	---	---	P	---	---	P	---	---
Brachypodium distachyon	Purple false brome	Hand-pull small patches; or mow before viable seed production but after soil moisture depleted	Foliar herbicide application - fluazifop	P	P/C	P/C	P	P/C	P/C	P	P	P
Brassica nigra	Black mustard	Hand-pull removing all rooting material; or mow after flowering but before viable seed production cutting close to the ground to prevent resprouting (this may require removal of thick plant thatch in sensitive habitat areas); remove viable seeds from mature plants	Foliar herbicide application - glyphosate	P	P/C	P/C	P	P/C	P/C	P	P	P
Bromus diandrus	Ripgut brome	Hand-pull small patches; or mow before viable seed production close to the ground removing bolting stems (this may require removal of thick plant thatch in sensitive habitat areas)	Foliar herbicide application - fluazifop	P	---	---	P	---	---	P	---	---
Carduus pycnocephalus	Italian thistle	Hand-pull removing all rooting material; remove viable seeds from mature plants	Foliar herbicide application – glyphosate or clopyralid	P	P/C	P/C	P	P/C	P/C	P	P	P
Carduus tenuiflorus	Slender flowered thistle	Hand-pull removing all rooting material; remove viable seeds from mature plants	Foliar herbicide application – glyphosate or clopyralid	P	P/C	P/C	P	P/C	P/C	P	P	P

Scientific Name	Common Name	Physical/Mechanical Treatment Method (P)	Chemical Treatment Method (C)	Control Event 1 (Jan. to Feb. 15)			Control Event 2 (Spring to Early Summer)			Control Event 3 (Summer to Fall)		
				VPW	WRA/CSS	Parkwide	VPW	WRA/CSS	Parkwide	VPW	WRA/CSS	Parkwide
Cirsium vulgare	Bull thistle	Hand-pull removing as much of the tap root as possible; remove viable seeds from mature plants	Foliar herbicide application - clopyralid	P	P/C	P/C	P	P/C	P/C	P	P/C	P/C
Conium maculatum	Poison hemlock	Hand-pull removing all rooting material; remove viable seeds from mature plants	Foliar herbicide application - glyphosate	P	P/C	P/C	P	P/C	P/C	P	P/C	P/C
Cynara cardunculus	Artichoke thistle	Hand-pull removing as much of the tap root as possible; remove viable seeds from mature plants	Foliar herbicide application - clopyralid	P	P/C	P/C	P	P/C	P/C	P	P/C	P/C
Echium candicans	Pride of Madeira	Cut and dig out plant removing all plant material	Foliar herbicide application; or Stump cut herbicide application (requires follow-up treatment of resprouts)	---	P/C	P/C	---	P/C	P/C	---	P/C	P/C
Foeniculum vulgare	Sweet fennel	Cut and dig out plant removing at least 3 to 6” of the root crown; remove viable seeds from mature plants	Foliar herbicide application – triclopyr in winter; glyphosate all other times most effective before flowering	P	P/C	P/C	P	P/C	P/C	P	P/C	P/C
Glebionis coronaria	Crown daisy	Hand-pull removing all rooting material including any viable seed	Foliar herbicide application - glyphosate	P	P/C	P/C	P	P/C	P/C	P	P	P
Hirschfeldia incana	Shortpod mustard	Hand-pull removing all rooting material; or mow after flowering but before viable seed production cutting close to the ground to prevent resprouting; remove viable seeds from mature plants	Foliar herbicide application - glyphosate	P	P/C	P/C	P	P/C	P/C	P	P/C	P/C
Oncosiphon pilulifer	Stinknet	Hand-pull removing all rooting material; remove viable seeds from mature plants	Foliar herbicide application – glyphosate most effective in the bolting stage	P	P/C	P/C	P	P/C	P/C	P	P/C	P/C

Scientific Name	Common Name	Physical/Mechanical Treatment Method (P)	Chemical Treatment Method (C)	Control Event 1 (Jan. to Feb. 15)			Control Event 2 (Spring to Early Summer)			Control Event 3 (Summer to Fall)		
				VPW	WRA/CSS	Parkwide	VPW	WRA/CSS	Parkwide	VPW	WRA/CSS	Parkwide
Pennisetum setaceum	Fountaingrass	Hand-pull seedlings; Cut and dig out mature plants removing all plant material; remove viable seeds from mature plants	Foliar herbicide application – fluazifop; or glyphosate best control when applied during flowering stage	P	P	P	P	P/C	P/C	P	P/C	P/C
Raphanus sativus	Wild radish	Hand-pull removing all rooting material; mow after flowering but before viable seed production cutting close to the ground to prevent resprouting	Foliar herbicide application - glyphosate	P	P/C	P/C	P	P/C	P/C	P	P	P
Ricinus communis	Castor bean	Hand-pull seedlings; cut and dig out mature plants removing all plant material; remove viable seeds from mature plants	Foliar herbicide application or Stump cut herbicide application (requires follow-up treatments to foliar spray any resprouts)	P	P/C	P/C	P	P/C	P/C	P	P/C	P/C
Rumex crispus	Curly dock	Hand-pull removing as much as the tap root (minimum of 2 inches) as possible to prevent resprouting	Foliar herbicide application – glyphosate or clopyralid	P	P/C	P/C	P	P/C	P/C	P	P/C	P/C
Salsola australis	Russian thistle	Hand-pull removing as much of the root as possible before seed set	Foliar herbicide application – glyphosate before seed set; triclopyr most effective on young plants	P	P/C	P/C	P	P/C	P/C	P	P/C	P/C
Silybum marianum	Milk thistle	Hand-pull removing as much of the root as possible; remove viable seeds from mature plants	Foliar herbicide application – clopyralid from seedling to bud stage	P	P/C	P/C	P	P/C	P/C	P	P/C	P/C
Sisymbrium irio	London rocket	Hand-pull removing all rooting material; or mow after flowering but before viable seed production cutting close to the	Foliar herbicide application - glyphosate	P	P/C	P/C	P	P/C	P/C	P	P	P

Scientific Name	Common Name	Physical/Mechanical Treatment Method (P)	Chemical Treatment Method (C)	Control Event 1 (Jan. to Feb. 15)			Control Event 2 (Spring to Early Summer)			Control Event 3 (Summer to Fall)		
				VPW	WRA/CSS	Parkwide	VPW	WRA/CSS	Parkwide	VPW	WRA/CSS	Parkwide
		ground to prevent resprouting; remove viable seeds from mature plants										
Solanum rostratum	Buffalobur	Hand-pull removing as much of the root as possible	Foliar herbicide application - glyphosate	P	---	---	P	---	---	P	---	---

Notes:

1. *Sensitive Habitat Areas = CSS Areas that have potential for nesting coastal California gnatcatcher nesting, and all riparian and wetland areas, including vernal pools.*
2. *P = Physical or mechanical control method appropriate for the life stage of the invasive plant. C = Chemical control method. "---" = Species does not currently or is not expected to occur in an area, or species is not a target for control in this portion of the Park, and no control method is provided.*
3. *The number of weed control events per year will be dependent on weed growth throughout the season, annual weather conditions, incidence of standing water and saturated soil conditions in the vernal pool areas, and ability to do nesting bird surveys during the bird nesting season.*
4. *Treatments during the nesting seasons will require pre-work biological surveys and monitoring around active nests: CAGN nesting season 2/15 to 8/31; LBV 3/15 to 9/15; Raptors 1/15 to 8/15; CRBB 4/1 to Oct 15; MBTA Protected Birds 2/15 to 8/31.*
5. *The City shall provide a cultural monitor to protect culturally significant materials if significant digging is required in areas with protected cultural resources. Cutting or pulling out the roots of the plant from the topsoil does not require a cultural monitor.*
6. *All treatments shall occur before viable seed production when possible; if control cannot occur before viable seed production all seed material shall be cut, bagged, removed, and properly disposed of off-site.*
7. *No weed control treatments shall occur in the vernal pool watershed when there is standing water or while the soil is saturated—until the surface is dry enough to walk on without disturbing the soil surface.*
8. *No herbicide treatment of any kind shall be conducted in the vernal pool watershed—except for the improper fill material soil that was placed on the mesa.*
9. *No mowing with mechanical equipment shall occur in the vernal pool watershed*
10. *Only aquatic approved herbicides shall be used within 100 feet of water.*
11. *A state licensed Pest Control Advisor (PCA) shall be consulted to provide written herbicide recommendations for species specific herbicide control methods for the Park.*

1.7.1 Vernal Pool Watershed

No weed control shall be implemented in areas with standing water or saturated soils that occurs during the rainy season October through April. No herbicides shall be used within the vernal pool watershed at any time of the year. The use of mechanical equipment including mowers shall not be used in the vernal pool watershed to prevent negative impacts to the soil, such as ruts, and the potential crushing of fairy shrimp cysts (i.e., eggs).

- **Control Event 1** timed to be in the winter prior to standing water in the pools and prior to nesting bird season. Only physical methods allowed, such as hand weeding or line trimming. No mowing with equipment or herbicides is allowed.
- **Control Event 2** timed to be during the late spring early summer when there is no longer standing water in the vernal pools or saturated soil conditions. The timing should coincide with the most effective treatment time with the target invasives species. Pre-work surveys are required prior to implementing this control event. Only physical methods allowed. No mowing with equipment or herbicides is allowed.
- **Control Event 3** timed in the fall after the bird nesting season has ended. Actively growing or senesced perennial species shall be hand-pulled and removed. Senesced annuals need not be pulled unless the standing biomass would degrade bird habitat or impact the function of vernal pool, only remaining intact and viable seed material need be cut and removed from the site. Care shall be taken so as not to shatter seed pods so as not to contribute weed seed to the seed bank.

1.7.2 Sensitive Habitat Areas (Potential CAGN and LBV Habitat)

- **Control Event 1** timed to be in the winter prior to bird nesting season February 15 in coastal sage scrub areas that are potential habitat for CAGN and prior to raptor nesting season January 15 in riparian areas that are potential LBV habitat as there is suitable habitat for raptor nests in the riparian habitat within the Park. Methods can be either physical or chemical.
- **Control Event 2** timed to be in mid-spring. The timing should coincide with the most effective treatment time with the target invasives species. Pre-work surveys are required prior to implementing this control event. Control can be either physical or chemical methods.
- **Control Event 3** timed to be after the nesting season has ended August 31 in CAGN potential habitat and September 15 in LBV potential habitat areas. Actively growing or senesced perennial species shall be hand-pulled and removed. Senesced annuals need not be pulled unless the standing biomass would degrade bird habitat only remaining intact and viable seed material need be cut and removed from the site. Care shall be taken so as not to shatter seed pods so as not to contribute weed seed to the seed bank.

1.7.3 All Other Natural Areas

- **Control Event 1** timed to be in the winter prior to bird nesting season February 15. If suitable raptor nesting habitat is present, the control should be timed prior to January 15. Methods can be either physical or chemical.
- **Control Event 2** timed in spring to be at the optimum time for most target invasive species to be treated. Requires a pre-project survey by a qualified bird biologist within one week of work.
- **Control Event 3** timed to be in the summer at the optimum time for most target invasive species to be treated. Requires a pre-project survey by a qualified bird biologist within one week of work if it occurs prior to August 31.

1.8 BIOSECURITY PROCEDURES TO PREVENT THE SPREAD OF INVASIVE PLANTS

Implementing biosecurity procedures is essential to prevent the unintentional spread of target invasive plant species during control activities and to mitigate the introduction of new invasive species to the park. Biosecurity measures include cleaning clothing and equipment, ensuring that equipment used on-site is free of any invasive plant species reproductive material, and verifying materials used in the park, such as erosion control devices, are weed seed-free.

Preventing the spread of invasive species is the first line of defense and a cost-effective approach to controlling their impact. Consistent measures to ensure that seeds and reproductive material of invasive plant species are not spread to new areas will help avoid costly future efforts and potential ecological damage. By safeguarding sensitive habitats from infestation, their ecological functions can be preserved, promoting the overall health and resilience of the park's ecosystem.

1.8.1 Biosecurity Measures During Control Activities

Effective weed management not only involves the physical removal and chemical treatment of invasive species but also requires careful attention to minimizing seed dispersal, resprouting, and other unintended consequences of control measures. By taking steps to prevent the future propagation of weeds, the effectiveness of current practices can be enhanced while reducing the severity of subsequent infestations.

Although it is advisable to control weeds before seeds mature, this may not always be feasible, such as when a weed can seed year-round, and monitoring each life stage is challenging. In these situations, it is crucial to be aware of the presence of seeds during control sessions. Even if the plant itself is removed, seeds left behind at the site or on clothing, equipment, vehicles, or waste containers can undermine management efforts and spread the infestation to new areas.

To reduce seed spread, follow these practices:

1. Remove seeds found on plants before cutting, hand-pulling, or herbicide application, placing the material in appropriate disposal containers.

2. Collect seeds from the ground and place them in containers.
3. After each treatment, remove seeds from clothing and equipment, placing them in disposal containers before leaving the area.
4. Thoroughly inspect and clean clothing, equipment, bags, etc., using a brush or other tool, paying close attention to laces, socks, cuffs, pockets, etc.
5. Remove dirt from shoe treads to eliminate embedded seed material.

Vehicles should only be driven on approved pathways to limit contact with potential invasive weed species seed material. Despite minimal contact, vehicles should be inspected and cleaned of all weed seeds before leaving the site, focusing on tire treads, bumpers, radiators, and undercarriages. If waste disposal containers are brought on-site from other locations, inspect, and remove any weed seeds before using them in the park.

Crews shall be trained by the qualified plant biologist on the Best Management Practices (BMP) for cleaning equipment and clothing to prevent the spread of invasive species. As an alternative, already developed sources for training crews is available online such as from Cal-IPC video that can be found here Training Video: Best Management Practices for Preventing the Spread of Invasive Plants – California Invasive Plant Council (cal-ipc.org).

By implementing these measures, the spread of invasive species can be mitigated, promoting a more effective and sustainable approach to weed management.

BIOSECURITY MEASURES FOR PROJECT MATERIALS USED IN THE PARK

To minimize the introduction of invasive species, all materials used within the park should be certified weed-free. This includes, but is not limited to, mulch materials, erosion control products (e.g., straw wattles, hay bales), container plants, soil, and aggregate (topsoil, sand, gravel, fill), and landscape materials such as plants, seeds, sod, mulch, and soil amendments. Prior to use, all materials shall be inspected, and confirmation of their weed seed-free status shall be obtained from the vendor.

In landscape areas, it is recommended to not plant any invasive plants including trees to prevent the infestation of these invasive plants into natural areas of the park, particularly in the sensitive habitat areas. Resources to check when making landscaping plant palettes includes Don't Plant a Pest! – California Invasive Plant Council (cal-ipc.org) and The Cal-IPC Inventory – California Invasive Plant Council which is a list of invasive plants in California that either are rated as an invasive plant or are on the watch or alert list.

1.9 HIGH-PRIORITY INVASIVE PLANT CONTROL METHODS

These guidelines for physical and chemical control methods are based on Land IQ's experience in Southern California, with a focus on treating the target invasive species recommended for control in this plan. Control methods have been cross-referenced

using "Invasive Plants of California's Wildlands" (Bossard et al., 2000) and "Weed Control in Natural Areas in the Western United States" (DiTomaso et al., 2013).

Nonnative plants identified as highly invasive in Fairview Park are designated as "High-Priority Invasive Plants" and targeted for focused control efforts. Repeated treatments over multiple years will likely be necessary for effective control of these invasive plants. A minimum of five years may be needed to eradicate some species, while others may require long-term management with containment as the primary goal when eradication is not feasible.

Recommended control methods consider site conditions, population density of invasive plants, biological constraints (e.g., avian breeding season, rare vegetation presence), regional management experience, and published weed control methods. Ideally, weeds should be controlled before seed production to limit soil seed bank accumulation. Care should be taken to avoid damaging native plants during weed control activities.

Methods for control include physical and chemical approaches. Before initiating herbicide treatment, a written herbicide application recommendation from a California Licensed Pest Control Advisor should be obtained, confirming appropriate dosage, timing, and application method. All herbicides used for the project require approval from the City before use.

Effective invasive plant species control involves managing the existing weed seed bank and implementing timely control measures to prevent additional seed or propagule input from target invasive species. Successful control may take several years, depending on population size and annual treatment frequency. Invasive species reproducing from seed should be controlled before seed set to deplete the existing weed seed bank and minimize new seed entry. Species that reproduce vegetatively should be controlled at the optimal time during their growing season.

Table 1-1 presents key phenological information for the target invasive species along with their reproductive strategies to help guide timing for scheduling survey events by the qualified plant biologist and control events.

The density and vigor of invasive plant species in any given season or year is highly dependent on annual weather patterns, including the timing and amount of rainfall, as well as diurnal temperature variations. This necessitates an adaptive weed management approach that allows flexibility in the timing and intensity of treatment events each year. Adaptive management is also crucial due to the difficulty and impracticality of quantifying the nonnative seed bank of target invasive species in the park. Instead, weed management efforts can only be estimated based on prior biological monitoring and experience with similar treatment efforts.

Invasive weed management is vital for the successful establishment and maintenance of native habitats within the park. Special care must be taken when weeding around native plants and within high-quality native habitats, requiring additional labor and expertise. Working around native species often necessitates increased use of manual methods

(e.g., hand-cutting or pulling) and reduces opportunities for time-saving mechanized equipment like mowers and line trimmers.

The number of years required for invasive species eradication through annual weed treatment events will depend on site-specific factors such as weed density, type of weed species, annual weather patterns, and variables like landscape position and soil type.

Weed management methods will be selected based on the type and density of target invasive species present, the density of native species, accessibility, and location within the park. Several control methods can be employed to manage invasive species at Fairview Park:

1. **Mechanical Methods:** Manual hand-pulling or cutting; taproot extraction with tools, such as weed extractors or shovels; mowing or line trimming
2. **Chemical Methods:** Targeted low-pressure foliar herbicide application; stump-cut and herbicide application

Each weed control method has advantages and disadvantages, with considerations including implementation timing, equipment and trained staff availability, biological resource protection, and site access limitations for equipment. Nonnative seedlings and flowering plants should be controlled before producing viable weed seeds to minimize contributions to the weed seed bank. If weeding is delayed until after seed development, seed material should be cut, bagged, and disposed of off-site.

Soil disruption should be minimized to reduce the germination of new weed individuals, injury to native species, and disturbance to biological soil crusts. Care should be taken not to disturb deep soil layers that could bring up buried weed seeds that would not otherwise germinate without disturbance.

Careful weeding by trained crews is necessary to avoid damage to native species in areas with significant native cover or sensitive species. Adaptive management, including regular monitoring to guide the scheduling and selection of weed control methods, is key to success. General guidelines for control methods are presented in Table 1-3.

1.9.1 Physical Control Methods

Physical control methods recommended include hand-pulling, cutting, or removal with digging equipment. These methods are best used for isolated individuals or small patches for the most efficient control. Digging with a shovel, pick or mattock can be labor intensive especially for larger mature individuals. Hand-pulling is best suited for seedlings or smaller plants that can be easily pulled. In many instances removal of all or most of the invasive species is necessary for effective control to limit resprouting from the roots or root crown. Using hand garden tools such as picks, cultivators, weeders, specialized hoes, mattocks, and trowels, can help to loosen the soil around the roots. After loosening the soil, pull vertically from the ground to remove as much of the root system as possible, especially weed species with a long tap root.

MOWING/LINE TRIMMING

Mowing with mechanical equipment, such as a rotary mower, flail mower, or mulcher attached to a tractor or skid steer, or hand-operated motorized cutting tools such as line trimmers are generally an efficient method to use in areas with a high density of target invasive grasses and herbaceous species in areas with little to no native vegetation present. Mowing is appropriate in larger areas that are flat to moderately sloped. Careful mowing should be implemented to limit injury to native species when cutting. The use of mechanical equipment including mowers shall not be used in the vernal pool watershed to prevent negative impacts to the soil, such as ruts, and the potential crushing of fairy shrimp cysts (i.e., eggs). In areas with a steeper slope or with a higher density of natives, walk behind, hand-operated mowers or line trimmers should be used.

Line trimming can be accomplished with a gas-powered, hand-operated line trimmer fitted with a string, brush blade, or similar instrument in areas inaccessible to larger equipment. Like line trimming, a gas-powered, hand-operated, shafted hedge trimmer with an articulating blade can be used to trim target invasive weeds above the soil surface from a standing position. Shafted hedge trimmers can be effective for cutting denser patches of broadleaf weeds after they have flowered, such as mustard species (*Brassica*, *Sisymbrium*, and *Hirschfeldia*). Line and hedge trimmers are most effective in areas that are inaccessible to larger equipment, or when working around dense, existing native vegetation that excludes the use of larger equipment.

Fire prevention measures must be taken to avoid accidental fires from sparks during machinery operation or line trimming with blades. These measures may include always having a water truck on site near the mowing activity, shovels carried on the mower and water truck, and water fire extinguishers. The weed material should be cut as close to the ground as possible to limit re-sprouting of herbaceous species and ensure removal of bolting crowns of grasses. Care should be taken to not damage biological soil crusts where present.

HAND/MECHANICAL PULLING OR CUTTING

Hand-pulling or cutting of target invasive weeds is one of the least disruptive methods but is an inefficient method of weed control in dense stands. Hand-pulling or cutting should be reserved for controlling isolated individuals, controlling small infestations in areas that are inaccessible to equipment, or where high densities of native or sensitive species are present. Hand-pulling is a very useful manual technique to use on young plants and small patches of weeds.

Hand-cutting can be used to remove the flowering stalks of target invasive weeds prior to seed development with tools such as sickles or vinyl knives. If cut material contains viable seed, then it should be properly disposed of off-site.

When hand-pulling target invasive weeds, the plants should be grasped near the base pulling in the direction the plant is growing to be able to better extract most of the roots

out of the ground. Short tugs work better than one long pull to prevent breaking the plant before the main roots are removed.

Isolated individuals of select invasive species can be pulled by hand or with a tool such as the Weed Wrench™. Using hand garden tools such as picks, cultivators, weeders, specialized hoes, mattocks, and trowels, can help to loosen the soil around the roots. After loosening the soil, pull vertically from the ground to remove as much of the root system as possible, especially weed species with a long tap root. When using a weed wrench, the clamp should be placed on the lowest point on the trunk of the plant as much as possible. The base of the weed wrench should be on the ground, but if it is not touching, rocks or branches can be placed underneath to improve leverage. Using your weight the weed wrench should be pulled toward you and not pushed away or injury could occur.

CUT-AND-DIG

Larger mature invasive species can be controlled by cutting the upper foliage of the plant and digging out the root system. Plant foliage can be cut with a handsaw, loppers, axe, or similar tools and removed to allow for better access to the roots. The root material can be dug out and removed with a shovel, mattock, Pulaski, or similar tool. As much of the root material should be removed as possible for effective control since many of the target invasive weed species can readily resprout from remaining roots. Removed root material should be properly disposed of to prevent resprouting. For example, the removed roots and rhizomes of giant reed (*Arundo donax*) or even cut stems with nodes can resprout if they are touching wet soil.

RAKING AND REMOVAL OF WEEDED BIOMASS

Plant biomass of weeded invasive species shall be removed from the vernal pool watershed and other sensitive habitat areas since plant thatch degrades the quality of bird habitat and the functioning of the vernal pool habitats. Thick pant thatch also inhibits germination and recruitment of desirable native species and would hinder the natural.

Raking of the cut material can be done with handheld rakes and collected on burlap bags to be removed from the Park.

1.9.2 Chemical Control Methods

Herbicide treatment is specified mainly for dense areas of the target invasive species with low densities of native species and are invasive species that are perennial or that may re-sprout from taproots and rhizomes. Limited use of selected herbicides is specified when no other effective alternative is feasible for effective control. Most herbicides are not selective for weeds only; in other words, herbicides must be applied with the least harmful effect to non-target native species.

For effective control of target invasive species populations, they must be controlled before they produce viable seed. Most herbicides are not selective for weeds only (i.e., these herbicides must be applied with the least harmful effect to non-target native

species). In general, only post-emergent herbicides, which kill plants after they have germinated and are actively growing, are recommended.

Herbicides shall not be used in the vernal pool watershed at any time of year, except for area on the mesa with improper fill material. Herbicides use in all other natural areas during the breeding season can be used if a pre-work survey by a qualified biologist is conducted prior to treatment. Herbicides may be used in the fuel modification zones outside the breeding season and during the breeding season if prework surveys for nesting birds is conducted.

Only herbicides registered for use in California and in wildlands should be used judiciously for the control of target invasive species. Herbicides that are registered for use in California natural areas are recommended to be used at rates specified on the herbicide labels for the target invasive species. The recommended herbicides registered for use in California that are proposed in these guidelines are glyphosate, a non-specific broad-spectrum herbicide registered for use on almost all weed species, fluazifop-p-butyl for the control of weedy grasses, clopyralid for the treatment of thistles in the rosette stage, and triclopyr for the treatment of woody invasive plant species.

A state licensed Pest Control Advisor (PCA) shall be consulted to provide written herbicide recommendations for species specific control methods for the Park. The herbicide applicator must have a pest control business license that requires at least one individual employed by the business be in possession of a qualified applicator's license. All licenses must be issued by the State of California and be currently registered in the county of work. If a qualified applicator is not present during the herbicide treatment, all applicators must have undergone documented herbicide training.

Personnel must wear all Personal Protective Equipment (PPE) required by law and follow all herbicide label directions and precautions. PPE includes but is not limited to chemical-resistant nitrile gloves, eye protection, chemical protective suits, e.g., Tyvek®, and protective footwear. All re-entry times specified on an herbicide label must be observed and posted. Herbicide preparation must be conducted only in approved staging areas more than 100 feet from a stream course or any body of water. Only herbicides and surfactants approved for aquatic use should be used within 100 feet of a stream course or any body of water.

A colorant or marking dye is recommended to ensure even coverage of herbicide. The material should be a non-toxic material such as Blazon®, Turf Mark®, or equivalent. The dye should be mixed with the herbicide at no more than half the rate specified on the label as it can reduce product performance of the active ingredient of the select herbicide, especially at lower herbicide application rates.

Herbicide treatment should be conducted only when weather conditions are conducive to effective uptake of the herbicide by target species when plants are at the specified growth stage. Optimal weather includes sunny and dry conditions with ambient temperatures of at least 65 degrees Fahrenheit. Wind conditions should be five miles per hour or less for herbicide applications that can be subject to drift, e.g., foliar spray

methods, to minimize herbicide drift for worker protection and to prevent damage to desirable vegetation. Treated plants shall not be disturbed until the applied herbicide has had time to take effect per the manufacturer's instruction.

FOLIAR SPRAY TREATMENT

Foliar spray treatment involves applying a select herbicide at a specified concentration directly to the exposed foliage of the plant to thoroughly wet all leaves. For the foliar spray treatment to be effective, the exposed foliage needs a thorough coating of herbicide, and the plant should be actively growing. The green or photosynthesizing parts of the plant should be sprayed for uptake of the herbicide by the plant. Typically, the foliar spray treatment is best used on smaller plants to ensure adequate cover of the herbicide.

The disadvantage of the foliar spray treatment is the damage that may be caused to desirable species in the localized area where spraying occurs, especially if a non-selective herbicide like glyphosate is being used. Additionally, the foliar application method is generally ineffective on invasive plants with thick waxy cuticles.

Foliar spray shall be by low pressure hand operated sprayers only and broadcast herbicide shall not be done anywhere in the Park. For backpack or hand-held application of herbicide, a low-pressure regulated sprayer with a coarse droplet size and single-nozzle wand shall be used. For this type of application use either spray-to-wet applications, or low volume directed spray.

Prior to use of hand-held herbicide applicators, the equipment should be checked to make sure it is fully functional and does not have any leaks. After filling the closure cap should be securely screwed on and not-cross threaded to prevent any spills or leakage. For backpack sprayers, the rubber gasket and nipple in the sprayer lid should be regularly lubricated for proper functioning. The applicator should not bend over or lean too far forward to prevent any spills onto their person or on to desirable vegetation. Prior to use, the pump of the backpack sprayer should be primed with 10 to 20 pumps. When traveling between spraying points, the applicator shall keep their hand off the lever to avoid any inadvertent spraying of herbicide.

To decrease the chances of spraying nontarget plants, preparation before spraying may be needed in areas where weeds are mixed in with native plants. The target invasive plant for control should be separated from natives and if the plant is tall, the plant should be carefully bent downward, away from natives, and the herbicide solution applied. After spraying, the plant should be released slowly and carefully to avoid any herbicide drips or runoff. The herbicide applicator should be sure to observe what is behind and around the target invasive species for control and be mindful of wind speed and direction. Nozzle adjustments may be necessary to get the mist pattern for best coverage of the target invasive plant. Larger plants should be sprayed from multiple angles to ensure adequate coverage of the plant with herbicide for effective control.

For application to small weeds (e.g., seedling stage) amongst dense native plants, if herbicide application is deemed necessary, the herbicide can be applied by backpack

sprayer with a low-pressure regulated wand with the nozzle directed to the weed foliage, thereby avoiding overspray. However, nozzle-to-plant application is time intensive and requires highly trained applicators that can differentiate between native and nonnative plants at the seedling stage; and therefore, it is typically not the most cost-effective weed management method. However, this treatment method may be needed since it is recommended to conduct herbicide treatment outside of the bird nesting season (January 15 to September 15) in sensitive habitat areas.

STUMP CUT AND HERBICIDE TREATMENT

Treatment of larger and well-established individuals, including high priority invasive species that may re-sprout from taproots or rhizomes, is best accomplished by using the stump cut and herbicide application method. Advantages of the stump-cut treatment compared with foliar application for larger individuals, includes the following:

- Lower quantity of herbicides required to treat the invasive species; and
- Localized application of the herbicides reduces the likelihood of herbicide contact with non-target native species, during application.

Typically, the stump cut and herbicide treatment is used in late summer and early fall when plants are translocating energy reserves to the rootstock and when seed dispersal is not enhanced by weeding activities optimal timing though is dependent on the weed species being treated.

The stump cut treatment method process involves cutting the stump of an invasive species flat at about 8 to 10 inches in height, then immediately (within 2 minutes or less) treating the exposed cambium of the cut stump with a select herbicide at a specified concentration. The stump cut treatment should be implemented in the following steps:

Step 1. Plants will be cleanly cut, horizontally, close to the ground (using a saw, rotary brush cutter or similar tool).

- If the weed species has already set seed, seed material shall be immediately collected, bagged, and removed from the project area prior to cutting
- The cut vegetation will be removed from the project area the same day it is cut and properly disposed of off-site or in a designated buffer area.

Step 2. The stumps or stems will be re-cut, cleared of sawdust and immediately painted with the specified herbicide within two minutes of cutting, before the cut surface begins to congeal, to ensure penetration of the herbicide. The herbicide should be applied to the cambium in 60 seconds or less after cutting.

- Apply the herbicide on the cut stump (the percent solution will be dependent on the weed species treated and herbicide used). Apply carefully to avoid any drips or damage to surrounding native species.

Plants generally should be checked about one month after initial stum cut treatment to determine the success of the herbicide treatment. Any re-growth from the treated

stumps should be treated with the foliar herbicide application method in the same growing season or as re-growth appears in the next growing season. Any new seedlings and small saplings observed during follow-up treatments can be hand-pulled, ensuring that the root system is removed. The pulled material should be removed from the project area or chipped and stockpiled for composting, as some species can regenerate when moisture is available.

If it is not possible for the herbicide applicator to work alongside the crew who is cutting the plants for treatment, then the herbicide treatment Step 2 may be applied within one week of the initial cutting. However, the cut stump must be re-cut to expose fresh cambium for effective herbicide treatment. If the stump cannot be re-cut, then herbicide application is not recommended as it will no longer be effective since the surface would be congealed and the herbicide would not be taken up by the plant.

RECOMMENDED HERBICIDES FOR USE IN FAIRVIEW PARK

The following sections provide information and application rates for specific herbicides recommended for use in the restoration areas.

Categories of herbicides include pre-emergent and post-emergent. Pre-emergent herbicides work on newly germinated weed species. They prevent them from developing and do not harm established plants. Post-emergent herbicides work on established and actively growing weed species. Only post-emergent herbicides are recommended for use. Pre-emergent herbicides should not be used for habitat restoration since they may also affect newly germinated native species.

Only herbicides registered for use in wildlands should be used judiciously within the Conservation Easement. Herbicides that are registered for use in California for natural areas are recommended for weed species at specific rates noted on the labels. Pre-emergent chemicals are not recommended for use at any time during. The following herbicides are recommended herbicides to implement this plan:

- Fluazifop-P-butyl (e.g., Fusilade®; EPA Toxicity Class III, low toxicity) will be specified for foliar applications, at application rates recommended on the label, for grasses.
- Glyphosate (e.g., Round-up®; EPA Toxicity Class III, low toxicity) will be specified for foliar and stump cut applications, at application rates recommended on the label, for most target invasive species.
- Clopyralid (e.g., Transline®; EPA Toxicity Class III, low toxicity), will be specified for foliar spray applications, at application rates recommended on the label, for thistle control.
- Triclopyr (e.g., Garlon 4 ultra®; EPA Toxicity Class III, low toxicity) will be specified for foliar spray applications and stump-cut application, at rates recommended on the label, for woody species, sweet fennel, and other target invasive herbaceous species.

Post-emergent herbicides are either selective (kills specific types of weeds such as grasses or broadleaves) or non-selective (works on all plants). Grass-selective herbicides include Fusilade® DX and Envoy®. Broadleaf-selective herbicides include Clopyralid. Non-selective herbicides include glyphosate and triclopyr.

Post-emergent herbicides can be broadcast sprayed in areas with a low density of native species or applied with backpack sprayers in areas with a higher density of native species. Selective herbicides can be broadcast sprayed to control the desired weed type with little to no impact on natives of a different plant type. Non-selective herbicides can be more efficient in areas with a mix of grass and broadleaf weed species since they can treat all the weed species present at the site. However, non-selective herbicides can cause the most harm to desirable native species and should only be broadcast sprayed in areas with a low density of natives.

Caution should be taken to prevent overspray and herbicide drift onto the foliage of native species as they can damage or kill the plant(s). Prior to selection and use, the label of each herbicide should be read to determine if the active ingredient can translocate through the soil and cause potential damage to the root system of native species. For example, imazapyr translocates through the soil and its use should be limited to the stump cut treatment method to reduce the amount of herbicide introduced into the soil and prevent herbicide drift.

Fluazifop (Fluazifop-p-butyl Fusilade® DX)

The active ingredient in Fusilade® DX is fluazifop-p-butyl. Fusilade® DX is a selective post-emergent herbicide used for the control of annual and perennial weed grasses. The herbicide is systemic i.e., it is absorbed and moves from the foliage to the roots, rhizomes, stolons, shoots, and meristematic regions of the grasses.

Application Rate

Fusilade® DX application rates for annual and perennial grasses are 16-24 ounces (oz) per acre (4 to 6 oz of active ingredient [a.i.] per acre). For control of seedlings the rate is 8 oz per acre (2 oz a.i. per acre). Add the following spray additives to the herbicide mixture for optimum effectiveness:

- Crop oil concentrate containing 15-20% approved emulsifier at 0.5-1% volume/volume (v/v) (0.5-1 gallon [gal]/100 gal)
- Nonionic surfactant containing at least 75% surface-active agent at 0.25-0.5% v/v (1-2 quarts/100 gal)
- A non-toxic colorant or marking dye to insure even coverage of herbicide. The dye should be mixed with the herbicide at no more than half the rate specified on the label of the dye as it can reduce product performance, especially at lower herbicide application rates.

Weedy grass species should be treated at the appropriate growth stage for optimum effectiveness. Grasses that have tillered (sprouted a shoot from its base), formed seed heads, or exceeded the growth stages listed on the label should not be treated. Target

weed grasses should not be under stress (e.g., from moisture, temperature, low soil fertility) for optimum control.

If the treatment area has a mix of weedy grasses, Fusilade application should be implemented when the first grass reaches the specified growth stage for treatment using the highest application rate for the grasses in the mixed population. The optimum growth stage for treatment of annual grasses is when grasses are 2–8 inches tall, but prior to tillering and/or seed head formation. It is important to note that in drought years when available water is limited, nonnative grasses can flower early when plants are less than 8 inches tall. Monitoring of flower production is critical to determine the optimum time for weed control. Thoroughly coat the foliage with herbicide during foliar application, but not to the point of runoff of the herbicide.

