

Rain Garden: Maintenance



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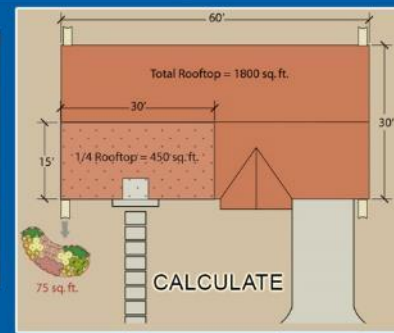
Lisa Nehring – Terra Systems

Chris Newton – Environmental Survey Consulting

Steps

1

PLANNING & DESIGN



2

CONSTRUCTION



3

PLANT SELECTION & INSTALLATION



4

MAINTENANCE



Types

Simple

- Shallow basin
- Infiltration
- Mainly turf

- Structural
- Connected to storm drain
- Plant diversity



Grover Avenue

Complex



JJ Seabrook

Types

Commercial



Harmon Ave.

Residential



Solvita
Townhomes

Parks




Bull Creek Park


Types

Roadways

Municipal



Spirit of Austin Blvd



Northwest Recreation Center

Inspection

Inspections should occur after large rain events
OR at least 2-3 times per year



Inspections should look at the following:

- Vegetation blocking the inflow OR outflow
- Scoured areas OR areas where the mulch washed away
- Sediment more than 3'' deep in basin bottom
- Woody plants growing too close to inflow or walls
- Dead vegetation or bare areas >10 sq. ft.
- Function - is the rain garden draining 48 hours after storm?
- Presence of weeds OR invasives
- Sediment OR debris in the inlet
- Plants obstructing sidewalks OR access points

Inspection

VEGETATION BLOCKING INFLOW



SCOURING AROUND INFLOW



SEDIMENT DEPOSITED IN BASIN



WOODY PLANTS BLOCKING INFLOW



Inspection

BARE AREAS GREATER THAN 10 SQ



WEEDS OR INVASIVES



SEDIMENT BLOCKING INFLOW



PLANTS OBSTRUCTING SIDEWALKS /ACCESS



Maintenance Tasks



Rainscapes – rain gardens

NOT low/no maintenance

Require frequent small scale maintenance to keep in good working order, particularly in rainy years

MAINTENANCE ITEMS:

- Irrigation
- Mulch
- Sediment
- Vegetation Management
 - Weeding
 - Pruning
 - Plant replacement
- Trash/Waste
- Leaves
- Ponding or Standing Water
- Structural Issues
- Safety
- The unexpected

Irrigation



Botanist in Big Bend with sotol killed by drought, 2012

Source: San Antonio Express-News

ALL
PLANTS
NEED
WATER

- Water for plant establishment – at least 1 year
- Water after installation through hot months
- Water during drought
- Follow Austin Water Conservation mandates

