

# **So You Want to Build a Rain Garden...**

**What have we learned so far?**

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**Watershed Protection Department**

**Sustainable Stormwater Solutions Section**

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# What is a Rain Garden?

A rain garden is a vegetated, depressed landscape area designed to capture and infiltrate and/or filter stormwater runoff from impervious surfaces.





# Rain Garden Guidance



earth-wise guide to

## Rain Gardens

Keeping Water on the Land

### what is a rain garden?

A rain garden is a shallow vegetated depression designed to absorb and filter runoff from hard (impervious) surfaces like roofs, sidewalks, and driveways. Rain gardens are usually planted with colorful native plants and grasses. They not only provide an attractive addition to the yard, but also help to conserve water and protect our water quality.

### how does a rain garden help?

As Austin becomes increasingly urbanized, native landscapes are replaced with impervious surfaces that prevent rainwater from soaking into the ground. Stormwater quickly runs off these hard surfaces, picking up pollutants from the land and carrying them to our creeks. The rapidly flowing water also increases the chances of flooding and erosion.

The goal of a rain garden is to keep water on the land. Rain gardens, with their shallow depressions, capture stormwater and provide for natural infiltration into the soil. This provides water for the plants and helps maintain a constant flow of water in our streams through groundwater. They also help filter our pollutants including fertilizers, pesticides, oil, heavy metals and other chemicals that would otherwise reach our creeks through storm drains or drainage ditches. By reducing the quantity of water that runs off your property, rain gardens help lower the risk of flooding and erosion.

[growgreen.org](http://growgreen.org)



Austin Parks and Recreation - 919 West 28th Street

## Create A Rain Garden in Six Steps

### 1 Find the Right Location

• Observe the flow of water from rooftops, driveways, or other hard surfaces and place the rain garden where this water collects



- Select an area on gently sloping or flat land
- Calculate the slope of your lawn (instructions on next page). The slope should be less than 10%.
- If possible, pick a spot in full to partial sun. Shady locations will still work, but the options for flowering plants are more limited in the shade.
- Make sure that any overflow will not cause unintended runoff to a neighbor's property or other structure.
- If drainage-related problems are occurring (e.g. foundation problems, erosion or flooding), consider placing the rain garden at least 10' away from the structure.
- Avoid areas with utility lines. Be sure to call 1-800-DIG-TRESS (344-8377) to identify the location of underground utilities - the service is free.

# Siting

## **For Water Quality Credit:**

### **Land Use -**

1. Commercial, Multi-Family, Civic, and Right of Way developments only.
2. Single Family water quality credit coming soon.

### **Stormwater Hotspots -**

Infiltration rain gardens are not allowed in areas where activities generate highly contaminated runoff due to the potential for ground water contamination.



# Location

## **Drainage Area –**

Contributing DA not to exceed 2.0 acres.

## **Setbacks –**

Prevent adverse impacts to building foundations, basements, wellheads, and roadways

