Green Stormwater Infrastructure Southwestern Case Studies
for Flood Mitigation…and many other benefits!

ASFPM 2018 Phoenix!

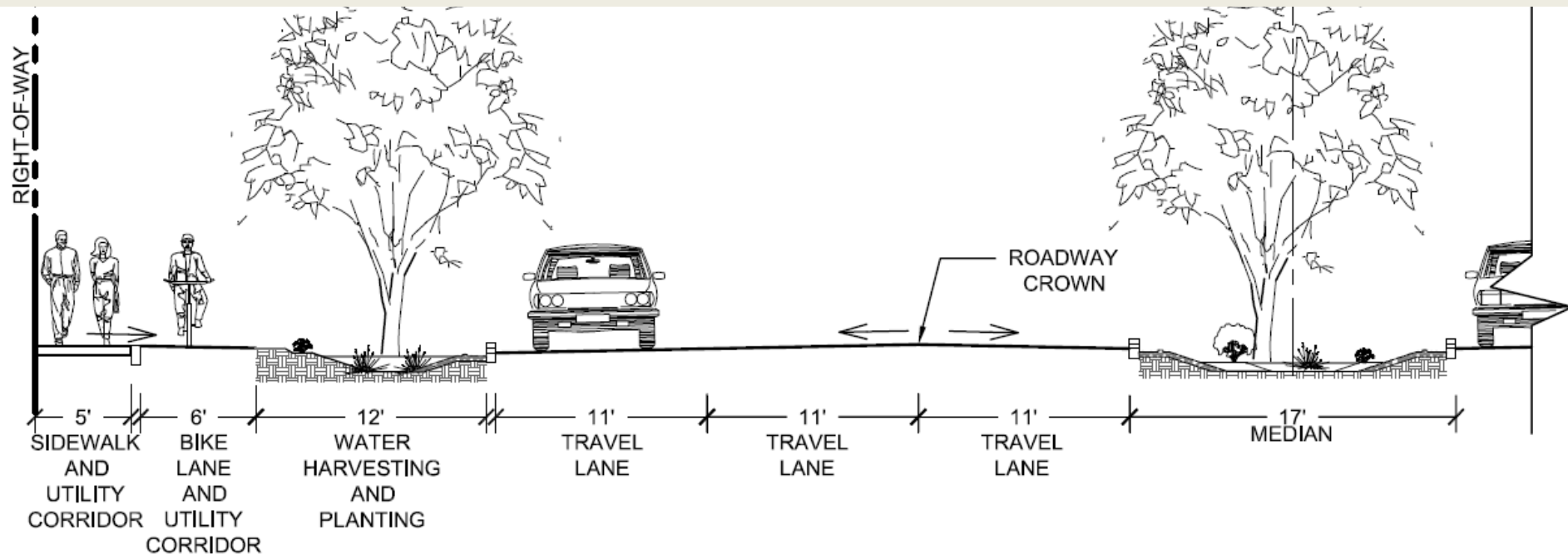## Kieran Sikdar

Stormwater Solutions Director

Certified Floodplain Manager

Watershed Management Group

watershedmg.org

Watershed Management Group develops and implements community-based solutions to ensure the long-term **prosperity of people** and **health of the environment**. We provide people with the knowledge, skills, and resources for sustainable livelihoods.

RIGHT-OF-WAY

ROADWAY CROWN

| 5' SIDEWALK AND UTILITY CORRIDOR | 6' BIKE LANE AND UTILITY CORRIDOR | 12' WATER HARVESTING AND PLANTING | 11' TRAVEL LANE | 11' TRAVEL LANE | 11' TRAVEL LANE | 17' MEDIAN |

Which story do you want for Sabino Creek?