<http://www.austintexas.gov/department/watering-restrictions>

Austin WATER CONSERVATION STAGE

**COMMERCIAL/
MULTI-FAMILY**

AUTOMATIC IRRIGATION
Even Address: **Tuesday**
Odd Address: **Friday**

HOURS
Midnight - 10 AM
7 PM - Midnight

Tree Bubblers, Hand-Held Hose,
Drip Irrigation: Any Day/Time

Austin WATER CONSERVATION STAGE

RESIDENTIAL

AUTOMATIC IRRIGATION
Even Address: **Thursday**
Odd Address: **Wednesday**

HOSE-END SPRINKLERS
Even Address: **Thurs, Sun**
Odd Address: **Wed, Sat**

HOURS
Midnight - 10 AM
7 PM - Midnight

Home Car Wash Allowed with
Bucket or Auto Shut-Off Hose

Tree Bubblers, Hand-Held Hose,
Drip Irrigation: Any Day/Time

Irrigation

M A N Y W A Y S T O W A T E R

Drip irrigation can be easily damaged during maintenance



Irrigation

RECLAIMED WATER

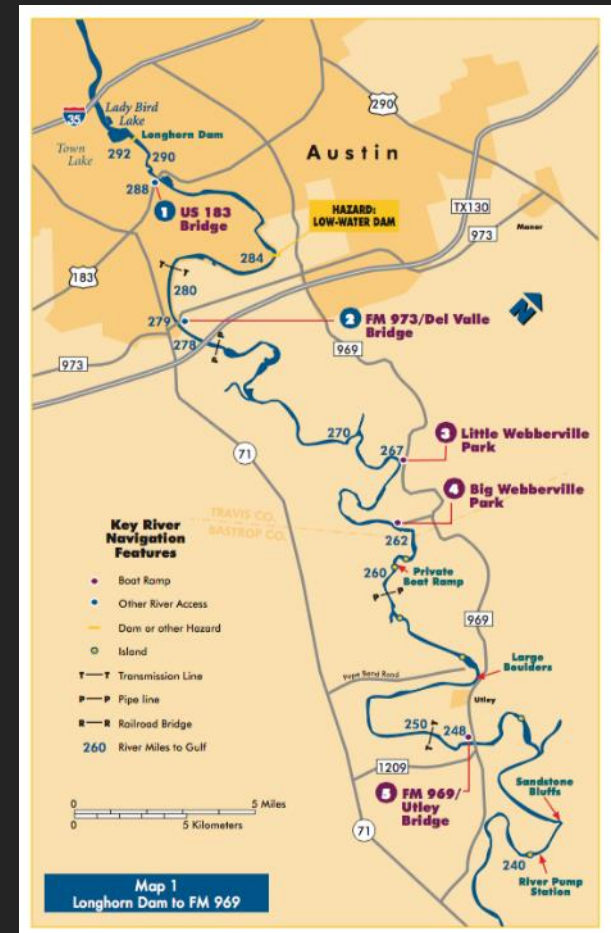
In commercial rain gardens, reclaimed water use is **NOT** permitted. Elevated nutrient concentrations impair nutrient removal function of facility. (ECM 1.6.3.D)

OTHER WATER SOURCES: LCRA raw water

- LCRA offers long-term landscape irrigation contracts to property owner associations, parks, and commercial properties for up to 10 years, up to 20 AF/yr.
- Temporary raw water use contracts for up to 10 AF/yr for up to 3 yrs.

For application and more information:

<http://www.lcra.org/water/water-supply/water-supply-contracts/Pages/default.aspx>



Mulch

3" OF MULCH



Photo: austinlandscapesupplies.com

Coarse-ground hardwood mulch

Avoid using finely ground mulch – it floats and washes to the sides.

Avoid rubber mulch.

Avoid dark colored mulch – increases soil heat.



Photo: www.kellermaterial.com

Pecan shell mulch



Photo: austinlandscapesupplies.com

Pea gravel



Photo: longhornlawnsaustin.com

River rock

Sediment

Remove when accumulates to depth of 2–3 inches

REMOVAL METHODS

- Shovel, rake
- larger equipment (mini excavator)



Blocked Inlet



Basin Filled with Sediment



Vegetation Management

PLANTS NEED TO BE REMOVED, PRUNED, REPLACED

TOOLS USED

- Mower, string trimmer (turf)
- Lopper, shears, clipper
- Blower, rake
- Personal Protective Equipment



Source: safetypostershop.com

PERSONAL PROTECTIVE EQUIPMENT

Weeding



Photo: news.psu.edu



No pesticide use in rain gardens

- Hand removal
- Corn gluten for weed control
- Boiling water for fire ant control

No fertilizer use in rain gardens



Pruning

- Cannot block access, especially in high traffic areas
- Suckers and seedlings should be thinned
 - If several relatively equal saplings are growing in an area, you may need to 'choose a winner' and remove the rest
 - all suckers or saplings growing within 3 to 4 feet of inlet should be removed
- Saplings growing near fences should be removed before they can damage fence

Plants Over Sidewalk



Growing Through Fence



Plant Replacement

PLANT MORTALITY DUE TO VARIOUS CAUSES:

- Wrong plant, wrong place
- Drought
- Pests
- Disease
- Other



Source: theleif.org

Plant Selection

PLANT FUNCTION: scrub stormwater (pollutant uptake), slows the water, improves soil microbial environment (rhizosphere is important).

USE DIVERSITY OF PLANTS:

- Type: small trees, shrubs, perennials, bunch grasses, groundcover.
- Leaf Retention: evergreen, semi-evergreen, deciduous.
- Mixed-species encourage diverse microbial environment in soil.
- Deep-rooted species facilitate water infiltration.

