

**Appendix F -  
Plant List & Guidelines for Landscape-Based Stormwater Measures**



# Appendix F - Plant List & Guidelines for Landscape-Based Stormwater Measures

## Introduction

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Of the list of Best Management Practices published by the EPA, the following depend on plant material for their success:

- Infiltration Basin;
- Grassed Channel;
- Infiltration Trench;
- Vegetated Filter Strip;
- Dry Swale;
- Bioretention;
- Dry Detention Pond;
- Wet Swale;
- Wet Pond;
- Storm Water Wetland.

Therefore, the careful selection of plant species is a critical step in successful LID design and implementation. Plants facilitate natural infiltration of surface runoff, increase evapotranspiration, reduce the 'heat island' effect of urbanized areas, and reduce the rate, volume, and pollutant loading of urban runoff that ultimately ends up in local waterways or in local aquifers.

For the drainage features to function optimally, several plant characteristics need to be considered to determine their appropriateness for that particular BMP, and more specifically, the zone at which they are located within it. Most of these characteristics are included in the LID Plant List table, but basically for each plant selection, the following need to be looked at: water requirements; tolerance for inundation; root and leaf structure; and the ability to filter pollutants.

California native plants make up the entire LID Plant List, and this is the case for several reasons: they are perfectly adapted to local environmental conditions; they generally require less water and fertilization; and they limit the impact to native habitats. Native plants are also less susceptible to pests and diseases. There are a vast number of plants native to San Luis Obispo County that should provide designers with enough choices for virtually every scenario likely to be encountered. While the list does not

within the County, it provides a good basis point for developing project specific plant palettes. Non-native species are inappropriate because they can become invasive, and water can quickly spread their occurrence and alter downstream habitats. Turf grass is also discouraged for LID drainage features due to its tendency to require large amounts of supplemental water, fertilizers, and regular maintenance.

## The Planting Zones

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### Zone A

The area at the bottom of the drainage feature where water temporarily ponds during either a rain event, or an upstream activity such as washing or irrigation. This zone should not be designed to hold water, but should completely drain within 72 hours. However, during rainy seasons, this zone may be inundated for extended periods of time. Species planted in this zone should have the following characteristics:

- Water tolerant;
- Dense root structure and vegetative cover to discourage erosion, slow runoff velocities, and provide maximum pollutant filtration.
- Native grasses and groundcovers are excellent choices for this zone.

### Zone B

This zone is the side slopes of the drainage feature, whose primary function is to slow down runoff velocity. While water passes through this area and saturates the soil, it does not stand for any period of time during typical storm events. Species planted in this zone should have the following characteristics:

- Tolerant of periodic inundation;
- Tolerant of periods without water;
- Dense root structure to provide erosion protection of side slopes.

include every suitable plant species for use

## **Planting Design Criteria**

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There are numerous conditions to consider when choosing plant species for LID drainage features. Not surprisingly, many of the species on the LID Plant List have native habitats that mimic the various and (sometimes) disparate conditions that these features employ.

The purpose of the LID Plant List is to provide a cross section of suitable plant species as a base point for the development of project specific plant palettes. Designers and property owners are encouraged to propose other species that meet the spirit of these guidelines; the County will have the discretionary right to permit or deny their use. The following characteristics should be considered when proposing new plants:

- The planting zone(s) where the plant will be located (see Planting Zones Diagram); The size of the planting area and the size of the plant species at maturity;  
Native to California, preferably to San Luis Obispo County (non-native plants are inappropriate);  
Tolerant of San Luis Obispo County's climatic patterns (such as prolonged dry periods, prevailing winds, or coastal conditions);
- Tolerant of seasonal flooding/inundation;
- Low maintenance requirements;
- Adaptability;
- Non-invasive species. (check California inventory at [www.cal-ipc.org](http://www.cal-ipc.org))

Plant species should aim to control erosion and wick water from soils. Some of the best choices for Zone A are groundcovers and grasses that quickly cover exposed soil. Low shrubs, grasses and groundcovers are suitable for the Zone B, depending on the area, gradient, soil type, and drainage patterns (sheet flow vs. concentrated flow, or flooding). Trees and larger shrubs are best planted in the Zone B where their deeper roots can provide reinforcement to the drainage feature, and absorb the infiltration.

