

ALBANY HILL FOREST MANAGEMENT AND HABITAT RESTORATION PLAN

Implementation Plan | City of Albany, CA

February 2025



Albany Hill Forest Management and Habitat Restoration Plan

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Executive Summary

Albany Hill, located in the City of Albany directly adjacent to the San Francisco Bay, was planted with blue gum eucalyptus over a century ago. Beginning in 2020, the City of Albany noticed a marked decline in the trees' condition and began a series of studies to evaluate them. The studies confirmed the trees' deterioration as well as the seasonal presence of Monarch butterflies in the hill's eucalyptus grove on City property. The City then began the process of developing a plan to address the failing eucalyptus and the associated fire risk, while maintaining Monarch habitat on Albany Hill.

This report documents the work and research done by the City and its hired consultants, an overview of the findings and analysis, descriptions of the community outreach and public input that helped guide and inform the development of the implementation strategy for the Albany Hill Forest Management and Habitat Restoration Plan.

As a result of the commissioned studies, public meetings and expert consultations, the proposed management plan described in this report consists of:

- A seven-phase adaptable implementation plan that outlines three eucalyptus removal phases alternating with four ecological restoration phases, which may take place sequentially over +/- 10 years, depending on available funding.
- Bid documents for both a removals contract and a restoration contract
- Long-term maintenance and monitoring recommendations

Taking into consideration the extensive analysis, studies, and public discussion of a defensible and responsible path forward for the City of Albany's property, the consultant team has developed an implementation plan that protects and expands the Hill's priority habitat areas, while accommodating the critical fire safety issues and long-term sustainability of the Albany Hill landscape post-project.

Project Overview

Description and Timeline

In 2020 the City of Albany (City) started to notice a decline in the health of eucalyptus trees growing on Albany Hill. The Albany Hill Eucalyptus Project (CIP No. 41015) was established in the fall of 2021 in response to the visibly declining health of the forest. Over the following two years, numerous studies were conducted as part of the project to determine the cause of the decline, as well as identify and characterize other factors at play on the hill. This research included studies on the monarch butterfly overwintering habitat, fire risk, and community use. The assessments determined a need to mitigate the associated risks of unhealthy trees as well as to plan for the future of this iconic open space. This implementation plan is intended to serve as a guiding document for the proposed design that has emerged in response to these needs. It outlines past assessment work, describes the community engagement efforts, and provides detailed descriptions of the design process, implementation strategies, and long-term management recommendations. This document is part of the City's larger stewardship efforts that define the work and care of Albany Hill.

The Albany Hill Forest Management and Habitat Restoration Plan will be implemented in seven phases of alternating tree removal and ecological restoration over the course of the next decade (see the Implementation Plan chapter for a description of the phases). Phases 1-3 are proposed to begin implementation by 2026. Phases 4-7 will follow in subsequent years, as funding is available.

Purpose Statement: *The City seeks a comprehensive plan for the phased removal of dead*

and dying eucalyptus trees on Albany Hill and the restoration of habitat for monarchs and native plants and wildlife in a way that creates self-sustaining ecosystems with low fire hazards and minimal maintenance requirements.

Background

As the only significant topographical feature in the East Bay that sits immediately adjacent to the water, Albany Hill, located on the western side of the City of Albany, is an ecological island and regional landmark. It sits directly across from the Golden Gate strait, where it receives fog and cool winds. The climate of the project area is characterized as Mediterranean with cool wet winters and warm to hot, dry summers moderated by a strong marine influence, including summer fog (USDA 1997). The annual average rainfall for the study area is approximately 24 inches (NOAA 2024) and all the precipitation is rainfall. The average annual temperature is 60.5 °F and the site currently supports a coast live oak woodland, eucalyptus forest, grassland openings, and the riparian zones of Cerrito and Middle Creeks (Nomad Ecology, Public Education Session, 2023).

Geologically, Albany Hill is an isolated body of Franciscan sandstone surrounded by Quaternary sediment shed from the Berkeley Hills (Alden, 2011). The formation dates from late in the Cretaceous Period, about 70- to 83-million-year-old (Graymer, 1994). There is one soil mapping unit in the project area: Millsholm silt loam, 50 to 75 percent slopes (USDA 1966). The Millsholm series consists of well-drained to somewhat excessively drained, shallow silt loam soils on steep and very steep uplands. These soils formed from interbedded fine-grained sandstone and



Figure 1. Project Timeline Diagram

shale. Millsholm silt loam ranges from loam or silt loam to light clay loam. Runoff is very rapid, and the erosion hazard is very severe.

Historically, the hill sat adjacent to marshland to the north and west and was predominately open grasslands with oak woodland on the sheltered north and east slopes. It is thought that the forests and grasslands were actively managed by the Lisjan Ohlone people, who had a village near Cerrito creek. The widespread conversion of the region's landscape to grazing lands during the Spanish and Mexican Rancho period in the early 19th century and industrialization during the Gold Rush contributed to marsh infill and urbanization that now characterize the surrounding area. Eucalyptus trees were planted in the late 1800s by the Giant Powder Company as blast protection from their gunpowder testing operations (City of Albany, 2012).

In the 1970s, the City created Creekside Park at the base and north slope of the hill, while the hilltop was designated as public open space. Developers constructed several condominium towers on private land on the west side of the hill in the early 1970's to early 1980's, with the agreement not to develop the open space above the buildings. Today these approximately 13 acres, which consist of steep wooded slopes, remain undeveloped and are minimally maintained. A separate privately owned 11-acre parcel on the southwest side of the hill is zoned for development but to date no proposal has been

approved by the City. This parcel consists of open meadows and wooded slopes. The elevation of Albany Hill ranges from 20 feet above mean sea level near Cerrito Creek at the north to 338 feet at the top. The project area is confined to the top of the hill which ranges in elevation from 180 feet to 338 feet. The top of the hill, now known as Albany Hill Park, is open space featuring a rustic trail and a stand of mature eucalyptus trees (City of Albany, 2024).

Planting eucalyptus on Albany Hill created forest conducive to monarch butterfly overwintering that had not historically been present on Albany Hill. With the vast majority of their historic habitat areas gone due to coastal development, Albany Hill now provides sunny, wind-sheltered microclimate that monarchs prefer for winter refuge. While their most preferred habitat on Albany Hill is located on private property on the western slope, monarchs use areas within the City property at the top of the hill more generally as transient cluster sites. (Weiss, Site Walk, 2024). In addition to monarchs, 100 bird species, 150 butterfly and moth species, and numerous other native insect and plant species have been identified on Albany Hill (Nomad Ecology, Public Education Session, 2023).

Despite the dominance of the eucalyptus on the hill, there are stands of native vegetation that persist. Current vegetation communities include eucalyptus forest, coast live oak woodland, and non-native grassland with patches of native grassland intermixed.

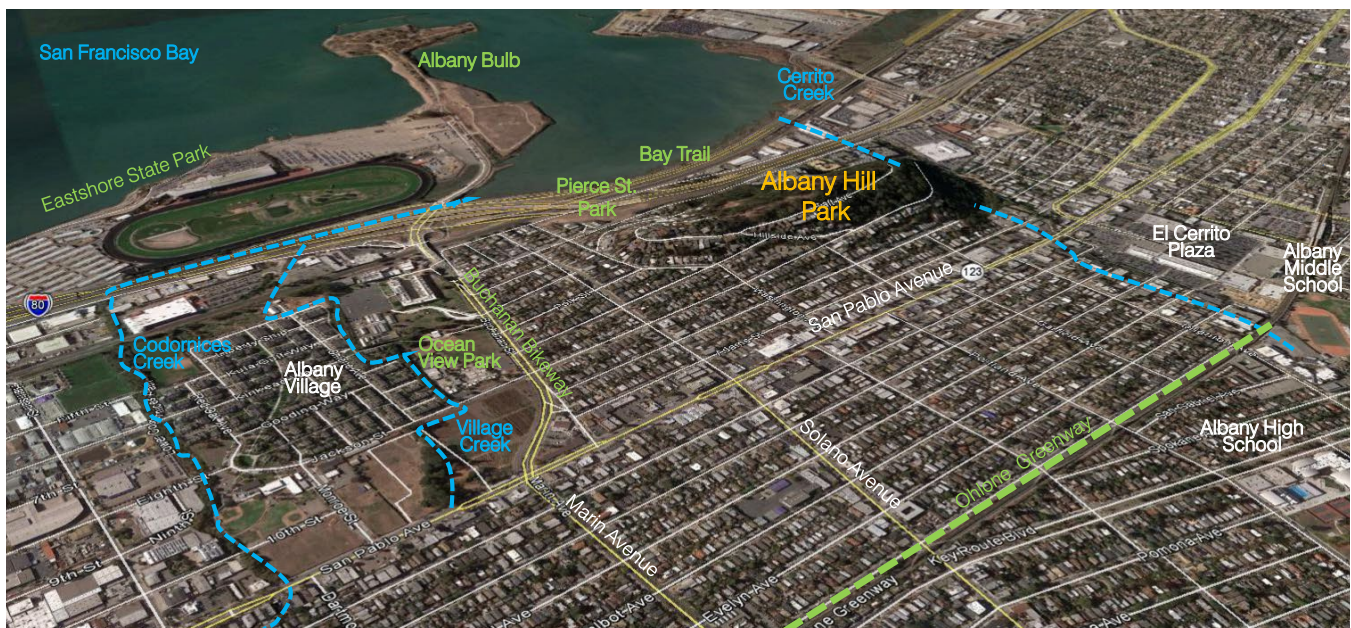


Figure 2. Current Context

The section below provides descriptions of the site vegetation from the text *A Manual of California Vegetation, Second Edition* (MCV; Sawyer et al. 2009). Non-native grassland is described using *Preliminary Descriptions of the Terrestrial Natural Communities of California* (Holland 1986):

Eucalyptus (globulus, camaldulensis) Semi-Natural Association (Eucalyptus groves)

Eucalyptus forest on Albany Hill conforms to the MCV association Eucalyptus (globulus, camaldulensis) Semi-Natural Association. Eucalyptus forest is characterized by eucalyptus trees dominant in the tree canopy (Sawyer et al. 2009). The canopy ranges from continuous to open and the shrub layer and herbaceous layer is generally sparse to intermittent. Eucalyptus have been planted as trees, groves, and windbreaks and is naturalized on uplands and stream courses (Sawyer et al. 2009). Blue gum is considered an invasive weed in California and has a Cal-IPC rank of Moderate (Cal-IPC 2024). Seedlings aggressively invade neighboring areas from original planted locations if adequate moisture is available. Understories in groves of these fast-growing long-lived trees are usually depauperate or consist of thick leaf and bark litter. Eucalyptus seeds germinate when tree crowns and built-up debris are removed by fire or in other ways. Trees stumps sprout readily.

On Albany Hill, the eucalyptus forest is composed of blue gum overstory with a range of understory types, including areas dominated by non-native grasses and herbs, areas dominated by dense poison oak (*Toxicodendron diversilobum*), and areas with diverse native plants present. Native trees and shrubs present include coast live oak (*Quercus agrifolia* var. *agrifolia*), toyon (*Heteromeles arbutifolia*), poison oak, California rose (*Rosa californica*), bush monkey flower (*Diplacus aurantiacus*), chaparral gooseberry (*Ribes malvaceum* var. *malvaceum*), and California blackberry (*Rubus ursinus*). Native herbs and grasses observed in the understory of eucalyptus forest include Torrey's melic (*Melica torreyana*), blue wildrye (*Elymus glaucus* subsp. *glaucus*), roughleaf aster (*Eurybia radulina*), Pacific sanicle (*Sanicula crassicaulis*), yarrow (*Achillea millefolium*), soaproot (*Chlorogalum pomeridianum* var. *pomeridianum*), and California goldenrod (*Solidago velutina* subsp. *californica*) among others. There are stands of non-native invasive weeds present, including Bermuda buttercup (*Oxalis pes-caprae*) and French broom (*Genista monspessulana*).

Coast Live Oak Woodland

Coast live oak woodland within the study area conforms to the MCV alliance *Quercus agrifolia* Woodland and Forest Alliance. In this alliance in California, coast live oak is dominant or co-dominant in the tree canopy with other native trees species including big leaf maple (*Acer macrophyllum*), boxelder (*Acer negundo*), California buckeye (*Aesculus californica*), and California bay (*Umbellularia californica*), among others. Trees are less than 100 feet (30 meters) tall in height and the canopy is open to continuous. Shrub layer is sparse to intermittent. The herbaceous layer is sparse or grassy. Within California, coast live oak woodland inhabits alluvial terraces, canyon bottoms, stream banks, slopes, and flats (Sawyer et al. 2009).

Coast live oak woodland is present at the northern end of Albany Hill, where there are dense stands of oaks, and along the margins of the eucalyptus forest, where oaks have higher total cover than the eucalyptus trees. Coast live oak woodland is mostly outside of the project area; however, the intact stands will provide a reference site for restoration in the project area where eucalyptus forest will be converted to coast live oak woodland. On Albany Hill, coast live oak woodland is dominated by coast live oak in the tree canopy with scattered California buckeye and blue elderberry (*Sambucus mexicana*). The understory includes native species such as poison oak, California blackberry, red flowering currant (*Ribes sanguineum* var. *glutinosum*), hedge nettle (*Stachys rigida* var. *quercetorum*), goldenback fern (*Pentagramma triangularis*), wood fern (*Dryopteris arguta*), and snowberry (*Symphoricarpos albus* var. *laevigatus*), among others. Areas dominated by stands of non-native Bermuda buttercup and upright veldt grass (*Ehrharta erecta*) are also present.

Grassland

Grassland is present on site in the openings of eucalyptus forest and adjacent to the trail along the ridge. Most of the grassland on site is dominated by non-native grasses but contains areas of high diversity of native grasses and forbs. As described by Holland (1986) non-native grassland is dominated by a sparse to dense cover of non-native annual grasses and weedy annual and perennial forbs, primarily of Mediterranean origin, that have replaced native perennial grasslands as a result of human disturbance. However, where not completely outcompeted by weedy non-native plant

species, scattered native wildflower species and native perennial grass species considered remnants of the original vegetation, may also be common. Germination occurs with the onset of the late fall rains while growth, flowering, and seed-set occur from winter through spring.

The grassland on site is currently dominated by non-native species: wild oats (*Avena fatua*), slender oats (*Avena barbata*), soft chess (*Bromus hordeaceus*), and riggut brome (*Bromus diandrus*). Within this matrix of non-native grasses, stands of native grasses and forbs are present including blue wildrye, soaproot, yarrow, California goldenrod, California brome (*Bromus sitchensis* var. *carinatus*), California oat grass (*Danthonia californica*), big squirreltail (*Elymus multisetus*), june grass (*Koeleria macrantha*), California melic (*Melica californica*), purple needlegrass (*Stipa pulchra*), Bolander's goldenaster (*Heterotheca sessiliflora* subsp. *bolanderi*), blue-eyed grass (*Sisyrinchium bellum*), foothill needlegrass (*Stipa lepida*), narrowleaf mule ears (*Wyethia angustifolia*), and Pacific aster (*Symphyotrichum chilense*). In some areas, these stands of native species have high cover and are dominant.

Eucalyptus Forest Decline

Tasmanian blue gum (*Eucalyptus globulus*), the species of eucalyptus planted on Albany Hill and throughout the Bay Area, has shown widespread decline since 2020. A report studying this regional dieback by U.C. Berkeley cited environmental stressors such as drought, increasing temperature, and fewer fog days, as well as disease from latent pathogens or opportunistic fungi, as strong drivers of the decline (Garbelotto, 2021). Compounding the fire risk from this decline in health, Tasmanian blue gum has a low branching and heavy limbed structure with shaggy bark, and they produce considerable ground litter and suckers. These conditions were spotlighted in the fire that burned on the west side of the hill on June 26th, 2022. While the fire burned important windbreak and cluster habitat for the monarchs (Weiss, 2022), no people or property were damaged. However, the event highlighted the imminent need to address the current high-risk fire conditions on Albany Hill.

Contributing Studies Review

While not a comprehensive list of documents pertaining to Albany Hill, the following were

commissioned as part of the Albany Hill Eucalyptus Project or particularly informative for developing this management plan. They represent the extensive consultations the City has done to address the issues with an informed foundation of expertise and sound science.