No more than 72 fluid ounces of Fusilade per acre a year should be applied to a treatment area. It should not be applied if rainfall is expected within 1 hour of application. Fusilade should not be applied directly to water, where surface water is present, or where runoff into water bodies could occur. To reduce herbicide runoff, avoid applications of herbicide within 48 hours of rainfall. Restrict entry into treated areas as specified on the label.

Visual observations of control can be seen within one week of treatment; however, it is dependent on the grass species and environmental conditions. Growth of treated grasses typically stops soon after application. Signs of herbicide control include loss of vigor, yellowing, reddening, and eventual death.

Glyphosate

Glyphosate (e.g., Roundup Pro® Concentrate or Roundup Pro® Max) is a broad-spectrum post-emergence herbicide for the control of annual, perennial, and woody weed species. The herbicide is systemic and moves from the treated foliage to the root system.

Foliar application should be implemented when the target species are at the appropriate growth stage for optimum effectiveness. Target annual and perennial species should be actively growing. Application to annual species should be prior to seed head formation of grasses and before bud formation in broadleaf weeds. Perennial weeds should be treated after they reach the reproductive stage of growth, seed head formation in grasses and bud formation for broadleaf species. If treatment is necessary prior to perennials reaching the reproductive stage, the higher label application rate should be used.

Application Rate

Most annual and perennial weed species can be effectively treated with a 2% solution of glyphosate when applied during the appropriate growth stage. Follow label directions of the glyphosate product used to mix a 2% solution. Add colorant or marking dyes to the spray solution to aid the applicator in achieving good coverage of target species. The dye should be mixed with the herbicide at no more than half the rate specified on the

label as the amount of dye can reduce product performance, especially at lower herbicide application rates.

Most glyphosate products contain a surfactant, and no additional surfactant is needed or recommended to add to the mix except for glyphosate products registered for aquatic use. Aquatic glyphosate formulations do not contain a surfactant in the herbicide product. If using an aquatic formulation and a surfactant is added to the mix, follow the directions on the herbicide label. However, it should be noted that in some cases, specific project permits and conditions may not allow use of a surfactant for aquatic applications.

Except where specified on the label, no more than 8 pounds (lbs) of glyphosate acid per acre per year should be applied to a treatment area in California. The total glyphosate acid amount is additive for all glyphosate products used in a given area, so it is important to keep a record of the amount of all glyphosate acid used in a given area per year. Glyphosate products have different acid concentrations and acid equivalents are provided on all product labels.

Herbicide application should not occur if heavy rainfall is expected soon after application. Herbicide should not be applied directly to water or to areas where surface water is present. Restrict entry into treated areas as specified on the label.

Visual observations of control on annual weeds can be seen within 2 to 4 days and 7 days or more for perennial weeds. Signs of herbicide control include wilting and yellowing of foliage advancing to complete browning of above-ground growth and deterioration of root material.

Clopyralid

Clopyralid is a post-emergence selective broadleaf herbicide. It is particularly effective for the control of thistle and clover species and is considered safe to use with established native grass species. However, immature native grasses prior to tillering and development of a secondary root system may be negatively affected by clopyralid. Clopyralid is the active ingredient in the herbicide Transline®.

Application Rate

Clopyralid should be applied at ¼ to ⅔ pint per acre, depending on the weed species being treated and associated growth stage. Add the following spray additives to the herbicide mixture for optimum effectiveness:

- A non-ionic surfactant at a rate of 1 to 2 gal/100 gal of herbicide mixture.
- A non-toxic colorant or marking dye to insure even coverage of herbicide. The dye should be mixed with the herbicide at no more than half the rate specified on the label of the dye as it can reduce product performance, especially at lower herbicide application rates.

In general, the herbicide is most effective when weeds are small and actively growing. The lower rate should be used only during highly favorable growing conditions and

when plants are 3 to 6 inches tall. The higher rates should be used if the plants are stressed or in areas with high weed density. The foliage should be thoroughly coated for effective control.

Application during extreme growing conditions such as drought, freezing conditions, or wet foliage at the time of application may reduce the effectiveness of the herbicide. Herbicide is rainfast within 2 hours of application. Avoid injury to non-target plants by avoiding spray drift. Non-target plants can be affected by direct spray on plant foliage or indirectly by root uptake through the soil. The maximum application rate per year in California during the growing season is ⅔ pint per acre.

Clopyralid should not be applied directly to water, where surface water is present or where runoff into water bodies could occur. Clopyralid should not be used in areas where movement through the soil could contaminate ground water, such as loamy sand, sandy soils or in areas with a shallow water table.

Sprayed material should not be used for composting or mulch as clopyralid may remain for long periods in dead plant tissue and negatively affect future growth and development of non-target species in treated areas.

Triclopyr

Triclopyr (e.g., Garlon 3A, Renovate® 3) is a systemic herbicide used for the control of broadleaf species and grasses. Triclopyr can be used at any time during the growing season and is most effective when used to treat actively growing plants.

Application Rate

For the control of broadleaf species triclopyr should be applied at 1 to 4.5 lbs acid equivalent (a.e.) per acre in a total volume of 20 to 100 gallons of water. The herbicide mixture can be applied at any time of the growing season. Add the following spray additives to the herbicide mixture for optimum effectiveness:

- A non-ionic surfactant at the rate specified on the label of the surfactant. Use the higher recommended concentrations of surfactant when applying lower spray volumes per acre.
- A non-toxic colorant or marking dye to insure even coverage of herbicide. The dye should be mixed with the herbicide at no more than half the rate specified on the label of the dye as it can reduce product performance, especially at lower herbicide application rates.

The maximum application rate of triclopyr is 9 lbs a.e. per acre per year.

Herbicides Approved for Aquatic Use

Only herbicides and surfactants approved for aquatic use should be used in riparian habitats for treatment of weed species. It is important to note that permits may not allow the use of a surfactant in riparian habitats. The purpose of a surfactant is to provide more uniform coverage and penetration of the herbicide into the plant. Approved aquatic herbicides include Round-up® Custom (active ingredient glyphosate)

and Renovate® 3 (active ingredient triclopyr). Non-ionic surfactants approved for aquatic use include Liberate® and Rainier®.

1.10 TARGET INVASIVE SPECIES CONTROL METHODS

The following are specific control methods for the target invasive species presented in this plan. As stated previously, no herbicides or mechanical mowing shall be done in the vernal pool watersheds and only physical control methods presented below shall be implemented for the target invasive species in the vernal pool watershed.

1.10.1 Artichoke Thistle

The type of herbicide used for artichoke thistle (*Cynara cardunculus*) control is dependent on its growth stage. In the seedling to rosette stage in winter to early spring, clopyralid (e.g., Transline®) should be applied at 1.5 to 4 oz a.e. per acre. Foliage should be thoroughly coated for effective control. The higher rates should be used if the plants are stressed or in areas with high weed density. Physical control methods include hand pulling seedlings and cutting plants in the rosette stage. When using physical methods, as much of the root system should be removed as possible to limit resprouting (DiTomaso et al. 2013). It should be noted that while physical control methods can effectively control artichoke thistle, it may take longer than chemical control methods with more treatments per year and more years of control.

For mature, bolting artichoke thistle plants, a foliar application of 2% glyphosate should be used. Glyphosate treatments should be done after bolting when the plants are actively translocating fluids to the root system. If sprayed before bolting, the above-ground material may die back, but many of the plants will resprout from the roots later in the season (Bossard et al. 2000).

Physical methods include cutting the mature plant and removing as much of the upper taproot as possible to prevent resprouting. Plants can be cut with a mower, line trimmer or hoe. The most effective cutting method is the use of a hoe to cut down below the soil to remove part of the upper tap root system. Mowers and brush cutters can be used to deplete mature plants of their resources. Repeat mowing will be necessary during the growing season prior to seed set over multiple seasons for effective control.

1.10.2 Australian Saltbush

Australian saltbush (*Atriplex semibaccata*) is a perennial subshrub that can be controlled by hand-pulling, removing as much of the root material as possible. While plants are easy to hand-pull, they are brittle, and care should be taken not to break the mainstem when pulling to ensure as much of the root material is removed as possible. Chemical methods of control include foliar application of glyphosate that can be used from postemergence to mature plants that are rapidly growing. If seeds are present before treatment, seeds should be carefully cut and removed from the plant and properly disposed of off-site.

1.10.3 Crown Daisy

Crown daisy (*Glebionis coronaria*) is an annual herb that reproduces from seed that can be controlled by hand-pulling removing as much of the root material as possible. Line trimming is most effective after the plant has flowered or produced fruits, cutting the plants as close to the base as possible. Follow-up treatments will likely be required if line trimming is the method used. Foliar application of glyphosate is most effective when the plant is mature but prior to seed set. If seed set has already occurred, line trimming should be the method used. If seeds are present before treatment, seeds should be carefully cut and removed from the plant and properly disposed of off-site.

1.10.4 Castor Bean

Castor bean (*Ricinus communis*) can be either a summer annual, perennial, shrub, or even a small tree up to 10 feet tall. The seeds are highly poisonous as well as to a lesser degree the foliage. Protective gloves should be worn during hand-pulling activities since all plant parts are toxic to humans. Hands should be thoroughly washed after working with castor bean.

Seedlings and smaller castor bean individuals should be hand-pulled, removing as much of the root system as possible to prevent resprouting. Medium sized individuals can be pulled with hand-held tools such as a weed wrench. Hand-pulling can be best accomplished in soils that are wet and even larger individuals can be hand-pulled in wet sandy soils. Hand-pulling is more difficult when soil conditions are dry and should not be the method used if most of the root system cannot be removed. If plants are broken during hand-pulling, they will readily resprout with multiple shoots from the root crown.

Mature plants should be treated with a foliar herbicide application of a 2% solution of glyphosate. Foliar herbicide application can occur at any life stage of the castor bean from seedlings to large mature plants. Control is optimum between seedling to bloom stage and is most effective at flower bud and flowering stage. Herbicide control should be done before seed production has started.

For larger individuals, the stump cut method as described above can be used. The cut stumps should be treated with a 25% solution of glyphosate applied to the cut stump. The stump cut treatment can be done on mature plants at any time of the year. Smaller plants can be cut with loppers while hand saws or chain saws may be required for larger plants.

If seed production has occurred prior to any treatment, seeds should be cut from the plant, bagged, and removed from the site to prevent the seeds from entering the weed seed bank.

1.10.5 Fountaingrass

Fountaingrass (*Pennisetum setaceum*) is a perennial grass that reproduces by seed. Small populations can be effectively controlled by digging up the plant removing as much of the root system as possible. Roots of mature plants can be dug out of the ground with a pick, shovel, or mattock. Flowers shall be cut and removed prior to

digging out the plant and the material bagged and removed from the site. Mowing is not an effective control method for fountaingrass.

Herbicide control methods included foliar application. Plants can be treated with fluazifop from postemergence to rapidly growing plants. Foliar application of glyphosate with a 1 to 2% solution is effective from postemergence to rapidly growing plants from mid-summer to fall. The most effective treatment timing for foliar application of glyphosate is during the flowering stage in the summer.

1.10.6 Giant Reed

Giant reed (*Arundo donax*) is a perennial grass that is bamboo-like with hollow cane-like stems that can grow upwards to 25 feet tall. Giant reed does not produce by seed but can readily reproduce from roots, rhizomes, and stem material.

Foliar herbicide spray should consist of spraying giant reed with an 8% solution of Roundup Custom™ (a glyphosate herbicide approved for aquatic use), and the surfactant Liberate® (approved for aquatic use) directly to exposed green foliage. The green foliage should be thoroughly wetted with herbicide with a minimum of 75% of the plant treated. Since the root and rhizomes of giant reed are so substantial sufficient herbicide needs to be translocated to the roots for effective control. Tall stalks shall be carefully bent downward, and herbicide solution applied, being careful to avoid spraying any adjacent native species. Similarly, giant reed in that is in or near standing water should be carefully bent so that the foliage is over land and not water for spraying.

Treatment shall occur when giant reed is actively growing starting early spring and is most effective at the end of summer or beginning of the fall season when it is actively translocating resources to its root system. Herbicide control is least effective during the winter months when temperatures are colder and giant reed is primarily dormant. Control of mature well-established stands of giant reed can take between 3 and 7 years to control where hydrologic conditions favor the regrowth of giant reed.

For large, dense giant reed stands with a lot of standing biomass, it may be necessary to cut the canes prior to herbicide treatments. When cutting is done, all cut cane material should be removed from the Park or mulched in place. Mulched in place canes should be thoroughly shredded to prevent potential resprouting from stem nodes. The initial cutting should be in the late fall/early winter. Follow-up herbicide treatment of giant reed resprouts as described above during the growing season will be necessary. It is recommended the resprouts are a minimum of three feet tall for there to be sufficient foliage to treat.

Giant reed can be removed by cutting the canes and digging up the roots, culms, and rhizomes. As much of the roots and rhizomes need to be removed as possible to prevent resprouting. Hand-removal is most efficient and effective for smaller infestations or in areas previously treated with herbicides and only a few viable giant reed canes remain. All plant material should be collected and properly disposed of off-site.

1.10.7 Milk Thistle and Italian Thistle

Milk thistle (*Silybum marianum*) is an annual or biennial species and typically emerges during the fall after first rains. Italian thistle (*Carduus pycnocephalus*) and slender flowered thistle (*Carduus tenuiflorus*) are annual species and seedlings emerge after the first rains.

Physical control methods include hand pulling seedlings, cutting with hand tools, or mowing. When using hand tools such as grubbing hoes, plants should be cut a minimum of 2 to 4 inches below the ground to prevent resprouting. Mowing is most effective when done after the plants have bolted and are about to flower, as plants will regrow if plants are cut before fully bolted. Plants should be cut or mowed prior to seed production.

The type of herbicide used for control is dependent on their growth stages. In the seedling to bud stage, clopyralid (e.g., Transline®) should be applied at 1.5 to 6 oz a.e. per acre for control of milk thistle and 1.5 to 8 oz a.e. per acre for Italian thistle and slender flowered thistle (DiTomaso et al. 2013). However, it should be noted that the maximum application rate for clopyralid in California is ⅔ pint per acre per annual growing season. Foliage should be thoroughly coated for effective control. The higher rates should be used if the plants are stressed or in areas with high weed density. A foliar application of 2% glyphosate for milk thistle and glyphosate at a rate of 1.5 to 3 lbs a.e. per acre for Italian thistle and slender flowered thistle can be used at any time during the growth stage for effective control.

1.10.8 Pride of Madeira

Pride of Madeira (*Echium candicans*) can be controlled by hand-pulling seedlings and younger plants. Larger mature plants can be controlled by cutting the upper foliage of the plant and digging out the root system. Plant foliage can be cut with a handsaw, loppers, axe, or similar tools and removed to allow for better access to the roots. The root material can be dug out and removed with a shovel, mattock, Pulaski, or similar tool. As much of the root material should be removed as possible for effective control since Pride of Madeira can readily resprout from remaining roots.

Foliar herbicide application of a 1 to 2% solution of glyphosate is most effective from late spring to summer and should be timed before seed production. Stump cut treatments can also be effective using glyphosate. If seed production has occurred prior to any treatment, seeds should be cut from the plant, bagged, and removed from the site to prevent the seeds from entering the weed seed bank.

1.10.9 Purple False Brome

Purple false brome (*Brachypodium distachyon*) is a fast growing annual or perennial grass with a short life cycle that allows for multiple life cycles during a growing season (Bakker et al. 2009). First emergence is typically during the fall after the first rains however, emergence can occur any time following a rain event. Purple false brome produces a dense thatch that inhibits germination of many native species and the first step for control is to eliminate the dense thatch in a restoration area. Initial mowing and

dethatching will allow for natural recruitment of natives; however, other nonnative herbaceous species can invade after clearing.

Treatment methods for the control of purple false brome include mowing, mechanized or line trimming and foliar herbicide application. When mowing, the plants should be cut as close to the ground as possible. Effective herbicide treatments include fluazifop at 4 to 6 oz a.i./acre from post-emergence to prior to the boot stage or 0.56 to 1.1 lb a.i. per acre of glyphosate from post-emergence application to rapidly growing, non-stressed plants (DiTomaso et al. 2013). Given the fast-growing nature of purple false brome and its ability to have multiple life cycles in a growing season, multiple treatments during a growing season are optimal for increased control. Treatments must be implemented prior to seed set to limit seed banking. Typical timing for treatments is to implement the first control event in winter after emergence with follow-up treatment(s) in spring for later germinating populations and resprouts.

Growth and flower production are dependent on annual rainfall and subsequent soil moisture availability. Monitoring growth and development is important particularly during drought years to plan treatment accordingly for effective control. For example, the flowering height of purple false brome in treatment areas was observed at only a height of 1 to 2 inches in response to the 2015 drought conditions. As a result, physical control methods, such as mowing required more time than usual to ensure that the tractor, or skid steer, mounted mower stayed close enough to the ground to cut the flowering parts of the grass. The low flowering height required the use of a flail mower, instead of a rotary mower, mounted to a hydraulically driven skid steer so the grass could be mowed at the soil surface. The additional time and equipment for the physical control of purple false brome control in dry years increases the cost of control. An alternative option for treating low stature plants is broadcast herbicide application of fluazifop or glyphosate.

1.10.10 Mustard Species

Control methods for mustard species such as black mustard (*Brassica nigra*), shortpod mustard (*Hirschfeldia incana*), and London rocket (*Sisymbrium irio*) consist of mowing, hand pulling, and foliar herbicide application. Mowing or hand cutting treatments are most effective for actively growing plants that have flowered but prior to setting seed to limit contributions back to the weed seed bank. Cutting is most effective for the annual mustard species black mustard and London rocket compared to the perennial shortpod mustard; however, follow-up treatments will likely be necessary for all the mustard species since resprouting can occur. Foliar herbicide application of a 2% solution of glyphosate is most effective when plants are younger prior to flowering, particularly for black mustard. When hand pulling, as much of the taproot as possible should be removed (DiTomaso et al. 2013).

Treatment times depend on annual weather, but typical treatment times are in the winter after emergence from rainfall and a follow-up treatment(s) in spring before seed set. Shortpod mustard can germinate and grow at any time of the year conditions are

right and follow-up treatments may be needed in the summer. Several years of control are necessary to eliminate mustard species.

1.10.11 Nonnative Grass Control

Ripgut brome (*Bromus diandrus*) is a nonnative annual grass that typically emerges after the first rains. Growth and development are dependent upon rainfall events, with flower production earlier in the season during drought years along with a decrease in biomass and height of the plants. Nonnative annual grasses are typically the first nonnative species to germinate after rains. Control methods include, hand pulling, cutting, mowing, and herbicide application. Timing for control of nonnative grasses is typically in winter with follow-up treatments in spring for later-germinating individuals.

Smaller infestations can be controlled with hand pulling before seed development. Mowing can reduce seed production when timed right after flowering but before seeds mature. Plants cut earlier than this stage will grow back. When mowing, the material should be cut to about 2 inches to remove the bolting stems (DiTomaso et al. 2013). If mowing is the only option for control, mowing should be repeated every 3 weeks, as needed.

Ripgut brome can be controlled with a 0.375 to 1.1 lbs a.e. per acre of glyphosate at postemergence in early spring to rapidly growing plants that are not stressed. Fluazifop at a rate of 4 to 6 oz a.i. per acre for mature plants and 2 oz a.i. per acre for seedlings can also be used with the most effective treatment time before the boot stage.

1.10.12 Poison Hemlock

Poison hemlock (*Conium maculatum*) is a biennial species that reproduces by seed. For small infestations, hand-pulling is the recommended method for control. When hand-pulling, the entire taproot should be removed to prevent resprouting. Care should be taken when handling poison hemlock as all plant parts are toxic to humans. Gloves should be worn during control activities and hands should be thoroughly washed after working with poison hemlock. This includes handling of dried material since it takes several years for the toxins present to dissipate. Foliar application of a 1 to 1.5% glyphosate solution is most effective from postemergence to rapidly growing plants prior to bolting. Higher rates of glyphosate can be used for control of plants from bud to full bloom stage. If seed production has occurred prior to any treatment, seeds should be cut from the plant, bagged, and removed from the site to prevent the seeds from entering the weed seed bank.

1.10.13 Stinknet

Stinknet (*Oncosiphon pilulifer*) is an annual species that reproduces from seed that can be controlled by physical methods or chemical methods. Hand-pulling removing all the root material is the best method and is recommended for smaller infestations. Larger populations can be controlled with line trimming once plants reach the bud stage. If viable seed has already formed, line trimming is not recommended since the seed can be easily dispersed, unless the seed material can be removed before cutting. Follow-up control will be needed if cutting is the method used. Care should be taken when

handling stinknet as it can cause contact dermatitis for some individuals. Protective gear includes long sleeve shirts, pants, and gloves to prevent skin contact. Chemical control methods include foliar application of glyphosate. Timing of chemical control methods is critical, and plants should be treated in the rosette stage up to bolting stage but before flowering. Once the plants have flowered, chemical control efficacy diminishes (McDonald, 2023).

1.10.14 Sweet Fennel

Sweet fennel (*Foeniculum vulgare*) is a perennial species that typically emerges in mid-winter to early spring. Control methods include slashing, hand pulling, and herbicide application. Slashing is best used just before the flowering stage of fennel plants, but repeated slashing of new growth is likely required to kill the plant. Hand pulling is best for seedlings and younger, smaller plants as the root system needs to be removed for effective control. When cutting or digging out plants a minimum of 3 to 6 inches of the taproot should be removed for effective control. Physical methods for control of sweet fennel are very labor intensive. It is important to note that digging up plants causes soil disturbance that can lead to increased germination of exposed seeds therefore, digging should be limited to less dense populations (DiTomaso et al. 2013).

Foliar herbicide application of a 2 to 5% solution of glyphosate is most effective from post-emergence to prior to flowering stage. Control with glyphosate is less effective after fennel has bolted (DiTomaso et al. 2013). A 0.5 to 1% solution of triclopyr is most effective during the wet season from late February to early March (DiTomaso. et al. 2013) but can be used from post emergence but prior to flowering. The stump cut method can be used for larger mature plants using a 100% solution of glyphosate.

Timing for treatments is dependent on weather with the first treatment typically in late winter with follow-up treatments in spring. Populations should be checked after using any treatment method to check for resprouts and new seedlings.

1.10.15 Target Annual Invasive Control in the Vernal Pool Watershed

Specific target invasive species to be controlled in the vernal pool watershed include five horn bassia (*Bassia hyssopifolia*), curly dock (*Rumex crispus*), Russian thistle (*Salsola australis*), and buffalobur (*Solanum rostratum*). Control shall be by hand-pulling or line-trimming methods. When hand-pulling, as much of the root material shall be removed as possible. For curly dock, a perennial species, as much of the tap root, at least to a depth of 2 inches, shall be removed to prevent resprouting. Mowing should be done before seed production. Multiple mowing events should be planned to treat subsequent resprouts, including for annual species.

1.11 Effectiveness Monitoring and Reporting

In addition to annual invasive plant surveys by a qualified biologist (see Section 1.6) to determine the appropriate method and timing of control events, and sensitive species surveys (see Section 1.5) before work in sensitive habitat areas during the bird breeding

season, control effectiveness monitoring should also be performed. Effectiveness monitoring involves an annual survey of invasive plant control effectiveness, conducted at least one month after the last annual invasive plant treatment. This survey assesses treated invasive plant populations' estimated size and new locations to guide recommendations for the following year.

The Qualified Biologist should confirm treatments are executed during the year and record key information for a running treatment log, including treatment location, species treated, treatment timing, and treatment method. Treatment areas' spatial locations can be tracked using the 2023 vegetation cover map, recording the polygon in which treatment occurred based on the vegetation map geodatabase. Alternatively, GPS locations can be collected at control locations and entered into a geodatabase for archiving treatment locations.

Recording control treatments is essential for invasive plant management, demonstrating treatment effectiveness and facilitating adaptive management when necessary. More detailed information allows for better management practice adjustments as needed. If resources and time for monitoring and reporting are limited, a minimum amount of basic information should be collected to inform decision-making.

All eradicated populations should be monitored for at least three years to ensure no new recruits emerge from the weed seed bank. Continued surveying is necessary for target invasive species that have been eradicated but are present in the surrounding area and have a high probability of reinvading the park, focusing on areas with the highest potential for recurrence.

Comparing year-to-year monitoring results can yield analytical insights, such as:

- Increase or decrease in target invasive cover within mapped populations and parkwide.
- New occurrences or spread of currently targeted invasive species.
- Eradication of a target invasive weed species.

These quantitative results can document the weed management program's success, help secure future funding sources, and guide adaptive management recommendations to improve future invasive weed management efforts.

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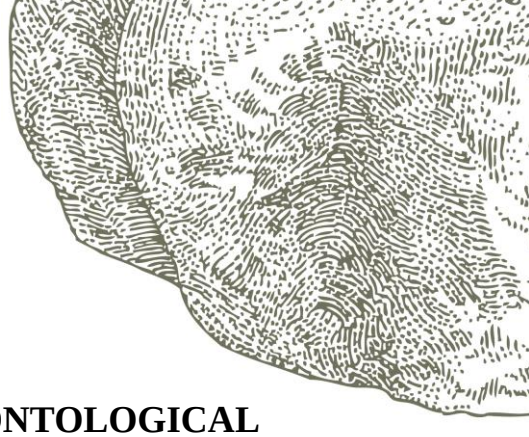
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cogstone
PALEONTOLOGY - ARCHAEOLOGY - HISTORY



CULTURAL, TRIBAL CULTURAL, AND PALEONTOLOGICAL RESOURCES ASSESSMENT FOR THE FAIRVIEW MASTER PLAN UPDATE PROJECT, CITY OF COSTA MESA, ORANGE COUNTY, CALIFORNIA

Prepared for:
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Cogstone Project Number: 5673
Type of Study: cultural, Native American, and paleontological resources assessment
Archaeological Sites: P-30-000058, P-30-000506, P-30-001667, P-30-001740
USGS 7.5' Quadrangle: Newport Beach
Area: 208 acres
Key Words: .Fairview Park; cultural, Native American, and paleontological resources assessment, damage assessment

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SUMMARY OF FINDINGS

The proposed Project intends to enhance the passive use (walking, biking, picnicking, quiet contemplation) of Fairview Park while continuing to protect the cultural and biological resources within the park, located in Costa Mesa, Orange County. The total size of the Project Area is approximately 208 acres and is located at 2525 Placentia Avenue, Costa Mesa, Orange County, California.

The City of Costa Mesa is seeking to expand the previously approved Fairview Park Master Plan. The Master Plan Project (Project) proposes specific developments to the park to preserve, protect and enhance the unique natural and cultural resources of the park. The Project consists of the restoration of the 208 acres of the park for continued passive use by the community and the natural habitats, as well as protect the cultural sites within the park boundaries. The Project will require implementation of laws, concepts, policies and activities such as Measure AA, restoration project, new maintenance practices and conservation easement concepts.

Cogstone archaeologist Logan Freeberg requested a search of the California Historical Resources Information System (CHRIS) from the South Central Coastal Information Center (SCCIC) located at California State University, Fullerton on August 24, 2023, which included the entirety of Fairview Park. Results of the record search indicate that 17 previous studies have been completed within the Park; seven of these postdate the 2002 Fairview Park Master Plan.

A total of four cultural resources have been previously recorded within the Park. These consist of two prehistoric archaeological sites (one NRHP listed and one unevaluated), one multicomponent archaeological site, and one historical archaeological site.

Cogstone archaeologist Logan Freeberg requested a Sacred Lands File (SLF) search from the Native American Heritage Commission (NAHC) on October 19, 2023. The NAHC responded on December 4, 2023 with a positive search result indicating that a tribal cultural resource is located within the same township, range, and section as the Project Area. The NAHC recommended that the Gabrieleño Band of Mission Indians – Kizh Nation, the Gabrieleño/Tongva San Gabriel Band of Mission Indians, the Juaneño Band of Mission Indians, and the Juaneño Band of Mission Indians Acjachemen Nation – Belardes be contacted for more information and provided a list of nine groups and individuals that may have information about the Project Area.

Cogstone sent letters inviting all groups and individuals on the NAHC to engage in Native American tribal consultations under Assembly Bill (AB) 52 and Senate Bill (SB) 18 on via United States Postal Service certified mail on October 7, 2024. Cogstone followed up via electronic mail (original consultation letter was attached) message on October 25, 3024 and by telephone call on November 8, 2024. (Appendix C). Cogstone also sent Native American Scoping letters to two individuals representing groups that are not on the NAHC list but may have information about the Project Area, on the same schedule. Cogstone is aware of fiveresponses total.

On October 25, 2024, Juaneno Band of Mission Indians, Belardes Cultural Resources Director

Joyce Perry responded via electronic mail indicating that Tribes wishes to engage in formal consultation on this project. This project is located in an extremely sensitive area to our tribe. Farview park is located on the sacred village site and known burial area of Genga. This place is also identified as the archaeological site CA-ORA-58 which is listed on the National Register of Historic Places

On November 8, 2024, a representative of the Gabrieleño Band of Mission Indians-Kizh Nation indicated during a telephone call that the Tribe would respond to City representative Kelly Dalton.

On November 8, 2024, a representative of the Gabrielino/Tongva Indians of California Tribal Council indicated that Cultural Resource Administrator Christina Conley will respond to the follow up electronic mail message sent on October 25, 2024

On October 28, 2024, Gabrielino-Tongva Tribe Sam Dunlap responded to the October 25, 2024 follow up electronic mail indicating that the Tribe does wish to engage in SB 18 and AB52 consultation and would contact City representative Kelly Dalton.

On November 8, 2024, Soboba Band of Luiseno Indians Tribal Historic Preservation Officer Joseph Ontiveros responded during a follow up telephone call that they will defer to local tribes within the Project Area.

On April 3, 2024, Cogstone archaeologists Pamela Gutierrez and Alyssa Polito conducted a field survey of the boundaries of the previously documented cultural resources P-30-000058 and P-30-000506 to assess damage to the resources caused by runoff, unauthorized “social” walking trails, vegetation clearing, etc. Ms. Gutierrez and Ms. Polito conducted the survey in 10-meter transects and by following the narrow, cleared paths along the park and site boundaries. Due to the previous rainstorms in the area, many of the paths were flooded, making survey of certain areas impossible for safety reasons. Vegetation overgrowth also limited survey, with ground visibility in both P-30-000058 and P-30-000506 at about five percent visibility. Vegetation included native brush, barley, sagebrush, prickly pear, bush sunflower, wild mustard, buckwheat, fennel, shrubs, golden bush, and grass. Native fauna was present such as rabbits, rodents, birds, insects and lizards, as well as warning signs for rattlesnakes and coyotes within the site boundaries.

The eastern edge of P-30-000506 could not be accessed due to fencing and was mostly covered by landscaping for the Costa Mesa Golf Course. There was a paved and cemented trail and train tracks throughout this site area. No cultural material was identified at the surface in this survey.

Cogstone archaeologist Sandy Duarte returned to the Park to complete the damage assessment survey on April 19, 2024 and was able to identify and quantify additional areas of disturbance to the cultural resources. Disturbances identified were in the form of social trails that de-vegetated the ground surface and resulted in erosion due to water movement and pedestrian and bicycle-based travel. Disturbances averaged approximately two feet wide and five to eight inches in depth.

Ground visibility in undisturbed areas was still poor, approximately five percent. The ground

visibility was low but one area of shell midden was visible within P-30-000058. Department of Parks and Recreation (DPR) 523 series site record updates were completed for P-30-000058 and P-30-000506 resources.

No paleontological resources were identified during the survey.

PALEONTOLOGICAL RESOURCES

The geology of the Project Area consists of middle to late Pleistocene old paralic deposits emplaced between 774,000 [774 ka] to 126 ka and late Pleistocene to Holocene young alluvial fan deposits less than 126 ka. No fossils were observed during the survey.

Unnamed Pleistocene deposits have produced fossils of mammoth and camel less than half a mile to the north of the Project Area. While these fossils were approximately 15 feet below the surface, other nearby localities have been recovered from as little as six feet deep. Other extinct vertebrates recovered from unnamed Pleistocene deposits near to the Project Area include ground sloths, sabre-toothed cat, California tapir, horses, camels, bison, mammoths, proboscidean, black vulture. Other megafauna recovered locally include deer and sea turtle, as well as a variety of small vertebrates that are found in southern California today.

Fossils recovered from the "Palos Verdes Sand" appear to have come from the old paralic deposits (Qopf) which are also mapped within the study area. This is a highly productive unit which has produced numerous marine and nonmarine fossils, many of which are still found in the California area today. Extinct vertebrates recovered from these sediments include ground sloths, dire wolf, tapirs, horse, llama, camels, bison, Pacific mastodon, Del Rey gannet, and flightless sea duck. Other megafauna recovered include mule deer, pronghorn(?), Steller sea lion, California sea lion, sea otter, elephant seal, whale, and sea turtles. The marine invertebrate record from these deposits is extensive with over 200 species known from the Newport Bay area.

All sediments within the study area are assigned a moderate sensitivity (PFYC 3). These units have finer grained deposits and have a good potential to produce fossils (and probably fossils have been recovered from them in the past). The required excavation depth for the following is dependent on how thick the unit is and the sensitivity of what lies under the surficial deposit.

- In general, more than five feet below the original surface of middle to late Pleistocene old axial channel/ flood plain, paralic, and marine units. At five feet deep the sediments are usually Pleistocene. On the paleontological sensitivity maps, these are mapped as moderate at the surface.
- In general, more than eight feet below the original surface of late Pleistocene to Holocene distal alluvial fans. At eight feet deep the sediments are usually Pleistocene. On the paleontological sensitivity maps, these are mapped as low at the surface.

MM PAL-1. City staff shall require applicants for future proposed projects with planned impacts in undisturbed sediments ranked moderate or above to either (1) provide a technical paleontological assessment consisting of a record search, survey, background context and project specific recommendations performed by a qualified paleontologist (with a graduate degree and a specialization in vertebrate paleontology) or (2) agree to monitoring all excavations below five

feet. If resources are known or reasonably anticipated the recommendations shall provide a detailed mitigation plan which shall require monitoring during grading and other earthmoving activities in undisturbed sediments, provides a fossil recovery protocol that includes data to be collected, requires professional identification, radiocarbon dates and other special studies as appropriate, requires curation at local curation facility such as such as the John D. Cooper Center operated by the County of Orange for fossils meeting significance criteria, requires a comprehensive final mitigation compliance report including a catalog of fossil specimens with museum numbers and an appendix containing a letter from the museum stating that they are in possession of the fossils.

CULTURAL RESOURCES

Based on the SCCIC records search, especially the documented history of CA-ORA-000058, the positive SLF search, and informal conversations with local tribes, Fairview Park has extremely high sensitivity for buried Native American origin cultural resources. The available data also indicate a low to moderate, patchy sensitivity for European-origin cultural resources.

A review of the site records for resources within Fairview Park also indicates that the Park area should be considered a single unified Native American cultural landscape rather than as a place with four separate archaeological sites.

MM CUL-1. The City staff shall ensure that qualified cultural resources and Native American monitors are present for all ground disturbing activities, and all vegetation clearance that is beyond normal maintenance that occurs within Fairview Park

MM CUL-2. The City shall ensure that an Archaeological Treatment Plan including a presence/absence testing program and a contingent data recovery program is prepared by a qualified archaeologist prior to ground disturbing activities that extends below the historic ploughzone.
Cogstone also recommends additional signage and physical barriers to prevent the use of existing, and creation of new, social trails. Revegetation of existing social trail areas should be a goal, in coordination with plant biologists, with no till options being preferred.

In the event of an unanticipated discovery, all work must be suspended within 50 feet of the find until a qualified archaeologist evaluates it. In the unlikely event that human remains are encountered during project development, all work must cease near the find immediately.

In accordance with California Health and Safety Code Section 7050.5, the County Coroner must be notified if potentially human bone is discovered. The Coroner will then determine within two working days of being notified if the remains are subject to his or her authority. If the Coroner recognizes the remains to be Native American, he or she shall contact the Native American Heritage Commission (NAHC) by phone within 24 hours, in accordance with Public Resources Code Section 5097.98. The NAHC will then designate a Most Likely Descendant (MLD) with respect to the human remains. The MLD then has the opportunity to recommend to the property owner or the person responsible for the excavation work means for treating or disposing, with

appropriate dignity, the human remains and associated grave goods. Work may not resume in the vicinity of the find until all requirements of the health and safety code have been met.