Energy dispersion devices may be required to be installed or constructed in certain situations to protect the integrity of the drainage feature, and the vegetation itself. These situations occur where features receive a concentrated flow, and

may include such elements as gabions, weirs, or cobblestones. Where conditions absolutely demand, small areas of hardscape may be used.

## **Plant Layout**

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Some rules of thumb for planting layout of LID drainage features are:

- The smallest practical area of land should be exposed at any one time during development to minimize erosion. Erosion control measures should be integrated into planting designs, such as biodegradable erosion control mats. Plant mixes applied through a hydroseeding process should include erosion control specifications, which may be via a mulching process, or an integral part of the seed mix;
- Vegetation should be installed as soon as possible after soil is exposed;
- Plants should be laid out in staggered rows, and spaced so 100% coverage is attained at two-thirds of the species mature size.

## **Soil Specification**

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### **Soils Test**

Prior to planting, but after grading operations are substantially complete, a soils test shall be undertaken by a qualified soil laboratory. The test results shall become a part of the design review submittal. Surface soils in San Luis Obispo County vary from almost pure sand at the coast, to heavy clay for much of the inland areas. Since the soils percolation rate, ability to allow the infiltration of water, and the depth to groundwater, is critical to the design of LID drainage features, this test will help to determine which BMP(s) are appropriate for that site. The soil report should contain, at a minimum:

- Native soil composition;
- Infiltration rates;
- Texture test;
- Depth at which groundwater was encountered (if at all);
- Cation exchange capacity;
- Agricultural suitability analysis;
- Recommended amendments for plant species to survive;

- Date of test.

Prior to planting, and on the advice of the soils report, the soil shall be amended to provide premium growing conditions for the plants specified.

Landscape design documents for LID projects must include a bioretention soil specification that specifies the exact materials to be used in the mix (aggregates and compost), the percent of each material included in the mix, how they are to be placed (i.e. in 8" to 12" lifts) and the soil mix depth.

### **General Bioretention Soil Specifications**

Bioretention soil shall achieve a long-term, in-place infiltration rate of at least 5 inches per hour. Bioretention soil shall also support vigorous plant growth. Bioretention Soil shall be a well-blended mixture of mineral aggregate and compost, measured on a volume basis. Bioretention soil shall consist of two parts compost (approximately 35 to 40 percent) by volume and three parts Mineral Aggregate (approximately 60 to 65 percent), by volume. The mixture shall be well blended to produce a homogeneous mix.

### **Mulch**

Immediately after planting, all exposed soil shall be covered with mulch to minimize erosion, and aid soil moisture retention. Mulch material may be either mineral (e.g. cobble or uncompacted decomposed granite) or biodegradable (e.g. bark or wood-chips). Biodegradable erosion control mats may also be used either on their own, or in conjunction with another mulch material. Mulch materials must not inhibit infiltration, and must be stable enough to withstand occasional high velocity runoff. Bark chips that have a tendency to float are not recommended. Acceptable mulching materials are:

- Nitrogen fortified bark (1" to 2" diameter);
- Redwood bark (1" to 2" diameter);
- Chipped gravel, crushed stone, or cobbles (1/2" to 2-1/2" diameter);
- 50/50 blend of top soil and aged compost.

Shredded bark (sometimes called 'Gorilla Hair') is not acceptable due to its tendency to form a tightly woven mat that can become almost

## **Other Requirements**

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### **Maintenance**

Good design and planning can minimize the amount of maintenance required for a drainage feature. Weeds can be suppressed by a good coverage of vegetation and the avoidance of over-planting will reduce the amount of pruning needed. The most critical time for the vegetation is in the period immediately following construction, when plant species are not fully established; weed control, and supplemental irrigation may be required to ensure a healthy, vigorous vegetative cover.

