

# Building More Resilient Urban Landscapes in New Mexico

New Mexico MainStreet 9.26.24

Sarah Hurteau



# Arid LID Coalition

2014  
Watershed  
-based  
MS4  
Permit

## 01 Practice Suspended Paving

**Definition:**  
A general term for any technology that supports the weight of paving or concrete, thereby creating void space and allowing compaction.

**Benefits:**

- Structures allow greater soil volumes that are not compacted for greater tree growth
- On-site stormwater management
- Increased infiltration
- Minimized non-point source pollution

**Considerations:**

- Attention must be paid to existing underground utilities

**Variations:**

- Structural soil
- Stone cells
- Pedestal systems
- Paver grids

**Can be used with:**

- Stormwater tree trench
- Permeable paving



2018 MRG GSI  
Projects  
Booklet

## National Pollutant Discharge Elimination System Manual

STORMWATER MANAGEMENT  
GUIDELINES FOR CONSTRUCTION,  
MS4, AND INDUSTRIAL ACTIVITIES

REVISION 3/12/2010



2020 NMDOT  
GSI Standards

2022 Pueblo  
Alto & Mile Hi  
Drainage  
Study, Harvey  
Jones Channel  
Demo Project



CITY OF ALBUQUERQUE COUNCIL SERVICES  
PUEBLO ALTO & MILE HI  
NEIGHBORHOODS DRAINAGE STUDY  
SUMMARY REPORT

JULY 2022

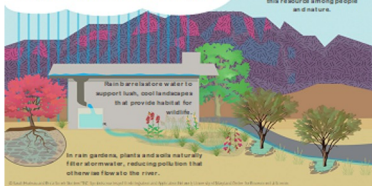


2024 Complete  
Streets Ordinance  
passed unanimously

2017 Arid LID  
Coalition  
formed

## Catch it if you can!

Three good reasons to harvest rainwater at your home



## What You Can Do

- Create a rain garden
- Install a rain barrel
- Plant native plants
- Use organic mulch

Find out more at [bemco.gov/rainwater](http://bemco.gov/rainwater)



2021 GSI  
Maintenance &  
Residential  
Rainwater  
Harvesting  
Trainings



2023 BernCo  
GSI Standards



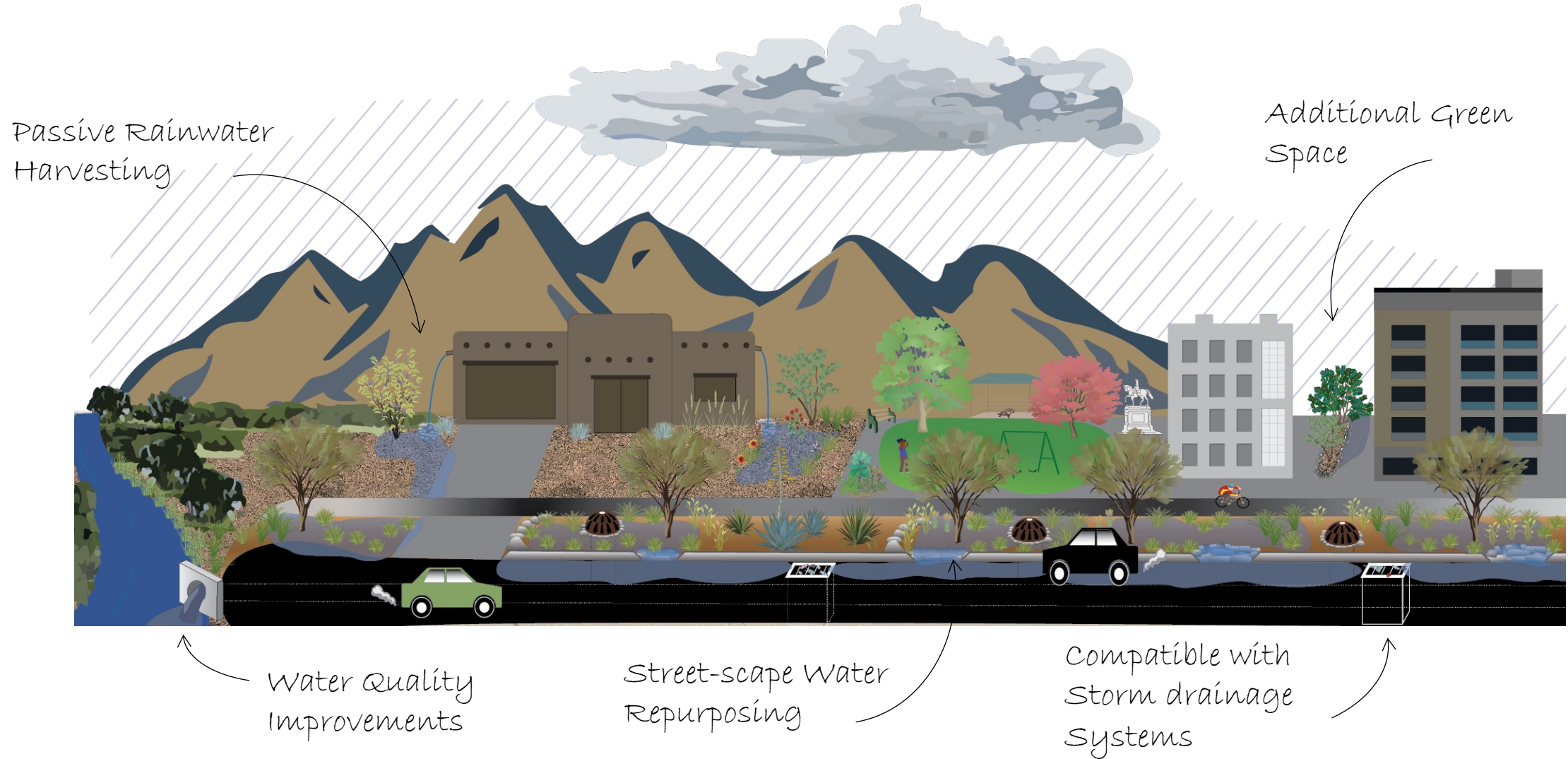
BERN  
CO  
Green Stormwater Infrastructure  
LOW IMPACT DEVELOPMENT STANDARDS

2025  
Stormwater  
Utility Bill?

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



# What is GSI/LID?





Is this GSI?