INTRODUCTION

PURPOSE OF STUDY

This study was conducted to determine the potential impacts of cultural resources during the Fairview Park Master Plan Project (Project), City of Costa Mesa, Orange County, California (Figure 1). The City of Costa Mesa is the lead agency under the California Environmental Quality Act (CEQA).

PROJECT DESCRIPTION AND LOCATION

The City of Costa Mesa is seeking to expand the previously approved Fairview Park Master Plan. The Master Plan Project proposes specific developments to the park to preserve, protect and enhance the unique natural and cultural resources of the park. The Project consists of the restoration of the 208 acres of the park for continued passive use by the community and the natural habitats, as well as protect the cultural sites within the park boundaries. The Project will require implementation of laws, concepts, policies and activities such as Measure AA, restoration project, new maintenance practices and conservation easement concepts.

Fairview Park is located on approximately 208 acres of land in the City of Costa Mesa at 2525 Placentia Avenue, Costa Mesa, Orange County, California (Figures 2 and 3). Placentia Avenue bisects the Park north-south allowing access to the east and west halves. The Project site is surrounded by a suburban neighborhood to the north, the Costa Mesa Country Club golf course to the east, two schools to the south, and the Talbert Nature Reserve and Santa Ana River along the west.

The Project is located within Sections 8, 9 and 17, Township 6 South, Range 10 West on the Newport Beach United States Geological Survey (USGS) 7.5-minute topographic quadrangle maps, San Bernardino Baseline and Meridian.

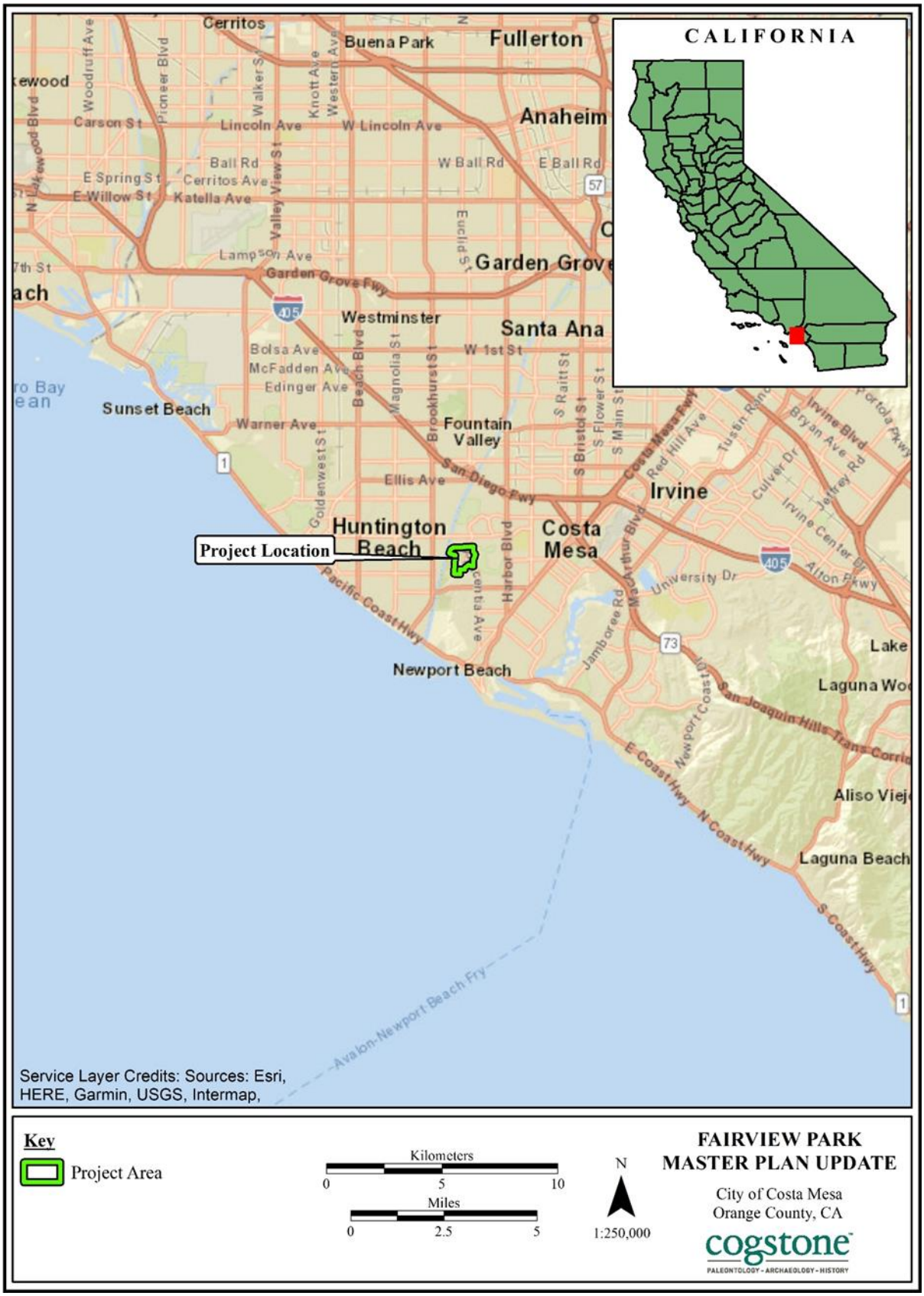


Figure 1. Project vicinity map

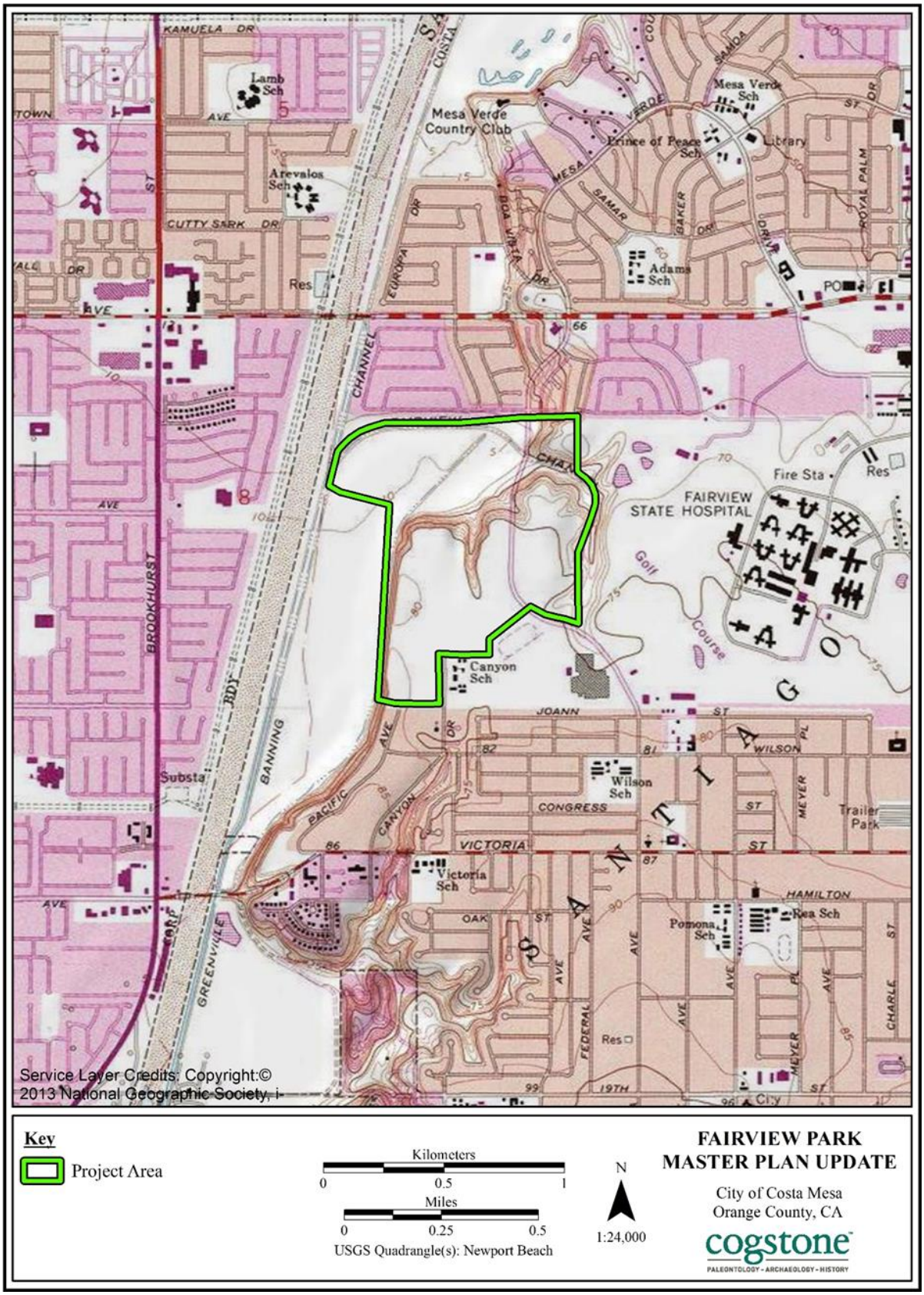


Figure 2. Project location map

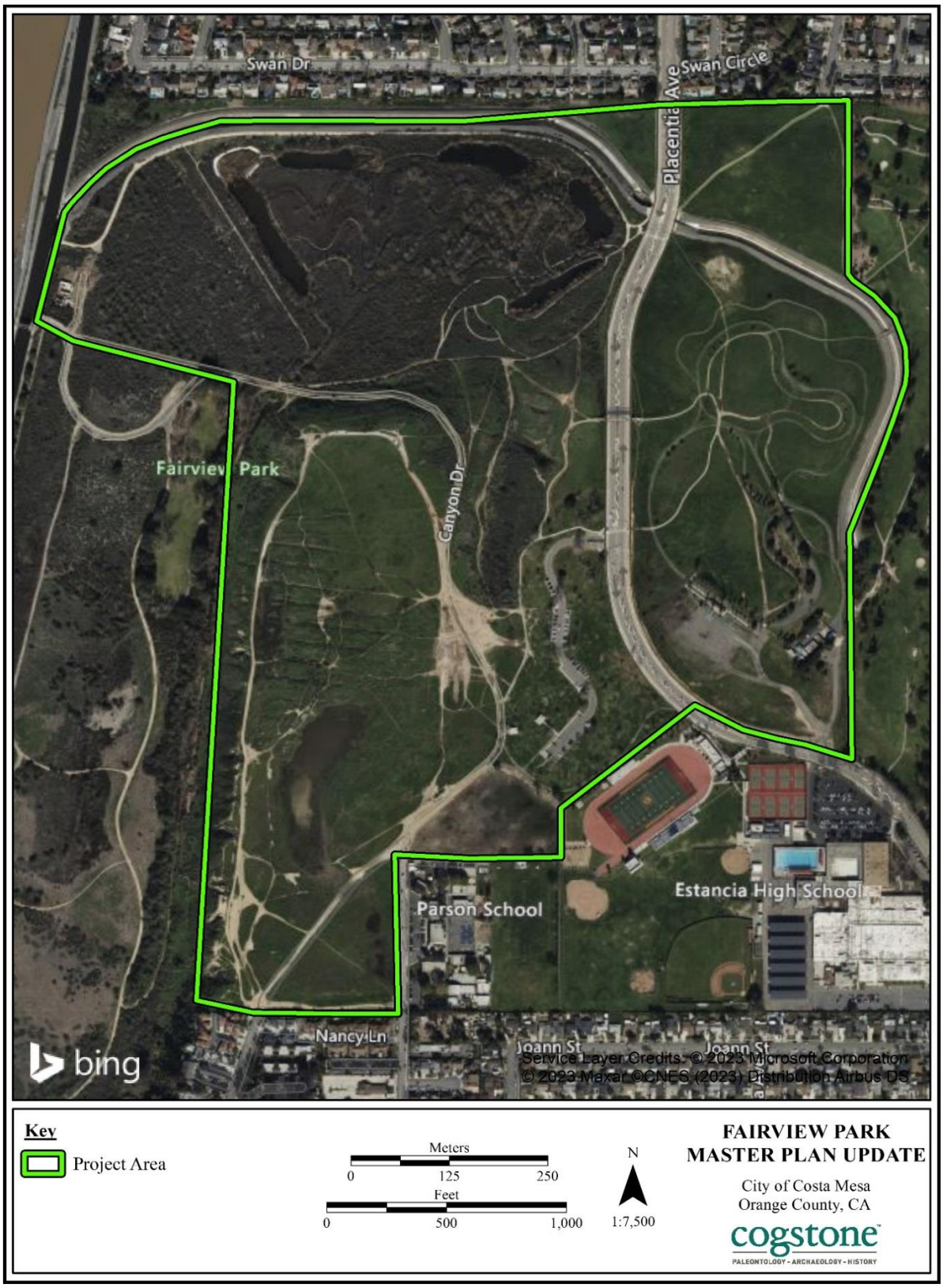


Figure 3. Project Area map

PROJECT PERSONNEL

Cogstone Resource Management (Cogstone) conducted the cultural and paleontological assessment and authored this report. Resumes of key personnel are provided in Appendix A.

John Gust, Registered Professional Archaeologist (RPA), served as the Task Manager and Principal Investigator for Archaeology for the Project, and co-authored this report. Dr. Gust has a Ph.D. in Anthropology from the University of California (UC), Riverside, and over 11 years of experience in archaeology.

Pamela Gutierrez conducted the pedestrian survey within known sensitive areas of the Park and co-authored this report. Ms. Gutierrez has a B.A. in Anthropology, from California State University (CSU), Northridge and six years of experience in southern California archaeology.

Kim Scott wrote the paleontology and geology sections of this report. Ms. Scott has an M.S. in Biology with an emphasis in paleontology from CSU San Bernardino, a B.S. in Geology with an emphasis in paleontology from the University of California, Los Angeles (UCLA), and over 28 years of experience in California paleontology and geology.

Molly Valasik, RPA, provided Quality Assurance and Quality Control (QA/QC) for the Project and reviewed this report. Ms. Valasik has an M.A. in Anthropology from Kent State University in Ohio and over 15 years of experience in California archaeology.

Eric Scott provided QA/QC of the paleontology and geology sections of this report. Mr. Scott has an M.A. in Anthropology, with an emphasis in biological paleoanthropology, from UCLA, and more than 40 years of experience in California paleontology.

Sandy Duarte conducted the pedestrian survey within known sensitive areas of the Park. Ms. Duarte has a B.A. in Archaeology from UC Santa Barbara, and more than 20 years of experience in southern California archaeology.

Alyssa Polito assisted with the pedestrian survey within known sensitive areas of the Park. Ms. Polito has a B.A. in Anthropology from CSU Long Beach and two years of experience in southern California archaeology.

REGULATORY ENVIRONMENT

FEDERAL LAWS AND REGULATIONS

NATIONAL HISTORIC PRESERVATION ACT

The National Historic Preservation Act (NHPA) is the primary federal law governing the preservation of cultural and historic resources in the United States. The law establishes a national preservation program and a system of procedural protections which encourage the identification and protection of cultural and historic resources of national, state, tribal and local significance. A primary component of the act requires that federal agencies take into consideration actions that could adversely affect historic properties listed or eligible for listing on the National Register of Historic Places, known as the Section 106 Review Process.

NATIONAL REGISTER OF HISTORIC PLACES

The National Register of Historic Places is the nation's official list of buildings, structures, objects, sites, and districts worthy of preservation because of their significance in American history, architecture, archeology, engineering, and culture. The National Register recognizes resources of local, state and national significance which have been documented and evaluated according to uniform standards and criteria.

Authorized under the National Historic Preservation Act of 1966, the National Register is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect historic and archeological resources. The National Register is administered by the National Park Service, which is part of the U. S. Department of the Interior.
To be eligible for listing in the National Register, a resource must meet at least one of the following criteria:

A. Is associated with events that have made a significant contribution to the broad patterns of our history
B. Is associated with the lives of persons significant in our past
C. Embodies the distinctive characteristics of a type, period or method of construction, or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components may lack individual distinction
D. Has yielded, or may be likely to yield, information important in history or prehistory

NATIONAL ENVIRONMENTAL POLICY ACT

NEPA directs federal agencies to use all practicable means to “Preserve important historic, cultural, and natural aspects of our national heritage…”. If the presence of a significant environmental resource is identified during the scoping process, federal agencies and their agents must take the resource into consideration when evaluating project effects. Consideration of paleontological resources may be required under NEPA when a project is proposed for

development on federal land, or land under federal jurisdiction. The level of consideration depends upon the federal agency involved.

ANTIQUITIES ACT

The Antiquities Act states, in part: That any person who shall appropriate, excavate, injure or destroy any historic or prehistoric ruin or monument, or any object of antiquity, situated on lands owned or controlled by the Government of the United States, without the permission of the Secretary of the Department of the Government having jurisdiction over the lands on which said antiquities are situated, shall upon conviction, be fined in a sum of not more than five hundred dollars or be imprisoned for a period of not more than ninety days, or shall suffer both fine and imprisonment, in the discretion of the court.

Although there is no specific mention of natural or paleontological resources in the Act itself, or in the Act's uniform rules and regulations [Title 43 Part 3, Code of Federal Regulations (CFR)], "objects of antiquity" has been interpreted to include fossils by the National Park Service, the Bureau of Land Management, the Forest Service, and other Federal agencies.

STATE LAWS AND REGULATIONS

CALIFORNIA ENVIRONMENTAL QUALITY ACT

CEQA states that: It is the policy of the state that public agencies should not approve projects as proposed if there are feasible alternatives or feasible mitigation measures available which would substantially lessen the significant environmental effects of such projects, and that the procedures required are intended to assist public agencies in systematically identifying both the significant effects of proposed project and the feasible alternatives or feasible mitigation measures which will avoid or substantially lessen such significant effects.

CEQA declares that it is state policy to: "take all action necessary to provide the people of this state with...historic environmental qualities." It further states that public or private projects financed or approved by the state are subject to environmental review by the state. All such projects, unless entitled to an exemption, may proceed only after this requirement has been satisfied. CEQA requires detailed studies that analyze the environmental effects of a proposed project. In the event that a project is determined to have a potential significant environmental effect, the act requires that alternative plans and mitigation measures be considered.

TRIBAL CULTURAL RESOURCES

As of 2015, CEQA established that "[a] project with an effect that may cause a substantial adverse change in the significance of a tribal cultural resource is a project that may have a significant effect on the environment" (Public Resources Code, § 21084.2). In order to be considered a "tribal cultural resource," a resource must be either:

(1) listed, or determined to be eligible for listing, on the national, state, or local register of historic resources, or
(2) a resource that the lead agency chooses, in its discretion, to treat as a tribal cultural resource.

To help determine whether a project may have such an effect, the lead agency must consult with any California Native American tribe that requests consultation and is traditionally and culturally affiliated with the geographic area of a proposed project. If a lead agency determines that a project may cause a substantial adverse change to tribal cultural resources, the lead agency must consider measures to mitigate that impact. Public Resources Code §20184.3 (b)(2) provides examples of mitigation measures that lead agencies may consider to avoid or minimize impacts to tribal cultural resources.

PUBLIC RESOURCES CODE

Section 5097.5: No person shall knowingly and willfully excavate upon, or remove, destroy, injure or deface any historic or prehistoric ruins, burial grounds, archaeological or vertebrate paleontological site, including fossilized footprints, inscriptions made by human agency, or any other archaeological, paleontological or historical feature, situated on public lands (lands under state, county, city, district or public authority jurisdiction, or the jurisdiction of a public corporation), except with the express permission of the public agency having jurisdiction over such lands. Violation of this section is a misdemeanor. As used in this section, "public lands" means lands owned by, or under the jurisdiction of, the state, or any city, county, district, authority, or public corporation, or any agency thereof.

CALIFORNIA REGISTER OF HISTORICAL RESOURCES

The California Register of Historical Resources (CRHR) is a listing of all properties considered to be significant historical resources in the state. The California Register includes all properties listed or determined eligible for listing on the National Register, including properties evaluated under Section 106, and State Historical Landmarks No. 770 and above. The California Register statute specifically provides that historical resources listed, determined eligible for listing on the California Register by the State Historical Resources Commission, or resources that meet the California Register criteria are resources which must be given consideration under CEQA (see above). Other resources, such as resources listed on local registers of historic resources or in local surveys, may be listed if they are determined by the State Historic Resources Commission to be significant in accordance with criteria and procedures to be adopted by the Commission and are nominated; their listing in the California Register is not automatic.

Resources eligible for listing include buildings, sites, structures, objects, or historic districts that retain historical integrity and are historically significant at the local, state or national level under one or more of the following four criteria:

1) It is associated with events that have made a significant contribution to the broad patterns of local or regional history, or the cultural heritage of California or the United States;
2) It is associated with the lives of persons important to local, California, or national history;
3) It embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of a master or possesses high artistic values; or
4) It has yielded, or has the potential to yield, information important to the prehistory or history of the local area, California, or the nation.

In addition to having significance, resources must have integrity for the period of significance. The period of significance is the date or span of time within which significant events transpired, or significant individuals made their important contributions. Integrity is the authenticity of a historical resource's physical identity as evidenced by the survival of characteristics or historic fabric that existed during the resource's period of significance.

Alterations to a resource or changes in its use over time may have historical, cultural, or architectural significance. Simply, resources must retain enough of their historic character or appearance to be recognizable as historical resources and to convey the reasons for their significance. A resource that has lost its historic character or appearance may still have sufficient integrity for the California Register, if, under Criterion 4, it maintains the potential to yield significant scientific or historical information or specific data.

NATIVE AMERICAN HUMAN REMAINS

Sites that may contain human remains important to Native Americans must be identified and treated in a sensitive manner, consistent with state law (i.e., Health and Safety Code §7050.5 and Public Resources Code §5097.98), as reviewed below:

In the event that human remains are encountered during project development and in accordance with the Health and Safety Code Section 7050.5, the County Coroner must be notified if potentially human bone is discovered. The Coroner will then determine within two working days of being notified if the remains are subject to his or her authority. If the Coroner recognizes the remains to be Native American, he or she shall contact the Native American Heritage Commission (NAHC) by phone within 24 hours, in accordance with Public Resources Code Section 5097.98. The NAHC will then designate a Most Likely Descendant (MLD) with respect to the human remains. The MLD then has the opportunity to recommend to the property owner or the person responsible for the excavation work means for treating or disposing, with appropriate dignity, the human remains and associated grave goods.

CALIFORNIA ADMINISTRATIVE CODE, TITLE 14, SECTION 4307

This section states that "No person shall remove, injure, deface or destroy any object of paleontological, archeological or historical interest or value."

CITY OF COSTA MESA GENERAL PLAN REQUIREMENTS

The Environmental Impact Report for the 2015-235 City of Costa Mesa General Plan includes Objective HCR-1A. Encourage the preservation and protection of the City's natural and man-made historic resources.

Policies pertinent to Fairview Park that support this objective are:

POLICY HCR-1.DA.4
Require, as part of the environmental review procedure, an evaluation of the significance of paleontological, archaeological, and historical resources and the impact of proposed development on those resources.

POLICY HCR-1.FA.6
Encourage development of an interpretive center for paleontological, archaeological, and historical resources at Fairview Park. The center may contain resources found in the park area as well as resources found throughout the City.

REQUIREMENTS EXCERPTED FROM 2008 FAIRVIEW PARK MASTER PLAN
The important resources of the archaeological sites require protection and preservation. Development of active uses or buildings in the area of these deposits will require mitigation measures including extensive research and/or capping. The fill soils found on the CA-ORA-58 site were placed in response to active uses or ball fields once planned for this area. The CA-ORA-506 site exists in the northern vicinity of the train operation. Any new heavy construction in this area will require monitoring and study by a certified archaeologist.

Decomposed granite, soil, or shell midden [may be installed] where these [cultural midden] materials are exposed. Boardwalk may be installed as a mitigation if midden area becomes degraded from public use.

Trail delineators and landscape buffers [will be used to confine public use to established walkways].

Erosion control measures [will be constructed] along the western bluff. This measure will arrest the deteriorating land area and protect the CA-ORA-58 archaeological site.

[T]he fill material that was deposited as a cap for the CA-ORA-58 archaeological site [should be removed]. This material contains asphalt, concrete, and other foreign material, which may further degrade the site. The removal of this material will be necessary before any restoration may begin in this area. Prior to the removal of the debris, a phasing plan is to be developed, which is to develop methods for preserving species of wildlife currently occupying the uneven terrain. Once

the fill soils are removed, restoration of vegetation and protective trail delineation must be immediately commenced in order to protect the archaeological site.

The area of the Park west of Placentia Avenue is dedicated to uses requiring few constructed facilities and is to be restored to its natural conditions. This area contains the vernal pools, fragments of other native plant communities and the CA-ORA-58 archaeological site, each of which require careful protection. The vernal pools are recognized as a significant and rare resource to be restored. General Park use traffic is to be limited to the trails in the archaeological area and in the natural restoration.

BACKGROUND

GEOLOGICAL SETTING

The broad, valley portion of the study area is called the Tustin Plain. The Tustin Plain is bounded by the Santa Ana Mountains to the east, the Puente and Coyote Hills to the north, the Pacific Ocean to the west, and the San Joaquin Hills to the south. Orange County is in the northern extent of the California Geomorphic Province known as the Peninsular Ranges. This geomorphic province is located in the southwestern corner of California and is bounded by the Transverse Ranges Geomorphic Province to the north and the Colorado Desert Geomorphic Province to the east. It extends from Mount San Jacinto in the north, through the tip of Baja, Mexico in the south. The Peninsular Ranges Geomorphic Province is characterized by elongated northwest-trending mountain ranges separated by sediment-filled valleys. Faults branching off from the San Andreas Fault to the east create the local mountains and hills. The northwestwards motion of the Pacific Plate relative to the North American Plate has created these ranges and their corresponding valleys (Wagner 2002).

PALEONTOLOGICAL SETTING

Orange County has a complicated paleoenvironmental history which began at the age of dinosaurs about 250 million years ago. The past 250 Ma has seen the region transition from marine in the Triassic through the Cretaceous, to coastal lowlands during the Paleocene to Oligocene, to shallow marine during the early Miocene, to deep marine during the early to early-late Miocene, back to shallow marine in the latest Miocene through the Pliocene, and finally to increasingly arid terrestrial deposits from the Pleistocene to the Holocene. In addition, younger sediments have been washed into the ocean by the action of streams. Details on each geological unit is in the Stratigraphy Section below.

STRATIGRAPHY

Geologic mapping by Morton and Miller (2006) maps the area as middle to late Pleistocene old paralic deposits emplaced between 774,000 [774 ka] to 126 ka and late Pleistocene to Holocene young alluvial fan deposits less than 126 ka (Figure 4).

OLD PARALIC DEPOSITS (QOPF)

Paralic deposits were emplaced during the middle to late Pleistocene adjacent to the ocean and include interfingered strandline, beach, estuarine, and colluvial deposits. These poorly sorted, moderately permeable, reddish-brown, are composed of silt, sand, and cobbles. The top of the unit is capped by thin but extensive sand-rich alluvial fan deposits derived from local sources (Morton and Miller 2006).

An older and poorly defined unit from the Newport Bay- Long Beach area, the "Palos Verdes Sand," has likely been subsumed into the old paralic deposits (Qopf) and/or similarly aged Pleistocene units with marine deposits. This is based on the prevalence of these deposits around Newport Bay. Kim Scott of Cogstone has not been able to find maps which include the unit and recent maps of the area (Morton and Miller 2006; Saucedo et al. 2016) that incorporate older maps do not identify the unit. Some of the "Palos Verdes Sand" deposits have been dated to between ~130,000- ~120,000 years old (Barrie et al. 1991).

YOUNG ALLUVIAL FAN DEPOSITS (QYF)

Emplaced between the late Pleistocene to Holocene, alluvial fans were deposited into our valleys from local mountains via the mouths of canyons. Sediments are unindurated to moderately indurated, silts to bouldery conglomerates, with slightly to moderately dissected fan surfaces (Morton and Miller 2006). Clasts coarsen upstream with boulders up to several meters across being deposited near the mountains during flash floods.

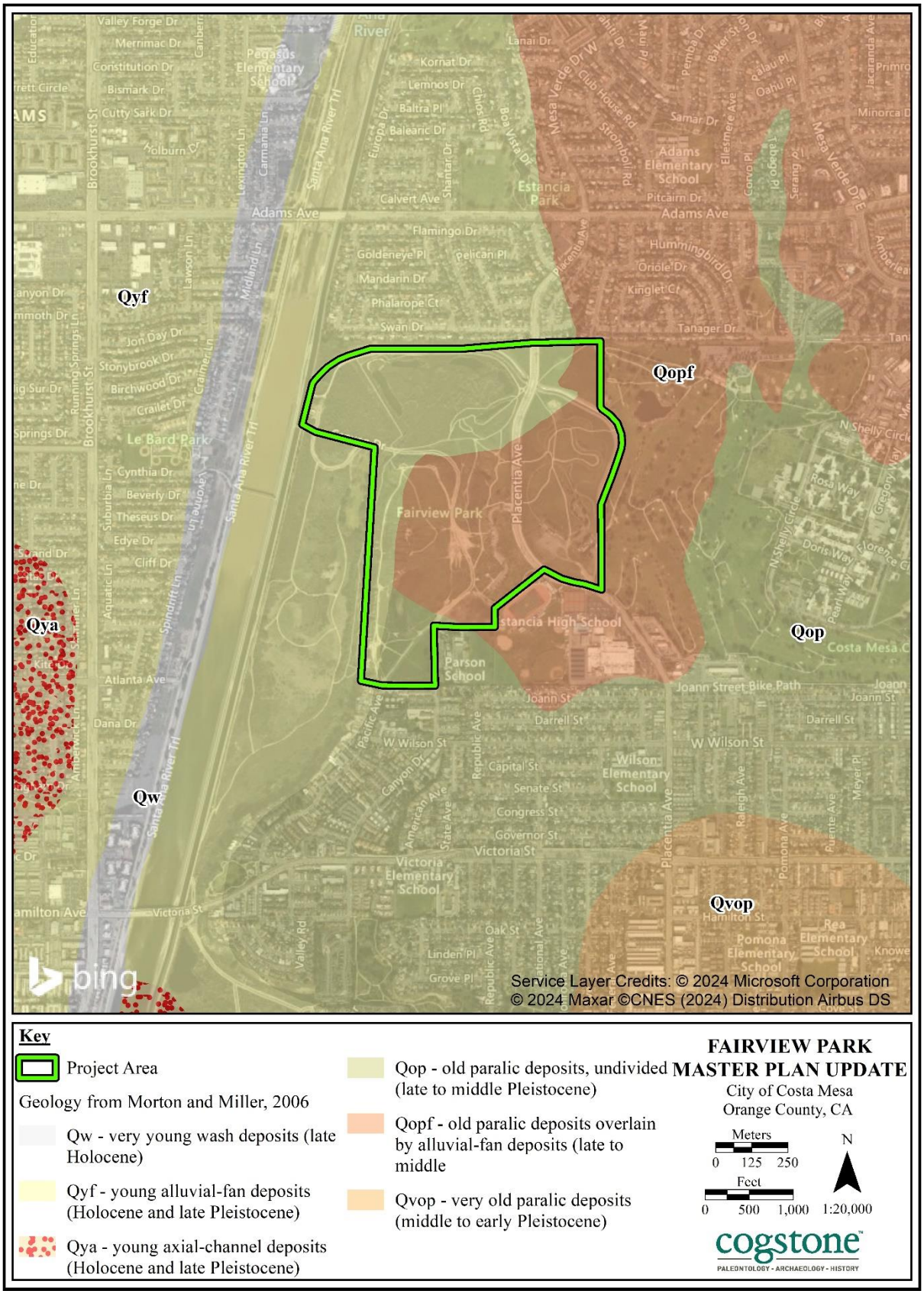


Figure 4. Project Area geology map

PREHISTORIC CONTEXT

PREHISTORIC CULTURAL SETTING

Approaches to prehistoric frameworks have changed over the years from being based on material attributes to radiocarbon chronologies to association with cultural traditions. Archaeologists defined a material complex consisting of an abundance of milling stones (for grinding food items) with few projectile points or vertebrate faunal remains dating from about 7,000-3,000 years before the present as the "Millingstone Horizon." Later, the "Millingstone Horizon" was redefined as a cultural tradition named the Encinitas Tradition with various regional expressions including Topanga and La Jolla. Use by archaeologists varied as some adopted a generalized Encinitas Tradition without regional variations, some continued to use "Millingstone Horizon" and some used middle Holocene (the time period) to indicate this observed pattern (Sutton and Gardner 2010:1-2).

Recently the fact that generalized terminology is suppressing the identification of cultural, spatial, and temporal variation and the movement of peoples throughout space and time was noted. These factors are critical to understanding adaptation and change (Sutton and Gardner 2010:1-2).

The Encinitas Tradition characteristics are: abundant metates and manos, crudely made core and flake tools, bone tools, shell ornaments, and very few projectile points. Subsistence focuses on collecting (plants, shellfish, etc.). Faunal remains vary by location but include shellfish, land animals, marine mammals, and fish (Sutton and Gardner 2010:7).

The Encinitas Tradition has been redefined to consist of four patterns (Sutton and Gardner 2010: 8-25). These are: (1) Topanga in coastal Los Angeles and Orange Counties; (2) La Jolla in coastal San Diego County; (3) Greven Knoll in inland San Bernardino, Riverside, Orange, and Los Angeles Counties; and (4) Pauma in inland San Diego County.

About 3,500 years before present, the Encinitas Tradition was replaced by a new archaeological entity, the Del Rey Tradition, in the greater Los Angeles Basin. This new entity has been generally assigned to the Intermediate and Late time periods. The changes that initiated the beginning of the Intermediate Period included new settlement patterns, economic foci and artifact types that coincided with the arrival of a new, biologically distinctive population. The Intermediate and Late periods have not been well-defined. However, many have proposed the beginning of the Intermediate Period marked the arrival of Takic groups (from the Mojave Desert, southern Sierra Nevada, and San Joaquin Valley) and the Late Period reflected Shoshonean groups (from the Great Basin). Related cultural and biological changes occurred on the Southern Channel Islands about 300 years later (Sutton 2010).

The Del Rey Tradition replaces the Intermediate and Late designations for both the southern California mainland and the Southern Channel Islands. Within the Del Rey Tradition are two regional patterns named Angeles and Island. The Del Rey Tradition represents the arrival, divergence, and development of the Gabrielino in southern California (Sutton 2010).

PROJECT AREA CULTURES

The latest cultural revisions for the Project Area define traits for time phases of the Greven Knoll pattern of the Encinitas Tradition applicable to inland Los Angeles County (Sutton and Gardner 2010; Table 1). This pattern is replaced in the Project Area by the Angeles pattern of the Del Rey Tradition later in time (Sutton 2010). Each pattern has subdivisions as identified by specific changes in cultural assemblages through time. Phases are identified by their archaeological signatures in components within sites.

These inland peoples did not switch from manos/metates to pestles/mortars like coastal peoples (c. 5,000 years before present); this may reflect their closer relationship with desert groups who did not exploit acorns. The Greven Knoll toolkit is dominated by manos and metates throughout its extent. In Phase I, other typical characteristics were pinto dart points for atlatls or spears, charmstones, cogged stones, absence of shell artifacts and flexed position burials. In Phase II, Elko dart points for atlatls or spears and core tools are observed along with increased indications of gathering. In addition, the Greven Knoll populations are biologically Yuman (based on skeletal remains), while the later Angeles populations are biologically Shoshonean (Sutton and Gardner 2010; Sutton 2010).

The Angeles pattern generally is restricted to the mainland and appears to have been less technologically conservative and more ecologically diverse, with a largely terrestrial focus and greater emphases on hunting and nearshore fishing. In Angeles Phase I, Elko points for atlatls or darts appear, small steatite objects such as pipes and effigies from Catalina are found, shell beads and ornaments increase, fishing technologies increase including bone harpoons/fishhooks and shell fishhooks, donut stones appear, and hafted micro blades for cutting/graving wood or stone appear. In addition, several Encinitas (Topanga) traits, such as discoidals, cogged stones, plummet-like charmstones, and cairn burials (see Sutton and Gardner 2010) virtually disappear from the record. Mortuary practices changed to consist of primarily flexed primary inhumations, with extended inhumations becoming less common. Settlement patterns made a shift from general use sites being common to habitation areas separate from functional work areas. Subsistence shifted from mostly collecting to increased hunting and fishing (Sutton 2010).