## **Slopes –**

Should not be located on slopes exceeding 15 percent

## **Soil Conditions –**

Consider depth to water table, bedrock, and the soil infiltration rate

# Soil Analysis

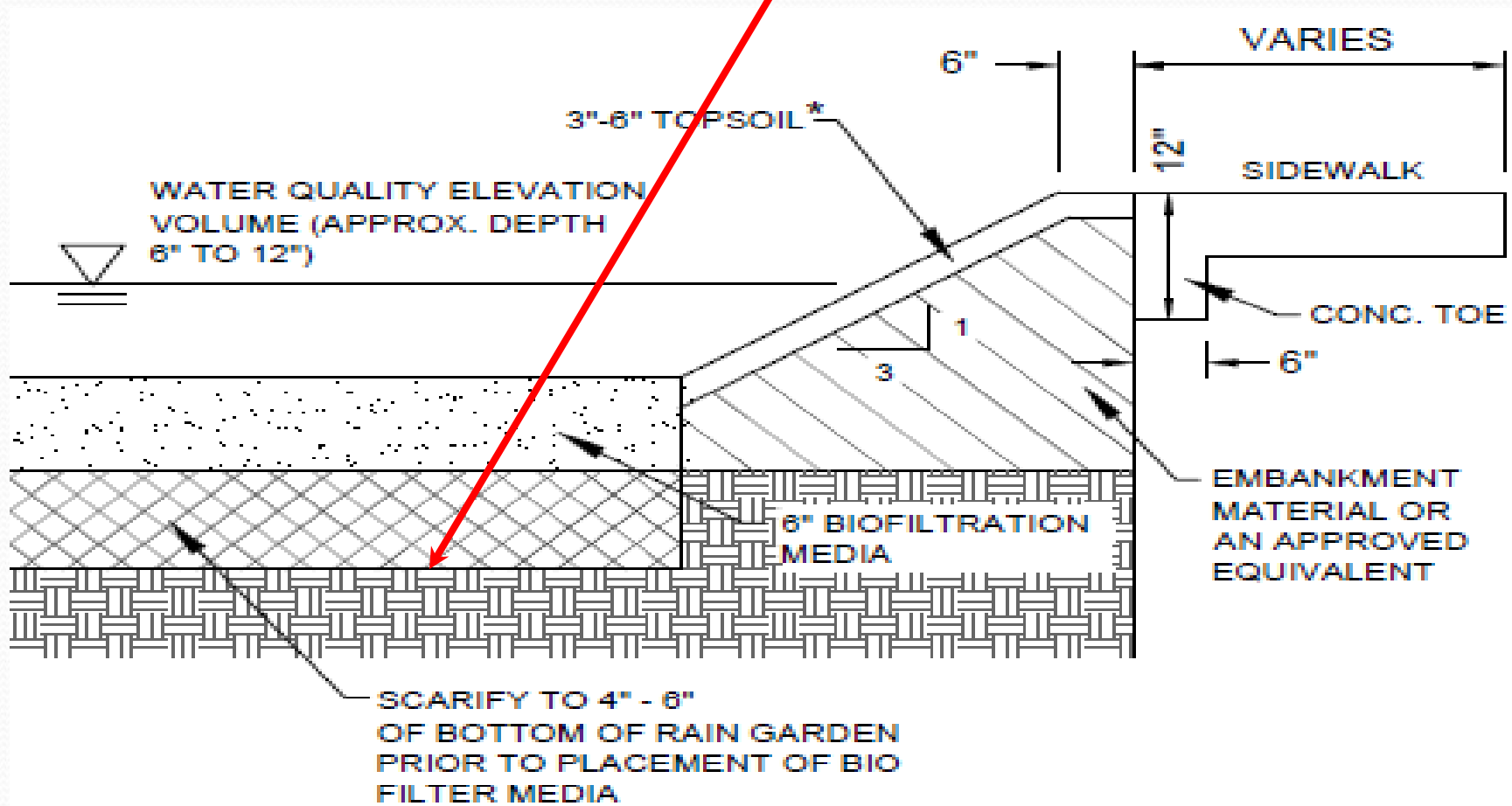
## Infiltration rates –

For infiltration rain gardens

- Don't rely on soil survey maps or desktop evaluation for soil infiltration rates
- Perform an onsite infiltration test (perc test)
- Perform at least one test for every 2000 square feet of rain garden
- Be sure to dig test hole deep enough to measure infiltration at the bottom of the rain garden.



