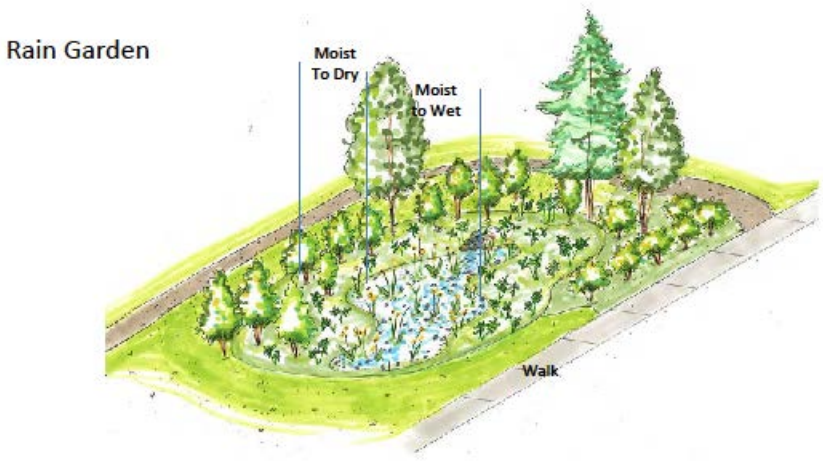
Stormwater Management Manual 2.3.9: Rain Gardens

Facility Description

Rain Gardens are vegetated, flat bottomed, shallow landscape depressions used to collect and hold stormwater runoff. This allows pollutants to settle and filter out as water infiltrates into the ground. Rain gardens are water reservoirs to collect and treat stormwater runoff by allowing the pollutants to settle and filter out as the water percolates through vegetation and soil mediums before infiltrating into the ground below or being piped to its downstream destination. Rain gardens can also be sized to infiltrate the flood control design storm and are often used as complete on-site systems. Rain gardens can be configured in a number of different shapes making them very versatile for integrating into site and landscape plans



Rockman Heights courtyard with infiltration garden

Rain Gardens can be used to help fulfill a site's required landscaping area requirement and should be integrated into the overall site design. Numerous design variations of shape and planting scheme can be used to fit the character of a site.

Rain Gardens qualify as infiltration and filtration facilities. Rain Gardens meet the stormwater management standards for water quality and flow control when designed under the Simplified Approach. Rain Gardens meet the stormwater management standards for water quality, flow control and flood control when designed under the Presumptive Approach.

Design Requirements

All facilities shall require an overflow to an approved discharge point unless sized to fully infiltrate the flood control storm.

Sizing: The Simplified Approach may be utilized for surface areas less than 15,000 square-feet of impervious area. Rain Gardens shall use a sizing factor of 0.05 for water quality using the Simplified Approach. Rain Gardens shall use a sizing factor of 0.11 for flow control with the Simplified Approach.

The Presumptive Approach shall be used for all other water quality, flow control and flood control designs in conjunction with a measured infiltration rate. Rain gardens shall be designed to pond water for less than 30 hours after each storm event.

Soil Suitability: Soils with infiltration rates greater than 2 in/hr shall be designed as infiltration treatment facilities. Soils with infiltration rates less than 2 in/hr shall be designed as filtration facilities.

Dimensions and Slopes: The facility storage depth must be at least 6 inches, unless the rain garden is horizontally sized larger than required. The facility storage depth shall be no more than 12 inches. Side slopes shall be a maximum of 3:1. The minimum bottom width shall be 2 feet. The bottom shall have no more than 0.5% slopes.

Setbacks: Rain Gardens located within 10-feet of building structures or 5 feet of property lines must be lined with an impermeable waterproof liner.

Materials

Piping: Pipes shall be sized to convey design flow rates but shall be no less than 3 inches for private piping. Private piping shall conform to the requirement of the Uniform Plumbing Code. Sizing of public conveyance piping shall conform to the Public Improvement Design Standards Manual.

Drain Rock: Drain rock may be used below the growing medium of a Rain Garden. Drain rock can be used for retention, detention or conveyance. Drain rock shall be open graded, washed 3/4 inch to 2-1/2 inch diameter. Drain rock and growing medium must be separated by a geotextile.

Mulch: Washed pea gravel, river run rock or other non-floating mulch is recommended for Rain Gardens. It should be applied 2 – 3 inches thick to cover all solid areas between plants. It should not be over applied.

Waterproof Liners: The use of waterproof liners is discouraged as infiltration is encouraged on all facility types. Waterproofing liners may be required in areas where hydraulic isolation is required due to existing structural, hydrologic or geotechnical limitations. Rain Gardens located within 10 feet of building foundations or 5 feet of property lines must be lined with an impermeable membrane of 30 mil (minimum) plastic film or equivalent.

