

A

Plant List and Planting Guidance for Landscape- Based Stormwater Measures

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A.1 Introduction

The purpose of this appendix is to provide guidance on the planting techniques and selection of appropriate plant materials for the stormwater measures described in this handbook.

The plant lists described in this appendix are not prescriptive, but should serve as a guide. In selecting plant materials, it is important to consider factors that influence plant establishment and success, such as microclimate, type of soil, water availability, proximity to saltwater and exposure to sun. Numerous resources are available to assist in selecting appropriate plant species in San Mateo County, including Sunset's *Western Garden Book* and the East Bay Municipal Utility District's *Plants and Landscapes for Summer-Dry Climates of the San Francisco Bay Region*.

In addition, the function of the individual stormwater measure should be carefully considered when selecting plant materials. Factors to be considered include inundation period, expected flow of water, and access and maintenance requirements.

The plant lists described in this appendix are not prescriptive, but should **serve as a guide**. In selecting plant materials, it is important to consider factors that influence plant establishment and success, such as microclimate, type of soil, water availability, proximity to saltwater and exposure to sun.

A.2 General Recommendations

- **Avoid the use of invasive species.** In selecting plants for stormwater measures, the use of invasive species should be avoided. A complete list of invasive plants can be found at www.cal-ipc.org, the California Invasive Plant Council's Invasive Plant Inventory.
- **Minimize or eliminate the use of irrigated turf.** Effort should be made to minimize the use of irrigated turf, which has higher maintenance requirements and greater potential for polluted runoff.

A.3 Plants for Stormwater Measures

Plants play an important role in the function of landscape-based stormwater treatment measures:

- **Infiltration and evapotranspiration.** Plants aid in the reduction of stormwater runoff by both increasing infiltration, and by returning water to the atmosphere through evapotranspiration.
- **Pollutant trapping.** Vegetation helps to prevent the resuspension of pollutants associated with sediment particles. It is essential that pollutants removed during small storms are not remobilized during large storms.
- **Phytoremediation.** Plants for stormwater treatment measures are important for their role in phytoremediation, the uptake of nutrients and the ability to neutralize pollutants.
- **Soil stabilization.** As in any landscaped area, established plantings help control soil erosion. This is important both to keep sediment out of stormwater and to retain the surface soils, which help to remove pollutants from infiltrated runoff.
- **Aesthetic benefits.** Plants within or adjacent to stormwater facilities provide an aesthetic benefit.

Plants suitable for use in stormwater treatment measures are organized according to the following categories:

C.3 STORMWATER TECHNICAL GUIDANCE

- **Grasses** refer to those species that are monocotyledonous plants with slender-leaved herbage found in the in the Family Poaceae.
- Perennials and groundcovers are typically **herbaceous** plants with soft upper growth rather than woody growth. Some species will die back to the roots at the end of the growing season and grow again at the start of the next season.
- **Shrub** is a horticultural distinction that refers to those species of woody plants which are distinguished from trees by their multiple stems and lower height. A large number of plants can be either shrubs or trees, depending on the growing conditions they experience.
- **Tree** refers to those species of woody plants with one main trunk and a rather distinct and elevated head.

Plants suitable for use in stormwater treatment measures are listed in two ways. First, a comprehensive list of all recommended plant species is provided in Table A-1, which lists the plants in alphabetical order by Latin name, in the categories described above. The columns in Table A-1 indicate stormwater treatment measures for which each plant species may be suitable. Following Table A-1 are brief descriptions of the stormwater measures for which technical guidance is included in this handbook, including the suitable plantings from Table A-1.

SAN MATEO COUNTYWIDE WATER POLLUTION PREVENTION PROGRAM

TREES		DESCRIPTION					PLANTING & MAINTENANCE					LANDSCAPE INTEREST/USES	TREATMENT TYPES			COMMENTS
Scientific Name	Common Name	Evergreen (E) or Deciduous (D)	Height (feet)	Spread (feet)	Shape: Round (R), Pyramidal (P), Broad (B), Oval (O), Upright (U)	Growth Rate: Fast (F), Moderate (M), Slow (S)	Water Needs: Very Low (VL), Low (L), Moderate (M)	Solar Needs: Full-Sun (FS), Part-Shade (PS), Shade (S)	Maintenance Needs: Low (L), Moderate (M)	CA Native		Bioretention Planter	Flow-Through Planter	Tree Well Filter		
<i>Acer circinatum</i>	Vine Maple	D	15	15-20	R	f	M	PS	M	●	Understory small tree from Pacific NW, avoid direct hot sun, orange-red fall color; adaptable to clay, rocky soils; tolerates moisture, drought tolerant when established.	●	●	●	Best in Sunset Zone 17 in part sunny areas.	
<i>Acer macrophyllum</i>	Big Leaf Maple	D	40 to 80	30 to 50	B	F	M	PS	M	●	Striking fast growing native maple with bright yellow fall color.	●			Best in Sunset Zone 17 in part sunny areas.	
<i>Arbutus 'Marina'</i>	Strawberry Tree	E	20	15	R	M	L	FS to PS	M	●	Red-brown trunks and large branches of mature trees become twisted and gnarled in appearance; can be messy. Clay-tolerant; acid to neutral soil.	●	●	●		
<i>Carpinus betulus</i>	Fastigate European Hornbeam	D	30 - 40	20 - 30	U	S-M	M	FS to PS	L		Upright, dense form; long lived. Tolerates moisture in well-drained soils.	●			Best in Sunset Zone 17 in part sunny areas.	
<i>Celtis reticulata</i>	Western Hackberry	D	30-60	30-60	R	M	L	FS to PS	L	●	Spreading tree canopy. Tolerates poor soils.	●				
<i>Cercis canadensis</i>	Eastern Redbud	D	25-35	25-35	R	F	L-M	FS to PS	L		Deep pink early spring bloom; glossy, heat resistant leaves; short lived	●	●	●	Part sun in hotter microclimates	
<i>Cercis occidentalis</i>	Western Redbud	D	10-18	10-18	R	S	L	FS	M	●	Deep pink early spring bloom; Use multi-trunk where possible; short lived. Clay-tolerant.	●	●	●		
<i>Geijera parviflora</i>	Australian Willow	E	40	30	O	S	M	FS to PS	L		Low, early pruning; train prune longer due to slow growth; long lived. Clay-tolerant.	●				
<i>Ginkgo biloba 'Autumn Gold'</i>	Autumn Gold Maidenhair Tree	D	40	30	O	S	M	FS to PS	L		Low, early pruning; train prune longer due to slow growth; long lived. Clay-tolerant. Prefers moist, well-drained soils. Golden fall color.	●			Best in Sunset Zone 17 in part sunny areas.	
<i>Ginkgo biloba 'Fairmount'</i>	Fairmount Maidenhair Tree	D	50	20	P	F	M	FS to PS	L		Faster growing than other Ginkgos; erect pyramidal form; long lived. Clay-tolerant. Prefers moist, well-drained soils. Golden fall color.	●			Best in Sunset Zone 17 in part sunny areas.	
<i>Ginkgo biloba 'Fastigiata'</i>	Columnar Ginkgo	D	30-50	10-15	U	S	M	FS to PS	L		Columnar. Clay-tolerant. Prefers moist, well-drained soils. Golden fall color.	●			Best in Sunset Zone 17 in part sunny areas.	
<i>Ginkgo biloba 'Magyar'</i>	Magyar Ginkgo	D	50	15	U	M	M	FS to PS	L		Clay-tolerant. Prefers moist, well-drained soils. Golden fall color. Tol. urban conditions.	●			Best in Sunset Zone 17 in part sunny areas.	
<i>Ginkgo biloba 'Princeton Sentry'</i>	Princeton Sentry Maidenhair Tree	D	40	15	P	S	M	FS to PS	L		Erect, pyramidal form; long lived. Clay tolerant. Prefers moist, well-drained soils. Heat tolerant. Golden yellow fall color.	●			Best in Sunset Zone 17 in part sunny areas.	
<i>Koelreuteria bipinnata</i>	Chinese Flame Tree	D	30	30	R	M	M	FS	L		Summer orange, red, or salmon bloom. Clay-tolerant.	●			Best in Sunset Zone 17 in part sunny areas.	
<i>Koelreuteria paniculata 'Fastigiata'</i>	Goldenrain Tree	D	20-25	20-25	R	S	M	FS	L		Yellow bloom; upright habit. Adaptable.	●			Best in Sunset Zone 17 in part sunny areas.	
<i>Lagerstroemia indica (cultivars)</i>	Crape Myrtle	D	15-25	8 to 15	R	S	L	FS	M		Attractive peeling cinnamon bark, excellent winter feature; spec cultivars: 'Muskogee', 'Natchez', 'Osage', 'Tuscarora'. Tolerates most soils; well-drained.	●		●		