- a. 2008 City of Albany IPM Policy
- b. 2012 Albany Hill Creekside Park Master Plan
- c. 2018 Albany Hill Monarch Habitat Assessment
- d. 2020 Vegetation and Fuels Management at Albany Hill (*Compatibility with Conservation of Monarch Over-wintering Habitat*)
- e. 2021 Albany Parks, Recreation, and Open Space Master Plan
- f. 2021 Eucalyptus Dieback Report
- g. 2021 Eucalyptus Water Stress Reading Report
- h. 2021 Arborist Report, Tree Risk Assessment Qualification (TRAQ) Level 2 Assessment
- i. 2022 TRAQ Level 3 Assessment of Trees in Monarch Habitat
- j. 2022 Forest Structure Analysis for Monarch Habitat
- k. 2022 Fuel Loads Assessment

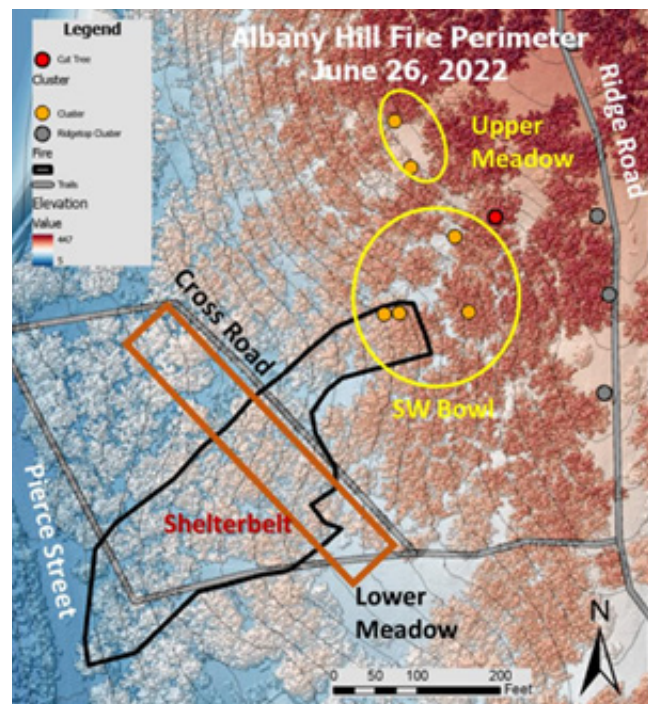


Figure 3. Fire Perimeter, Cluster Sites, and Canopy Elevation (Weiss, 2022)

Community Engagement Process

This section describes the methods and key take-aways from the project public engagement process. The priorities revealed through these meetings and surveys have directly informed the design explorations and decision-making processes. Content and recordings from these meetings are available on the city's project website (<https://www.albanyca.org/albany-hill/>).

Initial Public Survey

The initial public survey was live on the City's Albany Hill Project website from July 26th to November 6th, 2023. 745 people responded to questions about general usage, opinions of the hill, and opinions of the Albany Hill Eucalyptus Project. Questions included:

1. How often do you visit the natural areas on Albany Hill?
2. Why do you come to the natural areas on Albany Hill?
3. What aspects do you appreciate?
4. What aspects do you feel could be improved?
5. What is your opinion of the Albany Hill Eucalyptus Project?

The survey results showed strong support for the project (78% of respondents). While a small percentage of respondents (19%) felt they would benefit from additional information, only one opposed the overall project. Most respondents expressed concern over the eucalyptus' flammability and danger from dropped limbs and supported their removal. Respondents also expressed strong support for replacing the eucalyptus with native tree and plant species.

Public Education Session

On November 8, 2023, the City of Albany and project consultants held a community workshop at the Albany Senior Center. The early stages of the project were presented and discussed with the community. Major themes that emerged from this working session included fire safety, failing trees and eroding slopes, a desire for high-quality wildlife habitat, and improvements to the visitor experience.

Site Walk

On December 3, 2023, a site walk was held on Albany Hill with the City, project consultant team and the public to discuss and observe the major considerations of the project. Approximately 50 people participated in the site walk. The design team provided an overview of the project and explained the primary goals and constraints. Participants were able to discuss the project within the site context, which provided a richer and better-informed experience, leading to more in-depth questions and public input. The primary questions from this event concerned the project timeline, funding, non-butterfly wildlife habitat, grassland and oak restoration. The walk was also timed so participants could observe clusters of monarchs in the site eucalyptus trees.

Parks, Recreation, and Open Space Commission (PROSC) Meeting

On March 14, 2024, the design team presented the Concept Explorations, detailed in the Design Process section below, to the City of Albany Parks, Recreation, and Open Space Commission.

Design Exploration Survey

The second public survey was live on the City website from March 14th to April 29th, 2024. The survey asked participants to rank five elements of three concept explorations. Or, if all elements are equally important, to rank them as all high (priority 1) or all low (priority 5). Key takeaways from the concept explorations are listed at the end of the next section.

Design Process

Concept Explorations

The project purpose statement identified three priority concepts for the plan: Fire Safety, Monarch Overwintering and Native Habitat. During the spring of 2024, the City undertook a visioning exercise that explored each approach. For each concept exploration, this question was asked: "If there were no other factors at play, what would be the ideal configuration and action plan for Albany Hill?" Experts helped to develop strategies and outcomes to maximize benefit for each concept, while addressing the risks associated with the failing forest. The exercise assumed no constraints

other than existing site conditions. However, the benefits and drawbacks of each exploration were considered with the overall project in mind. The final plan integrates elements of all three explorations, which are presented below.

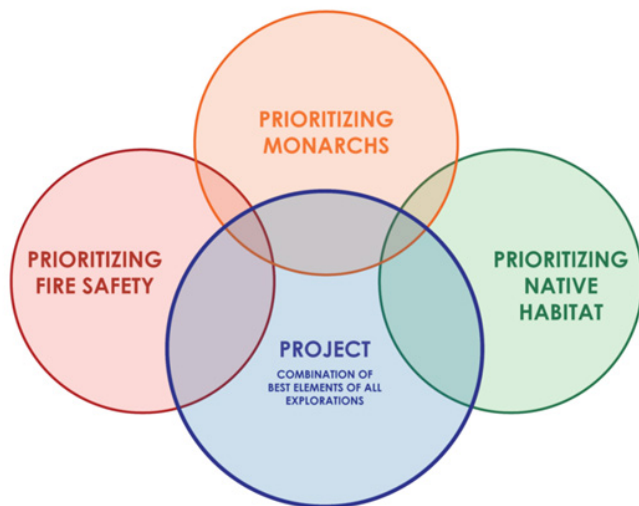


Figure 4. Design Process

Fire Safety

The design team worked with the Albany Fire Department to explore what Albany Hill would look like in its most fire-safe state. The following design priorities were identified:

- a. Good access for equipment and personnel
- b. A disconnected canopy and understory to prevent fire ladders
- c. A park that models the integration of fire safety and beautiful public space
- d. Eucalyptus removal and replacement with more appropriate canopy species

In addition to these priorities, the Fire Department identified the pressing need for eucalyptus removal prior to the plan being implemented. The team reviewed arborist reports (SBCA Tree Consulting, 2021 and McNeil Arboriculture Consultants, 2022) and life/property safety criteria to generate a list of 100-150 trees for which removal is critical. Trees within essential monarch overwintering habitat were excluded from this part of the exercise. These priority tree removals were split into two categories, each with associated criteria for inclusion.

Fire Spread Risk. Trees in this category were selected from three fuel models identified as having “High” or “Very High” fuel loads or “High” fire spread rate. These fuel models represent areas with considerable understory or areas with a thick layer of debris (Rice & Miller, 2022).

Residential Target. Trees in this category are within 100 feet of a private residence, are listed as dead, or listed as a residential target in the TRAQ2 Arborist Report (SBCA Tree Consulting, 2021).

After the priority tree list was created, the team developed a three phased vision plan for the Fire Safety concept exploration. Phase 1 involves creating a fire break between private and city owned land and removing trees from the priority tree list. Removals would happen as soon as the ground is dry enough to prevent erosion and before the fire season begins at the end of June. Existing oaks would be protected, and the removed eucalyptus would be chipped and used as mulch on site. Phase 2 work would happen on the slopes between the newly created fire break and the top of the hill. It includes selective eucalyptus removal with new oak trees and native understory planted to fire safe specifications. Phase 3 involves as-needed eucalyptus removal with subsequent mulching along the fire road at the top of the hill. It is important to note that at the time this exploration was done, fire regulations were anticipated to change, and any vegetation management strategies would need to comply with the new code requirements.

The pros to the Fire Safety concept exploration include reducing fire risk and thereby reducing the City’s liability by removing all eucalyptus from the hill over time. It would provide a working model for how defensible space can look, feel and serve as a tool for the fire department to showcase a beautiful neighborhood park that is also fire safe. An important downside to this concept is that monarch habitat would likely move to adjacent, privately-owned land, which would reduce public visibility of the overwintering site. This was the simplest and least expensive exploration.

Native Habitat

The design team worked with Nomad Ecology to envision an outcome for Albany Hill that would maximize native habitat. This concept assumes general eucalyptus removal, protection of existing native vegetation wherever possible, and active restoration

and maintenance to achieve intact native habitats. The north and east facing slopes are suited to scattered oak woodland with a grassland understory. The west facing slope can support denser oak woodland with mixed shrub understory, and the top of the hill is well suited to support a native grassland.

Strategies to achieve these habitats include:

1. Collect seed from existing native plants to generate well adapted restoration material
2. Conduct surveys prior to tree removals to protect existing native plants
3. Minimize ground disturbance by using delineated haul routes

4. Mulch extensively with chipped eucalyptus from removals
5. Reuse eucalyptus logs to create planting opportunities
6. Augment existing stands of native plants with new plantings.

One component of this concept exploration is the distinction between selective and general eucalyptus removals. Selective removal areas have existing native understories that could be delineated and protected during eucalyptus removal. This creates the need for a more nuanced removal process. General removal areas have little to no existing native understory and therefore less need for pre-removal work and less restricted removal processes.



Figure 5. Fire Safety Concept Exploration



Figure 6. Native Habitat Concept Exploration

Benefits of the Native Habitat concept include creating a complex native habitat mosaic with multi-species benefits, creating a resource for future nearby restoration projects, and maximizing opportunities for cultural use and community and tribal participation. The drawbacks include the need for a more complex maintenance regime than is currently in place, a more deliberate tree removal process to protect existing native species, more competency requirements for the contractor, and, like the Fire Safety concept, monarch habitat would likely move to adjacent, privately-owned land, which would reduce public visibility of the overwintering site. This was estimated to be the most expensive exploration.

Monarch Habitat

The design team worked with Creekside Science to explore what eucalyptus removal processes and outcomes would most benefit monarch butterfly use. Currently, monarchs use the ridgetop for transient cluster sites and move lower down the west facing slope to more sheltered, refuge sites during winter storms. These refuge sites exhibit solar access and wind protection characteristics that are favorable to the butterflies and were determined to be critical elements to protect in the Monarch Habitat concept.

Because the monarch use areas are concentrated in the southwestern part of the hill, large areas of eucalyptus (shown in light purple) can be removed without impacting the overwintering habitat. Within the monarch use areas, eucalyptus would be protected to maintain favorable habitat conditions. Replacement

trees and groundcover nectar sources would be planted to fill gaps and provide future continuity of these important resources. Along the rest of the ridge and west facing slopes (shown in dark purple), the failing eucalyptus would be evaluated by the City and then removed and replaced as they fail.

This concept explored what tree species might be appropriate replacements for the failing eucalyptus that currently provide the monarch habitat. Replacement species candidates were selected that have a better fire profile, are better adapted to climate conditions on the hill and provide a comparable morphology to the Tasmanian blue gum. This concept recommended planting field test trees to evaluate several species for suitability directly on the site.

The Monarch Habitat concept included maintaining the structures and resources currently used by monarchs and preserving public access to the overwintering sites by retaining critical portions of the existing eucalyptus forest. Drawbacks include the preservation of eucalyptus in the near term within high fire risk and public access areas (and the associated maintenance and liability considerations), and the introduction of new exotic species to the hill.

Public Survey Responses to Priority Area Explorations

Overall, the Fire Safety concept exploration had the most Priority 1 rankings with approximately 61, followed by the Native Habitat concept exploration with 49, and the Monarch Habitat concept exploration with 26.

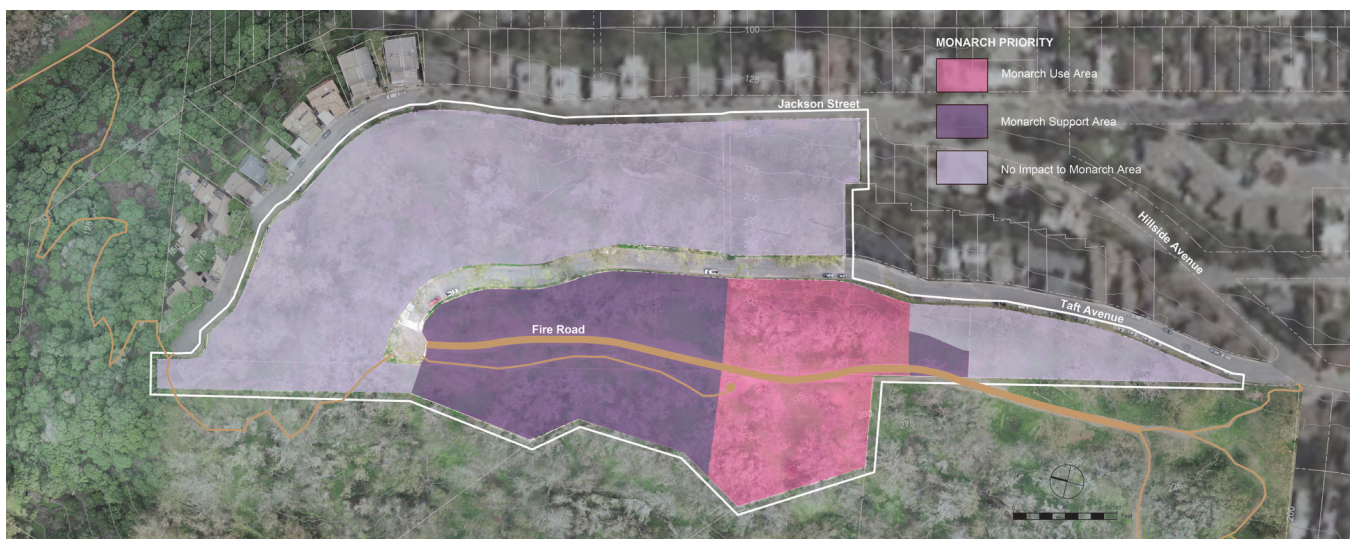


Figure 7. Monarch Concept Exploration

When the respondents were asked if there were any elements that they strongly opposed, “retention of existing eucalyptus” and “planting *Eucalyptus diversicolor*” received the highest percentage of votes with 55.3% and 49.4%, respectively. “Starting removals of the priority list before starting the larger project” received the next highest percentage with 12.9% strongly opposing. It is worth noting that most of the 2024 survey respondents did not attend any of the prior three community outreach meetings.

Some additional key takeaways from the response to the second online survey comparing the three concepts were:

1. 86.5% of respondents said that all elements of the Fire Safety exploration rank as high priority.
2. Of those that ranked each element of the Fire Safety exploration, “creating a fire break” received the greatest number of priority 1 rankings.
3. Responses from the Native Habitat exploration showed that “protection measures for existing native plants” and “active restoration planting” received the greatest number of priority 1 rankings.
4. The Monarch Habitat exploration responses had clear priority rankings for the five elements:
 - a. Priority 1 (highest): Plant non eucalyptus species replacement trees;
 - b. Priority 2: Plant new nectar sources;
 - c. Priority 3: Plant a new windbreak;

- d. Priority 4: Plant replacement trees – *Eucalyptus diversicolor*;
- e. Priority 5 (lowest): Retain existing eucalyptus.

Proposed Implementation Plan

Taking into consideration the extensive field observations, analysis, expert studies, and public discussion of a defensible and responsible path forward for the City of Albany’s property, the project team has developed this Implementation Plan that maximizes the benefits of each design concept, while accommodating the critical safety issues and long-term sustainability and public use of the Albany Hill landscape post-project.