Remember pollinators, birds



NO BULLET-PROOF PLANTS

NO "ONE-SIZE FITS ALL"

Plant Selection

PLANTS TO AVOID:

- Fast growing, weak wooded trees.
- Suckering trees.
- Plants with fruit, nuts (unless you plan to harvest them).
- Large trees in tiny rain gardens.
- Vigorous self seeders which will become a nuisance within a season or two.
- Plants with sharp edges, spines.

Suckering plants



Fruit, Nuts (acorns)



Plant Selection

Information courtesy of
Environmental Survey Consulting

HERBIVORY

PERENNIAL

- American germander
(*Teucrium canadense*)
- Blackfoot daisy
(*Melampodium leucanthum*)
- Blue-eyed grass
(*Sisyrinchium sp.*)
- Coneflower
(*Echinacea angustifolia*)
- Damianita
(*Chrysactinia mexicana*)
- Engelmann daisy
(*Engelmannia peristenia*)
- Frogfruit
(*Phyla nodiflora*)
- Maximilian sunflower
(*Helianthus maximiliani*)
- Mealy sage
(*Salvia farinacea*)
- Mexican hat
(*Ratibida columnifera*)
- Slender greenthread
(*Thelesperma filifolium*)
- Tall goldenrod
(*Solidago altissima*)
- Texas aster
(*Symphotrichum drummondii*)
- Texas lantana
(*Lantana urticoides*)
- Zexmenia (*Wedelia hispida*)

GRASS

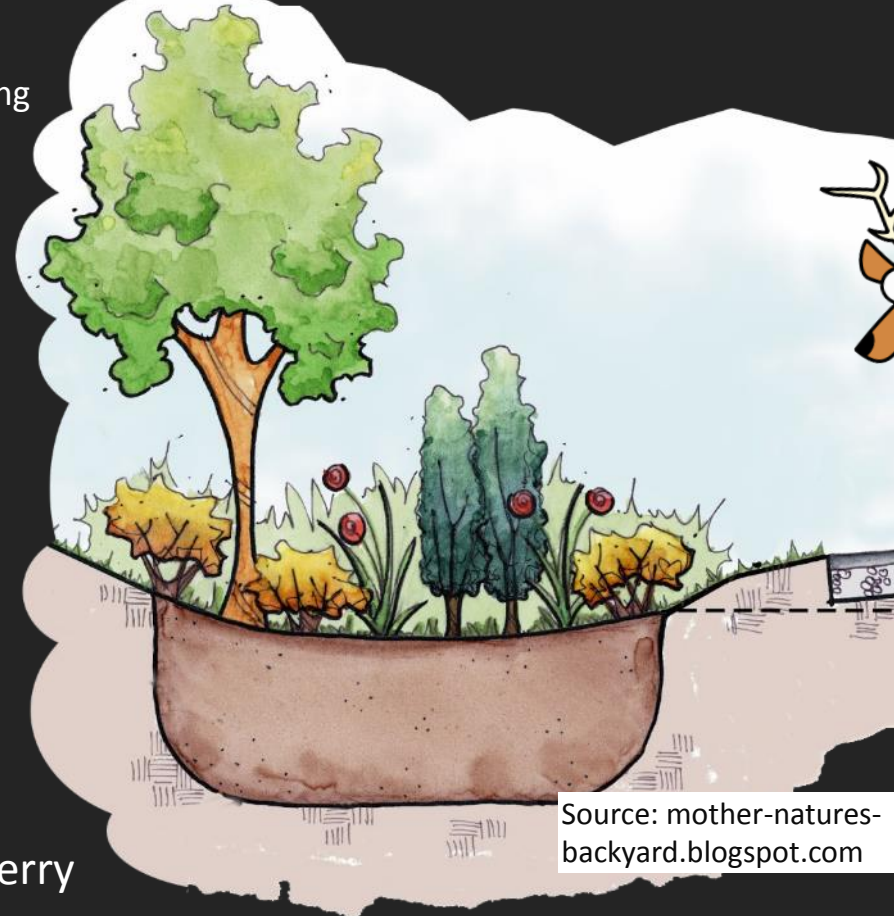
- Blue grama grass
(*Bouteloua gracilis*)
- Eastern gamagrass
(*Tripsacum dactyloides*)
- Gulf muhly
(*Muhlenbergia capillaris*)
- Little bluestem
(*Schizachyrium scoparium*)

