The Reilly Elementary School Stormwater Retrofit: Water as a Resource and Education Tool

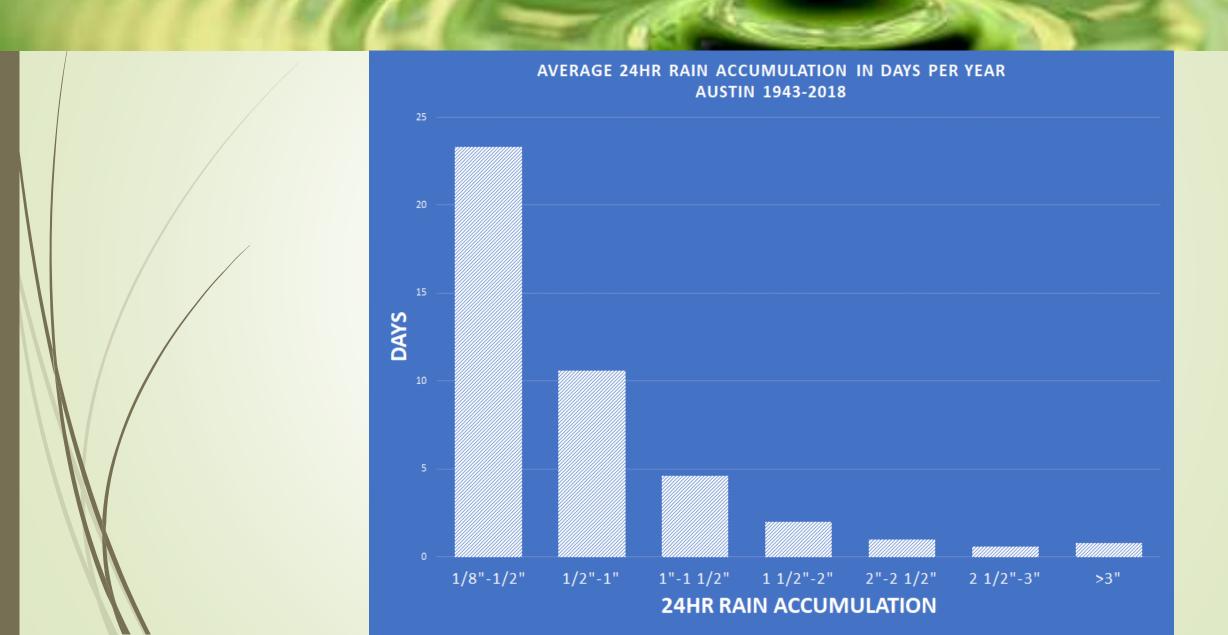
Staryn Wagner

Environmental Scientist with the City of Austin's Watershed Protection Department

