Design Templates for Wildfire Mitigation & Landscape Resilience

Vegetation Management Strategies for the Wildland Urban Interface in Coastal Central & Southern California

- Introduction
- Native Oak Shaded Fuel Break
- Post Eucalyptus Native Woodland Restoration
- Riparian Corridor & Drainage Restoration
- Agricultural Buffer Zones
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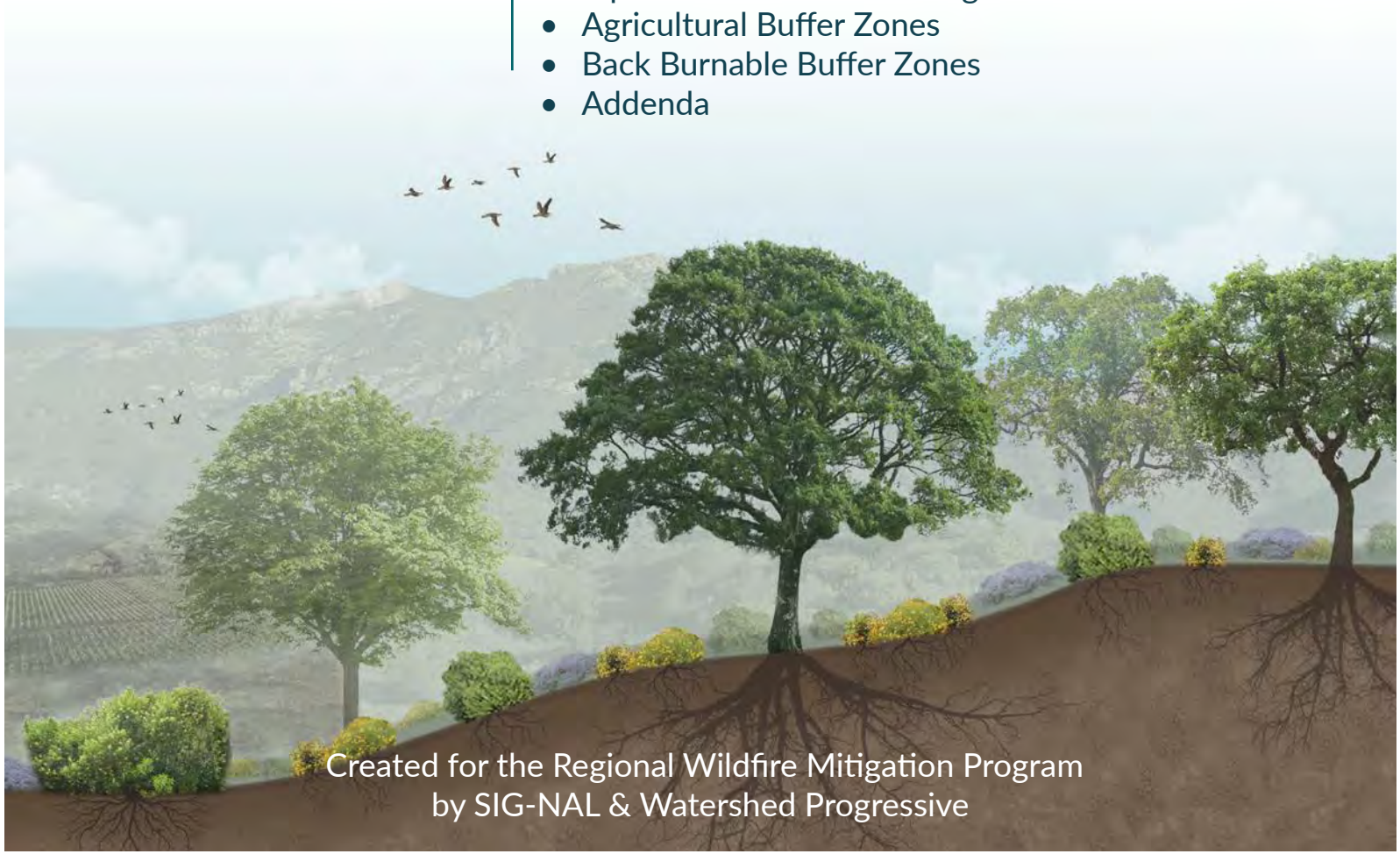

Created for the Regional Wildfire Mitigation Program
by SIG-NAL & Watershed Progressive

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Vegetation Management Strategies for the Wildland Urban Interface in Coastal Central & Southern California

The goal of this manual is to outline landscape management strategies, or design templates, for wildfire hazard mitigation in coastal California. Its target audience is the general public interested in how to take proactive land management steps to reduce physical wildfire hazards and risks. The design templates describe concept plans for native vegetation planting, restoration, and agricultural working lands conservation projects. When carried out in boundary areas between communities and wildland environments, such projects can expand areas of green, hydrated vegetation cover as protective buffers against future wildfires, with additional landscape benefits for native habitat and water conservation.

This manual is the fruit of an 18-month collaboration over 2022-2023 between Spatial Informatics Group-Natural Assets Laboratory (SIG-NAL) scientists, conservationists, and Watershed Progressive landscape architects, designers, and engineers. SIG-NAL led the Santa Barbara Regional Wildfire Mitigation Program (RWMP)'s Landscape Domain between 2021-2024, with funding from the National Fish and Wildlife Foundation (NFWF) Emergency Coastal Resilience Fund, granted through the California Fire Safe Council between 2021-2024. Watershed Progressive was a lead contractor with SIG-NAL to design and implement landscape projects for the RWMP. Watershed Progressive is a consulting and design-build collaborative, focused on connecting communities to their watersheds through integrated strategies for a healthy, resilient future. The design templates draw upon research, ecosystem science and landscaping project expertise across both organizations.

The authorship team hopes this manual will catalyze landscape projects that help communities mitigate wildfire risks.

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For more information about the Regional Wildfire Mitigation Program, visit: https://rwmpsantabarbara.org/

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Wildfire Mitigation

How to **adapt landscapes** to **mitigate wildfire hazards** and **enhance community resilience** to wildfire events

Regional Wildfire Mitigation Plan
The wildfire hazard mitigation strategies in this toolkit have been developed as part of the Santa Barbara Regional Wildfire Mitigation Program (RWMP)'s Landscape Domain.

The RWMP's goals are to decrease the risk of wildfire impacts to communities and infrastructure, promote wildfire resistant green spaces, working lands, and habitats, and develop community capacity to adapt and recover from wildfire-related natural disasters (1).
Within the RWMP, the Landscape Domain promotes land management strategies in the wildland-urban interface (WUI) that mitigate wildfire hazards by cultivating perennially-green, high-moisture native plant communities, hydrated plants in agricultural lands, and disturbance-adapted, thinned native shrub and grassland zones.

Such landscape management strategies include expanding or enhancing shaded fuel breaks with native trees, riparian corridors, landscaped greenbelts, agricultural zones, and back-burnable native vegetation in strategic locations. Across wildfire-prone communities, the strategies above can create improved protective buffers between communities and wildland fires, while also achieving conservation benefits for native ecosystems, water, and working lands.

Working with the RWMP can help you establish a long-term plan for incorporating various wildfire mitigation strategies throughout your landscape that are dependent on the conditions of each site. An integrated approach takes into consideration the uses of the land, goals for wildfire mitigation and habitat restoration, and other possible coordination factors with neighbors and community members.

Practices in the **Built Environment** include infrastructure retrofits, home hardening, improved access and evacuation routes, and regenerative approaches like onsite water re-use and water storage.

Practices in the **Community Domain** include education about wildfire behaviors, risks, and mitigation strategies. Social connections help communities work together to implement resilience practices.

Practices in the **Landscape Domain** include a mosaic of greenbelts including shaded fuel breaks, agricultural buffer zones, invasive plant removal, and native habitat and riparian restoration. Neighbors sharing parcel boundaries can work together to implement and maintain fire resilient buffer zones.

1.2

Wildfire Mitigation

Understanding **wildfire** in the **chaparral biome**

Understanding the Chaparral Biome
California chaparral is a plant community characterized by drought tolerant, woody shrubs and a Mediterranean type climate that includes hot, dry summers and mild, wet winters. It is one of the most biodiverse and threatened habitats in the world (10).

Fire is an important variable in chaparral ecosystems. Chaparral can sustain fire return intervals, or frequencies, that range between 30-200 years with high variability (11) (12). However, due to the rise of people living in the WUI and more human-caused ignitions, fire frequencies have increased in California to a rate that is untenable for chaparral habitat to recover from, thus, damaging critical habitat, and endangering WUI communities (13)(14).

Increased fire frequency impedes shrub recovery and exacerbates the threat of vegetation type conversion from woody shrubs to grasslands (15). Chaparral habitat loss and the spread of non-native annual grasslands has increased the vulnerability of the landscape to wildfire. Annual grasses hold less moisture than most chaparral plants, creating highly ignitable fuels that are difficult to manage (16)(17).

The wildfire mitigation strategies in this toolkit are designed to serve as buffers between sensitive wildland habitat and the built environment. Strategically placed fuel breaks and buffers in the WUI can protect human lives and infrastructure when wildfires occur, and reduce the risk of increased fire frequencies that are detrimental to chaparral ecosystems.

Wildfire Mitigation Strategies in the Landscape
The design templates included in this document are created for use in Southern and Central CA coastal chaparral communities at the Wildland-Urban Interface.

The vegetation management strategies covered include Native Oak Shaded Fuel Breaks, Post-Eucalyptus Native Woodland Restoration, Riparian Corridor and Drainage Restoration, Agricultural Buffer Zones and Backburnable Buffer Zones. These strategies are meant to work as parts of an integrated approach to wildfire resilience.

Native vegetation community protection and restoration, invasive plant removal, landscape rehydration, and fuel load reductions are all landscape management strategies that create safer spaces from which firefighters can defend WUI communities in wildfire incidents. When combined across landscapes, these landscape management strategies increase community and landscape resiliency to wildfire.
These templates consider approaches at the landscape scale, and therefore assume a long-term commitment to the removal of invasive plant species, and the preservation, maintenance and restoration of chaparral habitat.

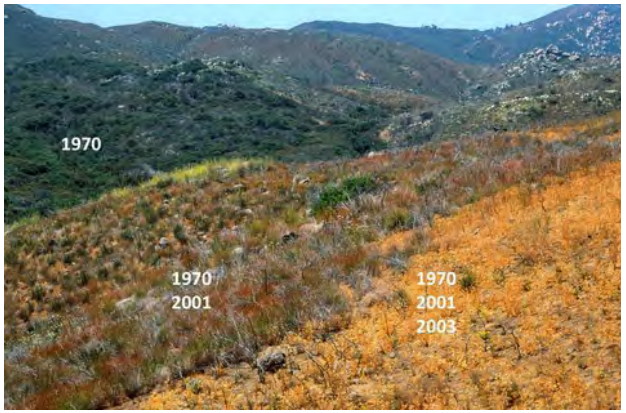

PHOTO (via californiachaparral.org) show vegetation type conversion to grassland in chaparral habitat since the 1970's.

Plant Palettes for Wildfire Mitigation Strategies
The plant palettes in the following design templates include native and some non-native, climate-appropriate plants that work best for their respective tools. All plants in this toolkit are considered *fire resistant*: plants that can "retain moisture even during dry periods, and don't ignite easily" (18).

Plants selected and listed are most fire resistant when used according to the spacing and implementation guidelines suggested. Plants that are fire resistant but require regular maintenance are marked.

Chaparral plant communities provide habitat for hundreds of rare and endangered species, and effective pollination of chaparral plants is dependent on the health of surrounding chaparral and native vegetation.

1.3

Wildfire Mitigation

Drawbacks of **single benefit approaches** for wildfire preparedness in the **landscape domain**

Traditional single-benefit approaches for wildfire mitigation focus narrowly on actions to reduce wildfire hazards. These approaches cannot address larger community hazards, risks, and vulnerabilities when they don't consider social, environmental, and ecological impacts. Traditional strategies generally focus on fuel reduction and fuel removal from the landscape and the use of non-flammable construction materials in the built environment. While effective in mitigating immediate wildfire hazards, implemented alone, these strategies can have unintended, negative consequences such as increasing landscape heat retention, habitat loss, and the spread of invasive species.

A holistic approach focused on nature-based solutions for wildfire hazard mitigation is needed to address the complex socio-ecological problems facing WUI communities in wildfire prone areas. Multiple-benefit design practices look holistically at opportunities on-site to mitigate wildfire risk while also improving soil health and water retention, providing shade, creating habitat for pollinators and birds, and working with wildfire to protect and restore native fire-adapted habitats. This multiple benefit approach is needed both at the individual parcel-level and community-wide scale.

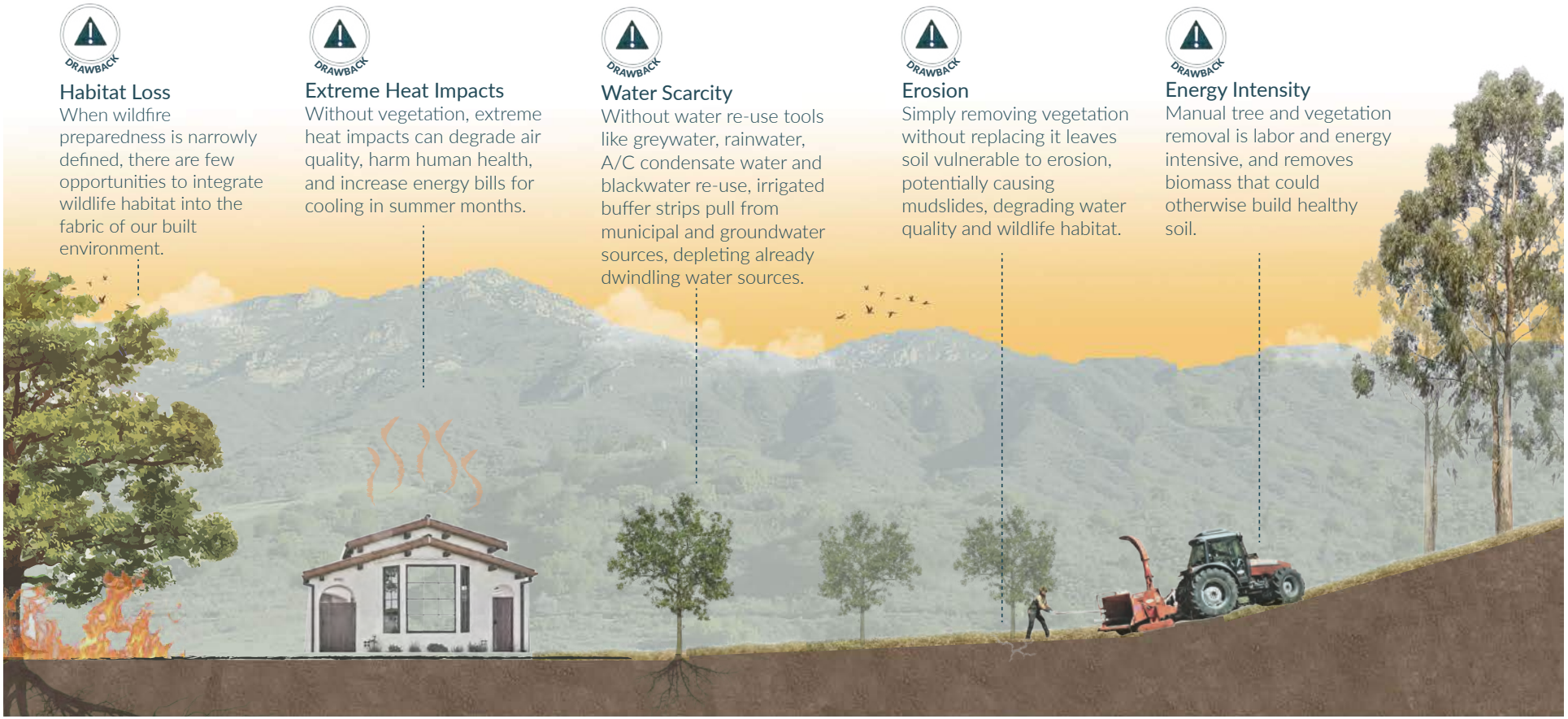

ILLUSTRATION: Drawbacks of Single-Benefit Design Approaches
Wildfire mitigation strategies that focus on single benefits exacerbate conditions that contribute to wildfire spread and intensity.

1.4

Wildfire Mitigation

Creating **defensible space** in the **landscape domain**

Greenbelts such as agricultural lands, shaded fuel breaks and other open spaces in the WUI can play a significant role in reducing wildfire hazards and damages to homes and communities by serving as strategic locations that help slow and decrease wildfire intensity. While these spaces in the WUI do burn, they serve as natural fuel breaks where wildfire intensity and speed are decreased by reduced fuel loads and increased soil moisture (19). We can increase resilience to wildfire through land management and land-use planning by creating buffers throughout the landscape that separate structures and wildlands, and by preserving the open space and agricultural buffers that already exist.

Native Oak Shaded Fuel Breaks reduce combustible fuel loads at parcel boundaries and provide additional shade that cools the landscape.
Riparian Corridor and Drainage Restoration Zones capture and infiltrate stormwater, hydrating landscapes and recharging groundwater supplies.
Agricultural Buffer Zones with fire-resistant crops build healthy soils and buffer nearby communities from elevated wildfire intensity.
Back Burnable Buffer Zones can be used by firefighters as a safe space to counter approaching wildfires.

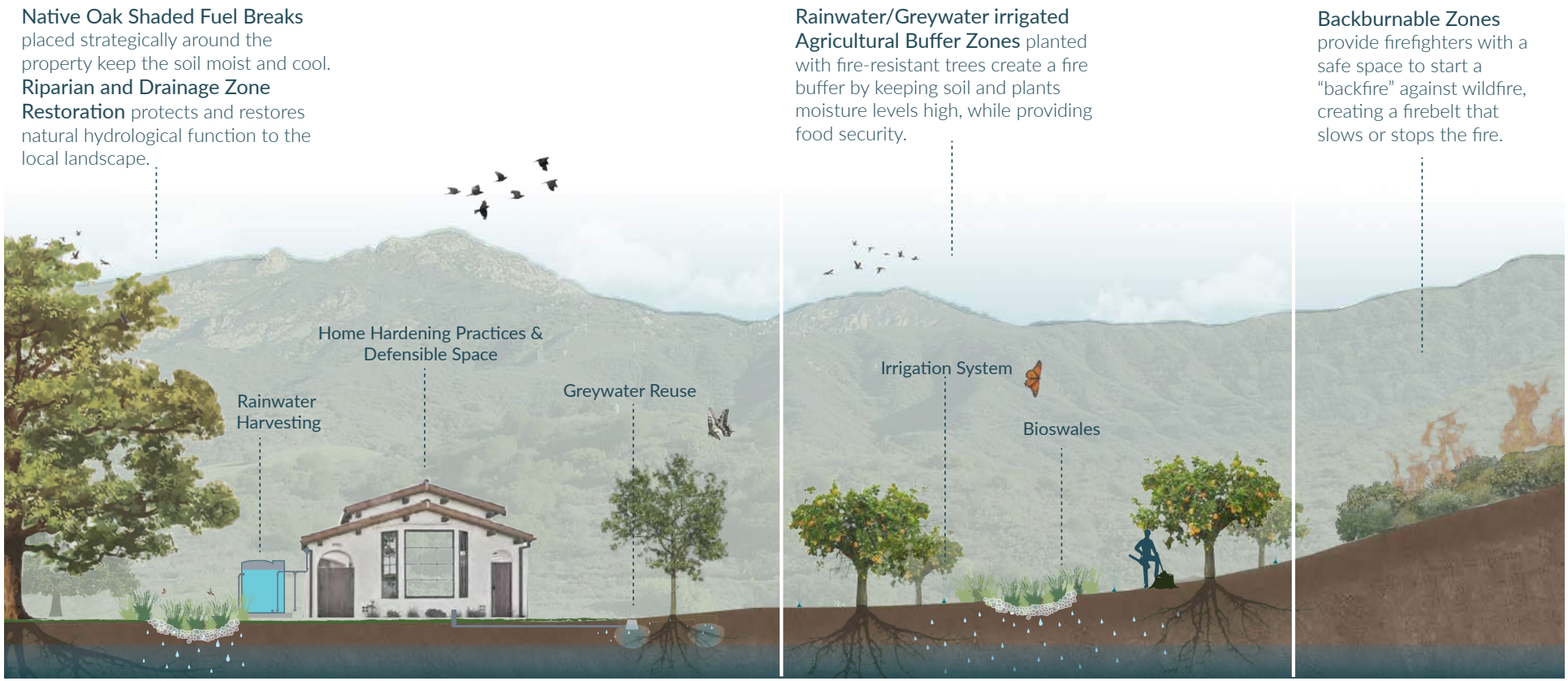

ILLUSTRATION: Multiple Benefits of Integrated, Holistic Wildfire Mitigation Strategies
Wildfire mitigation strategies that incorporate an integrated approach enhance climate resilience in landscapes and communities.

1.5

Wildfire Mitigation

Multiple benefits of integrated vegetation management strategies, and glossary of terms

Multiple Benefits

Shaded fuel breaks and buffer zones keep soils cool and moist, and when properly maintained help slow or stop approaching wildfires.

The restoration and maintenance of chaparral and coastal scrub habitat for wildfire resilience protects essential habitat for wildlife, increasing biodiversity.

Native plants, mulching and irrigating with gently reused or harvested water increase soil moisture and provide nutrients that increase soil health.

Many plants native to chaparral habitat attract pollinators like bees, and other insects and small animals that help sustain plant and ecosystem health.

Planted bioswales and restored riparian corridors and drainage zones capture and infiltrate stormwater, recharging precious groundwater supplies and rehydrating the landscape.

Fire-resistant fruit orchards provide food security, and production may help offset landscape maintenance costs.

Bioswale - A vegetated channel that collects, conveys, filters and infiltrates stormwater.

Climate Appropriate Plantings - Native and drought tolerant plant species which need low or no additional irrigation to survive.

Defensible Space - Buffers created between infrastructure on property and surrounding wildlands.

Fuel Break - A block of land in which flammable vegetation has been reduced or modified so that approaching fires can be readily and safely controlled.