SHRUB

- Agarito
(*Mahonia trifoliolata*)
- American beautyberry
(*Callicarpa americana*)
- Black dalea
(*Dalea frutescens*)
- Flame acanthus
(*Anisacanthus quadrifidus var. wrightii*)
- Shrubby boneset
(*Ageratina havanensis*)
- Texas kidneywood
(*Eysenhardtia texana*)
- Turk's cap
(*Malvaviscus arboreus*)
- Wright pavonia
(*Pavonia lasiopetala*)

TREE

- Cenizo
(*Leucophyllum frutescens*)
- Eve's necklace
(*Syphnolobium affine*)
- Fragrant mimosa
(*Mimosa borealis*)
- Texas mountain laurel
(*Sophora secundiflora*)
- Texas persimmon
(*Diospyros texana*)
- Wafer ash
(*Ptelea trifoliata*)



Source: mother-natures-backyard.blogspot.com

Plant Selection

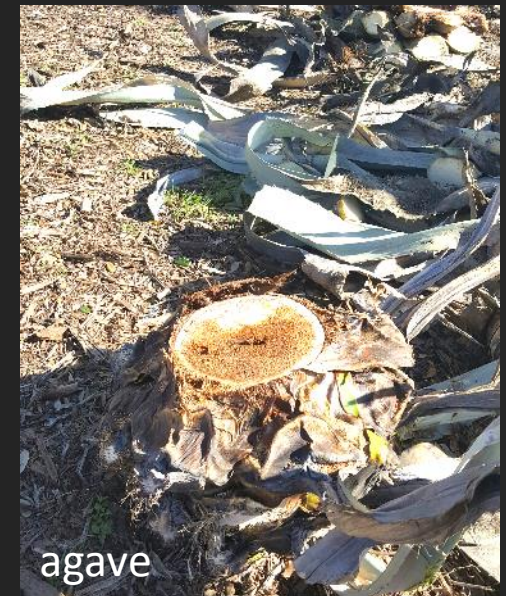
WHICH PLANTS WORK WELL?

- native bunchgrasses (Muhlies, Indian grass)
- sedges (*Carex* spp.)
- *Salvia* spp.
- Maximillian sunflower (*Helianthus maximiliani*)
- flame acanthus (*Anisacanthus quadrifidus*)
- Texas mountain laurel (*Sophora secundiflora*)
- obedient plant (*Physostegia virginiana*)



WHICH PLANTS ARE LESS SUITABLE?

- flameleaf sumac (*Rhus lanceolata*)
- desert willow (*Chilopsis linearis*)
- retama (*Parkinsonia* spp.)
- buckeye (*Ungnadia speciosa*)
- agaves
- bald cypress (*Taxodium distichum*)



Plant Selection

TALL PLANTS?



Austin Code Department

TALL WEEDS AND GRASS

Did you know that grass and weeds more than 12 inches in height is considered an unsanitary condition and a code violation? The city ordinance (City of Austin Code 10-5, Article 2) requires that grass and weeds be maintained below 12 inches.



While short grass and weeds may look nice, it is also an important way to prevent rodents, insects, and stagnant water from developing as a result of overgrowth. When grass and weeds are maintained below 12 inches, our community not only looks better, but its cleaner and safer too.



HOWEVER

WILDLIFE AUSTIN

Wildlife Austin promotes the creation and conservation of wildlife habitats through community-wide collaboration and public education, and helps bridge existing city initiatives that encourage a well balanced and healthy urban environment for people and wildlife. Austin has a long track record of being dedicated to preserving and enhancing our environment. All of us have an important role to play! We all can make a profound contribution to keep Austin wild!

Program History

In March 2007, the City of Austin passed a council resolution to obtain **National Wildlife Federation (NWF)** community level certification. On March 12, 2009 Austin realized that goal and was recognized as a certified community during the Community Wildlife Habitat Certification Ceremony. To date, the City of Austin has 2,154 certified wildlife habitats and the number is steadily increasing. You can be part of that momentum! Wildlife Austin has a certain number of prepaid applications to help you get certified! They are given out first come, first serve. Please **e-mail us** with your mailing address if you are interested.

