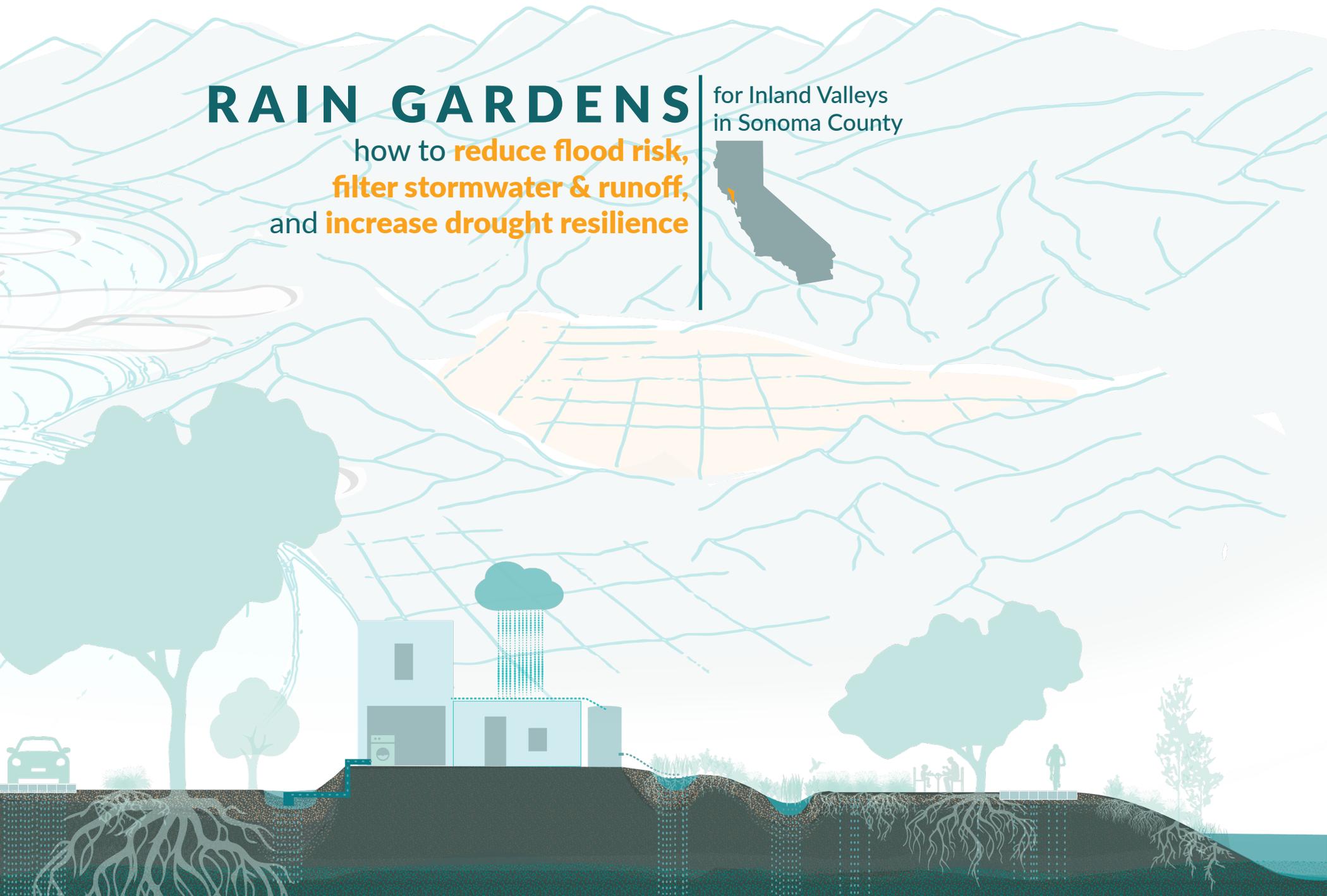




# RAIN GARDENS

how to **reduce flood risk,**  
**filter stormwater & runoff,**  
and **increase drought resilience**

for Inland Valleys  
in Sonoma County



# 1

## RAIN GARDENS

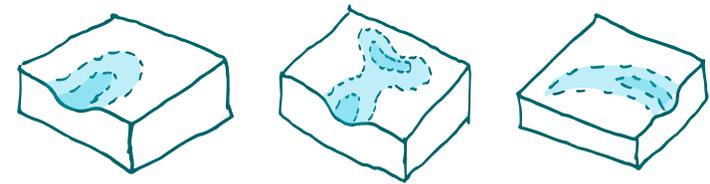
What is a **rain garden**?

What makes it a critical drought-resilient tool?