Fuel Load - The amount of combustible material within a defined space.

Greywater Reuse - Gently used water from bathroom sinks, showers, and washing machines that can be used to irrigate plants.

Fire Home Hardening - Measures taken to reduce the vulnerability of homes and infrastructure to fire storms.

Rain Garden - A depressed area planted with native plants that captures, holds, and infiltrates stormwater.

Rainwater Harvesting - The collection and storage of rainwater for domestic use, irrigation, agriculture, and environmental management.

Targeted Grazing - Also known as Prescribed Herbivory, a wildfire management strategy that involves using livestock to graze on vegetation in targeted areas to reduce fuel loads.

Wildland Urban Interface (WUI) - An area where undeveloped forests, woodlands, and shrublands meet the built environment.

Wildfire Mitigation

Additional Resources

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2A Native Oak Shaded Fuel Break

How **shaded fuel breaks** mitigate **wildfire hazards** by **reducing fuel loads**

What is a Shaded Fuel Break?
A fuel break is defined by the Southern CA National Land Management Plan as "a wide strip or block of land on which native or pre-existing vegetation has been permanently modified so that fires burning into it can be more readily extinguished."

Native oak shaded fuel breaks differ from traditional clear cut fuel breaks by preserving and maintaining tree canopy and native chaparral habitat, while helping to slow and reduce the intensity of approaching wildfires.

Shaded fuel breaks are planted with fire-resistant plants which, once established, are drought tolerant. Many of these plant species can regrow after fire.

Shaded fuel breaks create cooler temperatures. Shade contributes to cooler soils and provides habitat for native plant and animal species. Shaded fuel breaks require less maintenance than traditional fuel breaks, although close care is required during the initial 5-10 years after planting new oaks.

Implementing Shaded Fuel Breaks
Shaded fuel breaks should be placed strategically along access roads, parcel boundaries, and ridge tops to help protect infrastructure and crop fields.

Proper spacing between trees, shrubs and groundcover eliminates ladder fuels and should be maintained.

Implementing and maintaining a shaded fuel break consists of removing or pruning trees, shrubs, brush, and other vegetative growth in the area according to specific spacing guidelines outlined in the following pages.

ADDITIONAL CONSIDERATIONS

Prescribed herbivory or targeted grazing is a wildfire management strategy that involves using livestock to graze on vegetation in targeted areas to reduce fuel loads (1). This strategy can be considered as a site preparation step for targeted fuel reduction.

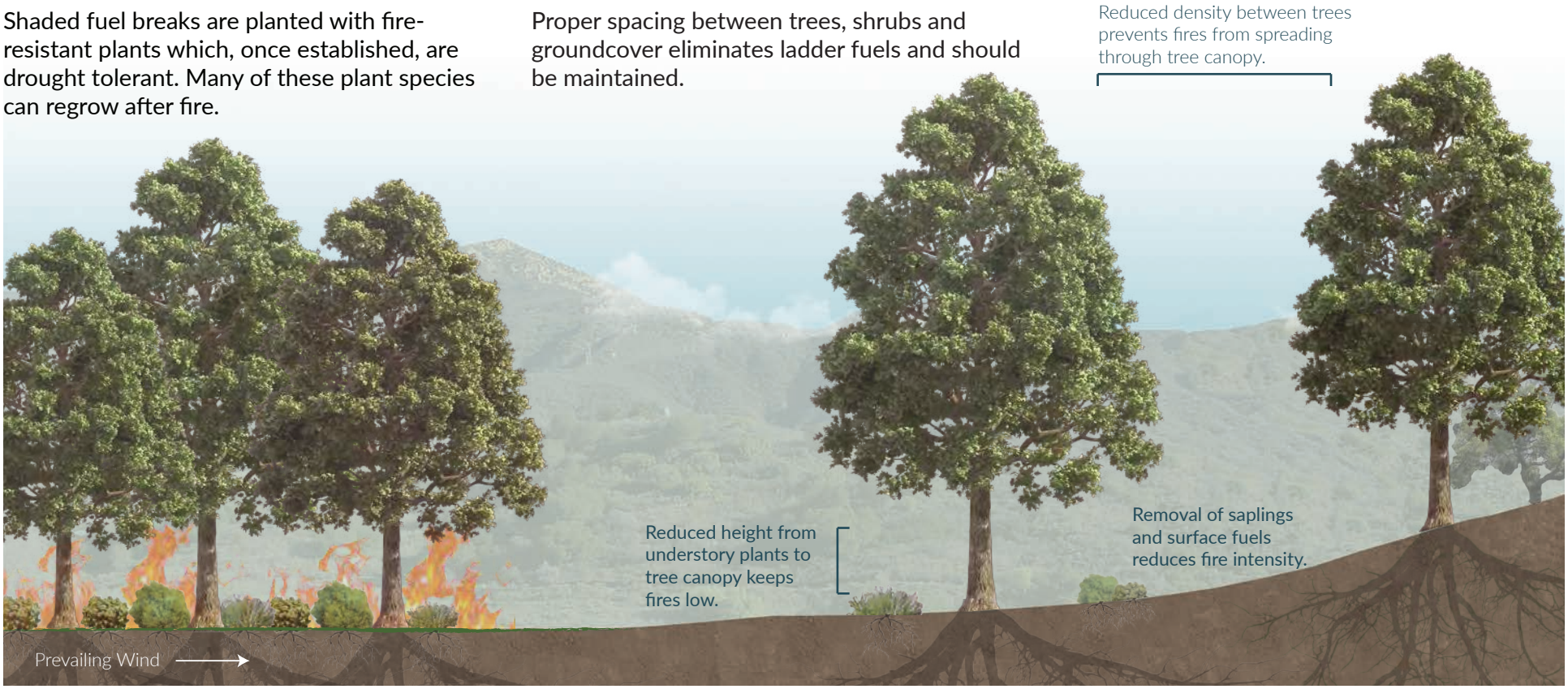


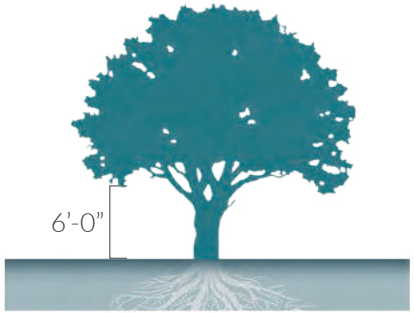
ILLUSTRATION: Native Oak Shaded Fuel Break (right) vs. Non-Managed Oak Woodland (left)
Shaded Fuel Breaks reduce density between trees and shrubs, helping to eliminate surface fuels while maintaining tree canopy that provides shade and cools the ground.

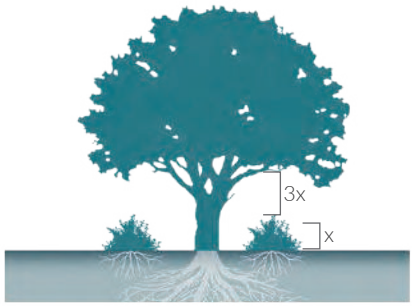
2.1A Native Oak Shaded Fuel Break

How to **space trees** and **shrubs** to create **defensible space** throughout the landscape

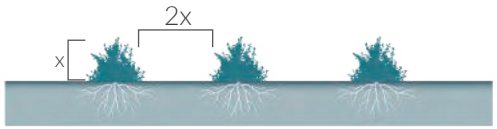
Maintenance of shaded fuel breaks is essential to their effectiveness in mitigating wildfire hazards, and for providing firefighters a safe space to suppress approaching wildfire. Maintenance includes invasive weed monitoring, and regular pruning of shrubs and branches to minimize combustible fuels.

- ✓ DO maintain a minimum width of 200 feet. In sites with steep slopes, consider increasing the fuel break to 600 feet or more.
- ✓ DO thin out thick shrubs and trees to create separation between them.
- ✓ DO remove or trim low shrubs and plants (understory fuels) that are over 1 foot in height.
- ✗ DO NOT remove or treat threatened and endangered plant and animal species, such as elderberry and other sensitive species.
- ✗ DO NOT compile brush or combustible materials in or around the fuel break.

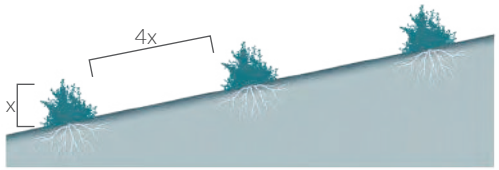




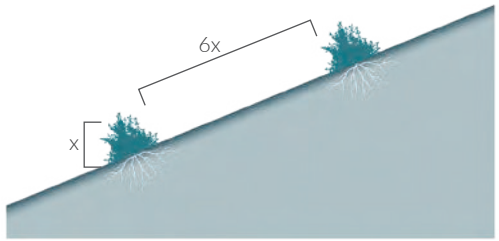
3x Height of Shrub = Minimum Vertical Clearance



Flat to Mid Slope (0%-20%)

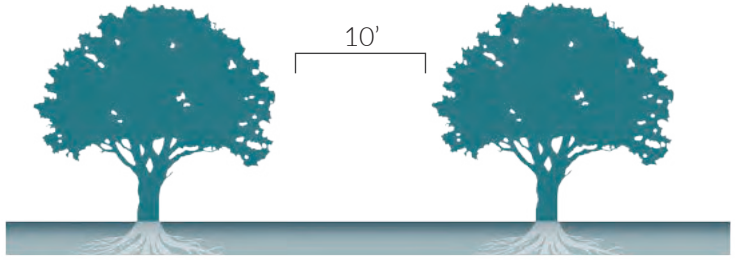


Mid to Moderate Slope (20%-40%)

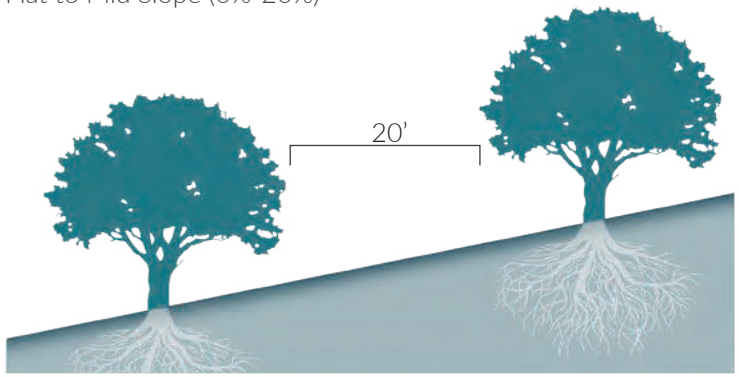


Moderate to Steep Slope (40% or Greater)

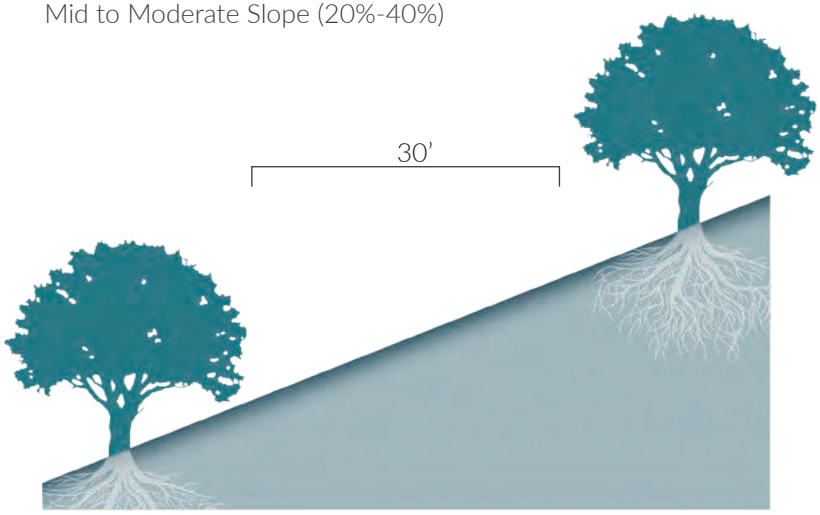
DIAGRAMS: Vertical (left) and Horizontal (right) Spacing Guidelines for Trees and Shrubs in Native Oak Shaded Fuel Breaks on Flat, Moderate, and Steep Slopes



Flat to Mid Slope (0%-20%)



Mid to Moderate Slope (20%-40%)



Moderate to Steep Slope (40% to Greater)

ADDITIONAL CONSIDERATIONS

Refer to CALFIRE for more information about Defensible Space Zones and spacing guidelines, and other ways to protect your homes from fire (2).
www.fire.ca.gov

2B

Native Oak Shaded Fuel Break

Prototypical plans, sections and details for implementation

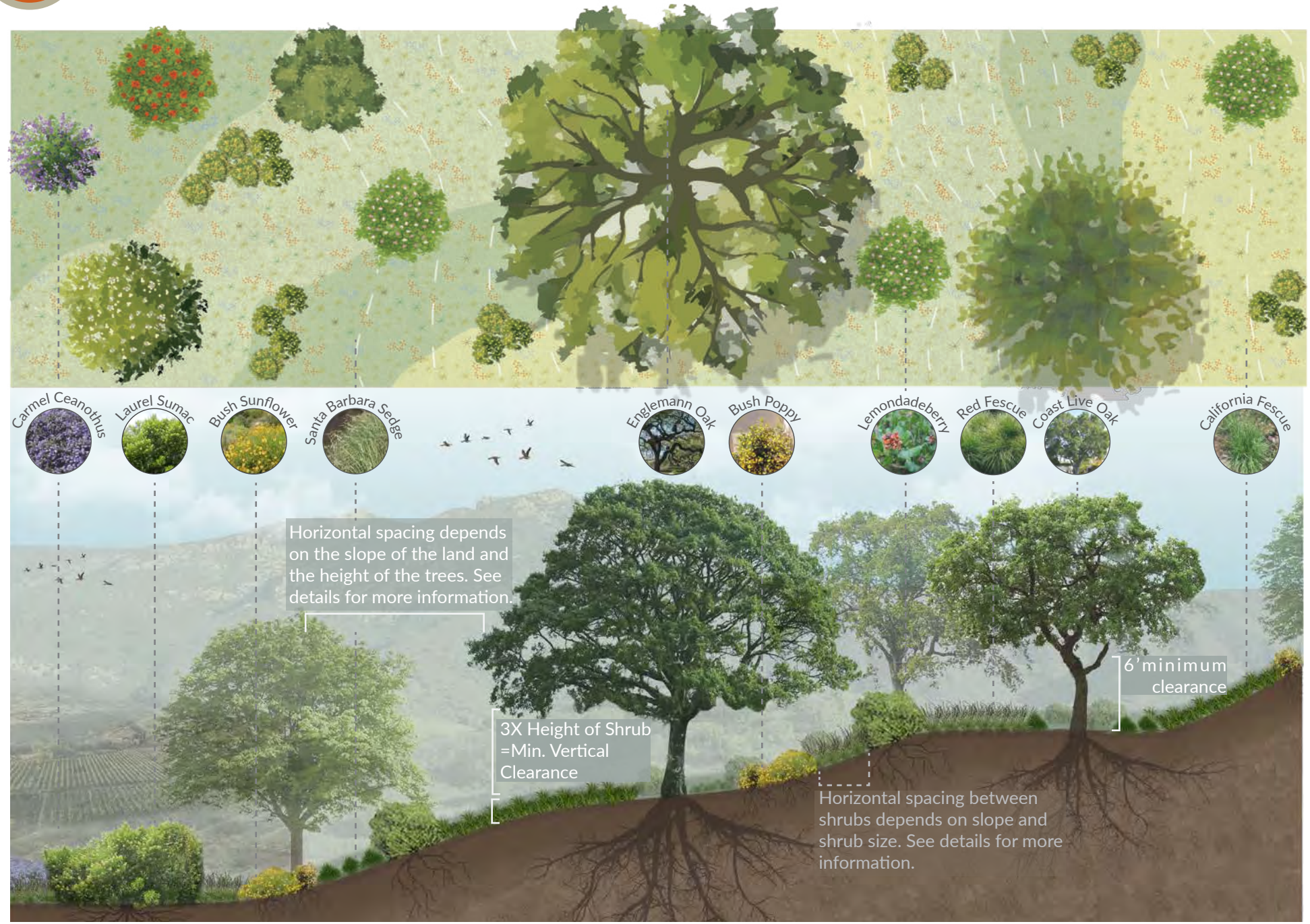


ILLUSTRATION with CORRESPONDING PLANTING PLAN: Native Oak Shaded Fuel Breaks, with Grasses
Vertical and horizontal spacing considerations for planting and maintaining oaks and appropriate shrubs help create shade while reducing fuel loads on steep slopes.

2.1B Native Oak Shaded Fuel Break

Prototypical plans, sections and details for implementation

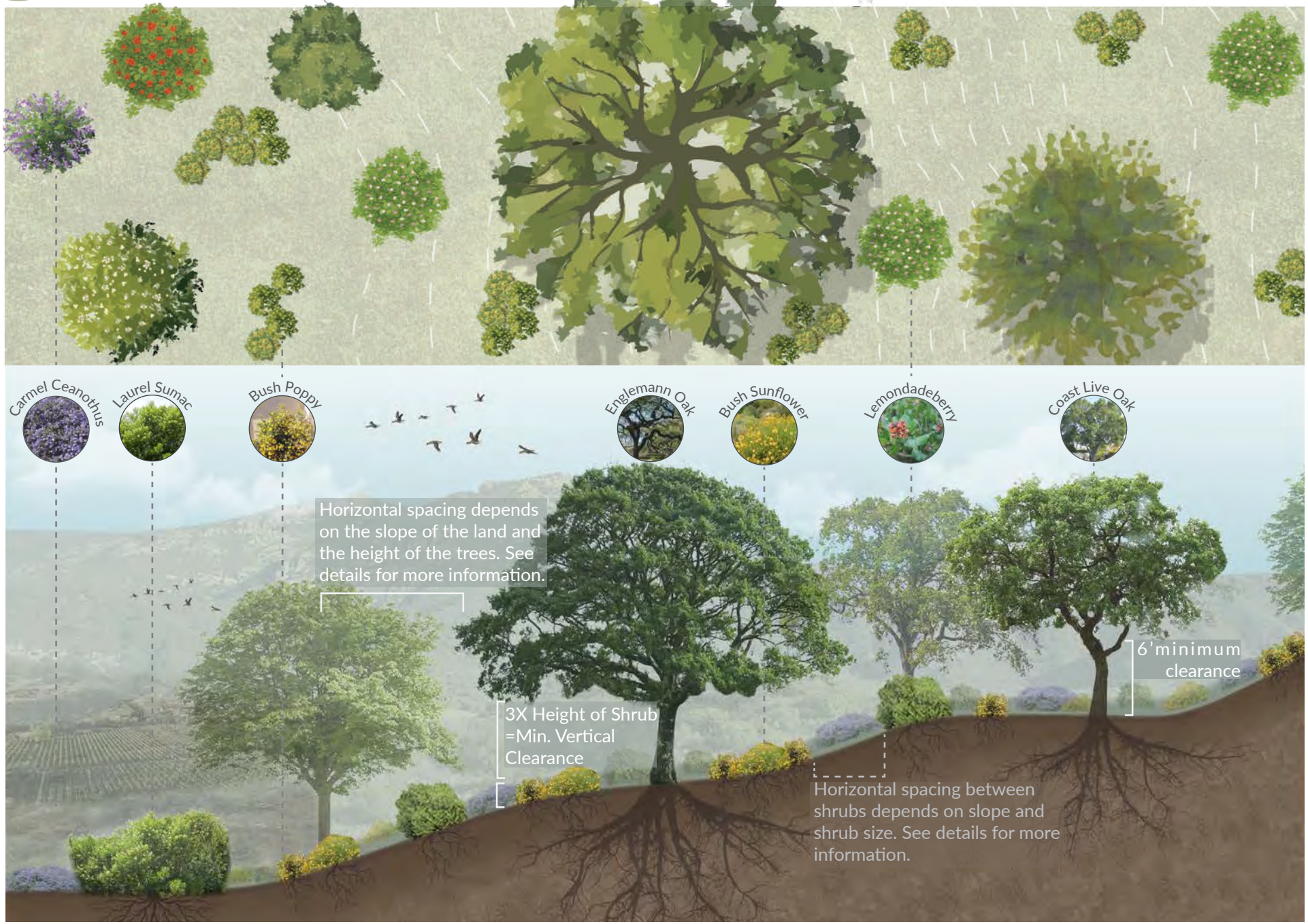


ILLUSTRATION with CORRESPONDING PLANTING PLAN: Native Oak Shaded Fuel Breaks, without Grasses
Vertical and horizontal spacing considerations for planting and maintaining oaks and appropriate shrubs help create shade while reducing fuel loads on steep slopes.

