Design Templates for Wildfire Mitigation & Landscape Resilience

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

Riparian Corridor and Drainage Restoration

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

A 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.

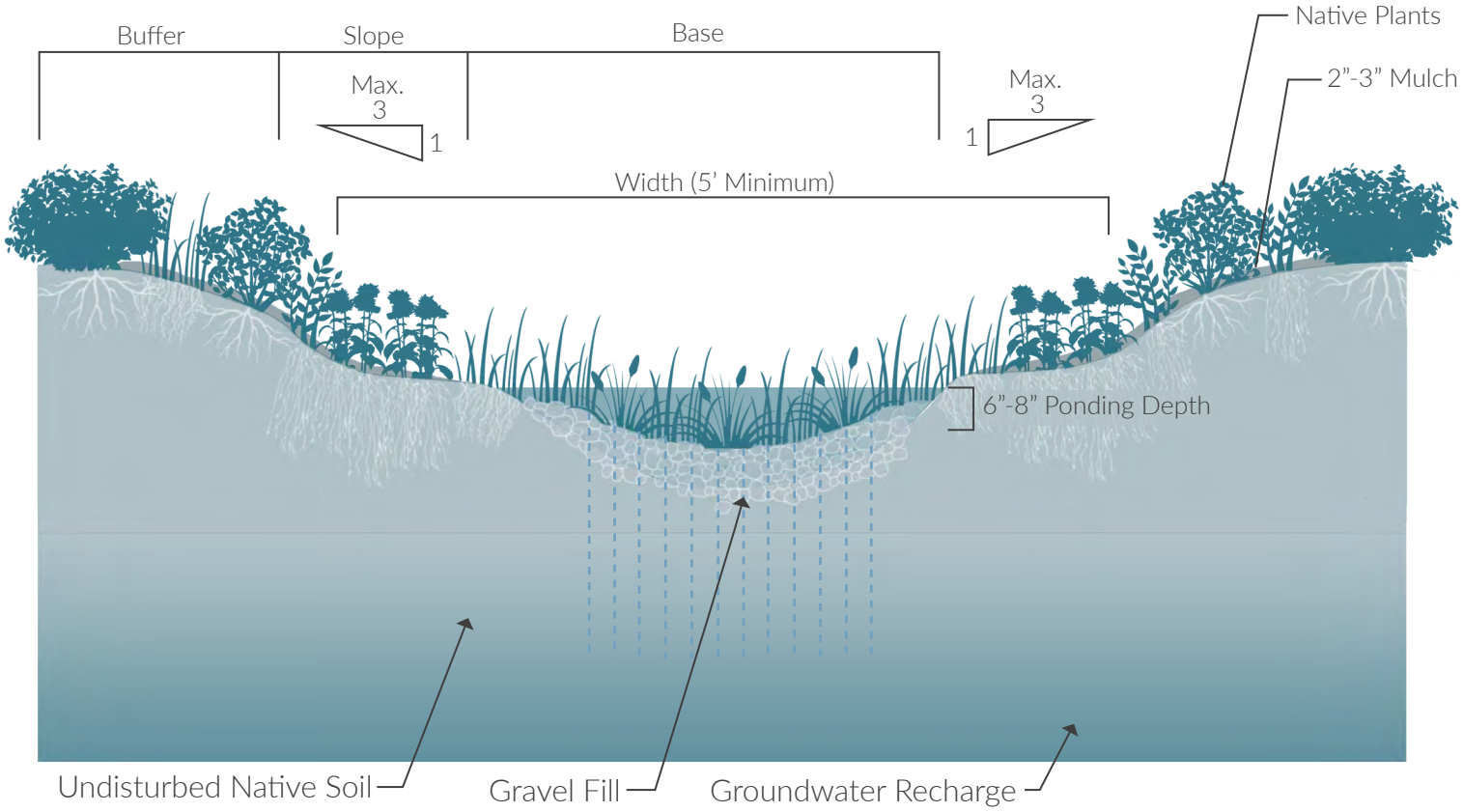