Angeles Phase II is identified primarily by the appearance of a new funerary complex, with other characteristics similar to Angeles I. The complex features killed (broken) artifacts, including manos, metates, bowls, mortars, pestles, points, and others, plus highly-fragmented cremated

human bones and a variety of faunal remains. In addition to the cremains, the other material also often burned. None of the burning was performed in the burial feature (Sutton 2010).

Table 1. Culture Change Chronology

Pattern	Phase	Dates (BP)	Material Traits	Other Traits
Encinitas	Greven Knoll I	8,500 to 4,000	Abundant manos and metates, Pinto dart points for atlatls or spears, charmstones, cogged stones and discoidals rare, no mortars or pestles, general absence of shell artifacts	No shellfish, hunting important, flexed inhumations, cremations rare
	Greven Knoll II	4,000 to 3,000	Abundant manos and metates, Elko dart points for atlatls or spears, core tools, late discoidals, few mortars and pestles, general absence of shell artifacts	No shellfish, hunting and gathering important, flexed inhumations, cremations rare
Angeles	Angeles I	3,500 to 2,600	Appearance of Elko dart points and an increase in the overall number of projectile points from Encinitas components; beginning of large-scale trade in small steatite artifacts (effigies, pipes, and beads) and *Olivella* shell beads from the southern Channel Islands; appearance of single-piece shell fishhooks and bone harpoon points; Coso obsidian becomes important; appearance of donut stones	appearance of a new biological population (Takic proto-Gab/Supan language), apparent population increase; fewer and larger sites along the coast; collector strategy; less overall dependence on shellfish but fishing and terrestrial hunting more important; appearance of flexed and extended inhumations without cairns, cremations uncommon
	Angeles II	2,600 to 1,600	Continuation of basic Angeles I material culture with the addition of mortuary features containing broken tools and fragmented cremated human bone; fishhooks become more common	continuation of basic Angeles I settlement and subsistence systems; appearance of a new funerary complex
	Angeles III	1,600 to 1,250	Appearance of bow and arrow technology (e.g., Marymount or Rose Spring points); changes in *Olivella* beads; asphaltum becomes important; reduction in obsidian use; Obsidian Butte obsidian largely replaces Coso	larger seasonal villages; flexed primary inhumations but no extended inhumations and an increase in cremations; appearance of obsidian grave goods; possible expansion into eastern Santa Monica Mountains, replacing Topanga III groups
	Angeles IV	1,250 to 800	Cottonwood points appear; some imported pottery appears; birdstone effigies at the beginning of the phase and "spike" effigies dropped by the end of the phase; possible appearance of ceramic pipes	change in settlement pattern to fewer but larger permanent villages; flexed primary inhumations continue, cremations uncommon; expansion into the San Gabriel Mountains, displacing Greven Knoll III groups

Pattern	Phase	Dates (BP)	Material Traits	Other Traits
	Angeles V	800 to 450	Trade of steatite artifacts from the southern Channel Islands becomes more intensive and extensive, with the addition or increase in more and larger artifacts, such as vessels and comals; larger and more elaborate effigies	strengthening of ties, especially trade, with southern Channel Islands; expansion into the northern Santa Ana Mountains and San Joaquin Hills; development of mainland dialects of Gabrielino
	Angeles VI	450 to 150	Addition of Euro-American material culture (e.g., glass beads and metal tools), locally made pottery, metal needle-drilled *Olivella* beads	change of settlement pattern, movement close to missions and ranches; use of domesticated species obtained from Euro-Americans; flexed primary inhumations continue, cremations uncommon to the north (nearer the Chumash) but somewhat more common to the south (nearer the Luiseño); apparent adoption of Chingichngish religion

The Angeles Phase III is the beginning of what has been known as the Late Period and is marked by several changes from Angeles I and II. These include the appearance of small projectile points, steatite shaft straighteners and increased use of asphaltum all reflecting adoption of bow and arrow technology. In addition, obsidian sources changed from mostly Coso to Obsidian Butte, and shell beads derived from Gulf of California species began to appear. Subsistence practices continued as before and the geographic extent of the Angeles Pattern increased (Sutton 2010).

Angeles Phase IV is marked by new material items including Cottonwood points for arrows, *Olivella* cupped beads and *Mytilus* shell disks, birdstones (zoomorphic effigies with magico-religious properties) and trade items from the Southwest including pottery. It appears that populations increased and there was a change in the settlement pattern to fewer but larger permanent villages. Presence and utility of steatite vessels may have impeded the diffusion of pottery into the Los Angeles Basin. Smaller, special-purpose sites continued to be used (Sutton 2010).

Angeles Phase V components contain more and larger steatite artifacts, including larger vessels, more elaborate effigies, and comals. Settlement locations shifted from woodland to open grasslands. The exploitation of marine resources seems to have declined and use of small seeds increased. Many Gabrielino inhumations contained grave goods while cremations did not (Sutton 2010).

The Angeles Phase VI reflects the ethnographic mainland Gabrielino of the post-contact (i.e., post-A.D. 1542) period. One of the first changes in Gabrielino culture after contact was undoubtedly population loss due to disease, coupled with resulting social and political disruption.

Angeles Phase VI material culture is essentially Angeles Phase V, augmented by a number of Euro-American tools and materials, including glass beads and metal tools such as knives and needles (used in bead manufacture). The frequency of Euro-American material culture increased through time until it constituted the vast majority of materials used. Locally produced brownware pottery appears along with metal needle-drilled *Olivella* disk beads (Sutton 2010).

The ethnographic mainland Gabrielino subsistence system was based primarily on terrestrial hunting and gathering; although nearshore fish and shellfish played important roles. Sea mammals, especially whales (likely from beached carcasses), were prized. In addition, a number of European plant and animal domesticates were obtained and exploited. Ethnographically, the mainland Gabrielino practiced interment and some cremation (Sutton 2010).

ETHNOGRAPHY

The Project Area is within the traditional use area of both Gabrielino Tongva and Juaneño Acjachemen groups (Figure 5).

GABRIELINO TONGVA

The Gabrielino are considered to have been one of the wealthiest tribes and to have greatly influenced tribes they traded with (Kroeber 1976:621). Houses were domed, circular structures thatched with tule or similar materials (Bean and Smith 1978:542). The best known artifacts were made of steatite and were highly prized. Many common everyday items were decorated with inlaid shell or carvings reflecting an elaborately developed artisanship (Bean and Smith 1978:542).

The main food zones utilized were marine, woodland and grassland (Bean and Smith 1978). Plant foods were, by far, the greatest part of the traditional diet at contact. Acorns were the most important single food source. Villages were located near water sources necessary for the leaching of acorns, which was a daily occurrence. Grass seeds were the next most abundant plant food used along with chia. Seeds were parched, ground, and cooked as mush in various combinations according to taste and availability. Greens and fruits were eaten raw or cooked or sometimes dried for storage. Bulbs, roots, and tubers were dug in the spring and summer and usually eaten fresh. Mushrooms and tree fungus were prized as delicacies. Various teas were made from flowers, fruits, stems, and roots for medicinal cures as well as beverages (Bean and Smith 1978:538-540).

The principal game animals were deer, rabbit, jackrabbit, woodrat, mice, ground squirrels, antelope, quail, dove, ducks, and other birds. Most predators were avoided as food, as were tree squirrels and most reptiles. Trout and other fish were caught in the streams, while salmon were available when they ran in the larger creeks. Marine foods were extensively utilized. Sea mammals, fish, and crustaceans were hunted and gathered from both the shoreline and the open

ocean, using reed and dugout canoes. Shellfish were the most common resource, including abalone, turbans, mussels, clams, scallops, bubble shells, and others (Bean and Smith 1978:538-540).

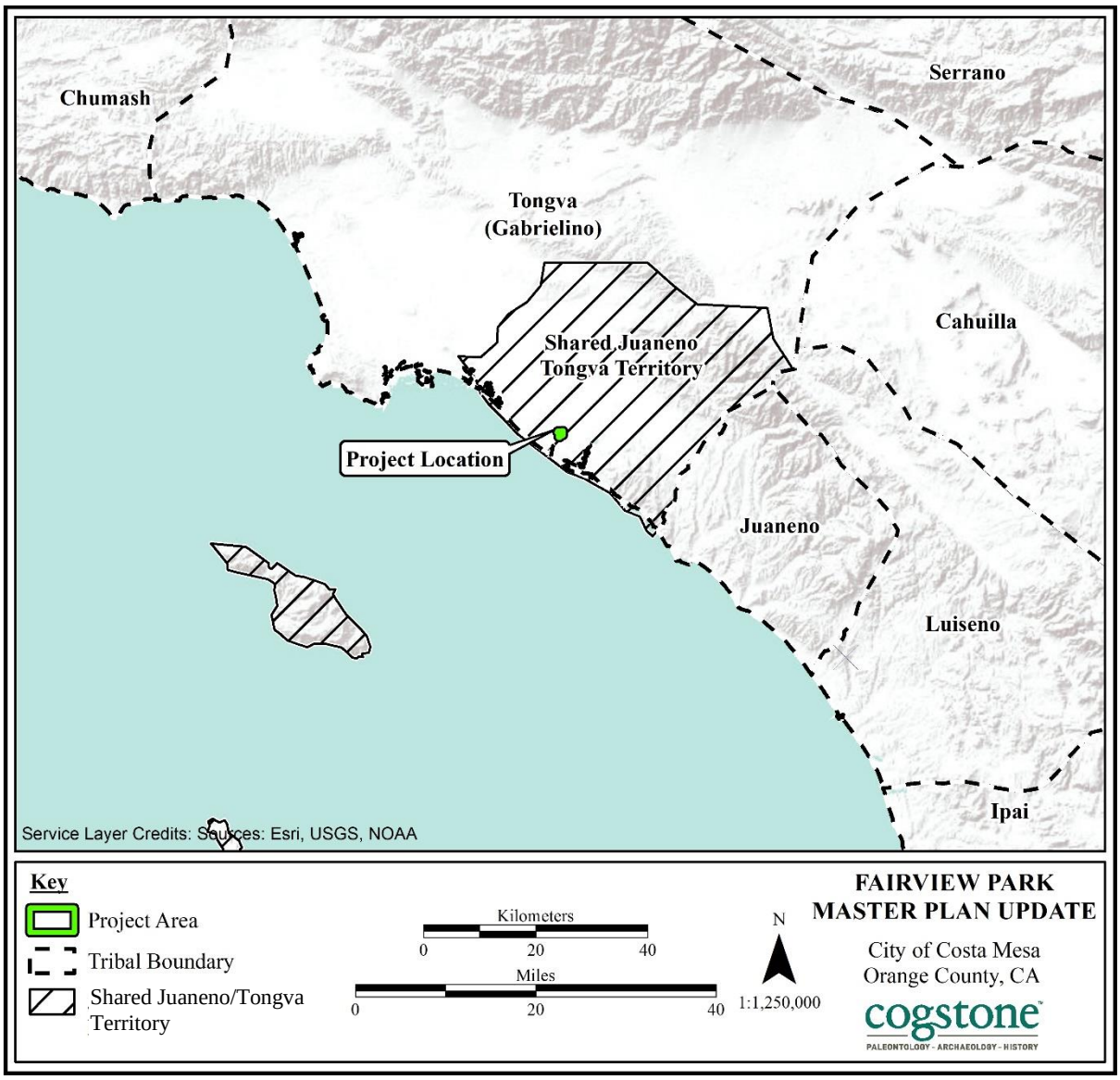


Figure 5. Tribal territories map

The Project Area was not home to any known major villages. The closest known named Gabrielino villages are Lukupa and Kengaa which are 2.3 miles northwest and 3.7 miles southeast of the Project Area respectively. However, Acjachemen villages, and smaller Gabrielino villages and seasonal camps may have been present closer to the Project Area.

JUANEÑO ACJACHEMEN

About 1,300 years ago the Acjachemen (Juaneño), who were hunters and gatherers of the San Luis Rey Cultural Pattern, moved into southern Orange County. The Acjachemen speak a language that is part of the Takic language family. Their traditional tribal territory was situated partly in northern San Diego County and partly in southern Orange County. The boundaries were Las Pulgas Creek (south), Aliso Creek (north), the Pacific Ocean (west) and the Santa Ana Mountains (east). Villages were mostly along San Juan Creek, Trabuco Creek, and San Mateo Creek (O'Neil and Evans 1980).

In prehistory, the Acjachemen had a patrilineal society and lived in groups with other relatives. These groups had established claims to places including the sites of their villages and resource areas. Marriages were usually arranged from outside villages establishing a social network of related peoples in the region. There was a well-developed political system including a hereditary chief. Religion was an important aspect of their society. Religious ceremonies included rites of passage at puberty and mourning rituals (Kroeber 1976).

Houses were typically conical in shape and thatched with locally available plant materials. Work areas were often shaded by rectangular brush-covered roofs (ramada). Each village had a ceremonial structure in the center enclosed by a circular fence where all religious activities were performed (Bean and Shipek 1978).

Women are known to have been the primary gatherers of plant foods, but also gathered shellfish and trapped small game animals. Men hunted large game, most small game, fished, and assisted with plant food gathering, especially of acorns. Adults were actively involved in making tools including nets, arrows, bows, traps, food preparation items, pottery, and ornaments. Tribal elders had important political and religious responsibilities and were involved in education of younger members (Bean and Shipek 1978).

HISTORIC SETTING

Spanish Period (1769-1820)

The earliest exploration of Orange County by Europeans was the land expedition of Gaspar de Portola. He set out from Mission San Diego to find a land route to the Bay of Monterey. His expedition passed through Orange County in northward (1769) and southward (1770) bound directions (Bean 1968). He named Trabuco Creek, Santiago Creek and other geographic features he encountered.

The Project Area was part of the 63,414-acre Rancho Santiago de Santa Ana, granted to José Antonio Yorba and his nephew Pablo Peralta in 1810 by California Governor José Joaquin de Arrillago (Figure 6). Yorba built an adobe residence at what is now First and Sullivan Streets in Santa Ana.

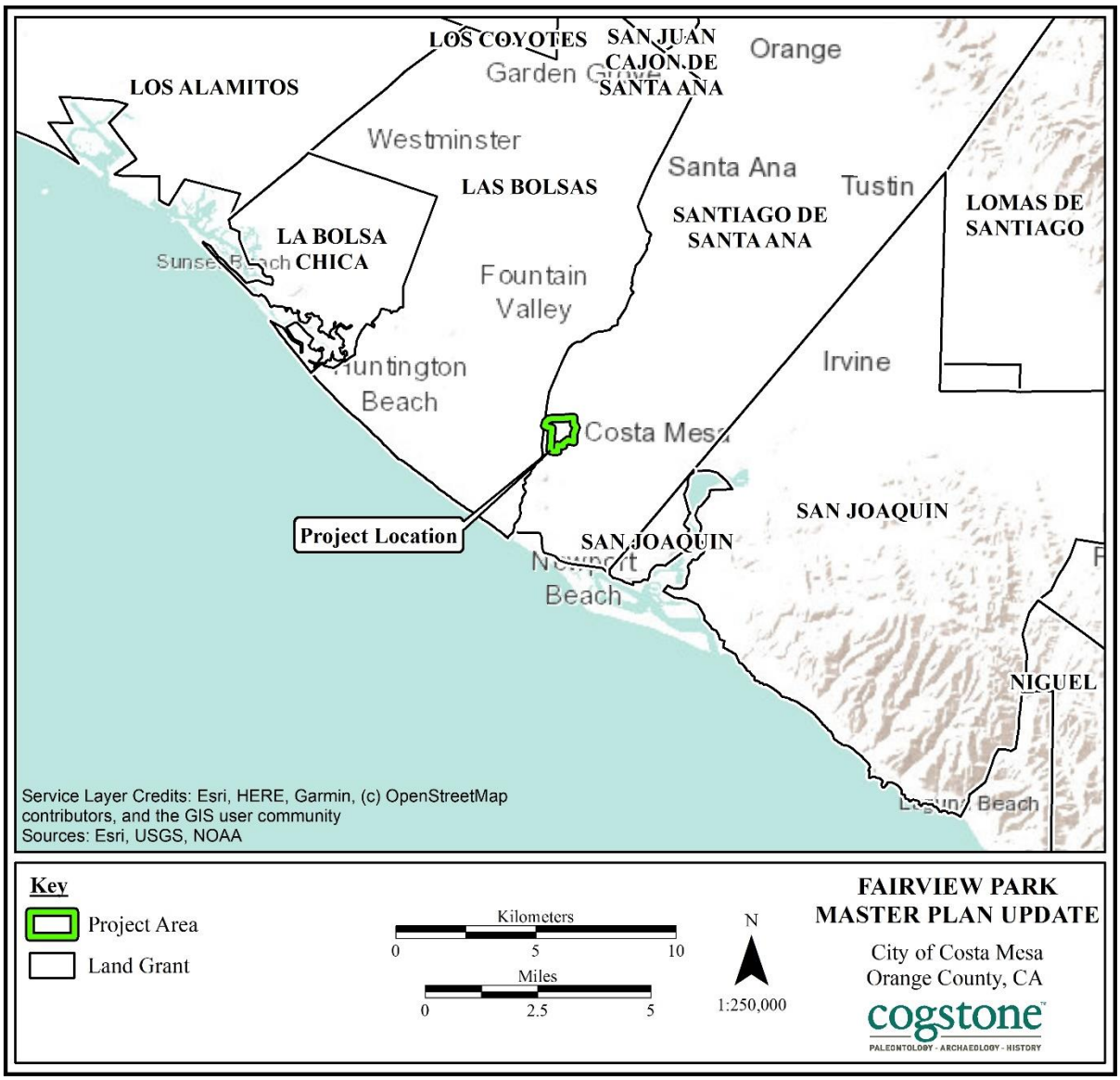


Figure 6. Land grant map

Mexican Period (1821-1847)

Mexico gained independence from Spain in 1821 and the new liberal politics of the Mexican Constitution of 1824 were embraced by the emerging generation of Californios and Californias (persons of Mexican heritage born in California). Most of these young peoples' parents were soldiers from Sonora and Sinaloa who had risen to positions of authority within the military. The opportunities for upward mobility for themselves and their families were significant (Beebe and Senkewicz 2001).

In 1846, the Mexican-American war erupted following the Bear Flag Revolt in California. Both the 1848 Treaty of Guadalupe Hidalgo in which Mexico ceded California to the United States

and the unprecedented events of the Gold Rush that same year destabilized California, producing rapid, dramatic change (Haas 1995).

American Period (1848-present)

The Mexican-American war followed on the heels of the Bear Flag Revolt of June 1846 (Ohles 1997). General Andrés Pico and John C. Frémont signed the Articles of Capitulation in December 1847, and with the signing of the Treaty of Guadalupe Hidalgo in February 1848, hostilities ended and Mexico relinquished California to the United States. Under the treaty, Mexico ceded the lands of present-day California, New Mexico and Texas to the U.S. for $15 million (Fogelson 1993:10). Within two years following the treaty, California applied for admission as a state.

City of Costa Mesa History

From 1810 to 1868, the majority of what would later become the City of Costa Mesa fell within the boundaries of the Spanish land grant Rancho Santiago de Santa Ana (issued to the Yorba Family in 1810).

After the Mexican War of Independence the land fell under Mexican governance and was retained by Yorba. Later, under the Land Act of 1851, a new claim was required to be filed. The lands were then granted to Bernardo, Teodoro and Ramón Yorba in 1883. The Yorba family sold the rancho to José Antonio Sepulveda but he lost the land due to bankruptcy (Goddard 1988).

Through California's Spanish and Mexican periods, the land was primarily used for the rearing of cattle. Following the annexation of California by the United States in 1848, the Rancho heirs began the process of breaking up the land into smaller portions. After decades of litigation amongst family members and American landowners, in 1868, the Rancho was officially partitioned into 73 parcels. Of these parcels, Costa Mesa would grow from the Andrew Glassell parcel (4,077 acres) and the Eduardo Polloreno parcel (2,760 acres). Additional portions of Costa Mesa would arise from land held by James McFadden (4,576 acres) and business partners Flint and Bixby (12,155 acres). In the following years property was continuously sold and subdivided which made the area ideal for the California land boom of the 1880s. The three communities of Fairview, Polloreno, and Harper arose from this period and united to form Costa Mesa (Miller 1970).

With the expansion of railroads to the American west coast, affordable transportation and cheap land opportunities drove a flood of new settlers into California. As a response, various land syndicates formed which contracted survey teams to outline new land tracts. The Fairview Development Company (FDC) was one such entity which filed their plans for the Fairview Tract with the City of Santa Ana in 1887. FDC sales soared resulting in the rapid growth of the

Fairview boom town, however its initial success was short lived with the collapse of its business district (Miller 1970).

In 1886, a year prior to the establishment of the Fairview community, the Polloreno community (named after the previous landowner, Eduardo Polloreno) was founded near the eastern border of Fairview. Also known as the Boston Farm Colony, early settlers originated from Boston, Massachusetts. The community never grew beyond a small farming village (Miller 1970). During this time, in 1891, the Santa Ana and Newport Railroad arrived in the area southeast of the Fairview and Polloreno communities. With the railroad came farmers who settled in the southern area of Costa Mesa, then known as Harper. Named after local rancher Gregory Harper Jr., the local economy thrived on grain-centered agriculture. Following years of population and economic growth, along with the discovery of oil, in 1920 the town of Harper officially changed its name to Costa Mesa. As Costa Mesa's boundaries expanded, Fairview and Polloreno were absorbed (Miller 1970).

With Costa Mesa's expansion came an increasing need for infrastructure and schools. By the 1940s Costa Mesa remained unincorporated but boasted a population of over 4,000. Prior to the United States' entry into World War II, the Santa Ana Army Air Base (SAAAB) was established in Costa Mesa. From 1942-1946, SAAAB hosted over 125,000 cadets (Costa Mesa Historical Society 2016).

In June of 1953, Costa Mesa voted to incorporate. From the 1950s through the late 1970s, the city undertook various annexation efforts of neighboring land to be used to develop residential and commercial sites. The Costa Mesa County Water District was established in 1960 which later oversaw the drilling of multiple deep wells to sustain the growing population. Costa Mesa's build out phase continued until the year 2000 (Costa Mesa Historical Society 2016).

Project Area History

The earliest known USGS topographic map of the Project Area shows no development in 1896 within the area which would become Fairview Park (Santa Ana, 1:62,500, 1896). The Santa Ana River is adjacent to or overlaps with the western boundary of the Project Area. By 1932, multiple unimproved roads are visible within the Project Area along with several large retaining ponds (Newport Beach, 1:31,680, 1932). By 1935, three buildings are visible within the northern half of the Project Area (Newport Beach, 1:32,680, 1935). By 1949, only one building remains near the center of the Project Area and a long intermittent stream cuts through the north/south on its western boundary (Newport Beach, 1:24,000, 1949). A 1953 USDA aerial photograph of the Project area depicts a single building with small ancillary buildings near the middle of the Project Area and a narrow water channel (NETROnline 1953). By 1963, the building in the middle of the Project Area is no longer extant (NETROnline 1963). A large concrete channel (currently extant) traverses along the east and northern boundary of the Project Area. By 1972, what is now Placentia Avenue is present, cutting through the eastern section of the Project Area

(NETROnline 1972). Between 1987 and ca. 2000, a network of unimproved roads is established through the Project Area (NETROnline 1987 and 2000). Between 1987 and 1992, the facility near 2480 Placentia Avenue at the southeast area of the Project Area is extant (NETROnline 1987 and 1992).

FAIRVIEW PARK

The Project Area overlaps with Fairview Park. As the largest park in Costa Mesa, Fairview Park consists of a total 208 acres (13 acres landscaped and 195 acres of open natural space). The park hosts multiple ecological habitats and recreational opportunities including 7 miles of walking/biking trails, miniature railroad, model aircraft flying fields, picnicking areas, etc. (Arts Orange County 2024). Plans for the first phase of the park were approved by the Orange County Board of Supervisors in May of 1978 (The Los Angeles Times 1978). The original plans involved designs for a lake, open areas, grading, roads, maintenance and administration buildings, restrooms, and parking.

RECORDS SEARCH

PALEONTOLOGICAL RECORD SEARCH

A search for paleontological records was completed by the Natural History Museum of Los Angeles County (LACM; Bell 2023; Appendix B). Published literature, unpublished paleontological reports, and fossil databases were also searched for fossil records (see tables in Appendix B). Databases included the Paleobiology Database (PBDB 2024), the San Diego Natural History Museum (SDNHM 2024), and the University of California Museum of Paleontology (UCMP 2024). Based on the project geology, the records search was limited to vertebrate remains from unnamed Pleistocene formations within a 10-mile area of the Project.

Unnamed Pleistocene deposits have produced fossils of mammoth (†[1]*Mammuthus* sp.) and camel (Camelidae) less than half a mile to the north of the Project Area (LACM 1339). While these fossils were approximately 15 feet below the surface, other nearby localities have been recovered from as little as six feet deep. Other extinct vertebrates recovered from unnamed Pleistocene deposits near to the Project Area include ground sloths (†*Megalonyx* sp., †*Paramylodon harlani*, †*Paramylodon* sp., Edentata), sabre-toothed cat (†*Smilodon fatalis*), California tapir (†*Tapirus californicus*), horses (†*Equus occidentalis?*, †*Equus* sp.), camels (†*Camelops hesternus*, †*Camelops* sp., Camelidae), bison (†*Bison antiquus*, †*Bison* sp.), mammoths (†*Mammuthus columbi*, †*Mammuthus* sp.), proboscidean (Proboscidea), and black vulture (†*Coragyps occidentalis*). Other megafauna recovered locally include deer (*Odocoileus* sp.) and sea turtle

[1] † = extinct taxon

(Cheloniidae), as well as a variety of small vertebrates that are still found in southern California today.

Fossils recovered from the "Palos Verdes Sand" appear to have come from the old paralic deposits (Qopf) that are also mapped within the study area. This is a highly productive unit that has produced numerous marine and nonmarine fossils, many of which are still found in the California area today. Extinct vertebrates recovered from these sediments include ground sloths (†*Megalonyx* sp. cf. *M. jeffersonii*, †*Nothrotheriops shastensis*), dire wolf (†*Aenocyon* sp. cf. *A. dirus*), tapirs (†*Tapirus* sp. cf. *T. californicus*, †*Tapirus merriami*), horse (†*Equus* sp.), llama (†*Hemiauchenia* sp.), camels (†*Camelops hesternus*, †*Camelops* sp., Camelidae), bison (†*Bison* sp. cf. *B. antiquus*, †*Bison* sp. cf. *B. latifrons*, †*Bison* sp.), Pacific mastodon (†*Mammut pacificus*), Del Rey gannet (†*Morus reyanus*), and flightless sea duck (†*Chendytes lawi*).

Other megafauna recovered include mule deer (*Odocoileus* sp. cf. *O. hemionus*), pronghorn? (*Antilocapra americana*?), Steller sea lion (*Eumetopias jubatus*), California sea lion (*Zalophus californicus*), sea otter (*Enhydra lutris*), elephant seal (*Mirounga* sp. cf. *M. angustirostris*), whale (Cetacea), and sea turtles (*Chelonia mydas, Caretta* sp.). The marine invertebrate record from these deposits is extensive with over 200 species known from the Newport Bay area (OCPC 2015; UCMP 2024).

CULTURAL RESOURCES RECORD SEARCH

CALIFORNIA HISTORIC RESOURCES INFORMATION SYSTEM

Cogstone archaeologist Logan Freeberg requested a search of the California Historical Resources Information System (CHRIS) from the South Central Coastal Information Center (SCCIC) located at California State University, Fullerton on August 24, 2023, which included the entirety of Fairview Park. Results of the record search indicate that 17 previous studies have been completed within the Park; seven of these postdate the 2002 Fairview Park Master Plan (Table 2).

Table 2. Previous cultural resources studies within Fairview Park.

Report No. (OR-)	Author(s)	Title	Year
00270	Leonard, Nelson N. III, and Mathew C. Hall	Description and Evaluation of Cultural Resources within the US Army Corps of Engineers' Santa Ana River Project	1975
00530	Anonymous	Orange County California Historical Research Project Report of Limestone Canyon Excavations Limestone-Sand Hill-Adams-Fairview-Sandstone Cave-Newland Hillside & Norris Excavations	1935
00809	Martz, Patricia, Marie G. Cottrell, and Stephen R. Van Wormer	Report of Preliminary Test Level Investigations Conducted at CA-ORA-506, Fairview Regional Park Site, Orange County, California	1985

Report No. (OR-)	Author(s)	Title	Year
01265	Dixon, Keith A.	Cogged Stones and Other Ceremonial Cache Artifacts in Stratigraphic Context at ORA-58, a Site in the Lower Santa Ana River Drainage, Orange County	1968
01266	Dixon, Keith A.	Archaeological Site Preservation: the Neglected Alternative to Destruction	1971
01267	Dixon, Keith A.	A Brief Report on Radiocarbon and Obsidian Hydration Measurements From ORA-58 (the Banning-Norris or Fairview Hospital Site) Orange County California	1970
01324	Koerper, Henry C.	Report on Investigations to Delineate Site Boundaries and Further Characterize Cultural Remains at CA-ORA-58, Costa Mesa California	1993
01335	Dixon, Keith A.	A Proposal for the Development of a "Fairview Park" Open-Air Archaeology Museum and Educational Resource, Costa Mesa, California	1971
01528	Padon, Beth	Archaeological Monitoring Report for the Vernal Pool Restoration, Fairview Park Project, Costa Mesa, Orange County, California	1996
03497	McKenna, Jeanette A.	A Section 106 Evaluation of the Proposed Fairview Park Bike Trail, Approximately 75 Linear Miles Within the Existing Park in Costa Mesa, Orange County, California	2007
03611	Brown, Joan C.	Archaeological Controlled Demolition and Monitoring of Excavations for Bridge Footings at Fairview Park, Costa Mesa, California	2006
03615	Brown, Joan C.	A Review of the Cultural Resources in Fairview Park, Located in the City of Costa Mesa, Orange County, California	2003
03627	Brown, Joan C.	Positive Archaeological Survey Report, Fairview Park Proposed Multi-Purpose Bicycle/Pedestrian Trail, Costa Mesa, California	2004
03627	Brown, Joan C.	Extended Phase I Report (XPI) Fairview Park Proposed Multi-Purpose Bicycle/Pedestrian Trail, Costa Mesa, California	2004
03627	Brown, Joan C.	A Review of the Cultural Resources in Fairview Park, Located in the City of Costa Mesa, Orange County, California	2003
04368	Wiley, Nancy, and Henry Koerper	The Fairview Park Storm Drain: Archaeological Testing and Monitoring	2014
04370	Wiley, Nancy, Paul Chace, and Henry Koerper	Archaeological Phase I: Cultural Resource Survey of the Southwest Quadrant of Fairview Park, Costa Mesa	2014

A total of four cultural resources have been previously recorded within the Park. These consist of two prehistoric archaeological sites (one NRHP listed and one unevaluated), one multicomponent archaeological site, and one historical archaeological site (Table 3).

Table 3. Previously recorded cultural resources within the Project Area.

Primary No. (P-30-)	Trinomial No. (CA-ORA-)	Resource Type	Resource Description	Year Recorded	NRHP/CRHR Status
000058	000058	Prehistoric Archaeological Site	Prehistoric habitation site and midden deposit with burials, lithic tools, projectile points and ground stone metates. Also referred to as the Fairview Hospital Indian Site.	1949, 1971, 1993, 2003, 2007	NR - Listed
000506	000506	Multi-Component Site	Shell midden with lithic flake, ground stone mano and historic era refuse deposit	1975, 2004, 2007	Unevaluated
001667		Prehistoric Archaeological Site	Shell deposit with lithic flake	2014	Unevaluated
001740		Historic Archaeological Site	Historic era refuse scatter with wooden fence or corral posts, attached nails and barbed wire. Second historic era refuse scatter with glass fragments, ceramic, concrete, utensils and other domestic material	2014	Unevaluated

Archeological Sites within Fairview Park

P-30-000058 (CA-ORA-000058)

P-30-000058 is a prehistoric archaeological site that included a lithic scraper tool, ground stone metates and ground stone manos. It was first recorded in 1949 by J. Eberhart and H. Eberhart. A site update was completed later in 1949 by Briggs, when additional resources were noted including flint lithic tools, lithic projectile points, ground stone metates and the presence of burials (Briggs 1949).

Another site update was conducted at the end of 1949 by J. Eberhart and H. Eberhart, and a shell midden deposit was noted, as well as two lithic scrapers, a granite ground stone metate fragment, and a ground stone mano or metate fragment (Eberhart and Eberhart 1949).

In 1971, Keith A. Dixon nominated the site to the NRHP. The site was described as the "Fairview Indian Site" consisting of a large midden deposit with a long period of early occupancy from at least 1500 BC (3450 BP)to approximately 500 AD. (1450 BP) Later excavations performed on the site would find a later deposit dated between 500 AD (1450 BP) to early 19th century. A large number of human burials, an extensive record of varying occupation, its large size, a vast collection of radio-carbon dated material, clearly defined levels of site stratigraphy, and the presence of extremely rare artifacts called "cogged stones" make this site a significantly important resource and a clear case for a National Register listing (Dixon 1971).

In 2003 Joan C. Brown updated the site boundary to include previous archaeological excavation work performed within the site. Joan C. Brown established that the largest concentration of

cultural material was located near the bluffs on the western side of the park, while the southern and eastern portions were more likely cultural materials redeposited by previous farming activity performed within the park (Brown 2003).

The last site update occurred in 2007 by M.A. McKenna and D. McKenna when a small shell deposit, one lithic flake, and a groundstone mano fragment were observed north of the site boundary. It was also noted that these new cultural materials were deposited on the surface of a highly disturbed area and were mostly just assumed to be a part of the larger P-30-000058 or P-30-000506 (McKenna 2007a).

P-30-000058 was listed in the NRHP/CRHR on June 27, 1972 as Fairview Indian Site (No. 72000243.

P-30-000506 (CA-ORA-000506)
P-30-000506 was originally recorded in 1975 by K. Dixon as a shell midden scatter as deep as 60 centimeters below the surface.

A site revisit in 2004 performed by Joan C. Brown added a historic component to the site as multiple historic era artifacts were observed during mechanical trenching performed within the Park (Brown 2004).

The last site update occurred in 2007 by M.A. McKenna and D. McKenna when a small shell deposit, one lithic flake, and a groundstone mano fragment were observed north of the site boundary. It was also noted that these new cultural materials were deposited on the surface of a highly disturbed area (McKenna 2007b).

P-30-001667 (CA-ORA-001667)
P-30-001667 was originally recorded in 2004 by Joan C. Brown as a marine shell deposit and a chert lithic flake. The site is located within close proximity to P-30-000058 and P-30-000506 and it is unclear if this deposit is directly related to either site specifically (Brown 2007).

In 2014 the site was updated by Andrew Garrison and Destiny Colocho. Soil observations performed by the survey crew noted a marine shell midden deposit extending from the previously recorded site boundary. As a result, the site boundary was updated.

P-30-001740 (CA-ORA-001740)
P-30-001740 was recorded by Andrew Garrison, Ricky Saldana and Nichole Marte in 2014 as two distinct refuse scatters. The first scatter includes standing wooden fence or corral posts with attached nails and barbed wire. The second scatter consists of glass fragments, ceramic, concrete, and eating utensils amongst other domestic material (Garrison et al. 2014).

OTHER CULTURAL RESOURCES SOURCES

In addition to the SCCIC records search, a variety of sources were consulted in August 2024 to obtain information regarding the cultural context of the Project vicinity (Table 4). Sources included the National Register of Historic Places (NRHP), California Register of Historical Resources (CRHR), Built Environment Resource Directory (BERD), California Historical Landmarks (CHL), and California Points of Historical Interest (CPHI). Specific information about the Project Area, obtained from historic-era maps and aerial photographs, is presented in the Project Area History section.