Dig Test Hole to  
this Depth

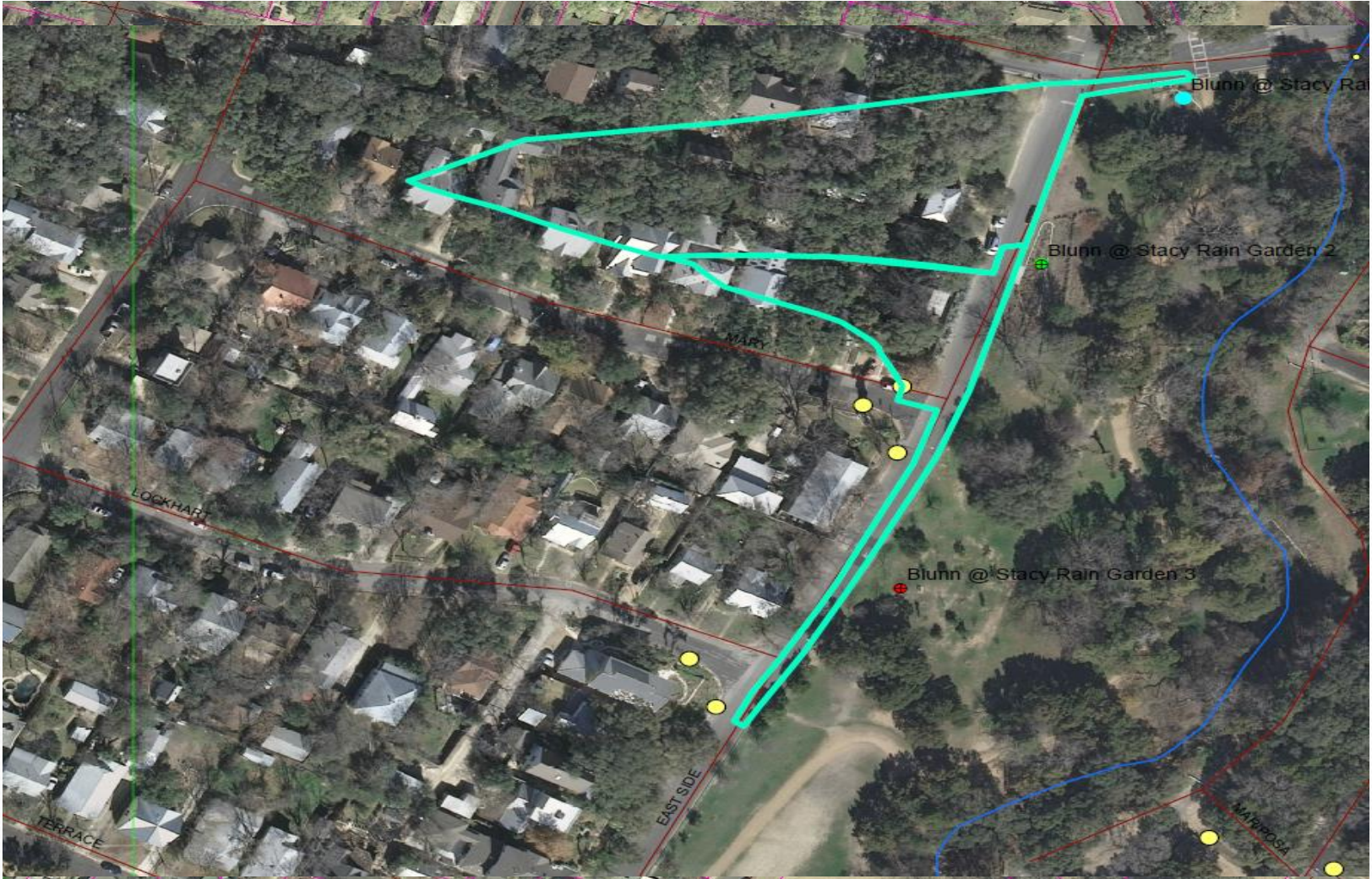


# Drainage Area

- **Desktop analysis**
  - GIS and Google map
- **Field Verify Drainage Areas**
  - Preferably in the rain
- **Design for certainty of capture**
  - Grading features or trench drains



# Drainage Area





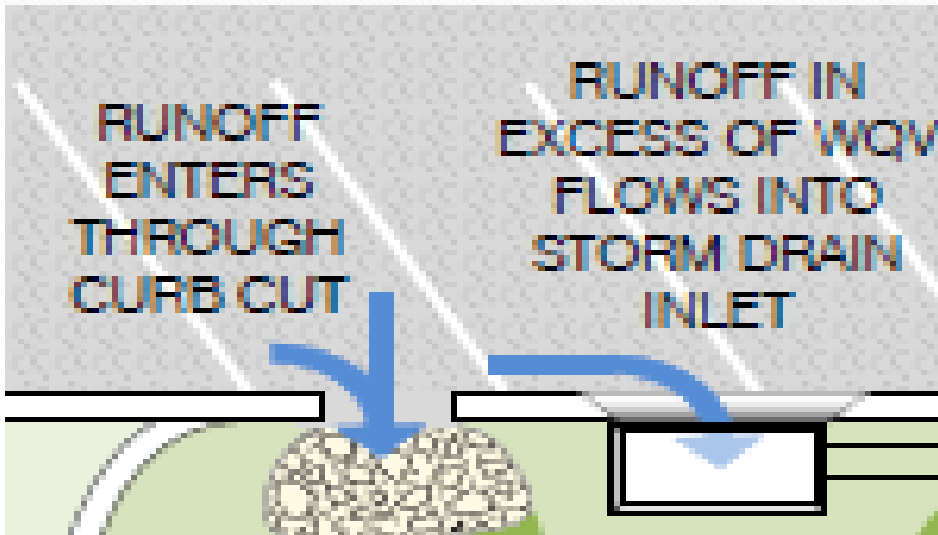
# Certainty of Capture



FAIL



# Inlet Design





# Items to consider

- Flow Control
  - Flows into the rain garden should not exceed (25 yr storm event)
- Watch the Elevations during Construction
  - Top of the area inlet
  - Location of curb cut and overflow weir

## Don't block flow path into RG

- Often the addition of topsoil, sod, rock spill during design or construction and WQV is





# Media and Underdrains

## Biofiltration medium

- Blend: 70% concrete sand and 30% chocolate loam
- No compost
- Aged mulch (partially decomposed) may be added (up to 5%)
  - Increase Water Holding Capacity
  - No added nutrients
  - Compost not allowed