Irrigation is an important aspect of any landscape establishment. Typically new plantings need two to three years of irrigation to become established. After that period, native plants will need little to no supplemental irrigation to survive. Plants may enter a dry season dormancy, which affects their appearance. Where this "dry look" is not desired, summer irrigation may be utilized. Systems should include a weather-based controller to avoid watering during wet weather. Because bioretention soils are formulated to infiltrate, irrigation application rates must be properly designed to avoid overwatering and prevent potential discharges via underdrains.

Fertilizer should not be used in bioretention areas. Instead, a compost top dressing or application of compost tea can be used to introduce nutrients and beneficial microorganisms to the soil. Apply compost mulch once per year in spring or fall or spray apply compost tea once per year between March and June.

Weeds compete with plants for nutrients, water and sunlight. They should be regularly removed, with their roots, by hand pulling or with manual pincer-type weeding tools. Care should be given to avoid unnecessary compaction of soils while weeding.

It is worth noting the County policy of not using any herbicides or pesticides on any of their rights-of-way. Native plants are less susceptible to pests and diseases, and are therefore often more durable choices.

Replace plants that die due to unsuitable plant

impervious, and can also encourage mold growth.

be removed and replaced to avoid spreading disease, establishment of weeds in bare areas and reduced LID function. Before replacing with the same species, determine if another species may be better suited to the conditions.

Given the nature of the LID drainage features, they will likely capture trash and debris (particularly after a significant rain event) and will need to be periodically cleaned out. Depending on the adjacent land uses, there may also be a build-up of silt that should be removed as necessary to allow optimum functionality of the feature. In the event that cleaning and maintenance operations damage the vegetation, it should be replaced as soon as possible.

### **Tree Placement Guidance**

Including trees in bioretention areas provides additional aesthetic and performance benefits. Following these guidelines will maximize their success and survival:

- Provide sufficient landscape width (a rule of thumb is 8' min.)
- Locate trees on the side slopes (Zone B), not in areas that pond (Zone A). Trees improperly located, in narrow planters that pond, are unlikely to thrive and may eventually fail.
- Select trees that will tolerate seasonally wet soils.
- Do not specify trees with invasive roots.

Provide extra support to trees planted in bioretention areas, especially in high wind areas. They should be securely staked during establishment and inspected once or twice a year and following storm events. Stakes should be removed as soon as they are no longer needed to stabilize the tree (between one and two years).

### **Guidelines for Municipalities**

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Project managers who are preparing RFPs or bid packages for public projects that include bioretention systems should clearly define expectations for the following:

- Bioretention soil mix specification
- Guidance for plant species selection

conditions, disease, underwatering or other unforeseen issues. Dead and dying plants must

### **Nursery Sources**

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Environmental Seed Producers Inc.  
P.O. Box 2709  
Lompoc, CA 93438  
(805) 735-8888  
[www.espseeds.com](http://www.espseeds.com)

Las Pilitas Nursery  
3232 Las Pilitas Road  
Santa Margarita, CA 93453  
(805) 438-5992  
[www.laspilitas.com](http://www.laspilitas.com)

Native Sons Inc.  
379 West El Campo Road Arroyo Grande, CA  
93420 (805) 481-5996  
[www.nativeson.com](http://www.nativeson.com)

S&S Seeds  
P.O. Box 1275  
Carpinteria, CA 93014  
(805) 684-0436  
[www.ssseeds.com](http://www.ssseeds.com)

San Marcos Growers  
125 South San Marcos Road Santa Barbara, CA  
93111  
(805) 683-1561  
[www.smgrowers.com](http://www.smgrowers.com)

Slo starts  
1858 Los Osos Valley Road Los Osos, CA 93402  
(805) 528-7533

- Appropriate plant zone placement
- Operations and maintenance protocols

## References

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Joni L. Janecki & Associates, Inc. City of Salinas Development Standards Plan - LID Development Practices for Urban Storm Drainage Management, 2007.