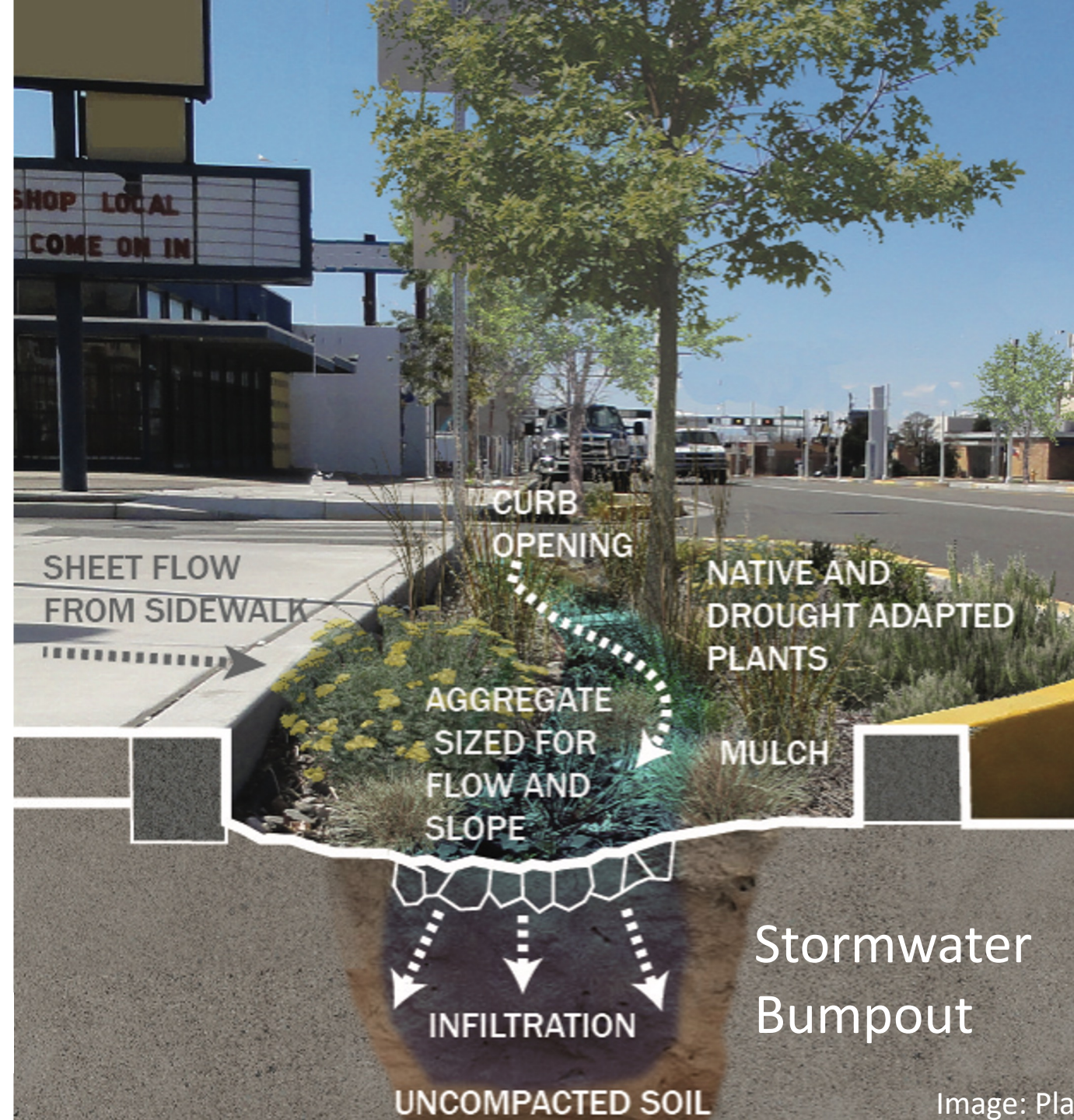
No!





# Recommended Best Management Practices

1. Stormwater harvesting basin
2. Bioswale
3. Stormwater bumpout
4. Depressed median
5. Infiltration trench
6. Curb cut
7. Check dam
8. Outlet control structure
9. Permeable pavement





# What does GSI look like in real life?



Image: Hunter Ten Broeck



Image: Megan Marsee

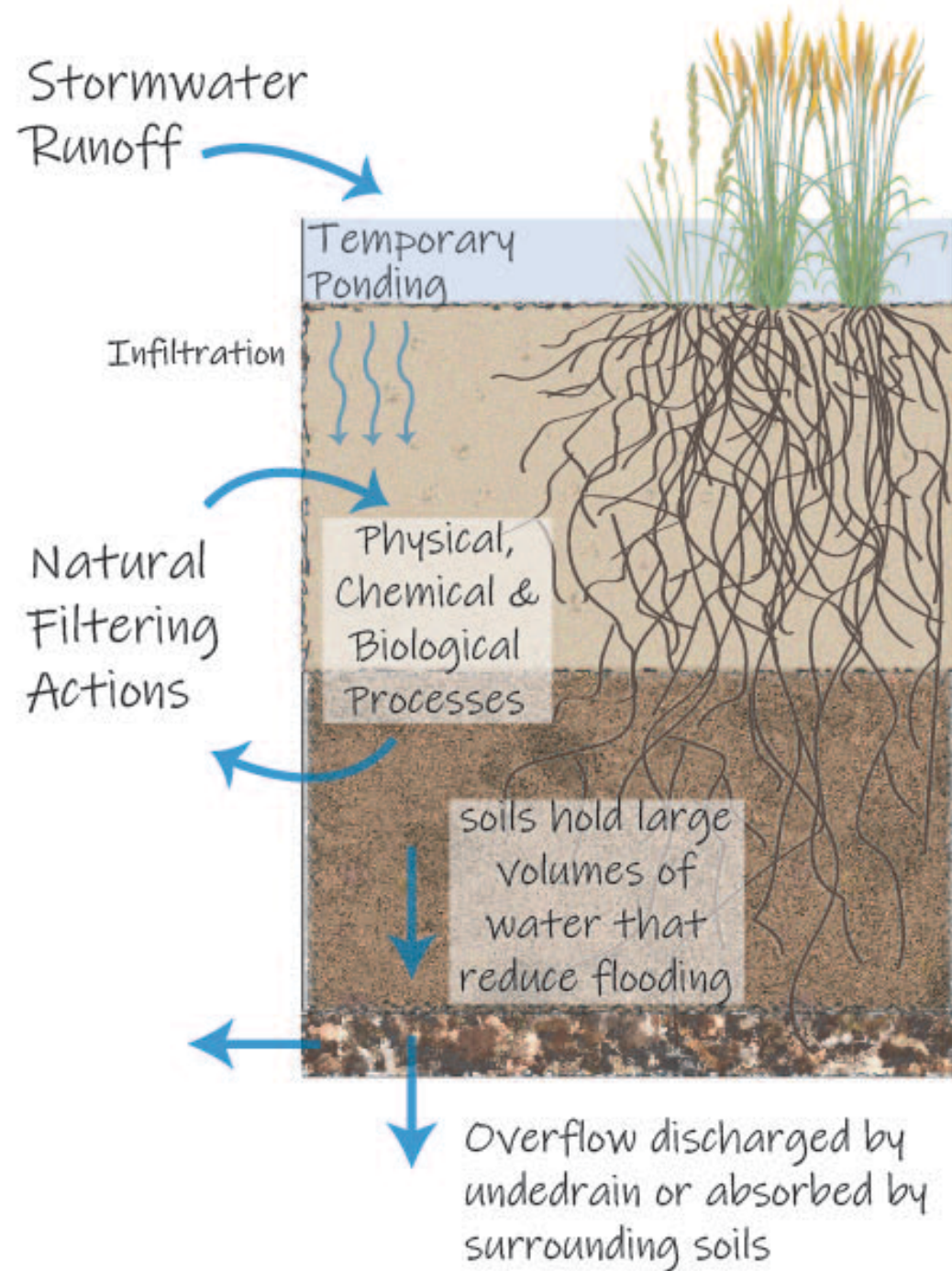


Image: Michael Payton



# How Does it work?

- Plants and their roots create tiny spaces for water to travel deeper into the soil
- Plant roots also support and are supported by the soil microbiome (beneficial fungi and bacteria and other tiny creatures)



## NEARBY NATURE

DOESN'T NEED TO BE EXPANSIVE TO HAVE A POSITIVE IMPACT ON PEOPLE IN URBAN AREAS.