11. Overall, please rank the Priority Explorations in order of your personal priorities (1 = most important, 2 =middle, 3 = lowest)

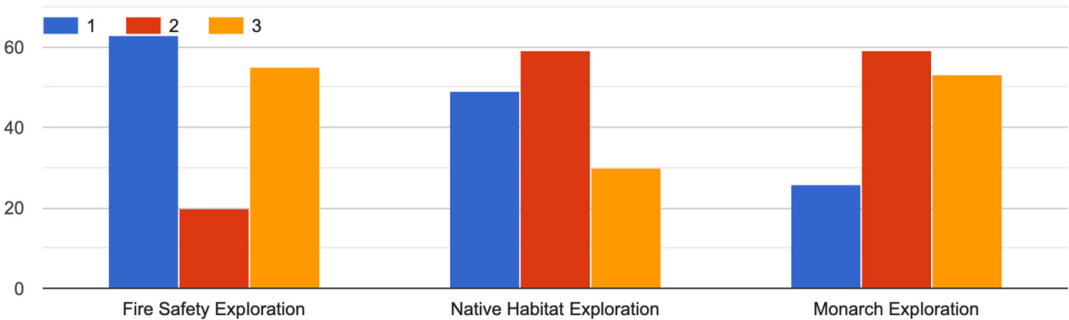


Figure 8. 2024 Survey Results

Project Vision

Overall Project Goals

At the conclusion of the project, the City aims to achieve the following:

- Reduce fire risk and hazard tree exposure from eucalyptus on City property
- Transition monarch overwintering habitat at the top of the hill to a more resilient forest stand that is less dependent on *E. globulus*
- Increase cover of California native oak species
- Increase cover of herbaceous California native plant species, including monarch nectar plants and species for Tribal use
- Improve and continue to foster suitable habitat for a wide range of fauna currently making Albany Hill their home
- Improve and continue control of invasive plant species
- Increase soil stability on Albany Hill
- Develop an adaptable, multi-phase strategy for removals and restoration
- Provide a eucalyptus removal model for adjacent property owners and local residents

Long-Term Vision

Reducing Fire Risk

Due to the decline in the health of eucalyptus trees on Albany Hill, this project will help the City reduce fire hazards by removing most of these trees from City-owned parcels on Albany Hill. This will also lower the risk of fires spreading to nearby private properties and the larger Albany community. The project will work from the perimeter of the site, prioritizing the removal of the most hazardous trees, and move inward to create a firebreak between City land and adjacent properties.

The planting palettes and plans for the restoration phases of the project will incorporate recommended fire-safe vegetation spacing and will demonstrate appropriate native vegetation communities to create an open space that is beautiful, enjoyable, and reduces the chance of catastrophic fire.

Monarch Overwintering

The area of trees used as seasonal cluster sites by the monarchs are in the same poor health as the rest of the Albany Hill eucalyptus forest. To achieve the project goal of maintaining public access to these cluster sites, these eucalyptus trees need to be managed differently than the rest of the forest. The area where these trees are found has been designated as the Monarch Management Area (see Strategy Overview section).

The key project strategies that will address the anticipated failure of the current eucalyptus in the Monarch Management Area are:

- Retain existing eucalyptus in the monarch clustering areas to provide wind protection (until existing trees fail/become imminent hazards)
- Plant replacement trees selected from field trial candidates and allow them to gain stature prior to the failure of current host trees
- Plant groundcover nectar sources in open areas adjacent potential cluster sites on City property

Replacement Trees

The Tasmanian blue gum on Albany Hill currently provides amenities to the monarch populations that were previously provided by native trees in habitat zones along the California coast which are no longer extant. The City is looking to ensure that the monarchs will continue to have the necessary habitat amenities on City Property for seasonal overwinter clustering into the future. Given this, the need to replace the highly invasive, and high fire risk eucalyptus stands with a more appropriate species that still meets monarch needs is urgent.

Early in the project, the City will plant four field trial replacement tree species to monitor and determine over time which ones thrive in the Albany Hill conditions and provide the best habitat monarch opportunities. In later restoration phases, the most appropriate tree species will be planted as replacements for *E. globulus*. See the Replacement Tree Field Trial section in the Implementation Plan chapter for details about the trial tree species.

Habitat Recovery: Restoring California Native Oak and Herbaceous Species

Three target habitat types have been identified for restoration planning on Albany Hill: Open Oak Woodland with Herbaceous Understory, Oak Woodland with Shrub Understory and Native Grassland. All the habitat types identified are similar in composition but vary based on the density of oak trees and the relative density (or absence) of shrubs.

Open Oak Woodland with Herbaceous Understory

Throughout the Bay Area, patches of native herbaceous species are often found in grassland openings on the margins of oak forests. This is true on Albany Hill where a high diversity of native herbaceous perennial species has been observed in openings between oak trees, particularly on the north facing slope just south of Jackson St. The target vegetation community in this area is scattered oak trees with openings that contain islands of native herbaceous species, and low cover of scattered native shrubs. Many of the young oak seedlings currently on site may be impacted during eucalyptus removal, which will help with optimizing oak spacing both for herbaceous understory establishment and fire safe spacing. The project will plant additional oaks on the site in different densities and at different sizes to mimic natural forms and to encourage a robust oak woodland on Albany Hill.

Species proposed for planting in Open Oak Woodland restoration areas include:

OPEN OAK WOODLAND WITH HERBACEOUS UNDERSTORY PALETTE

TREES

Quercus agrifolia

SHRUBS

Artemisia californica
Diplacus aurantiacus
Frangula californica subsp. *californica*
Lonicera hispidula
Ribes californicum var. *californicum*
Rosa gymnocarpus
Sambucus mexicana

PERENNIAL HERB

Achillea millefolium
Angelica californica
Carex barbarae

Chlorogalum pomeridianum var. *pomeridianum*
Heterotheca sessiliflora subsp. *bolanderi*
Horkelia californica var. *californica*
Lathyrus vestitus var. *vestitus*
Monardella villosa subsp. *villosa*
Sanicula bipinnatifida
Sanicula crassicaulis
Sisyrinchium bellum
Solidago velutina subsp. *californica*
Stachys rigida var. *quercetorum*
Symphotrichum chilense
Wyethia angustifolia

PERENNIAL GRASS

Bromus sitchensis var. *carinatus*
Elymus glaucus subsp. *glaucus*
Festuca californica
Stipa lepida
Stipa pulchra

ANNUAL HERB

Claytonia perfoliata

FERNS

Dryopteris arguta

Oak Woodland with Shrub Understory

Dense eucalyptus forest is present on the west side of Albany Hill. The understory in this zone consists of dense eucalyptus debris with native trees, including coast live oaks, and native shrubs, such as toyon and poison oak. Few native perennial species have been observed. The density of eucalyptus in this zone makes it difficult to protect native plants during tree removal. After tree removal there will be high cover of eucalyptus chips and wood debris, due to the amount already present and the amount generated by removal of the dense eucalyptus overstory. It is anticipated that the existing poison oak and toyon will resprout and colonize the slope. Due to the shrub regrowth and depth of the eucalyptus mulch, the hill's west slope will be less suitable for planting herbaceous plants. Native herbaceous species may be planted in openings between the oaks if habitat conditions appear suitable after eucalyptus removal is complete.

Reintroducing additional native shrub species will be the focus of this vegetation type, which includes the species below:

OAK WOODLAND WITH SHRUB UNDERSTORY PALETTE

TREES

Quercus agrifolia

SHRUBS

Artemisia californica
Baccharis pilularis subsp. *consanguinea*
Diplacus aurantiacus
Frangula californica subsp. *californica*
Heteromeles arbutifolia
Lonicera hispidula
Ribes californicum var. *californicum*
Ribes malvaceum var. *malvaceum*
Ribes sanguineum var. *glutinosum*
Rosa californica
Rosa gymnocarpus
Rubus ursinus
Sambucus mexicana
Symphoricarpos albus var. *laevigatus*
Symphoricarpos mollis
Toxicodendron diversilobum

PERENNIAL HERB

Angelica californica
Lathyrus vestitus var. *vestitus*
Scrophularia californica
Stachys rigida var. *quercetorum*

PERENNIAL GRASS

Bromus sitchensis var. *carinatus*

ANNUAL HERB

Claytonia perfoliata

FERNS

Dryopteris arguta

NATIVE GRASSLAND PALETTE

SHRUBS

Eriogonum nudum var. *auriculatum*

PERENNIAL HERB

Achillea millefolium
Chlorogalum pomeridianum var. *pomeridianum*
Corethrogyne filaginifolia
Epilobium canum subsp. *canum*
Eurybia radulina
Grindelia hirsutula
Heterotheca sessiliflora subsp. *bolanderi*
Horkelia californica var. *californica*
Monardella villosa subsp. *villosa*
Sanicula bipinnatifida
Sanicula crassicaulis
Sidalcea malviflora ssp. *malviflora*
Sisyrinchium bellum
Solidago velutina subsp. *californica*
Symphyotrichum chilense
Wyethia angustifolia

PERENNIAL GRASS

Bromus sitchensis var. *carinatus*
Danthonia californica
Elymus glaucus subsp. *glaucus*
Elymus multisetus
Festuca rubra
Koeleria macrantha
Melica californica
Stipa lepida
Stipa pulchra

ANNUAL HERB

Claytonia perfoliata

Native Grassland

At the top of the hill, there are grassland openings adjacent to the existing fire road. These areas currently have some native species present but are dominated by non-native annual grasses. Restoration activities would focus on increasing vegetative cover of native perennial grasses and herbs and decreasing cover of non-native grasses and forbs. Restoration in these areas would include timed mowing of annual grasses, patch planting of native species, and invasive weed control.

The Grassland areas are sequenced for active restoration in later phases to allow for greater sun exposure and reduced leaf litter facilitated by the earlier phase eucalyptus removals. Species proposed for planting in Grassland areas include:

Fauna

While this project is focused on addressing the future of the eucalyptus forest and how it relates to the charismatic monarch butterfly, there are a wide variety of fauna that make Albany Hill their home or utilize it as visitors. Almost 150 species of butterflies and moths have been recorded on the hill. (Powell & Langston, 2009). 117 bird species such as Anna's hummingbird and great horned owl, reptiles and amphibians, including the Pacific ringneck snake and Western fence lizard, and mammals such as mule deer and Botta's pocket gopher have all been observed on the hill as well (City of Albany, 2024).

Removing the eucalyptus from areas which have native understory and oaks already present will allow those

existing native trees and understory plants to receive more light and water, providing higher quality native habitat moving forward.

The project has incorporated protections and strategies to limit disturbance to fauna, while improving future habitat, soil health, food and nectar sources to encourage even more diversity and stability for those creatures that visit or live on the hill. These protections are detailed in the BMPs and Protective Measures & Conditions section.

Invasive Plant Species Removal

The City of Albany Natural Areas staff already removes stands of invasive non-native plants from Albany Hill as part of the site's ongoing maintenance. During the restoration phases of the project, the contractor will be responsible for removing invasive plants from the work areas. Over time, the project intent is to reduce the total area and number of non-native plant species to prevent them from outcompeting the restoration planting efforts and preventing the reestablishment of desirable native plant species. See the Invasive Plant Control Measures in the Long-Term Maintenance chapter for additional information about invasive plant species removal.

Slope Stability and Soil Health

The removal of the majority of *E. globulus* will reduce the slope instability currently seen on Albany Hill. Eucalyptus roots force themselves between sandstone cracks looking for water and to stabilize the tall tree from wind forces, loosening the soil and causing erosion on the hill's steep slopes. The slow rate of decomposition of eucalyptus duff also hinders the formation of a healthy soil profile and reduces available nutrients and habitat for soil microfauna. The project aims to retain and improve soils on the site through a variety of methods, including the use of logs on steep slopes to retain grade and provide planting areas for native bunchgrasses and other slope stabilizing species.

Eucalyptus Removal Phasing Strategy

Due to the large number of eucalyptus to be removed from City property and the sensitivity of the site, the project implementation plan distributes eucalyptus removal across three distinct removal phases, followed by restoration phases. This approach is described in the Strategy Overview and Phase Description sections of this document.

Carbon Sequestration

While the removal of eucalyptus trees from city property on Albany Hill will result in a short-term decrease in carbon sequestration, the long-term effect will likely be neutral. The project will mitigate the short-term sequestration impact by recycling much of the woody material generated from the tree removals as logs, mulch, and branches for on-site restoration activities. This approach will also reduce some of the carbon emissions that would have accumulated from transporting waste away from the hill. The project's phased tree removal will spread both the reduction in carbon sequestration and carbon emissions over several years, allowing the restoration planting to mature and offset the eucalyptus removals.

In the long term, the project will replace the carbon sequestered in eucalyptus trees by expanding existing habitats: coast live oak forest and grasslands. Oaks sequester carbon as well as eucalyptus and have the additional advantage of being longer lived and less prone to fire damage (Gaman). Research has shown that grasslands may be more reliable carbon sinks than forests because they store carbon underground in their roots and are more resilient to drought and wildfire (Dass).

Model for Future Eucalyptus Removal

The monarch-sensitive approach to removing eucalyptus trees on City property is a necessary approach to balancing the need for fire safety and preserving monarch clustering areas on Albany Hill. However, most of the eucalyptus and monarch habitat zones on Albany Hill are on private property. By spearheading this approach, the City will be modeling a thoughtful removal and restoration process for landowners and residents with properties adjacent to the project site. As part of the multi-year removal process, the City will be able to learn from the initial work phases, adjust the process over time and share practical insights with other Albany Hill landowners. By working out the details on City property, the City can speed up the process for funding and implementing eucalyptus removal and ecological restoration on the rest of Albany Hill.

Implementation Plan

Strategy Overview

The Albany Hill Forest Management and Habitat Restoration project is intended as a compromise between fire safety, habitat preservation, recreational use and project funding. Due to the complexity of removing a large number of eucalyptus trees from the City property on Albany Hill, many factors were taken into consideration in developing the following strategies:

- Alternating removal and restoration phases to allow for adaptive management based on results of previous phases
- Dividing the site into implementation areas based on eucalyptus removal zones and habitat type to simplify contractor work
- Front loading high-risk removals and sequencing removal phases to reduce potential risks of failure on remaining *E. globulus* trees
- Minimizing ecological disturbance on Albany Hill
- Limiting disturbance within the Monarch Management Area
- Assessing replacement tree field trial species
- Using active restoration and passive restoration approaches
- Allowing time for high quality native plant contract growing
- Separating the project implementation by areas of contractor expertise (tree removals and ecological restoration)
- Distribution of costs and tasks to maximize grant opportunities and fiscal efficiency

Phase Overview

The project as proposed has seven phases – four restoration and three removal phases. See the Project Phase Descriptions section below for details on each phase.

- Phase 1 Restoration – Pilot Phase
- Phase 2 Removals – Exterior
- Phase 3 Restoration – Exterior

- Phase 4 Removals – Interior
- Phase 5 Restoration – Interior
- Phase 6 Removals – Monarch Management Area
- Phase 7 Restoration – Monarch Management Area

Area Overview

The site has been divided into lettered areas to create discrete action areas and facilitate communication (see Figure 9). The areas were determined by existing site conditions and the target habitats for restoration activities. Depending on the extent of native plants in a given work area, some areas will require greater native plant salvage effort prior to tree removals. All proposed planting patches within an area target the same habitat type.

Hazardous Tree Removals

As discussed in the Fire Safety concept exploration, some of the eucalyptus trees pose more acute fire safety and public safety risks. These trees are included in the first phase of removals. Since eucalyptus grow in stands, removing some trees can destabilize the rest of the trees in the group, causing them to be more susceptible to damage from wind and solar exposure. To mitigate tree failures due to stand dynamics, the eucalyptus at the periphery of the site will be removed in Phase 2. If any of the remaining trees fail, they will fall within the project boundaries. Trees in the internal part of the site will be removed in later phases.

Priority Native Plant Stand (PNPS)

Priority Native Plant Stands (PNPSs) are discrete areas across the hill with existing clusters of native vegetation. The general extents of these areas have been determined to allow for a reasonable level-of-effort estimation in the Bid documents. However, prioritizing the native plant stands should be strongly informed by the City of Albany Natural Areas staff, the project consulting biologists (Nomad Ecology) and tribal input.

