Rain Gardens for Tennessee
Towards a water-healthy landscape

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SURVEY REVEALS TOP TEN DESIGN TRENDS FOR RESIDENTIAL LANDSCAPE ARCHITECTURE

Rainwater/graywater harvesting top trend for 2016
2/23/2016

Landscape architects were asked to rate the expected popularity of a variety of residential outdoor design elements in 2016. The survey was fielded February 4 through February 18, 2016, with 803 responding.

Respondents expected the greatest demand for outdoor living spaces that are environmentally sustainable, reduce water costs and are low maintenance.

Here are the top ten project types with the expected highest consumer demand:

- Rainwater/graywater harvesting – 88%
- Native plants – 86%
- Native/adapted drought tolerant plants – 85%
- Low-maintenance landscapes – 85%
- Permeable paving – 77%
- Fire pits/fireplaces – 75%
- Food/vegetable gardens (including orchards, vineyards, etc.) – 75%
- Rain gardens – 73%
- Drip/water-efficient irrigation – 72%
- Reduced lawn area – 72%

Water-focused design elements dominated this year’s top ten list and reflect consumers’ growing commitment to landscapes that reduce water use and stormwater runoff, says Nancy Somerville, Hon. ASLA, executive vice president and CEO of ASLA.

“Water issues are hot topics for many communities, and many people are turning to landscape architects for creative green infrastructure solutions,” said Somerville. “Sustainable residential landscape architecture, if part of a broader integrated site design, can dramatically reduce water usage and stormwater runoff over the long term while creating a healthy residential environment.”
Status of Streams in Tennessee

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Stream Miles Impaired by Urbanization

Stream Miles Impaired by Urbanization

Urban Stream Syndrome  (Walsh et al., 2005)

- "Flashy" Hydrology
- Increased Pollution
- Reduced Biodiversity
- Altered Channel Morphology
- Increase in Pollution

Image description: A stream with urban development in the background, showing the effects of urbanization on stream ecology.
Content adapted from The Auckland City Council, 2010. Graphics Creation Credit: Maudy Budipradigdo
No Golden Rule Here...
Soils & Infiltration

Natural Structure

More space between particles = better water infiltration
Soils & Infiltration

Compacted Structure

Less space between particles = less water infiltration
Connected Impervious Surface

Disconnected Impervious Surface
Rain Gardens

Knox County, Tennessee
Knox County, Tennessee
Locating Your Rain Garden

Where to locate:
• Between water source (gutter/upland yard) and where water leaves property

Avoid:
• Area 10 ft from house
• Underground utilities
• Greater than 12% slope
• Areas with standing water
• Highly shaded areas
• Septic field

Call *811 before you dig!
Size the Garden
Three Keys to Sizing

Rain Garden

Contributing Area

Rainfall

Soils
Soils & Infiltration

Field Texture Tests

Rub moist soil between fingers
- Gritty – sand
- Slick – silt
- Sticky – clay

Soil Ball Test

Ribbon Test
Particle Size Analysis
Rutherford County, TN

Hydrometer Method
1234

% Sand  26
% Silt  60
% Clay  14
Soils & Infiltration

Percolation Test

Dig 1ft. hole

Fill with water & allow to drain (prime)

Refill with water

Soil

1 ft. deep

- Less than .25 in. per hour: "No go" as is
- .25 – 1 in. per hour: Medium Rate
- 1 in. or greater: Fast Rate
**Size the Garden**

**Contributing Area**

*Impervious* (roof top, driveway, compacted soils)

*Pervious lawn and flower beds* (well established, no brown spots)
Size the Garden

Rainfall

Target = 1 inch
<table>
<thead>
<tr>
<th>Infiltration Test Result (assuming 1 foot deep test hole)</th>
<th>Category</th>
<th>Contributing Area (Percentage of Total)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 inch per hour or more (empties in less than 12 hrs)</td>
<td>Fast-Draining</td>
<td>10%</td>
</tr>
<tr>
<td>More than ¼ in/hr but less than 1 in/hr (empties between 12 and 48 hrs)</td>
<td>Moderately - Draining</td>
<td>15%</td>
</tr>
<tr>
<td>¼ inch per hour or less (does not empty in 48 hrs)</td>
<td>Slow-Draining</td>
<td>Not Suitable</td>
</tr>
</tbody>
</table>
Size the Garden

The equation

Rain Garden Size = \text{Total Contributing Area} \times 10\% \text{ or } 15\%
(based on infiltration test)
Size the Garden