Image Credit: TNC

## GSI Benefits

- Human Health and Wellbeing
- Economic Investment
- Climate mitigation and adaptation
- Social Connection





In areas where trees were planted,  
participants saw a reduction of inflammation  
levels by as much as 20%

This reduces the risk of:

- Heart Disease
- Cancers
- And other long-term chronic diseases

## Green Heart Louisville Project

The Green Heart Louisville Project is an initiative of the Christina Lee Brown Envirome Institute at University of Louisville that seeks to demonstrate the scientific link between nature and human health. The project is a clinical trial where trees are the medicine.



# Is it affordable?

## Key Findings:

- GSI delayed peak flows
- GSI was 77% less costly than upgrading gray infrastructure
- A combination of gray-green infrastructure provided the most cost-effective benefits

# Green Stormwater Infrastructure for Urban Flood Resilience:

Opportunity Analysis for Dallas, Texas





# Creating Resilient Ecosystems

- Soil Sponge
- Disconnected downspout
- Low flow channel
- Organic mulch
- Lots and lots of plants!

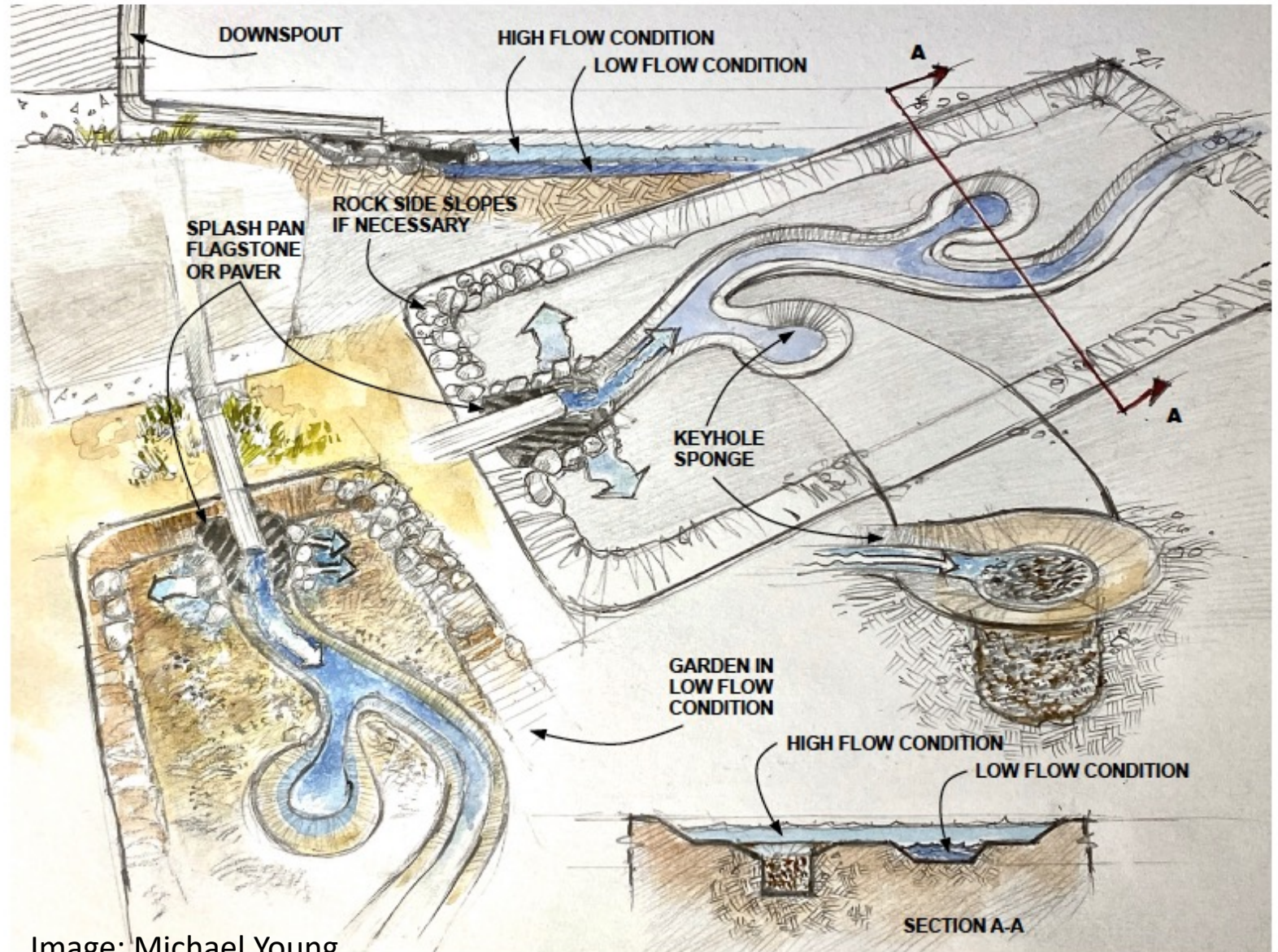
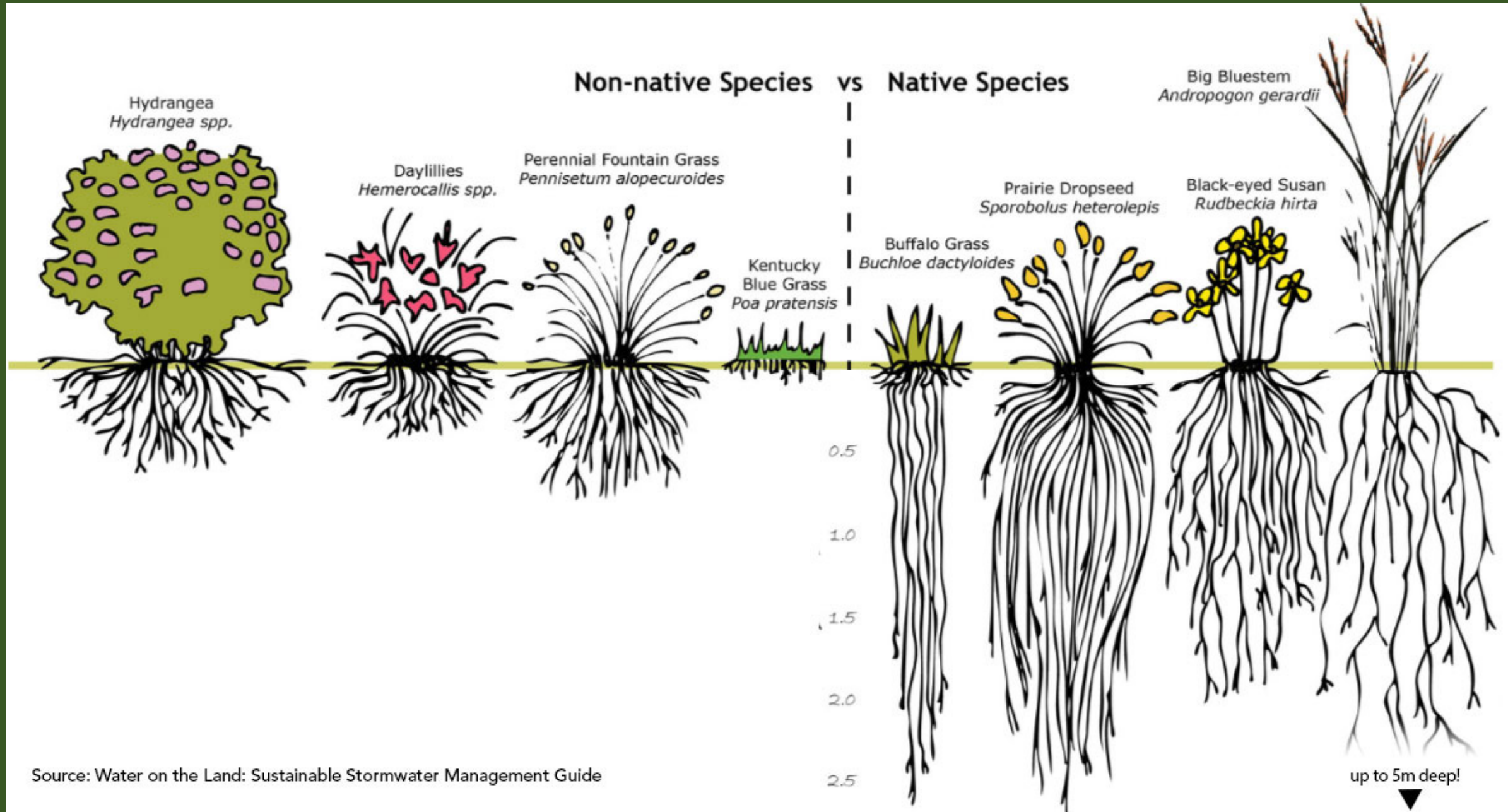