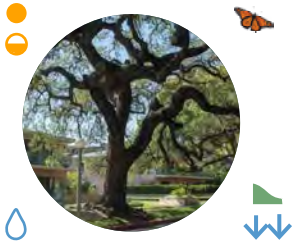
2C

Native Oak Shaded Fuel Break

Plant Palette for South, East and West facing (sunny) slopes

TREES

Quercus agrifolia
Coast Live Oak



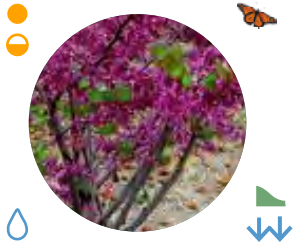
Quercus engelmanii
Engelmann Oak

Quercus tomentella
Island Oak

SHRUBS

Frangula california
California Coffeeberry

Arctostaphylos refugioensis
Refugio Manzanita



Cercis occidentalis
Western Redbud

SHRUBS

Heteromeles arbitufolia
Toyon

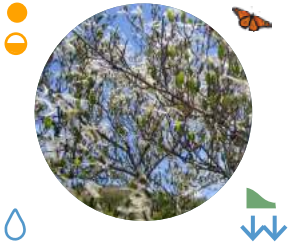
Rhus integrifolia
Lemonade Berry

Malosma laurina
Laurel Sumac

SHRUBS

Sambucus mexicana
Blue Elderberry

Dendromecon rigida
Bush Poppy



Cercocarpus betoluides
Mountain Mahogany

GRASSES

Carex barbarae
Santa Barbara Sedge

Festuca rubra
Red Fescue

SOIL DRAINAGE

- *slow*
- *adaptable*
- *fast*

SUN/SHADE

- *full sun*
- *partial sun / shade*
- *full shade*

WATER USAGE

- *low*
- *moderate*
- *high*

OTHER CONSIDERATIONS

- *erosion control*
- *pollinator*
- *fire resistant with maintenance*

2.1C

Native Oak Shaded Fuel Break

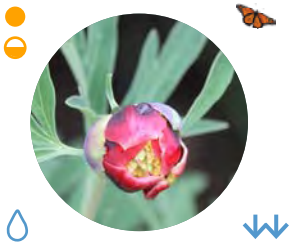
Plant Palette for North facing (shaded) slopes

TREES

Quercus agrifolia
Coast Live Oak

Quercus douglassi
Blue Oak

SHRUBS



Paeonia californica
California Peony

Venegasia carpesioides
Canyon Sunflower

Cercocarpus betuloides
Mountain Mahogany

SHRUBS

Heteromeles arbitufolia
Toyon

Woodwardia fimbriata
Giant Chain Fern

Quercus berberidifolia
Scrub Oak

SHRUBS

Sambucus mexicana
Blue Elderberry

Polypodium californicum
California Polypody

Achillea millefolium
Common Yarrow

GRASSES

Melica imperfecta
Small Flowered Melica

Stipa cernua
Nodding Needle Grass

SOIL DRAINAGE

- slow
- adaptable
- fast

SUN/SHADE

- full sun
- partial sun / shade
- full shade

WATER USAGE

- low
- moderate
- high

OTHER CONSIDERATIONS

- erosion control
- pollinator
- fire resistant with maintenance

2D Native Oak Shaded Fuel Break

Construction Details and Additional Resources

Mulching for Shaded Fuel Breaks
Mulching is the use of organic and inorganic material to cover soil surfaces throughout landscapes. Mulching conserves soil moisture, enhances soil quality, regulates soil temperatures for plant roots, and suppresses the growth of invasive weeds that may be flammable and threaten native habitat.

However, mulching can also increase combustible surface fuel cover. Where implemented, it needs to be done with careful consideration of hydrological benefits versus flammability tradeoffs (3). Assessing each site's needs will help you determine best practices for mulching in landscapes within the Wildland-Urban Interface.

In general, composted wood chips (around 3 inches in size*) have lower burn characteristics than other mulches, and can aid in smoldering fires. You should avoid fibrous mulches, which tend to spread fire.

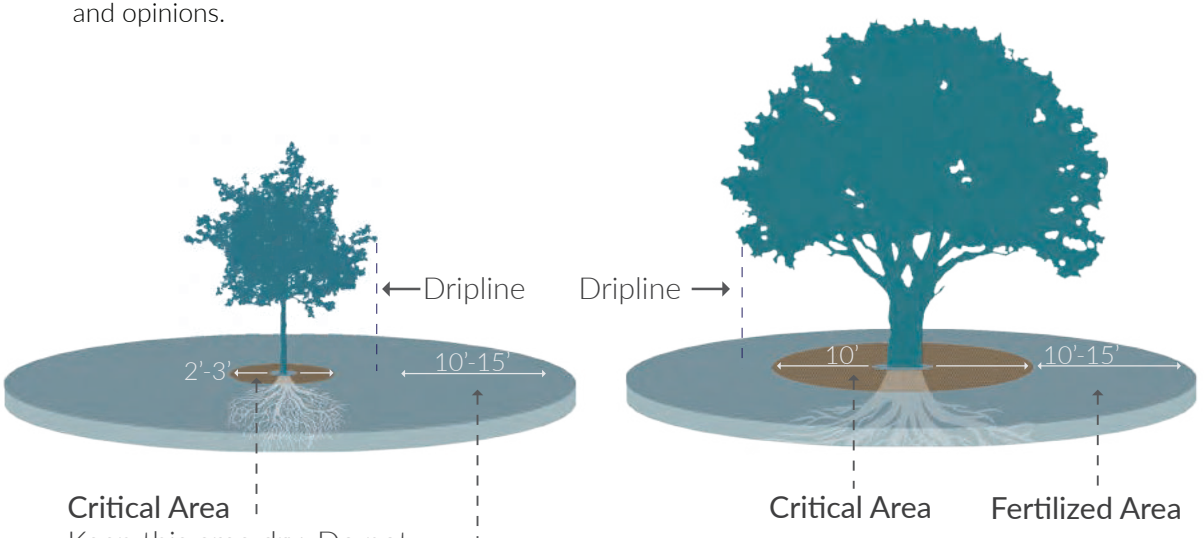
Mulching for Native Oaks
The best mulch for oaks is a thick layer of oak leaves. As oak trees are established, they amend the soil, improving the health of surrounding plants. If oak leaves are not available, wood chips can be used (4).

For newly planted seedlings, mulching around the base helps protect the plant from competing vegetation and weeds. Deep irrigation (2 gallons per seedling) several times during late spring and early summer can help protect seedlings from drought. Newly planted oaks in shaded fuel breaks should be closely monitored for the first 5-10 years after planting to make sure the plant is protected from invasive weeds.

- ✓ DO Mulch the soil beneath oak trees with 2"-4" of organic material.
- ✗ DO NOT Use gorilla hair, monotone fibrous mulches, shredded rubber, pine needles or shredded cedar bark. These are all highly combustible (4).

ADDITIONAL CONSIDERATIONS
*There are outstanding questions around mulching to reduce flammability risk. Consult your local fire district for guidance and opinions.

- ✗ DO NOT Place mulch directly against tree trunks.
- ✗ DO NOT Use synthetic materials such as rubber pellets, landscape fabric, or anything containing plastic
- ✗ DO NOT Put the oak mulch of one oak tree on another without verifying that the source oak is healthy and free of fungus.

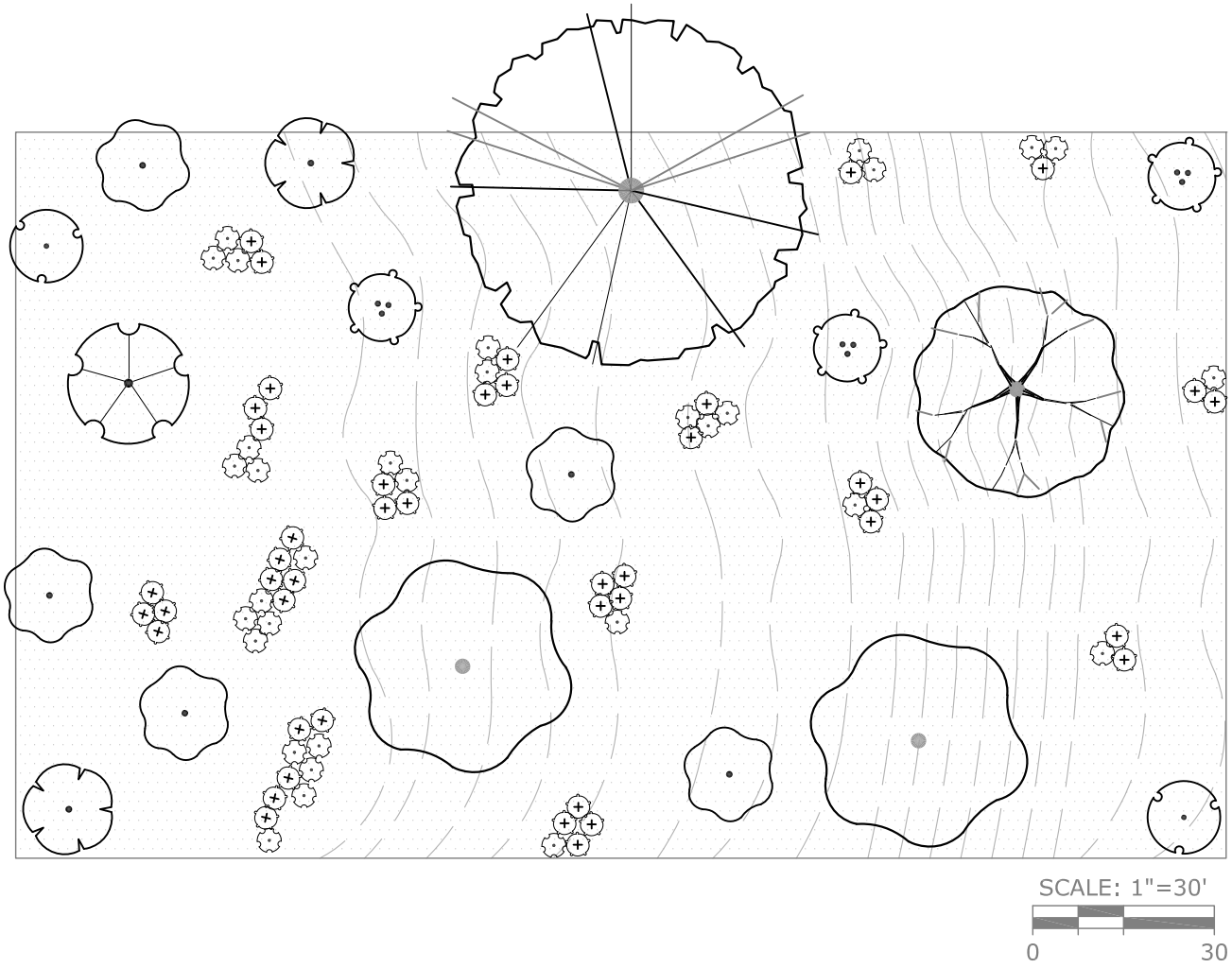


Generally, healthy oaks do not need fertilization, and it is not a good idea to fertilize over-stressed and weakened trees. Fertilization can help maintain oak health if done once a year. Fertilizers created specifically for use with oak trees can promote overall tree health by providing nutrients that encourage root development and disease resistance. (5).

DIAGRAM: Basic Mulching Guidelines for Newly Planted Seedlings and Existing Mature Oaks

2.1D Native Oak Shaded Fuel Break

Construction Details and Additional Resources



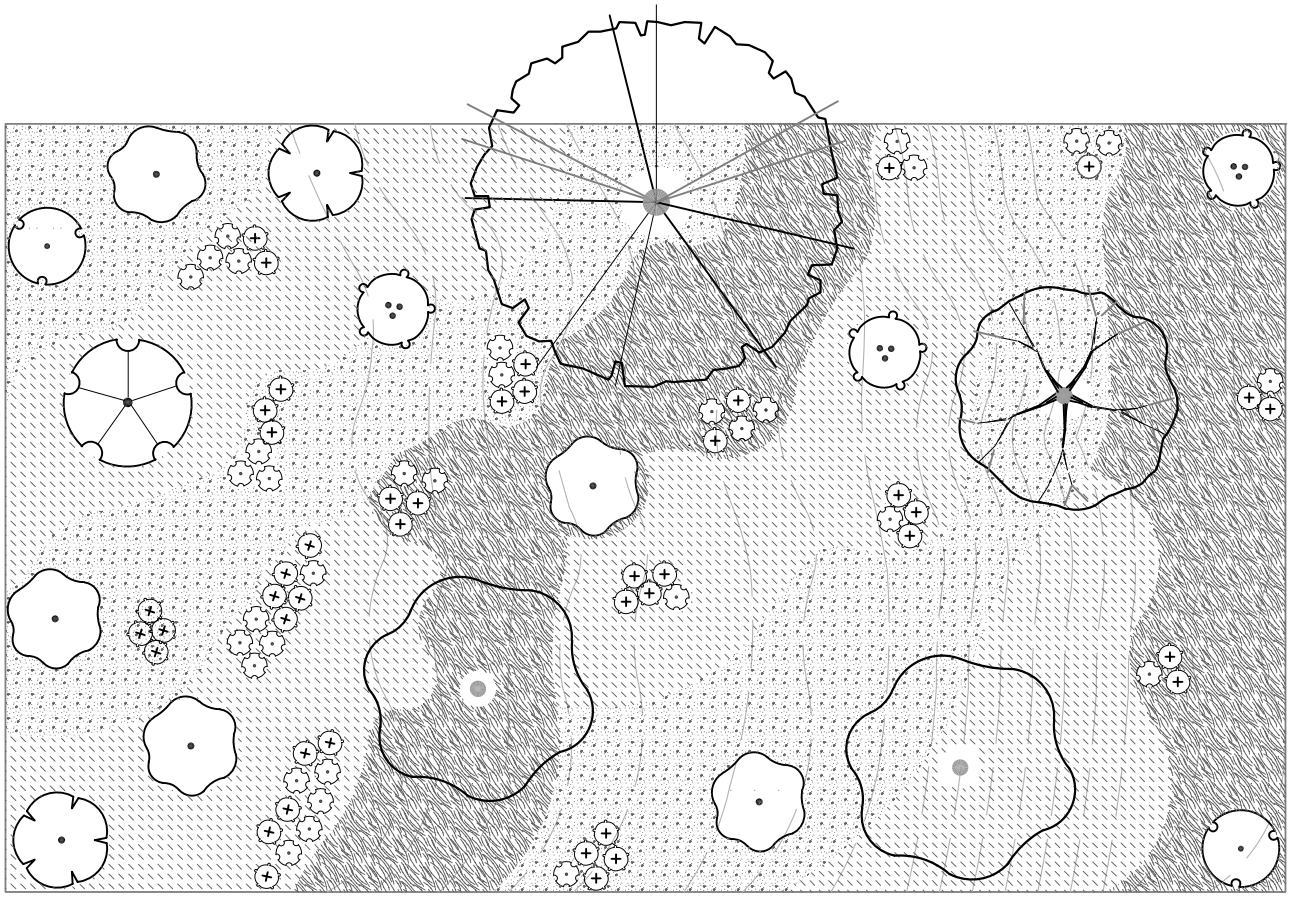
PLANT SCHEDULE

TREES	COMMON / BOTANICAL NAME
	Coast Live Oak Quercus agrifolia
	Engelmann Oak Quercus engelmannii
	Island Oak Quercus tomentella
SHRUBS	**COMMON / BOTANICAL NAME**
	Carmel Ceanothus Ceanothus griseus
	Bush Poppy Dendromecon rigida
	California Encelia Encelia californica
	Toyon Heteromeles arbutifolia
	Laurel Sumac Malosma laurina
	California Scrub Oak Quercus berberidifolia
	Lemonade Berry Rhus integrifolia

1 NATIVE OAK SHADED FUEL BREAK PLANTING PLAN WITHOUT GRASSES

2.2D Native Oak Shaded Fuel Break

Construction Details and Additional Resources



PLANT SCHEDULE

TREES	COMMON / BOTANICAL NAME
	Coast Live Oak Quercus agrifolia
	Engelmann Oak Quercus engelmannii
	Island Oak Quercus tomentella

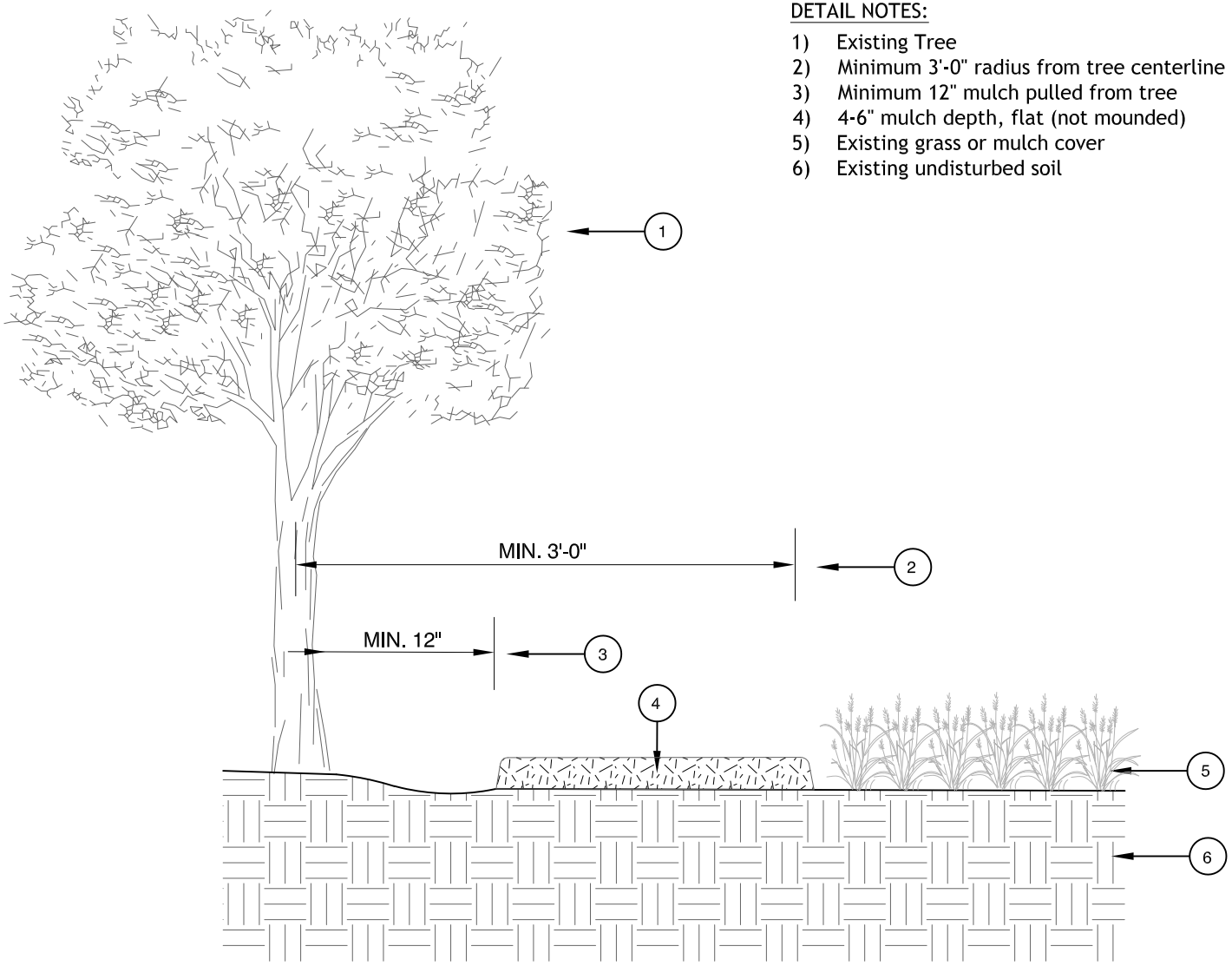
SHRUBS	COMMON / BOTANICAL NAME
	Carmel Ceanothus Ceanothus griseus
	Bush Poppy Dendromecon rigida
	California Encelia Encelia californica
	Toyon Heteromeles arbutifolia
	Laurel Sumac Malosma laurina
	California Scrub Oak Quercus berberidifolia
	Lemonade Berry Rhus integrifolia

GROUND COVERS	COMMON / BOTANICAL NAME
	Santa Barbara Sedge Carex barbarae
	California Fescue Festuca californica
	Red Fescue Festuca rubra

2 NATIVE OAK SHADED FUEL BREAK PLANTING PLAN WITH GRASSES

2.3D Native Oak Shaded Fuel Break

Construction Details and Additional Resources



DETAIL NOTES:

1) Existing Tree
2) Minimum 3'-0" radius from tree centerline
3) Minimum 12" mulch pulled from tree
4) 4-6" mulch depth, flat (not mounded)
5) Existing grass or mulch cover
6) Existing undisturbed soil

3 TREE MULCHING

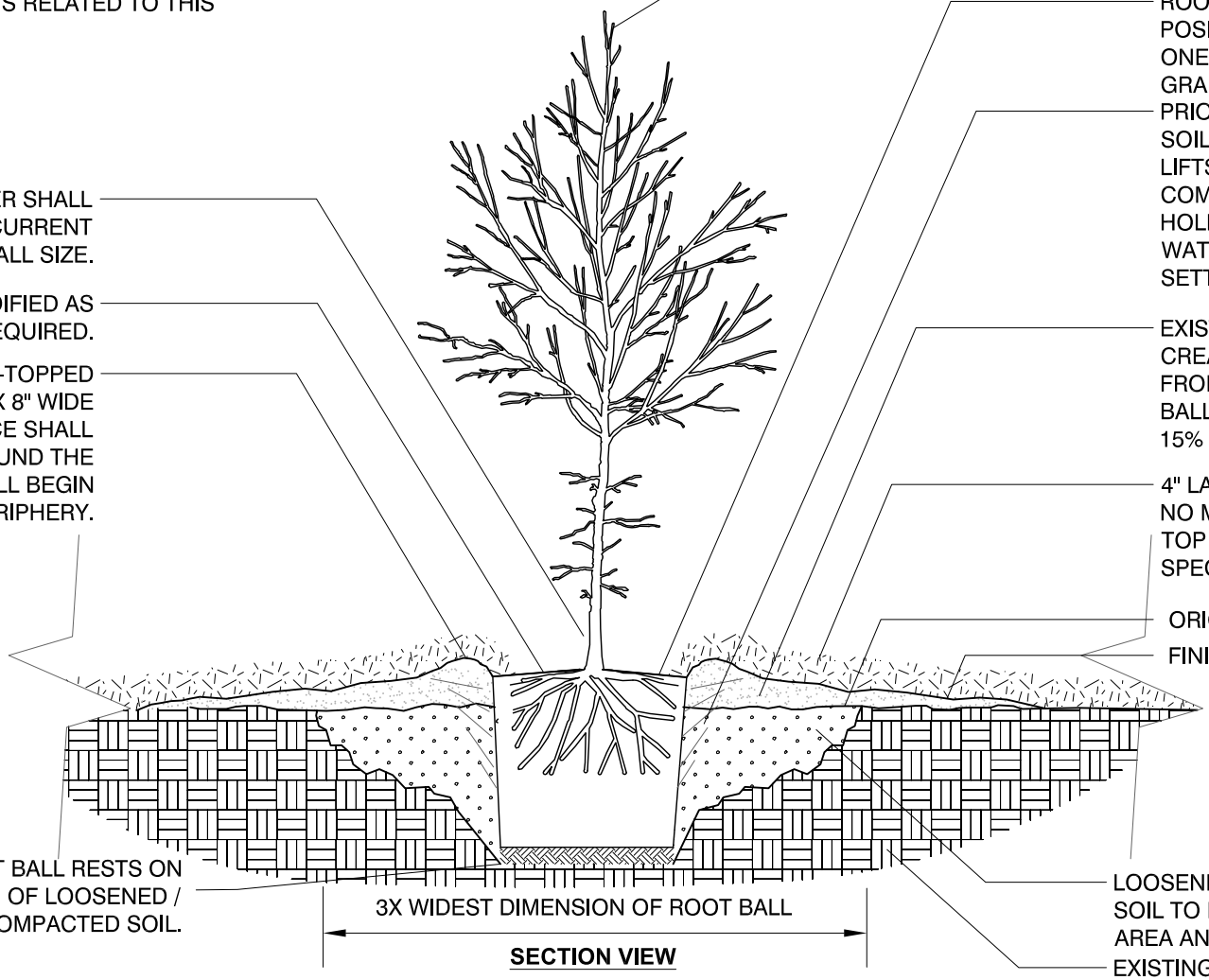
(N.T.S)

2.4D Native Oak Shaded Fuel Break

Construction Details and Additional Resources

NOTES:
1- TREES SHALL BE OF QUALITY PRESCRIBED IN CROWN OBSERVATIONS AND ROOT OBSERVATIONS DETAILS AND SPECIFICATIONS.

