

Bioswale

Clairemont Boys and Girls Club



Background

Bioswales are shallow, open channels with gently sloping sides that can be incorporated into landscapes to direct flow, slow runoff and promote pollutant removal. Vegetation planted within the channel, such as native plants or grasses, helps to slow the flow of water and filter out pollutants. Permeable soils encourage infiltration and are often amended to further enhance performance and support plant growth. Bioswales can serve as conveyance for storm water in place of traditional curbs and gutters; however, the primary objective is infiltration.

Bioswales are effective for removing:

- Runoff volume
- Total Suspended Solids (TSS)
- Trash
- Organics
- Bacteria
- Nutrients
- Heavy metals
- Oil and grease

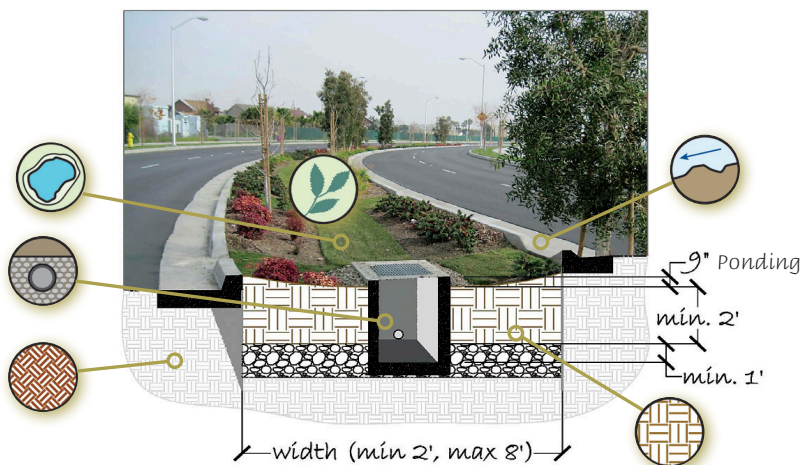
Site Assessment

Bioswales are versatile landscape design elements because their paths can meander or follow a straight course. Ideal sites for bioswales include street right-of-ways and along borders or medians of parking lots. Remove curbs or use curb cut-outs to funnel runoff into the bioswale. Storm drain inlets within the swale should be raised to encourage ponding and infiltration while still capturing overflow. Check dams may also be needed to control flow. Sizing must account for the drainage volume from the surrounding area.

Drainage area	Soil infiltration rate	Water table separation	Depth to bedrock	Facility slope	Inflow rate
< 2 acres	> 0.5 in/hr (if < 0.5 in/hr, install UD*)	> 10 ft (if > 2 but < 10 ft, install UD*)	> 10 ft (if > 2 but < 10 ft, install UD*)	< 2%	Mulch: 1 cfs, Grass: 3 cfs
Pollutant Removal	Sediments: High	Nutrients: Medium	Runoff volume reduction	Groundwater recharge	
	Trash: High	Metals: High			
	Bacteria: High	Oil and Grease: High	High no UD*; Medium with UD*	High no UD*; Low with UD*	
	Organics: High				

*UD = Underdrain system

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Flow regulation: Inflow must be non-erosive sheet flow (3 feet per second for grass cells) or use energy dissipating devices. Bioswales can be used effectively in areas with slopes of 2 to 5 percent by installing check dams to prevent erosive flow velocities; slopes between each check dam should not exceed 2 percent.



Shallow ponding area: Drainage area should be less than 2 acres. Pounded water must completely drain into the soil within 24 hours, with 12 hours preferred as a safety factor. Ponding depth should be less than 12 inches, 9 inches preferable.



Soil Type: Soil testing should be performed at the site by a licensed soil scientist or geological engineer to determine the infiltration rate of the in-situ soils. Bioswales should not be used in sites with highly erodible soils unless turf reinforcement is used. The soil media within the bioswale should be highly permeable and have an appropriate amount of organic material to support plant growth.



Vegetation: Bioswales are typically planted with grasses, shrubs, and trees that can withstand short periods of saturation followed by longer periods of drought. Native plant species or hardy cultivars that are not invasive and do not require chemical inputs are recommended.



Media layers: Media depth must be a minimum of 2 feet. The soil media must comply with the city's *Storm Water Standards*. If existing soils do not meet the criteria, a substitute media must be used.



Underdrain system: An underdrain must be installed if the current soil drainage is less than 0.5 in/hr. The underdrain pipe should be at least 6 inches in diameter and installed at a 0.5 percent minimum slope. An underdrain must be installed if the bioswale is within 50 feet of a sensitive, steep slope. Clean-out pipes must be provided if underdrains are required.



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To access the Storm Water Design Standards Manual, visit: sandiego.gov/development-services/news/pdf/stormwatermanual.pdf

To report storm water pollution, call (619) 235-1000