DIAGRAM: Basic Guidelines for Prototypical Design of Bioswale

A2 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.**

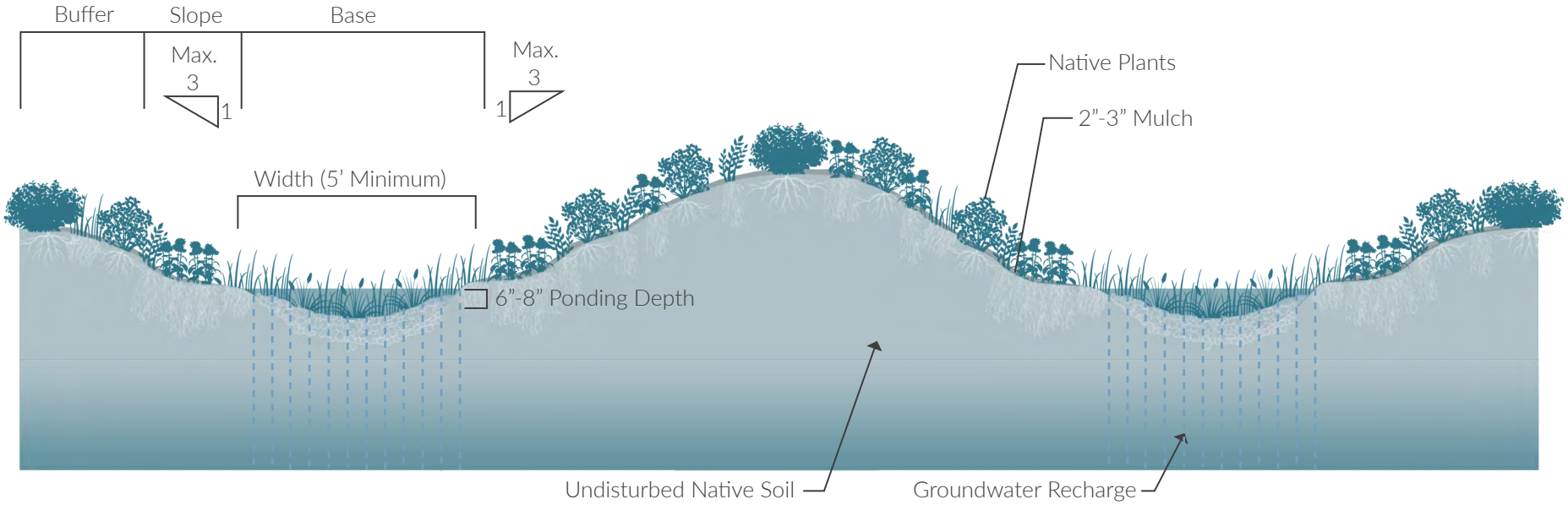
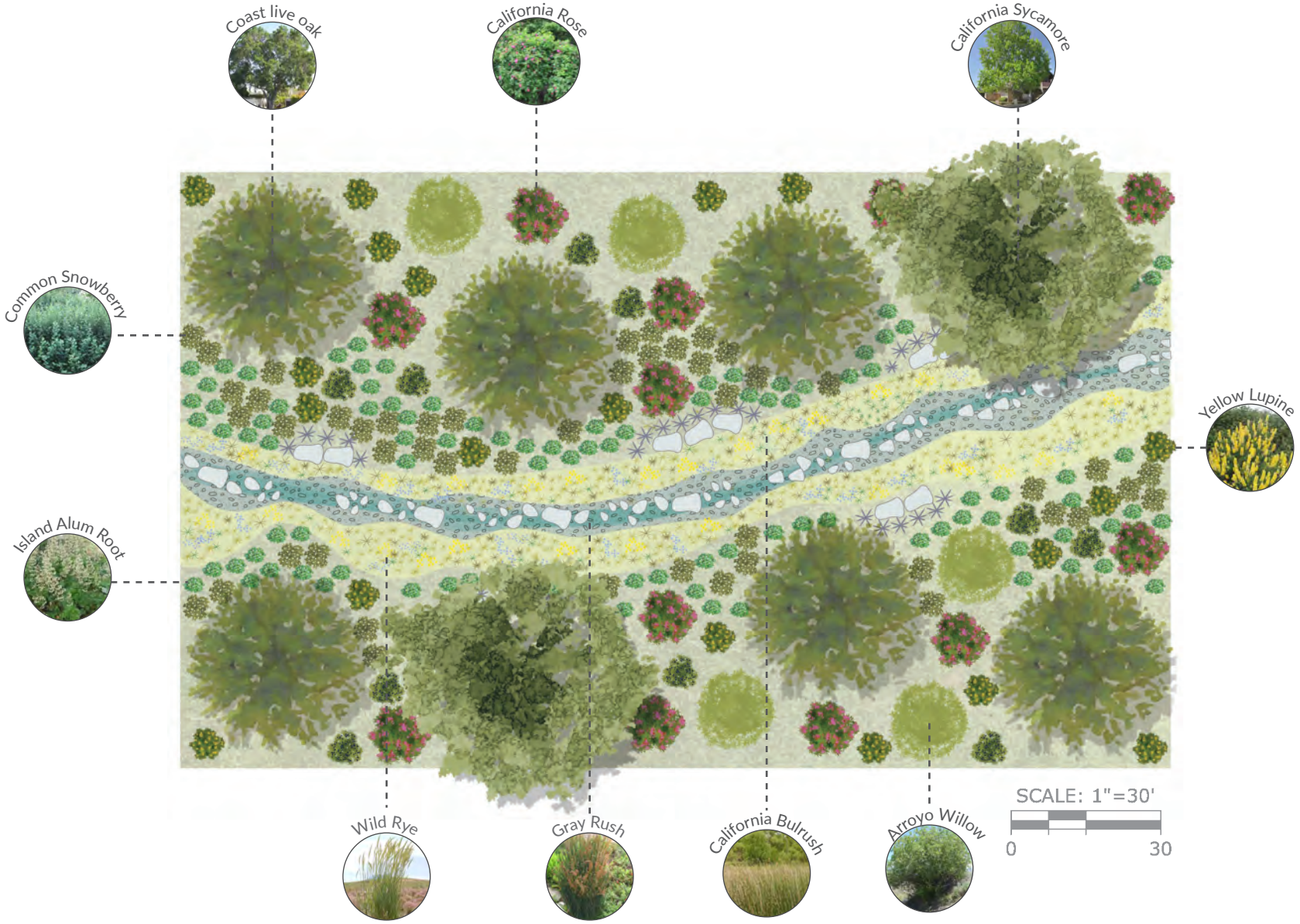


DIAGRAM: Basic Guidelines for Prototypical Design of Bioswale on Contour

B 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.