PNPSs will be demarcated in the field during restoration phases and prioritized for protection in the subsequent removals phase. These areas may

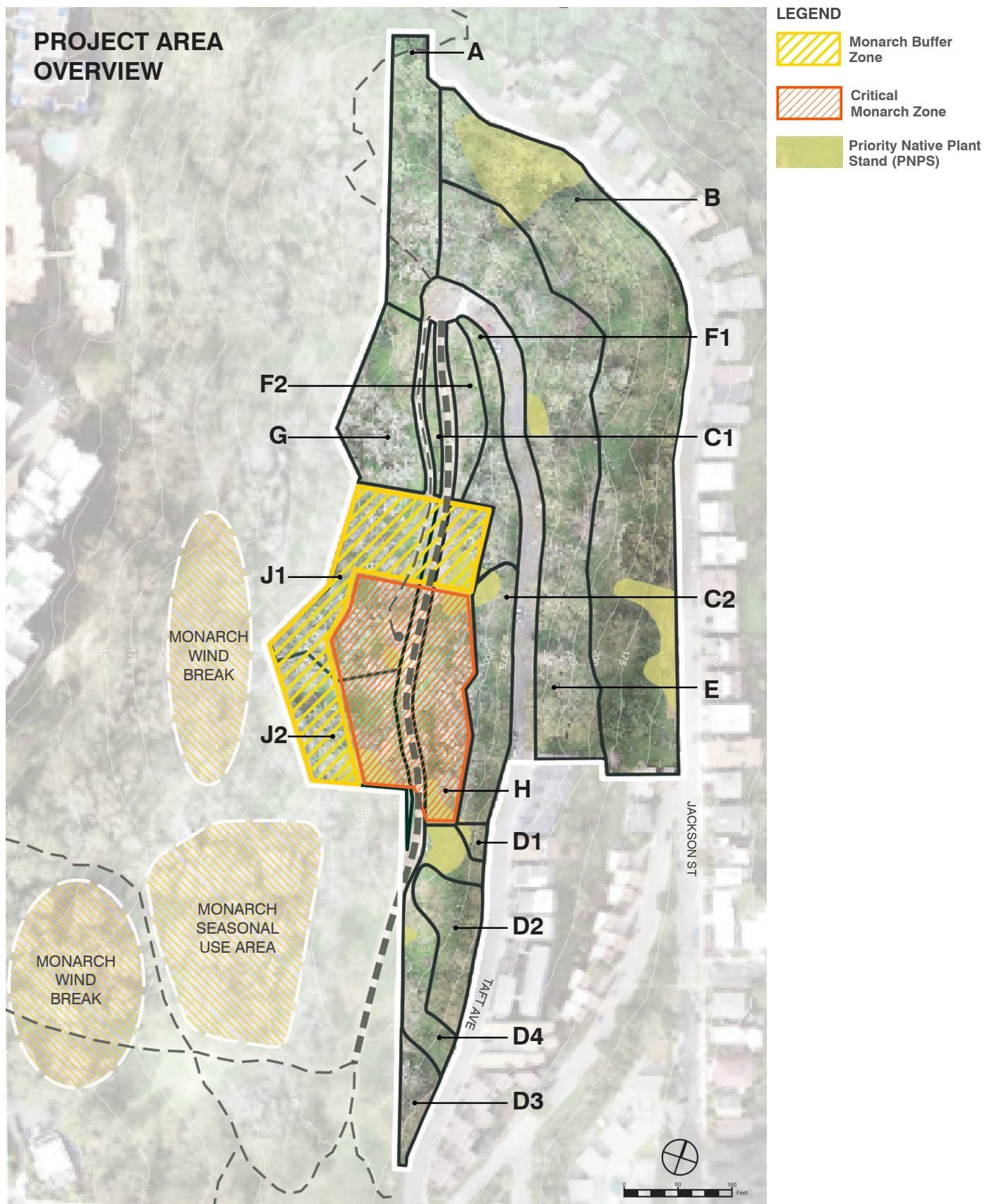


Figure 9. Project Area Overview

serve as important sources for natural native plant recruitment and have helped to inform the restoration planting palettes. See the Construction Documents and specifications for more information on how they will be protected and augmented with additional plantings during the construction process.

Monarch Management Area

The Monarch Management Area is the area at the top of the hill used by monarchs as overwintering habitat. The eucalyptus within this area are common cluster sites and provide the public access to the butterflies that the city values. For these reasons the area is treated separately from the rest of the site or excluded from this project's scope altogether.

The Monarch Management Area has been further divided into two zones. The Critical Monarch Zone (CMZ) includes the trees the monarchs prefer to cluster in and will be excluded from the removals contract. The Monarch Buffer Zone (MBZ) is the area of trees surrounding the CMZ that contribute to the conditions the monarchs prefer.

In Phase 6, the eucalyptus in the Monarch Buffer Zone will be evaluated for pruning and removal on a case-by-case basis to minimize disturbance to the overwintering habitat. Hazardous trees in the Monarch Management Area will be carefully removed only as needed and are not part of the scope of this current project. Preserving the trees in the Monarch Management Area will allow time for wind break plantings and field trial trees to mature and provide protection and habitat for monarchs. City staff will also selectively manage understory vegetation to reduce fire danger and disturbance to the monarchs. See the Phase 6 description in the Project Phase Descriptions section for more details on work proposed in this area.

Replacement Tree Field Trial

One of the pressing questions for this project is how to handle the opportunistic utilization of a Cal-IPC rated invasive species (*E. globulus*) by a potentially endangered species (monarch butterflies). Human development is responsible for the loss of their original habitat along the California coast, and human industry is responsible for the presence of the eucalyptus on Albany Hill. What is the responsible path forward for both the hill and the butterfly? How do we keep the educational

benefits (and sheer delights) of having monarch clusters on the publicly accessible parts of the hill without compromising its overall habitat health and fire profile?

A key component of the solution presented by the implementation plan is experimentation. The trees the monarchs use seasonally on City Property are failing. To provide continuity, we need to replace them with less problematic trees that will still provide the same services. This is not a unique problem to Albany Hill. Other land managers are taking different approaches, and various research is ongoing (Fisher 2023).

The first restoration phase calls for the planting of the field trial trees, which remain in place for evaluation and monitoring through Phases 1-6. This allows time for assessment, observation, public and expert comment, and an opportunity to see how the monarchs react to them in place. By Phase 7, the selected replacement species can be planted in larger numbers at the appropriate layout and spacing to provide ideal solar access and wind protection for the monarchs.

Replacement Tree Candidate Species

Eucalyptus diversicolor (Karri)

Unlike the Tasmanian blue gum (*E. globulus*), *E. diversicolor* is killed outright by severe fires and does not regenerate from a lignotuber or from epicormic shoots under the bark. It poses a much lower risk profile in terms of invasive spread outside of the zones where it may be planted. It has been introduced onto California state lands for the express purpose of providing monarch habitat in areas where the butterflies use existing stands of *E. globulus* and has been recommended by Creekside Science.

While non-native, the Karri tree is from the southwestern Australian coastal environment and has a much lower water use profile. The wood is also highly valued for lumber, and the blooms are a source of nectar for bees and other pollinators. The replacement trees would remain on the hill and serve as a living reminder of past human decisions, and consequences both positive and negative, providing a very tangible discussion point and educational opportunity for future generations. Field tests of their suitability will be critical in determining if their selection is appropriate.

Maximum height: 200 feet
Canopy width: 60 feet
Growth rate: ~36"/year
Dark green, spear-shaped leaves
Water: low

***Lyonothamnus floribundus ssp aspleniifolius* (Santa Cruz Island Ironwood)**

A California native tree from the Channel Islands and southern California, the Ironwood has very similar structural features to the Tasmanian Blue Gum – narrow tall form, drooping long leaves, and nectar producing blooms. It does, however, also share the issue of shedding bark and high leaf litter production. Unlike the eucalyptus, the leaf and bark products decompose more readily. It has strong branches but grows at a slower rate than the potential pine candidates.

Maximum height: 40 feet
Canopy width: 20 feet
Growth rate: ~24"/year
Dark green, oblong leaves
Water: low

***Pinus canariensis* (Canary Island Pine)**

A non-native pine tree from the Canary Islands, the Canary Island Pine is readily available in the nursery trade, is non-invasive, a rapid grower with the structural features needed for potential utilization by monarchs. It is frequently planted for screening adjacent parking garages, highways, and other high wind areas with challenging soil or pollution profiles. There are vigorous and healthy examples planted in West Berkeley and Albany that lend credence to their ability to thrive in the project area. *P. canariensis* is also considered one of the most fire-resistant pines available, and is highly drought resistant, which improves its ability to provide habitat amenities under a wide range of potential future conditions.

Maximum height: 80 feet
Canopy width: 30 feet
Growth rate: ~36"/year
Bluish Green needles
Water: medium

***Pinus sabiniana* (Gray or Foothill Pine)**

Unlike *P. canariensis*, the Gray Pine is native to California and was historically found in the East Bay. It too has a very vertical profile, with a growth rate of approximately 3' a year, allowing it the potential to replace the failing *E. globulus* stands in a shorter time period. It is utilized by a wide range of wildlife, and has medium branch strength (selecttree.calpoly.edu)

Maximum height: 70 feet
Canopy width: 20 feet
Growth rate: ~36"/year
Bluish Green needles
Water: low

Active Restoration and Passive Restoration

Restoration activities on Albany Hill will use two approaches: active and passive restoration. Combining these two strategies protects and expands the hill's existing ecosystem, improving its robustness and ability to weather future changes, while balancing the overall project costs. Specific restoration interventions by project area are detailed in the Project Phase Descriptions section.

- Active Restoration entails protection for and salvage of existing native plant species, extensive new planting and maintenance, an irrigation system, invasive weed control, mulching and management of oaks to maintain appropriate densities. Logs and branches from the eucalyptus removal process will be reused to prevent slope erosion and provide additional planting opportunities.
- Passive Restoration is a lower level of effort for areas not receiving active restoration. This includes existing plant protection and salvage, weeding and mulching. Instead of formal planting, passive restoration would allow native plant species to reestablish naturally after tree removal.

Contract Plant Growing

To restore Albany Hill with native species suitable to the site, the City will contract with native plant nurseries to collect seed on-site and grow restoration plants specifically for the project. This will improve the

likelihood that the plants installed in the restoration phases will be adapted to the conditions on the hill and persist long enough to reproduce and expand the site's native habitat. Restoring the site over time will also allow for observation of which plants thrive and will provide an opportunity to adapt the planting plans for future restoration phases.

Two Contractors

One of the challenges of creating an implementation plan for this project is the scope of tasks needed to achieve the primary goals. Eucalyptus removal is a specialized skill, and contractors who can tackle a site with slopes, tight access and adjacent residences will almost certainly not possess the equally specialized skills of native plant identification and environmental restoration experience. By separating the project into two distinct contracts, and allowing them to stagger in sequence, the City has a greater chance of receiving competent and competitive bids for the project.

Bid documentation will include specific drawings for the removals contractor and restoration contractor, as well as technical specifications for the full scope of project work, ensuring that all parties involved are working off the same information, requirements, and criteria. The intent is to make each scope of work as transparent as possible, and more easily coordinated. The project will involve site walks and meetings with both contractors present, for the same reason – to ensure that both contractors receive the same information, and each area of expertise can help inform and guide the other.

Funding Strategy

Given that the eucalyptus forest on City property is comprised of a large number of trees, the costs associated with removal and restoration are significant—approximately \$3 million. Some phases will be more costly than others, due to the relative difficulty of removals in a given project area, the amount of native plants to salvage and the square footage of restoration planting required in the phase. Breaking the project up into seven phases will allow the City to pursue funding for portions of the project, rather than having to secure funding for the entire project before starting work. Once funding is secured for early phases and results of the project can be evaluated, it is likely that additional funding will be more readily available for the continuation of the project in its later phases.

Phase Grouping Recommendation

Ideally the project's seven phases would be grouped and implemented in three overarching phases over the course of multiple years: Phases 1-3 would be funded as one project, then Phases 4 and 5, followed by Phases 6 and 7 to complete the project. The removal and restoration phases should be paired so that damage caused by the eucalyptus removals is restored as quickly as possible, allowing native species to establish in their place. The assumption is that the removals and restoration contractors will be under contract at the same time to facilitate coordination. If site work is coordinated, closure periods for Albany Hill could be minimized.

Project Phase Descriptions

Phase 1 Restoration – Pilot Phase

The first phase of the project is designed to lay the groundwork for protecting and enhancing the natural resources already present on the hill, and to initiate activities which require longer timelines for completion.

Initiate Contract Grow of Native Plants

Prior to any eucalyptus removals, the selected native plant nursery can collect seed and cuttings from Albany Hill to start a dedicated contract grow for Restoration Phases 3, 5 and 7. While the seed sources and cuttings from the site will likely not be enough to provide material for the full extent of planting needs, using seed from local populations has many ecological advantages. Many desirable species are also difficult to grow from seed, and cuttings may be used to supplement what is available.

Pre-removal Plant Salvage

Within the Phase 2 Removal areas (A, B, C1-2, D1-4) there are native plants adjacent to eucalyptus trees that are both valuable habitat plants and likely to be damaged in the removals process. Prior to Phase 2 Removals, the project biologist and City staff will walk the site and flag plants suitable for salvage, storage and transplanting back onto the site after the initial tree removal phase.

Ideally, salvage work would be done from early winter to early spring when the ground is still moist. For plants that may be dormant at that time, flagging the plants in the prior spring/summer when they are still visible is recommended. Plants would be salvaged and stored on site, kept moist and re-planted after tree removal in their designated zone is complete. Area C1, the existing native plant garden, has been identified as a suitable location for storage of salvaged plants.

For transplanting protocols, please see the construction documents for the Restoration Contractor and the Project Technical Specifications for further details. In brief, the contractor would do the following:

- Dig plant with a sanitized shovel
- Place dug plants on tarps, moving plants to identified storage area.

- Dig a very shallow trench, line-up and place all the plants in the trench and cover them in soil.
- Lay burlap over the edges of the pile to help keep it moist

Flag and Map Priority Native Plant Stands to Protect

Phase 1 Restoration will assess the Phase 2 Removal areas for patches of valuable existing native habitat, or mature oaks and toyons to be protected in place. These areas will be identified as Priority Native Plant Stands (PNPSS) and protected with specific measures outlined in the construction documents and specifications.

Identify Native Oaks to Remain

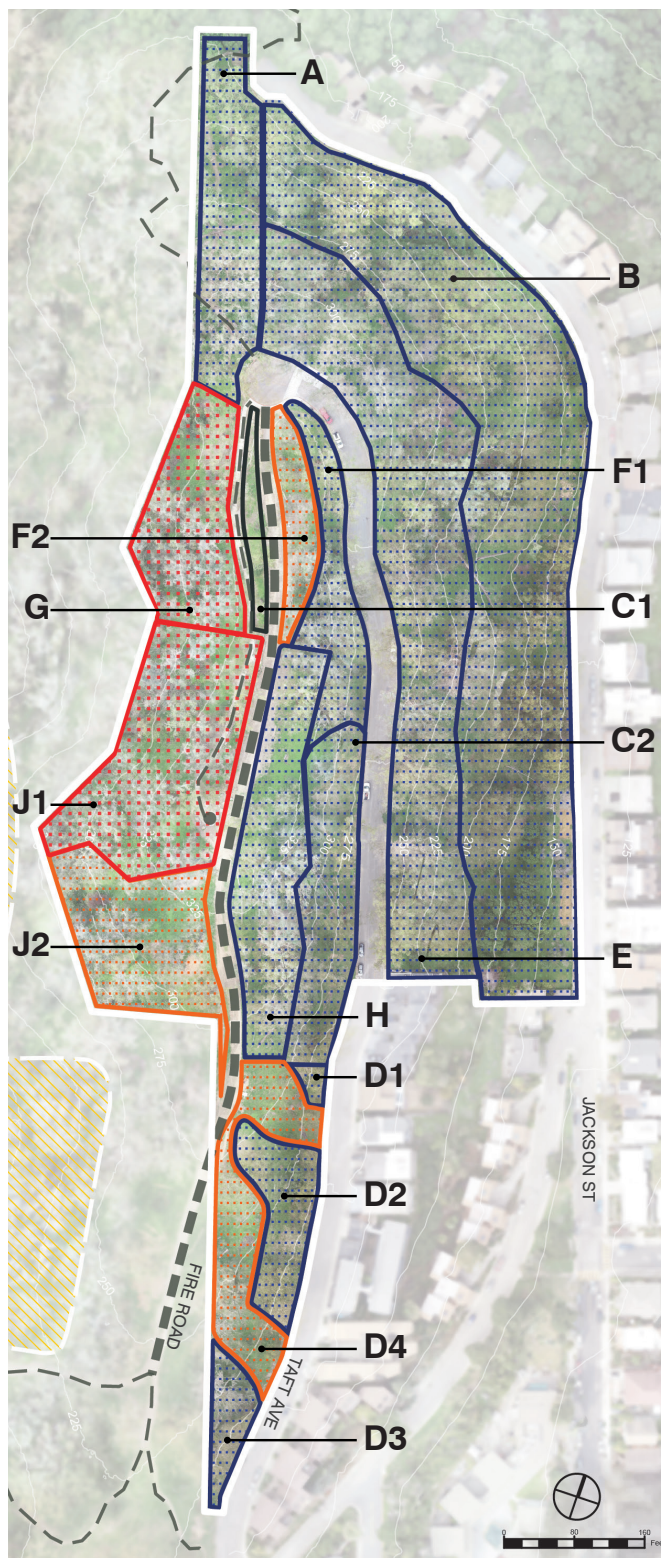
In Area A, oaks with 4” trunk diameter and larger that are far enough away from the eucalyptus removals will be flagged and evaluated for protection by the restoration contractor.

Plant Field Trial Trees

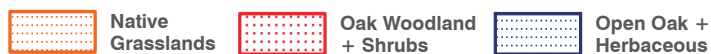
Five specimens of each of the replacement tree species candidates will be planted in locations as shown in the Restoration Bid Set (Areas H, J2). Locations will be reviewed and confirmed with the Natural Areas Coordinator and monarch biology consultant to maximize immediate services which may be provided (improving wind break, etc.). Temporary irrigation will need to be installed to water the field trial trees during their establishment period. Trees should be sourced from reputable nurseries with stringent pathogen prevention protocols to prevent introducing *Phytophthora ramorum* to the site.