Image: Michael Young



## Non-native Species vs Native Species

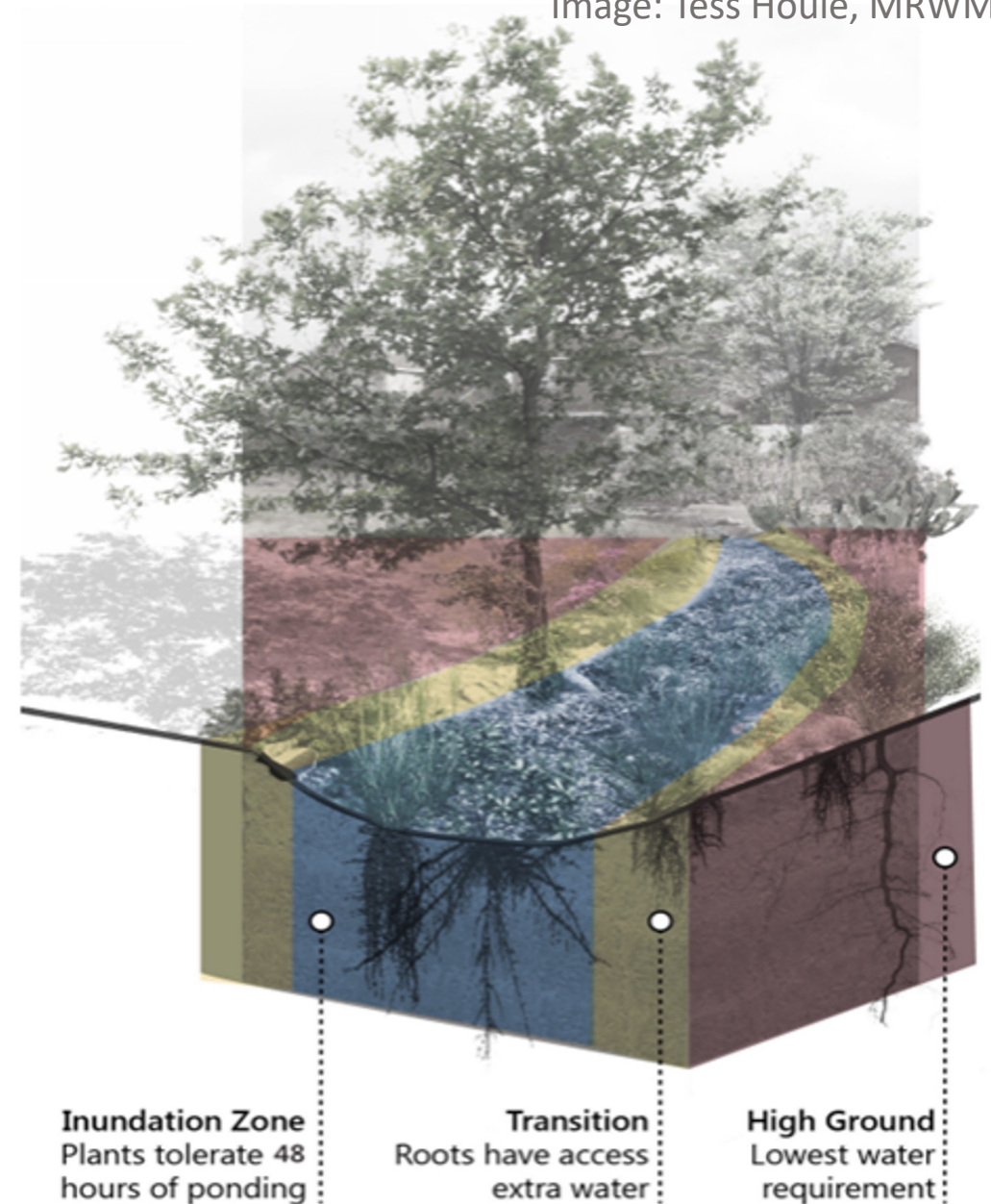


Source: Water on the Land: Sustainable Stormwater Management Guide



# Plants

- GSI Plant List provides recommended plants that can survive without irrigation in a GSI/LID BMP after establishment.
- Considers biome, elevation, and infiltration zone
- Includes trees, shrubs, perennials, and grasses
- [bernco.gov/plantlist](http://bernco.gov/plantlist)



Infiltration Zones in GSI/LID BMPs

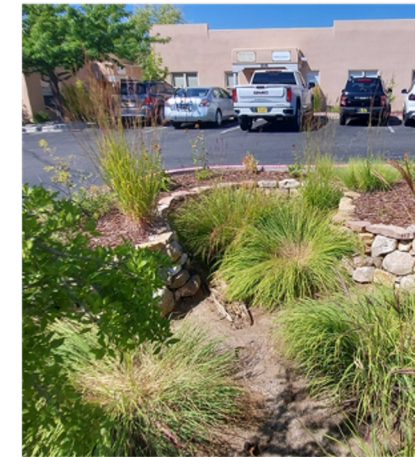
# Mulch

- Mulch can be organic (plant material) or inorganic (gravel, crushed rock).
- Organic mulch provides pollutant treatment and helps develop healthy soil microbiomes.
- Inorganic mulch provides less runoff treatment, stores and releases heat, appropriate for higher velocity flow.
- Preferred mulch: shredded, partially composted, woody mulch, 3" depth