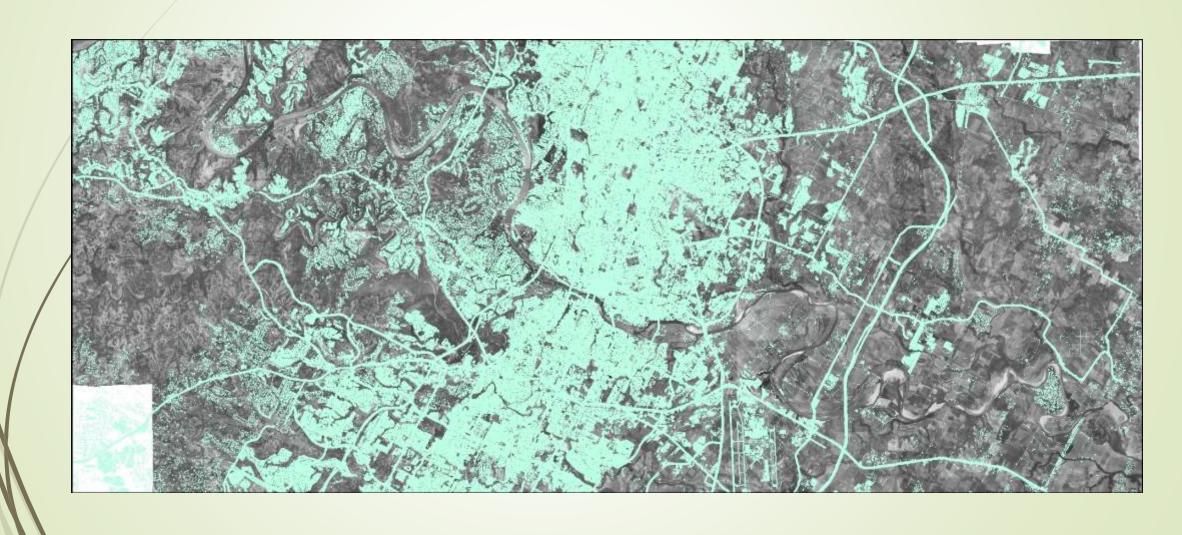
Amy Grossman

Landscape Architect Associate with the City of Austin's Parks and Recreation Department

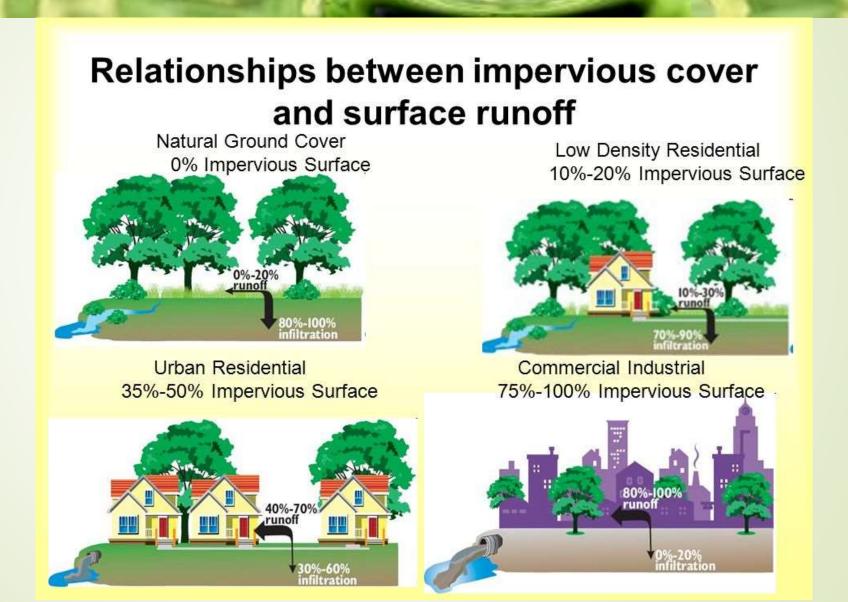
How Much Does It Rain In Austin?