Vegetation

The entire Rain Garden must maintain 90 percent coverage for vegetation. Vegetation shall conform to the facility planting list located in **Appendix D**.

Vegetated Rain Gardens shall be planted with minimum plant quantities from Schemes I, II or III. Minimum plant quantities for vegetated Rain Gardens are as follows:

Vegetated Rain Garden Planting Scheme	**I**	**II**	**III**
Ground Cover, 4-inch pots spaced 1' on center (per 100 square feet of the facility)	100	80	80
Large Shrubs, 3 gal. pots spaced 4' on center (per 100 square feet of the facility)		2	2
Small Shrubs, 1 gal. pots spaced 2' on center (per 100 square feet of the facility)		4	4
Evergreen tree, min. 6' height (per 200 square feet of the facility)		1	
Deciduous tree, 1-½ inch caliper (per 200 square feet of the facility)			1

Rain Gardens may elect to use grasses for side slopes. Grasses on side slopes must have 100 percent coverage at establishment by native grasses, turf grasses, native wildflower blends, native ground covers, or any combination thereof. Seed shall be applied at the rates specified by the supplier.

Vegetation or seed cover shall be established as soon as possible after the Rain Garden is completed, and before water is allowed to enter the facility. Unless vegetation or seed cover is established, biodegradable erosion control matting shall be installed in the flow area of the Swale before allowing water to flow through the Swale.

Growing Medium: The growing medium shall be a minimum 12 inches of topsoil or the soil shall be amended to support plant growth. Imported topsoil shall be a sandy loam mixed with compost or a sand/soil/compost blend. It shall be roughly one-third compost by volume, free-draining, and support plant growth. The compost shall be derived from plant material; animal waste is not allowed. In all cases, the growing medium shall be 12 inches deep.

4.5.7 Rain Garden Operations and Maintenance Plan

Rain Gardens are vegetated surface reservoirs used to collect and treat stormwater runoff from impervious surfaces by allowing the pollutants to settle and filter out as the water percolates through vegetation and soil mediums before infiltrating into the ground below or being piped to its downstream destination.

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The reservoir basin shall infiltrate stormwater within 24 hours. All facility components and vegetation shall be inspected for proper operations and structural stability, at a minimum, quarterly for the first 2 years from the date of installation, 2 times per year thereafter, and within 48 hours after each major storm event.

Training and/or Written Guidance information for operating and maintaining vegetated infiltration basins shall be provided to all property owners and tenants. A copy of the O & M Plan shall be provided to all property owners and tenants.

Inspection Logs shall be kept by the facility owner demonstrating the following items have been inspected and are being maintained properly:

- **Access** to Rain Gardens shall be safe and efficient. Obstacles preventing maintenance personnel and/or equipment access to the components of the facility shall be removed.
- **Debris and Litter** shall be removed to prevent channelization, clogging, and interference with plant growth. Fallen leaves and debris from deciduous plant foliage shall be raked and removed.
- **Erosion Damage** shall be identified and controlled when native soil is exposed or erosion channels are forming.
- **Grassed Rain Gardens** shall be mowed to 4"-9" high and grass clippings shall be removed no less than 2 times per year.
- **Infiltrating Rain Gardens** shall be excavated and cleaned, and gravel or soil shall be replaced to correct low infiltration rates.
- **Inlets** shall be cleared when conveyance capacity is plugged to ensure unrestricted stormwater flow to the rain garden.
- **Mulch** shall be replenished as needed to ensure healthy plant growth.
- **Nuisance and Prohibited Vegetation** from the Eugene Plant List (such as blackberries and English Ivy) shall be removed when discovered. Invasive vegetation contributing up to 25% of vegetation of all species shall be removed and replaced.
- **Outlets** shall be cleared when 50% of the conveyance capacity is plugged.
- **Overflows** shall be cleared when 25% of the conveyance capacity is plugged.

- **Rocks or Other Armoring** shall be replaced when only one layer of rock exists above native soil.
- **Sedimentation** build-up near or exceeding 2" in depth shall be hand-removed with minimum damage to vegetation using proper erosion control measures. Sediment shall be removed if it is more than 4 inches thick or so thick as to damage or kill vegetation.
- **Slopes** shall be stabilized using appropriate measures when native soil is exposed.
- **Vegetation** shall be healthy and dense enough to provide filtering while protecting underlying soils from erosion. Dead vegetation shall be removed to maintain less than 10% of area coverage or when vegetative filter function is impaired. Vegetation shall be replaced immediately to control erosion where soils are exposed and within 3 months to maintain cover density.

Spill Prevention Measures shall be exercised on site when handling substances that contaminate stormwater. Releases of pollutants shall be corrected as soon as identified.

Non-Chemical Pest Control measures shall be taken to prevent development of insects, mosquitoes, and rodents.