The **Community Wildlife Habitat** project is part of the National Wildlife Federation's Certified Wildlife Habitat™ program. These projects benefit the entire community through education, outreach and promoting the use of native plants and landscaping to develop natural habitats that attract wildlife and birds, use little or no fertilizer and require modest watering.

City code 10.25 section D

(D) It is an affirmative defense to a violation of Section 10-5-21(B)(1) that the weeds or grasses observed on the subject property did not reduce or impair visibility or line of sight at, of, or for right-of-way, vehicles, cyclists or pedestrians, and that the over-height weeds or grasses observed were located at or on one or more of the following:

- (1) an area within or adjacent to a stream, waterway, or water quality facility;
- (2) a landscaped area arranged and managed consistent with a plan accepted by the City which area includes native or adapted vegetation, where weed control and other periodic maintenance occurs

Plant Selection

CAN I PUT TREES IN MY RAIN GARDEN? Yes.



- In commercial rain gardens...*as long as the underdrain system is protected from penetration by the tree root system and the structure does not meet the definition of a dam or levee/floodwall (Drainage Criteria Manual 8.3.3.).*
- In residential rain gardens – up to homeowner.

HOWEVER ...

Right tree, right place



REMEMBER

A rain garden is a pond – it needs volume.



bald
cypress



big flare
takes up
volume

Trash/Waste

WHAT TYPES?

- Organic material vs Styrofoam and plastics
- Large dumped items
- Pet Waste, other biohazards
- Dead critters



VOLUME AND FREQUENCY OF TRASH REMOVAL WILL VARY BASED ON:

- Rainfall- intense storms and large amounts of rain will bring in more trash
- Location- residential areas and parks will get less trash than roadsides or high traffic areas.
- Season- more leaves and organic material in autumn

Brush and fence posts dumped in basin



Dead Critters



Trash in basin

Leaves

WHY REMOVE?

- Possibility of causing a blockage.
- Deep drifts can shade out low growing plants.
- Aesthetics.
- Some leaves (e.g., live oak) decompose very slowly.
- Can fill rain garden & take up volume. Leaf mats can slow infiltration into the soil.

REMOVAL METHODS

- Rake - can get between plants without damaging them.
- Leaf Blower. **DON'T BLOW LEAVES INTO STREET!!**
- Vactor truck.



Ponding or Standing Water

The goal of a rain garden is slow infiltration, not ponding.

PONDING WATER CAUSES:

- Soil compaction
- Mosquito problems
>4 days standing water
- Plant death: drowning, anaerobic conditions



Underdrain Repair

Structural Issues



Erosion undercutting concrete curb



Fence Damage



Loose block

Safety

Barrier-type fences are required when pond has slope $> 3:1$ or > 1 -ft drop



Poison ivy

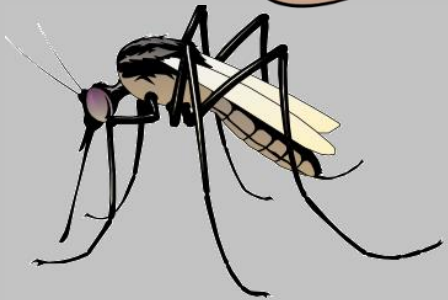


Tree limb partially fallen in high traffic area



Safety

-The Big Three-



SNAKES

Most snakes you will encounter are not harmful to humans. Exceptions – rattlesnakes, copperheads, moccasins, coral snakes. Rain gardens are not their preferred habitat.

ID guides for Central Texas snakes-

http://www.austinreptileservice.net/austin_area_reptiles.html

<http://www.whatsnakeisthat.com/south/texas.htm>

RATS

Rats and mice are disease carriers, - **But**- Snakes help control rat populations.

MOSQUITOES

- 5 day breeding cycle for *Aedes aegypti* – a working rain garden will drain in less time.
- Most mosquito problems originate close to the home in small pockets of water, as they have are no natural predators there.
- Avoid maintenance activities in peak feeding hours of dawn and dusk, or wear protective clothing.

Expect the Unexpected



Vehicle Damage



Animal Damage



Before



After

Enthusiastic Mowing

Design/Build for Maintenance



INFLOW IS PARTIALLY CLOGGED

- Design failure: pedestrian desire line
- No fence/barrier
- high traffic area
- people cut through
- Plants killed, soil compacted



Thank you for attending

Questions?

Discussion

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COMING UP ...

Rain Garden Tour