Centralized Stormwater Management

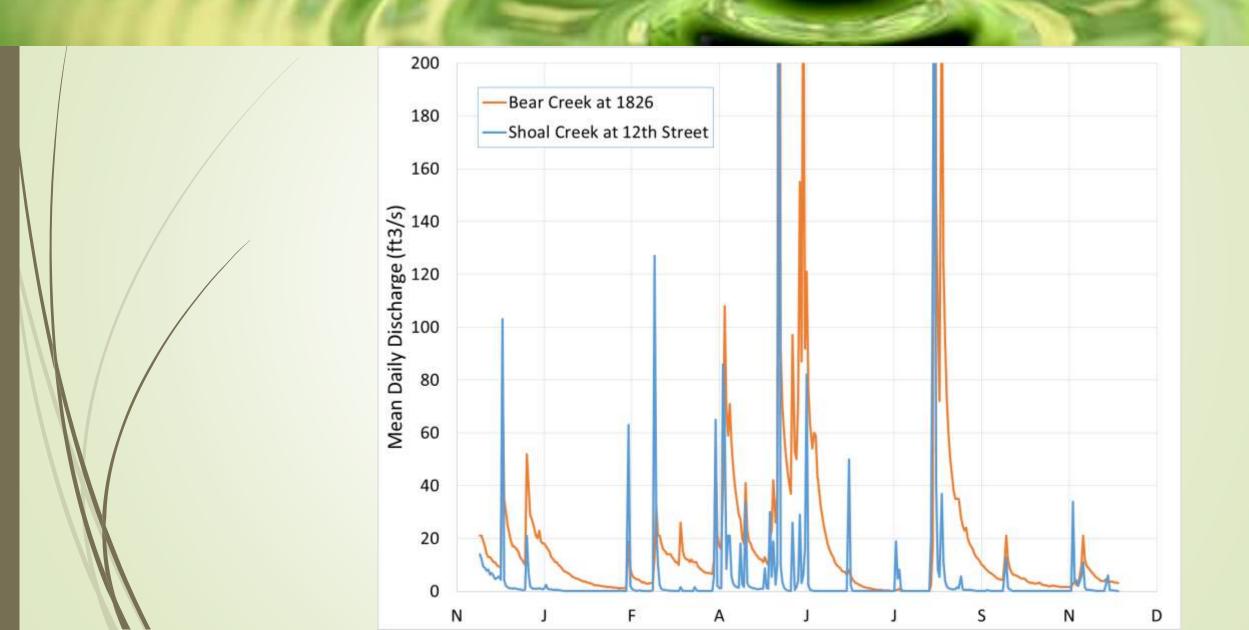


Past to Present Runoff



Journey of the Raindrop Runoff Water Body Inlet Storm Sewer

How The Streamflow Reacts





History of Environmental & Drainage Regulations

Waterway Ordinance

First flooding & environmental regulations.

"Natural & traditional character" concept introduced.

No "identifiable adverse flooding of other property."

Extended stream buffers to include headwaters, erosion hazard zone and increased floodplain protections.

Watershed Protection Ordinance

1974 1986 2013

Citywide (except Urban Wsheds), incl. BSZ.

At least ½-inch capture depth.

Critical environmental feature protection.

Water quality controls.

Stream setbacks.

Impervious cover limits.

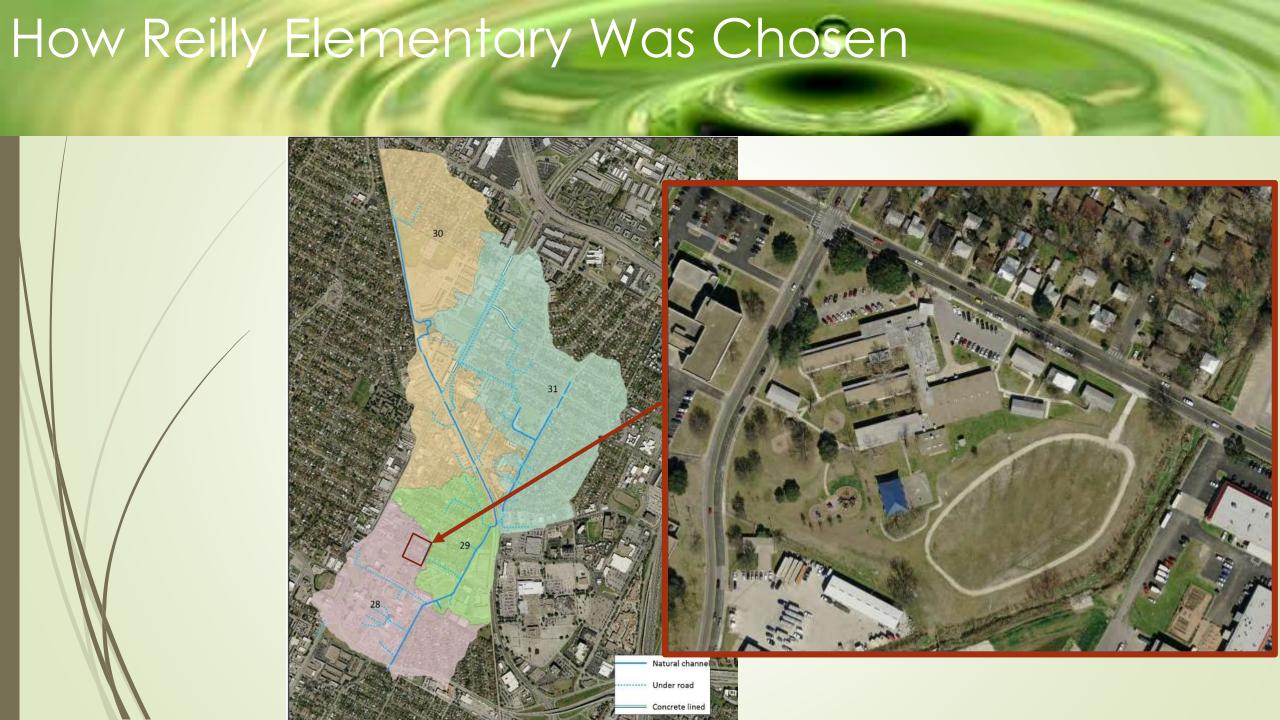
Comprehensive Watersheds Ordinance
Hill Country Roadway Ordinance