2- SEE SPECIFICATIONS FOR FURTHER REQUIREMENTS RELATED TO THIS DETAIL.



SECTION VIEW

4 TREE PLANTING

1/2" = 1'-0"

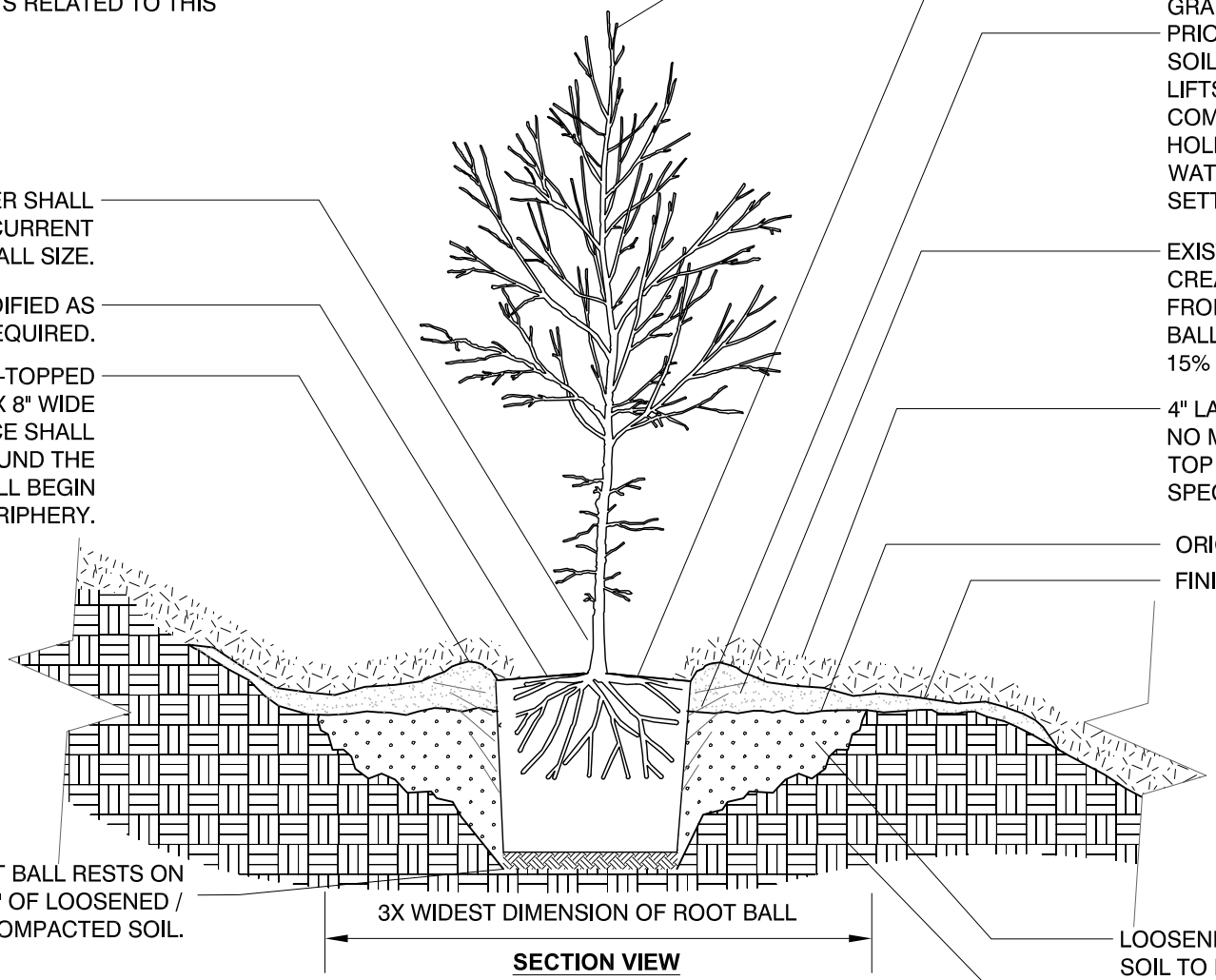
2.5D

Native Oak Shaded Fuel Break

Construction Details and Additional Resources

NOTES:
1- TREES SHALL BE OF QUALITY PRESCRIBED IN CROWN OBSERVATIONS AND ROOT OBSERVATIONS DETAILS AND SPECIFICATIONS.

2- SEE SPECIFICATIONS FOR FURTHER REQUIREMENTS RELATED TO THIS DETAIL.



SECTION VIEW

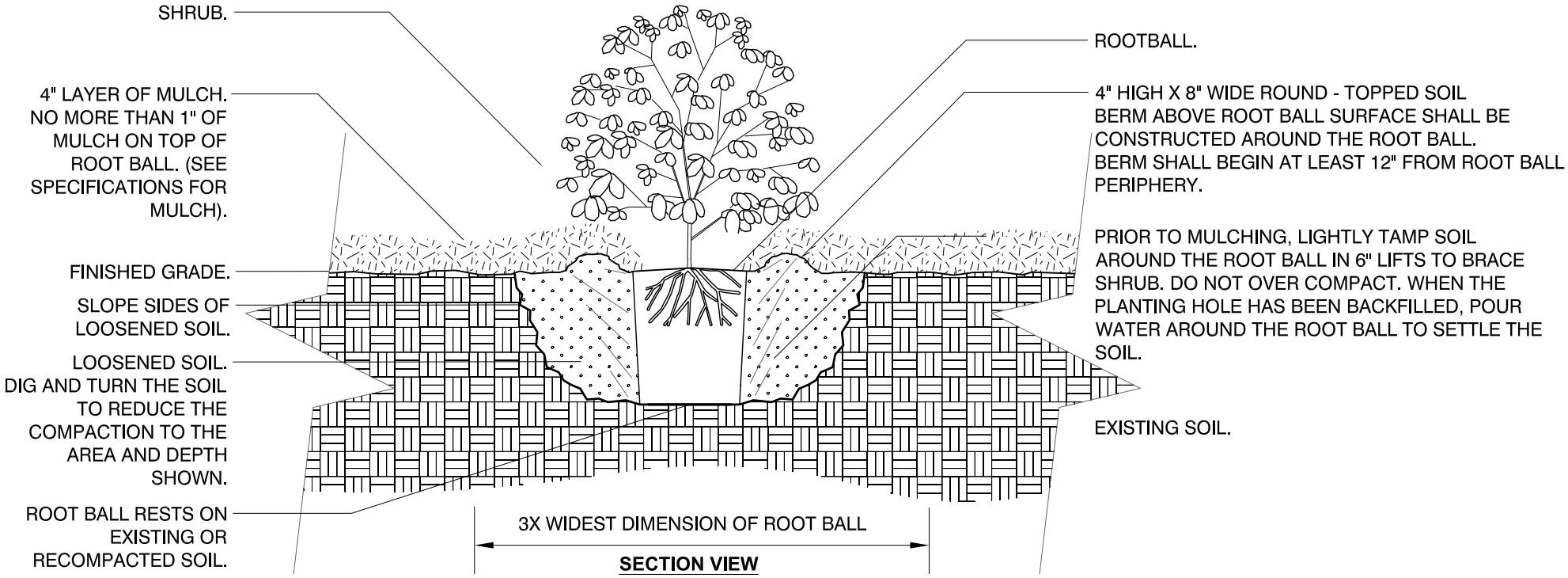
5

TREE PLANTING ON SLOPE

1/2" = 1'-0"

Native Oak Shaded Fuel Break

Construction Details and Additional Resources



6

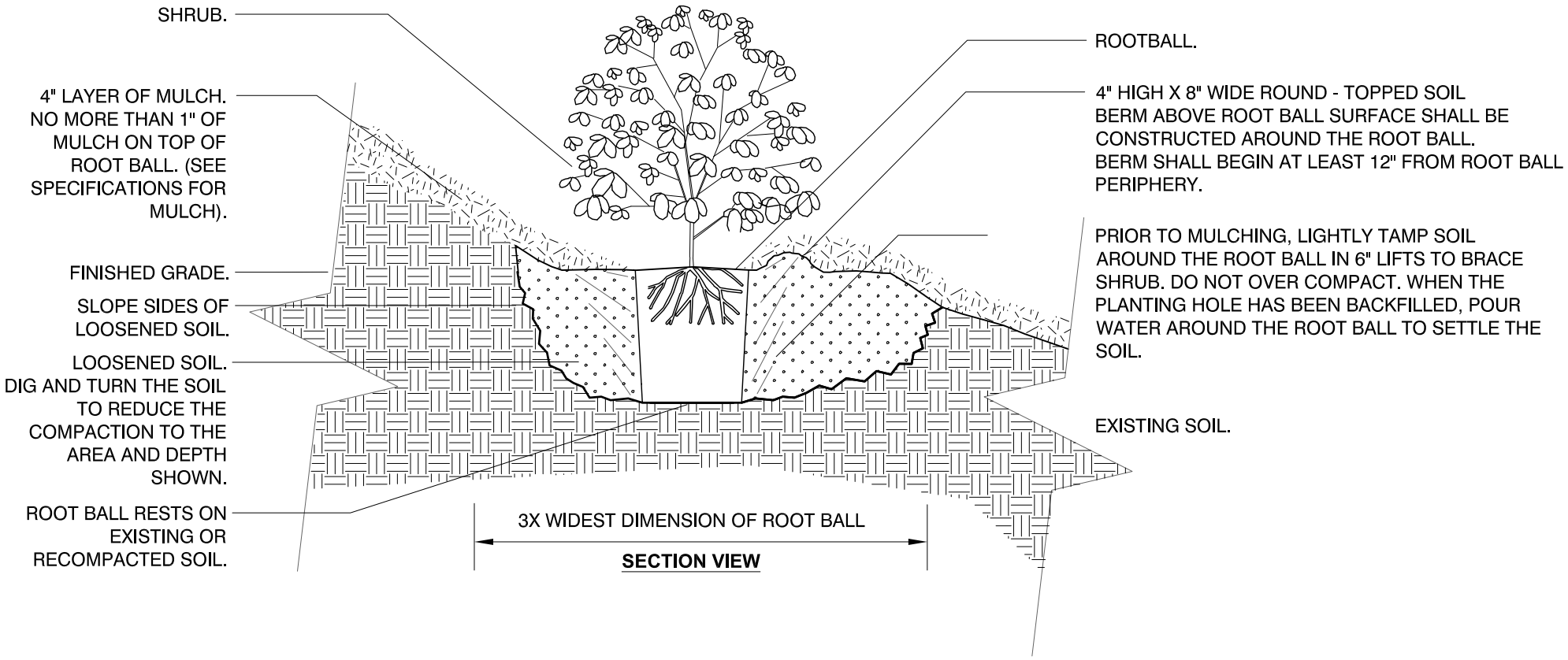
SHRUB PLANTING

3/4" = 1'-0"

DETAIL-FILE

2.7D Native Oak Shaded Fuel Break

Construction Details and Additional Resources



7 SHRUB PLANTING ON SLOPE (5%)

3/4" = 1'-0"

DETAIL-FILE

Native Oak Shaded Fuel Break

Construction Details and Additional Resources

Works Cited - Native Oak Shaded Fuel Break

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3A

Post Eucalyptus Restoration

Post Eucalyptus Native Woodland Restoration

Eucalyptus Fire Hazards

In California, Blue Gum Eucalyptus (*Eucalyptus globulus*) and other species, are a high wildfire hazard. Eucalyptus trees are non-native to California, and invasive in coastal locations because of their ability to grow, spread rapidly, and ignite more easily than trees native to chaparral habitat.

Eucalyptus stands are more susceptible to fire during the dry season. They accumulate more fuel than native trees through dropped limbs, bark and leaves. Eucalyptus leaf litter is especially flammable (1). Blue Gum trees tend to propagate fire through open crowns, and can increase the rate of fire spread to adjacent areas.

Maintenance of Eucalyptus trees in dense stands requires keeping lower branches of the trees trimmed (*see diagram*). Ultimately, full removal of dense Eucalyptus stands from chaparral habitat allows native vegetation to be reestablished.

DIAGRAM: Maintaining Eucalpytus Trees to Reduce Fire Hazard

Restoring Native Woodland

Eucalyptus trees negatively impact the hydrology of a region by extracting water from the soil with far-reaching root systems, often overtaking water resources from other plants in the ecosystem and impacting groundwater levels that feed local streams and creeks. Blue Gum Eucalyptus trees produce allelochemicals, natural substances that suppress the growth of surrounding plants. Changes to soil characteristics inhibit understory growth, which increases erosion and impacts soil health.

Restoring native woodland habitat repairs and re-hydrates soils, keeping the ground cool and moist. Allelochemicals may persist in the soil post Eucalyptus-removal (2). Compost and wood chip mulch from non-Eucalyptus sources offer soil protection and aid in restoring soil biology during native woodland restoration.

Plants in the Plant Palette on the following page were selected for their abilities to fix nitrogen post-Eucalyptus removal, and restore soil health. (Azomite is a naturally derived soil amendment that re-mineralizes soils.*)

ADDITIONAL CONSIDERATIONS

Eucalyptus stand removal requires preparation, tree assessments, and is site-specific. Experts in this field should be consulted for further information.

Protecting Monarch Habitat

Dense Eucalyptus groves threaten natural ecosystems and biodiversity because they displace native plants upon which biota rely (3).

However, Eucalyptus trees do provide critical habitat for migratory Monarch butterflies and various bird species. Every fall, monarchs migrate to overwintering sites in California. Monarchs seek out microclimates with stable temperatures, and need adequate dappled sunlight, shade, and protection from wind (4).

At sites where Eucalyptus do provide ecosystem services, such as monarch overwintering habitat, it is essential to phase their removal according to growth timelines for newly planted natives intended to replace the woodland overstory.

Plan to plant new replacement oaks and other native tree 10-15 years before complete removal of Eucalyptus trees so that new trees can reach adequate height for monarch habitat (5).

PHOTO (nps.gov) Monarch Butterfly. Studies have shown that monarchs do not prefer Eucalyptus trees over Oak trees, and will happily migrate to native oaks under the right conditions of temperature, sunlight, and wind protection.

3B Post Eucalyptus Restoration

Post Eucalyptus Native Woodland Restoration

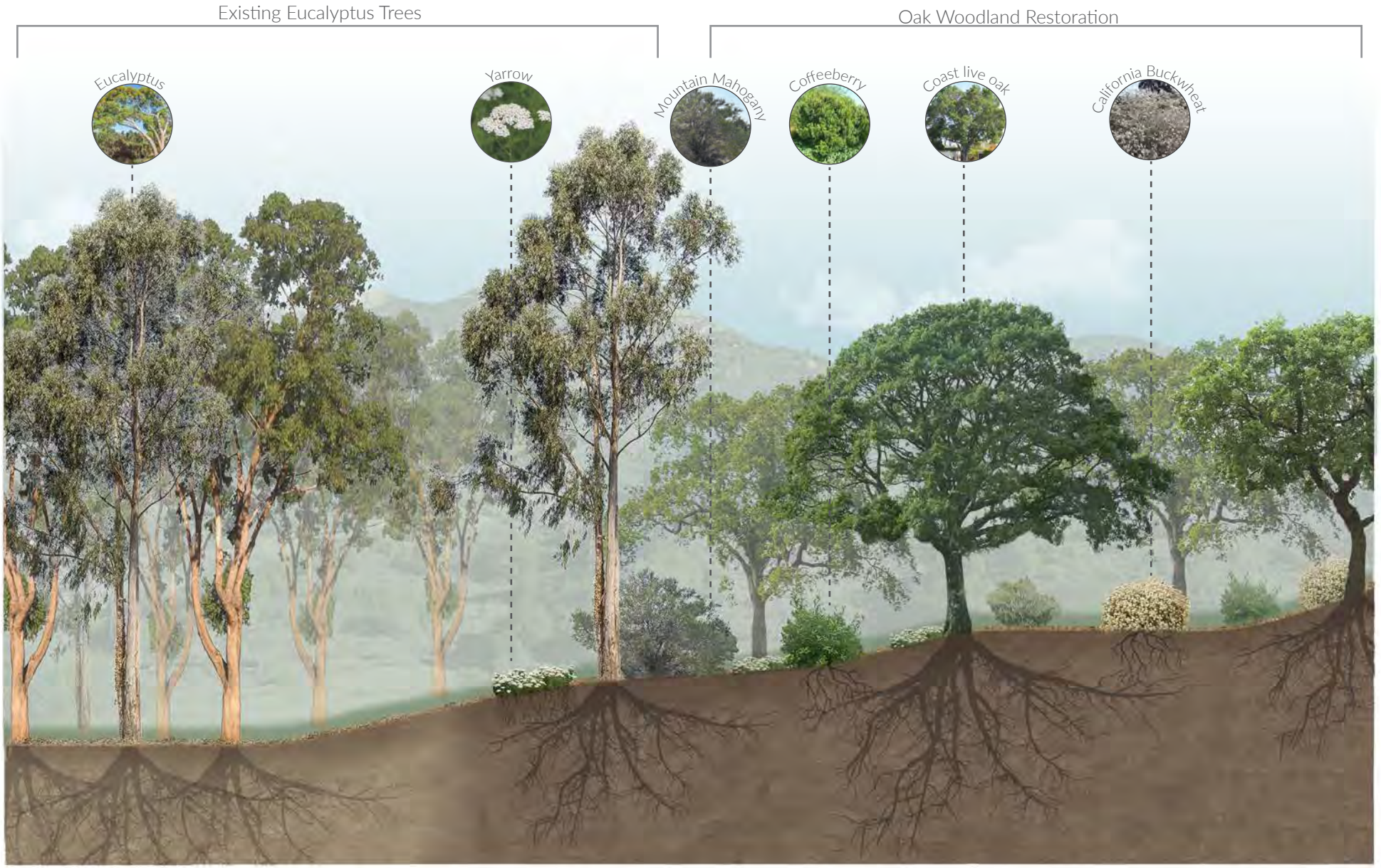


ILLUSTRATION: Phased Post-Eucalyptus Native Oak Woodland Restoration
Removing Eucalyptus trees eliminates highly combustible material from the environment. Post Eucalyptus Native Woodland Restoration repairs vulnerable Coastal Oak Woodland habitat.

3C

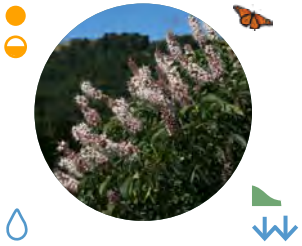
Post Eucalyptus Restoration

Plant Palette

TREES

Quercus agrifolia
Coast Live Oak

Prunus ilicifolia
Hollyleaf Cherry



Aesculus californica
California Buckeye

SHRUBS

Frangula california
California Coffeeberry

Eriogonum fasciculatum
California Buckwheat

Keckiella cordifolia
Climbing Penstemon

SHRUBS

Heteromeles arbitufolia
Toyon

Rhus integrifolia
Lemonade Berry

Ribes indecorum
White Flowering Currant

SHRUBS

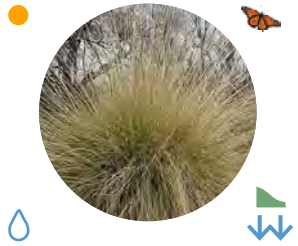
Sambucus mexicana
Blue Elderberry

Rosa californica
California Wild Rose

Cercocarpus betoluides
Mountain Mahogany

GRASSES

Elymus condensatus "Canyon Prince"
Giant Wild Rye



Muhlenbergia rigens
Deergrass

SOIL DRAINAGE

- slow
- adaptable
- fast

SUN/SHADE

- full sun
- partial sun / shade
- full shade

WATER USAGE

- low
- moderate
- high

OTHER CONSIDERATIONS

- erosion control
- pollinator
- fire resistant with maintenance

Works Cited - Post Eucalyptus Native Woodland Restoration

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4A Riparian & Drainage Restoration

How to **restore riparian corridors** and **drainage zones** to create **hydrated buffers** in the **landscape**

Protecting and Restoring Riparian Habitat in Coastal California

Creeks and streams prevent erosion, infiltrate stormwater, and safely convey floodwaters to the ocean, mitigating floods and landslides during large storm events (1). Creeks within the chaparral biome are incredibly diverse, providing wildlife corridors in which native animals travel from upland areas of chaparral to coastal environments.

Native riparian plants stabilize creek banks by holding the soil in place, thereby protecting creeks from excessive sedimentation and erosion. Riparian plants help slow the flow of water, enhancing streams and groundwater recharge (2). Recharged groundwater basins along streams ensure that creeks flow longer into the dry season, or year round, supporting a multitude of birds, fish, amphibian, reptile, and mammal species (3)(4).

Protecting and restoring creeks and drainage zones can assist hydrological restoration of natural watersheds (5).

ADDITIONAL CONSIDERATIONS

It is beyond the scope of this document to provide full guidance on CEQA/NEPA or other environmental review processes. Experts in these fields should be consulted for permitting considerations.