It's your choice.

watershedmg.org/rivers
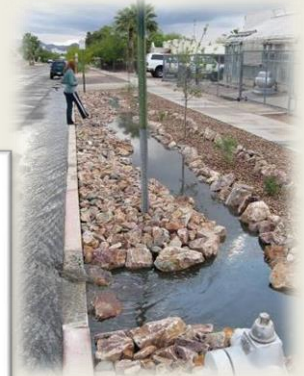
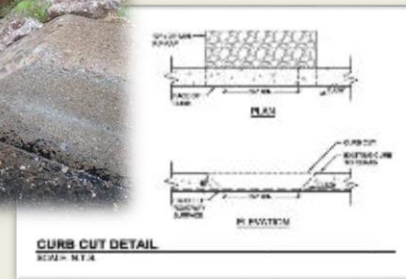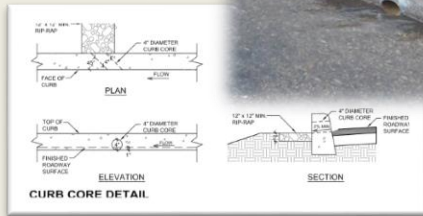# What is Green Stormwater Infrastructure (GSI)?

Our definition:

"constructed features that use living, natural systems to provide environmental services, such as capturing, cleaning and infiltrating stormwater; shading and cooling streets and buildings; and calming traffic."

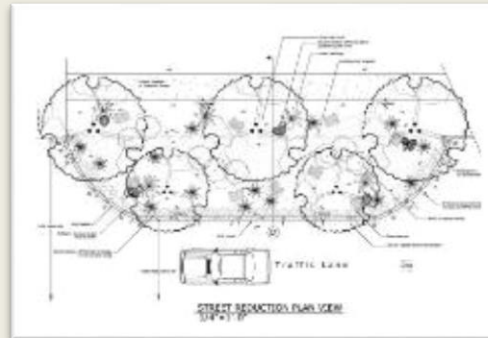# What is Green Stormwater Infrastructure (GSI)?

Curb Cuts/Cores

Chicane/Street width reduction/road diet

Can Small Scale Green Stormwater Infrastructure Solve Chronic Flooding Challenges Cost Effectively?

Photo: Provided by City of Tucson

El Vado at Santa Cruz

Drainage Area:

1280 Acres

XS 2 El Vado Wash at Santa Cruz (4)