Rain gardens slow, spread, and sink rain water by pooling water in landscape depressions, thereby allowing water to collect, stop, and sink into the earth. In turn, this can save you money, irrigate your landscape, and recharge your local aquifer!

At their simplest, rain gardens are planted depressions in the landscape that can take on many forms. Some large, some small, some linear, some rotund. Linear rain gardens can convey water and are called *bioswales*.



Rain gardens are critical features in a drought resilient landscape. The diagram below shows how they function and interact with other drought resilient tools to bring about local and regional water benefits.

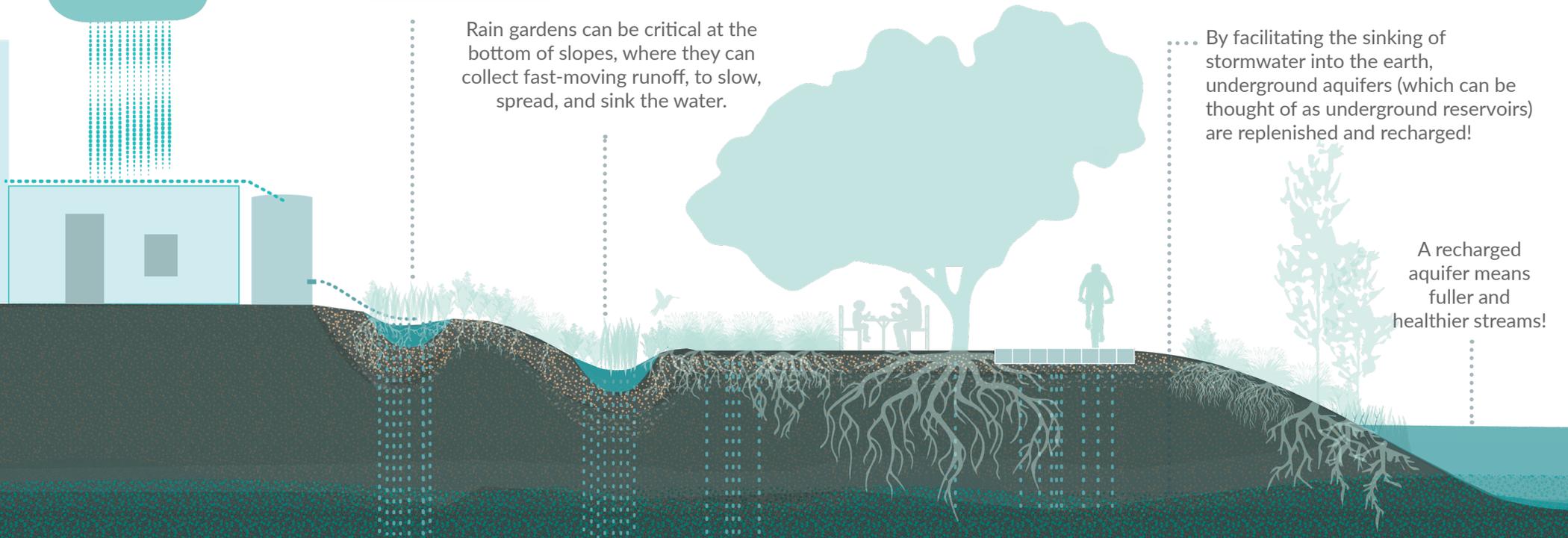


Rain gardens can catch overflows from roofs via [rainwater harvesting](#)!

Rain gardens can be critical at the bottom of slopes, where they can collect fast-moving runoff, to slow, spread, and sink the water.

By facilitating the sinking of stormwater into the earth, underground aquifers (which can be thought of as underground reservoirs) are replenished and recharged!

A recharged aquifer means fuller and healthier streams!



# 2

## RAIN GARDENS

What are the zones of a **rain garden**, best design practices, and other resources



### ZONES OF A RAIN GARDEN

#### ZONE 3

These are the outer edges of the rain garden. As the plantings here have the lowest water needs of the garden, use [Climate Appropriate Plantings](#).

#### ZONE 2

These are the slopes of the rain garden (at no more than 3:1). Plants here have intermediate water needs.

#### ZONE 1

This is the basin of the rain garden. This is where water collects and is held, slowly infiltrating into the ground and recharging the aquifer. Because water will pool here during rain events, the plantings in Zone 1 must have the capacity to tolerate periods of inundation and drought, or receive supplemental irrigation.