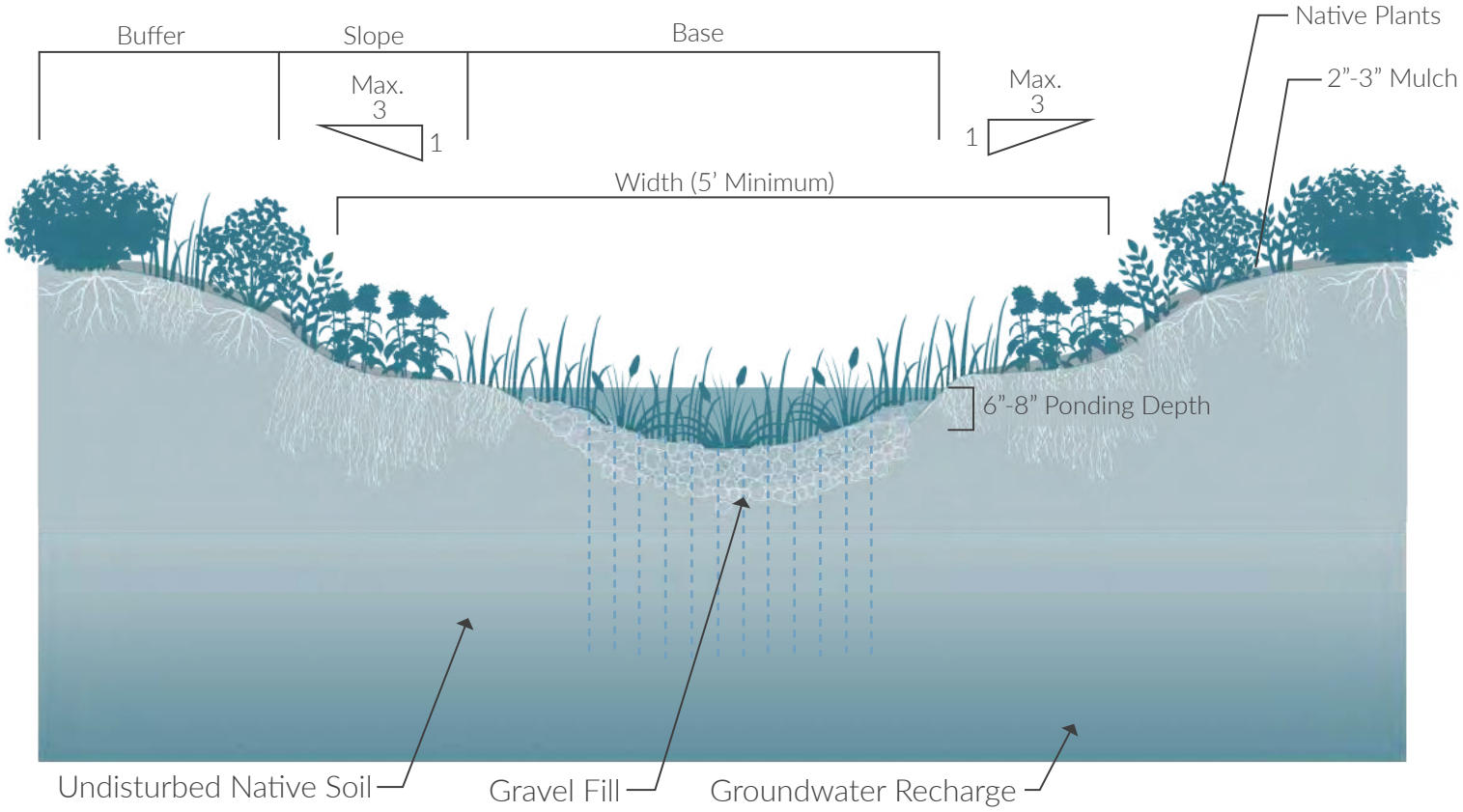


DIAGRAM: Basic Guidelines for Prototypical Design of Bioswale

4.1A Riparian & Drainage Restoration

How to **restore riparian corridors** and **drainage zones** to create **hydrated buffers** in the **landscape**

Protecting Creeks and Drainage Zones
The best way to protect your creeks is to keep them planted with native riparian plants, and remove invasive plants that crowd out natives and degrade stream health.

The Plant Palette in this template includes native plant suggestions for creeks that flow year-round, and for dry creeks, or creeks that flow seasonally.

Understanding Bioswales
Bioswales are vegetated channels that capture, convey, and infiltrate stormwater runoff as it moves downstream. Bioswales help recharge groundwater aquifers, contributing to a more hydrated, wildfire resilient landscape.

Bioswales can enhance existing drainage swales, and when designed properly are relatively low-maintenance tools. Inspecting bioswales on-site is critical after major storm events to check for sediment build up, ponding, or damage to vegetation.

Drainage Zones near Crop Fields
When restoring drainage zones or creeks at the edge of orchards or crop fields, consider placing the swales in the orchards slightly off-contour to slow water movement and avoid pooling and blow outs.

Adding a bioswale or rain garden where an orchard meets a drainage zone or creek will help capture and convey stormwater to the creek, and reduce flooding.

For more information, see the **Vegetation Management Strategies: Design Template for Agricultural Buffer Zones.**

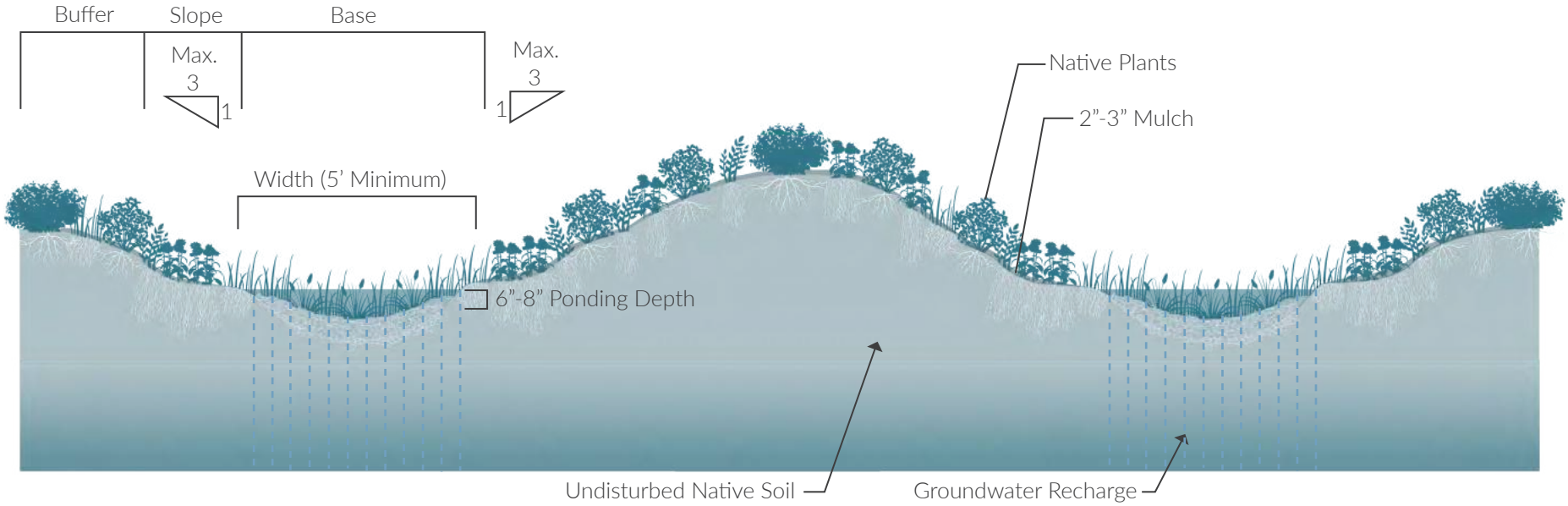
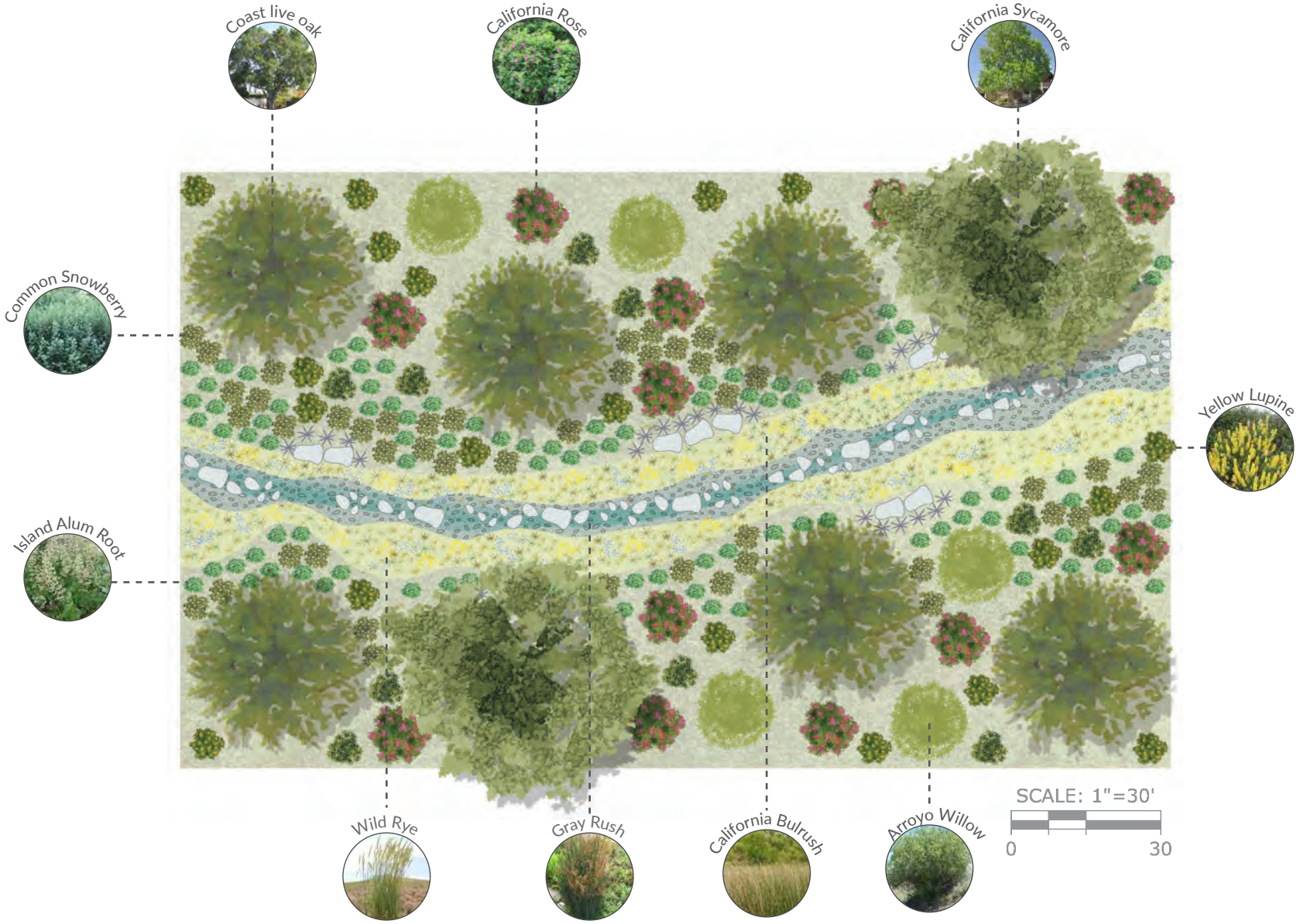


DIAGRAM: Basic Guidelines for Prototypical Design of Bioswale on Contour

4B Riparian & Drainage Restoration

Prototypical plans, sections and details for implementation



PLANTING PLAN ILLUSTRATION: Prototypical Planting Plan for Riparian Restoration and Drainage Zones
Restoring year-round creeks and maintaining drainage zones helps capture and infiltrate stormwater, keeping the ground cool and moist.

4.1B Riparian & Drainage Restoration

Prototypical plans, sections and details for implementation

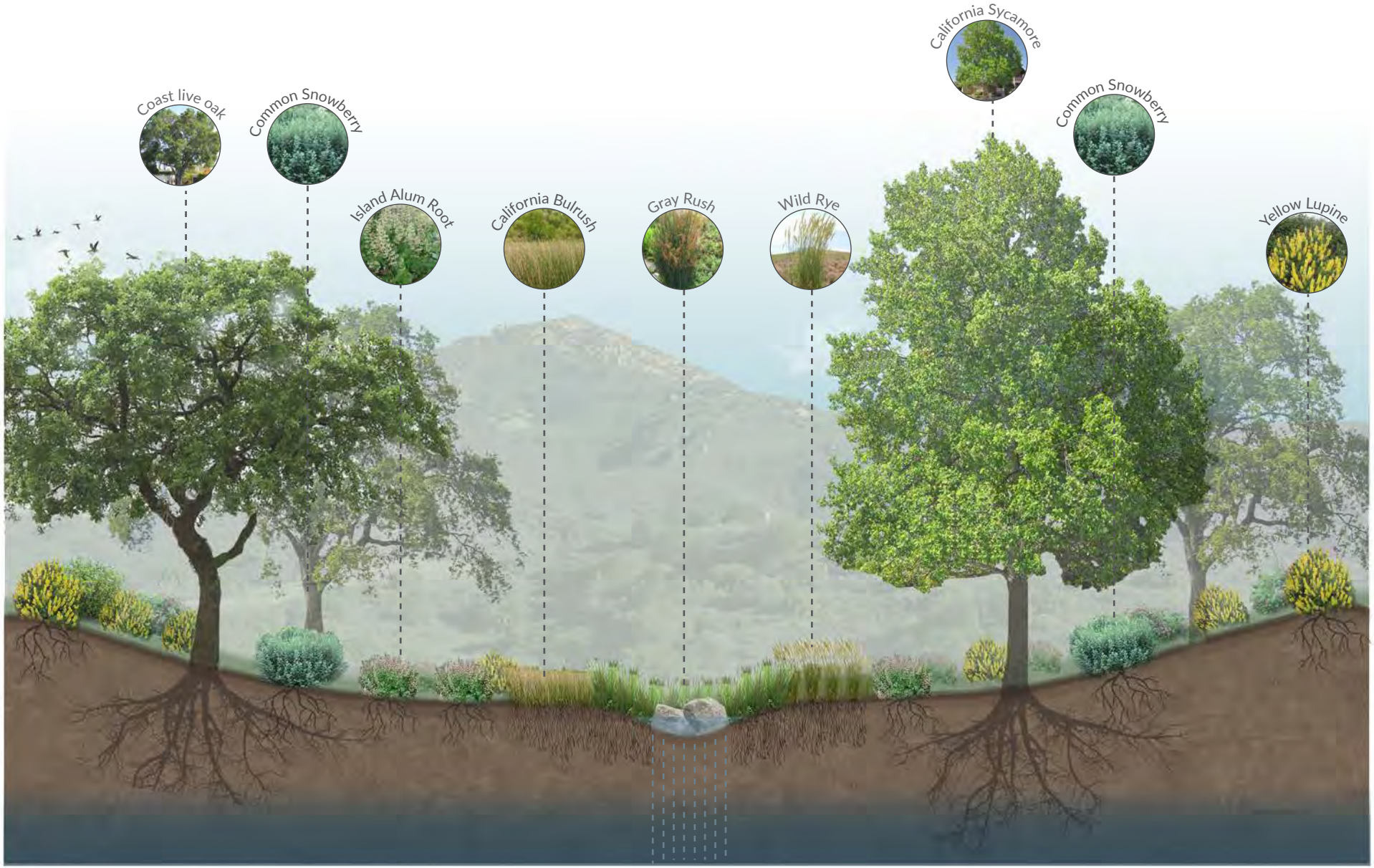
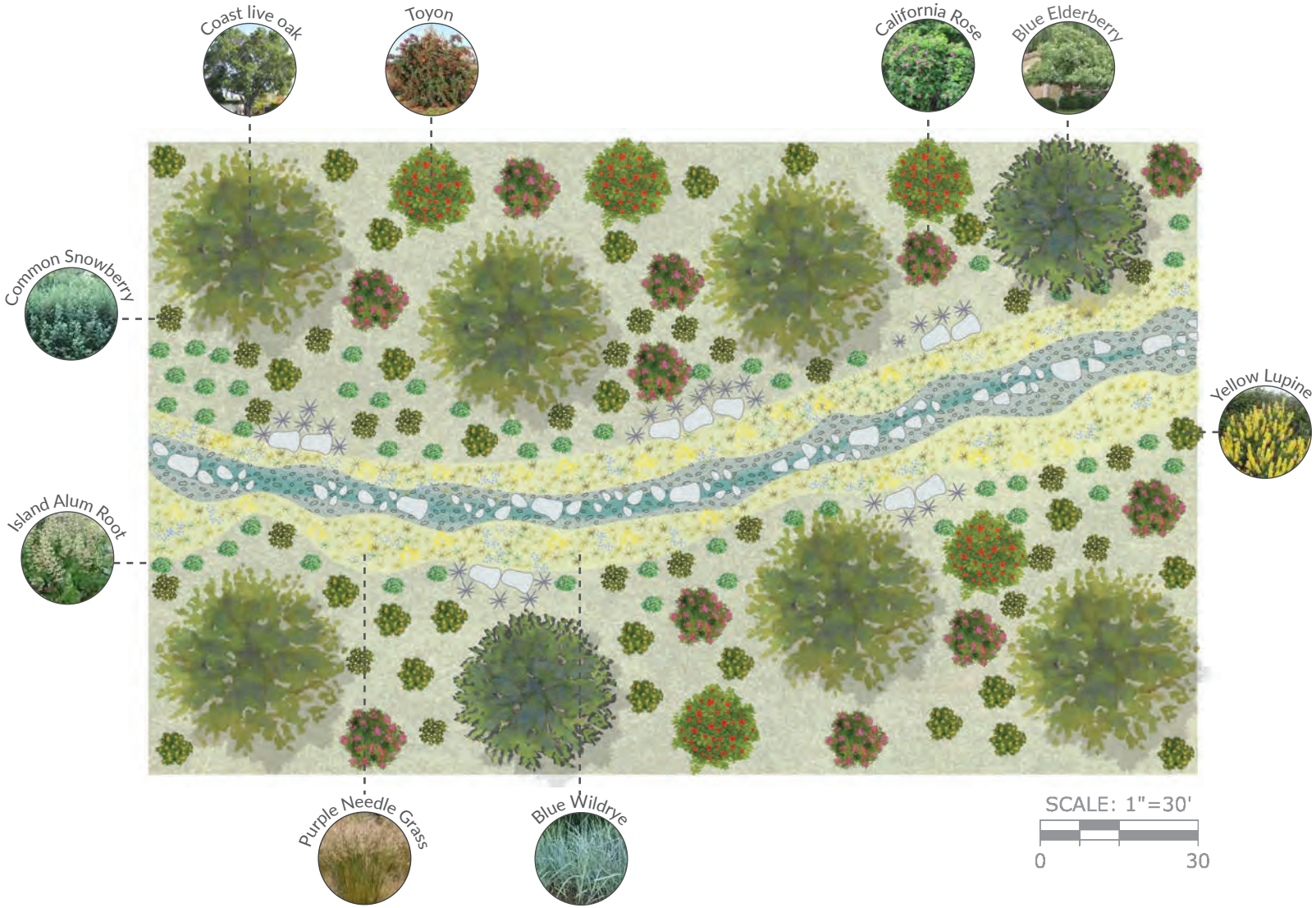


ILLUSTRATION: Riparian and Drainage Restoration
Restoring year-round creeks and maintaining drainage zones helps capture and infiltrate stormwater, keeping the ground cool and moist.

4.2B Riparian & Drainage Restoration

Prototypical plans, sections and details for implementation



PLANTING PLAN ILLUSTRATION: Prototypical Planting Plan for Dry Creeks
Restoring and protecting dry creeks helps capture and infiltrate stormwater in large storm events, keeping ground cool and moist.

4.3B Riparian & Drainage Restoration

Prototypical plans, sections and details for implementation

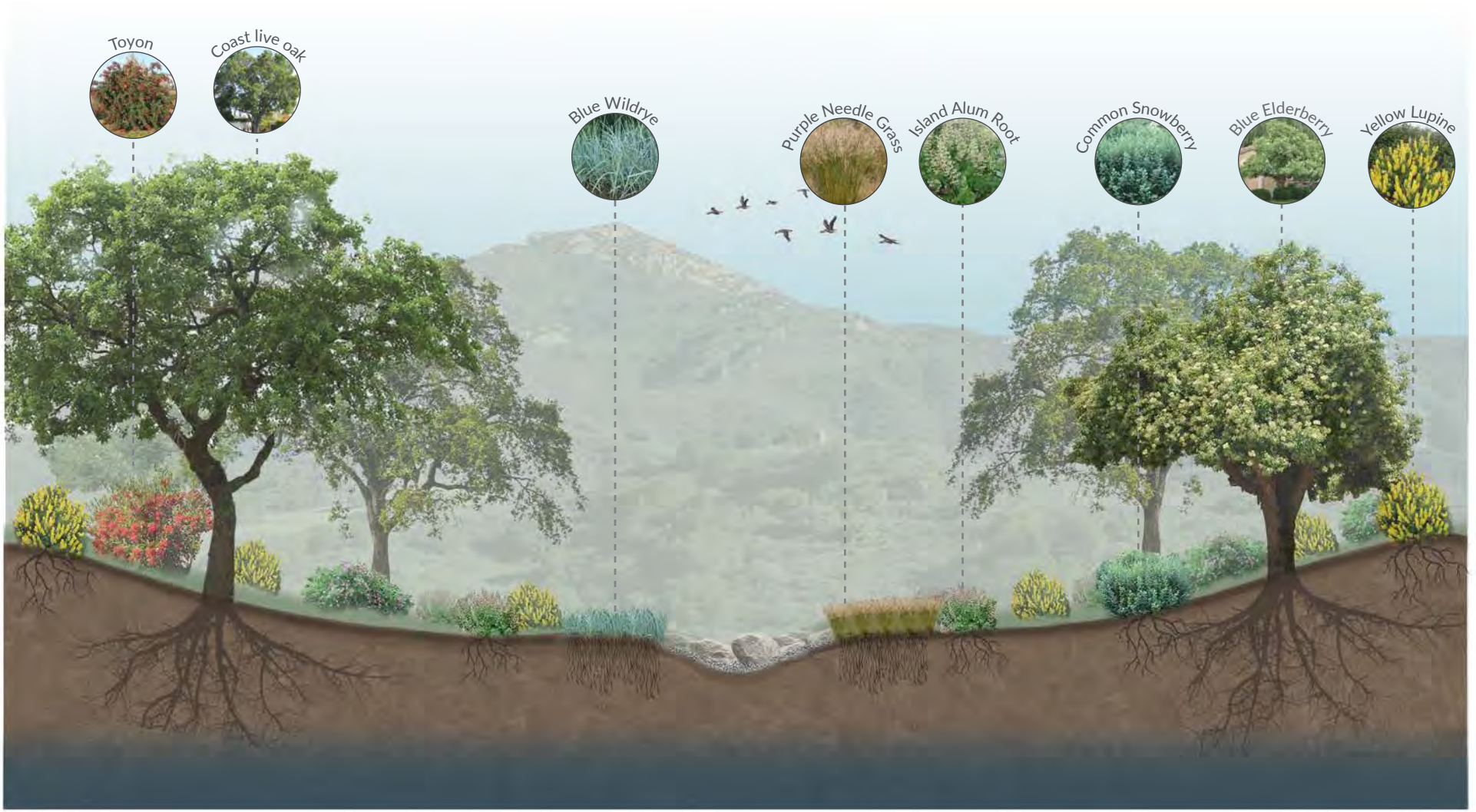


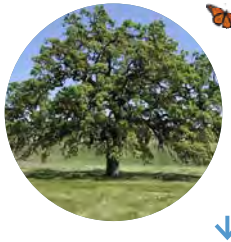
ILLUSTRATION: Dry Creek
Restoring and protecting dry creeks helps capture and infiltrate stormwater in large storm events, keeping ground cool and moist.