- 100yr3hr
- 100yr3hrGI25

PIMA COUNTY
FLOOD CONTROL
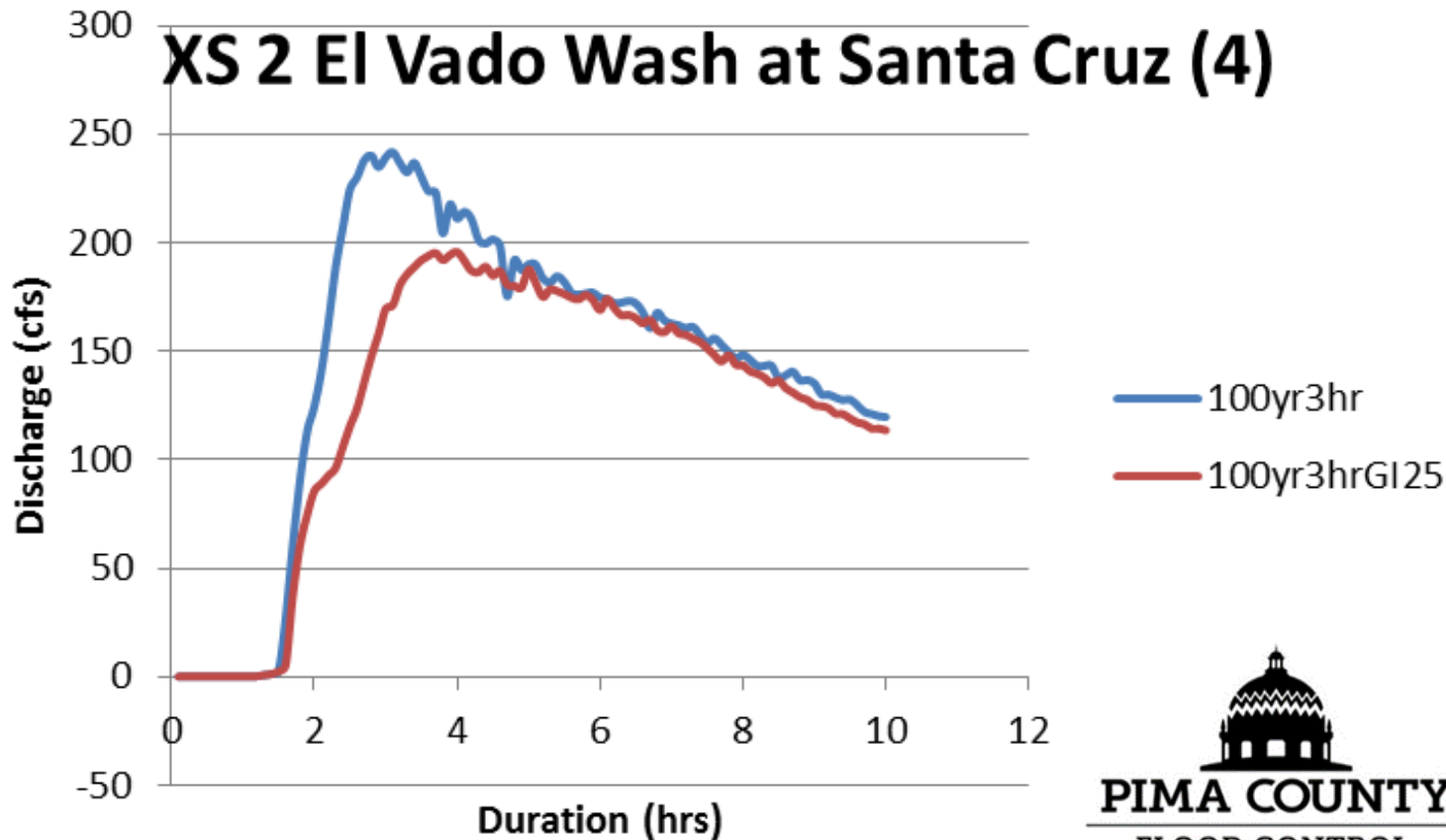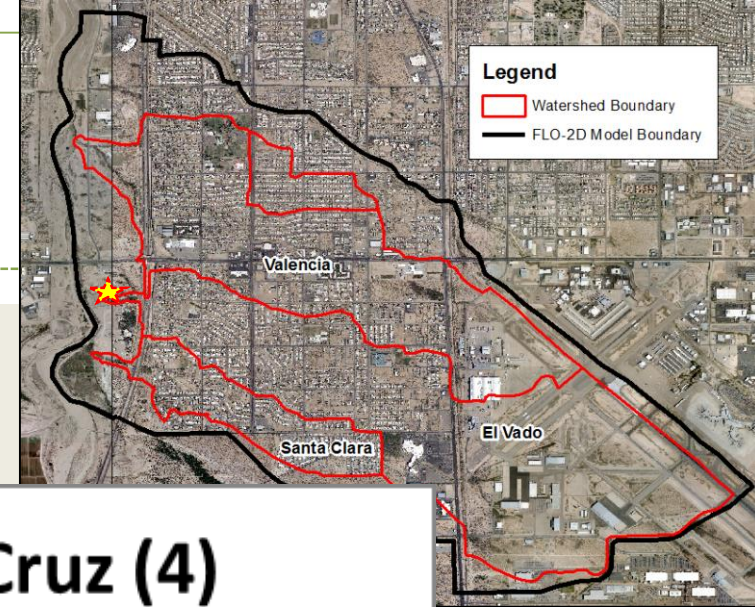
Identifying Target Areas