Table 4. Additional cultural resources sources consulted

Source	Results
National Register of Historic Places (NRHP)	Positive; CA-ORA-000058 Fairview Indian Site (No. 72000243, listed June 27, 1972.
Historic USGS Topographic Maps	see Project Area History section
Historic US Department of Agriculture Aerial Photographs	see Project Area history section
California Register of Historical Resources (CRHR)	Positive; CA-ORA-000058
Built Environment Resource Directory (BERD)	Negative
California Historical Landmarks (CHL)	Negative
California Points of Historical Interest (CPHI)	Negative
Bureau of Land Management (BLM) General Land Office Records	Positive, see Table 5
Local Registers (Historical Societies/Archives)	Negative

Table 5. BLM land patents

Name(s)	Year	Accession Number	Type	Township 6 South; Range 10 West
Juan Abila, Soledad Yorba Abila, Christobal Aguilar, Julian Chaves, Julian Dominga Yorba, Ramon Yorba	1874	CACAAA 084785	Spanish/Mexican land grant	Sections 8 and 17
Jose Justo Morillo, Don Jose Antonio Nieto, Don Manuel Nieto, Maria Cleofas Nieto, Dona Catarina Ruiz	1877	CACAAA 084786	Spanish/Mexican land grant	Sections 8 and 17
Juan Pablo Peralta, Antonio Yorba, Bernardo Yorba, Heirs of Bernarda Yorba	1883	CACAAA 084587	Spanish/Mexican land grant	Sections 8, 9, and 17

Rancho Santiago de Santa Ana and the extended Yorba family are discussed the Historic Setting section above. Patent for lands within this grant was acquired in 1874 and reaffirmed in 1883. The connection to the extended Nieto family, grantees of multiple other ranchos, is not clear.

NATIVE AMERICAN CONSULTATION OUTREACH

Cogstone archaeologist Logan Freeberg requested a Sacred Lands File (SLF) search from the Native American Heritage Commission (NAHC) on October 19, 2023. The NAHC responded on December 4, 2023 with a positive search result indicating that a tribal cultural resource is located within the same township, range, and section as the Project Area. The NAHC recommended that the Gabrieleño Band of Mission Indians – Kizh Nation, the Gabrieleño/Tongva San Gabriel Band of Mission Indians, the Juaneño Band of Mission Indians, and the Juaneño Band of Mission Indians Acjachemen Nation – Belardes be contacted for more information and provided a list of nine groups and individuals that may have information about the Project Area.

Cogstone sent letters inviting all groups and individuals on the NAHC to engage in Native American tribal consultations under Assembly Bill (AB) 52 and Senate Bill (SB) 18 on via United States Postal Service certified mail on October 7, 2024. Cogstone followed up via electronic mail (original consultation letter was attached) message on October 25, 3024 and by telephone call on November 8, 2024. (Appendix C). Cogstone also sent Native American Scoping letters to two individuals representing groups that are not on the NAHC list but may have information about the Project Area, on the same schedule. Cogstone is aware of five responses total.

On October 25, 2024, Juaneno Band of Mission Indians, Belardes Cultural Resources Director Joyce Perry responded via electronic mail indicating that Tribes wishes to engage in formal consultation on this project. This project is located in an extremely sensitive area to our tribe. Farview park is located on the sacred village site and known burial area of Genga. This place is also identified as the archaeological site CA-ORA-58 which is listed on the National Register of Historic Places.

On November 8, 2024, a representative of the Gabrieleño Band of Mission Indians-Kizh Nation indicated during a telephone call that the Tribe would respond to City representative Kelly Dalton.

On November 8, 2024, a representative of the Gabrielino/Tongva Indians of California Tribal Council indicated that Cultural Resource Administrator Christina Conley will respond to the follow up electronic mail message sent on October 25, 2024

On October 28, 2024, Gabrielino-Tongva Tribe Sam Dunlap responded to the October 25, 2024 follow up electronic mail indicating that the Tribe does wish to engage in SB 18 and AB52 consultation and would contact City representative Kelly Dalton.

On November 8, 2024, Soboba Band of Luiseno Indians Tribal Historic Preservation Officer Joseph Ontiveros responded during a follow up telephone call that they will defer to local tribes within the Project Area.

SURVEY

METHODS

The survey stage is important in a Project's environmental assessment phase to verify the exact location of each identified cultural resource and the proximity of the resource to areas of cultural resources sensitivity. Special attention was paid to assessing the integrity of known resources. All undeveloped ground surface areas of the Project Area within CA-ORA-000058 and CA-ORA-000506 were examined for artifacts (e.g., flaked stone tools, tool-making debris, stone milling tools or fire-affected rock), soil discoloration that might indicate the presence of a cultural midden, soil depressions and features indicative of the former presence of structures or buildings (e.g., postholes, foundations), or historic-era debris (e.g., metal, glass, ceramics). Existing ground disturbances (e.g., cutbanks, ditches, animal burrows, etc.) were visually inspected. Photographs of the surveyed areas, including ground surface visibility and items of interest, were taken with a digital camera.

RESULTS

On April 3, 2024, Cogstone archaeologists Pamela Gutierrez and Alyssa Polito conducted a field survey of the boundaries of the previously documented sites P-30-000058 and P-30-000506 to assess damage to the resources caused by runoff, unauthorized "social" walking trails, vegetation clearing, etc. Ms. Gutierrez and Ms. Polito conducted the survey in 10-meter transects and by following the narrow, cleared paths along the park and site boundaries (Figures 7 to 10). Due to the previous rainstorms in the area, many of the paths were flooded, making survey of certain areas impossible for safety reasons. Vegetation overgrowth also limited survey, with ground visibility in both P-30-000058 and P-30-000506 at about five percent visibility. Vegetation included native brush, barley, sagebrush, prickly pear, bush sunflower, wild mustard, buckwheat, fennel, shrubs, golden bush, and grass. Native fauna was present such as rabbits, rodents, birds, insects and lizards, as well as warning signs for rattlesnakes and coyotes within the site boundaries.

The eastern edge of P-30-000506 could not be accessed due to fencing and was mostly covered by landscaping for the Costa Mesa Golf Course. There was a paved and cemented trail and train tracks throughout this site area. No cultural material was identified at the surface in this survey.

Cogstone archaeologist Sandy Duarte returned to the Park to complete the damage assessment survey on April 19, 2024 and was able to identify and quantify additional areas of disturbance to

the cultural resources. Disturbances identified were in the form of social trails that de-vegetated the ground surface and resulted in erosion due to water movement and pedestrian and bicycle-based travel. Disturbances averaged approximately two feet wide and 5 inches to 8 inches in depth.

Ground visibility in undisturbed was still poor, approximately five percent. The ground visibility was low but one area of shell midden was visible within P-30-000058.

Department of Parks and Recreation (DPR) 523 series site record updates were completed for P-30-000058, P-30-000506, P-30-001667, and P-30-001740 (Appendix E).

No paleontological resources were identified during the survey.



Figure 7. Exposed shell midden and dark sediment, burrows being dug out, surface.



Figure 8. P-30-000058, overgrown trail leading to northern end of site, facing northeast.



Figure 9. P-30-000058, unauthorized trail, facing southeast.



Figure 10. P-30-000506, train tracks (modern) over trail, facing southwest.

A dense 12- to 18-inch thick concentration of seashells was discovered along the surface on a bluff's edge at the far western edge of the Park within CA-ORA-000058 during unrelated work in the Park in January 2024 and not reported elsewhere. The shells were embedded in a silt/clay mixture near arid coastal flora, and the scatter reaches down an adjacent vertical drop (Figures 11 and 12). No artifacts were identified in association with this probable shell midden.



Figure 11. Potential shell midden

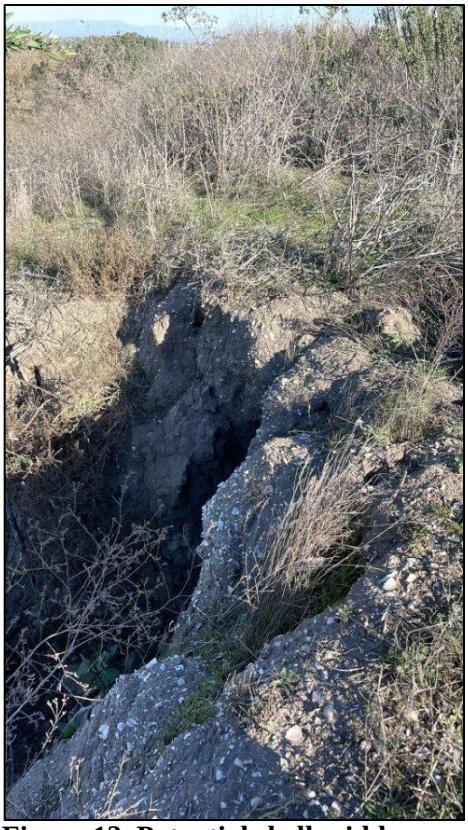


Figure 12. Potential shell midden

RESOURCE SENSITIVITY

DEFINITION OF SIGNIFICANCE FOR PALEONTOLOGICAL RESOURCES

A multilevel ranking system was developed by professional resource managers within the Bureau of Land Management (BLM) as a practical tool to assess the sensitivity of sediments for fossils. The Potential Fossil Yield Classification (PFYC) system (BLM 2016; Appendix D) has a multi-level scale based on demonstrated yield of fossils. The PFYC system provides additional guidance regarding assessment and management for different fossil yield rankings.

Fossil resources occur in geologic units (e.g., formations or members). The probability for finding significant fossils in a Project Area can be broadly predicted from previous records of fossils recovered from the geologic units present in and/or adjacent to the study area. The geological setting and the number of known fossil localities help determine the paleontological sensitivity according to PFYC criteria.

Sediments that are close to their basement rock source are typically coarse; those farther from the basement rock source are finer. The chance of fossils being preserved greatly increases once the average size of the sediment particles is reduced to 5 mm in diameter or less. Moreover, fossil preservation also greatly increases after natural burial in rivers, lakes, or oceans. Remains left on the ground surface become weathered by the sun or consumed by scavengers and bacterial activity, usually within 20 years or less. So, the sands, silts, and clays of rivers, lakes, and oceans are the most likely sediments to contain fossils.

Using the PFYC system, geologic units are classified according to the relative abundance of vertebrate fossils or scientifically significant invertebrate or plant fossils and their sensitivity to adverse impacts within the known extent of the geological unit. Although significant localities may occasionally occur in a geologic unit, a few widely scattered important fossils or localities do not necessarily indicate a higher PFYC value; instead, the relative abundance of localities is intended to be the major determinant for the value assignment.

PALEONTOLOGICAL RESOURCES SENSITIVITY

All sediments within the study area are assigned a moderate sensitivity (PFYC 3). These units have finer grained deposits and either have a good potential to produce fossils (and probably fossils have been recovered from them in the past). In some cases the formation produces a very large number of common fossils such as shell beds. Moderate ranking can include everything from a poorly explored area to something like a well-studied and highly productive formation that is full of so many marine invertebrates that they become common to see. These formations should still be monitored for fossils as they can produce significant fossil resources.

The required excavation depth for the following is dependent on how thick the unit is and the sensitivity of what lies under the surficial deposit.

- In general, more than five feet below the original surface of middle to late Pleistocene old axial channel/ flood plain, paralic, and marine units. At five feet deep the sediments are usually Pleistocene. On the paleontological sensitivity maps, these are mapped as moderate at the surface.
- In general, more than eight feet below the original surface of late Pleistocene to Holocene distal alluvial fans. At eight feet deep the sediments are usually Pleistocene. On the paleontological sensitivity maps, these are mapped as low at the surface.

TRIBAL CULTURAL RESOURCES SENSITIVITY

The whole of Fairview Park is of extremely sensitive for tribal cultural resources and is of utmost interest to Gabrielino Tongva and Juaneño Acjachemen groups due to burials that have been previously unearthed within P-30-000058. The tribes concur that the Park should be considered a single cultural landscape comprised of P-30-000058, P-30-000506, P-30-001667, and P-30-001740.

CULTURAL RESOURCES SENSITIVITY

Based on the SCCIC records search, especially the documented history of CA-ORA-000058, the positive SLF search, and conversations with local tribes, Fairview Park has extremely high sensitivity for buried Native American origin cultural resources. The available data also indicate a low to moderate, patchy sensitivity for European-origin cultural resources.

A review of the site records for resources within Fairview Park also indicates that the Park area should be considered a single unified Native American cultural landscape rather than as a place with four separate archaeological sites. DPR 523 series site record updates were completed for P-30-000058, P-30-000506, P-30-001667, and P-30-001740 (Appendix E). Most cultural resources, including burials, have been found within the areas currently recorded as P-30-000058, P-30-000506. As such these areas are considered with most sensitive within a highly sensitive landscape, efforts to stabilize the sediments through re-vegetation, and efforts to keep visitors from further eroding the site through barriers signing and barriers restricting social trails, raised walkways are most important in these areas.

MITIGATION MEASURES

PALEONTOLOGICAL MITIGATION MEASURES

MM PAL-1. City staff shall require applicants for future proposed projects with planned impacts in undisturbed sediments ranked moderate or above to either (1) provide a technical paleontological assessment consisting of a record search, survey, background context and project specific recommendations performed by a qualified paleontologist (with a graduate degree and a specialization in vertebrate paleontology) or (2) agree to monitoring all excavations below five feet. If resources are known or reasonably anticipated the recommendations shall provide a detailed mitigation plan which shall require monitoring during grading and other earthmoving activities in undisturbed sediments, provides a fossil recovery protocol that includes data to be collected, requires professional identification, radiocarbon dates and other special studies as appropriate, requires curation at local curation facility such as such as the John D. Cooper Center operated by the County of Orange for fossils meeting significance criteria, requires a comprehensive final mitigation compliance report including a catalog of fossil specimens with museum numbers and an appendix containing a letter from the museum stating that they are in possession of the fossils.

TRIBAL CULTURAL RESOURCES MITIGATION MEASURES

MM TRB-1. The City staff shall ensure that qualified cultural resources and Native American monitors are present for all ground disturbing activities, and all vegetation clearance that is beyond normal maintenance that occurs within Fairview Park.

MM TRB-2. The City shall ensure that an Archaeological Treatment Plan including a presence/absence testing program and a contingent data recovery program is prepared by a qualified archaeologist in consultation with consulting Tribes prior to ground disturbing activities that extends below the historic ploughzone.

MM TRB-3. Native American-origin cultural materials encountered during ground disturbing activities of vegetation clearing activities shall be stored on site at Fairview Park pending reburial on site and a location not to be disclosed to the public.

Disposition of tribal cultural resources will be in accordance with applicable law and in consultation with the consulting tribes.

CULTURAL RESOURCES MITIGATION MEASURES

MM CUL-1. The City staff shall ensure that qualified cultural resources and Native American monitors are present for all ground disturbing activities, and all vegetation clearance that is beyond normal maintenance that occurs within Fairview Park

MM CUL-2. The City shall ensure that an Archaeological Treatment Plan including a presence/absence testing program and a contingent data recovery program is prepared by a

qualified archaeologist prior to ground disturbing activities that extends below the historic ploughzone. Native American ancestral remains, burial-related items, and sacred

MM CUL-3. When an archaeological find is made, the archaeologist shall be allowed access to the artifact(s) necessary to describe, measure, photograph, draw (if necessary) , and catalog the items.

Cogstone also recommends additional signage and physical barriers to prevent the use of existing, and creation of new, social trails. Revegetation of existing social trail areas should be a goal, in coordination with plant biologists, with no till options being preferred.

In the event of an unanticipated discovery, all work must be suspended within 50 feet of the find until a qualified archaeologist evaluates it. In the unlikely event that human remains are encountered during project development, all work must cease near the find immediately.

In accordance with California Health and Safety Code Section 7050.5, the County Coroner must be notified if potentially human bone is discovered. The Coroner will then determine within two working days of being notified if the remains are subject to his or her authority. If the Coroner recognizes the remains to be Native American, he or she shall contact the Native American Heritage Commission (NAHC) by phone within 24 hours, in accordance with Public Resources Code Section 5097.98. The NAHC will then designate a Most Likely Descendant (MLD) with respect to the human remains. The MLD then has the opportunity to recommend to the property owner or the person responsible for the excavation work means for treating or disposing, with appropriate dignity, the human remains and associated grave goods. Work may not resume in the vicinity of the find until all requirements of the health and safety code have been met.

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APPENDIX A. QUALIFICATIONS

MOLLY VALASIK
QA/QC

EDUCATION

2009 M.A., Anthropology, Kent State University, Kent, Ohio
2006 B.A., Anthropology, Ohio State University, Columbus, Ohio

SUMMARY QUALIFICATIONS

Ms. Valasik is a Registered Professional Archaeologist (RPA) with more than 15 years of experience. She is a skilled professional who is well-versed in the compliance procedures of CEQA and Section 106 of the NHPA and regularly prepares cultural resources assessment reports for a variety of federal, state, and local agencies throughout California. Ms. Valasik has managed a variety of projects at Cogstone in the water, transportation, energy, development, and federal sectors. She meets the qualifications required by the Secretary of the Interior's *Standards and Guidelines for Archaeology and Historic Preservation*. She is accepted as a principal investigator for prehistoric archaeology by the State Office of Historic Preservation's Information Centers.

SELECTED EXPERIENCE

Brea 265 Specific Plan, City of Brea, Orange County, CA. The objective of this study was to review and summarize available information regarding known paleontological, archaeological, and historical resources within the boundaries of the proposed Specific Plan. This study provided environmental documentation as required by CEQA. A Paleontological Resource Impact Mitigation Program and full-time monitoring was recommended. Due to the high sensitivity for subsurface archaeological resources, a cultural resources mitigation plan and monitoring was also recommended. Sub to Placeworks. Project Manager and Principal Investigator for Archaeology. 2018-2019

1874 Alisos Avenue Project, City of Laguna Beach, Orange County, CA. The purpose of this study was to determine whether the construction of a building site for a single-family residence had the potential to impact cultural or paleontological resources. Cogstone conducted record searches, a Sacred Lands File Search, background research, a pedestrian survey, and produced an assessment. Principal Investigator for Archaeology. 2019

Irvine General Plan Update, Phase II, City of Irvine, Orange County, CA. Cogstone conducted a study to review and summarize available information regarding known paleontological, archaeological, and historical resources within the boundaries of the City of Irvine to support the Phase II update of the City's General Plan. A general analysis of impacts of future projects within the City of Irvine that may adversely affect paleontological, archaeological, or historic resources was provided along with mitigation recommendations. Sub to Placeworks. Principal Archaeologist. 2018-2019

River Street Marketplace, City of San Juan Capistrano, Orange County, CA. Cogstone conducted record searches, literature studies, and intensive pedestrian surveys to determine the potential effects to cultural and paleontological resources resulting from the construction of 64,900 square feet of proposed commercial and office space. The proposed project consisted of five buildings and was located on a 5.6-acre property occupied by the Ito Nursery which has been in operation since 1970. Sub to Placeworks. Principal Investigator for Archaeology. 2018

Agora Town Center Mixed-Use EIR, City of Laguna Niguel, Orange County, CA. Cogstone conducted due diligence review of the previous environmental document. Prepared updated cultural and paleontological sections, including updated records search. The project also involved preparation of a new Tribal cultural resources section and assisting the City of Laguna Niguel with combined SB 18/AB52 consultation and outreach. Sub to PlaceWorks. Principal Investigator. 2016

cogstone
PALEONTOLOGY - ARCHAEOLOGY - HISTORY

JOHN GUST
Principal Investigator for Archaeology and Report Co-Author

EDUCATION

2016 Ph.D., Department of Anthropology, University of California, Riverside (UCR)
2011 M.A., Department of Anthropology, UCR
2007 M.A., Applied Geography, University of Colorado, Colorado Springs (UCCS)
2002 B.A., Department of Anthropology, minor in Geography/Environmental Studies, UCCS

SUMMARY QUALIFICATIONS

Dr. Gust is a Registered Professional Archaeologist (RPA) with over 11 years of experience in field archaeology. His field expertise includes pedestrian surveys, excavation monitoring, resource recording, and historic artifact analysis. Dr. Gust has extensive experience in California cultural resources, having served as Principal Investigator on projects for Southern California Edison, Pacific Gas and Electric, the City of San Jose, Los Angeles International Airport, and the City of Morro Bay. He has managed a variety of projects at Cogstone in the water, transportation, energy, development, and federal sectors. He has also managed cultural resources monitoring projects for both public and private sector clients. He meets the qualifications required by the Secretary of the Interior's *Standards and Guidelines for Archaeology and Historic Preservation.* Dr. Gust is a member of the Society for California Archaeology, Society for American Archaeology, and the American Anthropological Association.

SELECTED EXPERIENCE

Laguna Niguel General Plan Update, City of San Juan Capistrano, Orange County, CA. Cogstone reviewed and summarized available information regarding known paleontological, archaeological, and historical resources within the City of Laguna Niguel to support the General Plan Update Project. Cogstone's services included cultural and paleontological resources records searches, a Sacred Lands File search from the Native American Heritage Commission (NAHC), and consultation with local historical societies. A Cultural and Paleontological Resources Assessment report was prepared that outlined culturally sensitive areas within the city and included recommendations for mitigation. The City of San Juan Capistrano was the lead agency under the California Environmental Quality Act (CEQA). Sub to De Novo Planning Group. Principal Investigator for Archaeology. 2023-2024

Camino Capistrano Mixed-Use Project, City of San Juan Capistrano, Orange County, CA. Cogstone conducted a cultural and paleontological resources assessment to determine the potential impacts to cultural and paleontological resources during the project, which consisted of the retention and rehabilitation of two National Register of Historic Places (NRHP)-listed adobe buildings; reconstruction of a contributing barn that was recently dismantled and stored onsite; removal, offsite relocation, and rehabilitation of a second contributing barn that is extant; and the construction of three new buildings. The project area and vicinity are known to be within archaeologically sensitive areas. Cogstone's services included cultural and paleontological resources records searches, a Sacred Lands File search from the NAHC, and an intensive pedestrian survey. Site updates were prepared on California Department of Parks and Recreation (DPR 523) forms for the two previously recorded adobe buildings and Cogstone prepared a Cultural and Paleontological Resources Assessment Report. The City of San Juan Capistrano was the lead agency under CEQA. Sub to 31871 Camino Capistrano LLC. Principal Investigator for Archaeology. 2022-2023

Los Cerritos Wetlands Authority (LCWA) South Area Assessment, LCWA, Los Angeles County, CA. Cogstone conducted Traditional Cultural Landscape Research and Evaluation as well as provided extended Native American coordination to the LCWA. Services included drafting consultation letters to tribes who requested notification and follow-up attempts via email and telephone for comments from Native American tribes. Cogstone conducted extensive ethnographic and historic research to document past use of the Los Cerritos Wetlands by the Gabrielino (Tongva) and Acjachemen as well as its connection to the villages of *Puvungna* and *Motuucheyngna*. Cogstone met with tribal community members and digitally recorded their explanations of current and past use of the wetlands including their recommendations for Tribal access. Cogstone prepared a Cultural Resources Assessment Report that incorporates the results of this research and is awaiting comments from the Tribes and LCWA. Sub to Moffat & Nichol. Principal Investigator for Archaeology. 2021-2023

cogstone
PALEONTOLOGY - ARCHAEOLOGY - HISTORY

KIM SCOTT
Principal Investigator for Paleontology and Report Co-Author

EDUCATION

2013 M. S., Biology with Paleontology Emphasis, California State University, San Bernardino
2000 B. S., Geology, University of California, Los Angeles

SUMMARY QUALIFICATIONS

Ms. Scott has more than 28 years of experience in California as a paleontologist and sedimentary geologist and 17 years with Cogstone. She has written over 100 paleontological assessments, paleontological mitigation plans, and monitoring compliance reports to all agency requirements. She has experience with street, roadway, interchange, bridge, and grade separation projects. She has managed multiple projects and prepared technical reports with Caltrans/FHWA/FTA/FRA as the lead agency and is knowledgeable of the processes and procedures required to obtain NEPA, NHPA Section 106 and CEQA environmental approvals. Ms. Scott meets the qualifications outlined in Attachment 1 to Caltrans Section 106 Programmatic Agreement with the FHWA, and Chapter 1, Volume 8, on paleontology of the Caltrans Standard Environmental Reference (SER). Ms. Scott serves as company safety officer and is the author of the company safety and paleontology manuals. She is a Member of the Society of Vertebrate Paleontology and the Pacific Section of the Society of Economic Paleontologists and Mineralogists.

SELECTED EXPERIENCE

Purple Line Extension (Westside Subway) Sections 1 and 2 Construction Management, Los Angeles County Metropolitan Transportation Authority, Los Angeles, Los Angeles County, CA. The project involves construction of seven stations from the existing Purple Line at Wilshire/Western Avenue along Wilshire Boulevard to the Veterans Administration Hospital in Westwood for 8.6 miles. Cogstone manages all paleontological services for Sections 1 and 2 of the subway project including budgets, Workers Environmental Awareness Program (WEAP) training, monitoring, fossil recovery, fossil preparation, identification, cataloguing curation with the Natural History Museum of Los Angeles County, and reporting. Sub to JV West (Stantec/Jacobs JV; Section 1), AECOM (Section 2). Principal Investigator for Paleontology. 2014-ongoing

University of California Natural Reserve System San Joaquin Marsh Reserve Water Conveyance and Drainage Improvement Project, City of Irvine, Orange County, CA. Cogstone conducted a cultural and paleontological resources assessment to determine the potential impacts to cultural and paleontological resources for the proposed long-term water management improvements and habitat value of the Marsh Reserve. Services included pedestrian survey, records searches, Sacred Land File (SLF) search from the Native American Heritage Commission (NAHC), background research, and reporting. Due to the proximity of the project to the San Diego Creek, the project required a Clean Water Act Section 404 permit from the United States Army Corps of Engineers (USACE) and Section 106 NHPA compliance. University of California acted as the lead California Environmental Quality Act (CEQA) agency and USACE acted as lead agency under the National Environmental Policy Act (NEPA). Sub to Moffat & Nichol. Principal Investigator for Paleontology. 2020-2021

Irvine General Plan Update - Phase II, City of Irvine, Orange County, CA. Cogstone conducted a study to review and summarize available information regarding known paleontological, archaeological, and historical resources within the boundaries of the City of Irvine to support the Phase II update of the City's General Plan. A general analysis of impacts of future projects within the City of Irvine that may adversely affect paleontological, archaeological, or historic resources was provided along with mitigation recommendations. Sub to Placeworks. Principal Investigator for Paleontology. 2018-2019

Brea 265 Specific Plan, City of Brea, Orange County, CA. The objective of this study was to review and summarize available information regarding known paleontological, archaeological, and historical resources within the boundaries of the proposed Specific Plan. This study provided environmental documentation as required by CEQA. A Paleontological Resource Impact Mitigation Program and full-time monitoring was recommended for deposits with a Potential Fossil Yield Classification ranking of 3 or greater. Sub to Placeworks. Principal Investigator for Paleontology. 2018-2019

APPENDIX B. PALEONTOLOGICAL RECORD SEARCH

Natural History Museum
of Los Angeles County
900 Exposition Boulevard
Los Angeles, CA 90007

tel 213.763.DINO
www.nhm.org

Research & Collections

e-mail: paleorecords@nhm.org

August 27, 2023

Cogstone Resource Management
Attn: Logan Freeberg

re: Paleontological resources for the Fairview Park Master Plan Update (Cogstone 5673) Project

Dear Logan:

I have conducted a thorough search of our paleontology collection records for the locality and specimen data for proposed development at the Fairview Park Master Plan Update project area as outlined on the portion of the Newport Beach USGS topographic quadrangle map that you sent to me via e-mail on August 25, 2023. We do not have any fossil localities that lie directly within the proposed project area, but we do have fossil localities nearby from the same sedimentary deposits that occur in the proposed project area, either at the surface or at depth.

The following table shows the closest known localities in the collection of the Natural History Museum of Los Angeles County (NHMLA).

Locality Number	Location	Formation	Taxa	Depth
LACM IP 436	Corner of Brookhurst and Hamilton Streets; Huntington Beach	Unknown formation (Holocene; sub-recent)	Invertebrates (unspecified)	35-40 feet bgs
LACM IP 241	On highway 101; 1 mile west of the viaduct [bridge], a one-mile exposure of fossiliferous beds	Palos Verdes Sand, bed 40-60 feet thick	Invertebrates (*Yoldia, Tivela, Penitella, Petricola, Semele, Tellina, Leukoma, Glycymeris, Leptopecten, Lucinisca, Macoma, Dentalum, Paciocinebrina, Cryptomya, Cumingia, Donax, Nassarius, Callianax, Nutricola, Seila, Turritella, Gari*, and others)	Unknown
LACM VP 3267	Near intersection of 19th & Anaheim in Costa Mesa	Unknown Formation (Pleistocene)	Proboscidea	Unknown
LACM VP 7366, 7422-7425, 7679…	The Huntington Beach Urban Center Sand Borrow Area, N of Pacific Coast Hwy and W of	Unknown formation (Pleistocene, sands)	Legless lizard (*Anniella*), tree frog (*Hyla*), gopher snake (*Pituophis*), garter snake (Thamnophis), kingsnake *(Lampropeltis)*, ring-necked snake *(Diadophis*), garter snake (*Thamnophis*), long-nosed snake (*Rhinocheilus*), coachwhip (*Masticophis*), salamander (*Enatina*), slender	Unknown

	Huntington Dr		salamander (*Batrachoseps*), skinks (*Plestiodon*), alligator lizard (*Gerrhonotus*), toad (*Bufo*), side-blotched lizard *(Uta*), spiny lizard (*Sceloporus*), climbing salamander (*Aneides*), turtle (*Clemmys*); quail (*Callipepla*), rail (*Rallus*); vole (*Microtus*), pocket gopher (*Thomomys*), shrew *(Sorex*), kangaroo rat (*Dipodomys*), cottontail rabbit (*Sylvilagus*), mole (*Scapanus*), harvest mouse (*Reithrodontomys*), deer mouse (*Peromyscus*), pack rat (*Neotoma*), chipmunk (*Eutamias*), bat (Chiroptera), Mammoth *(Mammuthus*), horse (*Equus*), bison (*Bison*); stickleback (*Gasterosteus*), houndshark (*Triakis*); Land snails (Gastropoda)	
LACM VP 4219	SW end of the Newport Fwy between Santa Isabel Ave & 23rd St	Palos Verdes Sand (coarse poorly sorted friable sand)	Camel family (Camelidae), sea turtle (Cheloniidae); uncatalogued fish and birds; invertebrates (*Entobia, Lottia, Caesia, Volvania, Ala, Eulithidium, Chama, Glossaulax, Agathistoma, Sinum, Chlorostoma, Calianax, Ophidiodermella, Serpulorbis, Argopecten*, and others)	30 feet bgs
LACM VP 7657 - 7659	Ellis Avenue & Patterson Lane, Huntington Beach	Unknown Formation (Pleistocene; gray siltstone)	School shark (*Galeorhinus*), eagle ray *(Myliobatus*), goby (*Lepidogobius, Leptocottus*), midshipmen (*Porichthys*), croaker (*Seriphus*), flatfish (*Citharichthys*), cusk-eel (*Otophidium*), skate (*Raja*), angelshark (*Squatina*), sculpin (Cottidae)	150 - 350 feet bgs

VP, Vertebrate Paleontology; IP, Invertebrate Paleontology; bgs, below ground surface

This records search covers only the records of the NHMLA. It is not intended as a paleontological assessment of the project area for the purposes of CEQA or NEPA. Potentially fossil-bearing units are present in the project area, either at the surface or in the subsurface. As such, NHMLA recommends that a full paleontological assessment of the project area be conducted by a paleontologist meeting Bureau of Land Management or Society of Vertebrate Paleontology standards.

Sincerely,

Alyssa Bell

Alyssa Bell, Ph.D.
Natural History Museum of Los Angeles County

enclosure: invoice

Fossils from the vicinity of the Project from unnamed Quaternary deposits.

Common Name	Taxon	Depth below original surface	Age	Locality	Location	Reference
ground sloth	†*Megalonyx* sp.	unknown	Pleistocene	LACM 186	Along MacArthur Blvd. N of intersection with Jamboree Road, Irvine	Bell 2020
ground sloth	†*Paramylodon* sp.	unknown	late Pleistocene, Rancholabrean	LACM 1068	East of MacArthur Boulevard and north of what is now Bison Avenue, Irvine	McLeod 2018
California tapir	†*Tapirus californicus*					
horse	†*Equus* sp.					
yesterday's camel	†*Camelops* sp.					
deer	*Odocoileus* sp.					
bison	†*Bison* sp.					
rabbit	*Sylvilagus* sp.					
mammal	Mammalia	unknown	Quaternary	LACM 1069	South side of University Drive east of MacArthur Boulevard, Irvine	McLeod 2018
ground sloth	Edentata	unknown	Pleistocene	LACM 1089	General McArthur Blvd Bridge, Newport Beach	Jefferson 1991b
111 taxa of mammals, sharks, rays, fish, amphibians, reptiles, or birds, including fossils belonging to 17 extinct taxa	multiple	unknown	Pleistocene	15 localities with LACM	older Quaternary sediments on the eastside of Newport Bay	McLeod 2013
mammoth	†*Mammuthus* sp.	~15 feet	Pleistocene	LACM 1339	Adams Ave east of the Santa Ana River, Costa Mesa	McLeod 2011, 2017, 2018
camel	Camelidae					
proboscidean	Proboscidea	unknown	Pleistocene	LACM 3267	near 19th Street and Anaheim Ave., Costa Mesa	McLeod 2019
even-toed ungulate	Artiodactyla	unknown	Quaternary	LACM 3978	Adjacent to the SE side of the intersection of University Drive and MacArthur Boulevard	McLeod 2018
turkey	*Meleagris* sp.					
deer	*Odocoileus* sp.	unknown	Holocene or Pleistocene	LACM 4018	Oceanview High School, Seal Beach	Jefferson 1991b
mammoth	†*Mammuthus* sp.	6-8 feet	late Pleistocene	LACM 65113	Warner Ave, close to Bolsa Chica St, Warner	McLeod 2017
bison	†*Bison* sp.	14-20 feet				

Common Name	Taxon	Depth below original surface	Age	Locality	Location	Reference
horse	†*Equus* sp.	unknown	Pleistocene	LACM 6370	Hoag Hospital lower campus near Superior Ave. and the Pacific Coast Hwy, Costa Mesa	McLeod 2019
Harlan's ground sloth	†*Paramylodon harlani*	unknown	late Pleistocene, Rancholabrean	LACM 69121	Bolsa Chica State Park	Jefferson 1991b
mammoth	†*Mammuthus* sp.					
ancient bison	†*Bison* sp.					
Harlan's ground sloth	†*Paramylodon harlani*	12-20 feet	late Pleistocene, Rancholabrean	OCPC, no number as yet	North of Jamboree and Michelson, Irvine	Scott and Gust 2007, Gust 2010
ground sloth	†*Paramylodon* sp.					
sabre-toothed cat	†*Smilodon fatalis*					
carnivore?	Carnivora?					
western horse?	†*Equus occidentalis?*					
yesterday's camel	†*Camelops hesternus*					
ancient bison	†*Bison antiquus*					
bison	†*Bison* sp.					
Columbian mammoth	†*Mammuthus columbi*					
rabbit?	Leporidae?					
Botta's pocket gopher	*Thomomys bottae*					
gopher	Geomyidae					
squirrel	Sciuridae					
black vulture	†*Corygyps occidentalis*					
bird	Aves					
rattlesnake	*Crotalus* sp.					
pine snake	*Pituophis melanoleucus*					
snakes	Serpentes					
alligator lizard	*Elegaria* sp.					
oak	*Quercus* sp.					

† = extinct taxon

Pleistocene fossils collected from an unknown depth from the Huntington Beach Urban Center Sand Borrow Area, north of Pacific Coast Highway and west of Huntington Drive (LACM VP 7366, 7422-7425, 7679; Bell 2023).

Common Name	**Taxon**
land snails	Gastropoda
houndshark	*Triakis* sp.
stickleback fish	*Gasterosteus* sp.
tree frog	*Hyla* sp.
toad	*Bufo* sp.
salamander	*Enatina* sp.
slender salamander	*Batrachoseps* sp.
climbing salamander	*Aneides* sp.
legless lizard	*Anniella* sp.
gopher snake	*Pituophis* sp.
garter snake	*Thamnophis* sp.
kingsnake	*Lampropeltis* sp.
ring-necked snake	*Diadophis* sp.
long-nosed snake	*Rhinocheilus* sp.
coachwhip	*Masticophis* sp.
skink	*Plestiodon* sp.
alligator lizard	*Gerrhonotus* sp.
side-blotched lizard	*Uta* sp.