4C

Riparian & Drainage Restoration

Plant Palette for riparian zones

TREES



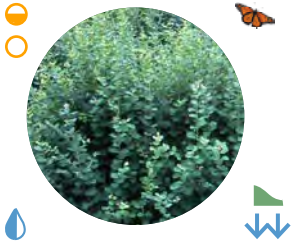
Quercus lobata
Valley Oak

Platanus racemosa
California Sycamore

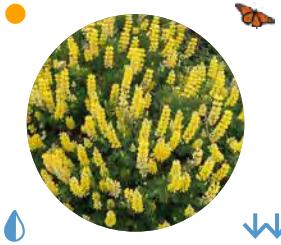
Populus trichocarpa
Black Cottonwood

SHRUBS

Rosa california
California Wildrose

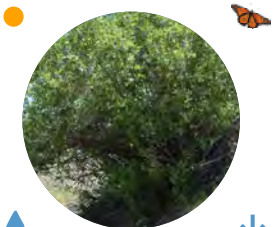


Symphoricarpos albus
Common Snowberry



Lupinus arboreus
Coastal Bush Lupine

SHRUBS/PERENNIALS



Salix lasiolesis
Arroyo Willow

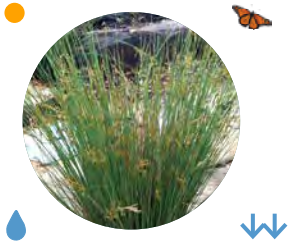
Rubus ursinus
Pacific Blackberry

Heuchera maxima
Island Alum Root

GRASSES

Stipa pulchra
Purple Needlegrass

Juncus patens
Gray Rush



Juncus textilis
Basket Rush

GRASSES

Schoenoplectus californicus
California Bulrush

Elymus triticoides
Creeping Wild Rye

SOIL DRAINAGE

- slow
- adaptable
- fast

SUN/SHADE

- full sun
- partial sun / shade
- full shade

WATER USAGE

- low
- moderate
- high

OTHER CONSIDERATIONS

- erosion control
- pollinator
- fire resistant with maintenance

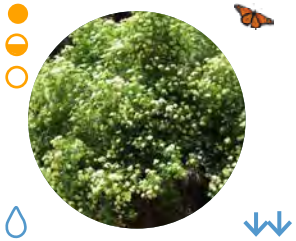
4.1C

Riparian & Drainage Restoration

Plant Palette for dry creeks

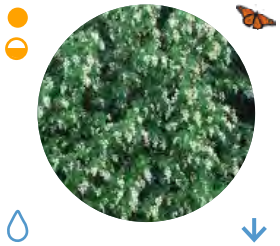
TREES

Quercus agrifolia
Coast Live Oak

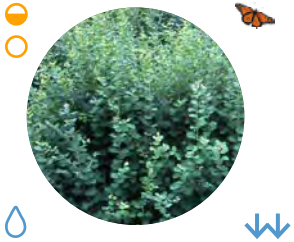


Sambucus mexicana
Blue Elderberry

SHRUBS



Ribes indecorum
White Flowering Currant



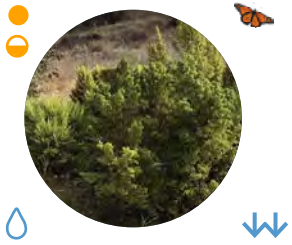
Diplacus aurantiacus
Bush Monkeyflower

Rosa Californica
California Wildrose

SHRUBS

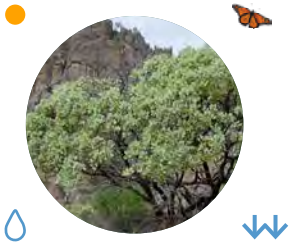
Ribes aureum
Golden Currant

Trichostema lanatum
Woolly Bluecurls



Bacharris pilularis spp. Pilularis
Coyote Brush

SHRUBS



Arcostaphylos glauca
Big Berry Manzanita

Heteromeles arbitufolia
Toyon

GRASSES/PERENNIALS

Elymus glaucus
Blue Wild Rye

Achillea millefolium
Common Yarrow

SOIL DRAINAGE

- *slow*
- *adaptable*
- *fast*

SUN/SHADE

- *full sun*
- *partial sun / shade*
- *full shade*

WATER USAGE

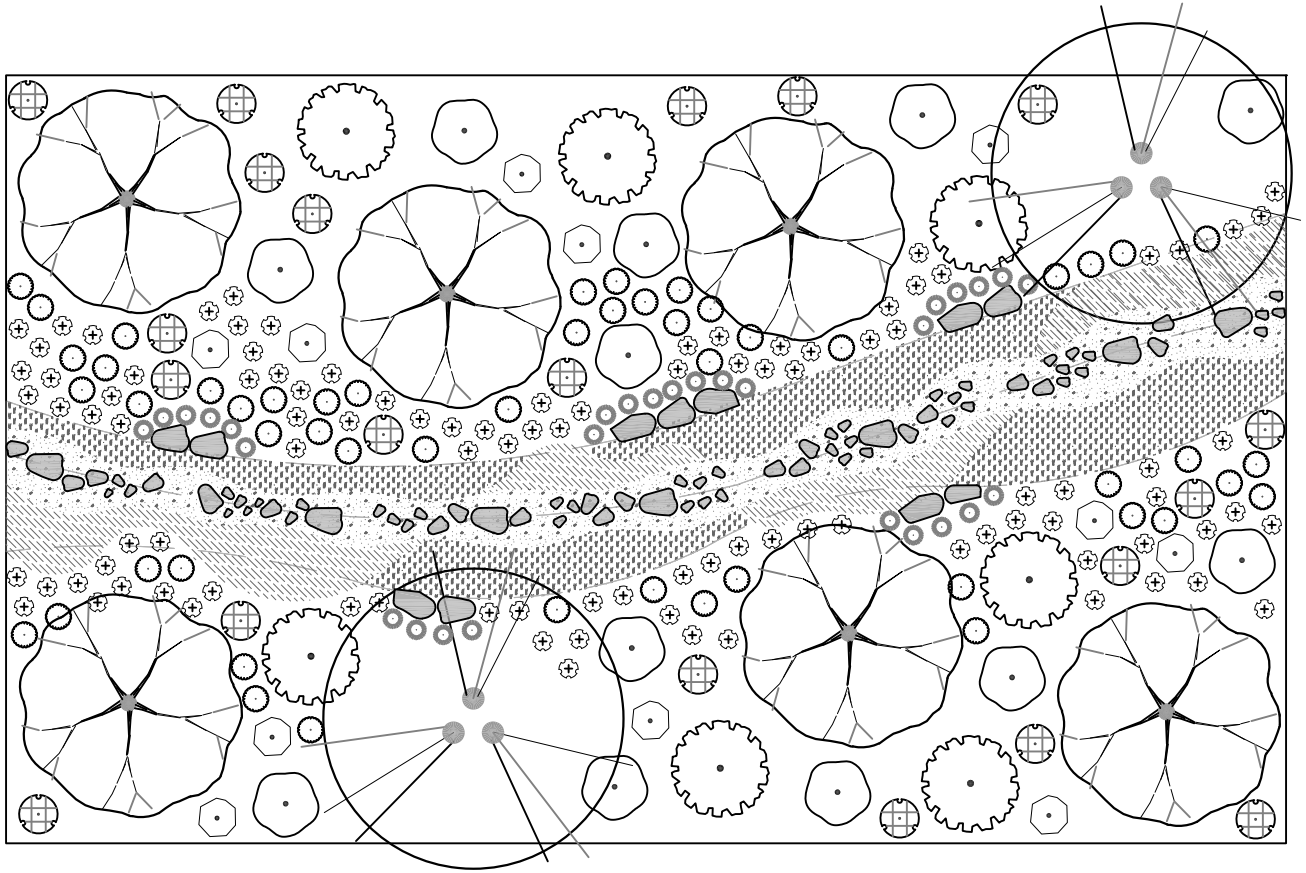
- *low*
- *moderate*
- *high*

OTHER CONSIDERATIONS

- *erosion control*
- *pollinator*
- *fire resistant with maintenance*

Riparian & Drainage Restoration

Construction Details and Additional Resources



SCALE: 1"=30'

0 30

PLANT SCHEDULE

TREES	COMMON / BOTANICAL NAME
	California Sycamore Platanus racemosa
	Coast Live Oak Quercus agrifolia

SHRUBS	COMMON / BOTANICAL NAME
	Island Alum Root Heuchera maxima
	Yellow Tree Lupine Lupinus arboreus
	California Wild Rose Rosa californica
	California Blackberry Rubus ursinus
	Arroyo Willow Salix lasiolepis
	Purple Needle Grass Stipa pulchra
	Common White Snowberry Symphoricarpos albus

GROUND COVERS	COMMON / BOTANICAL NAME
	California Gray Rush Juncus patens
	Wild Rye Leymus triticoides
	California Bulrush Schoenoplectus californicus

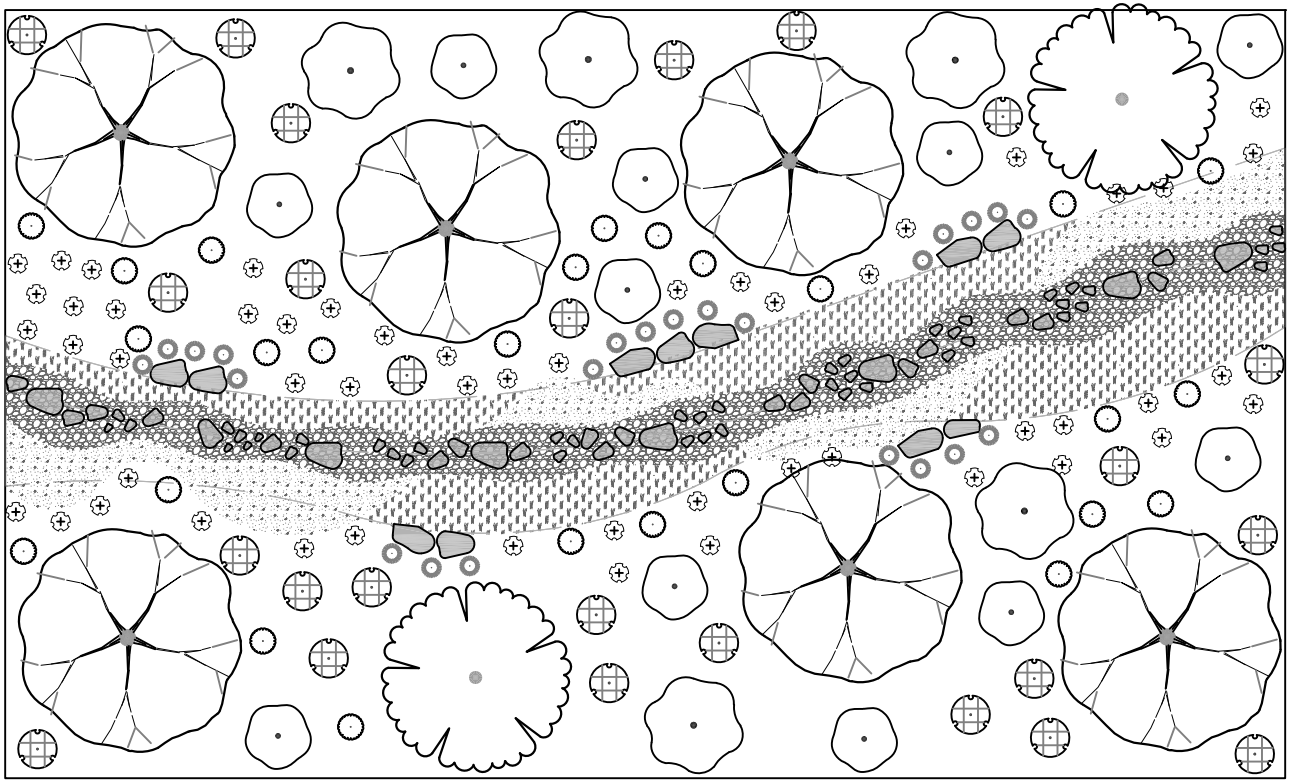
LEGEND

BOULDERS (OPTIONAL)

1 RIPARIAN CORRIDOR AND DRAINAGE RESTORATION

Riparian & Drainage Restoration

Construction Details and Additional Resources



SCALE: 1"=30'

0 30

PLANT SCHEDULE

TREES	COMMON / BOTANICAL NAME
	Coast Live Oak Quercus agrifolia
	Mexican Elderberry Sambucus mexicana

SHRUBS	COMMON / BOTANICAL NAME
	Toyon Heteromeles arbutifolia
	Island Alum Root Heuchera maxima
	Yellow Tree Lupine Lupinus arboreus
	California Wild Rose Rosa californica
	Purple Needle Grass Stipa pulchra
	Common White Snowberry Symphoricarpos albus

GROUND COVERS	COMMON / BOTANICAL NAME
	Blue Wildrye Elymus glaucus
	Purple Needle Grass Stipa pulchra

LEGEND

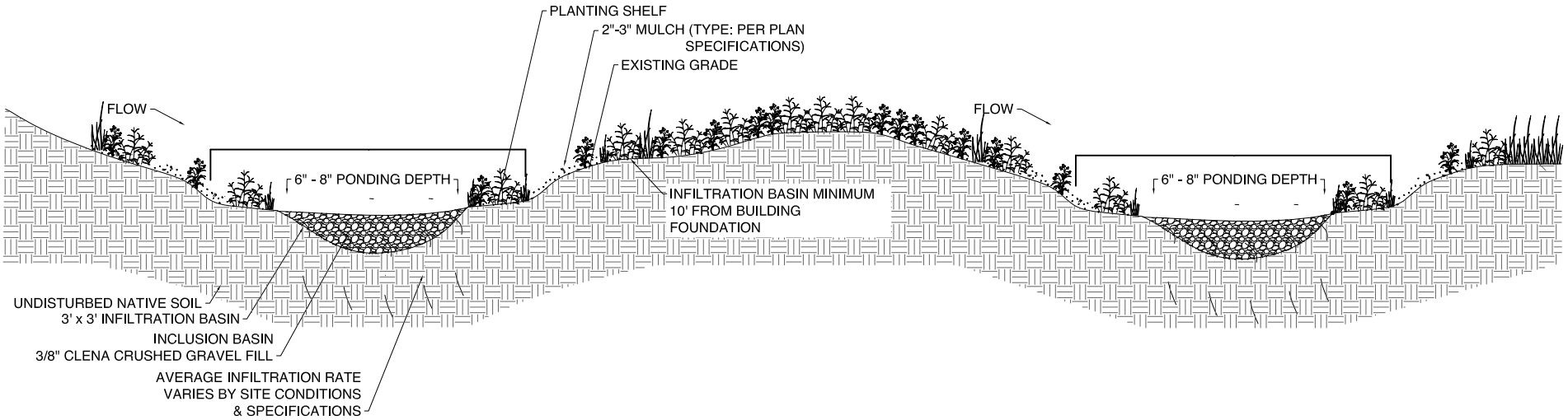
BOULDERS

GRAVEL

2 RIPARIAN CORRIDOR AND DRAINAGE RESTORATION - DRY CREEK

Riparian & Drainage Restoration

Construction Details and Additional Resources



3 **BIOSWALE ON CONTOUR**

(N.T.S)

Riparian & Drainage Restoration

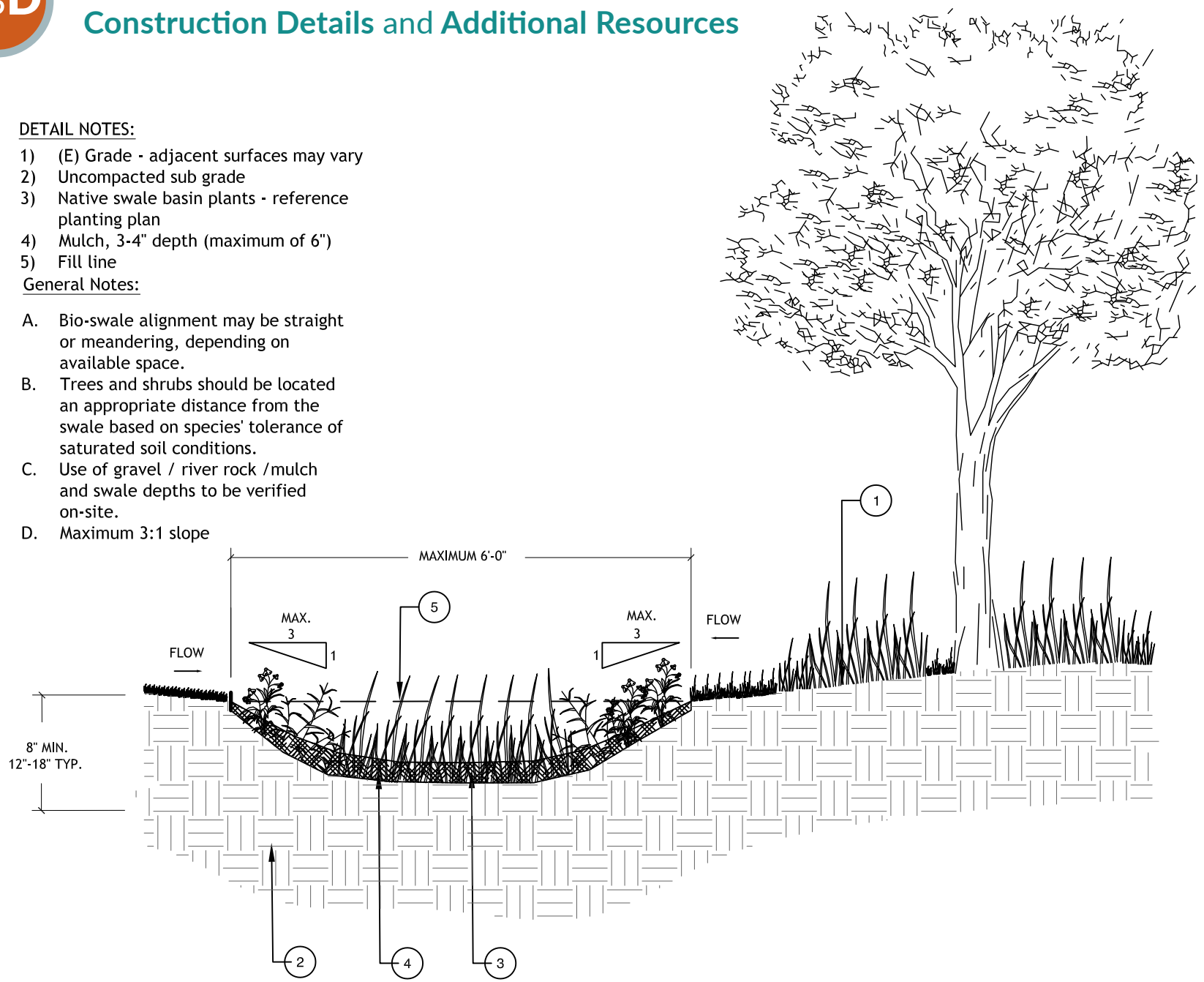
Construction Details and Additional Resources

DETAIL NOTES:

1) (E) Grade - adjacent surfaces may vary
2) Uncompacted sub grade
3) Native swale basin plants - reference planting plan
4) Mulch, 3-4" depth (maximum of 6")
5) Fill line

General Notes:

A. Bio-swale alignment may be straight or meandering, depending on available space.
B. Trees and shrubs should be located an appropriate distance from the swale based on species' tolerance of saturated soil conditions.
C. Use of gravel / river rock /mulch and swale depths to be verified on-site.
D. Maximum 3:1 slope



4 VEGETATED BIO-SWALE (TYP.)

(N.T.S)

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5. Stromberg, J. C. (2001). Restoration of riparian vegetation in the south-western United States: importance of flow regimes and fluvial dynamism. Journal of Arid Environments, 49(1), 17–34. https://doi.org/10.1006/jare.2001.0833

5A Agricultural Buffer Zones

How to design and maintain agricultural zones as wildfire buffers

The Regional Wildfire Mitigation Program (RWMP) recognizes the role that working agricultural lands can play in reducing community wildfire hazards in the WUI. Promoting the preservation and expansion of agricultural lands as wildland buffers to mitigate the risk of wildfire spread and intensity is an important land-use strategy.