## Plants

- Miniature biofilters provide enhanced nutrient removal
- Plant health is important in variable conditions

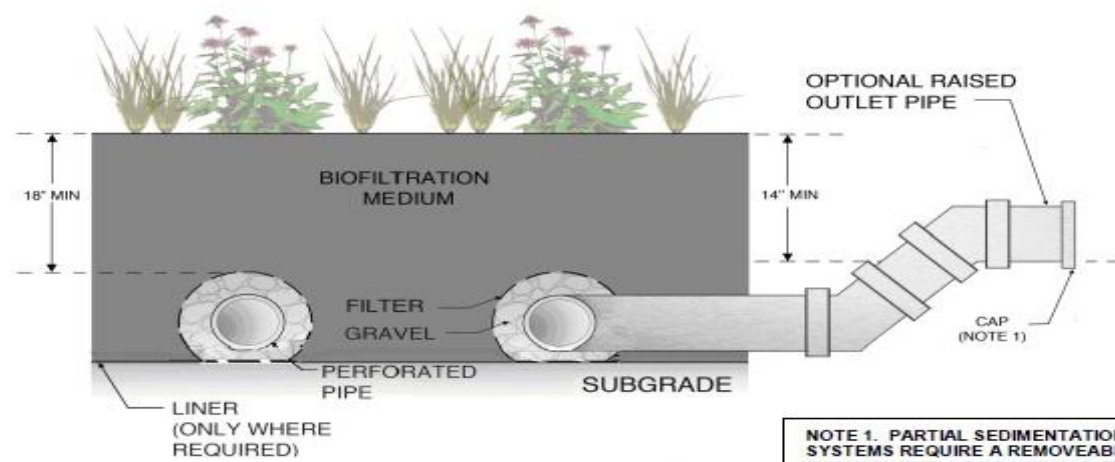
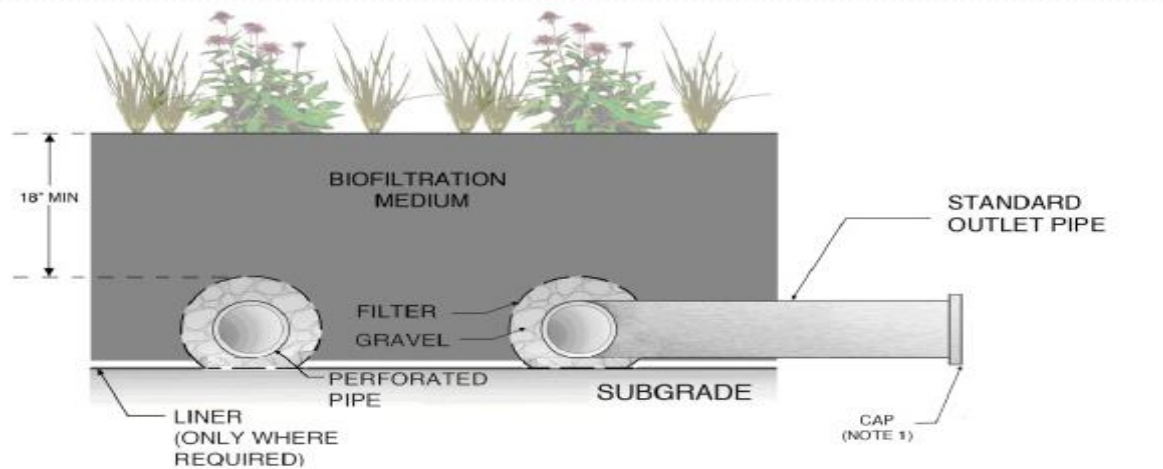
## Saturated zone

- Promotes pollution removal
- May help with plant viability

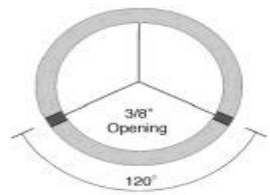
## Underdrain design

- Allows plant roots to access underlying soil
- Washed river gravel works best...

# Underdrains



**NOTE 1. PARTIAL SEDIMENTATION/BIOFILTRATION SYSTEMS REQUIRE A REMOVEABLE PVC CAP WITH A MINIMUM 48 HOUR DRAWDOWN TIME ORIFICE. FULL SEDIMENTATION/BIOFILTRATION SYSTEMS DO NOT REQUIRE A CAP ON THE UNDERDRAIN OUTLET PIPE.**



PERFORATED PIPE  
DETAIL











# Rain Garden Landscaping

- Critical to Project Success
- Integrate Engineering & Landscape
- Team: Include Landscape Professional