Centralized Stormwater Management

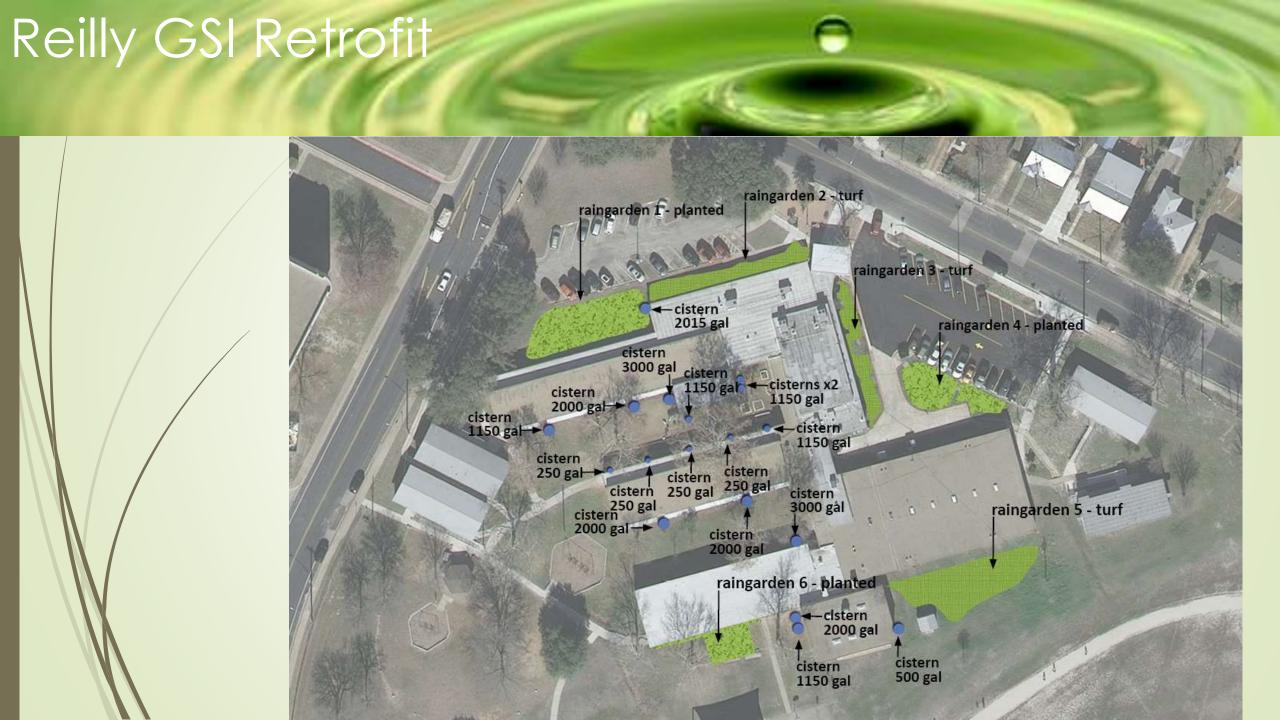
Decentralized Green Stormwater Infrastructure (GSI)