Bornstein, Fross & O'Brien. California Native Plants for the Garden. Cachuma Press, Los Olivos, California, 2005

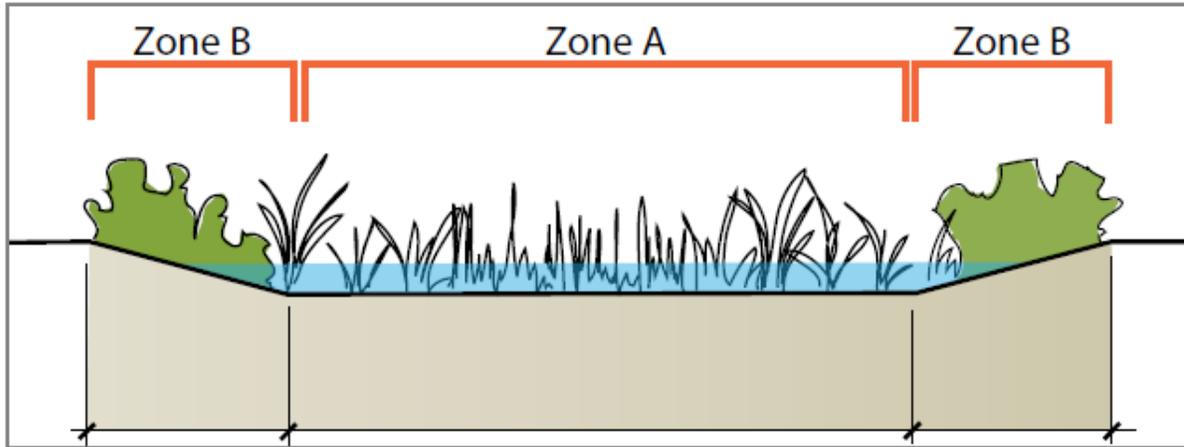
Greenlee, John. The Encyclopedia of Ornamental Grasses. Rodale Press, Pennsylvania, 1992

Las Pilitas Nursery. Online native plants information resource. Available at [www.lasoilitas.com](http://www.lasoilitas.com).

Native Sons Nursery. Online native plants information resource. Available at [www.nativeson.com](http://www.nativeson.com).

USDA Natural Resources Conservation Service Plants Database. Online plant information resource. Available at <http://plants.usda.gov/>

US Environment Protection Agency. Online storm water BMP resource. Available at [v.nv.emcw](http://v.nv.emcw).



### Planting Zones Diagram

This diagram illustrates the two basic planting zones for landscape-based stormwater measures. Used in conjunction with the LID Plant List, it shows the general zones that are recommended for each species. Site specific conditions should also be considered, such as solar orientation and micro-climate.

**Plant List for Landscape-Based Stormwater Measures**

Botanical Name	Common Name	Planting Zones <sup>1</sup>		LID Design Considerations <sup>2</sup>										Notes	
		Zone A	Zone B	Small Planting Strips (< 5' Wide)	Large Planting Areas (> 5' Wide)	Tolerates Prolonged Saturation	Tolerates Periodic Flooding	Tolerates Prolonged Dry Periods	Requires Good Drainage	Tolerates Mowing	Phytoremediation Capabilities	Tolerates Clay Soils	Light		Climate Zones <sup>3</sup>
<b>Trees</b>															
<i>Cercis occidentalis</i>	Western Redbud		✓	✓	✓		✓	✓	✓			✓	sun	All but coastal	Good erosion control  Avoid underground water/sewer pipes
<i>Chilopsis linearis</i>	Desert Willow		✓		✓		✓	✓				✓	sun	All, but 1A-3A	
<i>Platanus racemosa</i>	Western Sycamore		✓		✓		✓					✓	sun	All, but 1A-3A	
<i>Quercus agrifolia</i>	Coast Live Oak		✓		✓	✓	✓	✓					sun -shade	All, but 1A-3A	
<b>Large Shrubs</b>															
<i>Heteromeles arbutifolia</i>	Toyon		✓		✓			✓	✓			✓	sun – pt shade	All, but 1A-3A	Good erosion control
<i>Myrica californica</i>	Pacific Wax Myrtle		✓	✓	✓		✓					✓	sun – pt shade	All, but 1A-3A	
<i>Sambucus mexicana</i>	Western Elderberry		✓		✓		✓	✓				✓	sun – pt shade	All, but 1A-3A	