## Suggested Plants for Central Texas Rain Gardens

### Tall Plants

Cherry Laurel  
Eastern Gamagrass  
Maximilian Sunflower  
Possumhaw Holly  
Red Buckeye  
Switchgrass

### Medium Plants

American Beautyberry  
Bicolor Iris  
Big Bluestem  
Big Muhly  
Bushy Bluestem  
Cherokee Sedge  
Chili Pequin  
Indian Grass  
Little Bluestem  
Obedient Plant  
Prairie Wildrye  
Purple Muhly  
Turks Cap

### Low Plants

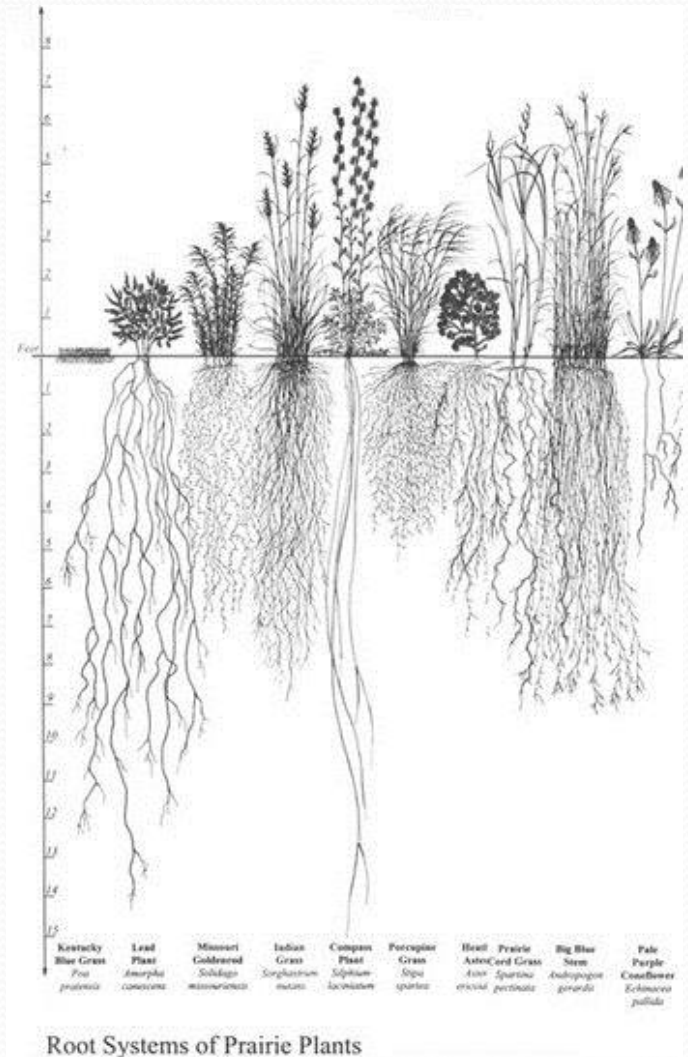
Black-eyed Susan  
Blue Mistflower  
Cherry Sage  
Coreopsis  
Deer Muhly  
Gulf Coast Muhly  
Gulf Coast Penstemon  
Horseherb  
Inland Sea Oats  
Liriope  
Meadow Sedge  
Missouri Violet  
Monkey Grass  
Pigeonberry  
River Fern  
Spiderwort  
Tropical Sage  
Water Clover  
Zexmenia





# Rain Gardens: Plants

- **Plants are an essential component** – they filter and clean stormwater, and stabilize the soil
- Use Native or adapted plants
- Use Drought-tolerant plants
- Plants with fibrous root systems are very beneficial
- Plant roots will maintain and increase soil porosity
- Avoid plants that require well-drained soils
- Diversity of plant types





# Rain Gardens: Plants

## PLANT INFORMATION SOURCES

- **Non-residential** follow ECM 1.6.7C, Biofiltration

- Turf grass (e.g., buffalo grass)
  - Groundcovers
  - Small trees
- Other with approval

- Perennials
- Shrubs
- Grasses, Sedges

Table 1.6.7.C-2  
Recommended Plant Species

Botanical Name	Common Name
<i>Andropogon gerardii</i>	Big bluestem
<i>Buchloe dactyloides</i>	Buffalo grass
<i>Elymus canadensis</i>	Canada wildrye
<i>Helianthus maximiliani</i>	Maximilian sunflower
<i>Muhlenbergia capillaris</i>	Gulf coast muhly
<i>Muhlenbergia filipes</i>	Purple muhly
<i>Muhlenbergia dumosa</i>	Pine muhly
<i>Muhlenbergia lindheimeri</i>	Big muhly
<i>Muhlenbergia rigens</i>	Deer muhly
<i>Panicum virgatum</i>	Switchgrass
<i>Penstemon tenuis</i>	Brazos penstemon
<i>Physostegia</i> spp.	Obedient plant
<i>Schizachyrium scoparium</i>	Little bluestem
<i>Sorghastrum nutans</i>	Indian grass
<i>Sporobolus airoides</i>	Alkali sacaton
<i>Stenotaphrum secundatum</i>	St. Augustine grass
<i>Tripsacum dactyloides</i>	Eastern gama grass