Pruning and Limbing of Eucalyptus Adjacent to Trails

The eucalyptus trees along the fire road and trail which are not slated for removal in Phases 2 or 4 will be evaluated for pruning and limbing by the restoration contractor and City Staff to minimize risks to both contractor staff and the public during the project (Areas H, J1 & J2). It is assumed that the trail from the Taft Circle to the Monarch Management Area will be able to remain open to the public during most of Phase 2 Removals. Phases 4 and 6 will likely necessitate the closure of the public amenities on the hill.



TARGET HABITAT BY AREA



RESTORATION PROJECT OVERVIEW

This project has **four distinct phases** of restoration work, each separated by a removals phase of work completed by another contractor:

Phase 1 Restoration - Pilot Phase will identify and protect native plant understory areas that will be designated as **Priority Native Plant Stands (PNPSS)**. Restoration phase contractors will flag PNPSS prior to the initiation of Removal phases. Phase 1 will also field test replacement tree species.

Phase 3 Restoration - Exterior will primarily restore Open Oak Woodland with Herbaceous Understory.

Phase 5 Restoration - Interior will restore additional areas of Open Oak Woodland with Herbaceous Understory as well as areas of Native Grasslands and Oak Woodlands and Shrubs.

Phase 7 Restoration - Monarch Management Area will restore habitat within the Monarch Management Area.

These diagrams are for use in support of the Implementation Plan report and for discussion with City representatives and the public. Contract documents will be issued separately for bidding.

Phase 1 Restoration - Pilot Phase

- Areas A, B, C1-2, D1-4: pre-removal work
- Areas H, J2: initiate field test of replacement trees

Phase 2 Removals - Exterior

Phase 3 Restoration - Exterior

- Areas A, B, C1-2, D1-3: post-removal restoration
- Areas E, F, G

Phase 4 Removals - Interior

Phase 5 Restoration - Interior

- Areas E, F1-2, G, D4: post-removal restoration
- Areas H, J1-2: pre-removal plant salvage

Phase 6 Removals - Monarch Management Area

Phase 7 Restoration - Monarch Management Area

- Areas H, J1-2: post-removal restoration
- Areas H, J1-2: replacement tree planting

Figure 10. Restoration Project Overview

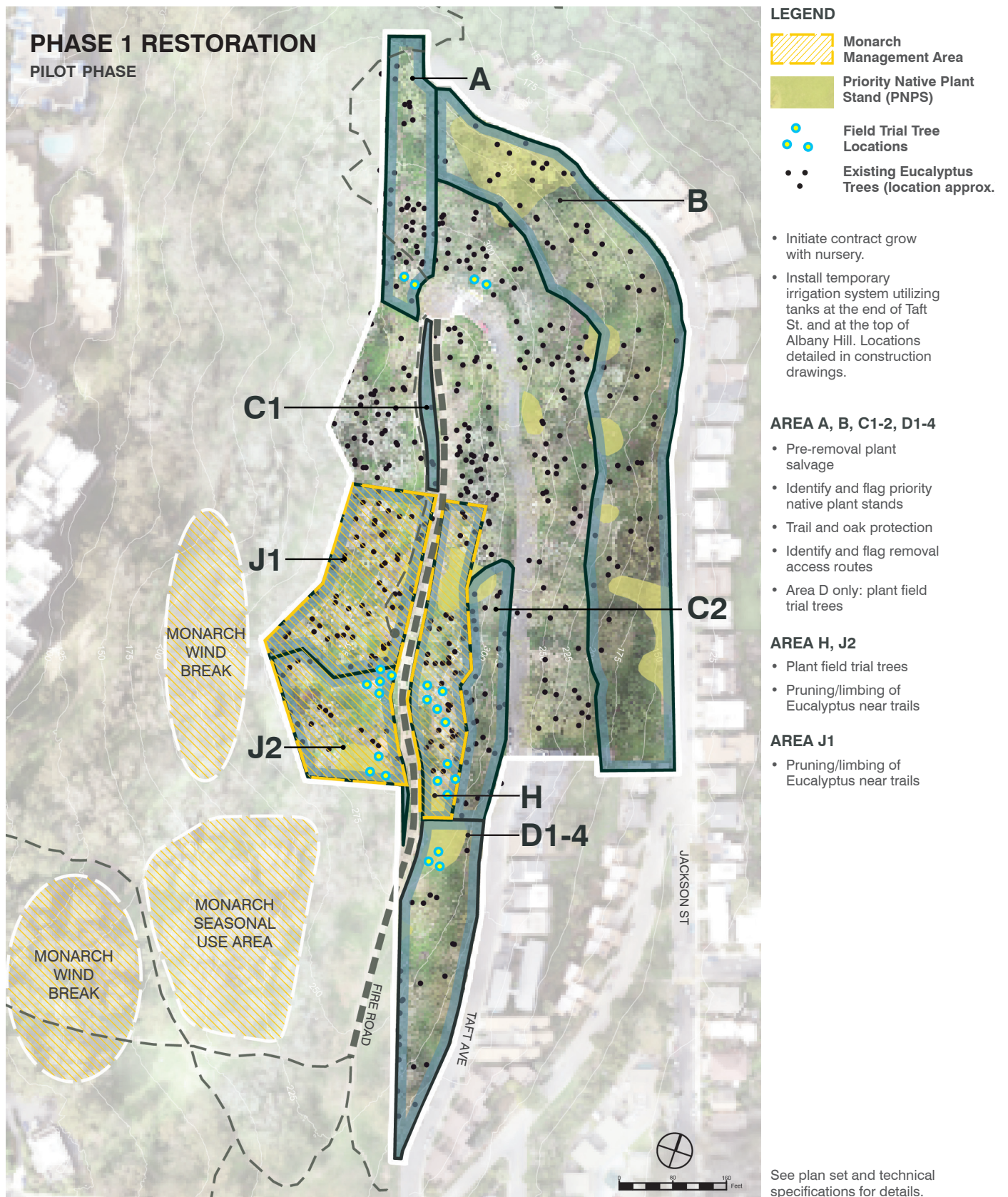


Figure 11. Phase 1 Restoration - Pilot Phase

Phase 2 Removals –Exterior

The first removals phase of the project prioritizes the removal of eucalyptus trees that pose the highest fire risk and the highest risk to adjacent properties. The trees directly uphill from homes on Taft Ave. and Jackson Street, and those trees which present the greatest potential for torching and ember spread are included in this phase. The Removals contractor will have the advantage of the advanced work done during Phase 1, with the risk of damaging important resources greatly reduced. Best Management Practices for the protection of faunal resources will also be required.

Pre-Removal Site Walk

Both the Restoration contractor and Removals contractor will walk the site with City staff prior to commencing the first removals phase to ensure timing, access routes, drag routes, staging areas, storage areas, and zones of responsibility are clearly laid out and agreed upon. Logs for salvage and reuse will also be confirmed during this meeting. Both contractors will be working from the same set of drawings and technical specifications.

Areas A, B, D1-4

Removals in Area A, B and D1-4 will create a fuel break between the privately held eucalyptus stands and the homes along Taft Ave. and Jackson St. Removing trees in Area A will also open views and routes for construction and can be used for temporary staging and storage. 125 eucalyptus are estimated to be in these areas based on LiDAR data and the arborist reports.

Areas C1, C2

Removals in Area C1 and C2 will address some of the most urgent fire risks by targeting trees along the ridge that have the potential to spread embers over the greatest distance. 32 eucalyptus are estimated to be in these areas based on LiDAR data and the arborist reports.

Stump Treatment and Lumber Salvage

Trees may be cut at field grade or left with up to 4' of trunk as needed to protect adjacent vegetation. Eucalyptus stumps should be treated per the technique in the Long-Term Management chapter of this

document. Lengths of logs will be salvaged and placed by the removals contractor to help create planting shelves on steeper slopes, for edging and informal benches along existing trails, and to help block lines of desire trails and informal pathways in the area. Eucalyptus branches should be stockpiled for the fabrication of fascines. There is the potential for the City to negotiate the sale of some eucalyptus materials to wood brokers such as Bay Area Redwoods or make in-kind arrangements for milling and processing on site. Wood from tree removals can be reused for stairs at Peggy Thompson Pierce Street Park, which can also be a site for storing and staging reused logs and lumber. Chipped wood will be salvaged for use as mulch during the Phase 3 restoration activities.

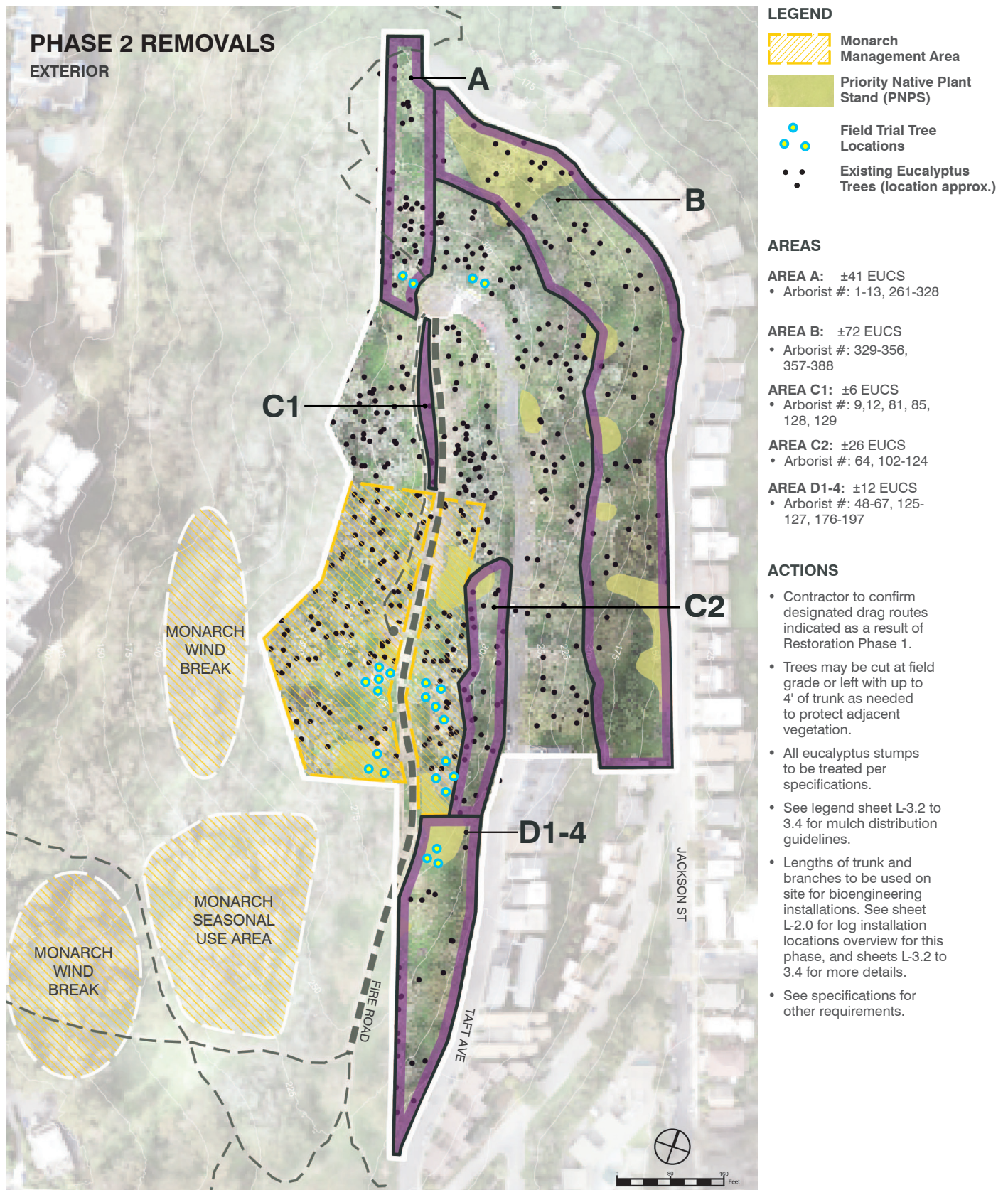


Figure 12. Phase 2 Removals - Exterior

Phase 3 Restoration – Exterior

This phase of restoration is focused on the removals areas from Phase 2 that target the Open Oak and Herbaceous Understory habitat type. The contract grown plants initiated in Phase 1 will be available for installation on the project site. The contracted native plant nursery will collect additional seeds and cuttings during this phase to grow the plants needed for Phase 5 planting.

Areas A, B, C2, D1, D2, D3 – Open Oak and Herbaceous Plants

These areas will receive active restoration in the form of dense patches of native planting, oak trees, and fascines, and passive restoration where the removal of the eucalyptus trees will allow the existing native vegetation to have access to greater resources – water, light, and nutrients. Invasive species management will be the main effort here, along with replanting any salvaged plants after removal disturbance is complete. Up to 6” of mulch can be installed between areas of active restoration (see sheets L3.2-L3.4). Fascines (bundles of branches) will be placed and secured on moderate slopes to create planting pockets and to prevent erosion.

Area C1 – Native Plant Garden

Area C1 will likely require the least number of inputs as it currently contains the native plant garden. Removing the eucalyptus and applying mulch will allow the native plantings already present to continue to grow and expand. Native plants salvaged in Phase 1 and stored in Area C1 can remain or be replanted in another area as part of the Phase 3 restoration effort.

Pre-removal Plant Salvage

The restoration contractor will walk the Phase 4 Removal Areas (E, F, and G) with the City of Albany Natural Areas staff and project biologist to flag areas to protect and identify candidates for salvage and replanting in preparation for the next phase of tree removals.

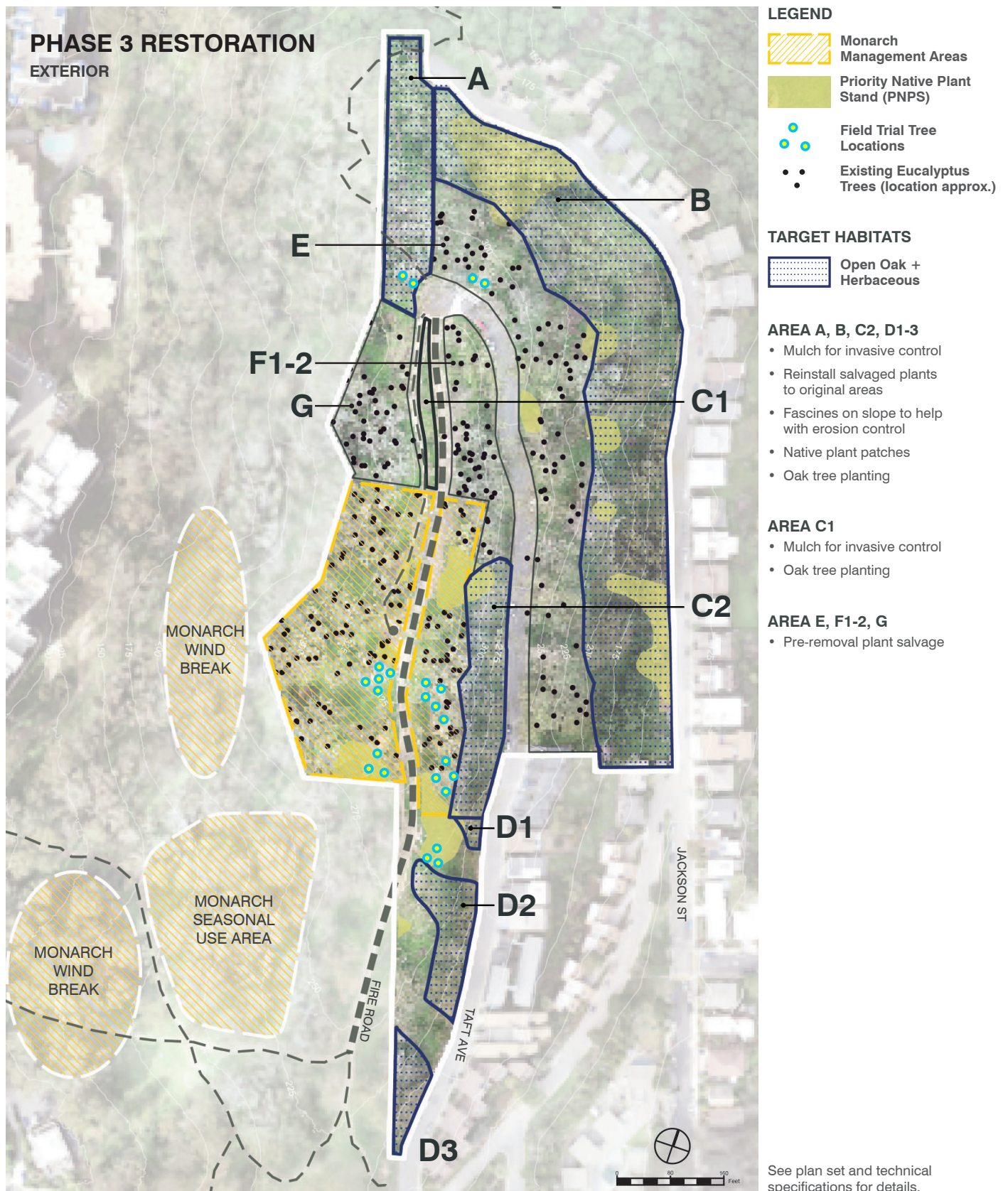


Figure 13. Phase 3 Restoration - Exterior

Phase 4 Removals – Interior

The fourth phase of the project focuses on the removal of eucalyptus trees at the interior of the site. The contractor can utilize drag and removal routes established in Phase 1 if practical. All areas in Phase 4 have access to Taft Circle and Taft Ave. for removal routes. A portion of the logs removed in Phase 4 will be salvaged and placed on the site for restoration purposes.