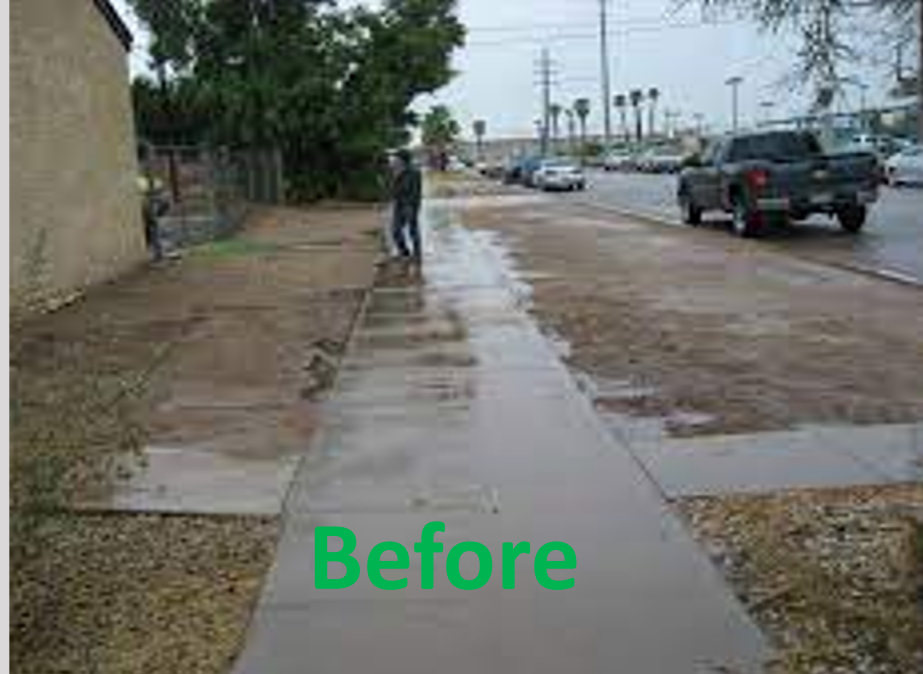
# GSI Opportunities At All Scales





*“Before and After”*

GSI examples in Tucson, AZ



Before



After



Before



After





# Streetside GSI Examples in Arid Cities



Sources: City of Tucson; Udall Center







## Streetside GSI Examples in Arid Cities



Source: Watershed Management Group



















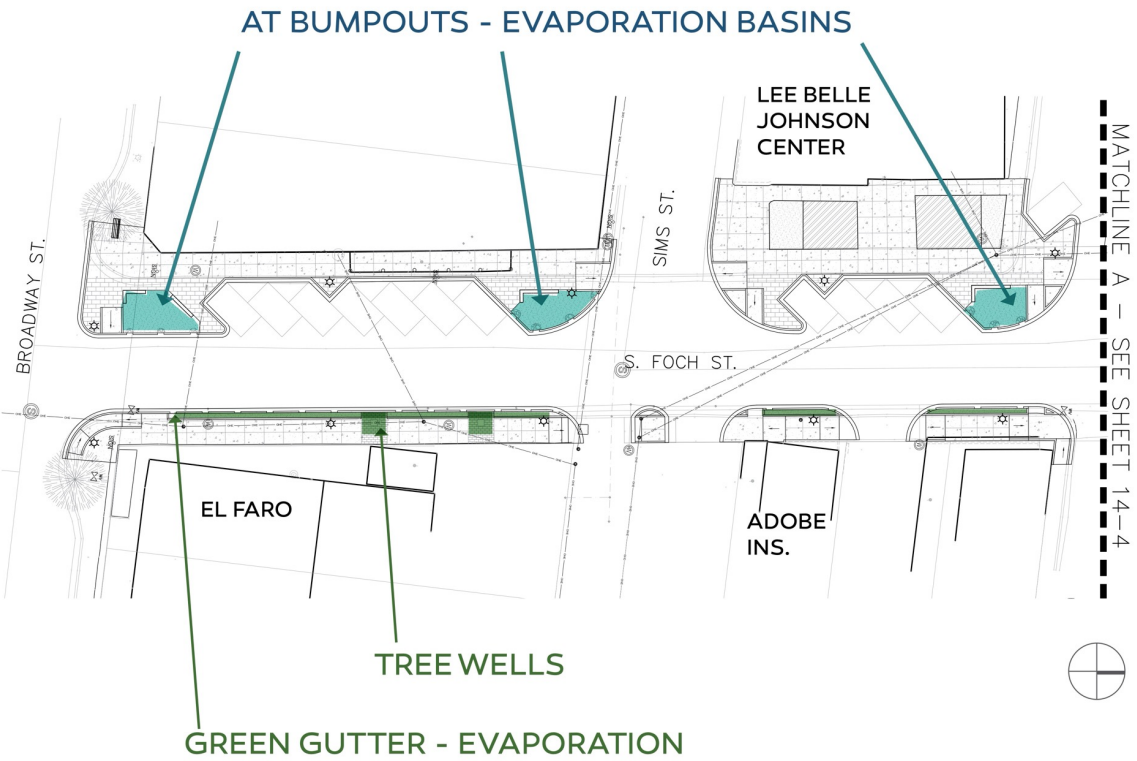


Source: Underwood Family Sonoran Landscape Laboratory, Ten Eyck Landscape Architects/Bill Timmerman. (Tucson, AZ)

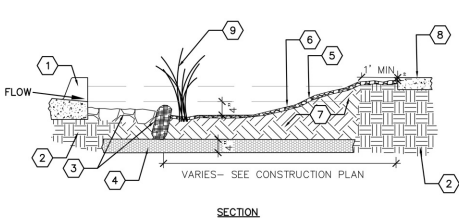




# Mainstreet Example

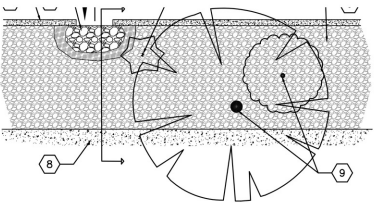


## AT BUMPOUTS - EVAPORATION BASINS



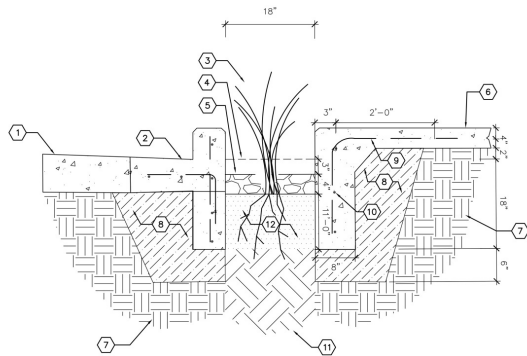
### KEYED NOTES

1. CURB AND GUTTER. SEE CONSTRUCTION PLAN.
2. COMPACTED SOIL.
3. SEDIMENT TRAP - SEE DETAIL E/14-16
4. CLAY LINER. SEE SPECIFICATIONS.
5. SIDE SLOPE NOT TO EXCEED 3:1.
6. GRAVEL MULCH. SEE PLANTING PLAN.
7. BIORETENTION SOIL MEDIA. SEE SPECIFICATIONS.
8. SIDEWALK. SEE CONSTRUCTION PLAN.
9. PLANT. SEE PLANTING PLAN.