Stream Functional Pyramid BIOLOGY » FUNCTION: Biodiversity and the life histories of equatic and riparian life. PARAMETERS: Primary and Secondary Production. Macroinvertebrate Communities, Fish Communities, Riparien Communities, Landscape Pathways PHYSIOCHEMICAL ... FUNCTION: Temperature and oxygen regulation; processing of organic matter and nutrients PARAMETERS: Dissalved Oxygen, Temperature Regulation, pH, Conductivity, Nutrient Processing, Organic Processing, Turbulity GEOMORPHOLOGY » FUNCTION: Transport of wood and sediment to create diverse bed forms and dynamic equilibrium PARAMETERS Sediment Transport Capacity and Competency, Channel Evolution, Streambank Erosion Rates, Parcent Riffie and Pool, Depth Vanability, Substrate Distributions, Large Woody Debris Transport and Storage. Ricertain Vegetation. density and composition HYDRAULIC » FUNCTION: Transport of water in the channel, on the floodplain, and through sediments PARAMETERS: Valocity, Shear Stress, Stream Power, Bank Height Ratio, Entranchment Ratio, Rating Curves (discharge vs. stage). Groundwater/Surface Water Exchange HYDROLOGY = FUNCTION: Transport of water from the watershed to the channel PARAMETERS: Precipitation/runoff relationship, Channel Forming Discharge, Flood Frequency, Flow Duration https://www.fws.gov/chesapeakebay/newsletter/fall11/Pyramid/Pyramid.html