4| Valencia Rd

1| Hope Church

3| 6th Ave & Medina

2| Pima Community College & Airport

5| Missiondale Rd and 6th Ave
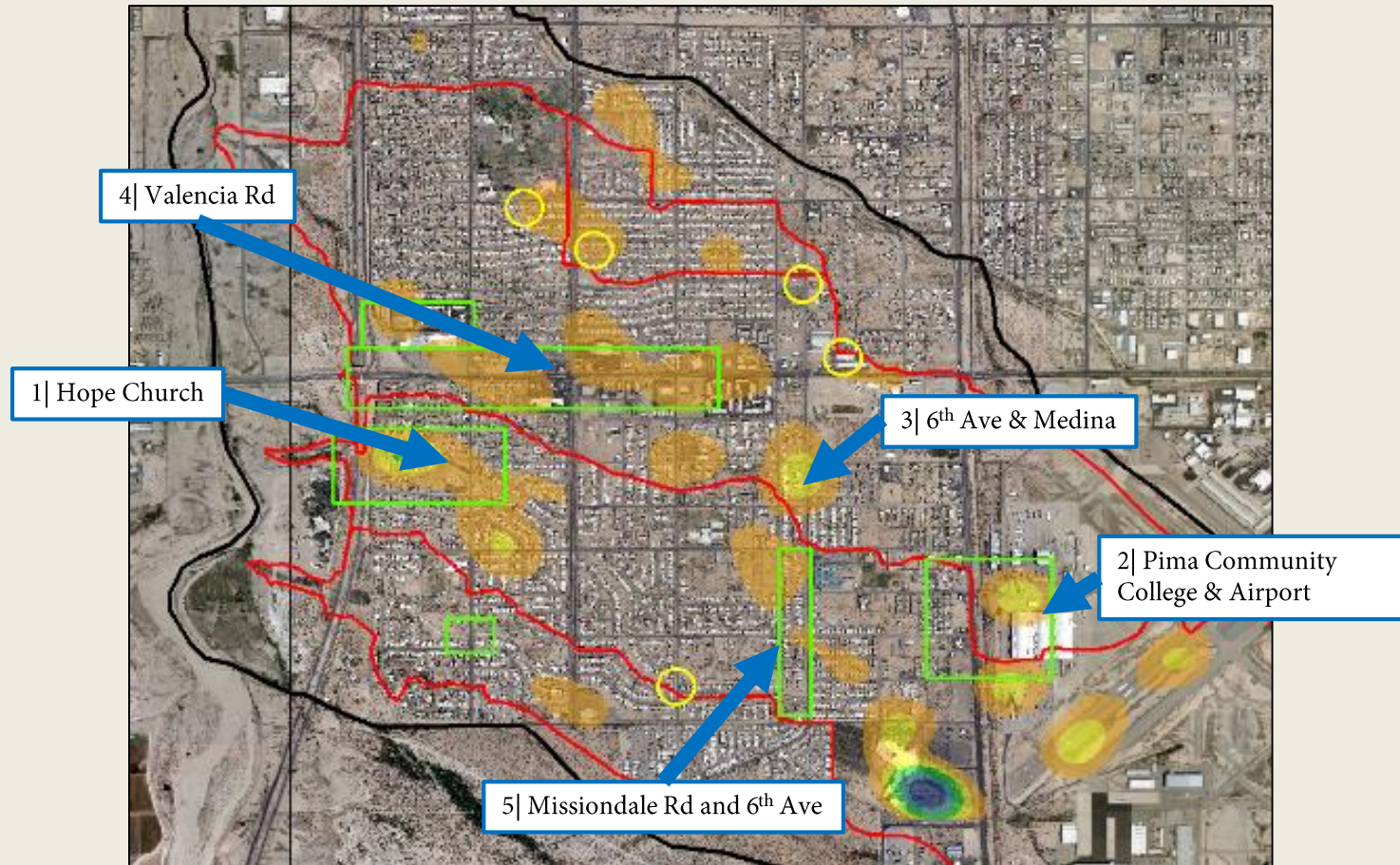
- Does small scale GI/LID have an impact on larger (> 10 yr) storm events?

- How can a detailed FLO-2D model with GI/LID be developed for large watersheds?