### ADDITIONAL RAIN GARDEN DESIGN REOUSRCES

[Daily Acts: Rain Gardens 101](#)

[Get Busy Gardening](#)

[Gardening Know How](#)

[Sonoma-Marín Saving Water Partnership](#)

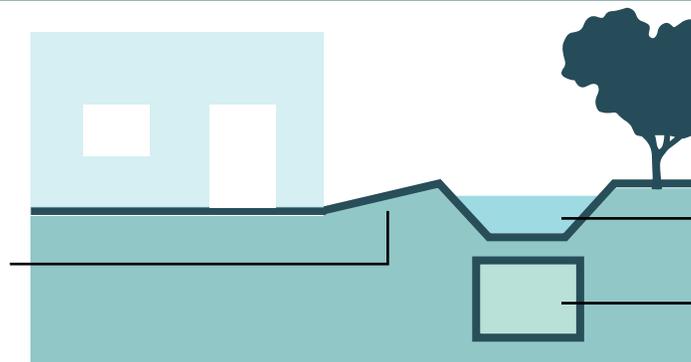
✓ DO make 6" to 18" deep



✓ DO slope sides at a 3:1 slope

### RAIN GARDEN DO NOT'S

✗ DO NOT slope rain garden toward building or place within 10' of foundation



✗ DO NOT put rain garden within drip line of exiting trees

✗ DO NOT make rain garden too deep

✗ DO NOT put rain garden over septic

# 3

# RAIN GARDENS

## How to construct a rain garden for a DIY design-build

### 1. Feasibility

- ✓ Identify/measure stormwater runoff sources such as:
  - a. Rooftop downspouts
  - b. Hard/paved surfaces
  - c. Uphill landscapes
- ✓ Identify a landscape area on your site for the rain garden that is:
  - a. A gentle down slope from one or more runoff source
  - b. A minimum of 10' away from buildings and property lines
- ✓ Understand your site's soils:
  - a. Determine your site's soil types and characteristics using: <https://websoilsurvey.sc.egov.usda.gov>
  - b. The best soils for rain gardens are well draining (not clayey).
- ✓ Perform a percolation test:
  - a. Follow steps at: <https://greywateraction.org/how-do-percolation-test/>
  - b. Ideal percolation rate is greater than 0.5 inches/hour.

### 2. Design

- ✓ Calculate potential runoff volume:
  - a. How many square feet is your rooftop or other source catchment area?
  - b. Use 0.22 ft for a 24-hour storm for Sonoma County
  - c.  $[\text{Runoff source sq. ft.}] \times [0.22 \text{ ft./storm}] \times [7.48 \text{ gal./cubic ft.}] = \text{Design Runoff Volume (gal.)}$
- ✓ Determine the size and shape of your rain garden to match Design Runoff Volume: Minimum depth of 6" and maximum of 18".
- ✓ Plan bioswales to convey stormwater to the rain garden.
- ✓ Determine path for overflow of rain garden in large storms: An overflow drain pipe, a perforated underdrain, or a reinforced low point to an existing drainage path.

### 3. Planting

- ✓ Use climate appropriate plants that don't need irrigation after establishment. Species that grow natively in dry creeks are well-suited to rain gardens.
- ✓ Place plants that prefer more moisture at the bottom of the rain garden basin: Plant species with a lower water demand but that can tolerate occasional saturation along edges of rain garden slopes. Group plants according to their size/space and sun/shade requirements.
- ✓ Minimize soil compaction from walking: Consider pathway locations you will use to weed and maintain the garden.
- ✓ Use mostly evergreen plant materials: Make sure that the majority of your plants are active all year rather than deciduous/dormant.
- ✓ Arrange to cover at least 80% of the rain garden in the first year of growth: This will help stabilize soil during storm flows.

### 4. Build It!

- ✓ Call 811: Always call first to identify underground utilities before you dig. Avoid existing tanks, pipes, and other utilities during construction.
- ✓ Dig bioswales: Start from downspout or other water source to rain garden, maintaining a minimum 2% slope away from all buildings.
- ✓ Dig rain garden basin: Designed depth (6-18" at lowest point), accounting for a minimum of 3" of mulch on top of soil at finished grade.
- ✓ Dig a deeper basin: In areas with space constraints, lower infiltration rates, or where additional volume is needed, deepen basin depth and backfill with gravel.
- ✓ Grade at a maximum of 3:1 slope (3 foot horizontal to 1 foot vertical angle) to reduce erosion unless side slopes are retained with rock. See Detail on next page for more information.
- ✓ Layer the rain garden with 4-6 inches of coarse, woody mulch: This prevents standing water and mosquitoes, as well as encourages healthy soil and reduce weeds. River rock or gravel may also be used to cover the base of the rain garden but has less soil and plant benefit.
- ✓ Include a compacted, raised berm: This "wall" must be constructed around the low side of the rain garden to prevent uncontrolled overflow on a sloped site. See photos for example.