Pre-Removal Walk

Both the Restoration contractor and Removals contractor will walk the site with City staff prior to commencing Phase 4 to ensure timing, routes, storage areas, and zones of responsibility are clearly laid out and agreed up. Logs to be salvaged will be confirmed at this time. Both contractors will be working from the same set of technical specifications.

Areas E, F1-2, G

These areas will continue the fuel break between the privately held eucalyptus stands and city property (Area G) and complete the removal of the eucalyptus between Taft Ave. and Jackson St. (Area E). This will further open views both towards the Bay, and towards the Phase 1 and 3 Restoration Areas. 159 eucalyptus trees are estimated to be in these areas based on LiDAR data and the arborists reports.

Stump Treatment and Lumber Salvage

Trees may be cut at field grade or left with up to 4' of trunk as needed to protect adjacent vegetation. Eucalyptus stumps should be treated per the technique in the Long-Term Management chapter of this document. Lengths of logs will be salvaged and placed by the removals contractor to help create planting shelves on steeper slopes, for edging and informal benches along existing trails, and to help block lines of desire trails and informal pathways in the area. Eucalyptus branches will be salvaged and stockpiled for use as fascines.

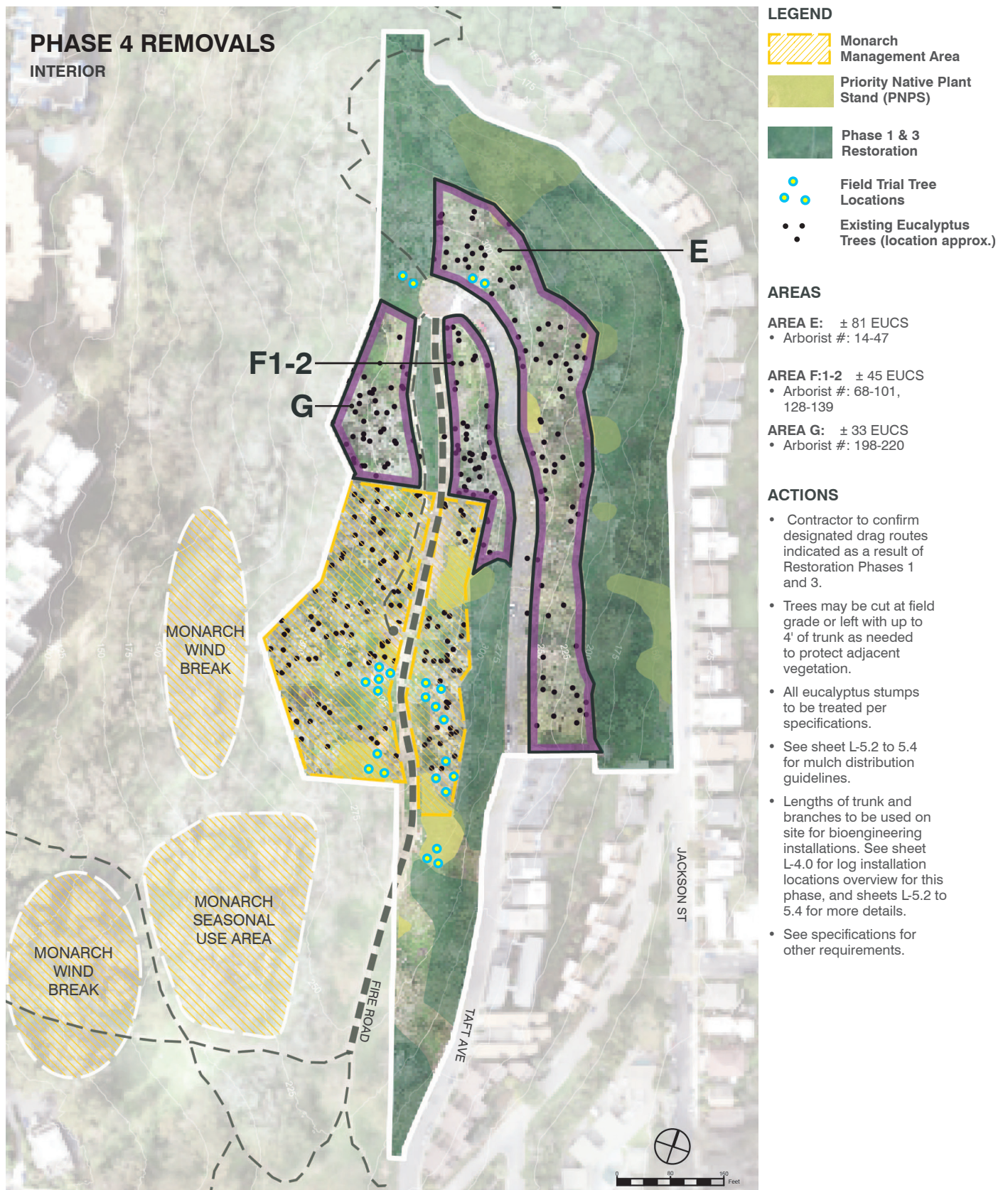


Figure 14. Phase 4 Removals - Interior

Phase 5 Restoration – Interior

The fifth project phase involves work to help establish all three target habitat types – Native Grassland, Open Oak and Herbaceous, and Oak Woodland and Shrub in the Phase 2 and Phase 4 removal areas. The contracted native plant nursery will collect additional seeds and cuttings during this phase to grow the plants needed for Phase 7 planting.

Area D4 – Native Grassland

The delay in the active restoration efforts for Area D4 allows for time to see whether native plants establish on site from the seed bank or if perennial species resprout from crowns or roots in this area following a reduction in canopy cover and a change in water regimes. The delay also allows for additional contract grow plants to mature. Area D4 active restoration includes installing Native Grassland patches and fascines.

Area E – Open Oak and Herbaceous Plants

The active restoration activities include installation of Open Oak and Herbaceous patches, oaks trees, and fascines. Spacing of planting patches will vary based on the topography to ensure adequate vertical spacing for fire safety.

Areas F1 & F2

The area between the fire road and Taft Ave. contains areas of two different habitat types, both within Area F. Most restoration efforts here will be passive, allowing the native understory that exists to express itself in the improved conditions post eucalyptus removal. Active restoration will include the reinstallation of several oak trees, any plants salvaged and stored during Phase 3, and the installation of three native plant patches, fascines and deep mulch.

Area G

The steepness of this area and the extensive presence of poison oak and toyon, both of which will very likely re-establish themselves with no active planting, makes taking a passive restoration approach in this area both practical and financially efficient. Restoration efforts in this area entail installing oak trees and deep mulch.

Salvaged Plants

Native plants salvaged in Phase 3 and stored in Area C1 can remain in the Native Plant Garden or be replanted in another area as part of Phase 5 restoration effort.

Pre-Removal Plant Salvage

The restoration contractor will walk the Monarch Management Area (Areas H and J1-2 - see Figure 16) with City of Albany Natural Areas staff and the project biologist to flag areas to protect and to determine whether there are stands native plants to be salvaged in preparation for potential tree removals in Phase 6. These plants will be stored in the existing native plant garden, Area C1.

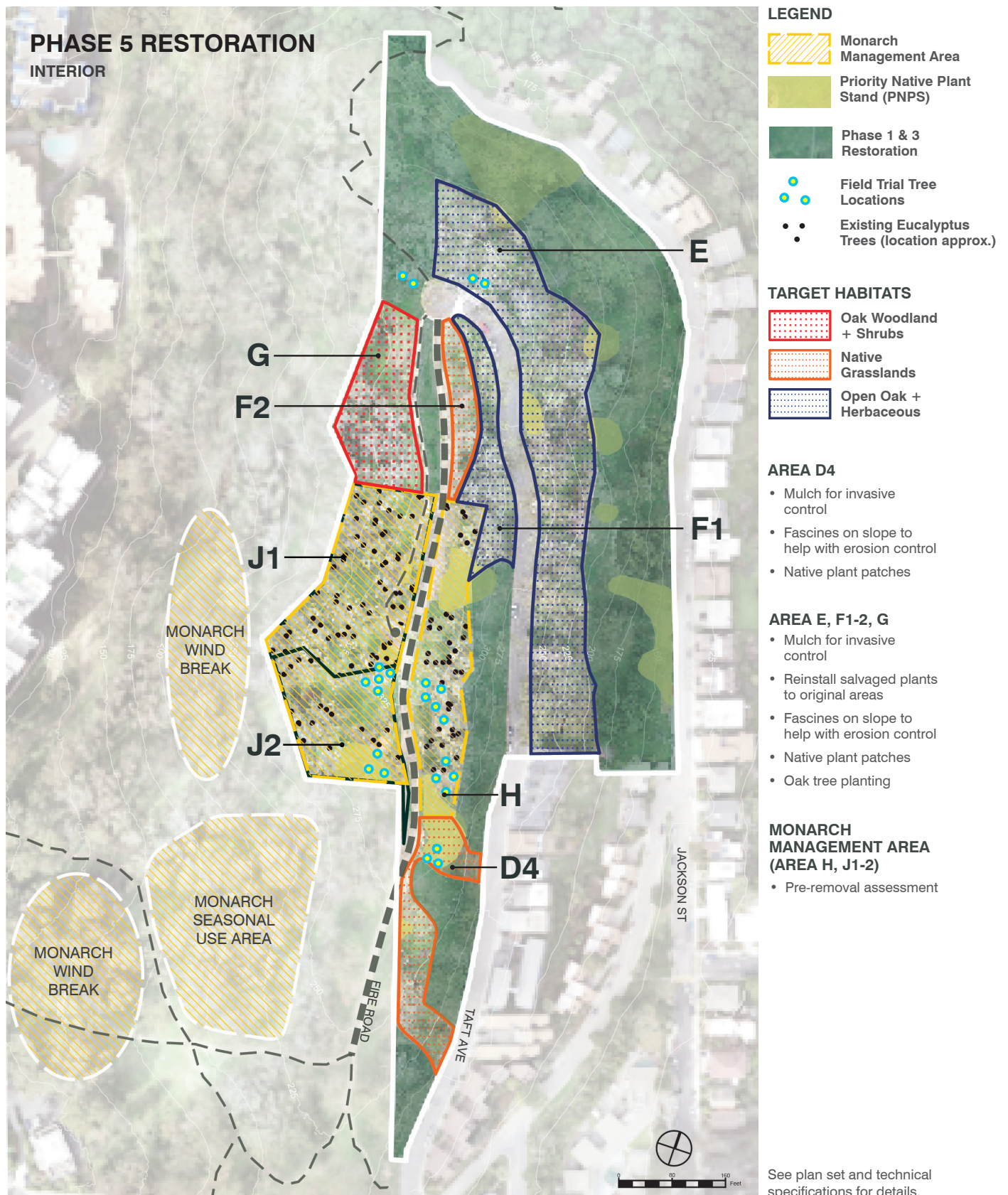


Figure 15. Phase 5 Restoration - Interior

Phase 6 Removals – Monarch Management Area (Areas J1-2 and H)

The final removals phase of the project focuses on the assessment and potential removal of select eucalyptus trees from within the Monarch Buffer Zone. Prior to initiating removals in Phase 6, the City arborist will flag any trees in the Monarch Buffer Zone in need of assessment. If trees from this zone are identified as failing or as hazards, the Removal contractor will remove them at the City's discretion. Any trees removed will be offhauled unless directed otherwise by the City.

Trees which have been identified by the City and the consulting monarch biologist to maintain existing habitat structures for the monarchs will be left standing, with the long-term intent to be replacement in kind by trees of the replacement species. No trees will be removed from the Critical Monarch Zone by the Removals contractor; this area is not part of the removals project. Leave some small, downed branches and low-growing vegetation for monarch to use to climb off the ground.

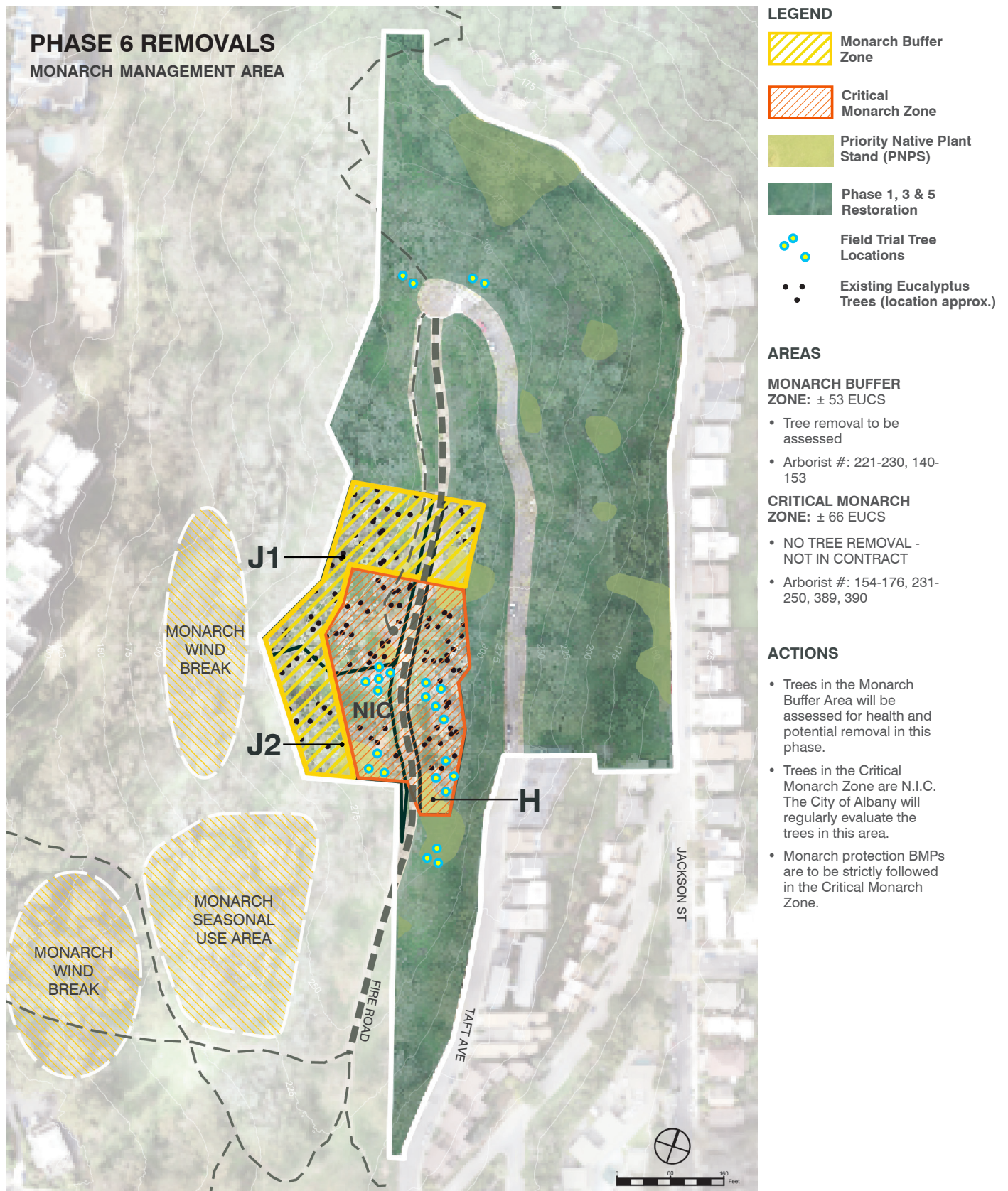


Figure 16. Phase 6 Removals - Monarch Management Area

Phase 7 Restoration – Monarch Management Area

The final restoration phase is focused on the Monarch Management Area and providing enhancements adjacent to the eucalyptus that will remain until failure, or until the replacement trees reach a size that would allow for a gradual reduction of the *E. globulus* stands with minimal impacts for the butterflies. Patches of all three project target habitat types are present in this phase and will be the last installation of contract grown plants on the hill for the project. Plants for this phase should be grown by the contracted native plant nursery from seeds and cuttings collected in Phase 5.