STORMWATER HARVESTING BASIN, TUCSON

## GREEN GUTTER - EVAPORATION



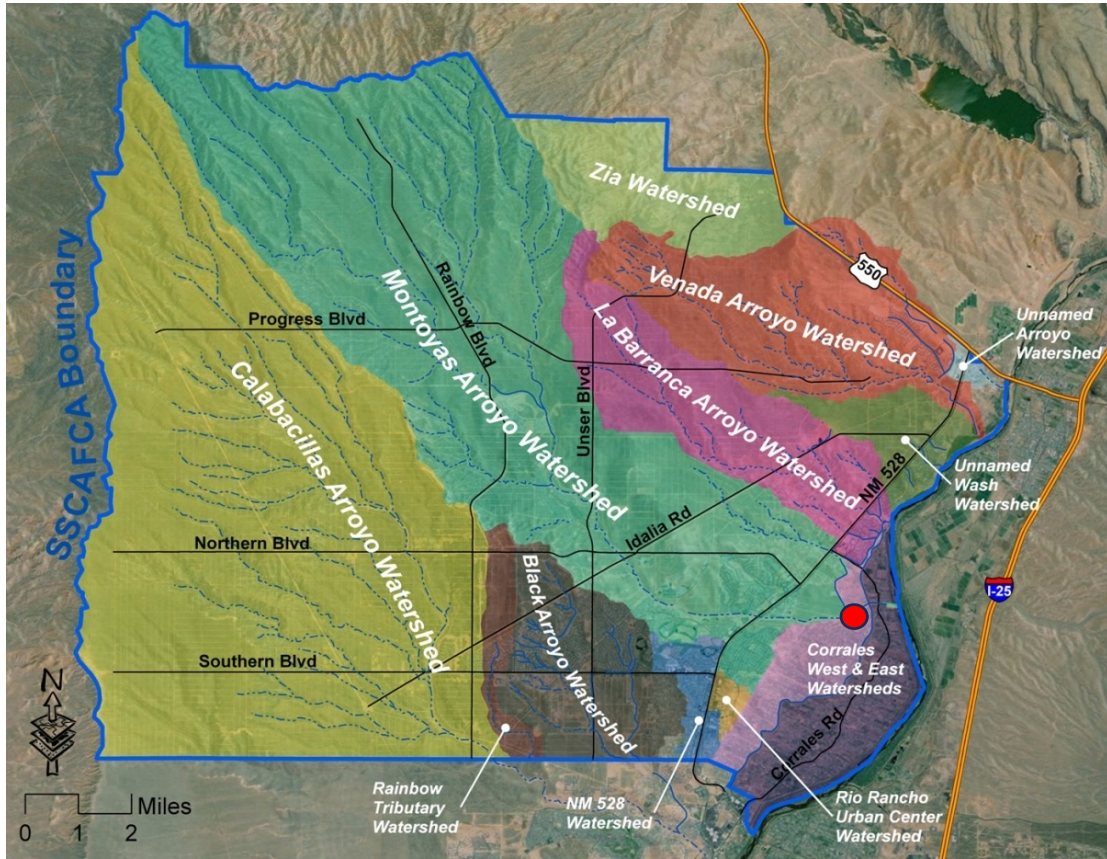
### KEYED NOTES

1. ROADWAY.
2. CURB AND GUTTER WITH REINFORCED SIDE WALL.
3. PLANT. SEE PLANTING PLAN.
4. PONDING DEPTH.
5. COBBLE MULCH. SEE CONSTRUCTION PLAN.
6. SIDEWALK COMBINED WITH TURNDOWN EDGE THAT FORMS SIDEWALK. ALSO SEE DETAIL X/XX
7. COMPACTED SUBGRADE.
8. STRUCTURAL BACKFILL.
9. #4 REBAR AT 12" O.C.
10. #4 REBAR, HORIZONTAL AND CONTINUOUS.
11. UNCOMPACTED SUBGRADE.
12. UNCOMPACTED BACKFILL OF 50% NATIVE SOIL AND 50% BACKFILL AMENDMENT.