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													Shrubs and Subshrubs		
<i>Baccharis pilularis</i>	Coyote Brush		✓	✓	✓		✓	✓				✓	sun	All, but 1A-3A	Good erosion control; Fast growing
<i>Rosa californica</i>	California Wild Rose	✓	✓		✓	✓	✓	✓					sun – pt shade	All	Good erosion control; Potentially invasive
													Perennials		
<i>Achillea millefolium</i>	Yarrow		✓	✓	✓				✓	✓		✓	sun – pt shade	All	Good erosion control
<i>Fragaria chiloensis</i>	Beach Strawberry		✓	✓	✓		✓	✓	✓			✓	sun – pt shade	All, but 1A-3A	
<i>Iris douglasiana</i>	Douglas Iris		✓	✓	✓		✓		✓			✓	sun – shade	All, but 1A-3A	Good erosion control
<i>Salvia spathacea</i>	Hummingbird Sage		✓	✓			✓	✓				✓	sun – shade	All, but 1A-3A	
<i>Salvia uliginosa*</i>	Bog Sage		✓	✓	✓		✓					✓	sun	All, but 1A-3A	
<i>Sisyrinchium helium</i>	Blue-Eyed Grass		✓	✓	✓			✓		✓			sun	All, but	

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														1A-3A	
<i>Solidago californica</i>	California Goldenrod		✓	✓			✓	✓					sun – pt shade	All, but 24	
Grasses and Grass-like Plants															
<i>Carex divulsa</i> *	Berkeley Sedge, Grey Sedge	✓	✓	✓		✓	✓	✓					sun – pt shade	All, but 1A-3A	
<i>Carex pansa</i>	California Meadow Sedge	✓	✓	✓	✓		✓		✓	✓			sun – shade	All, but 1A-3A	Good erosion control
<i>Carex praegracilis</i>	Clustered Field Sedge	✓		✓	✓	✓	✓	✓		✓			sun – pt shade	All, but 1A-3A	Good erosion control
<i>Carex spissa</i>	San Diego Sedge	✓		✓	✓		✓	✓				✓	sun – shade	All, but 1A-3A	
<i>Chondropetalum tectorum</i> *	Small Cape Rush	✓	✓	✓	✓	✓	✓	✓				✓	sun – pt shade	All, but 1A-3A and 7	
<i>Festuca rubra 'Molate'</i>	Molate Red Fescue	✓	✓	✓	✓		✓	✓					sun – shade	All	Good erosion control
<i>Juncus effusus</i>	Soft Rush	✓		✓	✓	✓	✓	✓					sun – pt	All	Good erosion control

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													shade		
<i>Juncus patens</i>	Wire Grass, Blue Rush	✓		✓	✓	✓	✓	✓					sun – shade	All, but 1A-3A	Good erosion control
<i>Leymus condensatus</i>	'Canyon Prince' Canyon Prince Wild Rye		✓	✓	✓		✓	✓					sun – pt shade	All, but 1A-3A	
<i>Muhlenbergia rigens</i>	Deer Grass		✓	✓	✓		✓	✓				✓	sun – pt shade	All, but 1A-3A	Good erosion control; Fast spreading

Footnotes:

- <sup>1</sup> See Planting Zone illustration above for zones as they relate to stormwater BMP's.
- <sup>2</sup> Lid design considerations are specific factors that relate to landscape-based stormwater measures. Designers should also consider usual environmental factors such as sun/shade requirements, coastal exposure, wind tolerance, etc., when developing site specific plant lists.
- <sup>3</sup> Refers to Sunset Western Garden Book Climate Zones. The Central Coast includes Zones 1A, 2A, 3A, 7, 9, and 14-24. [www.sunset.com/garden/climate-zones](http://www.sunset.com/garden/climate-zones).
- \* Indicates non native species. Non natives are only recommended for use in urbanized settings and should not be used on sites in proximity to natural areas.