Area J1 – Oak Woodland and Shrubs

Due to the steepness of this area, tree and patch plantings are concentrated along the trail and fire road. Because of the existing public infrastructure, the locations of all proposed restoration elements will be assessed by the City Natural Areas staff prior to installation.

Area J2 – Native Grassland

The Monarch Buffer Zone in Area J2 has an existing understory of poison oak and toyon. As trees are assessed and potentially removed, this native understory may naturally become the dominant habitat. Replacement tree and patch plantings will be concentrated along the fire road where the site is less steep and receives more sunlight.

Area H – Open Oak and Herbaceous Plants

Patch plantings in Area H will continue the establishment of the Open Oak target habitat on the east facing slope. Locations of these patches will be verified in the field after Phase 6 assessment and removals.

Salvaged Plants

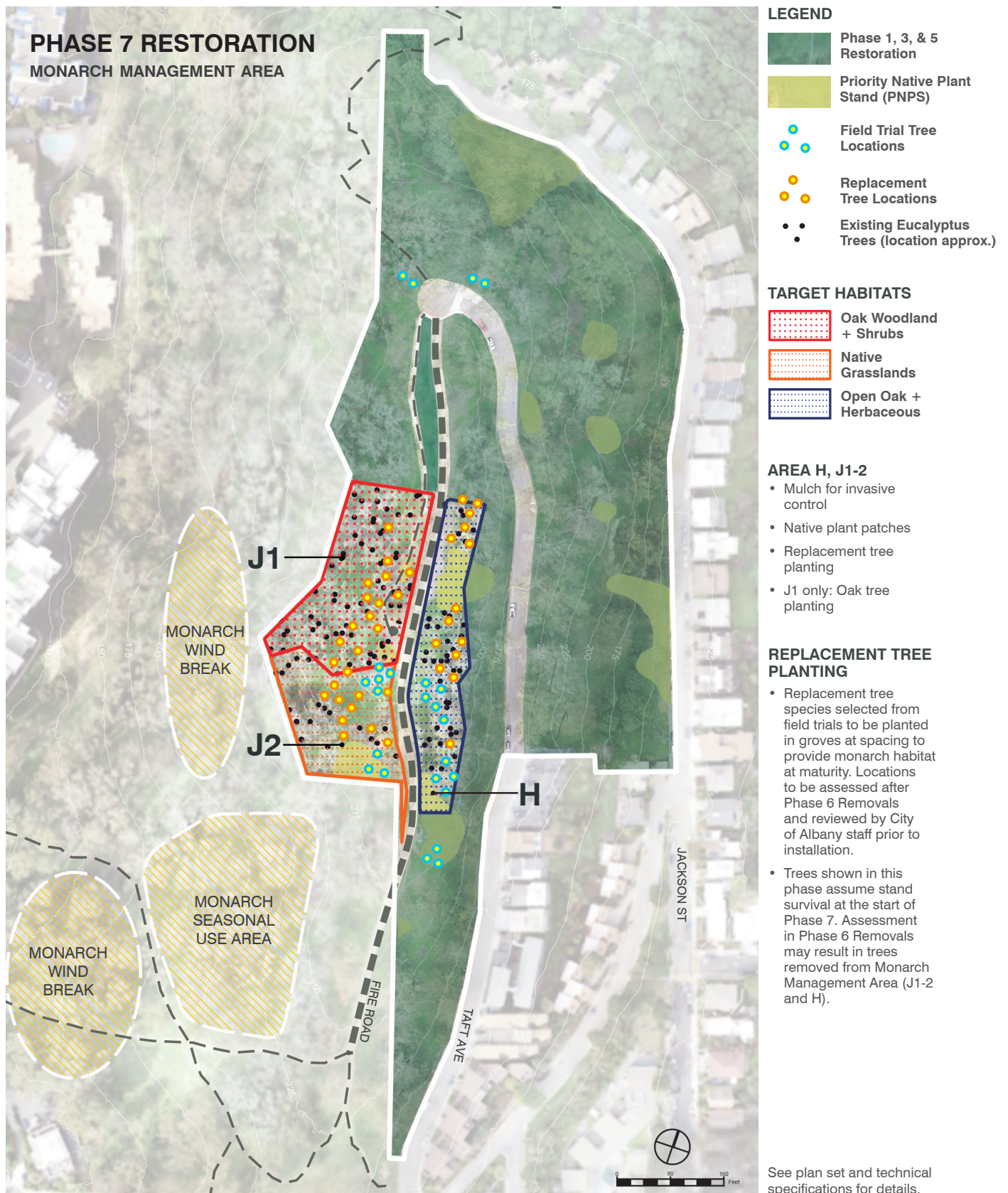
Any native plants salvaged in Phase 5 and stored in Area C1 can remain in the Native Plant Garden or be replanted in another area as part of the Phase 7 restoration effort.

Existing Eucalyptus Pruning

Existing eucalyptus to remain within the Monarch Management Buffer Area will be pruned to remove deadwood and thin branches. Trees in the Critical Monarch Zone will not be pruned as part of this project.

Replacement Tree Selection and Planting

By the time the project has reached Restoration Phase 7, several growing seasons will have passed, and the City will have enough data and documentation to make a choice regarding a preferred tree species for replacement. Augmenting and the *E. globulus* trees currently utilized for monarch cluster sites with new tree planting will be initiated as part of this phase of work. Both the replacement tree and oaks will be planted in Phase 7. Due to their 15 gallon size, the replacement trees will likely need to be sourced from a tree nursery. Nurseries providing trees for the project will be required to follow stringent pathogen prevention protocols.



BMPs and Protective Measures & Conditions

Cultural Resources

Native American habitation and use of the Albany Hill's resources date back millennia. However, villages and resources were concentrated near the two creeks that run on both the north and south ends of the hill, not on the ridgeline. The City will consult with the Lisjan Ohlone tribe to confirm areas of cultural significance or sensitivity prior to the start of project work, and where indicated, tribal monitors will be on site for any ground disturbing activities.

Tribal input will also be solicited for the composition of planting palettes to ensure culturally important plants are included for stewardship and propagation. Tribal members will be invited to collaborate and inform the priority rankings for species designated for salvage and transplant.

Botanical Resources

Existing Native Vegetation

Oak trees and native vegetation in the project area will be protected and avoided during tree removal to the maximum extent feasible. Areas of native trees and other native vegetation will be flagged or marked prior to the start of tree removals for that area. The tree removal contractor will be shown the flagged and marked locations of native trees and native vegetation, and strategies for avoidance will be planned and coordinated prior to the commencement of any tree removal activities.

Some native trees and native vegetation are in close proximity to eucalyptus slated for removal – species that are good candidates for salvage and subsequent replanting will be assessed and dug to the extent possible. This work will be conducted by the restoration contractor rather than the removals contractor.

Invasive Weed Prevention Measures

Invasive weeds can significantly impede the development of the restoration site and will need to be monitored and controlled through a combination of manual or mechanical means, as appropriate. The

California Invasive Plant Council assigns ratings to invasive weeds based on criteria such as ecological impacts, treatment or eradication priority, and threats they pose to agricultural economics (Cal-IPC 2024). Invasive weeds observed on site include Bermuda buttercup (*Oxalis pes-caprae*, Cal-IPC rated Moderate), French broom (*Genista monspessulana*, High), English ivy (*Hedera helix*, High), Italian thistle (*Carduus pycnocephalus* ssp. *pycnocephalus*, Moderate), bull thistle (*Cirsium vulgare*, Moderate), fennel (*Foeniculum vulgare*, Moderate), eggleaf spurge (*Euphorbia oblongata*, Limited), milkflower cotoneaster (*Cotoneaster lacteus*, Moderate), woolly cotoneaster (*Cotoneaster pannosus*, Moderate) and poison hemlock (*Conium maculatum*, Moderate), among others. Invasive weeds on Albany Hill will be treated if they are negatively impacting restoration progress, regardless of their Cal-IPC ranking.

1. The project biologist will provide prevention training to staff and tree removal contractors prior to starting work. Invasive weed identification and avoidance measures will be included in the preconstruction environmental tailboard meeting. The training will include field identification of invasive plants in the project area, reproductive biology of invasive plants, and invasive plant prevention Best Management Practices. The training will also include a summary of Phytophthora, its issues, spread, and Best Management Practices. The biological monitor will ensure that contractors understand provisions for invasive weed prevention and soil borne pathogen spread prevention throughout the project. Invasive and non-native plant and soil borne pathogen considerations will be routinely addressed during regular tailboard meetings.
2. Cleaning BMPs will be integrated into the project construction specifications. All equipment and material arriving on site will be clean and free of soil and plant material. Contractor vehicles and equipment will be cleaned prior to arriving at the work site, to minimize bringing invasive weed propagules, plant pathogens, insects, and soil from elsewhere onto the project.
3. The soil surface will be disturbed the minimum amount necessary to complete tree removal and replanting activities, which will reduce ground disturbance and consequently will help minimize the proliferation of invasive weeds.

Fauna

Western Monarch Protection Measures

The project will leave the Monarch Management Area largely undisturbed until Phase 7, leaving the host trees in place for as long as safety allows. The Critical Monarch Zone will be excluded from the removals contract and be managed entirely by the City of Albany. Work within the Monarch Buffer Zone will be determined in Phase 6.

1. Dead branches and dead trees do not provide monarch habitat or wind shelter because of the lack of foliage. Dead standing trees are hazards to people and other trees, and removals in the monarch area during the non-overwintering season (April –September) should be prioritized to avoid removal during the October-March overwintering season if possible.
2. If dead trees are deemed immediate hazards, then removal during the overwintering season can be considered. A monarch specialist or biologist should survey the area and confirm monarch cluster absence if work within the overwintering areas is absolutely necessary during the overwintering season.
3. Use of heavy machinery, construction activities, and tree management activities should be avoided within the overwintering areas when clustering monarchs are present (October 1- March 15). A monarch specialist or biologist should survey the area and confirm monarch cluster absence if work within the overwintering areas is necessary during the overwintering season.
4. Avoid wholesale clearing of understory vegetation in the monarch area. Removal of non-native understory (i.e., acacias, cotoneaster, and other shrubs) should proceed deliberately over many years. A good rule of thumb is that removal of a shrub or small tree should not increase wind exposure, i.e., there should be another shrub or small tree already in place so that wind shelter is maintained.
5. If a non-native shrub is eventually to be removed, then a native shrub should be planted prior to removal to maintain wind shelter provided by the non-native.
6. Weed treatments and plantings in the groundcover can be done during the overwintering season with appropriate precautions to not disturb monarchs.

Bird Protection Measures

1. If possible, tree and vegetation removal activities should be conducted between September 1 and January 31, outside of the nesting season.
2. Pre-construction surveys for nesting birds will be conducted by a qualified biologist year-round, no more than one week prior to the start of project work. The surveys will cover the project area and adjacent habitats up to 300 feet from the project boundary if possible. The surveys will entail a variety of techniques, such as systematically searching nesting substrates, watching adult birds for parental behavior (e.g., carrying nest material or food), incidental flushing of an adult from a concealed nest, and auditory detection of begging calls from nestlings. If no active nests are found within the survey area, no further action is necessary.
3. If active nests, i.e., nests with eggs or young present, are found within the survey area, non-disturbance buffers will be established at a distance sufficient to minimize disturbance based on the nest location, topography, cover, the nesting pair's tolerance to disturbance and the type/duration of potential disturbance. No work will occur within the non-disturbance buffers until the young have fledged as determined by a qualified biologist. If buffers are established and it is determined that project activities are resulting in nest disturbance, work in the nearby vicinity of the nest will cease immediately.

Bat Protection Measures

1. If possible, tree and vegetation removal activities should be conducted between September 1 and January 31, outside of the bat roosting season.
2. If tree and vegetation removal begin during the bat roosting season (February 1 – August 31), pre-construction surveys for roosting bats will be conducted by a qualified biologist no more than one week prior to the start of project work. The survey shall include a visual inspection of

features within 50 feet of the work area for potential roosting features and sign of roosting bats no more than one week prior to disturbance of such features. If bats (individuals or colonies) or recent bat signs (guano, urine staining) are detected during the survey or during work activities, no work will occur and no materials will be staged within 50 feet of the roost. If any occupied roosts identified during the survey will be altered or disturbed by project activities, CDFW will be contacted for further instructions on how to proceed.

Erosion Control and Soil Management

1. Trees will be cut as close to the ground as feasible, and stumps will remain on site to prevent ground disturbance.
2. Eucalyptus mulch will be retained on site in areas where it is desirable to provide the well-documented benefits of mulch. The mulch will help stabilize the soil following tree removal and minimize erosion and weed growth. The mulch will be comprised mainly of chipped eucalyptus wood. Care will be taken to ensure mulch is not spread thickly on areas of native grassland vegetation – Priority Native Plant Stands (PNPSs) will receive project mulch between stands of native plants only.
3. Removals contractor will oversee SWPPP and sediment controls, as conditions of the project.
4. On steep slopes, avoid excessive foot traffic or activities that can cause compaction or erosion.
5. Designate drag and equipment access routes to reduce site disturbance and soil compaction.
6. Locate landing zones, haul and skid routes, staging and loading areas to minimize erosion and water quality problems. Identify sensitive receptors (adjacent homes, roadways, creeks etc.) for noise, dust and visual disturbance and incorporate actions into management activities to reduce impacts. Concentrate supporting heavy equipment use (tractor based yarding activities) in designated areas and provide appropriate mitigation to reduce chance of rutting, erosion or sedimentation. Skidding of cut logs should be along pre-approved designated routes that minimize skidding distances and

effects to sensitive areas such as roads, creeks and drainages. Total area occupied by skidding trails typically should not exceed 15% of total treatment area. To minimize soil disturbance materials should be removed by alternate routes or lopped and scattered by hand or left as long log (with branches and debris removed).

7. Avoid driving support or haul vehicles off of established roads. If travel off road is required, inspect ground surface and avoid any wet areas. Spread mulch or wood chips (preferably from materials on site) to reduce potential for erosion or rutting.
8. Upon completion of project all access or skid trails shall be restored to original contours, re-vegetated if necessary, and existing roads or trails returned to their original condition (or better).

Pollution Control

1. Do not operate mechanized equipment in any stream or watercourse with running or standing water to avoid runoff and contamination from equipment.
2. Maintenance and refueling of equipment onsite shall be performed only when offsite operations is determined by the City to be impractical. These operations should take place in a designated area to reduce chance of spills or toxic material run off into adjacent areas. A secondary containment area, materials and supplies should be provided to facilitate prompt hazmat spill clean up. Personnel shall receive training on proper clean-up methods and disposal techniques. Disposal of clean up materials shall take place off site.
3. All waste, trash or debris generated by the management activities should be removed from treatment site to reduce risk of water pollution of adjacent creeks and drainages.

Pathogen Management

Eucalyptus Pathogen

The following section is from “Investigating the fungi responsible for the recent large-scale dieback of blue gum eucalyptus (*Eucalyptus globulus*) in the San Francisco Bay Area,” a 2021 report prepared by Matteo Garbelotto, U.C. Berkeley, for the SFPUC, USFS, and EBRPD. Albany Hill was one of the study sites and the report provides specific information about the pathogens found on site. The eucalyptus dieback “appears to be driven mostly by environmental stressors” (p. 14) and no infectious pathogen with a broad host range was identified as the driver of the decline (Garbelotto, 2021). Because little is known about the biology of *Pseudonocardia eucalypti*, the most widespread pathogen in their study, the Garbelotto report did not make explicit recommendations, although thinning to reduce tree density is expected to help mitigate environmental stressors that make the trees more vulnerable.

Phytophthora

The following section is from “Best Management Practices for Preventing *Phytophthora* Introduction and Spread,” a 2018 report prepared by Phytosphere Research for the Golden Gate National Parks Conservancy (Swiecki & Bernhardt, 2018). It is a useful starting point but does not preclude the need to follow specific BMP’s or protocols presented in permit requirements, construction specifications, or other relevant material.

Phytophthora is a genus of microorganisms, most of which are plant pathogens. They cause diseases such as root rot, stem cankers, and fruit and leaf blights. The diseases can “pose a threat to the health, functioning, and sustainability of both natural plant communities and urban landscapes” (p. 1-2). Sudden oak death, caused by *Phytophthora ramorum*, is a notable example in the Bay Area of the devastating effect these pathogens can have on native ecosystems.

The following BMPs are focused on preventing the introduction of *Phytophthora* to a site, spread within one site, and movement of contamination to another site. They apply even if already present, as infestation of more than one *Phytophthora* can further degrade an area and make management more complicated. The general

strategies below apply to trail work, construction, and soil import and management.