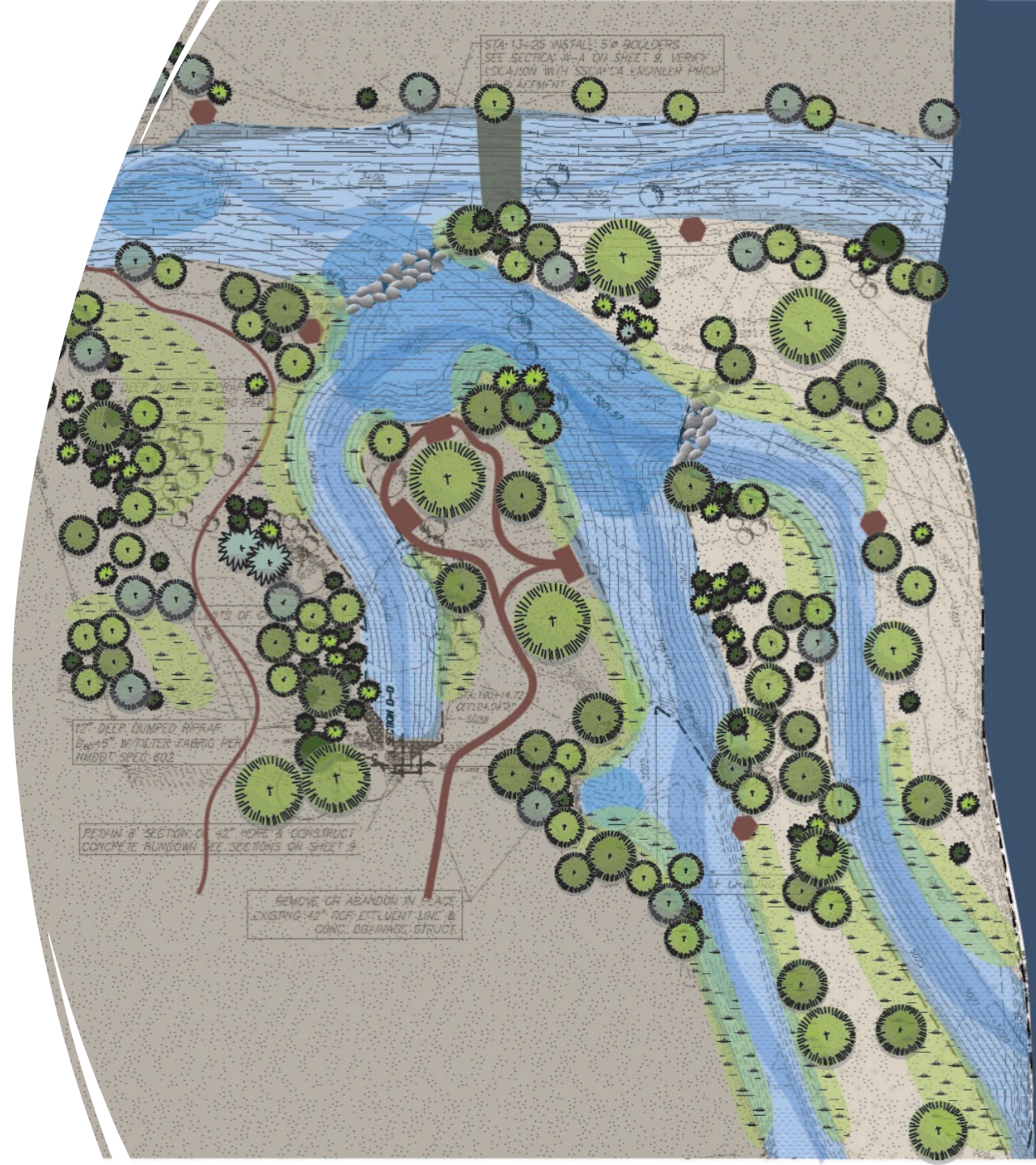
# Flood Control Structure Example





# Project Goals

- Increase infiltration
- Reconnect bosque vegetation to groundwater
- Enhance wildlife habitat
- Stormwater and flood control/Water Quality
- Reduce stagnant water
- Reduce bank erosion
- Upgrade existing outfall
- Large-scale GSI Demo

















# Maintenance for GSI in Arid Climates

Developed through the Arid LID Coalition

- <https://aridlidcoalition.org/index.php/gsi-maintenance/>

Maintenance Manual – 6 modules

- GSI Introduction
- Permeable Pavement
- Stormwater Harvesting Basins
- Infiltration Conveyance
- Plant Identification and Maintenance
- Mulch Maintenance

Training videos

In-person trainings





# GSI/LID Standards Overview

- Locations to use GSI/LID
- Benefits of GSI/LID
- Regulatory context
- Stormwater quality volume
- Best Management Practices (BMPs)
  - Design & construction
  - Maintenance
- Mulch & plant selection



**GREEN STORMWATER INFRASTRUCTURE**  
**LOW IMPACT DEVELOPMENT STANDARDS**



# Policy

**Goal 3:** Catalyze the revision of state and local stormwater policies to strengthen the equitable distribution of GSI / LID.



## Members:

Sarah Hurteau (SC)  
Shellie Eaton  
Kali Bronson  
Albert Palma  
Alyssa O'Brien  
Amanda Champion  
Kyle O'Malley  
Shelby Stimson (SC)

## Current Projects:

- Stormwater Utility Bill
- GSI gaps in IDO
- Mainstreaming GSI



**Recent Wins:** Complete Streets Ordinance update with GSI!

**Champions:** Sarah Hurteau  
[Sarah@ibis-llc.com](mailto:Sarah@ibis-llc.com); Shelby Stimson  
[sstimson@sig-nal.org](mailto:sstimson@sig-nal.org)





# Get in Touch!



Arid LID Coalition  
[aridlidcoalition.org](http://aridlidcoalition.org)

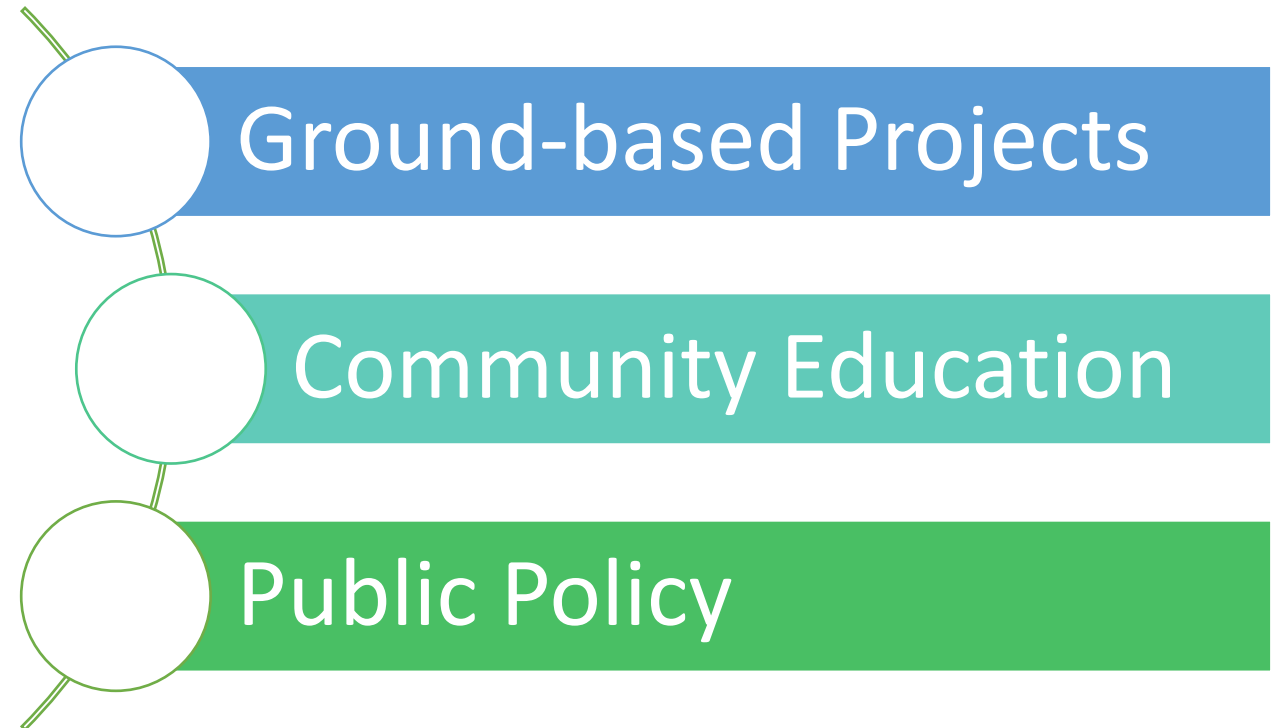
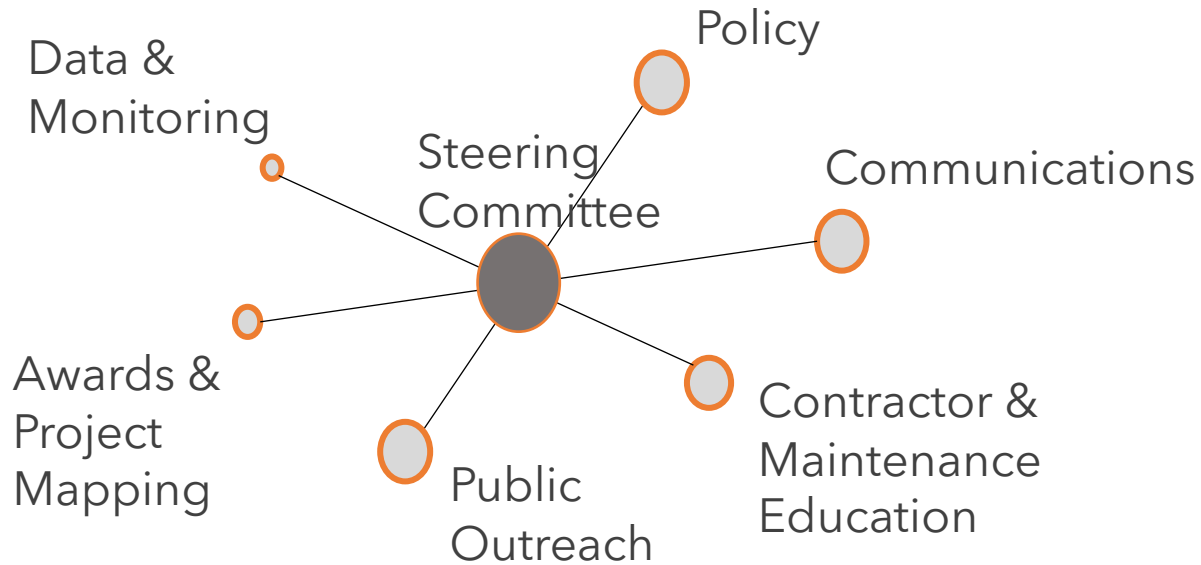
Sarah Hurteau  
[shurteau@sig-nal.org](mailto:shurteau@sig-nal.org)