B2 Riparian & Drainage Restoration

Prototypical plans, sections and details for implementation

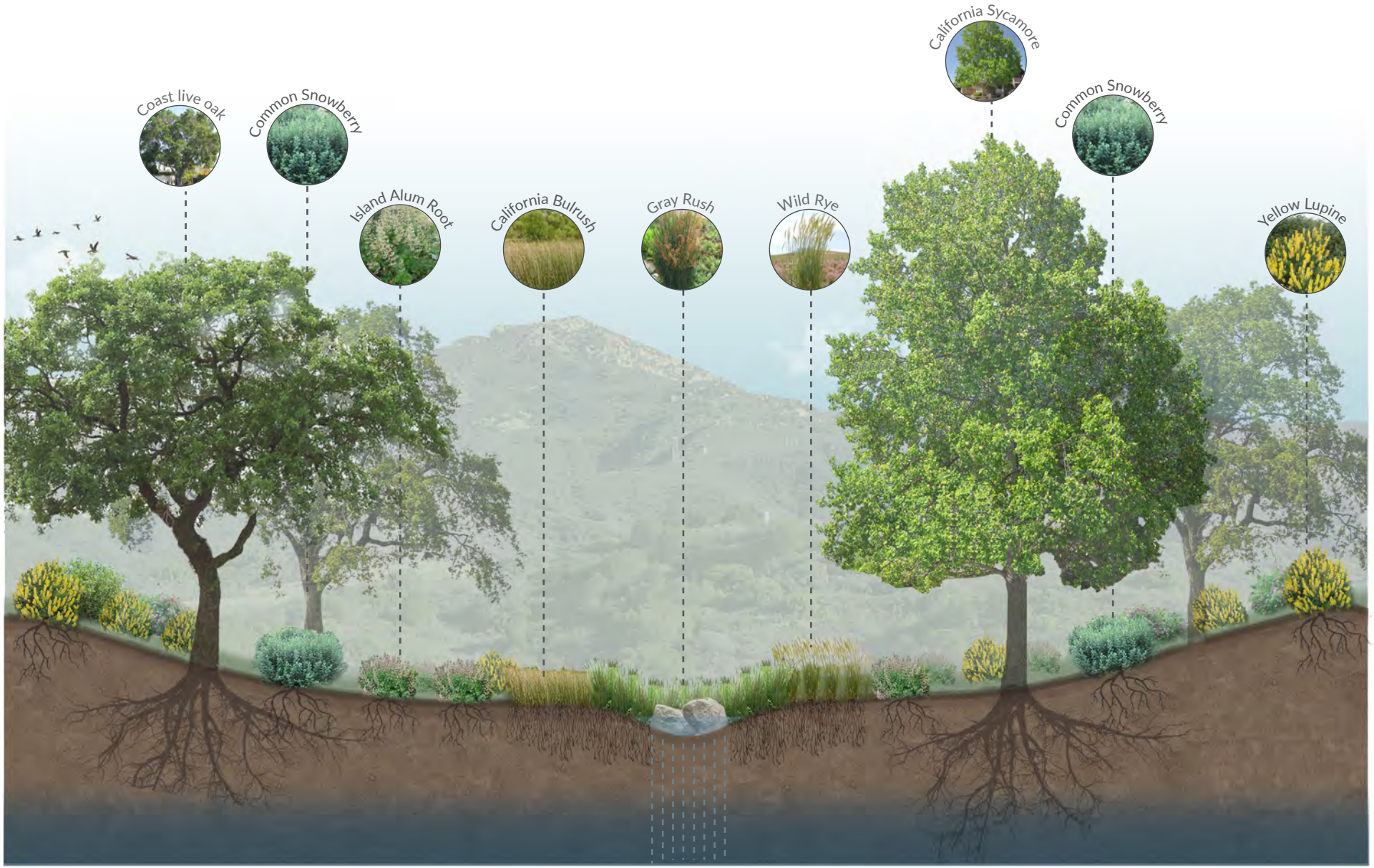
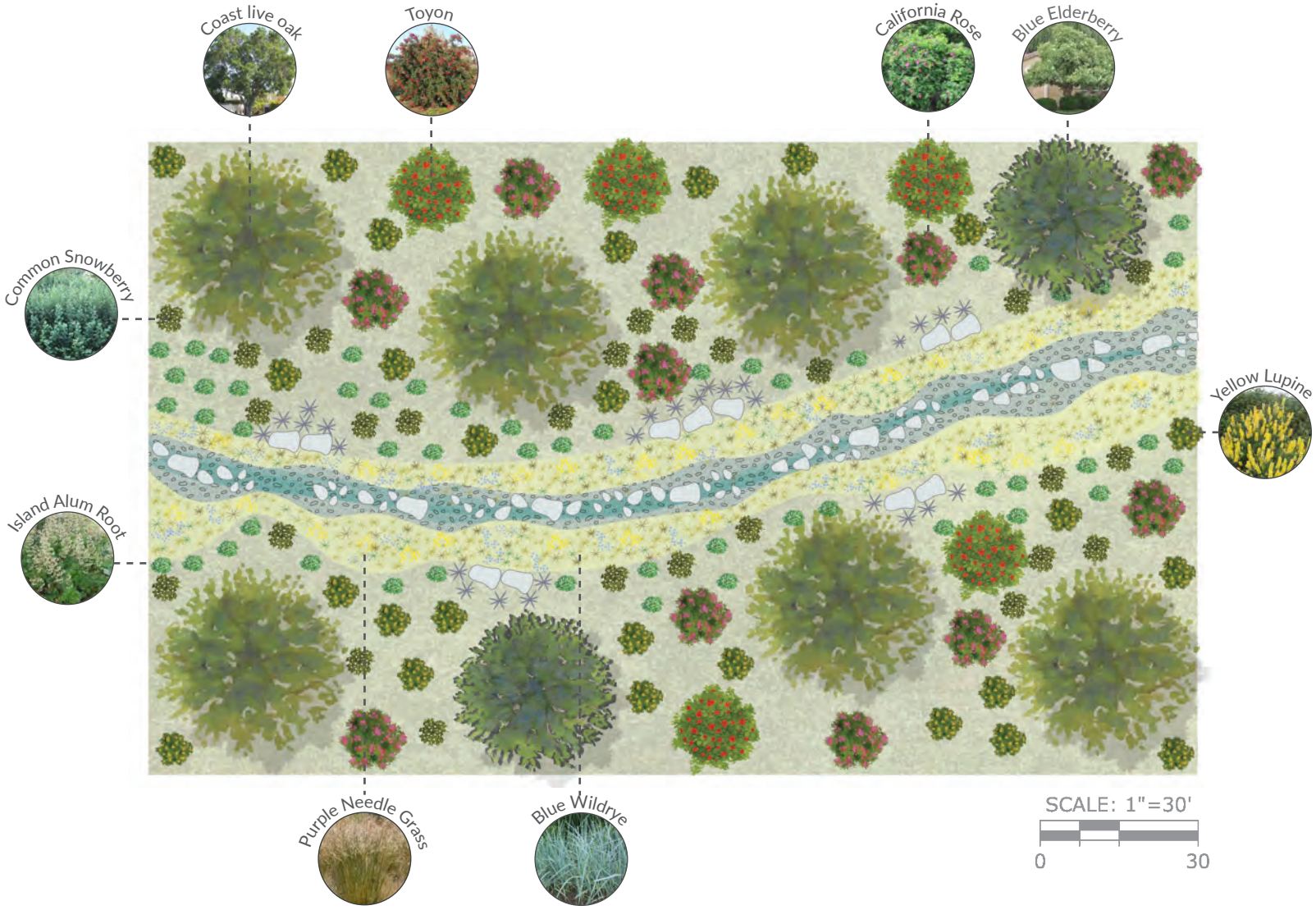