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TREES		DESCRIPTION					PLANTING & MAINTENANCE					LANDSCAPE INTEREST/USES	TREATMENT TYPES			COMMENTS
Scientific Name	Common Name	Evergreen (E) or Deciduous (D)	Height (feet)	Spread (feet)	Shape: Round (R), Pyramidal (P), Broad (B), Oval (O), Upright (U)	Growth Rate: Fast (F), Moderate (M), Slow (S)	Water Needs: Very Low (VL), Low (L), Moderate (M)	Solar Needs: Full-Sun (FS), Part-Shade (PS), Shade (S)	Maintenance Needs: Low (L), Moderate (M)	CA Native		Bioretention Planter	Flow-Through Planter	Tree Well Filter		
<i>Laurus nobilis</i> 'Saratoga'	Saratoga Bay Laurel	E	12-40	12-40	O	S	L	FS to PS	L		Tolerates many soils and climate conditions. Prefers moist, fast-draining soils.	●	●	●		
<i>Platanus x acerifolia</i> 'Bloodgood'	Bloodgood London Plane Tree	D	70-100	60	B	M/F	L/M	FS	M		Withstands high pH, and pollution and grime of cities. Prefers deep, rich, moist, well-drained soils.	●				
<i>Platanus x acerifolia</i> 'Liberty'	Liberty London Plane Tree	D	70-100	70	B	M/F	L-M	FS	M		Allergy concern; long lived; mildew resistant. Tolerates most soils.	●				
<i>Platanus x acerifolia</i> 'Yarwood'	Yarwood London Plane Tree	D	40-80	30-40	B	M/F	L-M	FS	M		Allergy concern; long lived; mildew resistant; 'Yarwood' foliage holds up better than most plane trees in late summer; yellow fall color. Tolerates most soils.	●				
<i>Platanus x acerifolia</i> 'Columbia'	Columbia London Plane Tree	D	45	40		M-F	L-M	FS	M		Allergy concern; long lived. Tolerates most soils.	●				
<i>Prunus ilicifolia</i>	Holley leaf Cherry	E	15	15	O	M	L	FS	L	●	Skinny branches with large leaves and cherry looking fruit; can be trained into a small tree. Adaptable to most soils.	●	●	●		
<i>Prunus ilicifolia</i> spp. <i>Lyonii</i>	Catalina Cherry Laurel	E	10	15	O	M	L	FS	L	●	Shiny green leaves with small white flowers. Adaptable to most soils.	●	●	●		
<i>Quercus agrifolia</i>	Coast Live Oak	E	20-70	70	O	M	VL	FS	L	●	Long-lived; attractive bark; attracts birds and butterflies; deer resistant; drought resilient. Prefers a deep loam. Use only where sufficient room for roots.	●			Provide sufficient room for deep and wide root structure	
<i>Quercus coccinea</i>	Scarlet Oak	D	70-80	40-50	R	M	L/M	FS	L		Foliage is a glossy green in summer turning to scarlet in fall.	●				
<i>Quercus ilex</i>	Holly Oak	E	30-60	30-60	R	S	L	FS	L		Tolerates water. Adaptable.	●				
<i>Quercus suber</i>	Cork Oak	E	40-70	35-40	R	M	L	FS	L		High VOC absorption and CO2 sequestration; long lived; ornamental cork bark. Acidic, dry to medium, well-drained loams.	●				
<i>Quercus wislizenii</i>	Interior Live Oak	E	25-40	25-40	O	F	VL	FS	L	●	Attractive bark; attractive birds and butterflies; deer resistant; very tough, adaptable tree. Dry, well-drained, loams, clay and gravelly loams.	●				
<i>Robina x ambigua</i> 'Purple Robe'	Purple Robe Locust	D	30-35	20-25	O	F	L	FS	M		Purplish bronze new foliage, showy violet purple flowers. Tolerate poor soils, heat, low water when established.	●			Brittle in high winds	
<i>Tristania laurina</i> 'Elegant'	Elegant Water Gum	E	45	35	O	M	M	FS to PS	M		Profuse fragrant yellow flowers April-June. Tolerates damp well-drained soils, drought tolerant, cold tolerant to 28 degrees.	●		●		

Notes:
 Plant selection shall be based upon site-specific conditions.
 Consider subsurface infrastructure and provide sufficient growth for root area for larger trees.
 Plants requiring moderate water should be planted in part sun and avoid late afternoon sun exposure on the root crowns.

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SHRUBS		DESCRIPTION						PLANTING & MAINTENANCE				LANDSCAPE INTEREST/USES	PLANTING ZONES			TREATMENT TYPES			COMMENTS
Scientific Name	Common Name	Flower Color	Height (Feet)	Spread (Feet)	Shape: Mounding (M), Spreading (S), Upright (U), Round (R)	Growth Rate: Fast (F), Moderate (M), Slow (S)	Water Needs: Very Low (VL), Low (L), Moderate (M)	Solar Needs: Full-Sun (FS), Part-Shade (PS), Shade (S)	Maintenance Needs	CA Native		Basin	Banks	Upland	Bioretenion	Flow-Through Planter	Tree Well Filter		
<i>Arctostaphylos densiflora</i> 'McMinn'	Mazanita 'McMinn'	white	5-6	7	M	M	L	FS to PS	L	●		●	●	●	●				
<i>Arctostaphylos hookeri</i>	Hooker's Manzanita	white	2-8	3-12	M	M	L	FS to PS	L	●		●	●	●	●			Will not tolerate wet roots	
<i>Callistemon viminalis</i> 'Little John'	Dwarf Bottlebrush	blood red	3-4	4-8	R	M	L/M	FS	L			●	●	●	●				
<i>Cistus</i> spp.	Rockrose	varies	varies 3-5 x 3-5		R	L	L	FS	M			●	●	●	●			Sensitive to excess water	
<i>Cotinus coggygria</i>	Smoke Tree	purple	12-15	up to 25	U	M	L	FS	L			●	●	●	●				
<i>Garrya elliptica</i>	Silk Tassel	white	10-20	10-20	R	M	L	FS to PS	L	●		●	●	●	●				
<i>Grevillea</i> spp.	Grevillea	varies				M	L	FS to PS	L			●	●	●	●			Does not tolerate wet roots	
<i>Heteromeles arbutifolia</i>	Toyon	white	6-15	15-20	R	F	VL	FS to PS	M	●		●	●	●	●				
<i>Mahonia aquifolium</i> 'Compacta'	Oregon Grape	yellow	1.5-2	3-4	S	S	L	PS	L	●		●	●	●	●				
<i>Mahonia aquifolium</i> var. <i>repens</i>	Creeping Barberry	yellow	2-3	3-4	S	S	L	PS	L	●		●	●	●	●				
<i>Mahonia nevinii</i>	Nevin Mahonia	yellow	6-10	6-12	U	M	L	PS	L	●		●	●	●	●				
<i>Mahonia pinnata</i>	California Holly Grape	yellow	4-5	4-5	U	M	L	PS	L	●		●	●	●	●				
<i>Nerium oleander</i>	Oleander	red/ pink/ white	varies		R	M	L	FS	L				●			●		Size varies with varieties; Standard form for tree well filters. Can develop mildew in Zone 17 - prefers moisture only at root zone.	
<i>Photinia x fraseri</i>	Fraser Photinia	white	8-12	8-10	R	F	M	FS	L									Standard form for tree well filters; bright red-bronze spring foliage	
<i>Pittosporum tenuifolium</i>	Tawhiwhi	purple	15-25	10-15	U	F	M	FS - PS	L									Standard form for tree well filters; bright red-bronze spring foliage	
<i>Rhamnus californica</i> 'Little Sur'	Little Sur Coffeeberry	inconspicuous	3-4	3-4	R	M	L/M	FS-PS	M	●			●	●	●			Partial shade inland	
<i>Ribes sanguineum</i> (incl cultivars)	Red-Flowering Currant	pink	6	6	U	F	L	PS	M	●		●	●	●	●				
<i>Symphoricarpos albus</i>	Snowberry	white	6	8	S	M	L/M	PS	M	●		●	●	●	●			Best with regular moisture	