Photo 1: 'Before' conditions.



Photo 2: Trench dug.



Photo 3: Gravel layers placed in trench.



Photo 4: Plants installed



Photo 5: Success!

# 6

# RAIN GARDEN

## RAIN GARDEN PLANTS



### SOIL DRAINAGE

- ↓↓↓ fast
- ↓ slow
- ↓↓ adaptable

### POLLINATOR

- butterfly / moth
- bird
- bee

### SUN/SHADE

- full sun
- ◐ partial sun / shade
- full shade

### OTHER CONSIDERATIONS

- erosion control
- edible

### TREES



*Aesculus californica*  
California Buckeye

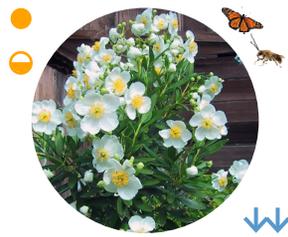


*Prunus ilicifolia*  
Hollyleaf Cherry



*Quercus agrifolia*  
Coast Live Oak

### SHRUBS



*Carpinteria californica*  
Bush Anemone



*Cercis occidentalis*  
Western Redbud



*Dendromecon rigida*  
Bush Poppy

### SHRUBS



*Heteromeles arbutifolia*  
Toyon



*Rhamnus californica*  
Coffeeberry



*Romneya coulteri*  
Matilija Poppy

### SHRUBS



*Ceanothus spp.*  
California Lilac



*Diplacus/Mimulus longiflorus*  
Sticky Monkeyflower



*Sambucus nigra*  
Black Elderberry

### SHRUBS



*Ribes aureum*  
Golden Currant

# 7

# RAIN GARDEN

## RAIN GARDEN PLANTS



MEDIUM WATER USE  
**ZONE 2**



SOIL DRAINAGE

- fast
- slow
- adaptable

POLLINATOR

- butterfly / moth
- bird
- bee

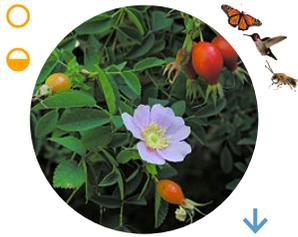
SUN/SHADE

- full sun
- partial sun / shade
- full shade

OTHER CONSIDERATIONS

- erosion control
- edible

SHRUBS



*Rosa californica*  
California Wild Rose

SHRUBS



*Trichostema lanatum*  
Woolly Blue Curls

PERRENNIALS



*Achillea millefolium*  
Yarrow

PERRENNIALS



*Iris douglasiana*  
Douglas Iris

GRASSES



*Calamagrostis foliosa*  
Mendocino Reed Grass



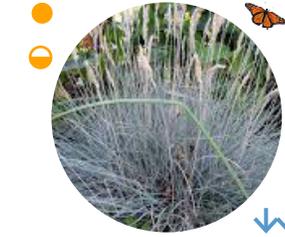
*Rubus ursinus*  
California Blackberry



*Eschscholzia californica*  
California Poppy



*Monardella villosa*  
Coyote Mint



*Festuca glauca*  
Blue Fescue



*Salvia apiana*  
White Sage



*Solidago velutina*  
*ssp. californica*  
California Goldenrod



*Leymus condensatus*  
Canyon Prince Wild Rye

# 8

# RAIN GARDEN

## RAIN GARDEN PLANTS



HIGHER WATER USE\*

**ZONE 1**



### SOIL DRAINAGE

- ↓↓↓ fast
- ↓ slow
- ↓↓ adaptable

### POLLINATOR

- butterfly / moth
- bird
- bee

### SUN/SHADE

- full sun
- ◐ partial sun / shade
- full shade

### OTHER CONSIDERATIONS

- erosion control
- allelopathic: consult [Calscape](#) for context and companion plants

### TREES\*\*

●  
◐  
▲  
↓

*Juglans californica*  
California Black Walnut

●  
↓

*Platanus racemosa*  
Sycamore

●  
◐  
↓

*Salix laevigata*  
Red Willow

### PERRENIALS

●  
◐  
↓↓↓

*Fragaria chiloensis*  
Beach Strawberry

●  
◐  
○  
↓↓↓

*Heuchera maxima*  
Coral Bells

### GRASSES

●  
↓↓

*Carex praegracilis*  
California Field Sedge

●  
↓↓

*Juncus textilis*  
Basket Rush

●  
◐  
↓↓

*Sisyrinchium bellum*  
Blue Eyed Grass

### GRASSES

●  
↓

*Juncus patens*  
California Gray Rush

\*Plants may require supplemental irrigation

\*\*Trees only appropriate for very large rain gardens