ILLUSTRATION: Riparian and Drainage Restoration
Restoring year-round creeks and maintaining drainage zones helps capture and infiltrate stormwater, keeping the ground cool and moist.

B3

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.

B4 Riparian & Drainage Restoration

Prototypical plans, sections and details for implementation

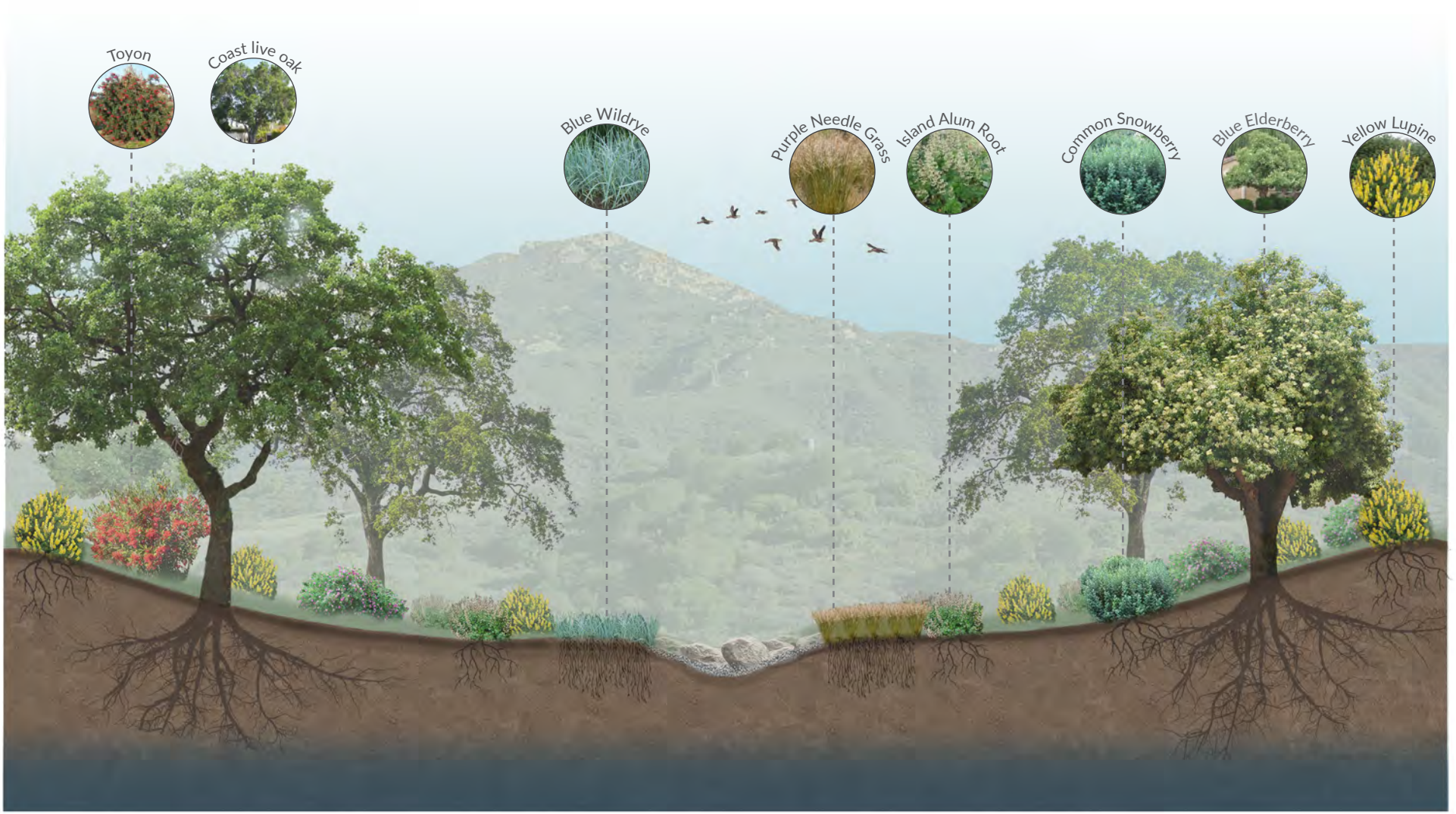


ILLUSTRATION: Dry Creek
Restoring and protecting dry creeks helps capture and infiltrate stormwater in large storm events, keeping ground cool and