Notes:
 Plant selection shall be based upon site-specific conditions.
 Taller shrubs and perennials with more substantial roots systems can be grown on green roofs with 18" growing medium.
 Plants requiring moderate water should be planted in part sun and avoid late afternoon sun exposure on the root crowns.
 Trees/Tall shrubs planted in tree well filters shall provide sufficient vertical clearance for the location.

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GRASSES		DESCRIPTION					PLANTING & MAINTENANCE				LANDSCAPE INTEREST/USES	PLANTING ZONES			TREATMENT TYPES				COMMENTS
Scientific Name	Common Name	Flower Color	Height (feet)	Spread (feet)	Shape: Mounding (M), Spreading (S), Upright (U), Round (R)	Growth Rate: Fast (F), Moderate (M), Slow (S)	Water Needs: Very Low (VL), Low (L), Moderate (M)	Solar Needs: Full-Sun (FS), Part-Shade (PS), Shade (S)	Maintenance Needs	CA Native		Basin	Banks	Upland	Bioretention	Flow-Through Planter	Tree Well Filter	Green Roof	
<i>Aristida purpurea</i>	Purple Three-Awn	white	2-3	2	U	F	VL	FS	L	●	Purple seed heads that wave gracefully in the wind; recommended for erosion control on slopes, hillsides, and in canyons. Well-drained soil.	●	●	●	●				
<i>Bouteloua gracilis</i> 'Blonde Ambition'	Blonde Ambition Blue Grama	chartreuse turning to blonde	1.5-2	1	M	M	L	FS	L	●	Can be grown from seed; no irrigation needed once established. Adaptable to many soils, prefers well-draining. Showy flowers last summer through winter.	●	●	●	●				
<i>Calamagrostis x acutiflora</i> 'Karl Foerster'	Feather Reed Grass	light tan	2-3	2-3	U	F	L	PS	L	●	Background plant. Well-draining.			●	●	●			
<i>Carex barbarae</i>	Santa Barbara Sedge		1-3	1	M	M	L/M	FS	L		Rich green leaves; good for erosion control; little or no summer water. Tolerates damp soil.	●	●	●	●	●			Cannot tolerate standing water
<i>Carex divulsa</i> (C. tumulicola)	Berkeley Sedge		2	2	U	F	L	FS to PS	L	●	Greenish flowers age to brown in winter and spring. Clay-tolerant; tolerates damp, well-drained soil.	●	●	●	●	●			Cannot tolerate standing water
<i>Carex pansa</i>	Dune Sedge		1	1	M	F	L/M	FS to PS	L	●	Creeping meadow sedge, good on slopes. Tolerates variety of soil and climate conditions.	●	●	●	●	●			Sensitive to overwatering
<i>Chondropetalum elephantinum</i>	Large Cape Rush	brown	3-5	4-6	U	M	L/M	FS to PS	L		Tolerates wet well-draining soils and drought. Large striking upright form.	●	●	●	●	●			
<i>Chondropetalum tectorum</i>	Small Cape Rush	brown	2-3	3-4	U	M	L	FS	L		Small, unique plant forms broad clumps of thin erect jointed stems; evergreen; good for erosion control. Accepts both dry and wet conditions	●	●	●	●	●			
<i>Deschampsia caespitosa</i>	Tufted Hairgrass	creamy white	1-2	2 (flr stalk to 3')	U	M	L	FS to PS	L	●	green to greenish gold, turning straw color in the winter; they generally maintain good color through the summer, but won't grow much when it is hot. tolerates most soils		●	●	●	●			
<i>Deschampsia caespitosa</i> ssp. <i>Holciformis</i>	Pacific Hairgrass		1-2	2	U	M	L	FS to PS	L	●	dense dark green foliage; good choice for erosion control near constant moisture such as marsh, vernal pool or seeps. tolerates most soils		●	●	●	●			
<i>Festuca californica</i>	California Fescue		2	2	U	M	L	FS to PS	L	●	Cool season bunchgrass with flower stalks that reach 5 ft. tall and create fountain-like clumps. Beneficial insect plant.		●	●	●	●			
<i>Festuca glauca</i> 'Elijah Blue'	Blue Fescue		>1	>1	R	F	L	PS	L		Forms clumps of silver-blue leaves; long lived; use as edging. well-drained		●	●	●	●			
<i>Festuca idahoensis</i>	Blue Bunchgrass		1	1	R	F	L	FS to PS	L		Well-drained		●	●	●	●	●		
<i>Helictotrichon sempervirens</i>	Blue Oat Grass	light blue	1-2	1-2	U	M	L	PS	L		Attractive symmetrical form and blue color with straw-colored flower. well-drained		●	●	●	●			
<i>Juncus patens</i>	Californian Grey Rush	brown	2	1	U	M	L	FS to PS	L	●	Accepts both dry and wet conditions	●	●	●	●	●			
<i>Muhlenbergia rigens</i>	Deer Grass	yellow	4	4-6	R	M	L	FS	L	●	Clean, dependable form; very rugged. Adaptable.		●	●	●	●			
<i>Muhlenbergia capillaris</i>	Pink Muhly Grass	pink	4	3-4	R	M	L	PS	L		Showy pink panicles in late summer. well-drained		●	●	●	●			
<i>Sisyrinchium bellum</i>	Blue-Eyed Grass	blue, yellow	1-1.5	0.5	U	F	VL/L	FS to PS	L	●	Dies back in summer; use as a small accent plant; long green leaves with blue and purple flowers with yellow center; goes dormant in summer. Adaptable		●	●	●	●		●	Check notes
<i>Stipa arundinacea</i>	New Zealand Wind Grass	NA	3	3	M	F	M*	S to FS	L		Arching olive, amber & gold foliage; cut to 12" in winter. *Some sources state low water req'mt. adaptable.	●	●	●	●	●			Check notes
<i>Stipa pulchra</i>	Purple Needlegrass		4-6	4-6	U	F	L	FS	L		Long-lived native bunch grass. Adaptable.	●	●	●	●	●			Check notes

Notes:
 Plant selection shall be based upon site-specific conditions.
 *Greenroof plants require a minimum of 4" growing medium and automatic irrigation with inline drip unless otherwise noted.
 Plants requiring moderate water should be planted in part sun and avoid late afternoon sun exposure on the root crowns.