5-10-15 Rule

5 = 5 inch rain garden depth

Determine Rain Garden Footprint

10 = Take 10% of contributing area when soils have infiltration rate = 1 in per hr or greater

15 = Take 15% of contributing area when soils have infiltration rate = .25 to 1 in per hr
Fast Draining Soils:
- 2500 x 0.1 = 250 ft²

Moderately Draining Soils:
- 2500 x 0.15 = 370 ft²
• **Shape:** Typically twice as long as wide
• **Orientation:** Length generally perpendicular to slope
Berm

- Use of clay-rich soil
- Compact well
- Use mulch to cover

Use tamp to compact
Inlets – Where the water enters

- Grassy swale draining upland driveway
- Sheet flow from lawn & sidewalks
Outlets – Where the water exits
Excavation

- Dig depth of bowl
- Dig mulch depth
- Dig deeper to loosen subsurface (poor infiltration – double dig)
- Replace to depth allowing for bowl and mulch depths
Soils & Infiltration

How to “Double Dig”

Loosened soil increases infiltration
Soil Amelioration with Amendments

- Low nutrient soil mixture (by volume)
  - 50% washed sand, no fines
  - 30% topsoil
  - 15% double shredded mulch
  - 5% peat moss

- Alternative
  - 50% washed sand
  - 25% topsoil
  - 25% compost or leaf litter

- Till in hardwood chips

- Sand straws
Design & Construction

Mark Boundaries and Remove Turf
Plant Considerations

*Choose Native!*

- **Soil moisture conditions**
- **Seasonal colors**
  - Bloom times
  - Fall leaf color changes
- **Grouping plants**
  - Easier to identify in spring
  - Bigger visual impact
- **Wildlife attractors**
  - Hummingbirds
  - Butterflies

Diagram:
- White Star Sedge - 1ftD
- Blue Flag Iris - 1ftD
- Brown-Eyed Susan - 2ftD
- New England Aster - 3ftD
- Wild Indigo - 3ftD
- Common Winterberry - 8ftD
Blue Indigo
Spring to Summer Blooms
Blue Flag
Iris versicolor
Rain Garden Plants
Rain Garden Plants
Rain Garden Plants

- Dwarf Joe Pye Weed
- Goldenrod
- Summer to Fall Blooms
- Northwind Switchgrass
- Fireworks Goldenrod
- Purple Coneflowers

Illustrations by Katie Walberg
Planting Design
Putting it All Together

500 ft$^2$ Full Sun

Plant Key
- Indigo Bush
- Swamp Milkweed
- Summersweet
- Cardinal Flower
- Brown-Eyed Susan
Following season, use to ID immature plants & ones that did not survive
Maintain Garden

Water (1st year important)
• Look for signs – water deprivation

• Amounts
  – 1 inch per week
  – ½ gallon – 1 ft wide plant
  – 5 gallons – 3 ft wide plant

Limit foot traffic

Observe:
• Infiltration times: Sediment clogging &/or compaction
• Erosion
• Berm breach
Maintain Garden

**Spring**
- Break-up hardened mulch/soil
- Cut back dead stalks
- Weed (check labeled photo & photos of immature installed plants)
- Install replacements
- Mulch, if needed

**Summer**
- Weed & water
- Deadhead

**Fall**
- Evaluate mulch needed
- Cut back dead flower stalks or retain for wildlife!
Green Infrastructure Demonstrations at UT
PLEASE EXCUSE OUR DUST!

Rain gardens under construction.

Designed By:
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Powered By:
Landscape Design Student Club, American Society of Agronomy and Biological Engineers, Construction Science Student Club, BESS Students, Hydroseeding

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Register your rain garden with UT Extension!
http://goo.gl/forms/lXZZT0loK4

Rain Gardens of Tennessee
Take a tour of the rain gardens of Tennessee, made possible by Tennessee Smart Yards and our collaborating partners.

UT Gardens, University of Tennessee Institute of Agriculture. Made possible through UT Green Fees.

www.tinyurl.com/tnsyraingardens
**Step 1: Know your rainwater footprint.**

*Rainwater: Your Liquid Asset*

*A Home Stormwater Exercise*

https://extension.tennessee.edu/publications/Documents/W300.pdf

**Step 2: Protect shorelines, streambanks and ditch lines.**

*Improving Stream Channels, Ditches and Lakeshores with Live Staking*

https://extension.tennessee.edu/publications/Documents/SP781-B.pdf

**Step 3: Let rainwater nourish your landscaping.**

*Rain Gardens for Tennessee: A Builder’s Guide for Homeowners*

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Knox County Stormwater