FLO-2D Modeling Methods

Table 4.1 FLO-2D Modeling Methods for LID Basic Controls				
LID Basic Control	Possible Modeling Methods			
	Grid elevation adjustment	Initial loss IA adjustment	Infiltration rate/Soil depth adjustment	Use of artificial storm drain
Bio Retention	X	X	X	X
Bio Swale	X	X	X	X
Pervious Pavement	X	X	X	X
Rainwater Harvesting		X	X	X
Green Roof		X		X
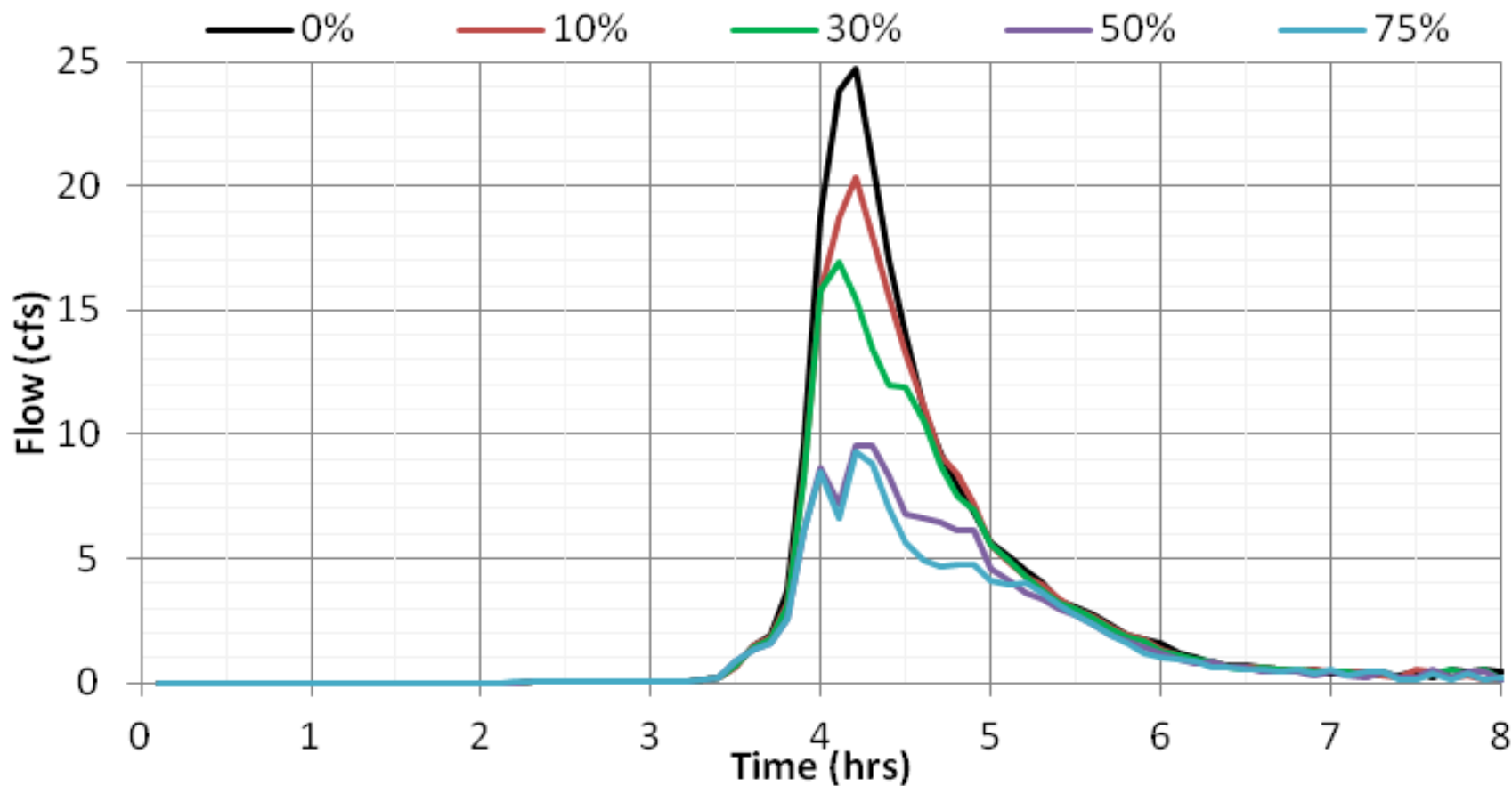
How do we protect the health of a desert river?