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GROUNDCOVERS & TURF ALTERNATIVES		DESCRIPTION					PLANTING & MAINTENANCE				LANDSCAPE INTEREST/USES	PLANTING ZONES			TREATMENT TYPES				COMMENTS	
Scientific Name	Common Name	Flower Color	Height (Feet)	Spread (Feet)	Shape: Mounding (M), Spreading (S), Upright (U), Round (R)	Growth Rate: Fast (F), Moderate (M), Slow (S)	Water Needs: Very Low (VL), Low (L), Moderate (M)	Solar Needs: Full-Sun (FS), Part-Shade (PS), Shade (S)	Maintenance Needs	CA Native		Basin	Banks	Upland	Bioretention	Flow-Through Planter	Tree Well Filter	Green Roof	Turf Block Pavers	
GROUNDCOVERS																				
<i>Arctostaphylos 'Emerald Carpet'</i>	Emerald Carpet Manzanita	white	1-1.5	3-6	S	M	L	FS	L	●	Neat, green, spreader. Adaptable, prefers well-drained	●	●	●	●				Spreads best with even moisture	
<i>Arctostaphylos uva-ursi</i>	Bearberry, Kinnikinnick	blood red	3-12	4-9	S	M	Low	FS	L	●	Set out plants 2' apart for solid cover. Clay-tolerant.	●	●	●	●					
<i>Baccharis pilularis 'Twin Peaks'</i>	Dwarf Coyote Brush	white	1-2	6-10	S	F	L/M	FS	M	●	Small dark green leaves; excellent for erosion control; very important shrub for wildlife. Tolerates most soils.	●	●	●	●					
<i>Fragaria chiloensis</i>	Beach Strawberry	white	6-12"	1-2'	S	F	M	FS to PS	L	●	Spreading groundcover, prefers light, well-drained soils and moisture, partial shade in hotter climates. Flowers in spring followed by edible fruit.	●	●	●	●			●	Prefers 6" growing medium and additional moisture on greenroofs	
<i>Fragaria vesca</i>	Mountain Strawberry; Woodland Strawberry	white	6-12"	1-2'	S	F	M	FS to PS	L	●	Similar to F. chiloensis with smaller leaves and tiny edible and tasty fruit.	●	●	●	●			●	Prefers 6" growing medium and additional moisture on greenroofs	
<i>Grindelia stricta platyphylla</i>	Coastal Gum Plant	yellow	6"	3'	S	M	L	FS	L	●	2" blooms from May thru Fall. Clay, sand & salt tolerant.	●	●	●	●				Prefers 6" growing medium and additional moisture on greenroofs	
<i>Mahonia repens</i>	Creeping Oregon Grape	yellow	2.5'	3-5'	S	M	L/M	PS	M	●	Fall color; Well-draining soil.	●	●	●	●					
<i>Salvia sonomensis</i>	Creeping Sage	purple	2	6-8	S	M	L	FS	M	●	Nice mounding and spreading groundcover with purple/blue flowers; fragrant leaves, especially in summer. Adaptable.	●	●	●	●			●	Prefers 6" growing medium	
<i>Verbena peruviana</i>	Peruvian Verbena	scarlet, white	>1	2-3	S	M	L	FS	M		Set out plants 2' apart for solid cover; offers super vibrant red flowers with small white centers. Well-drained; adaptable.	●	●	●	●					
TURF ALTERNATIVES																				
<i>Bouteloua gracilis</i>	Blue Gramma Grass		1.5-2	1	S	F	L	FS	L	●	irrigate to 1ft to establish; after established needs no irrigation; nice as border planting; okay to mow down to 1.5in	●	●	●	●			●	●	
<i>Buchloe dactyloides</i>	Buffalograss		<1	<1	S	F	VL	FS	L		requires little or no mowing; grows to 4" tall; start from sod or plugs. Adaptable to soil types.	●	●	●	●				●	
<i>Festuca rubra 'molate'</i>	Molate Fescue		1	-	S	F	M/L	FS/PS	M		Prefers part shade, regular water in hot areas, lawn alternative.				●	●		●	●	
<i>Dymondia margaretae</i>	Dymondia, Silver Carpet	yellow	1-3"	1-2'	S	M	M/L	FS	L		Tight ground-hugging groundcover good as turf substitute in small areas. Tolerates heat, sun and cold to 28 degrees.	●	●	●	●				●	
<i>Lippia nodiflora</i>	Kurapia	white	1"-3"	-	S	M	L	FS/PS	L		Spreading groundcover from Japan. Tolerates periodic inundation. Flowers can attract bees.	●	●	●	●			●		Prefers 6" growing medium
NA	Biofiltration Sod		<1	<1	S	F	M	FS	L		Tolerates periodic inundation.	●			●	●				
NA	Native, No-Mow Sod		<1	<1	S	S	M/L	FS/PS	L	●	Slow growing, narrow leafed grass with blades that are very lax and flexuous. Provides soil stabilization for sloped areas. Can be mowed as turf lawn, or left unmowed.	●	●	●	●			●	●	

Notes:
 Plant selection shall be based upon site-specific conditions.
 *Greenroof plants require a minimum of 4" growing medium and automatic irrigation with inline drip unless otherwise noted.
 Plants requiring moderate water should be planted in part sun and avoid late afternoon sun exposure on the root crowns.

