Before you build: Locating and Planning a Rain Garden

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Plants that fit soil conditions

Runoff from roof or driveway, flowing in over yard or through ditch or pipe. Inflow higher than overflow

Ponding depth (6” to 12” inches)
Mulch layer
Rain garden soil mix (bioretention soil)
Overflow (rock-lined to prevent erosion)

Rain garden soil mix (12” to 24” inches deep) - bioretention soil mix
Refer to Rain Garden Handbook & Seattle Flow Control Manual

- **Rain Garden Handbook for Western Washington Homeowners** has complete “how to” except sizing chart not appropriate for Seattle.
- Seattle RainWise sizing: see next slide
- Code-required bioretention project sizing: refer to **Seattle Stormwater Code**:

  *Volume 3 – Flow Control and Water Quality Treatment Technical Requirements Manual, Chapter 4 – Flow Control Design*

  **Table 4.5 “Flow Control Sizing Factors for Pre-Sized Approach”**

  Look under “Bioretention Cell” for rain gardens with 2-inch, 6-inch, or 12-inch ponding depths on soils with infiltration rates of $\frac{1}{4}$, $\frac{1}{2}$, or 1 inch per hour.

- Both linked from [www.seattle.gov/util/rainwise](http://www.seattle.gov/util/rainwise)
Sizing Factor from tables gives the **bottom area** of rain garden — add side-slope width to get top area

Example: Site with 0.25”/hr infiltration rate.
Sizing Factor from table (for 6” ponding depth) is 7.4% (.074)  
500 SF roof area X .074 = **37 sf bottom rain garden area** (or about 6’x6’)

To convert to **top** rain garden area, add slope grading for 10” minimum depth (the 6-inch ponding depth plus 4” inch minimum freeboard). At 2.5H:1V side slope, add 10”x2.5 = 25” (~2 feet) around RG bottom area, = **100 sf top rain garden area**
Infiltration ("perc") on-site test

1) Dig hole 24 inches deep, add stake with ruler
2) Fill with hose to depth of 12”, let drain completely
3) Repeat fill-&-drain (may take overnight)
4) On third fill to 12-inch depth:
   - Measure water height every hour
   - Continue until rate of fall stabilizes
     (same amount of fall for 2-3 hours)
   - Use that as the infiltration rate (inches/hour)

Results:
< 0.25 in/hr: don’t install rain garden
≥ 0.25 in/hr: use 0.25 (or 0.5, 1.0) RG size in table
> 1.0 in/hr: use 1.0 in/hr RG size in table
  (can’t make RG size smaller)
Rain Garden Location
– Don’t locate Ø

Ø Over underground utilities – call 1-800-424-5555 for free utility location service or www.callbeforeyoudig.com

Ø Over major tree roots

Ø In soggy areas (water table at surface in winter)

Ø Within 300 feet of steep slopes or landslide-prone areas (500 ft. setback for code-required bioretention projects)
  – Enter your site on RainWise Tools website to see critical areas, or see DPD map showing steep slope & landslide areas at http://web1.seattle.gov/dpd/dpdgisv2/mapviewer.aspx
  – Consult a geotechnical engineer if in doubt

Ø Within setback limits from buildings:
  – 5 ft. minimum from all buildings
  – 10 ft. min. from buildings with basements. Add 2 ft. more setback for each foot that basement extends below 5 feet.
Rain Garden Location

Do locate

- On a fairly level site – up to 5% slope (1ft. drop in 20 feet)
- On site big enough for required bottom area (from sizing table) plus width of side slopes (depending on depth & freeboard)
- Where roof (or driveway) runoff will flow downhill to the rain garden through a pipe, swale (shallow ditch) or overland
- Where overflow (in a big storm) will flow downhill to street drains in ROW.
- Where it will look good.
Sizing to allow for side slope width (depending on ponding depth and freeboard)

- Side slopes must be max. slope of 2.5H:1V (2½ inches horizontal run per 1 inch vertical rise), and
- Require minimum 4 inches of vertical freeboard from overflow height (which determines ponding depth) to top of slope,
- So to compute top size for:
  - 6-inch ponding depth + 4 inches of freeboard = 10 in. vertical rise, so add $10'' \times 2.5 = 25$ inches (~2 ft.) to bottom width all around
  - 12-inch ponding depth + 4 in. freeboard = 16 in. rise, so add $3\frac{1}{2}$ ft. ($16'' \times 2.5 = 40$ inches) to bottom width all around

Ponding depth is determined by height of overflow. Must have 4 inches minimum freeboard above overflow height to top of berm
Simple layout method, to see where RG will fit in existing landscape

- Start with required bottom size (square feet) from sizing table
- Make that size into a square (take square root of bottom size)
  - Example: 100 sf bottom area as a square is 10 ft x 10 ft
- Add side slopes to get top dimensions as square
  - 6 in. ponding depth + 4 in. freeboard at 2.5:1 slope = 25 in. (~2 ft.) side slope width all around, so
  - 10’x10’ bottom needs 14 ft x 14 ft top width
- Calculate perimeter of square (side length x 4)
  - 14 ft side length x 4 = 56 ft. perimeter
- Mark a rope or hose to that length, tie it in loop
- Use that loop to try RG layouts and shapes in different locations in yard
  (works for oval or bean shapes).
Planning the inflow

- Downhill (≥ 2% slope) from downspout or driveway contributing area.
- Convey inflow by:
  - Underground pipe (connected above-ground to downspout),
  - Shallow swale (with grass or vegetation), or ditch filled with drain rock.

Runoff from roof or driveway, flowing into yard or through ditch or pipe. Inflow higher than overflow.

Plants that fit soil conditions:

- Ponding depth (6” to 12” inches)
- Mulch layer
- Bioretention soil mix
- Overflow (rock-lined to prevent erosion)
- Rain garden soil mix (12” to 24” inches deep)

1/3 compost, 2/3 soil.
Planning the overflow

- In big storms, rain garden may overflow – plan for it!
- **Rock line overflow area** to prevent erosion
- Should disperse onto landscape *minimum* of 3 ft. away from sidewalks or alleys – disperse with rock or gravel level spreader (see Detail sheet #8 on website)

**Plants that fit soil conditions**

Runoff from roof or driveway, flowing in over yard or through ditch or pipe. Inflow higher than overflow

- **Ponding depth** (6” to 12” inches)
- **Mulch layer**
- **Bioretention soil mix**
- **Overflow** (rock-lined to prevent erosion)
- **Disperse overflow into landscape**

**Must have 4 inches min. freeboard above overflow height to top of berm**
Pre-construction site inspection
(for projects seeking reimbursement by SPU)

SPU inspector must verify on-site, prior to construction:

- Appropriate location: slope, trees, etc.
- Size:
  - measured infiltration rate
  - chosen ponding depth
  - verify contributing area, \( x \) sizing factor from tables
    - required minimum RG bottom area
    + side slope width
    - required top area of rain garden
- Inflow conveyance (PVC Schedule 40 pipe, swale, or ditch) and slope
- Overflow location and dispersion
  - min. 3 ft. from rock/gravel overflow spreader to sidewalk
  - not flooding neighboring properties