Table 1.6.7.C-3  
Vegetation That Is Not Permitted For Planting

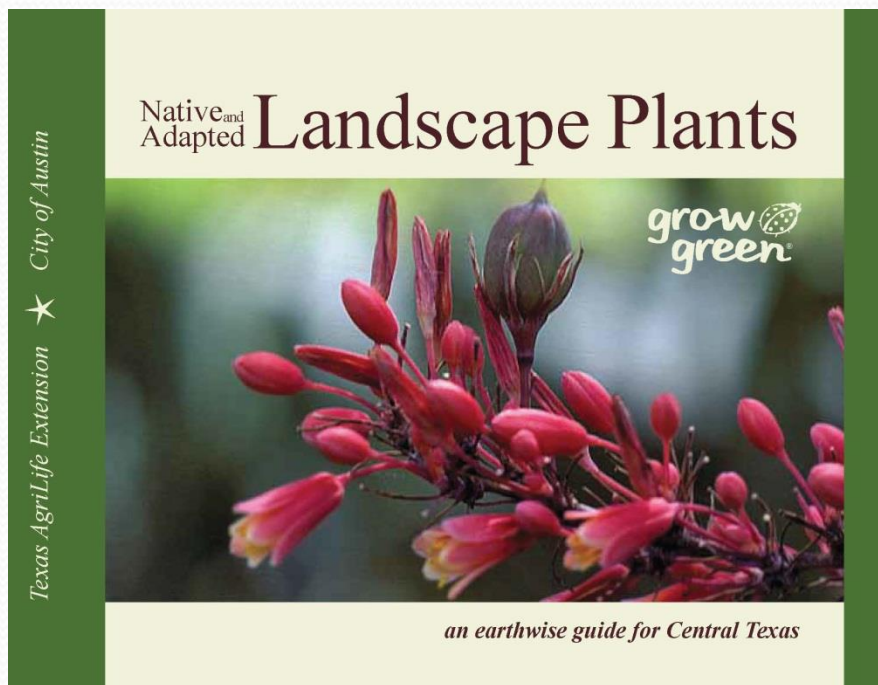
Botanical Name	Common Name	Comments
<i>Arundo donax</i>	Giant reed	Tall invasive grass
<i>Bothriochloa ischaemum</i> var. <i>songarica</i>	'King Ranch' bluestem (KR bluestem)	Invasive grass
<i>Cortaderia selloana</i>	Pampas grass	Potentially invasive
<i>Cytisus scoparius</i>	Scotch broom	Invasive shrub
<i>Eragrostis curvula</i>	Weeping love grass	Invasive grass
<i>Imperata cylindrica</i>	Cogon grass	Invasive grass
<i>Miscanthus sinensis</i>	Japanese silver grass	Invasive grass
<i>Pennisetum setaceum</i>	Fountain grass	Invasive grass
<i>Phragmites australis</i>	Common reed	Tall invasive grass
<i>Sapium sebiferum</i>	Chinese tallow	Invasive tree



# Rain Gardens: Plants

## PLANT INFORMATION SOURCES

- **Residential**
  - Grow Green brochure
  - Landscape Plants guide



## Suggested Plants for Central Texas Rain Gardens

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Missouri Violet  
Monkey Grass  
Pigeonberry  
River Fern  
Spiderwort  
Tropical Sage  
Water Clover  
Zexmenia





# Maintenance

“Another flaw in the human character is that everybody wants to build and nobody wants to do maintenance.”

— Kurt Vonnegut, *Hocus Pocus*



Source: [sbgardendesign.wordpress.com](http://sbgardendesign.wordpress.com)