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PERENNIALS		DESCRIPTION						PLANTING & MAINTENANCE				LANDSCAPE INTEREST/USES	PLANTING ZONES			TREATMENT TYPES			COMMENTS
Scientific Name	Common Name	Flower Color	Height (Feet)	Spread (Feet)	Shape: Mounding (M), Spreading (S), Upright (U), Round (R)	Growth Rate: Fast (F), Moderate (M), Slow (S)	Water Needs: Very Low (VL), Low (L), Moderate (M)	Solar Needs: Full-Sun (FS), Part-Shade (PS), Shade (S)	Maintenance Needs	CA Native		Basin	Banks	Upland	Bioretention	Flow-Through Planter	Green Roof		
<i>Achillea millefolium</i>	Common Yarrow	white	3	2	S	F	L	FS	L	●	Erect plant with narrow green stems and wide white flowers - easy, full sun near bay, part shade inland; attracts beneficial insects. tolerates most soils		●	●	●	●	Maintenance challenges; longevity issues		
<i>Achillea filipendulina</i>	Fern-Leaf Yarrow	golden	3-4	2-3	U	M	L	FS	M		Deeply-dissected, fern-like, aromatic, grayish-green to green foliage and its tiny, long-lasting, bright golden flowers. Tolerates most soils.		●	●	●	●			
<i>Armeria maritima</i>	Sea Pink	pink	1	1	M	S	L-M	FS	L		Only in zones 16-17; not for hot interior landscapes		●	●	●	●	Maintenance challenges; longevity issues		
<i>Anigozanthus spp.</i>	Kangaroo Paw	red, purple, green, yellow	to 6	to 3	U	F	L	FS	L		Attracts hummingbirds. Well-drained soils.		●	●	●	●	Unattractive if subject to freezing or standing water		
<i>Coreopsis grandiflora</i>	Coreopsis	purple-blue	1.5-2.5	2-3	S	M	L	FS	L		Daisy-like single flowers feature deep yellow rays (notched at the tips) surrounding a darker golden yellow center disk. Tolerates most soils.		●	●	●	●			
<i>Dietes iridioides</i>	Fortnight Lily	pale yellow; light blue; white	up to 3	1-1.5	U	M	L	FS	L		Use as accent or massing, orchid-like flowers. Clay-tolerant.		●	●	●	●	Disruptive to planting/soil when pulled up and divided every 5 years		
<i>Echeveria spp.</i>	Hens and Chicks	pink	varies			M	L/VL	FS	L		Succulent; use in small areas; colorful foliage - variety of species and textures. Prefer light well-drained soil w/some moisture spring/summer.		●	●	●	●			
<i>Epilobium bowman</i>	Bowman California Fuchsia	orange	varies	1.5-3	S	F	L	FS	L	●	Gray foliage; showy summer flowers; height varies by cultivar		●	●	●	●			
<i>Epilobium canum</i>	California Fuchsia	orange-red	varies	1.5-3	S	F	L	FS	L	●	Gray foliage; showy summer flowers; height varies by cultivar		●	●	●	●			
<i>Erigeron glaucus</i> <i>Wayne Roderick</i>	Wayne Roderick Daisy	lavender	1	3	M	M	M	FS to PS	L	●	Blooms spring thru fall. Well-drained soil.		●	●	●	●			
<i>Erigeron karwinskianus</i>	Santa Barbara Daisy	white with pink tinge	10-18"	2-3'	M	F	L-M	FS to PS	L	●	Small daisy-like flowers, feathery texture. Well-drained soil.		●	●	●	●	Reseeds		
<i>Eriogonum grande var. rubescens</i>	Red-Flowered Buckwheat	rosy red	1-2'	1-2'	S	F	L	FS to PS	L	●	Flowers spring-summer atop slender stems, attracts beneficial insects. Tolerates most soils.		●	●	●	●	Reseeds		
<i>Eriogonum latifolium</i>	Coast Buckwheat	pink, white	6	6	S	F	Low	FS	Low	●	Creamy white pom-poms rise above dark green, spoon-shaped leaves in the summer; good in containers. Tolerates most soils.		●	●	●	●			
<i>Eschscholzia californica</i>	California Poppy	orange	1.5	1.5-2	S	F	VL	FS	L	●	Reseeds easily; summer dormant. Well-drained soils.		●	●	●	●	Maintenance challenges; longevity issues		
<i>Gaillardia grandiflora</i>	Blanket Flower	varies	2-3	1-2	U	M	L	FS	L		Daisy-like flowers, usually yellow to orange to red rays with maroon to orange banding at the petal bases and dark burgundy center disks. Well-drained soils.		●	●	●	●	Prefers 6" planting medium		
<i>Gaura lindheimeri</i>	Gaura	white	2.5-4	2-3	U	M	L/M	FS	M				●	●	●	●	More drought tolerant in Zone 17; Can self-sow		
<i>Heuchera maxima</i>	Island Alum Root	white, pink	1-2	3-4	S	M	L	PS	L	●	Needs shade; good edging plant. Clay-tolerant.		●	●	●	●			
<i>Iris douglasiana</i>	Douglas Iris	varies	1.5	1.5	S	M	L	PS	L	●	Well-drained soil.		●	●	●	●	Maintenance challenges; longevity issues		
<i>Mimulus aurantiacus</i>	Sticky Monkey Flower	varies	3-4	3-4	M	M	L	FS to PS	L	●	Well adapted to heat, sun, summer drought. Well-drained soils.		●	●	●	●	Can be short-lived, 3 years; Maintenance challenges; longevity issues		
<i>Mimulus aurantiacus var. puniceus</i>	Red Monkey Flower	red	3-4	3-4	M	M	L	FS to PS	L	●	Well-drained soil.		●	●	●	●	Can be short-lived, 3 years; Maintenance challenges; longevity issues		
<i>Monardella villosa</i>	Coyote Mint	light purple	2	2	M	F	VL	FS to PS	L	●	Attracts butterflies, including Monarchs, Tiger Swallowtails Well-drained soil.		●	●	●	●	Prefers 6" growing medium; Maintenance challenges; longevity issues		
<i>Penstemon heterophyllus</i> 'Blue Springs'	Foothill Penstemon	Iridescent blue-purple	1-2	2	M	F	L	FS	M	●	Very tough plant. Tolerates full sun, heat, most soils. Flowers attract butterflies, bees, hummingbirds.		●	●	●	●	Prefers 6" planting medium		
<i>Sedum sp. (many)</i>	Stone Crop	varies	varies			S	M	L	FS	L	Varied succulent species. Prefer well-drained soils. Many heat adapted and thrive in dry gardens, green roofs.		●	●	●	●			
<i>Tulbaghia violacea</i>	Society Garlic	pink	2	1	M	F	L	FS	L		Very dependable grass-like plant with pink flower atop 2' stalks. Distinctive garlic odor. Tolerates most soils.		●	●	●	●			
<i>Verbena lilacina</i>	De La Mina Lilac	purple	3	3	S	M	L	S to PS	L		Low, mounding perennial, attracts bees and butterflies.		●	●	●	●			

Notes:
 Plant selection shall be based upon site-specific conditions.
 *Greenroof plants require a minimum of 4" growing medium and automatic irrigation with inline drip unless otherwise noted.
 Taller shrubs and perennials with more substantial roots systems can be grown on green roofs with 18" growing medium.

A.4 Planting Specifications

Planting plans and specifications must be prepared by a qualified professional and coordinated with other site development details and specifications including earthwork, soil preparation and irrigation (if used). Plans indicating a planting layout, with species composition and density, should be prepared on a site-specific basis. Reference the Bay-Friendly Landscaping Guidelines (available at www.rescapeca.org), which outline principles and practices to minimize waste, protect air and water quality, conserve energy and water, and protect natural ecosystems, including:

- Evaluate site and assess the soil;
- Consider potential for fire;
- Select plants for appropriate size upon maturity, do not over-plant;
- Irrigation, if required, should be designed as a high efficiency, water conserving system; and
- Utilize compost (see the specification in the Bay-Friendly Landscaping Guidelines) and mulch to build healthy soils and increase the water holding capacity of the soil.

PROPAGATION AND PLANTING METHODS

The propagation methods for different species will vary, depending upon type of plant and stormwater adaptation. In general, container stock will be utilized most commonly for green roofs, flow-through planters, tree well filters, vegetated swales and infiltration trenches. Bioretention areas and extended detention basins will generally utilize native plants available as transplants (plugs), pole cuttings and seed mixes.

CONTAINER STOCK. Planting holes for container stock should be twice as wide and only as deep as the container size. Plant spacing should be determined on a site-specific basis. When planting, the root collar and base of the stem should be 1" above the adjacent soil surface. Soils should be backfilled and tamped down to assure contact with the roots. The planting should be watered-in promptly to promote the settling of soil. If appropriate, container plantings may receive a balanced time-released fertilizer tablet, quantity and placement per manufacturer's recommendation, placed in the planting hole prior to installation of the plant. Planting berms for water retention and mulch shall be used to enhance plant establishment. Trees shall be staked or guyed to provide interim support until established.