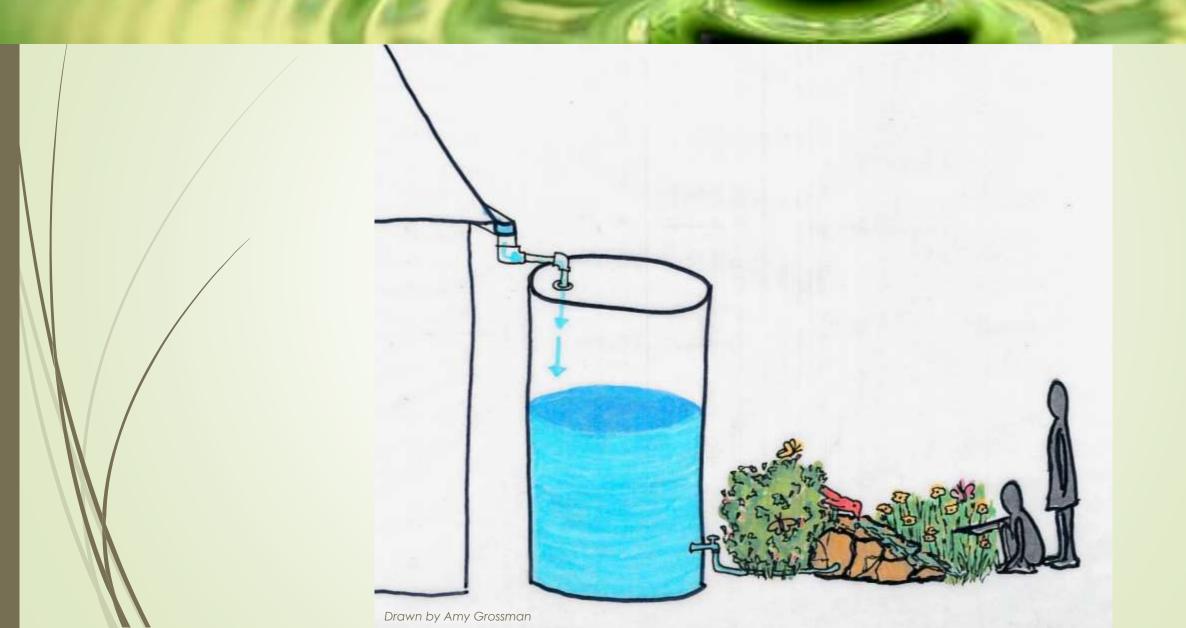


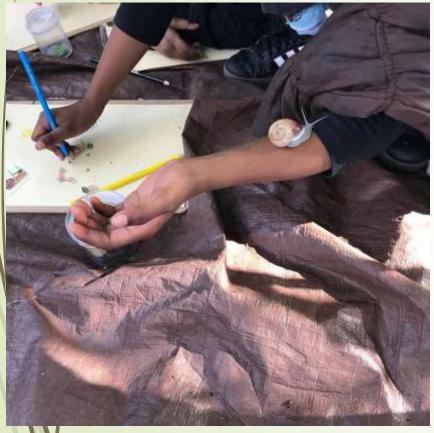
Rain Garden and Cistern Benefits

- Reduce runoff from site
- Reduce localized flooding
- Reduce erosion on site and in stream channel
- Provide deep watering for lawn and landscaping
- Creates an active and interesting space
- Water for vegetable gardens
- Reduces water use for landscaping
- Provides new playful uses of water
- Educational purposes

The Passive Cistern At Work 1000 – 2500 gallon cisterns

Provides Wildlife Watering and Monarch Habitat





- Weather and climate
- Water cycle
- Infiltration
- Erosion and deposition
- Pervious vs impervious
- Runoff
- Flooding
- Native vegetation
- Root systems

- Function of living organisms
- Plant care
- Design
- Mechanics
- Composting
- Decomposition
- Soil dynamics
- Properties of water



ART

SCIENCE



Vegetation changes, playgrounds do not

Provides enriched and constantly new environment for children

Rain gardens do not need to be fenced off but can be enjoyed with simple design additions

Dry for most of the year!

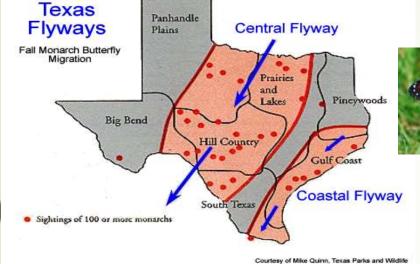


Turf rain gardens focus the visuals on the water

It was empty, then it's full of water, and a day later it's empty →"Where did the water go?"

Design for interaction

Design for maintenance





How to get support/funding – overlap with other goals

Construction, materials, maintenance all cost money



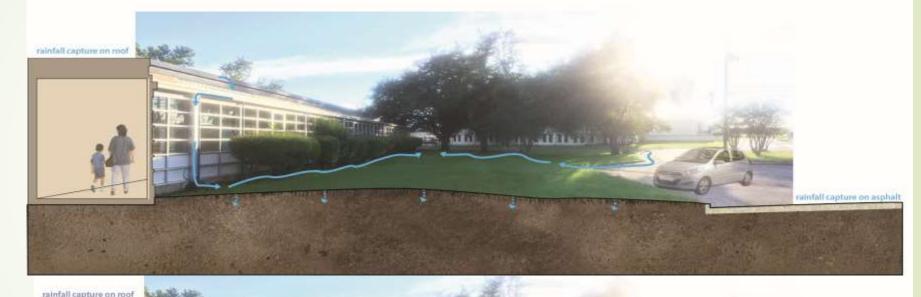
Utilizing Outdoor Learning Environments: A Natural Approach to Preventing Childhood Obesity





Not just elementary schools

- Campuses
- Parks
- Businesses
- Houses
- Apartments
- Right of Way
- Parking Lots





Additional Resources on Rain Gardens and Cisterns

- City of Austin How to Build a Rain Garden Fact Sheet
 - <u>https://www.austintexas.gov/sites/default/files/files/Watershed/growgreen/raingarden_factsheet.pdfParks</u>
 - http://www.austintexas.gov/department/grow-green
- Texas Water Development Board Rainwater Harvesting
 - http://www.twdb.texas.gov/innovativewater/rainwater/index.asp

Contact Us:

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