For a thriving community in balance with local water resources supported by a healthy watershed

- Promote Health of San Pedro River
  - Reduce groundwater demand
  - Enhance recharge

- Promote Health of Community
  - Economic prosperity
  - Shade & beautify
  - Reduce nuisance flooding

Street Rights-of-Way LID (scenario #2)
Basin Area*: 110,500 sf
Basin Volume*: 54,600 cf
% of Total Development Area: 6%
*Note: Does not include planned detention basins
Lots: 93

Stormwater Annual Runoff:
Pre = 1.1 AF/Yr
LID = 12.2 AF/Yr

Slight property reduction to increase LID feature capacity

ROW LID swale capturing runoff from property; 5ft walkway with 1ft offset preserved

Basin 1:
Peak Flow
Depth = 1.9ft
Change -0.1ft

56'

30'

Basin 2:
Peak Flow
Depth = 3.5ft
Change -0.1ft

Creation of LID basin(s) for public amenity and access to wash

Re-configuration of street to increase connectivity

Slight property reduction to increase LID feature capacity

0   150   300 ft

N

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Canada Vista | LID Scenario #2 ::
Sierra Vista, AZ *scale: 1:3600*

A

03

Clustered Townhome LID (scenario #4)
Basin Area*: 136,960sf
Basin Volume*: 68480cf
% of Total Development Area: 5%
*Note: Does not include planned detention basins
Homes: 108

Stormwater Annual Runoff:
Pre = 1.1 AF/Yr
LID = 8.5 AF/Yr

4000sf per townhome residence clustered in fours

Basin 1:
Peak Flow
Depth = 0.5ft
Change = -1.5ft

Basin 2:
Peak Flow
Depth = 0.4ft
Change = -3.2ft

ROW LID swale capturing runoff from crowned roadway

Maximizing natural, open space for drainage and LID features

0   150   300 ft

N

Watershed Management Group

Canada Vista | LID Scenario #4 ::
Sierra Vista, AZ *scale: 1:3600*

A

05

SWMM Peak Runoff Analysis

Scenario	Scenario Type	Number of Homes	Annual runoff estimate (AF)	Peak flow depth estimate for detention basin 1 (FT)	Peak runoff estimate for detention basin 2 (FT)
0	Pre-development	N/A	1.1	N/A	N/A
Base	Platted single-family residential	92	12.9	2.0	3.6
1	Opportunistic Low Impact Development (LID)	93	12.3	1.8	3.5
2	Streets rights-of-way with LID	93	12.2	1.9	3.5
3	Drainage easement with LID	92	9.1	1.5	2.5
4	Clustered townhome with LID	108	8.5	0.5	0.4

SWMM Water Supply Analysis

Scenario	Scenario Type	Number of Homes	Annual Urban Enhanced Runoff (AF)	Annual water use (AF)	Annual Indoor Wastewater Treated & Recharged (AF)	Balance (AF)	Assumptions
Base	Existing proposed single-family residential	92	11.8	57.4	9.3	(48.1)	Original development proposal with ADWR estimated water use
1	Opportunistic Low Impact Development (LID)	93	11.2	35.8	7.6	(28.2)	Assume EPA WaterSense interior, 30 gpcd exterior use, no swimming pools, no turf, low water use large lot adjustment
2	Streets rights-of-way LID	93	11.1	38.25	7.6	(30.7)	Assume EPA WaterSense interior, 30 gpcd exterior use, no swimming pools, no turf, low water use large lot adjustment
3	Drainage easement LID	92	8	13.8	7.6	(6.2)	Assume EPA WaterSense interior, 30 gpcd exterior use, no swimming pools, no turf
4	Clustered townhome with LID	108	7.4	9.5	7.6	(1.9)	Assume EPA WaterSense interior with toilet (8.2 gpcd) fed by rainwater tank, exterior irrigated by rainwater tank, no swimming pools, no turf

Midvale Park Community Demonstration

…thank you! Any questions?

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Las Cruces Community Resilience with GSI

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