Transplants (Plugs). Transplanted plant divisions, referred to here as "plugs", should be planted during the fall dormant period, preferably between October 1 and November 15 after first soaking rain. Plugs should be collected from a suitable collection site in the vicinity of the constructed basins. Plugs are clumps of plant roots, rhizomes or tubers combined with associated soil that can be manually removed, or salvaged with an excavator or backhoe. The maximum recommended size is 1 foot x 1 foot. Whole plants or plant divisions can be utilized. The plugs should be from

healthy specimens free of insects, weeds and disease. The plugs should be spaced from 1 foot to 6 feet apart, depending on the size of the plug. Smaller plugs can be planted at the minimum distance to promote faster spreading and cover. Larger plugs from cattail and bulrush species should be planted at 3-foot to 6-foot intervals.

To plant a plug, a hole slightly wider than the diameter of the plug should be prepared and the roots system of the plug placed in the hole. Do not over-excavate the hole depth or the plant will settle below grade. A shovel could be used to create the planting hole. Manual planting with a spade is recommended for wet soils. Power augers can be used for creating holes in dry soils. Alternatively, a trench could be created along the narrow axis of the extended detention basin, and planting material manually placed at specified elevations in relation to the proximity of permanently saturated soils. To plant a plug with an established root system, the base of the stem and top of the root collar should be level with the ground surface. Tubers should be secured to prevent floating. Rhizomes should be placed in the soil with a slight upward angle.

The hole or trench containing the plug(s) should be backfilled with soil and the soil tamped down to assure good soil contact and secure the plug. The vegetative portion of the plant should be cut back to prevent water loss and wilting, and encourage the growth of roots and new shoots. Plugs of wetland plants should be grown in saturated soil. The soil should not be allowed to dry out after planting. Plugs should be planted immediately, when possible. When necessary, plugs can be stored in a cool, moist, shaded location for a maximum of one day. Plants must be thoroughly watered.

Pole Cuttings. Pole cuttings should be collected from the 1-year old wood of dormant trees and have a minimum of 5 viable nodes. The parent material should be healthy and free of diseases. The basal area of the pole cutting should be a minimum of one to two inches in diameter; however, the diameter at the base should not exceed 2 inches. The optimum diameter width of the base is 1 inch. The length of the cutting should be a minimum of 2 feet and should not exceed a maximum of 4 feet in length. Generally, 75 percent of the length of the cutting should be planted beneath the soil surface.

Pole cuttings should be collected no more than 2 days prior to planting. Cuttings should be placed in cool water to promote swelling of the nodes. Water should be kept fresh by aeration and/or by daily replacement. The pole cuttings should be placed in a hole approximately 3 feet deep (as determined by the length of the cutting) and backfilled with native soil, or a rich organic medium mixed with native soil. Soil should be tamped down to remove air pockets and assure soil contact with the cutting.

Seeding. Seeding should be conducted after plugs, container stock and pole cuttings are installed. Hydroseeding or broadcast method shall be utilized as appropriate for the size and accessibility of the area. The soil surface should be scarified prior to seeding. Do not damage previously planted vegetation. The seeds should be planted in fall, ideally in October.

Seeds should be broadcast or hydroseeded over the specified planting area. With broadcast seeding, the seed should be applied with hand-held spreaders to scarified

soil. The soil surface should then be raked to cover the seeds with about one-eighth to one-quarter inch of soil to discourage predation, and tamped or rolled to firm soil surface.

Seeds should be planted at the ratios and rates specified by the supplier. The seed should be free of weeds and diseases. The certified germination percentage should be provided by the supplier.

Water Level Management and Irrigation for Plant Establishment

All newly planted material will need careful attention to watering requirements to ensure proper establishment. As mentioned in the introduction, it is important to select plants based on specific site conditions, which will affect the availability of water for plant use. In addition, grouping plants with similar water requirements can help reduce irrigation needs. The specific approach will vary for irrigated and non-irrigated conditions, and for each stormwater application. In most cases, stormwater applications will require a permanent irrigation system which shall be designed to maximize water conservation. Irrigation specifications and design plans shall be provided.

Plants such as shrubs and trees grown in naturalized areas that are not saturated to the surface or inundated shall be irrigated with drip irrigation. The irrigation system shall remain in place for a minimum of three years, and should continue until it is demonstrated that the plantings can survive on annual rainfall and/or groundwater. Seeded areas do not need irrigation in years of normal rainfall. If a period of drought occurs after seeding, supplemental watering may be needed for germination in the first year.

The plants on the bottom and edge of the constructed basins should be allowed to become established for one growing season prior to the onset of significant flooding that will inundate the plantings for extended periods. The types of plants recommended for these locations are rushes, sedges, grasses and herbaceous species. Initially, saturated soils are required for the bioretention areas and extended detention basins during the establishment period of the plantings. After the plants have become established, inundation with a surface depth of 1 cm to 2 cm alternating with short dry periods is recommended for the basins during the first year. Periodic shallow flooding of these basins can slow the growth of non-native weedy terrestrial species in the wetland system; however, the water depth should not be greater than the height of the plants. This initial irrigation regime will prevent plant mortality from dry periods or excessive flooding in the first year, and reduce the growth of non-native weedy species.

Emergent species should be planted in saturated soil so the plants will become established. For emergent species, the water level in the first year should be maintained to allow for soil saturation or shallow inundation around the base of the plants. Significant flooding and inundation of stems and leaves of the plants should be avoided the first year. Tall plugs and plantings can tolerate greater depths of inundation if a significant portion of the stems and leaves of the plantings remain above the water surface.

A.5 Monitoring and Maintenance

General Requirements

All planted areas shall be monitored and maintained as required to ensure proper establishment by a Contractor with a valid California C-27 contractor's license. Frequency of site visits and required maintenance practices will vary depending upon the stormwater measure and plant selection. Maintenance shall include watering, cultivation, weeding and pruning as necessary to maintain optimum growth conditions and, as appropriate to the specific stormwater measure, to keep the planted areas neat and attractive in appearance. In all instances, controlling weeds and unwanted growth with chemical applications is prohibited.

The contractor shall be familiar with the design and function of the specific stormwater measure(s) to ensure that the plantings are maintained appropriately and do not interfere with the efficient runoff drainage and filtration.

Ongoing management of invasive weed species will be required in all applications. Monthly hand weeding will allow the naturalized vegetation to take hold, and will ultimately be less costly than less frequent, and more intensive clearing. Regular application of composted mulch (also known as aged mulch) or other mulch material that will resist floating with surface runoff, will also help control weed growth. "Micro-bark" and "gorilla hair" mulches are not recommended.

Erosion Control

Particularly with landscapes that are not fully established, contractors will need to monitor and evaluate potential for erosion and sediment accumulation in the runoff, which will influence irrigation scheduling and as well as determine the need for additional erosion control measures. Soil can be protected from erosion by a number of methods including:

- Keep the soil covered with vegetation to the extent possible;
- Slow water runoff by using compost berms, blanket, socks or tubes along slopes;
- Cover bare soil with a minimum of 2" mulch cover;
- Minimize the use of blowers in planting beds and on turf;
- On slopes use shredded arbor mulch that is not prone to washing into storms drains ("Micro-bark" and "gorilla hair" mulches are not recommended); and
- Store leaf litter as additional mulch in planting beds as appropriate.

Irrigation Systems

Where irrigation systems have been installed for temporary or permanent irrigation, the contractor shall maintain the irrigation system for optimum performance, as per

manufacturer's specifications. Contractor shall inspect the entire system on an ongoing basis, including cleaning and adjusting all sprinkler and bubbler heads, drip emitters and valves for proper coverage. Contractor shall monitor the irrigation system while operating to identify and correct problems with water runoff or standing water.