# Consider Maintenance During Design

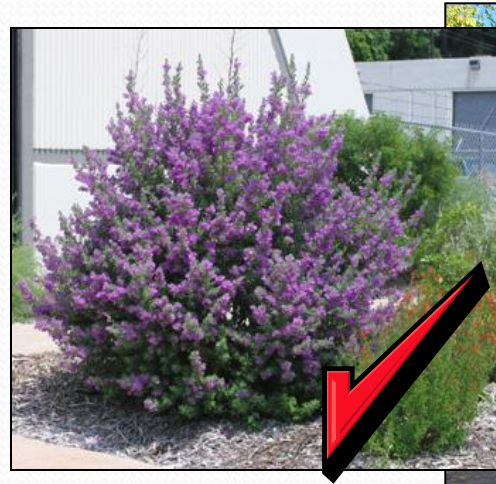
- Design with maintenance in mind.
- Select native vegetation whenever possible.
- Plan vegetation throughout the entire garden.
- Plants should predominate over mulch or gravel soil stabilization.
- Proper plant spacing is important.
- Crushed granite & other materials with fines should not be used as they can clog the system, preventing proper drainage.
- If pedestrian traffic is expected, provide stepping stones to direct walking.
- Plant spiny vegetation along garden edge to discourage pedestrian use.
- Design the garden depression to be as shallow as possible to facilitate mowing and reduce erosion.





# Post-construction Maintenance

## Plants



- ✓ Prune excessive growth or prune for plant health
- ✓ Do not prune native plants in geometric or unnatural shapes



- ✓ Mow sod-forming grasses no shorter than 4"



# Post-construction Maintenance

## Plants, Mulch, Soil



- ✓ Replace dead or diseased vegetation.  
95% living veg. is required.

- ✓ Maintain mulch depth & coverage.
- ✓ No bare areas over 10 s.f.
- ✓ Repair erosion, animal burrows.



- ✓ Remove or control weeds with minimal herbicide, pesticide use.
- ✓ IPM



# Post-construction Maintenance

## Trash, Dead Animals, Standing Water



- ✓ Remove dead animals, pet waste, and trash regularly



- ✓ Water standing for over 96 hrs may signal clogging & become a mosquito breeding area



# Green Stormwater Infrastructure – Maintenance Manual



Completed early 2014

Includes:

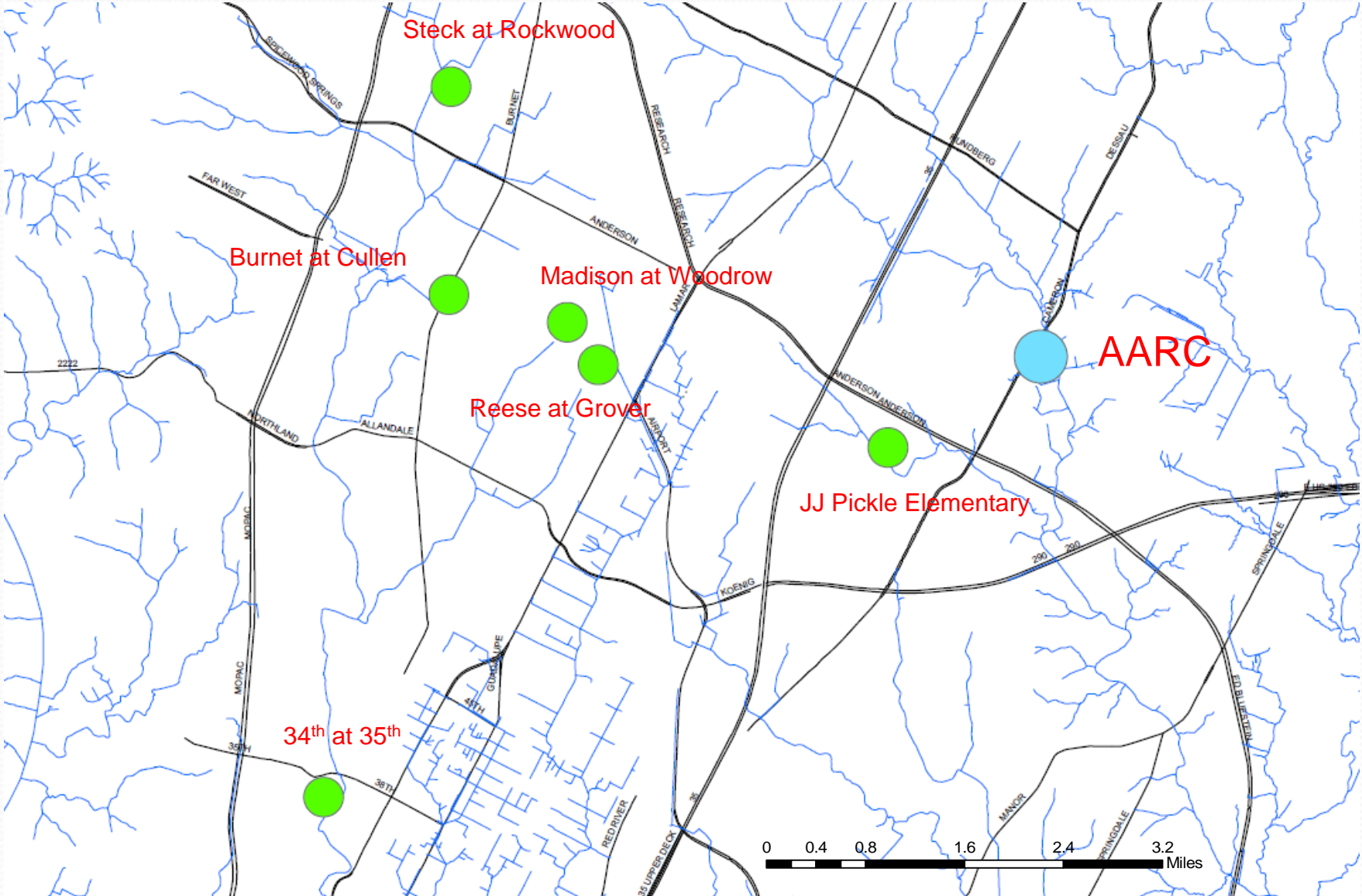
- Recommended maintenance schedule
- Checklist of items to inspect/maintain for a variety of stormwater control measures