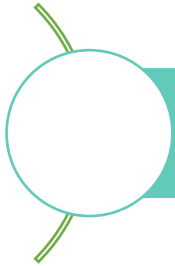


# Coalition Structure

Our vision is to foster urban landscapes that sustainably use all sources of water, integrating natural infrastructure alongside engineered solutions to provide resilient, climate-adapted habitat for generations of people, plants and wildlife.







# Community Education & Outreach

- Residential Rainwater Harvesting Workshops
- Water Authority Bill Stuffers – 200,000+ residents
- Contractor Maintenance Workshops
- Pueblo Alto/Mile Hi Neighborhood Drainage Study
- GSI Awards



**WATER CONSERVATION Workshops**  
SUMMER 2022

- 1 Rainwater or Graywater: Which is Right for You?**  
Online workshop  
Thursday, June 9, 6:00 – 7:30 p.m., or  
Saturday, June 11, 2:00 – 3:30 p.m.
- 2 Residential Rainwater Harvesting: Q&A with Local Experts**  
Online workshop  
Thursday, June 23, 6:00 – 7:30 p.m.
- 3 Selecting Plants for Rainwater Harvesting Basins**  
Gutiérrez Hubbell House (6029 Isleta Blvd SW)  
Saturday, June 25, 9:00 – 11:00 a.m.
- 4 Drip Irrigation Repair for Homeowners**  
Gutiérrez Hubbell House (6029 Isleta Blvd SW)  
Saturday, Aug. 13, 9:00 – 11:00 a.m.

For more information and to register:  
[berncogov.openspacesignup](https://berncogov.openspacesignup)

**Climate-Ready Trees for Albuquerque**

LOCATION TYPE 2  
LARGE GREEN STORMWATER INFRASTRUCTURE (GSI) FEATURES

**LOCATION CHARACTERISTICS.**  
Follows "Right Tree in the Right Place"  
Low Points Collect Stormwater Runoff  
Soil Decompacted to a Depth ≥ 18"  
May Have Basins, Swales, or Infiltration Trenches  
Examples: Southern Sandoval County Arroyo Flood Control Authority Main Office Landscaping, Pete Domenici Courthouse, and Smith Brasher Hall

**RECOMMENDED TREES**

<i>Celtis reticulata</i> <i>Cercis canadensis</i> var. <i>mexicana</i> * <i>Cercis occidentalis</i> * <i>Cercis reniformis</i> * <i>Cercis canadensis</i> var. <i>texensis</i> * <i>Crataegus ambigua</i> * <i>Forestersia neomexicana</i> <i>Gymnocladus dioica</i> * <i>Platanus mexicana</i> <i>Lagerstroemia indica</i> * <i>Malvula parviflora</i> <i>Populus deltoides</i> <i>Populus deltoides</i> var. <i>albigena</i> * <i>Prunella virginiana</i> * <i>Quercus agrifolia</i> <i>Quercus ilex</i> * <i>Quercus muhlenbergii</i> <i>Quercus rubra</i> * <i>Quercus virginiana</i> * <i>Salix gooddingii</i> <i>Salix pyramidalis</i> var. <i>drummondii</i> * <i>Ulmus</i> * Mortoni Accolade™ <i>Ulmus x Frontalis</i> <i>Ulmus parviflorus</i> * <i>Taxodium mucronatum</i> * <i>Zelkova serrata</i>	<i>Netleaf Hackberry</i> <i>Mexican Redbud</i> * <i>Western Redbud</i> * <i>Oklahoma Redbud</i> * <i>Texas Redbud</i> * <i>Russian Hawthorn</i> * <i>New Mexico Privet</i> <i>Fragrant Ash</i> <i>Kentucky Coffeetree</i> * <i>Mexican Sycamore</i> <i>Crape Myrtle</i> * <i>Orange Orange</i> * <i>Chinese Pistache</i> <i>Eastern Cottonwood</i> <i>Rio Grande Cottonwood</i> <i>Honey Mesquite</i> * <i>Screwbean Mesquite</i> <i>Arizona White Oak</i> <i>Holly Oak</i> * <i>Chinkapin Oak</i> <i>Cork Oak</i> * <i>Southern Live Oak</i> * <i>Goodding's Willow</i> <i>Western Soapberry</i> <i>Accolade Elm</i> <i>Frontier Elm</i> <i>Lacinate Elm</i> * <i>Montezuma Cypress</i> * <i>Japanese Zelkova</i>
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\* These species have further site specific needs outlined in Appendix A – Master List

**Right Tree, Right Place**  
Keeping mature size and other species characteristics in mind, consider overhead and underground utilities, proximity to buildings and traffic, the users of the space and maintenance and upkeep.

Photo Credit: MRWM Landscape Architects

The Nature Conservancy  
A Guideline for Selecting Climate-Ready Trees

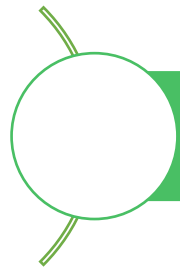
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JULY 2022

**GREEN STORMWATER INFRASTRUCTURE AWARD OF EXCELLENCE**  
Unbuilt Category

ASLA NEW MEXICO

**WATER CATHEDRAL**





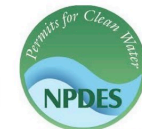
# Public Policy

- NMDOT NPDES Manual
- Bernalillo County Stormwater Standards
- Educating Elected Officials to gain support for GSI/LID
- Development of a GSI Fund Feasibility Analysis

## National Pollutant Discharge Elimination System Manual

STORMWATER MANAGEMENT  
GUIDELINES FOR CONSTRUCTION,  
MS4, AND INDUSTRIAL ACTIVITIES

Revision 3 12/2020



**GREEN STORMWATER INFRASTRUCTURE**  
**LOW IMPACT DEVELOPMENT STANDARDS**