Monitor soil moisture within plant root zones using a soil probe or shovel and adjust irrigation schedules accordingly if a soil moisture sensor is not being utilized to signal the irrigation controller. If a Weather-Based Irrigation Controller (WBIC), otherwise known as a "Smart" Controller is not utilized on the project, irrigation shall be scheduled using a water budget approach, basing irrigation frequency on evapotranspiration data (ET) to avoid over-irrigation of plant material. Adjust irrigation frequency within each hydrozone area a minimum of every four weeks to respond to expected adjustments in ET data.

If a standard turf mix is used in lieu of a no-mow variety, implement grasscycling, where appropriate to the stormwater treatment measure. Grass clippings shall not be carried into the drainage structures. Refer to A Landscaper's Guide to Grasscycling available from StopWaste.Org.

Bioretention and Extended Detention Basins

In bioretention areas, undesirable and/or invasive plant species should be carefully monitored and controlled to reduce competition with the desired plantings and to assure the success of the revegetation activities. The establishment of undesirable and/or invasive species can be partially controlled during the establishment period by implementing the watering schedule of initial saturation followed by alternating periods of shallow inundation and dry soil. Manual methods of undesired plant removal should be conducted on the bottom, edge and side of the areas when they are not inundated.

Undesired plant removal should be conducted regularly the first two years to prevent the growth, flowering, and seed set of undesirable and/or invasive species. After the first two years, plant removal frequency will vary on a site-specific basis as determined by the type and seasonal growth cycle of the undesired species. In general, plant removal as often as once a month may be necessary to avoid more extensive and costly eradication in the future.

Long-term maintenance tasks will include continued control of undesirable and/or invasive plants, and control of erosion. Erosion could include gullies, rills and sheet erosion. Actions to control erosion should include redirecting or dissipating the water source. Recontouring and subsequent mulching and/or replanting may be required in bare areas. In the event of extensive die-off of the desired plant species, the bare areas should be replanted. Where the event that caused plant mortality was not a natural catastrophic occurrence, the site condition that resulted in the die-off should be investigated and remedial action to correct the problem should be undertaken prior to replanting.

A.6 Bay-Friendly Landscaping and Integrated Pest Management

This section provides a summary of Bay-Friendly Landscaping and integrated pest management techniques, based on the Bay-Friendly Landscaping Guidelines at www.ReScapeCa.org.

Bay Friendly Landscaping

Bay-Friendly Landscaping is a whole systems approach to the design, construction and maintenance of the landscape in order to support the integrity of the San Francisco Bay watershed. Project sponsors are encouraged to use landscape professionals who are familiar with and committed to implementing Bay-Friendly Landscaping practices from the initial plant selection through the long-term maintenance of the site. This section summarizes Bay-Friendly Landscaping practices that may be implemented information that project sponsors need about how these practices can benefit water quality of the Bay and its tributaries.

Bay-Friendly Landscaping is based on 7 principles of sustainable landscaping and features the following practices

1. **Landscape Locally.** Landscapes designed to be part of the larger ecosystem of the Bay Area can both protect the health, diversity and sustainability of this valuable resource while making the most of the natural processes of a well-functioning ecosystem. By selecting plants appropriate to the climate, exposure, soils, drainage and topography, plantings can be established more successfully with less consumption of resources and intensive maintenance. Landscape designers are also encouraged to use local, well-adapted plant communities as models and to consider the potential for fire when developing the plant palette for a project.
2. **Less to the Landfill.** Reducing waste –and thus conserving landfill space and fossil fuel for hauling this material to the landfill - starts with not generating it in the first place. Plant trimmings pruning can be reduced by selecting plants that can grow to their natural size in the space allotted them, by avoiding the use of sheared hedges as design elements and not specifying invasive species (go to www.cal-ipc.org). Prune selectively, and avoid excessive plant growth by applying water and fertilizer judiciously.

The second step is to recognize the value of plant debris, and to keep this organic matter on the site, using it as a gardening resource for mulching and composting.

3. **Nurture the Soil.** Returning organic matter to the soil, in the form of plant debris, is the link between protecting our watershed and protecting our watershed. Healthy soil that is rich in organic matter is full of life and can store water and actively cycle nutrients, regulate and partition water flow, neutralize pollutants, and resist pests. The following practices will encourage a complex soil community of microorganisms, worms, and other beneficial creatures. Base the landscape design on a soil analysis and understanding of soil texture, structure and drainage. The following practices are recommended during construction:

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- Remove and store the topsoil for re-spreading after grading;
- Limit construction traffic to areas that will not be landscaped;
- Control soil erosion;
- Amend the soils with compost before planting; and
- Specify and maintain an adequate layer of organic mulch, taking into account water flow and designing to avoid the loss of mulch with runoff.

Maintenance practices to benefit soils and the watershed include allowing grass clippings to remain on the lawn; feeding soils with naturally based products including compost and a water extract of mature compost, instead of synthetic, fast release fertilizers and avoiding pesticides.

4. **Conserve Water.** Amending the soil with compost and keeping it covered with composted mulch (or other mulch that resists floating) can increase soil permeability and water-holding capacity, reduce water loss through evaporation and decrease the need for irrigation. Planting appropriate, drought tolerant California natives or Mediterranean plants also reduces water consumption for irrigation, as well as consumption of other resources for mowing, fertilizing, and spraying. Minimize the use of turf grasses that require regular watering and fertilizing to remain green, particularly on slopes or in narrow, irregular hard to water shapes. Arrange plants in “hydrozones” of low, medium or high water demand. Onsite collection systems can allow the use of rainwater, or the reuse of “graywater” – uncontaminated wastewater from sinks, bathtubs, and washing machines. Specify, install and maintain high-efficiency irrigation systems, and train landscaping staff to manage irrigation according to need.
5. **Conserve Energy.** Conventional landscapes are very fossil fuel consumptive. Selecting plantings that do not require regular mowing or pruning, fertilizing and watering can help reduce this demand and restore our landscapes to those that are more productive than consumptive. Tree plantings can be used to moderate building temperatures, and to shade paved areas and air conditioners. Trees can also intercept significant amounts of rainfall each year and thus help control stormwater runoff. Specify as large a tree as possible but be sure that it will be allowed to grow to its natural shape and size in the allotted space. Outdoor lighting should be designed to use less energy and minimize “light pollution.” Choose and maintain energy-efficient landscaping equipment to conserve fuel. Specifying local products and suppliers reduces the energy needed to transport products and supports local economies.
6. **Protect Water and Air Quality.** Bay-Friendly landscaping can help protect water quality by increasing on-site infiltration and reducing runoff, reducing pollutants in runoff, and increasing the soil’s ability to remove pollutants from runoff. It can help protect air quality by reducing fossil fuel consumption, recycling plant debris onsite, and planting trees to remove carbon dioxide and absorb air pollutants. Many of the practices described previously, such as minimizing high input decorative lawns, keeping soil covered with mulch and planting trees play a critical role in protecting water and air quality. An additional very important component of Bay-Friendly landscaping is reducing the use of pesticides through integrated pest management, which is described in a separate section, below.

- 7. Create and Protect Wildlife Habitat.** Although we tend to rely on parks and open space to preserve wildlife habitat, developed landscapes can also provide food, water, shelter and nesting sites for birds, butterflies, beneficial insects, and other creatures. This can be accomplished by providing a diverse landscape that includes annuals, biennials and perennials of many different sizes, shapes, colors and textures; by choosing California natives first; providing appropriate water and shelter for wildlife; eliminating the use of pesticides; and planning sites to conserve or restore natural areas and wildlife corridors.