Common Name	**Taxon**
spiny lizard	*Sceloporus* sp.
turtle	*Clemmys* sp.
quail	*Callipepla* sp.
bat	Chiroptera
rail	*Rallus* sp.
shrew	*Sorex* sp.
mole	*Scapanus* sp.
vole	*Microtus* sp.
pocket gopher	*Thomomys* sp.
kangaroo rat	*Dipodomys* sp.
harvest mouse	*Reithrodontomys* sp.
deer mouse	*Peromyscus* sp.
pack rat	*Neotoma* sp.
chipmunk	*Eutamias* sp.
cottontail rabbit	*Sylvilagus* sp.
mammoth	†*Mammuthus* sp.
horse	†*Equus* sp.
bison	†*Bison* sp.

"Palos Verdes Sand" fossils collected from about 15 feet deep near SR-55 at Santa Isabel Avenue, Costa Mesa. UCMP V93124 late Pleistocene, ~130,000- ~120,000 years old (Barrie et al.1992, Long 1993, PBDB 2024).

Common Name	Taxon
sea otter	*Enhydra lutris*
Steller sea lion	*Eumetopias jubatus*
California sea lion	*Zalophus californicus*
†horse	†*Equus* sp.
†camel	†*Camelops hesternus*
†bison	†*Bison* sp.
rabbit	Lagomorpha
loon	*Gavia* sp.
common murre	*Uria aalge*
albatros	*Diomedea* sp.
shearwater	*Puffinis* sp.
Western pond turtle	*Actinemys marmorata*
northern anchovy	*Engraulis mordax*
Pacific sardine	*Sardinops sagax*
plainfin midshipman	*Porichthys notalus*
Pacific tomcod	*Microgadus proximus*
spotted cusk-eel	*Chilara taylori*
basketweave cusk-eel	*Ophidion scrippase*
jack silverside	*Atherinopsis californiensis*
Pacific staghorn sculpin	*Leptocottus armatus*
lingcod	*Ophiodon elongatus*
splitnose rockfish	*Sebastes diploproa*
rosethorn rockfish	*Sebastes helvomaculatus*
shortbelly rockfish	*Sebastes jordani*
rockfish	*Sebastes sp.*
bay goby	*Lepidogobius lepidus*
California sheephead	*Semicossyphus pulcher*

Common Name	Taxon
shiner surfperch	*Cymatogaster aggregata*
pile surfperch	*Rhacochilus vacca*
sea perches	*Rhacochilus* sp.; †*Damalichthys* sp.
white seabass	*Atractoscion nobilis*
white croaker	*Genyonemus lineatus*
yellowfin croaker	*Umbrina roncador*
queenfish	*Seriphus politus*
California barracuda	*Sphyraena argentea*
California halibut	*Paralichthys californicus*
Pacific porgy	*Calamus brachysomus*
narrowtooth shark	*Carcharhinus brachyurus*
requiem shark	*Carcharhinus* sp.
Pacific sharpnose shark	*Rhizoprionodon longurio*
soupfin shark	*Galeorhinus galeus*
grey smoothhound	*Mustelus californicus*
brown smoothhound	*Mustelus henlei*
leopard shark	*Triakis semifasciata*
horn shark	*Heterodontus francisci*
common thresher shark	*Alopias vulpinus*
great white shark	*Carcharodon carcharias*
Atlantic mako shark	*Isurus oxyrinchus*
Pacific angel shark	*Squatina californica*
bat ray	*Myliobatis californica*
round stingray	*Urolophus halleri*
skate	*Raja sp.*
thornback	*Platyrhinoidis triseriata*
shovelnosed guitarfish	*Rhinobatos productus*

Fossils in vicinity of the Project from the late Pleistocene "Palos Verdes Sand" deposits

Common Name	Taxon	Depth	Age	Locality	Location	Reference
61 species of invertebrates, ten species of sharks, six species of bony fish, reptiles, amphibians, 17 species of birds, and three type of mammals		unknown	Pleistocene	unlisted	Costa Mesa Water District Reservoir 2 near Lindbergh School at 23rd Street and Orange Street, Costa Mesa	Govean 1994
Bishop pine	*Pinus muricata*	unlisted	Pleistocene	unlisted	Costa Mesa Water District Reservoir 2 near Lindbergh School at 23rd Street and Orange Street, Costa Mesa	Axelrod and Govean 1996
island Bishop pine	*Pinus remorata*					
Monterey pine	*Pinus radiata*					
Monterey cypress	*Cupressus macrocarpa*					
camel	Camelidae	30 feet	Pleistocene	LACM VP 4219	SW end of the Newport Fwy between Santa Isabel Ave & 23rd St, Costa Mesa	McLeod 2011, Bell 2023
sea turtle	Cheloniidae					
uncatalogued fish and birds						
limpet	*Lottia* sp.					
pheasant snail	*Eulithidium* sp.					
turban snail	*Tegula* (~~*Agathistoma*~~) sp.					
turban snail	*Tegula* (~~*Chlorostoma*~~) sp.					
moon snail	*Glossaulax* sp.					
moon snail	*Sinum* sp.					
worm snail	*Serpulorbis* sp.					
nassa	*Nassarius* (~~*Caesia*~~) sp.					
scallop	*Argopecten* sp.					
jewel box	*Chama* sp.					
trace fossil formed by sponges	*Entobia*					
whale	*Cetacea*	unknown	Rancholabrean	UCMP V72104	Newport Bay E 1	UCMP 2024
rodent	*Rodentia*					
bird	*Aves*					
bony fish	*Osteichthyes*					
round stingray	*Urolophus halleri*					
shark	*Carcharhiniformes*					
white shark	*Carcharodon sp.*					

Common Name	Taxon	Depth	Dates	Locality	Location	Reference
bird	Aves	unknown	Pleistocene	UCMP IP7056	Newport Bay	UCMP 2024
cartilagenous fish	Myliobatiformes					
decapod crustacean	Decapoda					
bird	Aves	unknown	Rancholabrean, substage 5e (130-120 ka BP)	LACM 4426	General MacArthur Boulevard and Bison Avenue, Newport Beach:	Jefferson 1991a
bird	Aves	unknown	Rancholabrean	UCMP V79082 (= UCMP A3104)	Newport Bay,	UCMP 2024
shark	Carcharhiniformes					
Merriam's tapir	†*Tapirus merriami*	unknown	Rancholabrean, ^{18}O substage 5e (130-120 ka BP)	LACM 6801	Newport Beach	Jefferson 1991b

Depth and species suggest that this locality is part of the "Palos Verdes Sand"

Common Name	Taxon	Depth	Dates	Locality	Location	Reference
midshipman	*Porichthys* sp.	150 - 350 feet bgs	Pleistocene	LACM VP 7657 - 7659	Ellis Avenue & Patterson Lane, Huntington Beach	Bell 2023
cusk-eel	*Ophidion* sp.					
sculpin	Cottidae					
goby	*Lepidogobius* sp., *Leptocottus* sp.					
queenfish	*Seriphus* sp.					
sanddab	*Citharichthys* sp.					
soupfin shark	*Galeorhinus* sp.					
angelshark	*Squatina* sp.					
eagle ray	*Myliobatis* sp.					
skate	*Raja sp.*					

"Palos Verdes Sand" fossils collected from a 40-60 feet bed on US 1 (LACM note listed it as US 101); 1 mile west of the viaduct [bridge], a one-mile exposure of fossiliferous beds near Huntington Beach. LACM IP 241 (Bell 2023).

Common Name	**Taxon**		**Common Name**	**Taxon**
snail	*Seila* sp.		clam	*Semele* sp.
turret snail	*Turritella* sp.		clam	*Cumingia* sp.
nassa snail	*Nassarius* sp.		macoma clam	*Macoma* sp.
murex snail	*Paciocinebrina* sp.		tellin clam	*Tellina* sp.
olive snail	*Olivella (Callianax)* sp.		clam	*Petricola* sp.
clam	*Yoldia* sp.		littleneck clam	*Leukoma* sp.
bittersweet clam	*Glycymeris* sp.		venus clam	*Nutricola* sp.
scallop	*Leptopecten* sp.		clam	*Tivela* sp.
clam	*Lucinisca* sp.		softshell clam	*Cryptomya* sp.
bean clam	*Donax* sp.		piddock	*Penitella* sp.
clam	*Gari* sp.		tusk shell	*Dentalium* sp.

"Palos Verdes Sand" fossils collected from the from Newport Bay area. Dated to ^{18}O substage 5e (130-120 ka BP). LACM 1066, 1067, 1100, 1240, 3877, UCMP V79082 (Miller 1971; Jefferson 1991a, 1991b)

Common Name	**Taxon**
bony fish	Osteichthyes
possible newt	cf. *Taricha* sp.
arboreal salamander	*Aneides lugubris*
western toad	*Bufo boreas*
Pacific treefrog	*Hyla regilla*
red-legged frog	*Rana aurora*
Pacific green sea turtle	*Chelonia mydas*
Pacific loggerhead turtle	*Caretta* sp.
common kingsnake	*Lampropeltis getulus*
coachwhip	*Masticophis flagellum*
garter snake	*Thamnophis* sp.
southern Pacific rattlesnake	*Crotalus viridis*
Arctic loon	*Gavia ?arctica*
common loon	*Gavia immer*
red-throated loon	*Gavia stellata*
western grebe	*Aechmorphorus occidentalis*
short-tailed albatross	*Diomedia albatrus*
northern fulmar	*Fulmarus glacialis*
sooty shearwater	*Puffinus griseus*
black-vented shearwater	*Puffinus ?opisthomelas*
Brandt's cormorant	*Phalacrocorax penicillatus*
Del Rey gannet	†*Morus reyanus*
greater white-fronted goose	*Anser ?albifrons*
flightless sea duck	†*Chendytes lawi*
Canada goose	*Branta ?canadensis*
canvasback	*Aythya valisineria*
scaup probably lesser scaup	*Aythya* sp. cf. *A. affinis*
white-winged scoter	*Melanitta ?deglandi*
gull	*Larus sp.*
skua	*Stercorarius sp.*
hawk	*Accipiter* sp.
quail	*Callipepla* sp.
crow	*Corvus* sp.
blackbird	*Agelaius* sp.

Common Name	***Taxon***
desert shrew	*Notiosorex crawfordi*
ornate shrew	*Sorex ornatus*
broad-footed mole	*Scapanus latimanus*
pallid bat	*Antrozous pallidus*
Jefferson's ground sloth	†*Megalonyx* sp. cf. *M. jeffersonii*
Shasta's ground sloth	+
desert cottontail	*Sylvilagus* sp. cf. *S. audubonii*
brush rabbit	*Sylvilagus bachmani*
California ground squirrel	*Spermophilus* sp. cf. *S. beecheyi*
Botta's pocket gopher	*Thomomys bottae*
California pocket mouse	*Perognathus californicus*
Pacific kangaroo rat	*Dipodomys* sp. cf. *D. agilis*
harvest mouse	*Reithrodontomys megalotus*
canon mouse	*Peromyscus* sp. cf. *P. crinitus*
deer mouse	*Peromyscus maniculatus*
dusky-footed wood rat	*Neotoma fuscipes*
California meadow vole	*Microtus californicus*
probably skunk	cf. *Spilogale* sp.
sea otter	*Enhydra lutris*
dire wolf	†*Canis* sp. cf. *C. dirus*
sea lion family	Otariidae
elephant seal	*Mirounga* sp. cf. *M. angustirostris*
whale	Cetacea
Pacific mastodon	†*Mammut pacificus*
horse	†*Equus* sp.
California tapir	†*Tapirus* sp. cf. *T. californicus*
Merriam's tapir	†*Tapirus merriami*
stilt-legged llama	†*Hemiauchenia* sp.
camel	†*Camelops* sp.
mule deer	*Odocoileus* sp. cf. *O. hemionus*
[pronghorn]	[*Antilocapra americana*]
long-horned bison	†*Bison* sp. cf. *B. latifrons*
antique bison	†*Bison* sp. cf. *B. antiquus*

APPENDIX C. NATIVE AMERICAN CONSULTATION OUTREACH

Sacred Lands File & Native American Contacts List Request

NATIVE AMERICAN HERITAGE COMMISSION
1550 Harbor Blvd, Suite 100
West Sacramento, CA 95691
(916) 373-3710
(916) 373-5471 – Fax
nahc@nahc.ca.gov

Information Below is Required for a Sacred Lands File Search

Project: Fairview Park Master Plan
County: Orange

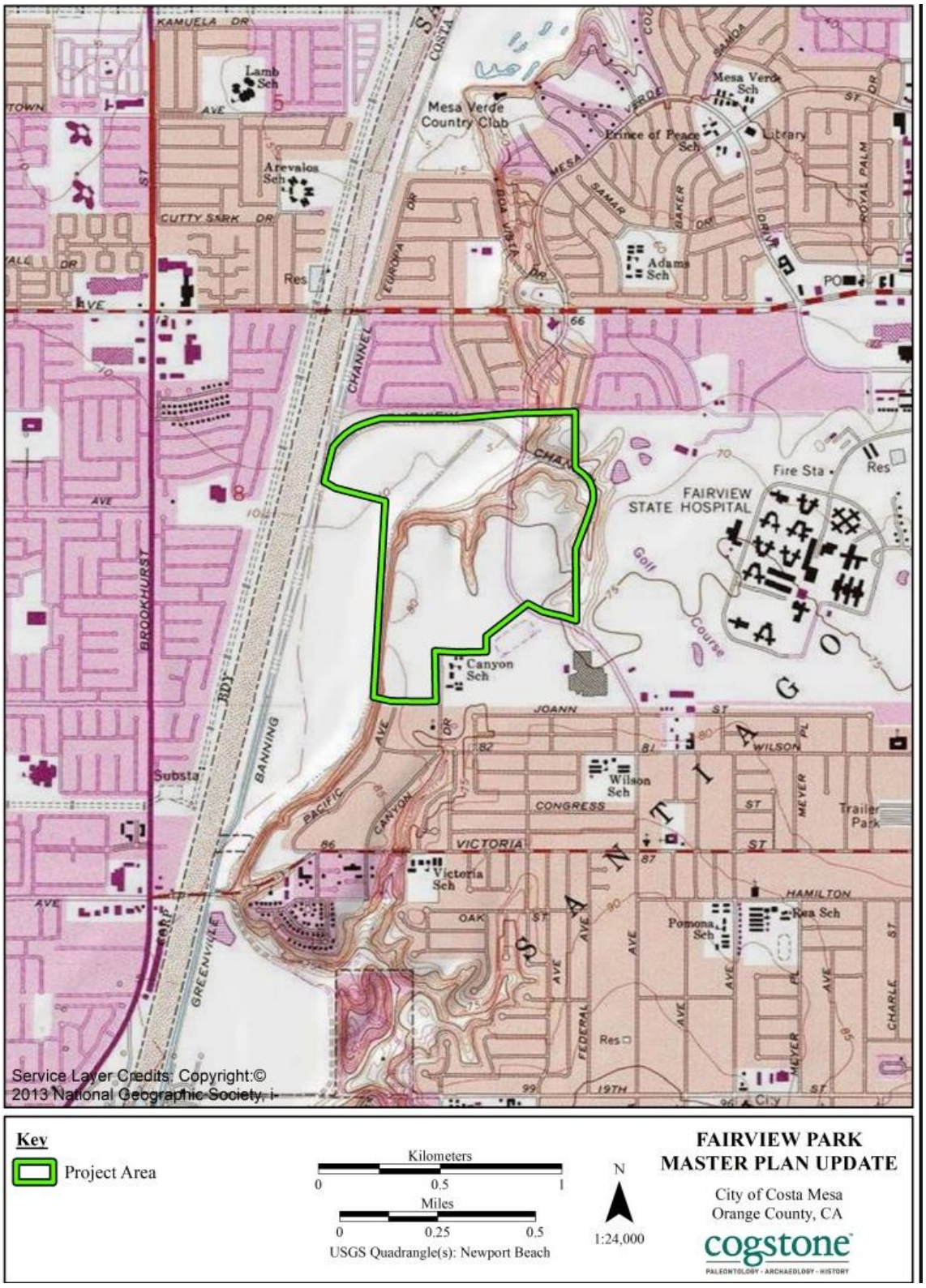
USGS Quadrangle
Name: Newport Beach
Township: 6S Range: 10W Section(s): 8, 9, 17

Company/Firm/Agency:
Cogstone Resource Management
Contact Person:
Street Address: 1518 W. Taft Avenue
City: Orange Zip: 92865
Phone: (714) 974-8300 Extension:
Fax: (714) 974-8303
Email: cogstoneconsult@cogstone.com

Project Description:
The overall goal of this update is to provide a revised plan that, when implemented, will protect, preserve, and enhance the unique natural and cultural resources of Fairview Park as a passive open space park, and that reflects the vested interests of the community and the City in environmental stewardship at Fairview Park.

☑ Project Location Map is attached

SLF&Contactsform: rev: 05/07/14


Service Layer Credits: Copyright:© 2013 National Geographic Society, i-
Key
Project Area
Kilometers
0
0.5
1
Miles
0
0.25
0.5
USGS Quadrangle(s): Newport Beach
N
1:24,000
FAIRVIEW PARK
MASTER PLAN UPDATE
City of Costa Mesa
Orange County, CA
cogstone
PALEONTOLOGY - ARCHAEOLOGY - HISTORY

Native American Heritage Commission Native American Contact List Orange County 12/4/2023				
Tribe Name	Contact Person	Cultural Affiliation	Counties	Last Updated
Gabrieleno Band of Mission Indians - Kizh Nation	Andrew Salas, Chairperson	Gabrieleno	Los Angeles, Orange, Riverside, San Bernardino, Santa Barbara, Ventura	8/18/2023
Gabrieleno Band of Mission Indians - Kizh Nation	Christina Swindall Martinez, Secretary	Gabrieleno	Los Angeles, Orange, Riverside, San Bernardino, Santa Barbara, Ventura	8/18/2023
Gabrieleno/Tongva San Gabriel Band of Mission Indians	Anthony Morales, Chairperson	Gabrieleno	Los Angeles, Orange, Riverside, San Bernardino, Ventura	12/4/2023
Gabrielino /Tongva Nation	Sandonne Goad, Chairperson	Gabrielino	Los Angeles, Orange, Riverside, San Bernardino, Ventura	3/28/2023
Gabrielino Tongva Indians of California Tribal Council	Christina Conley, Cultural Resource Administrator	Gabrielino	Los Angeles, Orange, Riverside, San Bernardino, Santa Barbara, Ventura	3/16/2023
Gabrielino Tongva Indians of California Tribal Council	Robert Dorame, Chairperson	Gabrielino	Los Angeles, Orange, Riverside, San Bernardino, Santa Barbara, Ventura	3/16/2023
Gabrielino-Tongva Tribe	Charles Alvarez, Chairperson	Gabrielino	Los Angeles, Orange, Riverside, San Bernardino, Ventura	5/30/2023
Gabrielino-Tongva Tribe	Sam Dunlap, Cultural Resource Director	Gabrielino	Los Angeles, Orange, Riverside, San Bernardino, Ventura	5/30/2023
Juaneno Band of Mission Indians	Sonia Johnston, Chairperson	Juaneno	Orange, Riverside, San Diego	
Juaneno Band of Mission Indians Acjachemen Nation - Belardes	Joyce Perry, Cultural Resource Director	Juaneno	Los Angeles, Orange, Riverside, San Bernardino, San Diego	3/17/2023
Juaneno Band of Mission Indians Acjachemen Nation 84A	Heidi Lucero, Chairperson, THPO	Juaneno	Los Angeles, Orange, Riverside, San Bernardino, San Diego	3/28/2023
Pala Band of Mission Indians	Christopher Nejo, Legal Analyst/Researcher	Cupeno Luiseno	Orange, Riverside, San Bernardino, San Diego	11/27/2023
Pala Band of Mission Indians	Shasta Gaughen, Tribal Historic Preservation Officer	Cupeno Luiseno	Orange, Riverside, San Bernardino, San Diego	11/27/2023
Pala Band of Mission Indians	Alexis Wallick, Assistant THPO	Cupeno Luiseno	Orange, Riverside, San Bernardino, San Diego	11/27/2023
Santa Rosa Band of Cahuilla Indians	Lovina Redner, Tribal Chair	Cahuilla	Imperial, Los Angeles, Orange, Riverside, San Bernardino, San Diego	

Soboba Band of Luiseno Indians	Jessica Valdez, Cultural Resource Specialist	Cahuilla Luiseno	Imperial, Los Angeles, Orange, Riverside, San Bernardino, San Diego	7/14/2023
Soboba Band of Luiseno Indians	Joseph Ontiveros, Tribal Historic Preservation Officer	Cahuilla Luiseno	Imperial, Los Angeles, Orange, Riverside, San Bernardino, San Diego	7/14/2023
This list is current only as of the date of this document. Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resource Section 5097.98 of the Public Resources Code. This list is only applicable for contacting local Native Americans with regard to cultural resources assessment for the proposed Fairview Park Master Plan Project, Orange County.				
Record: PROJ-2023-005918 Report Type: List of Tribes Counties: Orange NAHC Group: All				

CITY OF COSTA MESA
P.O. BOX 1200, COSTA MESA, CALIFORNIA 92628-1200
PARKS AND COMMUNITY SERVICES DEPARTMENT

[MONTH, DAY, YEAR]

[FIRST LAST]
[TRIBE]
[TITLE/ROLE]
[ADDRESS, STREET]
[CITY, CA, ZIP]

RE: California Environmental Quality Act (CEQA) and Senate Bill (SB) 18 Consultation Request for the Fairview Park Master Plan, City of Costa Mesa, Orange County, California.

[TITLE & LAST NAME]:

The City of Costa Mesa proposes to expand the previously approved Fairview Park Master Plan. The Master Plan Project proposes specific developments to the park to preserve, protect and enhance the unique natural and cultural resources of the park. The Project consists of the restoration of the 208 acres of the park for continued passive use by the community and the natural habitats, as well as protect the cultural sites within the park boundaries. Fairview Park is located on approximately 208 acres of land in the City of Costa Mesa at 2525 Placentia Avenue, Costa Mesa, Orange County, CA (Figures 1 and 2).

This Project will comply with CEQA regulations and an Initial Study/Mitigated Negative Declaration will be prepared. The City of Costa Mesa will be the lead CEQA Agency.

We are contacting you because the [TRIBE] requested to be notified and provided information, under the provisions of CEQA (Public Resources Code section 21080.3.1 subdivisions (b), (d) and (e)), also known as Assembly Bill (AB) 52, regarding projects with the City's jurisdiction and within the traditional territory of the [TRIBE]. Please consider this letter and preliminary Project information as the formal notification of the proposed Project. The City is requesting to consult with the [TRIBE] in order to identify tribal cultural resources that may be impacted by the proposed Project. The point of contact for the City of Costa Mesa is on the next page.

CITY OF COSTA MESA

P.O. BOX 1200, COSTA MESA, CALIFORNIA 92628-1200

PARKS AND COMMUNITY SERVICES DEPARTMENT

City of Costa Mesa Point of Contact Information	
Name/Title:	
Address:	
City:	
Tel:	
E-Mail:	

Additionally, City of Costa Mesa is requesting consultation under SB 18 (Chapter 905, Statutes of 2004) which requires local governments to consult with tribes prior to making certain planning decisions and requires consultation and notice for a general and specific plan adoption or amendment in order to preserve, or mitigate impacts to, cultural places that may be affected. The Native American Heritage Commission (NAHC) provided us with a list of tribal entities and individuals who have requested to be placed on the SB 18 consultation list. The [TRIBE] is on the list provided. As a result, please consider this letter as a notice of the Project and an invitation to provide comments regarding the Project.

Cogstone Resource Management (Cogstone) has been retained to assist the City of Costa Mesa with completing the cultural resources assessment, drafting tribal consultation notification letters, and otherwise assisting with the tribal consultation process as needed.

The NAHC was contacted on October 19, 2023 to perform a search of the Sacred Lands File. The NAHC responded on December 4, 2023 and reported positive results indicating that Native American sacred sites and/or heritage resources are located within the Project area or the immediate vicinity.

Cogstone requested a record search of the Project area, which included the entirety of Fairview Park from the South Central Coastal Information Center located at California State University, Fullerton on August 24, 2023. The results of the record search indicates four cultural resources have been previously recorded within the Park.

A reconnaissance pedestrian survey was conducted on April 3, 2024 focusing on the previously documented boundaries of CA-ORA-58 and CA-ORA-506 to document the current conditions of the sites and negative impacts that these extremely sensitive resources have sustained due to use of the Park. Unauthorized trails in a number of areas have caused clearing of surface vegetation resulting in erosion in area of up to six inches and varying widths. One area of shell midden was visible within CA-ORA-58.

CITY OF COSTA MESA
P.O. BOX 1200, COSTA MESA, CALIFORNIA 92628-1200
PARKS AND COMMUNITY SERVICES DEPARTMENT

The City would appreciate receiving any comments, issues and/or concerns relating to cultural resources, sacred lands, and tribal cultural resources that you may have within the Project area. All information provided will be kept confidential.

Please respond within 30 days, pursuant to PRC 21080.3.1(d), if you would like to consult on this Project. For consultation under SB 18, **you have 90 days to respond.** If you have any questions or concerns about the Project, please do not hesitate to contact me. Additionally, the City's point of contact for the Project is Kelly Dalton. He can be contacted via email kelly.dalton@CostaMesaCA.gov or via phone (714)754-5135.

Thank you for your assistance.

Sincerely,

Kelly Dalton
Project Manager

Attachments: Project vicinity map
Project location map
Project aerial map

CITY OF COSTA MESA
P.O. BOX 1200, COSTA MESA, CALIFORNIA 92628-1200
PARKS AND COMMUNITY SERVICES DEPARTMENT



Figure 1. Project vicinity map

CITY OF COSTA MESA
P.O. BOX 1200, COSTA MESA, CALIFORNIA 92628-1200
PARKS AND COMMUNITY SERVICES DEPARTMENT

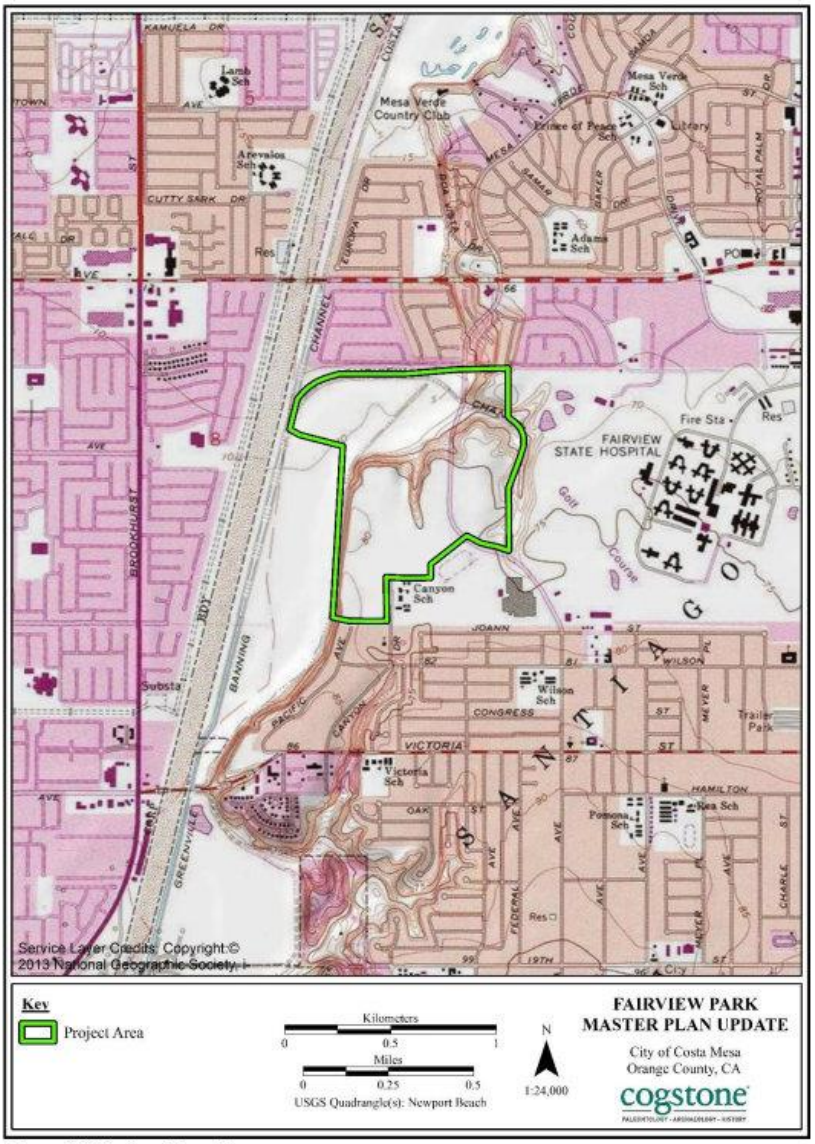


Figure 2. Project location map

CITY OF COSTA MESA
P.O. BOX 1200, COSTA MESA, CALIFORNIA 92628-1200
PARKS AND COMMUNITY SERVICES DEPARTMENT

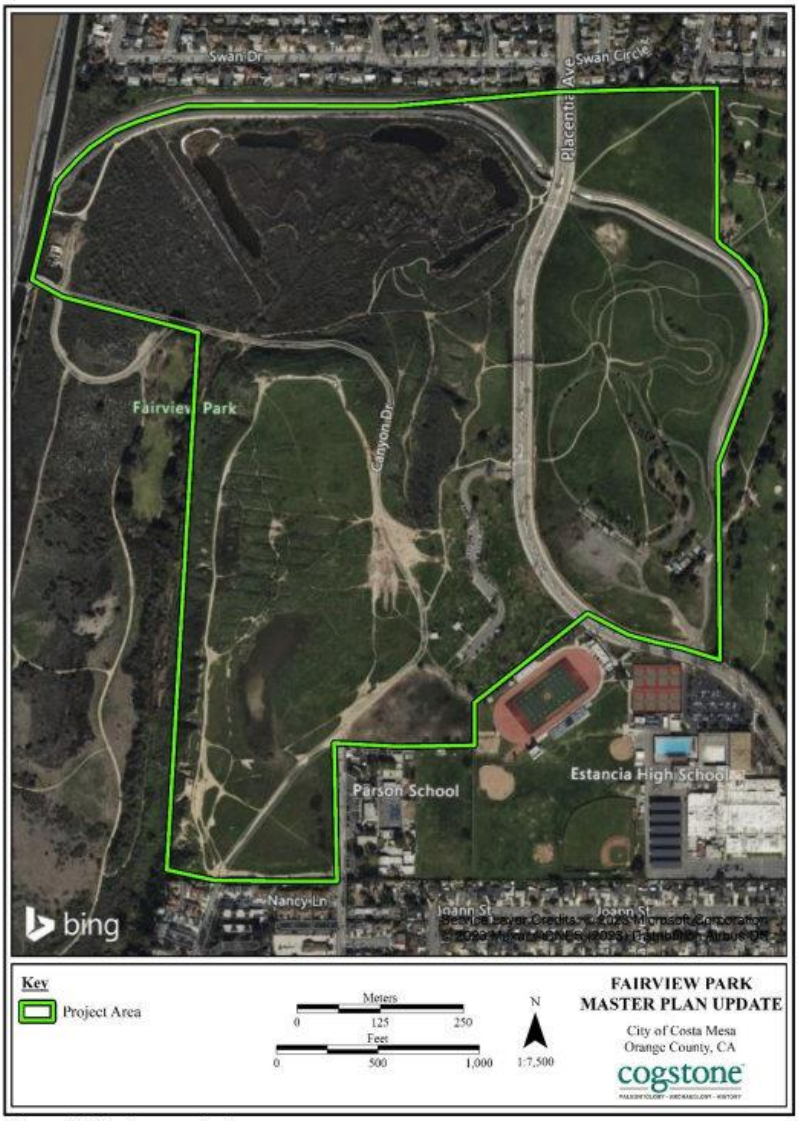


Figure 3. Project aerial map

cogstone
PALEONTOLOGY - ARCHAEOLOGY - HISTORY



[MONTH, DAY, YEAR]

Cogstone 5673

[FIRST LAST]
[TRIBE]
[TITLE/ROLE]
[ADDRESS, STREET]
[CITY, CA, ZIP]

RE: Native American Scoping Request for the Fairview Park Master Plan, City of Costa Mesa, Orange County, California.

[TITLE & LAST NAME]:

The City of Costa Mesa proposes to expand the previously approved Fairview Park Master Plan. The Master Plan Update proposes specific developments to the park measures to preserve, protect and enhance the unique natural and cultural resources of the park. The Project Master Plan Update incorporates new concepts for restoration projects, maintenance practices, and expanded cultural and environmental education a the park. The Master Plan Update consists of the restoration and preservation of the 208 acres of the park for continued passive use by the community and the natural habitats, as well as protect the cultural sites within the park boundaries. Fairview Park is located on approximately 208 acres of land in the City of Costa Mesa at 2525 Placentia Avenue, Costa Mesa, Orange County, CA (Figures 1 and 2).

City of Costa Mesa Point of Contact Information	
Name/Title:	Kelly Dalton, Fairview Park Administrator Parks and Community Services Department City of Costa Mesa
Address:	77 Fair Drive
City:	Costa Mesa, CA
Tel:	714-754-5135
E-Mail:	kelly.dalton@CostaMesaCA.gov

We are contacting the [TRIBE] because we believe that the [TRIBE] may have knowledge of cultural resources in the Project area which is known to be of great interest to local tribes. Cogstone Resource Management (Cogstone) has been retained to assist the City of Costa Mesa with cultural resources and tribal cultural resources assessment of the project area for the Fairview Park Master Plan update, We invite you to help identify cultural resources and/or areas of religious and cultural significance that might

1518 West Taft Avenue
Orange, CA 92865
Office [714] 974-8300

Branch Offices
Riverside - Morro Bay - Sacramento

cogstone.com
Toll free [888] 333-3212

Federal Certifications WOSB, EDWOSB, SDB
State Certifications DBE, WBE, UDBE

be affected by the Project. If the Project might have an impact to these resources and/or spaces and places, we would like to discuss possible ways to avoid, minimize or mitigate the potential effects.

The NAHC was contacted on October 19, 2023 to perform a search of the Sacred Lands File. The NAHC responded on December 4, 2023 and reported positive results indicating that Native American sacred sites and/or heritage resources are located within the Project area or the immediate vicinity.

Cogstone requested a record search of the Project area, which included the entirety of Fairview Park from the South Central Coastal Information Center located at California State University, Fullerton on August 24, 2023. The results of the record search indicates that four cultural resources have been previously recorded within the Park.

A reconnaissance pedestrian survey was conducted on April 3, 2024 focusing on the previously documented boundaries of CA-ORA-58 and CA-ORA-506 to document the current conditions of the sites and negative impacts that these extremely sensitive resources have sustained due to use of the Park. Unauthorized trails in a number of areas have caused clearing of surface vegetation resulting in erosion in area of up to six inches and varying widths. One area of shell midden was visible within CA-ORA-58.

This is not a tribal consultation request. Cogstone would appreciate receiving any comments, issues and/or concerns relating to cultural resources and sacred lands that you may have within the [APE/project area] so that they can be included in the assessment that is being prepared. All information provided will be kept confidential.

If you have any questions or concerns with the Project, please do not hesitant to contact me by phone (714-974-8300), email (cogstoneconsult@cogstone.com), or fax (714-974-8303). You can also contact Kelly Dalton at the City of Costa Mesa at the address or email above. Thank you for your attention to this matter.

Thank you for your assistance.