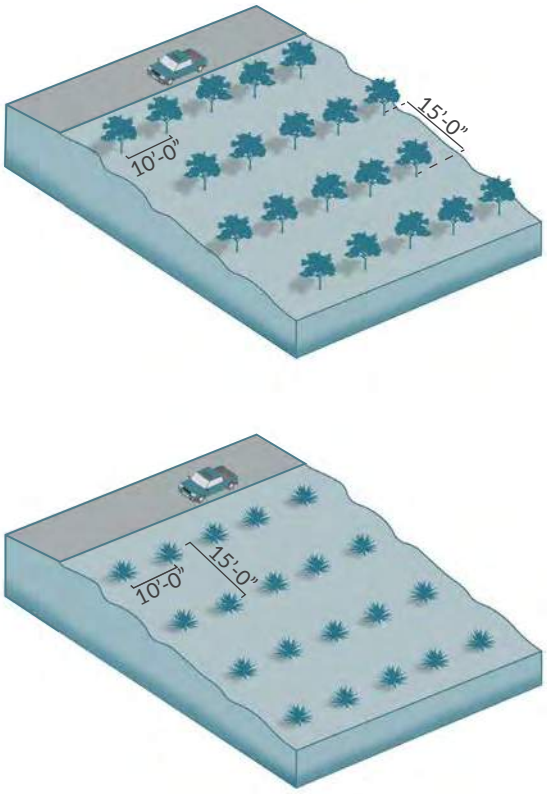


DIAGRAM: Spacing recommendations are dependent on the crop being planted. Top diagram shows basic fruit or deciduous tree spacing, bottom diagram shows spacing for succulents. Maintaining at least 10' between crops and 15' between rows helps reduce fuel loads.

Working agricultural lands can be used as effective wildfire buffers with the proper design and management practices. Here is a guide on how to use farms, orchards, and vineyards as wildfire buffers:

- DO Select fire-resistant crops: Choosing tree/crop species that are less flammable or carry lower fuel loads can reduce the risk of wildfire spread. This means selecting crops that remain hydrated during wildfire season.
- DO Plant with the right spacing: Plant trees and crops with adequate spacing between canopies. Always plant with a perimeter road for firefighter access. Consider large alleyways for high density plantings and alternating plant placement in rows to prevent wind tunnels.
- DO Use mulch strategically: Use a composted wood chip mulch in the interior of orchards and vineyards while maintaining 100 ft buffers along the perimeter with no mulching. Always mulch in the rows only, leaving alleys clear of flammable materials.
- DO consider offsetting every other row to slow wind and fire intensity when planting trees.
- DO create defensible space by clearing fuel breaks around your orchard or vineyard. (*See Backburner Zone Template*)
- DO maintain an efficient irrigation system capable of evenly delivering water to crops. Dry, non-irrigated crops can be more flammable.
- DO run irrigation in the case of oncoming fire to elevate live fuel moisture and keep leaf litter and soil hydrated. (Check with your local fire department and don't jeopardize firefighting efforts by compromising existing water availability.)
- DO Maintain orchard health: Regular pruning and removing dead branches, excessive leaf droppings, and other debris from the orchard or vineyard floor can reduce the amount of flammable material available in the area. This includes maintaining a clear area of 2-3 ft around the tree trunks, free from deadwood, dry grasses, and other debris.
- DO Consider fire-resistant materials: Using fire-resistant materials for orchard or vineyard infrastructure, such as steel pipes for risers, metal trellis systems, and subsurface plastic drip tubing.

ADDITIONAL CONSIDERATIONS

*Prescribed herbivory or targeted grazing is a wildfire management strategy that involves using livestock to graze on vegetation in targeted areas to reduce fuel loads (1). This strategy can be considered as a site preparation step for targeted fuel reduction.

5B Agricultural Buffer Zones

Prototypical plans, sections and details for implementation

Working agricultural lands can serve as hydrated buffers under specific conditions (2) (3). Crops that require dry season irrigation and display high live fuel moisture content year round are effective hydrated buffers between wildlands and developed areas. This can include crops such as citrus, avocados, pome and stone fruits, vineyards, and alternative crops like agave and cactus.

By irrigating these crops frequently, the vegetation and soil remain moist and less prone to ignition. The moist vegetation can slow or stop the spread of wildfires, providing a barrier between wildlands and developed areas.

The layout of agricultural blocks also contributes to their effectiveness as wildfire buffers. Well-maintained roads, water storage and water delivery infrastructure can make farms, orchards, and vineyards important for fire firefighter operations during wildfire events.

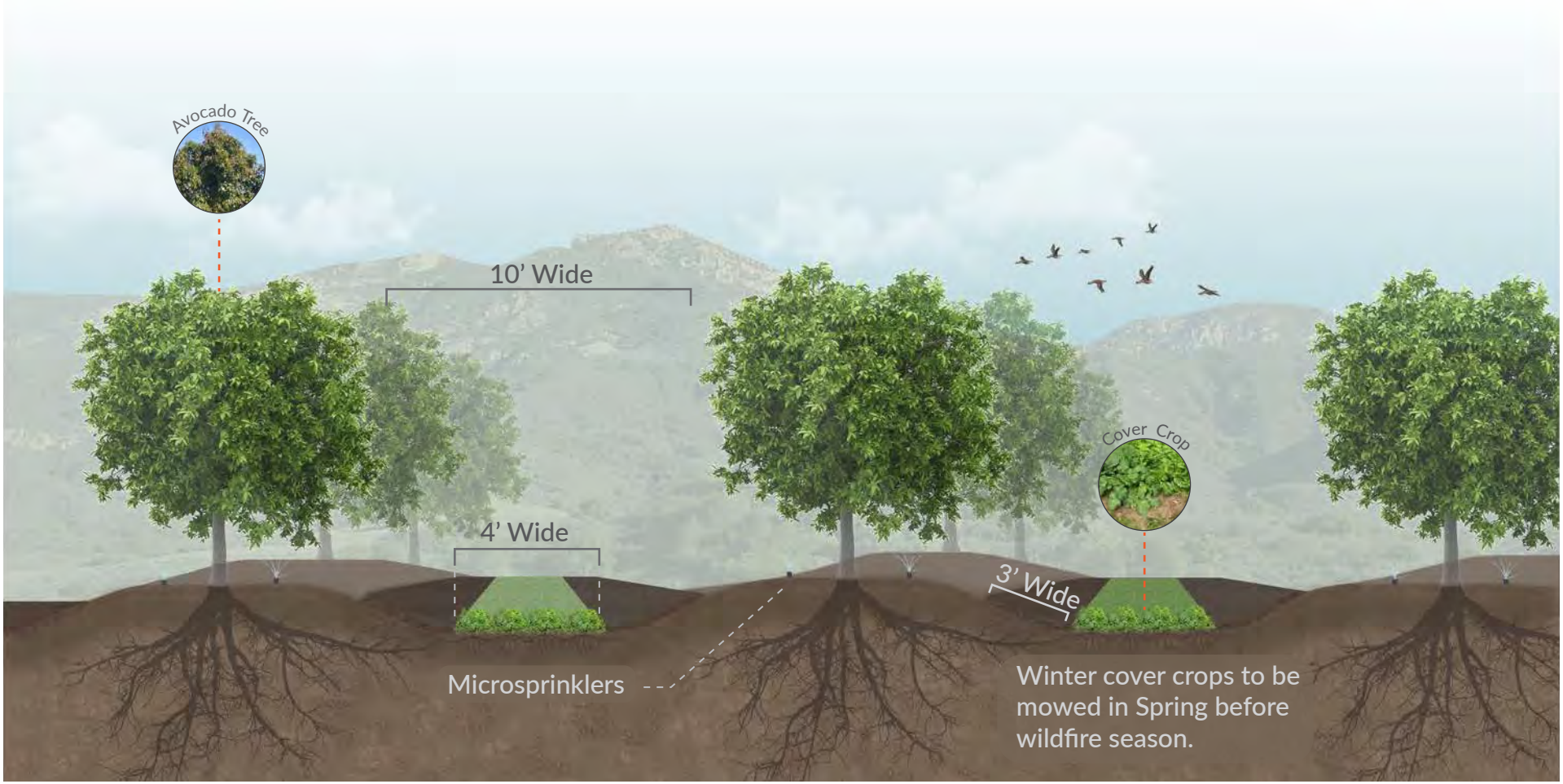


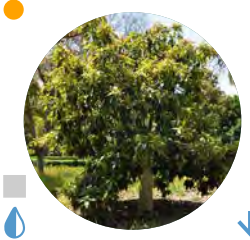
ILLUSTRATION: Basic Guidelines for Planting Crop Fields with Swales Between Rows.
Swales between crop rows help capture stormwater and irrigate the soil. Mulch at the base of each tree protects tree roots from heat and keeps soils cool.

5C

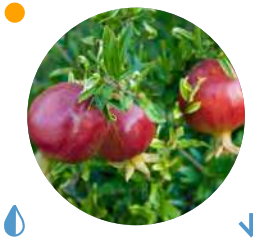
Agricultural Buffer Zones

Plant Palette

TREES



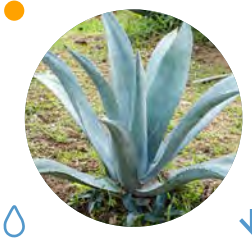
Persea americana
Avocado



Punica granatum
Pomegranate

Diospyros kaki
Persimmon

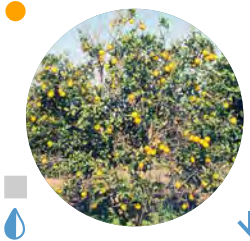
SUCCULENTS



Agave tequilana (or spp.)
Agave

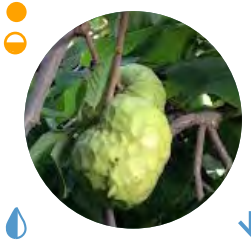
VINES

Vitis vinifera
Common Wine Grape

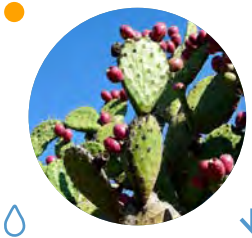


Citrus spp.
Citrus

Ficus carica
Fig



Annona cherimola
Cherimoya

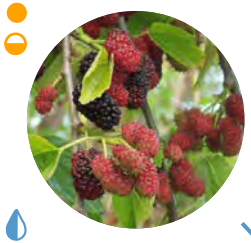


Opuntia ficus-indica
Prickly Pear

Actinidia deliciosa
Kiwi Fruit

Olea europaea
Olive

Macadamia integrifolia
Macadamia Nut



Morus rubra
Red Mulberry

Selenicereus undatus
Dragon Fruit (Pitaya)

*Note: Be careful not to plant White Mulberry trees, which are highly invasive.

SOIL DRAINAGE

- *slow*
- *adaptable*
- *fast*

SUN/SHADE

- *full sun*
- *partial sun / shade*
- *full shade*

WATER USAGE

- *low*
- *moderate*
- *high*

OTHER CONSIDERATIONS

- *erosion control*
- *can be irrigated with greywater*
- *fire resistant with maintenance*

5D Agricultural Buffer Zones

Construction Details and Additional Resources

Mulching for Agricultural Zones
Mulching is the use of organic and inorganic material to cover soil surfaces throughout landscapes. Mulching is a valuable tool for wildfire mitigation because it conserves soil moisture, enhances soil quality, regulates soil temperatures for plant roots, and suppresses the growth of invasive weeds.

Mulching in crop fields increases soil moisture, and reduces soil erosion and weed germination, and helps conserve precious water resources. It increases soil water availability "by reducing evaporation, managing soil temperature, or reducing crop irrigation requirements" (4).

However, mulching can also increase combustible surface fuel cover. Where implemented, it needs to be done with careful consideration of hydrological benefits versus flammability tradeoffs (5). Assessing each site's needs will help you determine best practices for mulching in landscapes within the Wildland-Urban Interface.

In general, composted wood chips (around 3 inches in size*) have lower burn characteristics than other mulches, and can aid in smoldering fires. You should avoid fibrous mulches, which tend to spread fire.

Wood chip mulches are effective for covering the rootzones of tree and vine crops from 12" from the crown or trunk to just beyond the dripline. It is important not to cover the crown or trunk with wood chip mulches as they can damage the plants.

- DO Mulch the soil beneath fruit trees with 2"-4" of organic material.
- DO consider where NOT to mulch. Avoid mulching the first few rows of orchards to eliminate creating embers close to homes and infrastructure.
- DO NOT Use shredded rubber, pine needles, or shredded cedar bark, as these are highly combustible (6).

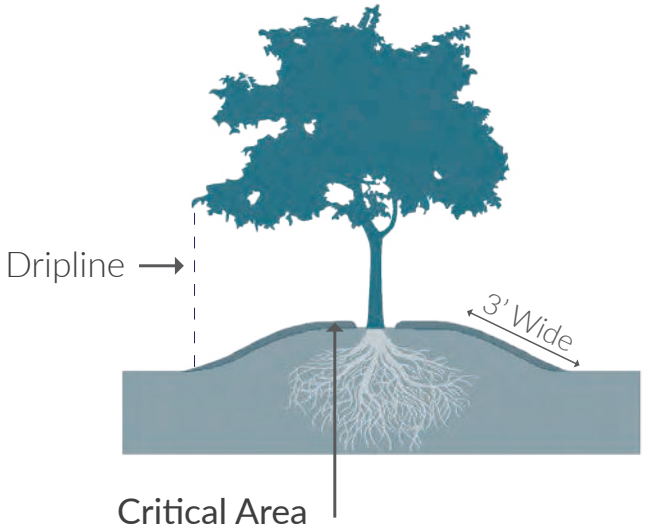


DIAGRAM: Basic Mulching Guidelines for Crop Fields

- DO NOT Place mulch directly against tree trunks.
- DO NOT Use synthetic materials such as rubber pellets, landscape fabric, or anything containing plastic.
- DO NOT Use gorilla hair or monotone fibrous mulch, which can be a fire hazard, not a fire retardant.

ADDITIONAL CONSIDERATIONS

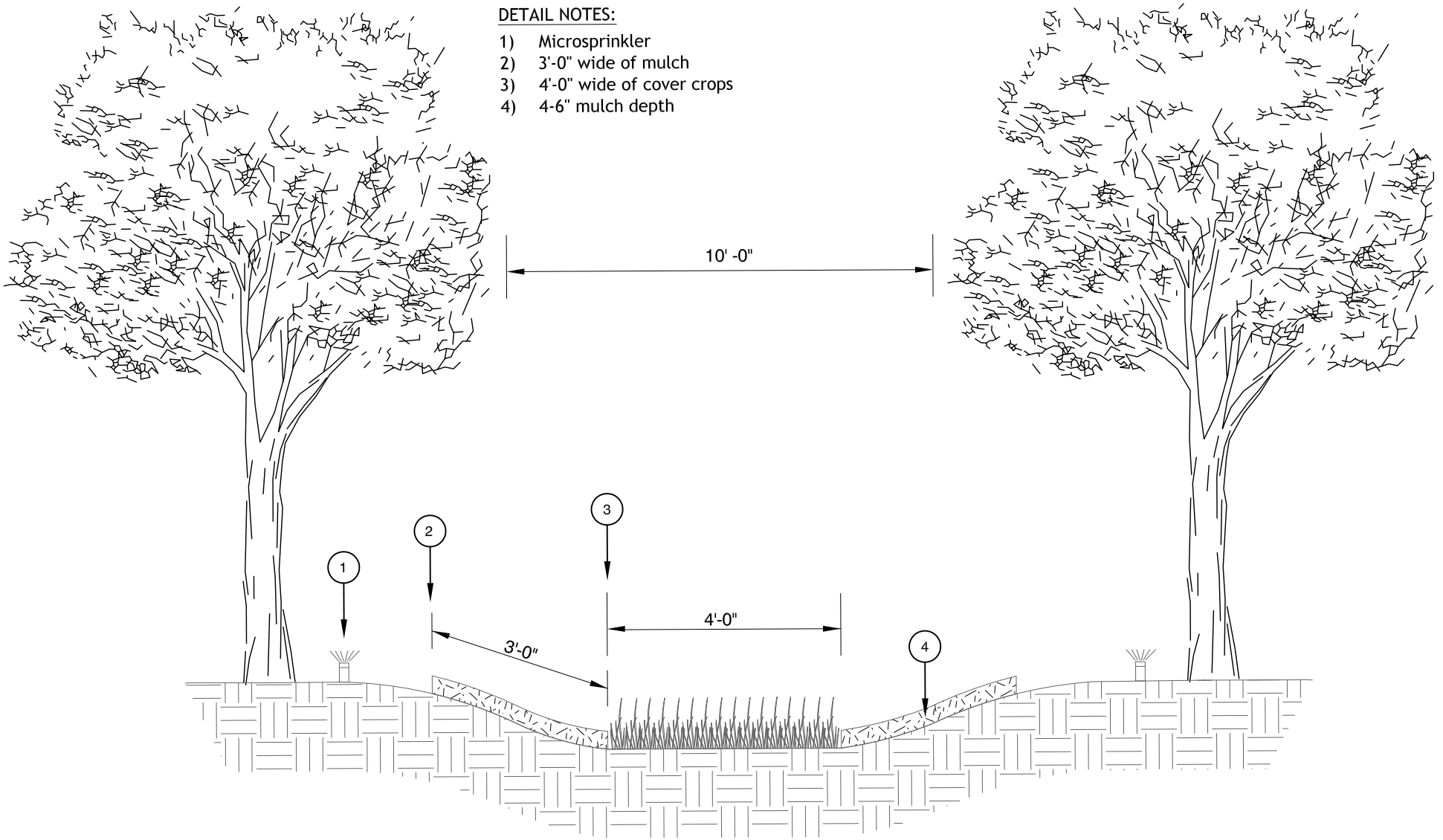
*There are outstanding questions around mulching to reduce flammability risk. Consult your local fire district for guidance and opinions.

5.1D Agricultural Buffer Zones

Construction Details and Additional Resources

DETAIL NOTES:

1) Microsprinkler
2) 3'-0" wide of mulch
3) 4'-0" wide of cover crops
4) 4-6" mulch depth

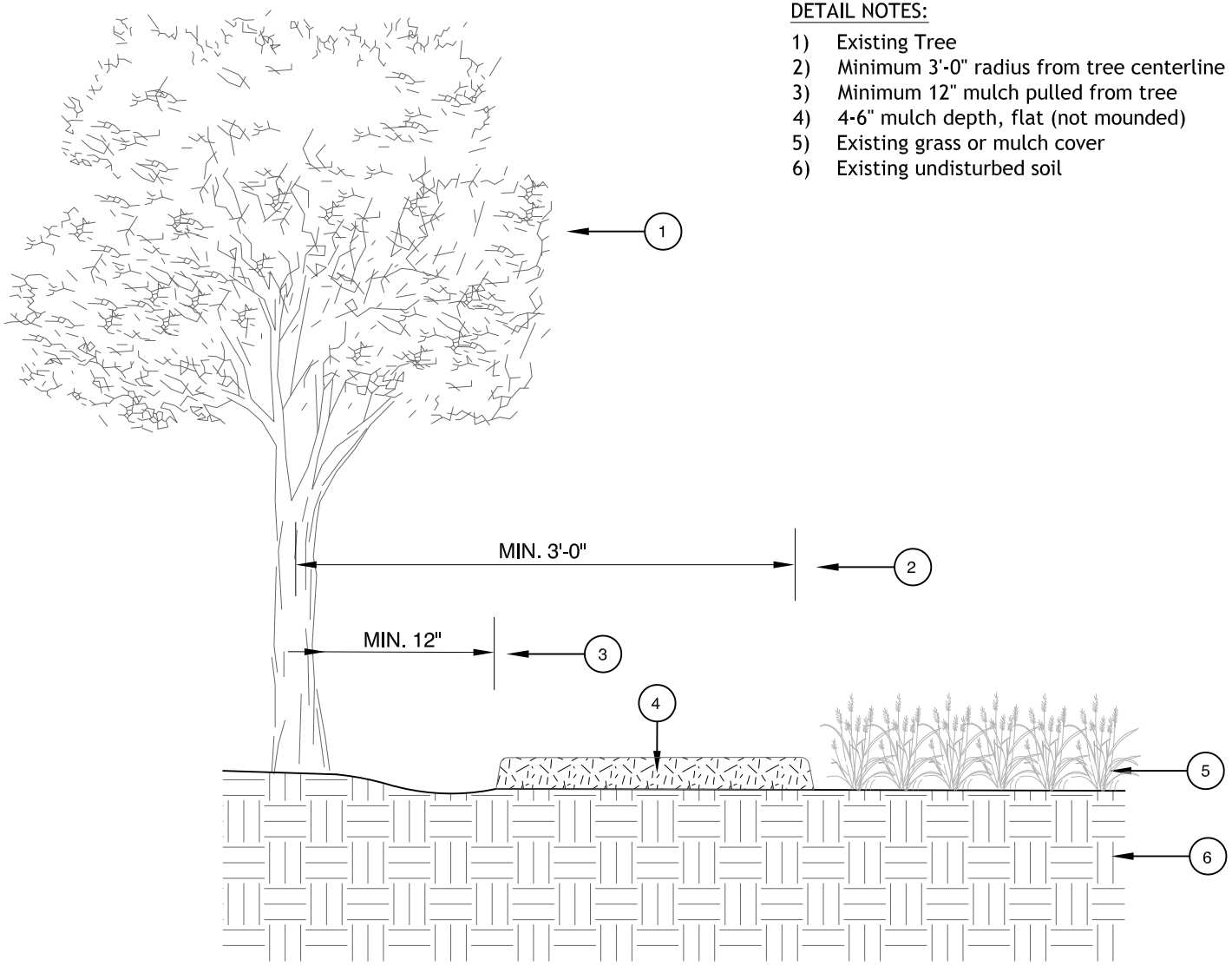


1 ORCHARD SWALE

(N.T.S)

5.2D Agricultural Buffer Zones

Construction Details and Additional Resources



DETAIL NOTES:

1) Existing Tree
2) Minimum 3'-0" radius from tree centerline
3) Minimum 12" mulch pulled from tree
4) 4-6" mulch depth, flat (not mounded)
5) Existing grass or mulch cover
6) Existing undisturbed soil

2 TREE MULCHING

(N.T.S)

Agricultural Buffer Zones

Construction Details and Additional Resources

Works Cited - Agricultural Buffer Zones

1. Nader, G., Henkin, Z., Smith, E., Ingram, R., & Narvaez, N. (2007). Planned herbivory in the management of wildfire fuels. Rangelands, 29(5), 18–24. https://doi.org/10.2111/1551-501X(2007)29[18:PHITMO]2.0.CO;2
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6. Mulch—Fire in California. (n.d.). University of California - Agriculture and Natural Resources. Retrieved June 21, 2023, from https://ucanr.edu/sites/fire/Prepare/Landscaping/Mulch/

6A Back Burnable Buffer Zones

How to create a back burnable buffer zone to reduce wildfire risk

Using Backfire to Counter Approaching Wildfire

A backfire is a controlled fire set deliberately to counter approaching wildfire. Backburning consumes combustible material before the wildfire, and creates a fire belt that slows wildfire (1). Unlike prescribed burning, which is planned fire set under predetermined weather conditions, backburns are conducted as a response to wildfire, and are higher risk. Escaped backburns can add to the wildfire (2). Backburn fires tend to be set at night when fire danger is low.