Integrated Pest Management

All creeks in the San Francisco Bay Area exceed water quality toxicity limits, primarily due to the pesticide Diazinon entering urban runoff. Although the residential use of Diazinon is currently being phased out, the use of a group of highly toxic chemicals, called pyrethroids, is increasing. Because all pesticides are toxins, integrated pest management (IPM) places a priority on avoiding their use. IPM is a holistic approach to mitigating insects, plant diseases, weeds, and other pests. Projects that require a landscaping plan as part of a development project application are required encouraged to use IPM, as indicated in each agency's source control measures list, which is based on the countywide Source Control Model. Avoiding pesticides and quick release synthetic fertilizers are particularly important when maintaining stormwater treatment measures, to protect water quality.

IPM encourages the use of many strategies for first preventing, and then controlling, but not eliminating, pests. It places a priority on fostering a healthy environment in which plants have the strength to resist diseases and insect infestations, and out-compete weeds. Using IPM requires an understanding of the life cycles of pests and beneficial organisms, as well as regular monitoring of their populations. When pest problems are identified, IPM considers all viable solutions and uses a combination of strategies to control pests, rather than relying on pesticides alone. The least toxic pesticides are used only as a last resort. IPM features the following practices:

- **Prevent Pest Problems.** Fostering a healthy soil and selecting appropriate plant communities for the site helps reduce the susceptibility to disease and other pests. Landscape designs should include a diversity of species that are well-suited to the site; specify resistant varieties and native species, including plants that attract beneficial insects; place plants a proper distance from buildings; avoid over-planting; and include compost in the soil specifications. Cultural methods of avoiding pests during construction and maintenance include the following:
 - Selecting plant material that is free from disease and insects;
 - Planting at the right depth;
 - Watering thoroughly but not over-watering;
 - Keeping mulch on the soil surface at all times, keeping it away from root crowns;
 - Using slow release fertilizer, if necessary, and not over-fertilizing;
 - Pruning judiciously;
 - Eliminating noxious weeds before they go to seed or spread;

- Cleaning equipment after use on infected plants;
- Inspecting and removing invasive plant parts or seeds from clothing, tools and vehicle before leaving an infected site; and
- Cleaning up fruit and plant material that is infected with insects or diseases.
- **Watch for and Monitor Problems.** Landscaping firms should provide their staff with the time and resources to learn to identify both pest and beneficial organisms, and train residential clients to monitor and record pest problems. Plants should be checked often for vigor and signs of pests. Clarify which problems are the result of pests and not other environmental problems. Evaluate the results of any treatments, and check regularly with the Bio-Integral Resource Center (www.birc.org) or UC Davis (www.ipm.ucdavis.edu) for up-to-date resources and information.
- **Education is Key.** Many property owners have unrealistic standards of absolute pest control and need to learn how landscapes can tolerate a certain level of pests without resulting in significant, or even noticeable, damage. Landscape professionals should educate their clients and refer them to www.ourwaterourworld.org for fact sheets and information on alternative pest control strategies.
- **Use Physical and Mechanical Controls.** If pests are identified as the source of unacceptable levels of damage, physical barriers or mechanical techniques are the first line of control. This can include the carefully timed and conducted pruning of infested plant material or removal of whole plants, spraying aphids with a strong jet of water, using pheromone or sticky traps to keep ants and other insects away or hand-picking large adult insect pests and larvae as they appear
- **Use Biological Controls.** Living organisms can also be used to keep pest populations under control. The most important biological controls appear naturally and will be abundant in a landscape that is not heavily treated with pesticides. Encourage beneficial insects by planting a wide range of plants that flower throughout the year (a list is provided in the Bay-Friendly Landscaping Guidelines), and introduce natural predators. Buy all biological controls from a reputable source, and do not use pesticides except as a last resort.
- **Least Toxic Pesticides are a Last Resort.** The least toxic and least persistent pesticide is used only when monitoring indicates that preventative and non-chemical methods are not keeping pests below acceptable levels. Pesticides are not used on a calendar basis. When used, their efficiency is maximized by understanding the pest and beneficial life cycles, by careful timing and targeted application.

A.7 Planting Tips for Single-Family Homes

It is recommended that homeowners and builders follow the practices of Bay Friendly Landscaping and Integrated Pest Management (see Section A.6) to minimize pesticide usage and over-watering. Planting tips for single-family homes include:

- Avoid using invasive species such as iceplant and eucalyptus;

- Minimize turf grass areas to reduce need for fertilizer and excessive watering;
- Use appropriate species for soil and climate conditions; and
- Use compost instead of fertilizer.

Please review Section A.6 for complete information on Bay Friendly Landscaping and Integrated Pest Management.

A.8 Nursery Sources for Native Plants

It is recommended that the native plants used in treatment controls be grown by a qualified nursery. Seed collection should be conducted by a qualified botanist and/or nursery staff. Seed should be collected locally from selected sites to maintain the genetic integrity of the native plant species. The seeds shall be propagated by the nursery for planting during the fall dormant season. The appropriate container size for each species shall be used by the nursery. An asterisk (*) indicates a nursery with a dedicated native plant section.

Berkeley Horticultural Nursery*
1310 McGee Ave., Berkeley, CA
510-526-4704
<http://www.berkeleyhort.com/>

Clyde Robin Seed Company
Castro Valley, CA
510-785-0425
www.clyderobin.com

East Bay Nursery*
2332 San Pablo Ave., Berkeley, CA
510- 845-6490
<http://www.eastbaynursery.com/>

Golden Nursery
1122 2nd Street
San Mateo, CA 94401
(650) 348-5525
www.goldennursery.com

Larner Seeds
PO Box 407
Bollinas, California
415-868-9407
info@larnerseeds.com
webmaster@larnerseeds.com

Mines Road Natives
17505 Mines Road, Livermore, CA

SAN MATEO COUNTYWIDE WATER POLLUTION PREVENTION PROGRAM

925-371-0887

Note: by appointment only.

Mostly Natives Nursery
27235 Highway 1, Tomales, CA
707-878-2009
www.mostlynatives.com

Native Here Nursery
101 Golf Course Road, Berkeley, CA
510-549-0211
<http://www.nativeherenursery.org/>
Oaktown Native Plant Nursery
1019 Bella Vista Ave., Oakland, CA
510-534-2552
<http://www.oaktownnativenursery.info/>

Pacific Coast Seed
533 Hawthorne Place
Livermore, CA
925- 373-4417
www.pcseed.com

Redwood City Nursery
2760 El Camino Real
Redwood City, CA 94061
(650) 368-0357
www.rcnursery.com

Watershed Nursery
Berkeley, CA
510-548-4714
www.thewatershednursery.com

Wegman's Nursery
492 Woodside Road
Redwood City, CA 94061
(650)368-5821
<http://www.wegmansnursery.com/>

Yerba Buena Nursery
19500 Skyline Blvd.
Woodside, CA 94062
(650) 851-1668
www.yerbabuenanursery.com

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- C. Irrigation water audits, Irrigation Association, www.irrigation.org, and the Irrigation Technology Research Center, www.itrc.org.
- D. California Irrigation Management Information System, www.cimis.water.ca.gov, Waste management and recycling, www.calrecycle.ca.gov.
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- F. Pests of Landscape Trees and Shrubs: An Integrated Pest Management Guide, 2nd ed., UC Publication 3359, <http://www.ipm.ucdavis.edu>.
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- J. California Stormwater Quality Association (CASQA). Stormwater BMP Handbook: New Development and Redevelopment. January 2003.
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