1. Worker training and preparation
2. Cleaning and sanitation required before entering work sites
3. Minimize risk generating activities:
 - a. Keep high risk activities to a minimum, these include general site disturbance, earth moving activities, and plant root disturbance.
4. Segment operations spatially across the site:
 - a. Separate project activities into smaller areas, may include directional controls such as working from more sensitive areas towards less sensitive areas.
5. Segment operations temporally across the site:
 - a. Separate project activities into phases or respond to site specific conditions, e.g., avoid high-risk areas in wet weather.
6. Use clean materials
 - a. Use construction equipment and plant material (mulch, plants for revegetation) that is free from contamination.
7. Use clean water
8. Decontaminate more frequently

Fire and Human Safety During Removals

The safety of the people performing tree removal and restoration work, as well as that of adjacent residents and Albany Hill recreational users, is paramount. To that end, safety recommendations should be implemented before sitework begins. Comprehensive safety information can be found in the project technical specifications. See Cal/OSHA for additional tree work safety information: <https://www.dir.ca.gov/dosh/tree-work-safety.html>

- Contractor to develop, implement and enforce a comprehensive health and safety program for all work tasks performed.
- Conduct an initial job site inspection and perform daily hazard assessments before the start of each workday to identify all existing hazards and other potentially dangerous conditions.
- Stay alert to surrounding hazards especially

uphill, where gravity can send hazards toward people.

- Wear high-visibility attire and take a position where they can be easily seen by others.
- Check safety equipment and condition of limbs before working at heights
- Establish a drop zone for falling objects
- Provide adequate training before assigning chain saw or chipper work
- Require the use of PPE, including eye wear, heavy duty gloves, earplugs and hardhat
- Control pedestrian and vehicular traffic effectively, as needed
- Check for weather updates and storm warnings. Extreme weather conditions—such as high winds, fog, rain, high heat, thunder and lightning—can stop work.

To mitigate fire risk, the best time of year to remove trees in Albany is during the winter months. Tree removal work will adhere to the following fire-prevention BMPs from the 2012 Creekside Albany Hill Master Plan.

1. Gas-powered or other equipment that could generate a spark should not be permitted during periods of high fire danger or “Red Flag” conditions. Albany Fire Department may specify extra precautions to allow continued equipment activity. Weed-eaters, chain saws, small mowers or other internal combustion engine powered equipment must be equipped with approved spark arrestors.
2. If mechanical equipment is used to support tree removal, fire suppression equipment must be available at the site and in adequate working order (per State Public Resources Code 4427(b), including a round-pointed shovel and backpack water pump. Each piece of heavy equipment shall have on-board required fire extinguisher and communications equipment to be able to report from scene of ignition

Long-Term Management

Albany Hill is a living landscape that will continue to evolve and transition over time, often reacting to conditions outside human control. Drought, pest and invasive species dynamics, and the anticipated changes to seasonal fog and rainfall intensity may impact Albany Hill in unforeseen ways. Long-term management of Albany Hill will be required to guide the trajectory of the site towards the vision of a fire-safe, native habitat that supports monarch butterfly presence and community recreation.

The City of Albany will utilize an adaptive management approach to evaluate how the project is meeting its goals over time. The advantage of temporally spreading out eucalyptus removals and restoration activities is the ability to observe how the site evolves with new plantings and what native species grow from the seed bank on the hill. Close observation and documentation of plants that emerge on their own will inform future planting strategies and activities.

Long-term Maintenance and Adaptive Management Goals

- Balancing Active and Passive Restoration
- Preventing spread of *E. globulus* onto City property from adjacent parcels
- Controlling invasive weeds between active restoration plant patches
- Assessing and restoring the Monarch Management Area to retain functional monarch habitat on City property
- Assessing the success of the replacement tree species for their effectiveness in providing monarch habitat
- Augmenting native seeds and plants from site sources (existing and project patches)
- Providing ongoing fire risk reduction on City property
- Involving community members and stewardship partners crucial to the success of the project
- Encouraging citizen science and observations
- Ensuring that future management decisions are in-line with project objectives and goals

Active and Passive Restoration

The Implementation Plan provides direction on how best to re-set Albany Hill's trajectory, based on the current understanding of the site and the potential for project funding. The implementation approach can be adapted so that the level of restoration effort aligns with the realized funding. This will be determined by how much active restoration is completed. The cost of the active restoration components is roughly half the total costs of the project, or about \$1.5 million dollars. The advantage of including active restoration efforts was noted earlier in this document and includes a faster and more robust push towards an ecologically rich and resilient landscape on Albany Hill. However, the site could be guided more passively by putting a greater emphasis on protection and stewardship of the existing flora on-site. While implementation money is saved with this approach, the tradeoff is a slower process for achieving the overall site vision. It is important to emphasize that the City can continuously adjust the degree of active restoration over time to match available funds. Funding will be the biggest driver in how Albany Hill is managed in the short and long-term.

Restoration Maintenance

Eucalyptus Re-sprout Prevention

Effective eucalyptus management requires a multi-year strategy. Research recommends that during the mechanical removal of eucalyptus trees, stumps should be cut as close to the ground as possible. In addition, stumps should be covered with thick black polyethylene tarps, secured with staples, and reinforced with chicken wire for added durability (DiTomaso, 2013). This method enhances the success of eucalyptus control without relying on herbicides.

If trees are not tarped, they may require frequent (two to three times a year) removal of sprouts. Based on past City experience on Albany Hill, this approach has been successful at killing the tree after 4 or 5 years (Cunningham, personal communication 2024).

Invasive Weed Control

Several invasive weed species have been observed on Albany Hill that will require control throughout all phases of restoration implementation and long-term management. Invasive species observed include Bermuda buttercup (*Oxalis pes-caprae*), French broom (*Genista monspessulana*), cotoneaster (*Cotoneaster lacteus*, *Cotoneaster pannosus*), fennel (*Foeniculum vulgare*), Italian thistle (*Carduus pycnocephalus* subsp. *pycnocephalus*) and blackwood acacia (*Acacia melanoxylon*), among others. New invasive weeds may establish on Albany Hill in the future. Tree removal contractors will implement invasive weed BMP's to prevent bringing new invasive weeds on site.

Invasive weed species will be removed and controlled in the restoration site to keep the project on track to restoration goals. Invasive weed control will be prioritized around planting areas and native plant stands and in areas where they are interfering with establishment of native vegetation. Control will also target new species that have not been observed on Albany Hill with the goal of preventing them from becoming established. Invasive weed control will utilize mechanical methods including hand pulling, mowing, grubbing, tarping, mulching etc. Herbicide use is not allowed on Albany Hill. Invasive weed control will occur at different times throughout the year to target different species. It is not expected that restoration activities will eradicate all invasive weeds that currently occur onsite.

Mulching

Eucalyptus mulch offers many site benefits. It helps to retain soil moisture, suppress weeds, and improve soil health by releasing essential nutrients as it decomposes. Additionally, eucalyptus mulch can enhance fire safety by reducing the amount of flammable ground material, such as tall dry grasses, and suppressing a robust shrub layer from reestablishing.

Mulch can, however, pose a fire danger. If stored in large piles in hot, dry conditions, mulch can spontaneously combust. Mulch exposed to fire can smolder undetected, only to flare up later (University of Nevada, 2011). The fire risk decreases as the mulch decomposes overtime. To reduce risk, mulch will be installed on Albany Hill in discontinuous patches and will not remain in large piles.

Four-inch depth is a suitable minimum for general application, but mulch can be placed significantly deeper if the site work generates sufficient material. Plant patches and existing native plant zones require a thinner mulch layer of 2 to 3 inches so as not to inhibit growth of desirable native plant species. Other areas could benefit from up to six inches of mulch. Larger chips are suitable for this project because they tend to break down more slowly, proving a long period of coverage and a slow release of nutrients, both of which inhibit weed growth.

For long-term maintenance, new mulch generated from maintenance activities can be used to replenish existing mulch. It is recommended to top up the mulch every 6-12 months to maintain a depth of at least three inches, which will help keep weeds down and retain soil moisture. If the mulch is not replenished, it will still functionally persist for about a year, but its effectiveness in moisture retention and weed suppression will gradually diminish over time.

Annual Grass Control

A canopy of scattered oaks is envisioned for much of the hill, creating shaded fuel breaks (strategically thinned forest areas) that will eventually require less frequent vegetation management than open grasslands.

Even with the transition to shaded fuel breaks over much of the hill, it is anticipated that portions of the hill will require long-term management of annual grass and thick herbaceous vegetation to reduce fuel loads and maintain a more diverse assemblage of native grasses and forbs. Annual grasses can outcompete and shade native plantings.

If well-timed, the removal of annual grasses and thatch can be completed once a year to reduce competition of annual grasses and favor establishment of native perennial species. This precise timing should be evaluated annually to match the changing site conditions.

There are a few strategies for managing weedy vegetation on Albany Hill that the City may consider. These include line trimming, goats, and hand weeding select areas. Line trimming is an effective way to control moderate-sized stands of weedy grasses. If well-timed, the removal of annual grassland thatch can take place once a year and can be synchronized with the flowering and seeding of beneficial plant species and the removal

of other pest species. The timing of this work should be evaluated annually to match the changing on-site conditions. Line trimming is particularly useful in areas that require special protection and is likely the most suitable strategy as long as the scale of the work remains around a few acres or less.

Goats are becoming an increasingly common sight around the Bay Area as land managers have seen the value of these aggressive grazers at efficiently clearing large areas of unwanted vegetation, including invasive species that are difficult to manage with traditional methods. A small industry has emerged to cater to this business, enabling the growth of goats as a management tool. Goats can access the steep or rocky areas of Albany Hill; however, they will require intricate fencing to keep them out of stands of native vegetation and active restoration areas. If properly fenced, goats can manage a larger area of Albany Hill than line trimming. Goat grazing would also require a minimum of five acres, which is greater than the area of City property on the hill. To implement goat grazing, the City would need to develop agreements with adjacent private landowners to allow goats on their property at the same time grazing takes place on City land.

Hand weeding species such as Bermuda buttercup and annual grasses, though labor-intensive, is a precise and effective way to defend specific restoration areas from the encroachment of invasive species. Hand weeding is also an appropriate technique to target specific nuisance species that may persist throughout the hill and are particularly noxious; they should be searched for and removed. This includes species such as French broom. Each species will have specific methods for effective removal. Bermuda buttercup has challenging bulbs that require manual removal to extract, and French broom is best pulled when young or when the soils are loosened after the winter rains. While not as efficient as grazing or line trimming, hand weeding allows for the targeted removal of invasive plants without disturbing the surrounding vegetation. Hand weeding can also be combined with either line trimming or goat grazing to manage Albany Hill effectively.

Monarch Management Area

The priority for this area is to protect the overwintering habitat and use of the monarch butterfly within City property on Albany Hill. Tree removals within this area are to be managed overtime as trees pose hazards or die. The 2021 SBCA Arborist Report

identified a number of hazard trees within the Monarch Management Area that should be evaluated if left in place. The goal is to maintain monarch habitat while encouraging the top of the hill to transition to a more healthy and resilient plant community.

Time is of the essence to transition the Monarch Management Area from reliance on the decaying eucalyptus forest. The challenge will be to foster the growth of new roosting and wind break trees within this area before the eucalyptus stand becomes functionally insufficient as habitat.

The following are management activities prescribed for the Monarch Management Area:

- All work in this area is subject to the monarch BMP's (see the Implementation Plan chapter)
- Monitor the health of the remaining eucalyptus trees quarterly to evaluate hazard trees
- Remove trees identified as hazards per BMP's
- Thin dead wood from trees and from the low and mid-canopy
- Monitor replacement trees and adapt the revegetation approach to continue to plant the species most successful at providing monarch habitat on the top of the hill (see below for additional detail)
- Protect mid-canopy growth for habitat and wind break benefits
 - Along the ridgeline, maintain a horizontally discontinuous patchwork of understory and middle story trees and shrubs to provide some wind shelter while reducing fuel continuity (Weiss, 2022)
 - Allow toyons and live oaks to fill in the gaps in the wind shelter area across the fire road
- Revegetate and steward the Monarch Management Area for nectar/pollinator plants
 - Ensure adequate nectar sources are available in fall and winter
 - Maintain restoration patches keeping the interplay between wind protection and fuel discontinuity in mind
- Maintain grassland habitat outside of patch and shrub locations to keep the fuel loads low and minimize the risk of damage from fire spreading into the monarch zones

Replacement Tree Monitoring and Assessment

The City is looking to replace the degraded and high fire risk eucalyptus stands within the Monarch Management Area with a replacement tree species that will meet the following criteria:

- Non-invasive –will remain within original planting areas and not spread
- Reduced fire risk profile – tree will remain healthy and vigorous with minimal inputs, and does not create leaf and bark litter which resists decomposition
- Structurally compatible with monarch needs – sufficient height and canopy/leaf patterns to provide wind protection while allowing light penetration
- Growth rate occurs at a meaningful rate to provide habitat
- Prioritize native species to reduce risk of unintended consequences and maximize habitat value beyond the use of monarch butterflies

During Phase 1 Restoration – Pilot Phase, field test specimens of four species are to be planted for evaluation as suitable substitutions for *E. globulus* on site. These trial trees will be maintained through the duration of the remaining phases of the Implementation Plan and evaluated by the City as candidates for additional replanting efforts.

The Implementation Plan is the first step in transitioning this Monarch Management Area into a resilient forest. Long-term management will be required to adaptively manage the introduced tree species. It is anticipated that long term management will involve continued active planting of trees and may include species not considered in this plan.

Ongoing Fire Risk Reduction

There are three primary Fire Risk Reduction goals for Albany Hill:

- Reduce chance of ignition
- Reduce potential damage from wildfire to lives, property and the environment
- Improve potential fire control by the Fire Department

The following tasks shall continue as part of the long-term management of fire fuel on Albany Hill (Rice, 2022; City of Albany, 2012) for areas outside the Monarch Management Area. These tasks will assist in meeting the goals listed above and should be part of annual assessment and management activities. In drought years, management activities should take place more frequently and should begin in late spring.

- Continue thinning understory shrubs and remove small dead material (loose bark, downed and hanging branches). Use large dead material to prevent unauthorized trail development.
- Keep accumulated eucalyptus duff to less than two-inch depth
- Remove, chip or masticate all accumulated ground material greater than 3” diameter
- Remove standing hazard or dead eucalyptus trees immediately, even if they are scheduled for removal in a later project phase
- Remove eucalyptus suckers regularly and do not allow eucalyptus seedlings to establish
- Eliminate or reduce migration of shrub species into grassland areas and actively restore grassland patches
- Remove invasive non-native plant species and time treatment to prevent regrowth and seed spread
- Cut back annual grasses and tall weeds to 6” prior to fire season (June-November).
- Create and maintain defensible space within 100 feet of all structures. Collaborate with adjacent landowners to achieve this goal, potentially funded by grants.
- Provide education and community outreach during “Red Flag” high fire danger weather conditions (low humidity, high winds)

Long-Term Stewardship Opportunities

Long-term collaboration between the City of Albany and those in the community who care about the hill is an opportunity to instill stewardship values in future generations, provide work and employment opportunities for community members, and provide for consistent and quality care. Consistent and well-trained maintenance efforts will also protect the significant investment being made with public funds.

Public outreach surveys conducted for this project indicate there is significant interest in helping with weeding, planting, and maintenance work to ensure the success of native habitats. For more skilled work, precedent can be found in the creeks and open space maintenance contract that the City awarded to Urban Tilth in 2021. Important to consider is that the habitats on the hill will evolve rapidly, both after removal and over the long term. Initial efforts will be more intense to help the new plants establish themselves and to keep the invasives at bay – including the *E. globulus* stands remaining on adjacent parcels. Stewardship will require attention and effort by City officials, skilled laborers, and the community to both launch and foster the long-term stability of the healthy habitats and public access amenities this project aims to achieve.

Citizen Science and Observations

The tree removal and restoration activities on Albany Hill will provide excellent opportunities for local residents to monitor and track changes over the course of years and to document the project successes, as well as its less effective solutions. By tracking restoration plant growth, the rate of native plant reestablishment, the number of monarch clusters and the species of insects and birds found during the various phases of the project, residents will be able to be actively involved in restoring the ecological health of Albany Hill. Working in collaboration with City of Albany staff and outside consultants, residents will be able to provide useful data that will help guide the adaptations of the project as it moves from one phase to the next.

Future Management Decisions

The Albany Hill Forest Management and Habitat Restoration Plan may take a decade to complete. During this time, there will be innumerable decisions to make about the management of Albany Hill. This plan is intended as a guide for these decisions. By following the goals laid out in the previous chapters, City staff will have a reference tool to develop a methodology for site management prioritization.

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