C

Riparian & Drainage Restoration

Plant Palette for riparian zones

TREES

Quercus lobata
Valley Oak

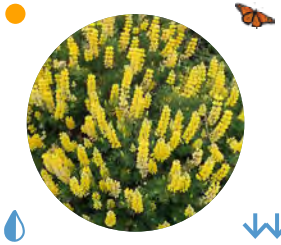
Platanus racemosa
California Sycamore

Populus trichocarpa
Black Cottonwood

SHRUBS

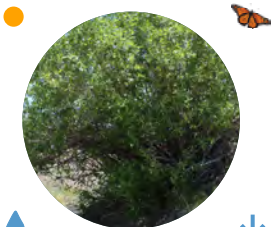
Rosa california
California Wildrose

Symphoricarpos albus
Common Snowberry



Lupinus arboreus
Coastal Bush Lupine

SHRUBS/PERENNIALS



Salix lasiolesis
Arroyo Willow

Rubus ursinus
Pacific Blackberry

Heuchera maxima
Island Alum Root

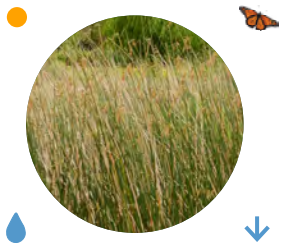
GRASSES

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*

C2

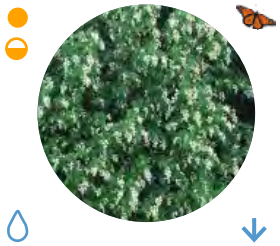
Riparian & Drainage Restoration

Plant Palette for dry creeks

TREES

Quercus agrifolia
Coast Live Oak

SHRUBS



Ribes indecorum
White Flowering Currant

SHRUBS

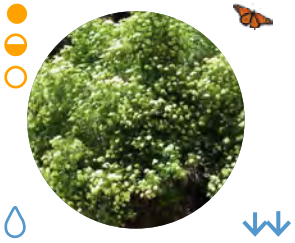
Ribes aureum
Golden Currant

SHRUBS

Arcostaphylos glauca
Big Berry Manzanita

GRASSES/PERENNIALS

Elymus glaucus
Blue Wild Rye



Sambucus mexicana
Blue Elderberry

Diplacus aurantiacus
Bush Monkeyflower

Trichostema lanatum
Woolly Bluecurls

Heteromeles arbitufolia
Toyon

Achillea millefolium
Common Yarrow

Rosa Californica
California Wildrose

Bacharris pilularis spp. Pilularis
Coyote Brush

SOIL DRAINAGE

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

SUN/SHADE

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

WATER USAGE

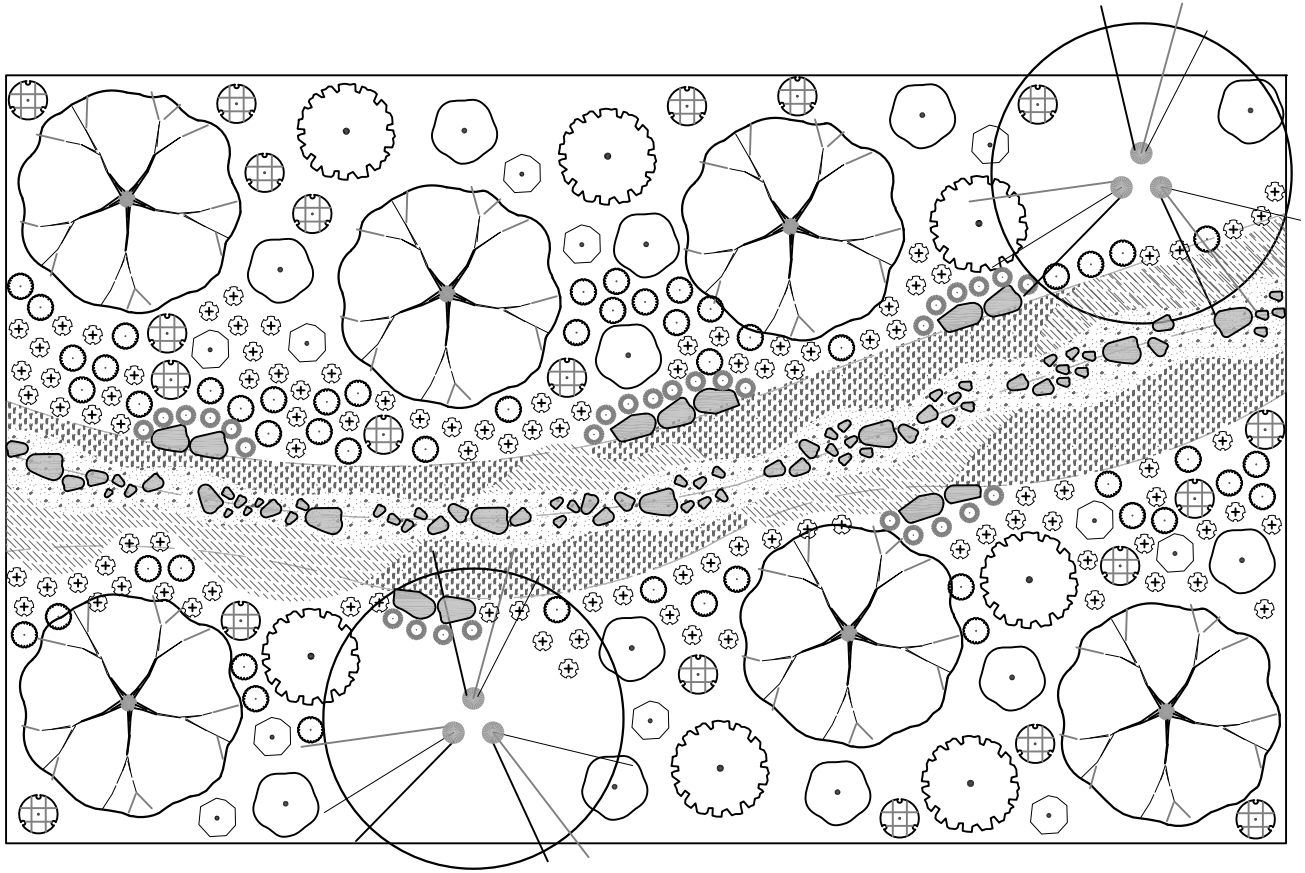
- *low*
- *moderate*
- *high*

OTHER CONSIDERATIONS

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

D Riparian & Drainage Restoration

Construction Details and Additional Resources



SCALE: 1"=30'