John Gust, Principal Investigator for Archaeology

Attachments: Project vicinity map
Project location map
Project aerial map



Figure 1. Project vicinity map

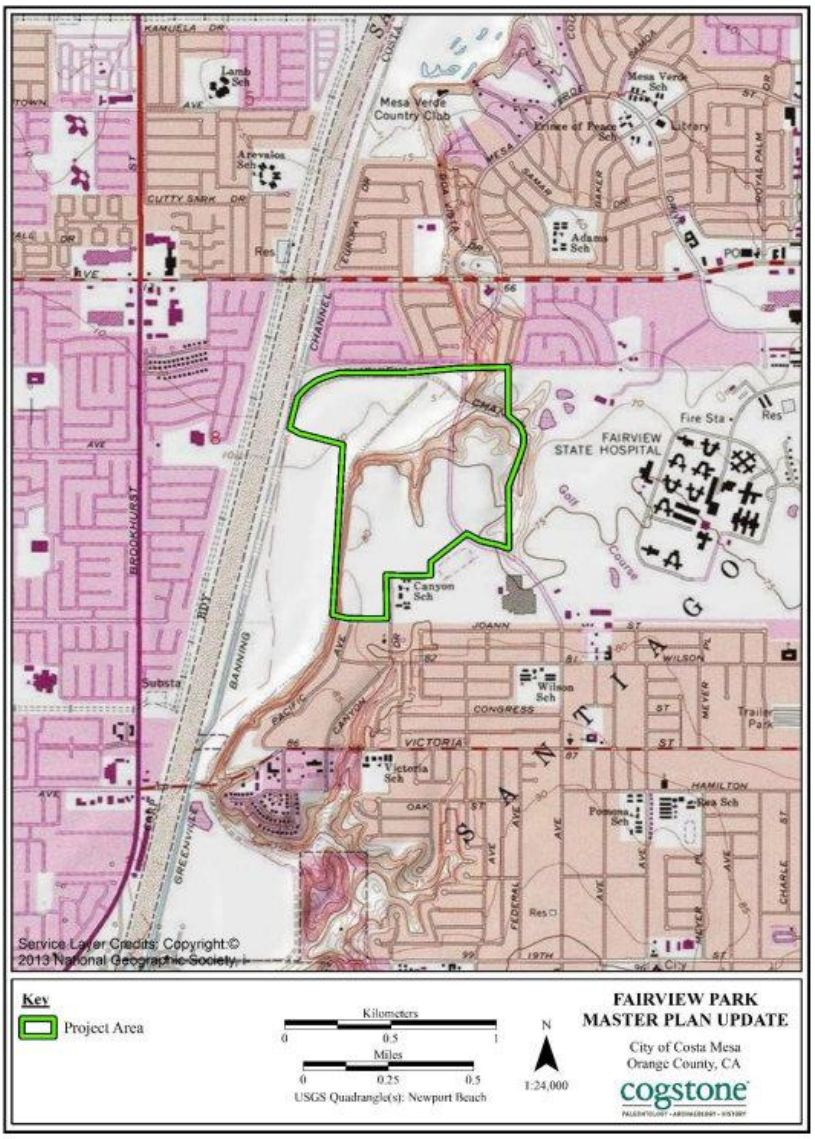


Figure 2. Project location map

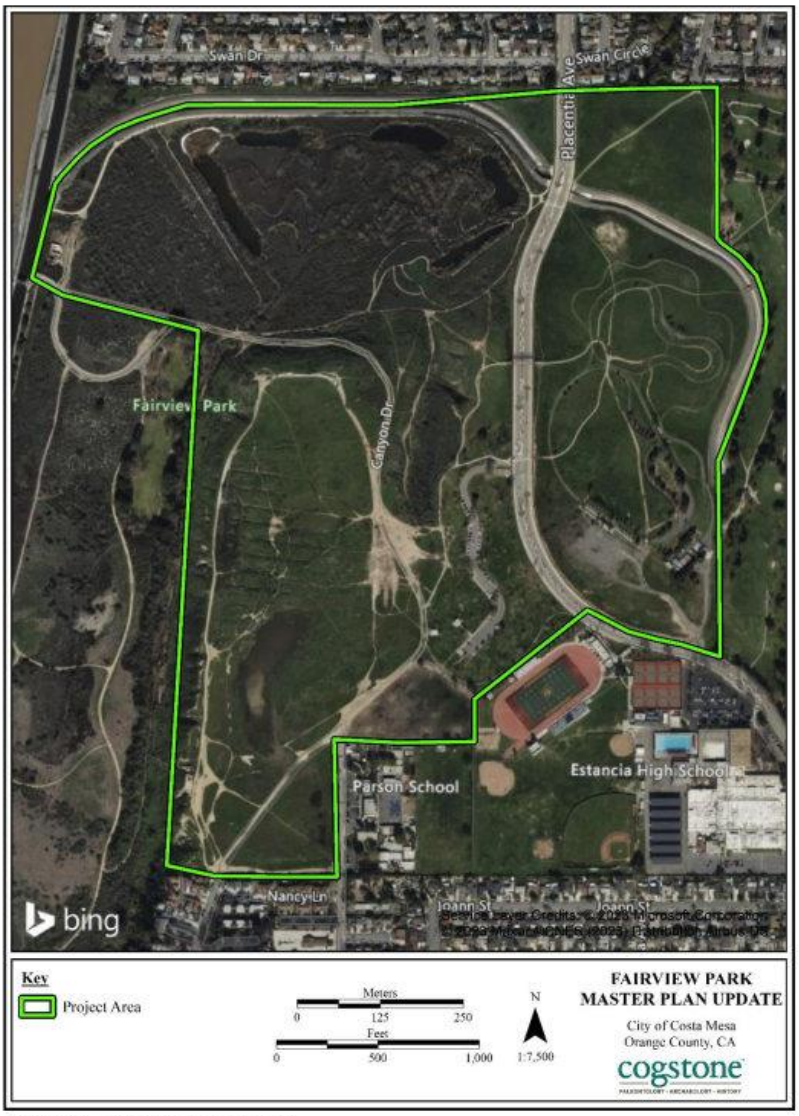


Figure 3. Project aerial map

Native American Group and Contact	Date(s) and Method of First Contact Attempt	Date(s) and Method of Second Attempt	Date(s) and Method of Third Attempt	Date(s) of Replies Rec'd	Comments
Gabrieleno Band of Mission Indians-Kizh Nation Chairman Andrew Salas	Certified mail, 10/7/2024	electronic mail on 10/25/2024	phone call on 11/8/2024		Representative of Gabrieleno Band of Mission Indians-Kizh Nation took down my message and will respond to City Representative Kelly Dalton.
Gabrieleno Band of Mission Indians-Kizh Nation Secretary Christina Swindall Martinez	Certified mail, 10/7/2024	electronic mail on 10/25/2024	phone call on 11/8/2024		Representative of Gabrieleno Band of Mission Indians-Kizh Nation took down my message and will respond to City Representative Kelly Dalton.
Gabrieleno/Tongva Tribal Council Chairperson Anthony Morales	Certified mail, 10/7/2024	electronic mail on 10/25/2024	phone call on 11/8/2024		no answer. Left a voicemail.
Gabrielino/Tongva Indians of California Tribal Council Cultural Resource Administrator Christina Conley	Certified mail, 10/7/2024	electronic mail on 10/25/2024	phone call on 11/8/2024		Cultural Resource Administrator Christina Conley will respond to the electronic mail sent out on 10/25/2024
Gabrielino/Tongva Indians of California Tribal Council Chairperson Robert Dorame	Certified mail, 10/7/2024	electronic mail on 10/25/2024	phone call on 11/8/2024		Cultural Resource Administrator Christina Conley will respond to the electronic mail sent out on 10/25/2024
Gabrielino-Tongva Tribe Chairperson Charles Alvarez	Certified mail, 10/7/2024	electronic mail on 10/25/2024		10/28/2024, to electronic mail	Cultural Resource Director Sam Dunlap responded to the electronic mail sent on 10/25/2024. Thank you for the follow-up electronic mail. I have reviewed the information provided and the Gabrielino Tongva Tribe does request tribal consultation per AB 52 and SB 18 consultation

Native American Group and Contact	Date(s) and Method of First Contact Attempt	Date(s) and Method of Second Attempt	Date(s) and Method of Third Attempt	Date(s) of Replies Rec'd	Comments
					requirements and will contact Kelly Dalton.
Gabrielino-Tongva Tribe Cultural Resoruce Director Sam Dunlap	Certified mail, 10/7/2024	electronic mail on 10/25/2024		10/28/2024, to electronic mail	Cultural Resource Director Sam Dunlap responded to the electronic mail sent on 10/25/2024. Thank you for the follow-up electronic mail. I have reviewed the information provided and the Gabrielino Tongva Tribe does request tribal consultation per AB 52 and SB 18 consultation requirements and will contact Kelly Dalton.
Gabrielino/Tongva Nation Chairperson Sandonne Goad	Certified mail, 10/7/2024	electronic mail on 10/25/2024	phone call on 11/8/2024		No Answer, left voicemail
Juaneno Band of Mission Indians Chairperson Sonia Johnston	Certified mail, 10/7/2024	electronic mail on 10/25/2024	electronic mail on 11/8/2024		No Response
Juaneno Band of Mission Indians Cultural Resource Director Joyce Perry	Certified mail, 10/7/2024	electronic mail on 10/25/2024			No Answer, left voicemail
Juaneno Band of Mission Indians Acjachemen Nation 84A Chairperson Heidi Lucero	Certified mail, 10/7/2024	electronic mail on 10/25/2024	phone call on 11/8/2024		No Answer, left voicemail
Pala Band of Mission Indians Legal Analyst/Researcher Christopher Nejo	Certified mail, 10/7/2024	electronic mail on 10/25/2024	phone call on 11/8/2024		No Answer, left voicemail
Pala Band of Mission Indians Tribal Historic Preservation Officer Shasta Gaughen	Certified mail, 10/7/2024	electronic mail on 10/25/2024	phone call on 11/8/2024		No Answer, left voicemail
Pala Band of Mission Indians Assistant THPO Alexis Wallick	Certified mail, 10/7/2024	electronic mail on 10/25/2024	phone call on 11/8/2024		No Answer, left voicemail

Native American Group and Contact	Date(s) and Method of First Contact Attempt	Date(s) and Method of Second Attempt	Date(s) and Method of Third Attempt	Date(s) of Replies Rec'd	Comments
Santa Rosa Band of Cahuilla Indians Tribal Chair Lovina Redner	Certified mail, 10/7/2024	electronic mail on 10/25/2024	phone call on 11/8/2024		No Answer, left voicemail
Soboba Band of Luiseno Indians Cultural Resource Specialist Jessica Valdez	Certified mail, 10/7/2024	electronic mail on 10/25/2024	phone call on 11/8/2024		Tribal Historic Preservation Officer Joseph Ontiveros responded they will defer to local tribe within the Project Area.
Soboba Band of Luiseno Indians Tribal Historic Preservation Officer Joseph Ontiveros	Certified mail, 10/7/2024	electronic mail on 10/25/2024	phone call on 11/8/2024		Tribal Historic Preservation Officer Joseph Ontiveros responded they will defer to local tribe within the Project Area.
Ti'at Society/Traditional Council of Pimu/Mother Earth Clan Director Cindi Alvitre[2]	**Certified mail, 10/7/2024**	**electronic mail on 10/25/2024**	**phone call on 11/8/2024**		**No Answer, left voicemail**
Shoshone-Gabrielino Nation Chairperson Nick Rocha	**Certified mail, 10/7/2024**	**electronic mail on 10/25/2024**	**phone call on 11/8/2024**		**No Answer, left voicemail**

[2] Bolded contacts were sent Native American scoping letters, not consultation invitation letters.

Juaneño Band of Mission Indians

Acjachemen Nation

November 11, 2024

Kelly Dalton
Fairview Park Administrator
Department of Park and Community Services
City of Costa Mesa

Via Email: kelly.dalton@costamesaca.gov, cc. Laura.Fauta@costamesaca.gov,
RE: Fairview Park Masterplan

To Whom It May Concern

I am writing on behalf of the Juaneno Band of Mission Indians, Acjachemen Nation- Belardes (JBMIAN-Belardes) regarding the Fairview Park Master Plan Update. We wish to engage in formal consultation on this project.

This project is located in an extremely sensitive area to our tribe. Farview park is located on the sacred village site and known burial area of Genga. This place is also identified as the archaeological site CA-ORA-58 which is listed on the National Register of Historic Places. It is essential that any proposed restoration projects and improvements,trails, and public access do not inadvertently impact Genga village site.

Numerous burials and cultural resources were removed from this site. Our tribe is in the process of repatriation of our ancestors from Genga, with the intention of reburial. We ask that the Fairview Park Master Plan incorporate a designated and private space on-site for Tribal use of re-interring remains and funerary objects.

We ask to be kept updated on the Master Plan Update. Please feel free to contact me at kaamalam@gmail.com.

Sincerely,

Joyce Stanfield Perry

Joyce Stanfield Perry, Cultural Resource Director

32211 Los Amigos, San Juan Capistrano, California 92675 ◊ (949) 293-8522 ◊ kaamalam@gmail.com

Cogstone Resource Management

From: Sam Dunlap <tongvatcr@gmail.com>
Sent: Monday, October 28, 2024 8:41 AM
To: Cogstone Resource Management
Cc: kelly.dalton@CostaMesaCA.gov
Subject: Re: California Environmental Quality Act (CEQA) and Senate Bill (SB) 18 Consultation Request for the Fairview Park Master Plan, City of Costa Mesa, Orange County, California.

Good Morning,

Thank you for the follow-up email. I have reviewed the information provided and the Gabrielino Tongva Tribe does request tribal consultation per AB 52 and SB 18 consultation requirements. As Mr Dalton is cc'd on this email, I can make arrangements with the City of Costa Mesa to have these discussions.

Sincerely,

Sam Dunlap
Cultural Resource Director
Gabrielino Tongva Tribe
909-262-9351

On Fri, Oct 25, 2024 at 8:21 AM Cogstone Resource Management <CogstoneConsult@cogstone.com> wrote:

> Good morning Cultural Resource Director Dunlap,
>
> We are writing to follow up on CEQA, also known as Assembly Bill (AB) 52 and SB18 consultation request for the Fairview Park Master Plan, City of Costa Mesa, Orange County, California.
>
> Cogstone Resource Management (Cogstone) has been retained to assist the City of Costa Mesa with completing the cultural resources assessment, drafting tribal consultation notification letters, and otherwise assisting with the tribal consultation process as needed.
>
> Please see the attached copy of the Project letter for more information. If you have any questions about the project, please do not hesitate to reach out. Additionally, the
> City's Point of Contact for the Project is Kelly Dalton. He can be contacted via phone at 714-754-5135 or via email at kelly.dalton@CostaMesaCA.gov.

1

Good morning Cultural Resource Director Dunlap,

We are writing to follow up on CEQA, also known as Assembly Bill (AB) 52 and SB18 consultation request for the Fairview Park Master Plan, City of Costa Mesa, Orange County, California.

Cogstone Resource Management (Cogstone) has been retained to assist the City of Costa Mesa with completing the cultural resources assessment, drafting tribal consultation notification letters, and otherwise assisting with the tribal consultation process as needed.

Please see the attached copy of the Project letter for more information. If you have any questions about the project, please do not hesitate to reach out. Additionally, the
City's Point of Contact for the Project is Kelly Dalton. He can be contacted via phone at 714-754-5135 or via email at kelly.dalton@CostaMesaCA.gov.

Cogstone Resource Management

Native American Consultation Department

P.O. Box 7366, Orange, CA, 92863

714-974-8300 office | 562-346-4576 cell

sduarte@cogstone.com www.cogstone.com

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Cogstone Resource Management

From: DALTON, KELLY M. <KELLY.DALTON@costamesaca.gov>
Sent: Tuesday, October 29, 2024 3:59 PM
To: Sam Dunlap; Cogstone Resource Management
Subject: RE: California Environmental Quality Act (CEQA) and Senate Bill (SB) 18 Consultation Request for the Fairview Park Master Plan, City of Costa Mesa, Orange County, California.

Follow Up Flag: Follow up
Flag Status: Flagged

Good afternoon,

Thank you for the response. I can be available to meet any time that suits everyone's availability.

I will be out of office Nov. 6 through Nov. 13, but I am generally flexible on scheduling once I return to the office.

Sincerely,

Kelly Dalton
Fairview Park Administrator
Parks and Community Services Department
City of Costa Mesa
kelly.dalton@CostaMesaCA.gov
714-754-5135

From: Sam Dunlap <tongvatcr@gmail.com>
Sent: Monday, October 28, 2024 8:41 AM
To: Cogstone Resource Management <CogstoneConsult@cogstone.com>
Cc: DALTON, KELLY M. <KELLY.DALTON@costamesaca.gov>
Subject: Re: California Environmental Quality Act (CEQA) and Senate Bill (SB) 18 Consultation Request for the Fairview Park Master Plan, City of Costa Mesa, Orange County, California.

Good Morning,

Thank you for the follow-up email. I have reviewed the information provided and the Gabrielino Tongva Tribe does request tribal consultation per AB 52 and SB 18 consultation requirements. As Mr Dalton is cc'd on this email, I can make arrangements with the City of Costa Mesa to have these discussions.

Sincerely,

Sam Dunlap
Cultural Resource Director
Gabrielino Tongva Tribe
909-262-9351

On Fri, Oct 25, 2024 at 8:21 AM Cogstone Resource Management <CogstoneConsult@cogstone.com> wrote:

Cogstone Resource Management

Native American Consultation Department

P.O. Box 7366, Orange, CA, 92863

714-974-8300 office | 562-346-4576 cell

sduarte@cogstone.com www.cogstone.com

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APPENDIX D. PALEONTOLOGICAL SENSITIVITY SYSTEM

Table E-1: Bureau of Land Management PFYC Description Summary

	PFYC Rank
Very Low. The occurrence of significant fossils is non-existent or extremely rare. Includes igneous (excluding air-fall and reworked volcanic ash units), metamorphic, or Precambrian rocks. Assessment or mitigation of paleontological resources is usually unnecessary except in very rare or isolated circumstances that result in the unanticipated presence of fossils.	**1**
Low. Sedimentary geologic units that are unlikely to contain vertebrate or scientifically significant nonvertebrate fossils. Includes rock units less than 10,000 years old and sediments with significant physical and chemical changes (e.g., diagenetic alteration) which decrease the potential for fossil preservation. Assessment or mitigation of paleontological resources is not likely to be necessary.	**2**
Moderate. Units are known to contain vertebrate or scientifically significant nonvertebrate fossils, but these occurrences are widely scattered and/or of low abundance. Common invertebrate or plant fossils may be found and opportunities may exist for casual collecting. Paleontological mitigation strategies will be based on the nature of the proposed activity. Management considerations cover a broad range of options that may include record searches, pre-disturbance surveys, monitoring, mitigation, or avoidance. Surface-disturbing activities may require assessment by a qualified paleontologist to determine whether significant paleontological resources occur in the area of a proposed action, and whether the action could affect the paleontological resources.	**3**
High. Geologic units containing a high occurrence of significant fossils. Fossils must be abundant per locality. Vertebrates or scientifically significant invertebrate or plant fossils are known to occur and have been documented, but may vary in occurrence and predictability. Mitigation plans must consider the nature of the proposed disturbance, such as removal or penetration of protective surface alluvium or soils, potential for future accelerated erosion, or increased ease of access that could result in looting. Detailed field assessment is normally required and on-site monitoring or spot-checking may be necessary during land disturbing activities. In some cases avoidance of known paleontological resources may be necessary.	**4**
Very High. Highly fossiliferous geologic units that consistently and predictably produce vertebrate or scientifically significant invertebrate or plant fossils. Vertebrate fossils or scientifically significant invertebrate fossils are known or can reasonably be expected to occur in the impacted area. Paleontological resources are highly susceptible to adverse impacts from surface disturbing activities. Paleontological mitigation may be necessary before or during surface disturbing activities. The area should be assessed prior to land tenure adjustments. Pre-work surveys are usually needed and on-site monitoring may be necessary during land use activities. Avoidance or resource preservation through controlled access, designation of areas of avoidance, or special management designations should be considered.	**5**
Unknown. An assignment of "Unknown" may indicate the unit or area is poorly studied and field studies are needed to verify the presence or absence of paleontological resources. The unit may exhibit features or preservational conditions that suggest significant fossils could be present, but little information about the actual unit or area is known. Literature searches or consultation with professional colleagues may allow an unknown unit to be provisionally assigned to another Class, but the geological unit should be formally assigned to a Class after adequate survey and research is performed to make an informed determination.	**U**
Water or Ice. Typically used only for areas which have been covered thus preventing an examination of the underlying geology.	**W, I**

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Fairview Park Detailed Report

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1. Basic Project Information

1.1. Basic Project Information

Data Field	Value
Project Name	Fairview Park
Construction Start Date	1/1/2026
Operational Year	2026
Lead Agency	—
Land Use Scale	Project/site
Analysis Level for Defaults	County
Windspeed (m/s)	2.50000
Precipitation (days)	19.2000
Location	33.664333, -117.942237
County	Orange
City	Costa Mesa
Air District	South Coast AQMD
Air Basin	South Coast
TAZ	5912
EDFZ	7
Electric Utility	Southern California Edison
Gas Utility	Southern California Gas
App Version	2022.1.1.37

1.2. Land Use Types

Land Use Subtype	Size	Unit	Lot Acreage	Building Area (sq ft)	Landscape Area (sq ft)	Special Landscape Area (sq ft)	Population	Description
City Park	25.0000	Acre	25.0000	0.00000	435,600	0.00000	—	Restoration

Road Construction	2.00000	Mile	1.000000	0.00000	0.00000	—	—	New Trails

1.3. User-Selected Emission Reduction Measures by Emissions Sector

No measures selected

2. Emissions Summary

2.1. Construction Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	1.39488	1.17814	9.78458	15.1962	0.02042	0.42048	1.30313	1.67762	0.38684	0.15248	0.49703	—	2,377.03	2,377.03	0.08894	0.02665	0.90518	2,388.10
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	2.63567	2.01114	22.1336	32.6340	0.05678	0.70041	123.552	124.252	0.64633	12.4821	13.1284	—	7,001.44	7,001.44	0.44888	0.39497	0.14341	7,130.50
Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.35597	0.28213	2.84289	4.20292	0.00680	0.10463	9.78696	9.89159	0.09643	0.99115	1.08758	—	814.147	814.147	0.04665	0.03535	0.21871	826.066
Annual (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.06497	0.05149	0.51883	0.76703	0.00124	0.01910	1.78612	1.80522	0.01760	0.18089	0.19848	—	134.791	134.791	0.00772	0.00585	0.03621	136.765
Exceeds (Daily Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Threshold	—	75.0000	100.0000	550.000	150.000	—	—	150.000	—	—	55.0000	—	—	—	—	—	—	—
Unmit.	—	No	No	No	No	—	—	No	—	—	No	—	—	—	—	—	—	—

Exceeds (Average Daily)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Threshold	—	75.0000	100.0000	550.000	150.000	—	—	150.000	—	—	55.0000	—	—	—	—	—	—	—
Unmit.	—	No	No	No	No	—	—	No	—	—	No	—	—	—	—	—	—	—

2.2. Construction Emissions by Year, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Year	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily - Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2026	1.39488	1.17814	9.78458	15.1962	0.02042	0.42048	1.30313	1.67762	0.38684	0.15248	0.49703	—	2,377.03	2,377.03	0.08894	0.02665	0.90518	2,388.10
Daily - Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2026	2.63567	2.01114	22.1336	32.6340	0.05678	0.70041	123.552	124.252	0.64633	12.4821	13.1284	—	7,001.44	7,001.44	0.44888	0.39497	0.14341	7,130.50
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2026	0.35597	0.28213	2.84289	4.20292	0.00680	0.10463	9.78696	9.89159	0.09643	0.99115	1.08758	—	814.147	814.147	0.04665	0.03535	0.21871	826.066
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2026	0.06497	0.05149	0.51883	0.76703	0.00124	0.01910	1.78612	1.80522	0.01760	0.18089	0.19848	—	134.791	134.791	0.00772	0.00585	0.03621	136.765

2.4. Operations Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.42794	0.41360	0.11081	1.25657	0.00314	0.00192	0.29616	0.29808	0.00179	0.07517	0.07696	1.15872	348.881	350.039	0.13375	0.01301	1.10803	358.367

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.42658	0.41197	0.12040	1.18112	0.00302	0.00192	0.29616	0.29808	0.00179	0.07517	0.07696	1.15872	336.639	337.798	0.13448	0.01361	0.02873	345.243
Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.34095	0.33330	0.06379	0.63352	0.00160	0.00101	0.15360	0.15461	0.00094	0.03900	0.03994	1.15872	192.003	193.162	0.12683	0.00732	0.25124	198.764
Annual (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.06222	0.06083	0.01164	0.11562	0.00029	0.00018	0.02803	0.02822	0.00017	0.00712	0.00729	0.19184	31.7883	31.9802	0.02100	0.00121	0.04159	32.9077
Exceeds (Daily Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Threshold	—	55.0000	55.0000	550.000	150.000	—	—	150.000	—	—	55.0000	—	—	—	—	—	—	—
Unmit.	—	No	No	No	No	—	—	No	—	—	No	—	—	—	—	—	—	—
Exceeds (Average Daily)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Threshold	—	55.0000	55.0000	550.000	150.000	—	—	150.000	—	—	55.0000	—	—	—	—	—	—	—
Unmit.	—	No	No	No	No	—	—	No	—	—	No	—	—	—	—	—	—	—

2.5. Operations Emissions by Sector, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Sector	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.18038	0.16603	0.11081	1.25657	0.00314	0.00192	0.29616	0.29808	0.00179	0.07517	0.07696	—	320.464	320.464	0.01523	0.01268	1.10803	325.731
Area	0.24757	0.24757	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Energy	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	—	0.00000	—	0.00000	0.00000	0.00000	0.00000	—	0.00000

Water	—	—	—	—	—	—	—	—	—	—	—	0.00000	28.4161	28.4161	0.00271	0.00033	—	28.5817
Waste	—	—	—	—	—	—	—	—	—	—	—	1.15872	0.00000	1.15872	0.11581	0.00000	—	4.05396
Total	0.42794	0.41360	0.11081	1.25657	0.00314	0.00192	0.29616	0.29808	0.00179	0.07517	0.07696	1.15872	348.881	350.039	0.13375	0.01301	1.10803	358.367
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.17902	0.16441	0.12040	1.18112	0.00302	0.00192	0.29616	0.29808	0.00179	0.07517	0.07696	—	308.223	308.223	0.01596	0.01328	0.02873	312.608
Area	0.24757	0.24757	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Energy	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	—	0.00000	—	0.00000	0.00000	0.00000	0.00000	—	0.00000
Water	—	—	—	—	—	—	—	—	—	—	—	0.00000	28.4161	28.4161	0.00271	0.00033	—	28.5817
Waste	—	—	—	—	—	—	—	—	—	—	—	1.15872	0.00000	1.15872	0.11581	0.00000	—	4.05396
Total	0.42658	0.41197	0.12040	1.18112	0.00302	0.00192	0.29616	0.29808	0.00179	0.07517	0.07696	1.15872	336.639	337.798	0.13448	0.01361	0.02873	345.243
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.09338	0.08573	0.06379	0.63352	0.00160	0.00101	0.15360	0.15461	0.00094	0.03900	0.03994	—	163.587	163.587	0.00832	0.00699	0.25124	166.129
Area	0.24757	0.24757	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Energy	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	—	0.00000	—	0.00000	0.00000	0.00000	0.00000	—	0.00000
Water	—	—	—	—	—	—	—	—	—	—	—	0.00000	28.4161	28.4161	0.00271	0.00033	—	28.5817
Waste	—	—	—	—	—	—	—	—	—	—	—	1.15872	0.00000	1.15872	0.11581	0.00000	—	4.05396
Total	0.34095	0.33330	0.06379	0.63352	0.00160	0.00101	0.15360	0.15461	0.00094	0.03900	0.03994	1.15872	192.003	193.162	0.12683	0.00732	0.25124	198.764
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.01704	0.01565	0.01164	0.11562	0.00029	0.00018	0.02803	0.02822	0.00017	0.00712	0.00729	—	27.0837	27.0837	0.00138	0.00116	0.04159	27.5045
Area	0.04518	0.04518	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Energy	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	—	0.00000	—	0.00000	0.00000	0.00000	0.00000	—	0.00000
Water	—	—	—	—	—	—	—	—	—	—	—	0.00000	4.70462	4.70462	0.00045	0.00005	—	4.73203
Waste	—	—	—	—	—	—	—	—	—	—	—	0.19184	0.00000	0.19184	0.01917	0.00000	—	0.67118
Total	0.06222	0.06083	0.01164	0.11562	0.00029	0.00018	0.02803	0.02822	0.00017	0.00712	0.00729	0.19184	31.7883	31.9802	0.02100	0.00121	0.04159	32.9077

3. Construction Emissions Details

3.1. Linear, Grubbing & Land Clearing (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.41988	0.35282	3.18375	3.32944	0.00453	0.18467	—	0.18467	0.16990	—	0.16990	—	490.814	490.814	0.01991	0.00398	—	492.498
Dust From Material Movement	—	—	—	—	—	—	0.20680	0.20680	—	0.02233	0.02233	—	—	—	—	—	—	—
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.41988	0.35282	3.18375	3.32944	0.00453	0.18467	—	0.18467	0.16990	—	0.16990	—	490.814	490.814	0.01991	0.00398	—	492.498
Dust From Material Movement	—	—	—	—	—	—	0.20680	0.20680	—	0.02233	0.02233	—	—	—	—	—	—	—
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.00690	0.00580	0.05234	0.05473	0.00007	0.00304	—	0.00304	0.00279	—	0.00279	—	8.06817	8.06817	0.00033	0.00007	—	8.09586

Dust From Material Movement	—	—	—	—	—	—	0.00340	0.00340	—	0.00037	0.00037	—	—	—	—	—	—	—
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.00126	0.00106	0.00955	0.00999	0.00001	0.00055	—	0.00055	0.00051	—	0.00051	—	1.33578	1.33578	0.00005	0.00001	—	1.34036
Dust From Material Movement	—	—	—	—	—	—	0.00062	0.00062	—	0.00007	0.00007	—	—	—	—	—	—	—
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01731	0.01687	0.01521	0.26351	0.00000	0.00000	0.06535	0.06535	0.00000	0.01532	0.01532	—	65.1080	65.1080	0.00077	0.00237	0.22629	66.0598
Vendor	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Hauling	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01720	0.01687	0.01747	0.22730	0.00000	0.00000	0.06535	0.06535	0.00000	0.01532	0.01532	—	61.9633	61.9633	0.00088	0.00237	0.00586	62.6975
Vendor	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Hauling	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00028	0.00028	0.00029	0.00388	0.00000	0.00000	0.00106	0.00106	0.00000	0.00025	0.00025	—	1.03252	1.03252	0.00001	0.00004	0.00161	1.04610
Vendor	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

Hauling	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00005	0.00005	0.00005	0.00071	0.00000	0.00000	0.00019	0.00019	0.00000	0.00005	0.00005	—	0.17095	0.17095	< 0.000005	0.00001	0.00027	0.17319
Vendor	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Hauling	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

3.3. Linear, Grading & Excavation (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.95626	0.80352	6.95592	9.01987	0.01245	0.37426	—	0.37426	0.34432	—	0.34432	—	1,348.87	1,348.87	0.05472	0.01094	—	1,353.50
Dust From Material Movement	—	—	—	—	—	—	0.41360	0.41360	—	0.04466	0.04466	—	—	—	—	—	—	—
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.06550	0.05504	0.47643	0.61780	0.00085	0.02563	—	0.02563	0.02358	—	0.02358	—	92.3884	92.3884	0.00375	0.00075	—	92.7055

Dust From Material Movement	—	—	—	—	—	—	0.02833	0.02833	—	0.00306	0.00306	—	—	—	—	—	—	—
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01195	0.01004	0.08695	0.11275	0.00016	0.00468	—	0.00468	0.00430	—	0.00430	—	15.2960	15.2960	0.00062	0.00012	—	15.3484
Dust From Material Movement	—	—	—	—	—	—	0.00517	0.00517	—	0.00056	0.00056	—	—	—	—	—	—	—
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03461	0.03373	0.03042	0.52702	0.00000	0.00000	0.13071	0.13071	0.00000	0.03064	0.03064	—	130.216	130.216	0.00154	0.00474	0.45259	132.120
Vendor	0.00246	0.00067	0.03193	0.01598	0.00022	0.00022	0.75882	0.75905	0.00022	0.07718	0.07741	—	31.3643	31.3643	0.00157	0.00443	0.08103	32.8037
Hauling	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00236	0.00230	0.00239	0.03237	0.00000	0.00000	0.00884	0.00884	0.00000	0.00207	0.00207	—	8.60431	8.60431	0.00012	0.00032	0.01338	8.71746
Vendor	0.00017	0.00004	0.00229	0.00111	0.00002	0.00002	0.04926	0.04928	0.00002	0.00502	0.00503	—	2.14869	2.14869	0.00011	0.00030	0.00240	2.24413
Hauling	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00043	0.00042	0.00044	0.00591	0.00000	0.00000	0.00161	0.00161	0.00000	0.00038	0.00038	—	1.42454	1.42454	0.00002	0.00005	0.00222	1.44327

Vendor	0.00003	0.00001	0.00042	0.00020	< 0.000005	< 0.000005	0.00899	0.00899	< 0.000005	0.00092	0.00092	—	0.35574	0.35574	0.00002	0.00005	0.00040	0.37154
Hauling	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

3.5. Linear, Drainage, Utilities, & Sub-Grade (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.75285	0.62937	5.13148	7.26500	0.01076	0.22576	—	0.22576	0.20770	—	0.20770	—	1,070.93	1,070.93	0.04344	0.00869	—	1,074.61
Dust From Material Movement	—	—	—	—	—	—	0.20680	0.20680	—	0.02233	0.02233	—	—	—	—	—	—	—
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03506	0.02931	0.23900	0.33837	0.00050	0.01051	—	0.01051	0.00967	—	0.00967	—	49.8792	49.8792	0.00202	0.00040	—	50.0503
Dust From Material Movement	—	—	—	—	—	—	0.00963	0.00963	—	0.00104	0.00104	—	—	—	—	—	—	—

Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.00640	0.00535	0.04362	0.06175	0.00009	0.00192	—	0.00192	0.00177	—	0.00177	—	8.25806	8.25806	0.00033	0.00007	—	8.28640
Dust From Material Movement	—	—	—	—	—	—	0.00176	0.00176	—	0.00019	0.00019	—	—	—	—	—	—	—
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03461	0.03373	0.03042	0.52702	0.00000	0.00000	0.13071	0.13071	0.00000	0.03064	0.03064	—	130.216	130.216	0.00154	0.00474	0.45259	132.120
Vendor	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Hauling	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00160	0.00156	0.00163	0.02201	0.00000	0.00000	0.00601	0.00601	0.00000	0.00141	0.00141	—	5.85093	5.85093	0.00008	0.00022	0.00910	5.92787
Vendor	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Hauling	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00029	0.00028	0.00030	0.00402	0.00000	0.00000	0.00110	0.00110	0.00000	0.00026	0.00026	—	0.96869	0.96869	0.00001	0.00004	0.00151	0.98143
Vendor	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Hauling	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

3.7. Linear, Paving (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.57280	0.48131	4.59226	6.87716	0.00966	0.19472	—	0.19472	0.17914	—	0.17914	—	1,045.66	1,045.66	0.04242	0.00848	—	1,049.25
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01099	0.00923	0.08807	0.13189	0.00019	0.00373	—	0.00373	0.00344	—	0.00344	—	20.0537	20.0537	0.00081	0.00016	—	20.1225
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.00200	0.00168	0.01607	0.02407	0.00003	0.00068	—	0.00068	0.00063	—	0.00063	—	3.32012	3.32012	0.00013	0.00003	—	3.33152
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Worker	0.03461	0.03373	0.03042	0.52702	0.00000	0.00000	0.13071	0.13071	0.00000	0.03064	0.03064	—	130.216	130.216	0.00154	0.00474	0.45259	132.120
Vendor	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Hauling	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00066	0.00064	0.00067	0.00906	0.00000	0.00000	0.00248	0.00248	0.00000	0.00058	0.00058	—	2.40921	2.40921	0.00003	0.00009	0.00375	2.44089
Vendor	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Hauling	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00012	0.00012	0.00012	0.00165	0.00000	0.00000	0.00045	0.00045	0.00000	0.00011	0.00011	—	0.39887	0.39887	0.00001	0.00002	0.00062	0.40412
Vendor	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Hauling	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