Backburning is most often a last-resort measure, and therefore requires working directly with fire personnel in the case of approaching fire. Planning for and creating a backburn zone on your property ahead of time will give firefighters an additional wildfire mitigation strategy to use if necessary, and a space from which to safely fight fire.

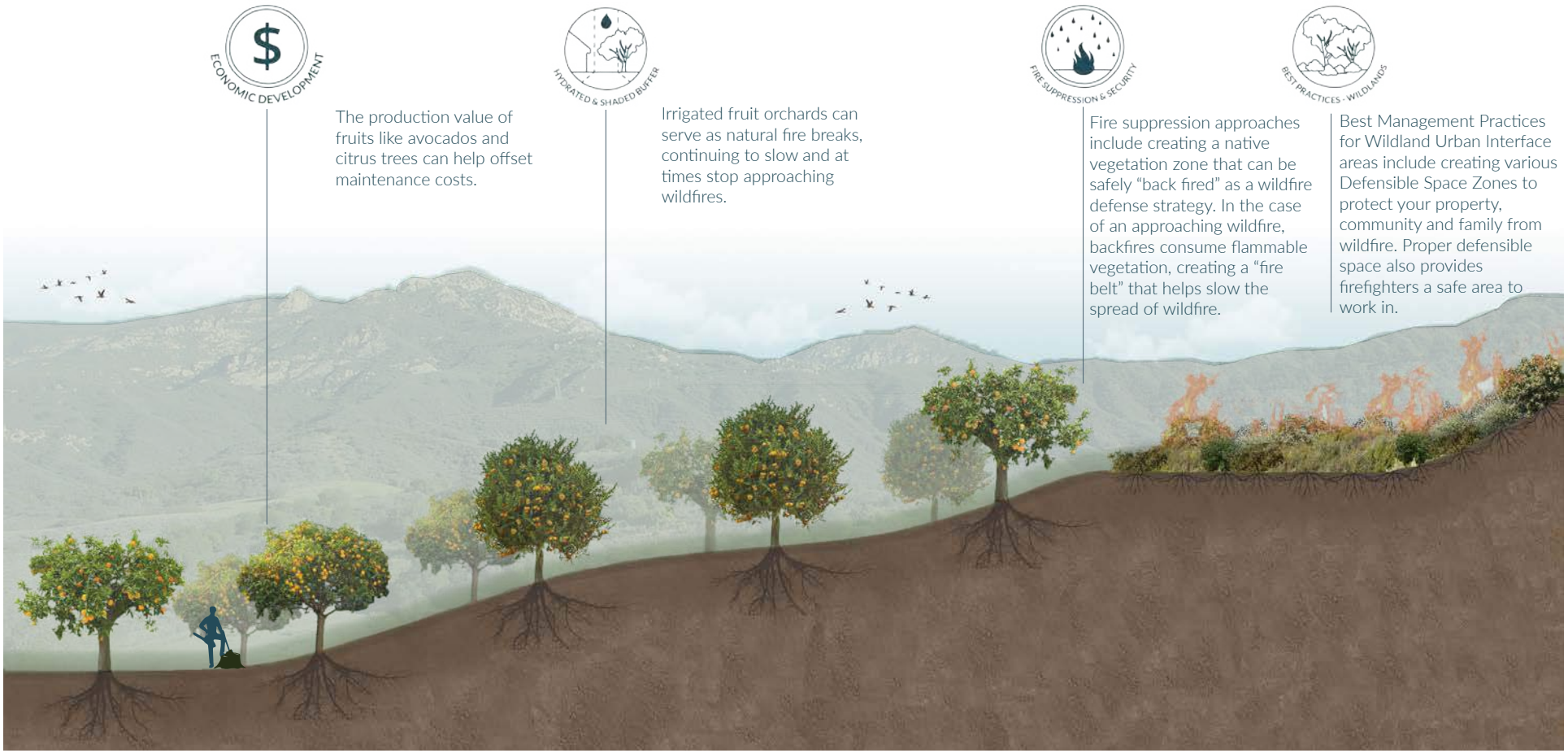


ILLUSTRATION: Basic Guidelines for Backburn Zone Placement on an Agricultural Property

6B Back Burnable Buffer Zones

Prototypical plans, sections and details for implementation

Grasses and Shrubs in the Backburn Zone
Planting backburn zones with native grasses and low shrubs creates an area that can be maintained by mowing when needed. Including plants that are drought tolerant and not highly flammable reduces the risk of a backburn escaping.

Backburn zones can be created by planting appropriate plants (see Plant Palette) on the uphill side of agricultural fields. In areas that are already dense with chaparral and other plants, selectively clearing away larger shrubs and high maintenance plants will help create an area that can be used for controlled fire.

Backburn zones set adjacent to crop fields can protect homes and other infrastructure, ideally slowing or stopping fire before it reaches the orchards, which serve as an additional buffer between wildfire and homes and communities.

- DO coordinate with local fire personnel to determine best placement for a backburn zone and a line of communication in the case of approaching wildfire.
- DO thin out thick shrubs and trees to create separation between them.
- DO consider working with design ecologists who can help plan the footprint of your backburn zone while protecting wildlife habitat or areas recovering from previous wildfires (3).
- DO NOT remove or treat threatened and endangered plant and animal species, such as elderberry and other sensitive species.

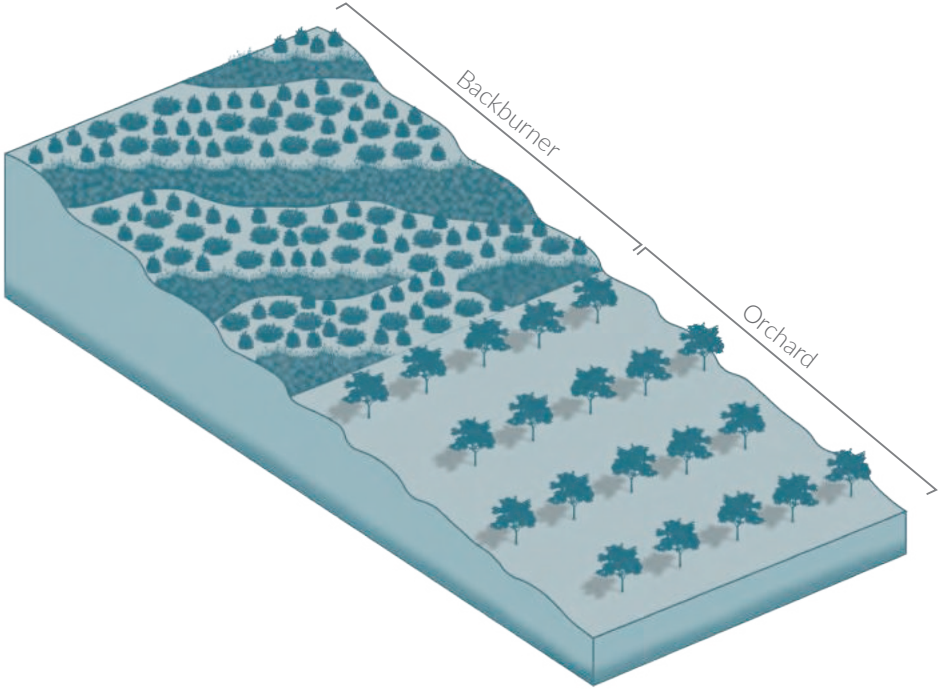


DIAGRAM: Backburn Zone
Backburn zones should be placed uphill of agricultural fields.

6.1B Back Burnable Buffer Zones

Prototypical plans, sections and details for implementation

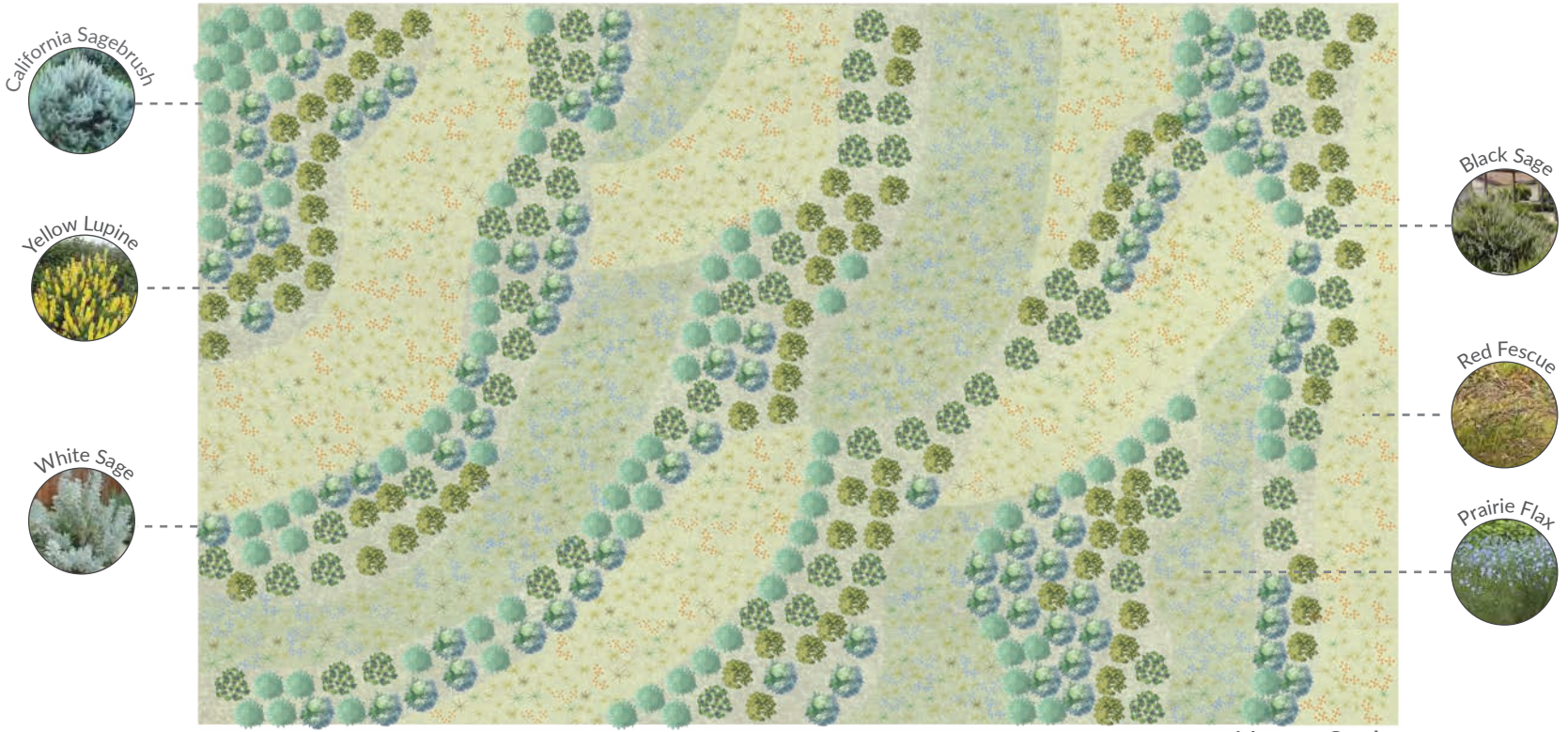


ILLUSTRATION: Backburn Zone Planting Plan

6.2B Back Burnable Buffer Zones

Prototypical plans, sections and details for implementation

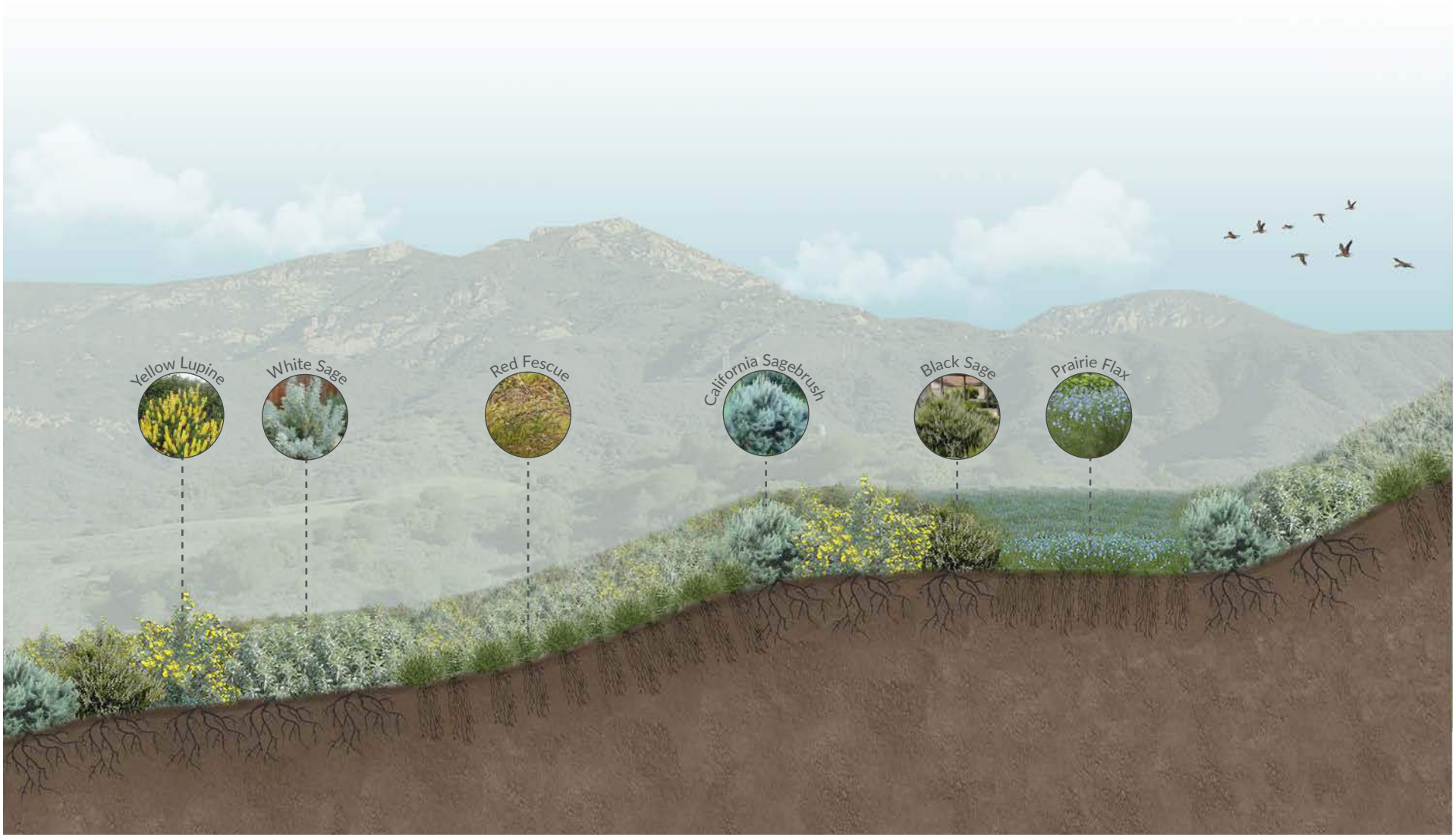


ILLUSTRATION: Backburn Zone Planting Palette on a slope.

6C Back Burnable Buffer Zones

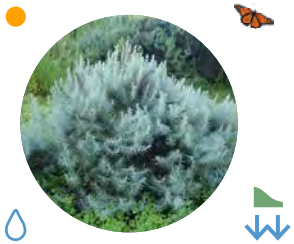
Plant Palette

SHRUBS

Eriogonum fasciculatum
California Buckwheat

Salvia apiana
White Sage

SHRUBS



Artemisia californica
California Sagebrush

Dendromecon rigida
Bush Poppy

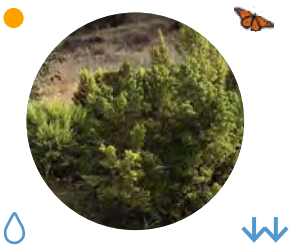
SHRUBS/PERENNIALS

Acmispon glaber
Deerweed

Eriophyllum confertiflorum
Golden Yarrow

Encelia californica
California Encelia

SHRUBS



Bacharris pilularis spp. Pilularis
Coyote Brush

Salvia mellifera
Black Sage

GRASSES

Festuca rubra
Red Fescue

Linum lewisii
Prairie Flax

SOIL DRAINAGE

- slow
- adaptable
- fast

SUN/SHADE

- full sun
- partial sun / shade
- full shade

WATER USAGE

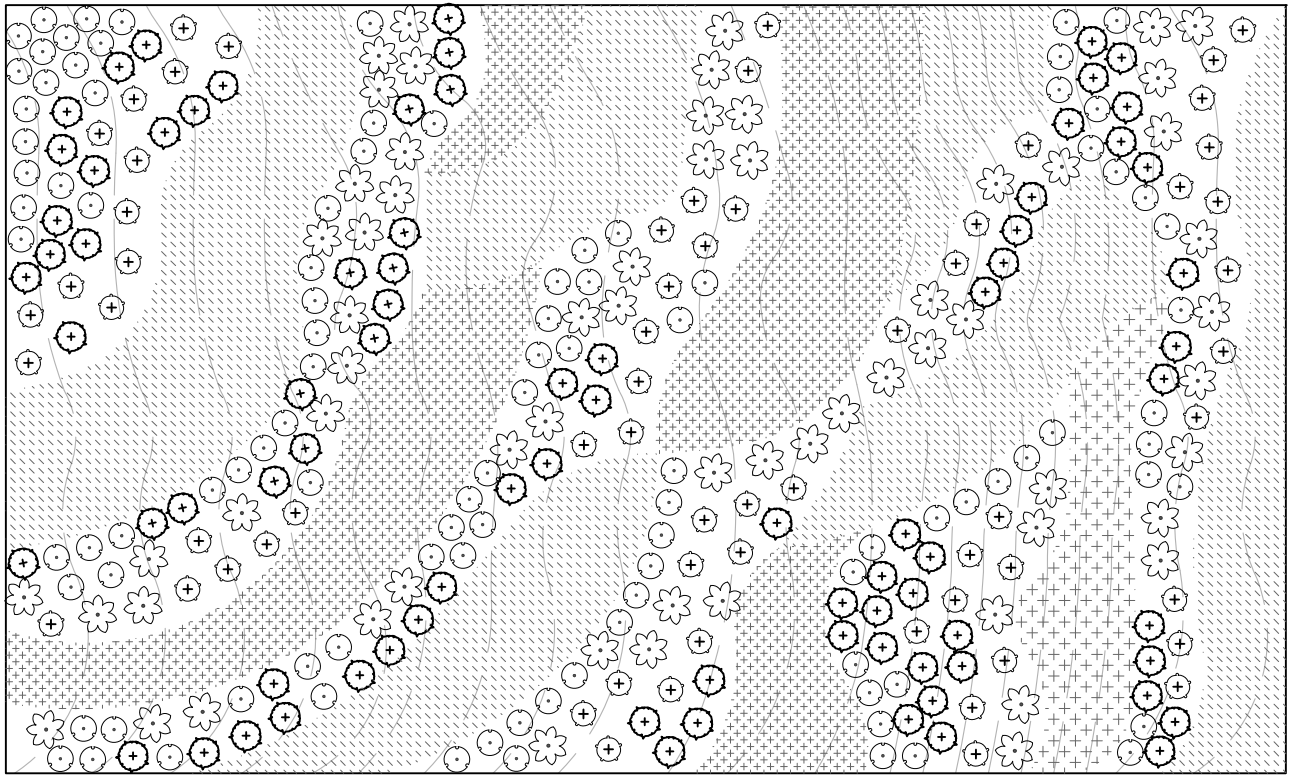
- low
- moderate
- high

OTHER CONSIDERATIONS

- erosion control
- pollinator
- fire resistant with maintenance

6D Back Burnable Buffer Zones

Construction Details and Additional Resources



SCALE: 1"=30'

0 30

PLANT SCHEDULE

SHRUBS	COMMON / BOTANICAL NAME
	California Sagebrush Artemisia californica
	Bush Poppy Dendromecon rigida
	White Sage Salvia apiana
	Black Sage Salvia mellifera

GROUND COVERS	COMMON / BOTANICAL NAME
	Red Fescue Festuca rubra
	Lewis Flax Linum lewisii

1 BACK-BURNER PLANTING PLAN

Back Burnable Buffer Zones

Construction Details and Additional Resources

Works Cited - Back Burnable Buffer Zones

1. Prevention & Control: Using back fire to combat wildfire. (n.d.). Prevention & Control: Using Back Fire to Combat Wildfire | CTIF - International Association of Fire Services for Safer Citizens through Skilled Firefighters. Retrieved June 21, 2023, from https://ctif.org/news/prevention-control-using-back-fire-combat-wildfire
2. Fire management issues papers number 06: Backburning. Tasmania Parks and Wildlife Services. (n.d.). https://parks.tas.gov.au/Documents/Backburning.pdf
3. Bowman, D. (2014, August 7). Explainer: Back burning and fuel reduction. The Conversation. http://theconversation.com/explainer-back-burning-and-fuel-reduction-20605