0 30

1 RIPARIAN CORRIDOR AND DRAINAGE RESTORATION

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

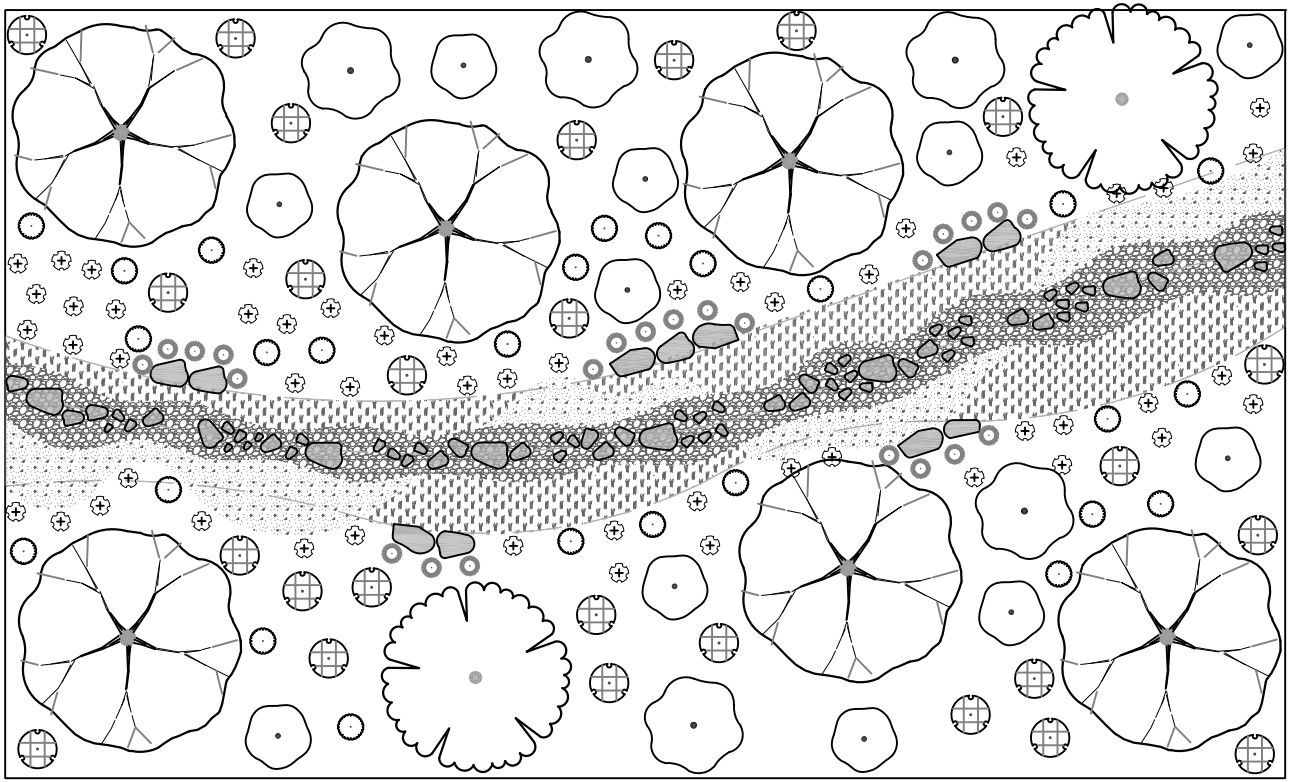
GROUND COVERS	COMMON / BOTANICAL NAME
	California Gray Rush Juncus patens
	Wild Rye Leymus triticoides
	California Bulrush Schoenoplectus californicus

LEGEND

BOULDERS (OPTIONAL)

Riparian & Drainage Restoration

Construction Details and Additional Resources



SCALE: 1"=30'

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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

