

## 4.1-f RAIN GARDEN

Alternative Names: Small Vegetated Basin, Infiltration Garden, Bio-Retention Garden

### DESCRIPTION

Rain gardens are small, vegetated depressions used to promote infiltration of stormwater runoff. Runoff may enter the gardens via sheet flow or point discharge. Rainwater gardens can be planned and integrated into both new and existing developments and usually combine amended soils, shrubs, grasses, and flowering perennials. Plant roots, foliage, and soil help to retain and infiltrate water. Rain gardens can achieve an appealing, aesthetic look and are well suited for small sites, such as individual homes, and larger sites, such as common areas and schools.



### APPLICABILITY

- Primarily used to treat and infiltrate runoff from small impervious surfaces typically less than 1 acre in size.
- Rain gardens may not be suitable to treat the entire design storm for a large drainage area but they may be able to treat a small sub-drainage area if flows can be broken up.
- Site rain gardens on relatively flat terrain (less than a 5 percent slope).
- Not appropriate for soils with infiltration rates less than 1"/hr or areas with seasonally high groundwater (e.g., SEZ) where groundwater contamination and low infiltration rates are concerns.
- Because of the potential to pollute surrounding water sources, rain gardens shall not infiltrate stormwater runoff from pollutant "hot spots" such as industrial properties, vehicle fueling and maintenance areas, and any other location where spills may occur without adequate measures for pretreatment.

### BMP DESIGN APPROACH

- Pollutant Source Control
- Hydrologic Source Control
- Stormwater Treatment

### SCALE OF APPLICATION

- All SFR and MFR < 1 acre
- MFR 1-5 Acre and CICU < 5 acres
- MFR and CICU > 5 acres and all WQIPs

### TYPE OF APPLICATION

- Temporary
- Permanent

- Avoid using a rain garden as a snow storage facility as snow storage activities can damage or block the inlet and outlet and can damage vegetation.

### Advantages

- Rain gardens can be incorporated into a number of different landscape settings, such as front and back yards of residential areas, parking lot planter islands, and in connection with roof downspouts.
- Can help alleviate downstream flooding and other drainage problems.
- When properly designed and maintained, integrates into home and neighborhood landscapes and enhances aesthetic value.
- Can provide benefits besides water quality, such as wildlife habitat and open space.

### Disadvantages

- May require irrigation to maintain vegetation.
- Applicability limited to sites with higher infiltration rates and low pollutant loads (unless pretreatment is provided). Depending upon inflowing pollutant loads, frequent maintenance may be necessary to maintain effectiveness.
- If improperly designed, installed, or maintained standing water may persist and provide a location for mosquito breeding.

## DESIGN CONSIDERATIONS

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- Configure the rain garden ponding area (bottom) to be a shallow depression between 6 to 18 inches deep.
- Design side slopes to be 3:1 (run to rise) or flatter to encourage growth of vegetation and slope stability.
- Where space is available, size the rain garden to retain at least the 20-yr/1-hr storm volume generated from the tributary impervious area.
- Rain gardens shall be designed to infiltrate stormwater within 96 hours.
- Consider designing an accessible forebay, sediment trap, or an equivalent pretreatment device at the inlet of a rain garden for removal of coarse sediments and debris. Accessible maintenance facilities can markedly improve the ease of maintenance and contribute to extended effectiveness.
- Avoid siting near building foundations or other structural features. As a rule of thumb, a rain garden shall be sited as least 10 feet down gradient and 50 feet upgradient of a structural feature. (Suggested distances may be shortened or lengthened at the discretion of the design engineer dependent on the measures taken to mitigate potential damages from seepage).
- To manage high flows, design a stabilized outlet that directs overflow to a stabilized channel or other appropriate stabilized area.
- Develop planting plans in accordance with fire defensible space recommendations found in *“Living with Fire: A Guide for the Homeowner”* for the Lake Tahoe Region.



*A grass swale leading runoff from a small commercial parking area into a rain garden.*

## INSTALLATION CONSIDERATIONS

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- Prior to construction, stabilize the drainage area to the facility with temporary BMPs to keep runoff and sediment from entering the work area.
- Scrape away and stockpile any organic topsoil for later use prior to excavating the rain garden.
- Grade the bottom of the rain garden flat (less than 1 percent slope) to provide uniform distribution and infiltration of runoff.
- After completing grading activities, till back in topsoil or other soil amendments to improve infiltration capacity, which may have been diminished by compaction from heavy equipment during grading. Tilling activities are typically at least 12 inches deep.
- Where topsoil is lacking or has been depleted, amend the soil with at least 4 to 6 inches of organic compost incorporated into the soil prior to planting.
- Choose any combination of native and/or adapted perennial flowers, ornamental grasses, shrubs, or small trees. Use native plants to reduce maintenance and irrigation needs. Contain the vegetation within the rain garden through the use of a border, such as an attractive wall, pavers, or a band of turf.

## INSPECTION AND MAINTENANCE

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- Inspect after large runoff events and the spring melt period. Inspect for overall plant health; inflow and outflow function; and accumulation of sediment, trash, and debris.
- If a large quantity of sediment has discharged to the rain garden, examine the drainage area to the rain garden and identify potential sources of sediment that may be addressed through other pollutant source control BMPs identified in this Handbook. Alternatively, consider retrofitting the inlet to the rain garden to include a pretreatment device.

- Remove sediment from a rain garden when it hinders infiltration or creates an unfavorable condition for vegetation. Vegetation may need to be replaced or replanted after sediment removal. Salvage existing native or adapted plants to the greatest extent possible.
- If erosion is found to occur at the inlet or outlet, stabilize with rock riprap or other types of energy dissipation and stabilization BMPs identified in this Handbook.
- Irrigate vegetation as necessary to maintain soil moisture required for dense growth, but do not overwater. Some level of irrigation will likely be needed to maintain vegetation.

## EFFECTIVENESS CONSIDERATIONS

An appropriately sized rain garden that is adequately maintained is one of the most effective BMPs described in this Handbook for achieving runoff reductions from development. However, continued effectiveness may require frequent maintenance if infiltrated stormwater contains significant sediment loads. Rain gardens are relatively easy to construct when land is available, but irrigation may be necessary to maintain vegetation.



*A rain garden accepting parking lot runoff.*