3.9. Site Preparation (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.38771	0.32578	3.74097	6.82281	0.00989	0.11724	—	0.11724	0.10786	—	0.10786	—	1,070.57	1,070.57	0.04343	0.00869	—	1,074.24

Dust From Material Movement	—	—	—	—	—	—	0.00000	0.00000	—	0.00000	0.00000	—	—	—	—	—	—	—
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01062	0.00893	0.10249	0.18693	0.00027	0.00321	—	0.00321	0.00296	—	0.00296	—	29.3307	29.3307	0.00119	0.00024	—	29.4314
Dust From Material Movement	—	—	—	—	—	—	0.00000	0.00000	—	0.00000	0.00000	—	—	—	—	—	—	—
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.00194	0.00163	0.01870	0.03411	0.00005	0.00059	—	0.00059	0.00054	—	0.00054	—	4.85603	4.85603	0.00020	0.00004	—	4.87270
Dust From Material Movement	—	—	—	—	—	—	0.00000	0.00000	—	0.00000	0.00000	—	—	—	—	—	—	—
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03439	0.03373	0.03494	0.45459	0.00000	0.00000	0.13071	0.13071	0.00000	0.03064	0.03064	—	123.927	123.927	0.00176	0.00474	0.01172	125.395

Vendor	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Hauling	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00094	0.00092	0.00096	0.01295	0.00000	0.00000	0.00354	0.00354	0.00000	0.00083	0.00083	—	3.44172	3.44172	0.00005	0.00013	0.00535	3.48698
Vendor	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Hauling	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00017	0.00017	0.00017	0.00236	0.00000	0.00000	0.00065	0.00065	0.00000	0.00015	0.00015	—	0.56982	0.56982	0.00001	0.00002	0.00089	0.57731
Vendor	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Hauling	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

3.11. Grading (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.78625	0.66067	6.44600	10.4587	0.01513	0.26751	—	0.26751	0.24611	—	0.24611	—	1,638.66	1,638.66	0.06647	0.01329	—	1,644.28
Dust From Material Movement	—	—	—	—	—	—	0.20680	0.20680	—	0.02233	0.02233	—	—	—	—	—	—	—
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.06462	0.05430	0.52981	0.85962	0.00124	0.02199	—	0.02199	0.02023	—	0.02023	—	134.684	134.684	0.00546	0.00109	—	135.146
Dust From Material Movement	—	—	—	—	—	—	0.01700	0.01700	—	0.00184	0.00184	—	—	—	—	—	—	—
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01179	0.00991	0.09669	0.15688	0.00023	0.00401	—	0.00401	0.00369	—	0.00369	—	22.2985	22.2985	0.00090	0.00018	—	22.3750
Dust From Material Movement	—	—	—	—	—	—	0.00310	0.00310	—	0.00033	0.00033	—	—	—	—	—	—	—
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.04299	0.04216	0.04368	0.56824	0.00000	0.00000	0.16339	0.16339	0.00000	0.03830	0.03830	—	154.908	154.908	0.00220	0.00592	0.01465	156.744
Vendor	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Hauling	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00353	0.00344	0.00359	0.04855	0.00000	0.00000	0.01326	0.01326	0.00000	0.00311	0.00311	—	12.9065	12.9065	0.00018	0.00049	0.02007	13.0762

Vendor	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Hauling	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00064	0.00063	0.00066	0.00886	0.00000	0.00000	0.00242	0.00242	0.00000	0.00057	0.00057	—	2.13681	2.13681	0.00003	0.00008	0.00332	2.16491
Vendor	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Hauling	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

3.13. Artificial Soil Removal (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.93826	0.78840	7.25266	10.9922	0.01549	0.29126	—	0.29126	0.26796	—	0.26796	—	1,677.00	1,677.00	0.06803	0.01361	—	1,682.76
Dust From Material Movement	—	—	—	—	—	—	0.23714	0.23714	—	0.02692	0.02692	—	—	—	—	—	—	—
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07712	0.06480	0.59611	0.90347	0.00127	0.02394	—	0.02394	0.02202	—	0.02202	—	137.836	137.836	0.00559	0.00112	—	138.309

Dust From Material Movement	—	—	—	—	—	—	0.01949	0.01949	—	0.00221	0.00221	—	—	—	—	—	—	—
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01407	0.01183	0.10879	0.16488	0.00023	0.00437	—	0.00437	0.00402	—	0.00402	—	22.8203	22.8203	0.00093	0.00019	—	22.8986
Dust From Material Movement	—	—	—	—	—	—	0.00356	0.00356	—	0.00040	0.00040	—	—	—	—	—	—	—
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.05159	0.05060	0.05241	0.68189	0.00000	0.00000	0.19606	0.19606	0.00000	0.04596	0.04596	—	185.890	185.890	0.00265	0.00711	0.01758	188.092
Vendor	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Hauling	0.39448	0.10980	4.56294	2.65562	0.01627	0.02440	122.618	122.642	0.02440	12.3179	12.3423	—	2,150.48	2,150.48	0.26434	0.34161	0.09945	2,258.99
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00424	0.00413	0.00431	0.05826	0.00000	0.00000	0.01592	0.01592	0.00000	0.00373	0.00373	—	15.4878	15.4878	0.00022	0.00058	0.02409	15.6914
Vendor	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Hauling	0.03309	0.00936	0.37270	0.21560	0.00134	0.00201	9.54962	9.55162	0.00201	0.95964	0.96164	—	176.539	176.539	0.02206	0.02808	0.13608	185.594
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00077	0.00075	0.00079	0.01063	0.00000	0.00000	0.00290	0.00290	0.00000	0.00068	0.00068	—	2.56418	2.56418	0.00004	0.00010	0.00399	2.59789

Vendor	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Hauling	0.00604	0.00171	0.06802	0.03935	0.00024	0.00037	1.74281	1.74317	0.00037	0.17513	0.17550	—	29.2280	29.2280	0.00365	0.00465	0.02253	30.7271

3.15. Fencing and Related Construction (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.46342	0.38940	4.46596	8.57754	0.01247	0.12820	—	0.12820	0.11794	—	0.11794	—	1,349.38	1,349.38	0.05474	0.01095	—	1,354.01
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03809	0.03201	0.36707	0.70500	0.00102	0.01054	—	0.01054	0.00969	—	0.00969	—	110.908	110.908	0.00450	0.00090	—	111.288
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.00695	0.00584	0.06699	0.12866	0.00019	0.00192	—	0.00192	0.00177	—	0.00177	—	18.3620	18.3620	0.00074	0.00015	—	18.4250
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Vendor	0.00241	0.00062	0.03323	0.01634	0.00022	0.00022	0.75882	0.75905	0.00022	0.07718	0.07741	—	31.3798	31.3798	0.00157	0.00443	0.00210	32.7402
Hauling	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Vendor	0.00020	0.00005	0.00275	0.00133	0.00002	0.00002	0.05912	0.05914	0.00002	0.00602	0.00604	—	2.57843	2.57843	0.00013	0.00036	0.00288	2.69295
Hauling	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Vendor	0.00004	0.00001	0.00050	0.00024	< 0.000005	< 0.000005	0.01079	0.01079	< 0.000005	0.00110	0.00110	—	0.42689	0.42689	0.00002	0.00006	0.00048	0.44585
Hauling	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

4. Operations Emissions Details

4.1. Mobile Emissions by Land Use

4.1.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

City Park	0.18038	0.16603	0.11081	1.25657	0.00314	0.00192	0.29616	0.29808	0.00179	0.07517	0.07696	—	320.464	320.464	0.01523	0.01268	1.10803	325.731
Total	0.18038	0.16603	0.11081	1.25657	0.00314	0.00192	0.29616	0.29808	0.00179	0.07517	0.07696	—	320.464	320.464	0.01523	0.01268	1.10803	325.731
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
City Park	0.17902	0.16441	0.12040	1.18112	0.00302	0.00192	0.29616	0.29808	0.00179	0.07517	0.07696	—	308.223	308.223	0.01596	0.01328	0.02873	312.608
Total	0.17902	0.16441	0.12040	1.18112	0.00302	0.00192	0.29616	0.29808	0.00179	0.07517	0.07696	—	308.223	308.223	0.01596	0.01328	0.02873	312.608
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
City Park	0.01704	0.01565	0.01164	0.11562	0.00029	0.00018	0.02803	0.02822	0.00017	0.00712	0.00729	—	27.0837	27.0837	0.00138	0.00116	0.04159	27.5045
Total	0.01704	0.01565	0.01164	0.11562	0.00029	0.00018	0.02803	0.02822	0.00017	0.00712	0.00729	—	27.0837	27.0837	0.00138	0.00116	0.04159	27.5045

4.2. Energy

4.2.1. Electricity Emissions By Land Use - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
City Park	—	—	—	—	—	—	—	—	—	—	—	—	0.00000	0.00000	0.00000	0.00000	—	0.00000
Total	—	—	—	—	—	—	—	—	—	—	—	—	0.00000	0.00000	0.00000	0.00000	—	0.00000
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
City Park	—	—	—	—	—	—	—	—	—	—	—	—	0.00000	0.00000	0.00000	0.00000	—	0.00000
Total	—	—	—	—	—	—	—	—	—	—	—	—	0.00000	0.00000	0.00000	0.00000	—	0.00000
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

City Park	—	—	—	—	—	—	—	—	—	—	—	—	0.00000	0.00000	0.00000	0.00000	—	0.00000
Total	—	—	—	—	—	—	—	—	—	—	—	—	0.00000	0.00000	0.00000	0.00000	—	0.00000

4.2.3. Natural Gas Emissions By Land Use - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
City Park	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	—	0.00000	—	0.00000	0.00000	0.00000	0.00000	—	0.00000
Total	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	—	0.00000	—	0.00000	0.00000	0.00000	0.00000	—	0.00000
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
City Park	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	—	0.00000	—	0.00000	0.00000	0.00000	0.00000	—	0.00000
Total	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	—	0.00000	—	0.00000	0.00000	0.00000	0.00000	—	0.00000
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
City Park	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	—	0.00000	—	0.00000	0.00000	0.00000	0.00000	—	0.00000
Total	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	—	0.00000	—	0.00000	0.00000	0.00000	0.00000	—	0.00000

4.3. Area Emissions by Source

4.3.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Source	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	0.24757	0.24757	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	0.00000	0.00000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	0.24757	0.24757	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	0.24757	0.24757	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	0.00000	0.00000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	0.24757	0.24757	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	0.04518	0.04518	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	0.00000	0.00000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	0.04518	0.04518	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.4. Water Emissions by Land Use

4.4.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
City Park	—	—	—	—	—	—	—	—	—	—	—	0.00000	28.4161	28.4161	0.00271	0.00033	—	28.5817
Total	—	—	—	—	—	—	—	—	—	—	—	0.00000	28.4161	28.4161	0.00271	0.00033	—	28.5817
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
City Park	—	—	—	—	—	—	—	—	—	—	—	0.00000	28.4161	28.4161	0.00271	0.00033	—	28.5817
Total	—	—	—	—	—	—	—	—	—	—	—	0.00000	28.4161	28.4161	0.00271	0.00033	—	28.5817
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
City Park	—	—	—	—	—	—	—	—	—	—	—	0.00000	4.70462	4.70462	0.00045	0.00005	—	4.73203
Total	—	—	—	—	—	—	—	—	—	—	—	0.00000	4.70462	4.70462	0.00045	0.00005	—	4.73203

4.5. Waste Emissions by Land Use

4.5.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
City Park	—	—	—	—	—	—	—	—	—	—	—	1.15872	0.00000	1.15872	0.11581	0.00000	—	4.05396

Total	—	—	—	—	—	—	—	—	—	—	—	1.15872	0.00000	1.15872	0.11581	0.00000	—	4.05396
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
City Park	—	—	—	—	—	—	—	—	—	—	—	1.15872	0.00000	1.15872	0.11581	0.00000	—	4.05396
Total	—	—	—	—	—	—	—	—	—	—	—	1.15872	0.00000	1.15872	0.11581	0.00000	—	4.05396
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
City Park	—	—	—	—	—	—	—	—	—	—	—	0.19184	0.00000	0.19184	0.01917	0.00000	—	0.67118
Total	—	—	—	—	—	—	—	—	—	—	—	0.19184	0.00000	0.19184	0.01917	0.00000	—	0.67118

4.6. Refrigerant Emissions by Land Use

4.6.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.7. Offroad Emissions By Equipment Type

4.7.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.8. Stationary Emissions By Equipment Type

4.8.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.9. User Defined Emissions By Equipment Type

4.9.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10. Soil Carbon Accumulation By Vegetation Type

4.10.1. Soil Carbon Accumulation By Vegetation Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Vegetation	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.2. Above and Belowground Carbon Accumulation by Land Use Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.3. Avoided and Sequestered Emissions by Species - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Species	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

5. Activity Data

5.1. Construction Schedule

Phase Name	Phase Type	Start Date	End Date	Days Per Week	Work Days per Phase	Phase Description

Linear, Grubbing & Land Clearing	Linear, Grubbing & Land Clearing	3/28/2026	4/6/2026	5.00000	6.00000	—
Linear, Grading & Excavation	Linear, Grading & Excavation	4/7/2026	5/11/2026	5.00000	25.0000	—
Linear, Drainage, Utilities, & Sub-Grade	Linear, Drainage, Utilities, & Sub-Grade	5/12/2026	6/3/2026	5.00000	17.0000	—
Linear, Paving	Linear, Paving	6/3/2026	6/11/2026	5.00000	7.00000	—
Site Preparation	Site Preparation	1/1/2026	1/14/2026	5.00000	10.00000	—
Grading	Grading	1/3/2026	2/13/2026	5.00000	30.0000	—
Artificial Soil Removal	Grading	1/4/2026	2/15/2026	5.00000	30.0000	Removal of artificial soil fill
Fencing and Related Construction	Building Construction	2/16/2026	3/27/2026	5.00000	30.0000	—

5.2. Off-Road Equipment

5.2.1. Unmitigated

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor
Linear, Grubbing & Land Clearing	Crawler Tractors	Diesel	Average	1.000000	8.00000	87.0000	0.43000
Linear, Grubbing & Land Clearing	Skid Steer Loaders	Diesel	Average	1.000000	8.00000	36.0000	0.38000
Linear, Grading & Excavation	Crawler Tractors	Diesel	Average	1.000000	8.00000	87.0000	0.43000
Linear, Grading & Excavation	Excavators	Diesel	Average	1.000000	8.00000	36.0000	0.38000
Linear, Grading & Excavation	Graders	Diesel	Average	1.000000	8.00000	148.000	0.41000
Linear, Grading & Excavation	Tractors/Loaders/Backhoes	Diesel	Average	1.000000	8.00000	84.0000	0.37000
Linear, Drainage, Utilities, & Sub-Grade	Air Compressors	Diesel	Average	1.000000	8.00000	37.0000	0.48000

Linear, Drainage, Utilities, & Sub-Grade	Plate Compactors	Diesel	Average	1.000000	8.00000	8.00000	0.43000
Linear, Drainage, Utilities, & Sub-Grade	Tractors/Loaders/Backhoes	Diesel	Average	1.000000	8.00000	84.0000	0.37000
Linear, Drainage, Utilities, & Sub-Grade	Graders	Diesel	Average	1.000000	8.00000	148.000	0.41000
Linear, Paving	Pavers	Diesel	Average	1.000000	8.00000	81.0000	0.42000
Linear, Paving	Paving Equipment	Diesel	Average	1.000000	8.00000	89.0000	0.36000
Linear, Paving	Rollers	Diesel	Average	1.000000	8.00000	36.0000	0.38000
Linear, Paving	Tractors/Loaders/Backhoes	Diesel	Average	1.000000	8.00000	84.0000	0.37000
Site Preparation	Tractors/Loaders/Backhoes	Diesel	Average	2.00000	8.00000	84.0000	0.37000
Site Preparation	Skid Steer Loaders	Diesel	Average	2.00000	8.00000	71.0000	0.37000
Grading	Tractors/Loaders/Backhoes	Diesel	Average	2.00000	8.00000	84.0000	0.37000
Grading	Skid Steer Loaders	Diesel	Average	2.00000	8.00000	71.0000	0.37000
Grading	Graders	Diesel	Average	1.000000	8.00000	148.000	0.41000
Artificial Soil Removal	Tractors/Loaders/Backhoes	Diesel	Average	2.00000	8.00000	84.0000	0.37000
Artificial Soil Removal	Excavators	Diesel	Average	2.00000	8.00000	36.0000	0.38000
Artificial Soil Removal	Graders	Diesel	Average	1.000000	8.00000	148.000	0.41000
Artificial Soil Removal	Skid Steer Loaders	Diesel	Average	1.000000	8.00000	71.0000	0.37000
Fencing and Related Construction	Bore/Drill Rigs	Diesel	Average	2.00000	8.00000	83.0000	0.50000
Fencing and Related Construction	Tractors/Loaders/Backhoes	Diesel	Average	2.00000	8.00000	84.0000	0.37000

5.3. Construction Vehicles

5.3.1. Unmitigated

Phase Name	Trip Type	One-Way Trips per Day	Miles per Trip	Vehicle Mix

Linear, Grubbing & Land Clearing	Worker	5.00000	18.5000	LDA,LDT1,LDT2
Linear, Grubbing & Land Clearing	Vendor	0.00000	10.2000	HHDT,MHDT
Linear, Grubbing & Land Clearing	Hauling	0.00000	20.0000	HHDT
Linear, Grubbing & Land Clearing	Onsite truck	—	—	HHDT
Linear, Grading & Excavation	Worker	10.00000	18.5000	LDA,LDT1,LDT2
Linear, Grading & Excavation	Vendor	1.000000	10.2000	HHDT,MHDT
Linear, Grading & Excavation	Hauling	0.00000	20.0000	HHDT
Linear, Grading & Excavation	Onsite truck	—	—	HHDT
Linear, Drainage, Utilities, & Sub-Grade	Worker	10.00000	18.5000	LDA,LDT1,LDT2
Linear, Drainage, Utilities, & Sub-Grade	Vendor	0.00000	10.2000	HHDT,MHDT
Linear, Drainage, Utilities, & Sub-Grade	Hauling	0.00000	20.0000	HHDT
Linear, Drainage, Utilities, & Sub-Grade	Onsite truck	—	—	HHDT
Linear, Paving	Worker	10.00000	18.5000	LDA,LDT1,LDT2
Linear, Paving	Vendor	0.00000	10.2000	HHDT,MHDT
Linear, Paving	Hauling	0.00000	20.0000	HHDT
Linear, Paving	Onsite truck	—	—	HHDT
Site Preparation	Worker	10.00000	18.5000	LDA,LDT1,LDT2
Site Preparation	Vendor	—	10.2000	HHDT,MHDT
Site Preparation	Hauling	0.00000	20.0000	HHDT
Site Preparation	Onsite truck	—	—	HHDT
Grading	Worker	12.5000	18.5000	LDA,LDT1,LDT2
Grading	Vendor	—	10.2000	HHDT,MHDT
Grading	Hauling	0.00000	20.0000	HHDT
Grading	Onsite truck	—	—	HHDT
Artificial Soil Removal	Worker	15.0000	18.5000	LDA,LDT1,LDT2
Artificial Soil Removal	Vendor	—	10.2000	HHDT,MHDT

Artificial Soil Removal	Hauling	184.467	3.00000	HHDT
Artificial Soil Removal	Onsite truck	—	—	HHDT
Fencing and Related Construction	Worker	0.00000	18.5000	LDA,LDT1,LDT2
Fencing and Related Construction	Vendor	1.000000	10.2000	HHDT,MHDT
Fencing and Related Construction	Hauling	0.00000	20.0000	HHDT
Fencing and Related Construction	Onsite truck	—	—	HHDT

5.4. Vehicles

5.4.1. Construction Vehicle Control Strategies

Non-applicable. No control strategies activated by user.

5.5. Architectural Coatings

5.6. Dust Mitigation

5.6.1. Construction Earthmoving Activities

Phase Name	Material Imported (Cubic Yards)	Material Exported (Cubic Yards)	Acres Graded (acres)	Material Demolished (sq. ft.)	Acres Paved (acres)
Linear, Grubbing & Land Clearing	0.00000	0.00000	0.00000	0.00000	0.00000
Linear, Grading & Excavation	0.00000	0.00000	0.00000	0.00000	0.00000
Linear, Drainage, Utilities, & Sub-Grade	0.00000	0.00000	0.00000	0.00000	0.00000
Site Preparation	0.00000	0.00000	0.00000	0.00000	0.00000
Grading	0.00000	0.00000	11.2500	0.00000	0.00000
Artificial Soil Removal	0.00000	44,269.0	15.0000	0.00000	0.00000

5.6.2. Construction Earthmoving Control Strategies

Control Strategies Applied	Frequency (per day)	PM10 Reduction	PM2.5 Reduction

Water Exposed Area	2	61%	61%

5.7. Construction Paving

5.8. Construction Electricity Consumption and Emissions Factors

kWh per Year and Emission Factor (lb/MWh)

Year	kWh per Year	CO2	CH4	N2O
2026	0.00000	346.196	0.03300	0.00400

5.9. Operational Mobile Sources

5.9.1. Unmitigated

Land Use Type	Trips/Weekday	Trips/Saturday	Trips/Sunday	Trips/Year	VMT/Weekday	VMT/Saturday	VMT/Sunday	VMT/Year
City Park	19.5000	49.0000	54.7500	10,493.7	149.062	374.567	418.521	80,216.5

5.10. Operational Area Sources

5.10.1. Hearths

Land Use	Hearth Type	Unmitigated (number)	Mitigated (number)
City Park	Wood Fireplaces	0	0
City Park	Gas Fireplaces	0	0
City Park	Propane Fireplaces	0	0
City Park	Electric Fireplaces	0	0
City Park	No Fireplaces	0	0
City Park	Conventional Wood Stoves	0	0
City Park	Catalytic Wood Stoves	0	0
City Park	Non-Catalytic Wood Stoves	0	0
City Park	Pellet Wood Stoves	0	0

5.10.2. Architectural Coatings

Residential Interior Area Coated (sq ft)	Residential Exterior Area Coated (sq ft)	Non-Residential Interior Area Coated (sq ft)	Non-Residential Exterior Area Coated (sq ft)	Parking Area Coated (sq ft)
0.00000	0.00000	0.00000	0.00000	—

5.10.3. Landscape Equipment

5.11. Operational Energy Consumption

5.11.1. Unmitigated

Electricity (kWh/yr) and CO2 and CH4 and N2O and Natural Gas (kBTU/yr)

Land Use	Electricity (kWh/yr)	CO2	CH4	N2O	Natural Gas (kBTU/yr)
City Park	0.00000	346.196	0.0330	0.0040	0.00000

5.12. Operational Water and Wastewater Consumption

5.12.1. Unmitigated

Land Use	Indoor Water (gal/year)	Outdoor Water (gal/year)
City Park	0.00000	5,645,538

5.13. Operational Waste Generation

5.13.1. Unmitigated

Land Use	Waste (ton/year)	Cogeneration (kWh/year)
City Park	2.15000	0.00000

5.14. Operational Refrigeration and Air Conditioning Equipment

5.14.1. Unmitigated

5.15. Operational Off-Road Equipment

5.15.1. Unmitigated

5.16. Stationary Sources

5.16.1. Emergency Generators and Fire Pumps

5.16.2. Process Boilers

5.17. User Defined

5.18. Vegetation

5.18.1. Land Use Change

5.18.1.1. Unmitigated

Vegetation Land Use Type	Vegetation Soil Type	Initial Acres	Final Acres

5.18.1. Biomass Cover Type

5.18.1.1. Unmitigated

Biomass Cover Type	Initial Acres	Final Acres

5.18.2. Sequestration

5.18.2.1. Unmitigated

Tree Type	Number	Electricity Saved (kWh/year)	Natural Gas Saved (btu/year)

6. Climate Risk Detailed Report

6.1. Climate Risk Summary

Cal-Adapt midcentury 2040–2059 average projections for four hazards are reported below for your project location. These are under Representation Concentration Pathway (RCP) 8.5 which assumes GHG emissions will continue to rise strongly through 2050 and then plateau around 2100.

Climate Hazard	Result for Project Location	Unit
Temperature and Extreme Heat	8.74000	annual days of extreme heat
Extreme Precipitation	3.50000	annual days with precipitation above 20 mm
Sea Level Rise	—	meters of inundation depth
Wildfire	0.00000	annual hectares burned

Temperature and Extreme Heat data are for grid cell in which your project are located. The projection is based on the 98th historical percentile of daily maximum/minimum temperatures from observed historical data (32 climate model ensemble from Cal-Adapt, 2040–2059 average under RCP 8.5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Extreme Precipitation data are for the grid cell in which your project are located. The threshold of 20 mm is equivalent to about ¾ an inch of rain, which would be light to moderate rainfall if received over a full day or heavy rain if received over a period of 2 to 4 hours. Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Sea Level Rise data are for the grid cell in which your project are located. The projections are from Radke et al. (2017), as reported in Cal-Adapt (Radke et al., 2017, CEC-500-2017-008), and consider inundation location and depth for the San Francisco Bay, the Sacramento-San Joaquin River Delta and California coast resulting different increments of sea level rise coupled with extreme storm events. Users may select from four scenarios to view the range in potential inundation depth for the grid cell. The four scenarios are: No rise, 0.5 meter, 1.0 meter, 1.41 meters
Wildfire data are for the grid cell in which your project are located. The projections are from UC Davis, as reported in Cal-Adapt (2040–2059 average under RCP 8.5), and consider historical data of climate, vegetation, population density, and large (> 400 ha) fire history. Users may select from four model simulations to view the range in potential wildfire probabilities for the grid cell. The four simulations make different assumptions about expected rainfall and temperature are: Warmer/drier (HadGEM2-ES), Cooler/wetter (CNRM-CM5), Average conditions (CanESM2), Range of different rainfall and temperature possibilities (MIROC5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.

6.2. Initial Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	1	0	0	N/A
Extreme Precipitation	N/A	N/A	N/A	N/A
Sea Level Rise	1	0	0	N/A
Wildfire	1	0	0	N/A
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	N/A	N/A	N/A	N/A
Air Quality Degradation	0	0	0	N/A

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores do not include implementation of climate risk reduction measures.

6.3. Adjusted Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	1	1	1	2
Extreme Precipitation	N/A	N/A	N/A	N/A
Sea Level Rise	1	1	1	2
Wildfire	1	1	1	2
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	N/A	N/A	N/A	N/A
Air Quality Degradation	1	1	1	2

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores include implementation of climate risk reduction measures.

6.4. Climate Risk Reduction Measures

7. Health and Equity Details

7.1. CalEnviroScreen 4.0 Scores

The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Exposure Indicators	—
AQ-Ozone	46.9944

AQ-PM	54.9844
AQ-DPM	29.1724
Drinking Water	6.18209
Lead Risk Housing	48.0277
Pesticides	55.8966
Toxic Releases	85.1963
Traffic	54.6250
Effect Indicators	—
CleanUp Sites	0.00000
Groundwater	26.1664
Haz Waste Facilities/Generators	4.93713
Impaired Water Bodies	0.00000
Solid Waste	54.8454
Sensitive Population	—
Asthma	32.9387
Cardio-vascular	13.7712
Low Birth Weights	37.2338
Socioeconomic Factor Indicators	—
Education	41.8502
Housing	31.7364
Linguistic	28.0417
Poverty	22.4749
Unemployment	29.4118

7.2. Healthy Places Index Scores

The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Economic	—

Above Poverty	55.79366098
Employed	61.79905043
Median HI	68.93365841
Education	—
Bachelor's or higher	59.05299628
High school enrollment	100
Preschool enrollment	70.15270114
Transportation	—
Auto Access	65.16104196
Active commuting	39.04786347
Social	—
2-parent households	84.72988579
Voting	53.53522392
Neighborhood	—
Alcohol availability	59.20698062
Park access	81.35506224
Retail density	57.56448094
Supermarket access	20.95470294
Tree canopy	52.08520467
Housing	—
Homeownership	56.42243039
Housing habitability	61.38842551
Low-inc homeowner severe housing cost burden	27.26806108
Low-inc renter severe housing cost burden	58.19325035
Uncrowded housing	57.46182471
Health Outcomes	—
Insured adults	34.83895804
Arthritis	47.0

Asthma ER Admissions	59.1
High Blood Pressure	61.0
Cancer (excluding skin)	29.3
Asthma	51.9
Coronary Heart Disease	51.0
Chronic Obstructive Pulmonary Disease	47.8
Diagnosed Diabetes	73.9
Life Expectancy at Birth	74.0
Cognitively Disabled	62.4
Physically Disabled	57.4
Heart Attack ER Admissions	75.0
Mental Health Not Good	57.3
Chronic Kidney Disease	73.0
Obesity	63.1
Pedestrian Injuries	19.6
Physical Health Not Good	60.5
Stroke	64.5
Health Risk Behaviors	—
Binge Drinking	7.5
Current Smoker	53.5
No Leisure Time for Physical Activity	65.2
Climate Change Exposures	—
Wildfire Risk	0.0
SLR Inundation Area	42.4
Children	47.4
Elderly	64.7
English Speaking	71.3
Foreign-born	40.2

Outdoor Workers	84.4
Climate Change Adaptive Capacity	—
Impervious Surface Cover	50.5
Traffic Density	52.7
Traffic Access	23.0
Other Indices	—
Hardship	32.4
Other Decision Support	—
2016 Voting	81.9

7.3. Overall Health & Equity Scores

Metric	Result for Project Census Tract
CalEnviroScreen 4.0 Score for Project Location (a)	23.0000
Healthy Places Index Score for Project Location (b)	65.0000
Project Located in a Designated Disadvantaged Community (Senate Bill 535)	No
Project Located in a Low-Income Community (Assembly Bill 1550)	No
Project Located in a Community Air Protection Program Community (Assembly Bill 617)	No

a: The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.
b: The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

7.4. Health & Equity Measures

No Health & Equity Measures selected.

7.5. Evaluation Scorecard

Health & Equity Evaluation Scorecard not completed.

7.6. Health & Equity Custom Measures

No Health & Equity Custom Measures created.

8. User Changes to Default Data

8.1. Justifications

Screen	Justification
Land Use	Model inputs were entered to reflect the subset of Fairview Park, approximately 25 acres, which is estimated to undergo park improvements, as well as approximately two miles of new trails. No buildings would be constructed as part of the proposed project.
Construction: Construction Phases	Default values replaced with project-specific construction phases
Construction: Off-Road Equipment	Equipment was adjusted based on equipment for Costa Mesa habitat restoration work characteristic of the proposed project. Equipment removed from model defaults to account for the use of nonmotorized equipment during construction.
Construction: Dust From Material Movement	Added the export of artificial soil. All other soil would be balanced on site.
Construction: Trips and VMT	Haul trip length decreased to 3 miles, since the soil is expected to be transported to Talbert Regional Park, or another nearby location.
Construction: On-Road Fugitive Dust	Percentages updated to reflect truck travel may occur onsite on unpaved roads.
Construction: Paving	Approximately 50% of the trail constructed would be paved.
Operations: Refrigerants	Removed default AC and refrigerator equipment, as the project is a habitat restoration project and would not involve additional buildings or equipment.

8.3. Land Use

Model Parameter	Units	Default Value	New Value
Landscape Area	sq. ft	—	435,600
Special Landscape Area	sq. ft	435,600	0.00000
Recreational Building Area	sq. ft	—	0.00000

8.4. Construction

8.4.1. Construction Phases

Phase Type	Phase Name	Model Parameter	Default Value	New Value
Site Preparation	Site Preparation	Start Date	2/13/2026	1/1/2026
Site Preparation	Site Preparation	End Date	3/13/2026	1/14/2026

Site Preparation	Site Preparation	Work Days per Phase	20.0000	10.00000
Grading	Grading	Start Date	3/14/2026	1/3/2026
Grading	Grading	End Date	5/16/2026	2/13/2026
Grading	Grading	Work Days per Phase	45.0000	30.0000
Linear, Grubbing & Land Clearing	Linear, Grubbing & Land Clearing	Start Date	1/1/2026	3/28/2026
Linear, Grubbing & Land Clearing	Linear, Grubbing & Land Clearing	End Date	1/9/2026	4/6/2026
Linear, Grading & Excavation	Linear, Grading & Excavation	Start Date	1/10/2026	4/7/2026
Linear, Grading & Excavation	Linear, Grading & Excavation	End Date	2/14/2026	5/11/2026
Linear, Drainage, Utilities, & Sub-Grade	Linear, Drainage, Utilities, & Sub-Grade	Start Date	2/15/2026	5/12/2026
Linear, Drainage, Utilities, & Sub-Grade	Linear, Drainage, Utilities, & Sub-Grade	End Date	3/10/2026	6/3/2026
Linear, Paving	Linear, Paving	Start Date	3/11/2026	6/3/2026
Linear, Paving	Linear, Paving	End Date	3/22/2026	6/11/2026
Linear, Paving	Linear, Paving	Work Days per Phase	8.00000	7.00000

8.4.2. Off-Road Equipment

Phase Name	Equipment Type	Model Parameter	Default Value	New Value
Linear, Grading & Excavation	Excavators	Number per Day	3.00000	1.000000
Linear, Grading & Excavation	Tractors/Loaders/Backhoes	Number per Day	2.00000	1.000000
Linear, Drainage, Utilities, & Sub-Grade	Tractors/Loaders/Backhoes	Number per Day	2.00000	1.000000
Linear, Paving	Rollers	Number per Day	3.00000	1.000000
Linear, Paving	Tractors/Loaders/Backhoes	Number per Day	2.00000	1.000000

8.4.4. Dust from Material Movement

Phase Name	Model Parameter	Units	Default Value	New Value
Linear, Grubbing & Land Clearing	Material Imported	Cubic Yards	—	0.00000
Linear, Grubbing & Land Clearing	Material Exported	Cubic Yards	—	0.00000

Linear, Grubbing & Land Clearing	Total Acres Graded	acres	1.000000	0.00000
Linear, Grading & Excavation	Material Imported	Cubic Yards	—	0.00000
Linear, Grading & Excavation	Material Exported	Cubic Yards	—	0.00000
Linear, Grading & Excavation	Total Acres Graded	acres	1.000000	0.00000
Linear, Drainage, Utilities, & Sub-Grade	Material Imported	Cubic Yards	—	0.00000
Linear, Drainage, Utilities, & Sub-Grade	Material Exported	Cubic Yards	—	0.00000
Linear, Drainage, Utilities, & Sub-Grade	Total Acres Graded	acres	1.000000	0.00000
Grading	Material Imported	Cubic Yards	—	0.00000
Grading	Material Exported	Cubic Yards	—	0.00000
Grading	Total Acres Graded	acres	15.0000	11.2500

8.4.6. Trips and VMT

Phase Name	Trip Type	Model Parameter	Default Value	New Value
Artificial Soil Removal	Hauling	Miles per Trip	20.0000	3.00000
Fencing and Related Construction	Vendor	One-Way Trips per Day	0.00000	1.000000

8.4.7. On-Road Fugitive Dust

Phase Name	Model Parameter	Units	Default Value	New Value
Linear, Grubbing & Land Clearing	Vendor Trip Paved	%	100.0000	95.0000
Linear, Grubbing & Land Clearing	Hauling Trip Paved	%	100.0000	85.0000
Linear, Grading & Excavation	Vendor Trip Paved	%	100.0000	95.0000
Linear, Grading & Excavation	Hauling Trip Paved	%	100.0000	85.0000
Linear, Drainage, Utilities, & Sub-Grade	Vendor Trip Paved	%	100.0000	95.0000
Linear, Drainage, Utilities, & Sub-Grade	Hauling Trip Paved	%	100.0000	85.0000

Linear, Paving	Vendor Trip Paved	%	100.0000	95.0000
Linear, Paving	Hauling Trip Paved	%	100.0000	85.0000
Site Preparation	Vendor Trip Paved	%	100.0000	95.0000
Site Preparation	Hauling Trip Paved	%	100.0000	85.0000
Grading	Vendor Trip Paved	%	100.0000	95.0000
Grading	Hauling Trip Paved	%	100.0000	85.0000
Artificial Soil Removal	Vendor Trip Paved	%	100.0000	95.0000
Artificial Soil Removal	Hauling Trip Paved	%	100.0000	85.0000
Fencing and Related Construction	Vendor Trip Paved	%	100.0000	95.0000
Fencing and Related Construction	Hauling Trip Paved	%	100.0000	85.0000