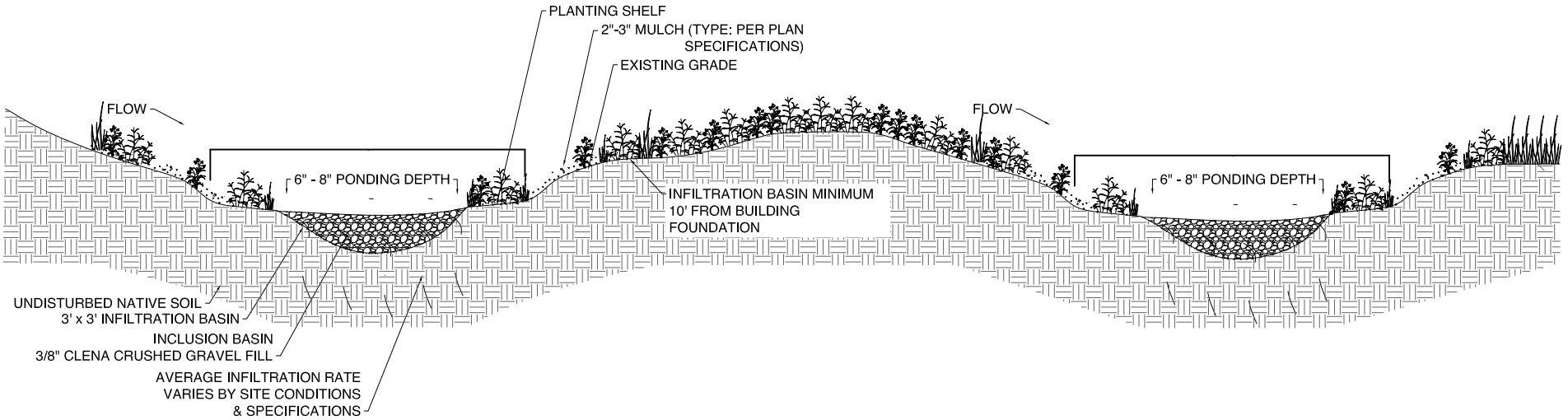
BOULDERS

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

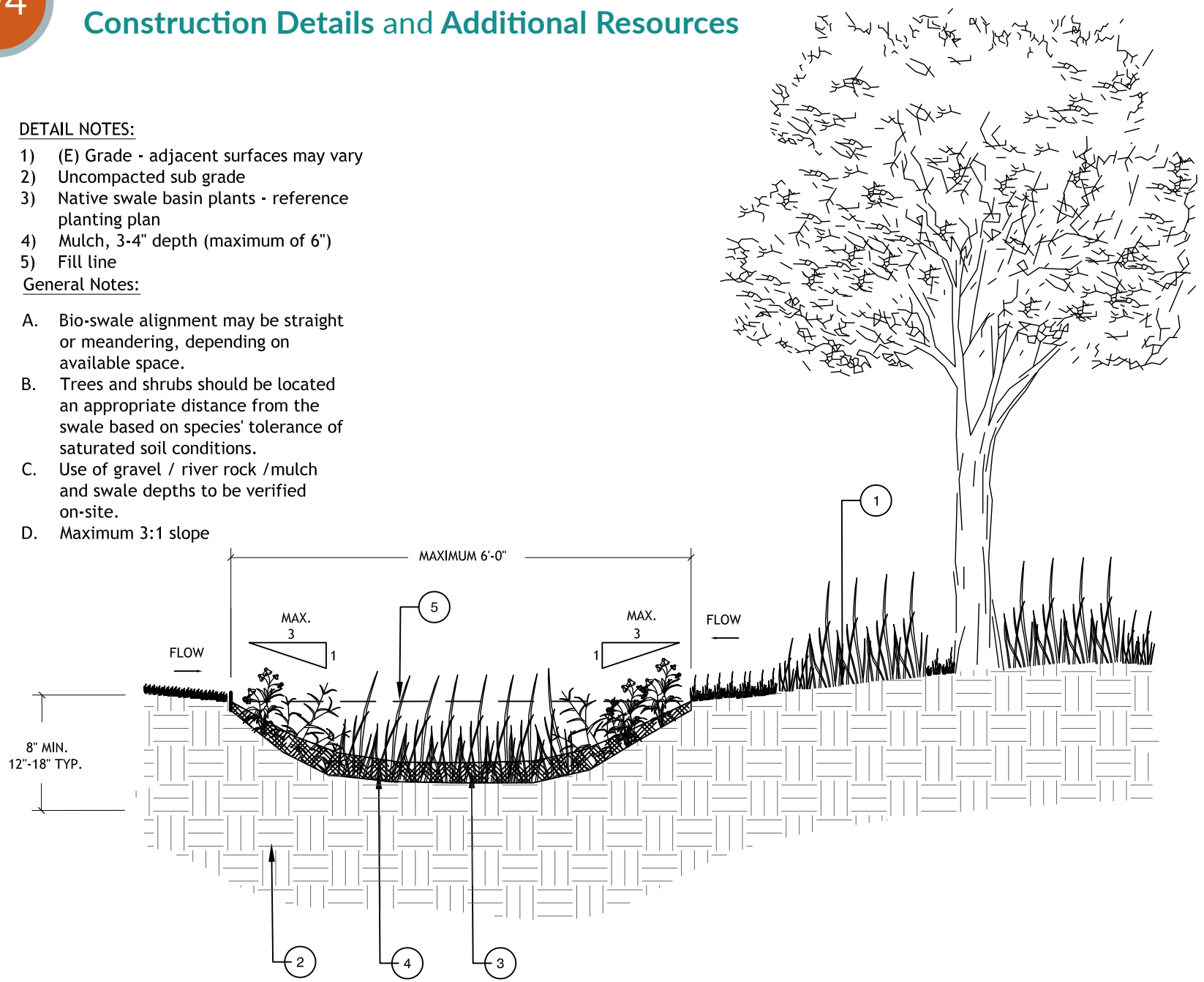
Construction Details and Additional Resources

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)

Works Cited - Riparian and Drainage Restoration

1. Kalber, M., & Trautwein, B. (2021). GOLETA WATERSHEDS AND WILDLAND-URBAN INTERFACES: ENHANCING FIRE SAFETY AND RIPARIAN FOREST HEALTH. Environmental Defense Center. https://www.environmentaldefensecenter.org/wp-content/uploads/2021/08/EDC_2021_FireSafety_RiparianHealthReport_2021_08_11.pdf

2. Baird, K. J., Stromberg, J. C., & Maddock, T. (2005, August 29). Linking riparian dynamics and groundwater: An Ecohydrologic approach to modeling groundwater and riparian vegetation - environmental management. SpringerLink. https://link.springer.com/article/10.1007/s00267-004-0181-z

3. Thiel, B., & Aston, D. (2003, June). Santa Barbara County Creek Care Guide. Santa Barbara; Santa Barbara County Creek Care Guide. https://content.civicplus.com/api/assets/c391bc57-2956-4a1d-82a3-235e410cf7a9?cache=1800

4. Dybala, K. E., Engilis, A., Trochet, J. A., Engilis, I. E., & Truan, M. L. (2018). Evaluating Riparian Restoration Success: Long-Term Responses of the Breeding Bird Community in California's Lower Putah Creek Watershed. Ecological Restoration, 36(1), 76–85. https://doi.org/10.3368/er.36.1.76

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