Direct link =

[www.austintexas.gov/sites/default/files/files/Watershed/stormwater/GSI\\_Maintenance\\_Manual\\_web.pdf](http://www.austintexas.gov/sites/default/files/files/Watershed/stormwater/GSI_Maintenance_Manual_web.pdf)



# Completed projects in the area





# Burnet & Cullen Intersection Improvement





# Grover & Reese Intersection Improvement





# Steck at Rockwood





# JJ Pickle Elementary





# One Texas Center Rain Gardens

**Increased Plant Growth  
w/Infiltration Design**







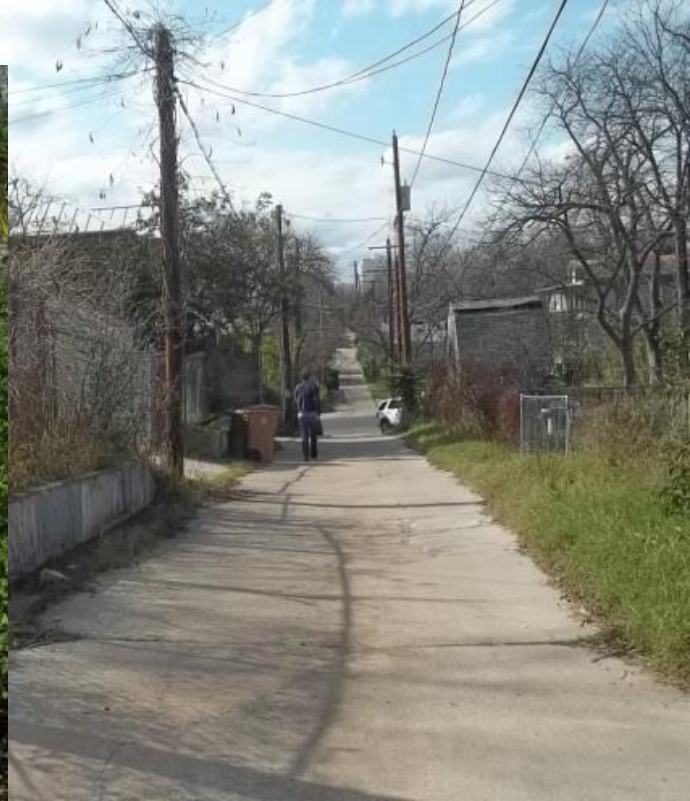
# Green Alley Demonstration Project

In Partnership with:

**City of Austin,  
University of Texas, &  
Guadalupe Neighborhood Development  
Corporation**



# Alley Before Reconstruction





# Design



- RAIN GARDENS
- RAINWATER PAVEMENT
- RAIN GARDENS
- GROUNDWATER COLLECTION
- CONCRETE PAVEMENT
- SOCIAL GASOLINE AREAS
- ART PROJECT
- EDUCATIONAL SIGNAGE
- USE OF RECYCLED MATERIALS (KINDERLOCK)

GREEN ALLEY DEMONSTRATION PROJECT - DESIGN SHOWING ROW IMPROVEMENTS

CITY OF AUSTIN  
PUBLIC WORKS  
FEB., 2014



# Sustainability and Other Features

- Replacement of concrete pavement only as necessary
- Use of colored concrete as part of beautification
- Pervious pavement alley sides, clean-up and social gathering
- Use of recycled river rock and reuse of cacti plants from the alley
- Organized trash collection
- Rain gardens
- Herb Gardens
- Community engagement and participation translates into community education



# Remaking of Alley





# Completed Rain Gardens







# Questions ???

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