



CITIZENS' WATER ADVISORY COMMITTEE CONSERVATION & EDUCATION SUBCOMMITTEE

Wednesday, May 13 2015, 3:30 p.m.
Director's Conference Room
Tucson Water, 3rd Floor
310 W. Alameda Street, Tucson, Arizona

Legal Action Report

1. Call to Order/Roll Call

The meeting was called to order by Chairperson Amy McCoy at 3:33 p.m. Those present and absent were:

Members Present:

Amy McCoy	Chairperson, Representative, Ward 2
Mark Murphy	Representative, Mayor
Placido dos Santos	Representative, City Manager
Jean McLain	Representative, City Manager
Catlow Shipek	Representative, City Manager
* Mark Lewis	Representative, Ward 5

* Member Lewis arrived at 4:00 p.m.

Tucson Water Staff Members:

Fernando Molina	Public Information Supervisor
Daniel Ransom	Water Conservation Supervisor
Kris LaFleur	Staff Assistant

Others Present

Evan Canfield	Pima County Flood Control District
Mead Mier	Pima Association of Governments
Steve Arnquist	Ward 1
Amy Stabler	Ward 6

- 2. Announcements** – Chairperson McCoy clarified that any C&E updates to Mayor & Council on the topic of low-income conservation assistance funds and arterial rainwater harvesting demonstration projects would need to be approved first by the full CWAC. Chairperson McCoy asked Mayor & Council to be aware that the CWAC and C&E meeting schedule and the upcoming CWAC summer break may affect the timeline of C&E's update to Mayor & Council.
- 3. Call to Audience** – Mr. Arnquist addressed those present on behalf of Councilmember Romero. He asked members and staff to include Ward office input in the site selection process for rainwater harvesting demonstration projects. He also requested consideration of Mayor and Council input on infrastructure issues, resource distribution, and underserved areas of the city during selection of project sites.
- 4. Review of April 8, 2015, Legal Action Report and Meeting Minutes** – Member McLain requested a correction to the spelling of her name throughout the April 8, 2015, Legal Action Report. With that change, she moved to approve the Legal Action Report and Meeting Minutes of April 8, 2015. The motion was seconded by Member Murphy and carried by a vote of 5-0.

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5. **Monthly Report** – Mr. Ransom presented Tucson Water's conservation program report for FY15, through the month of April. He indicated that 86% of the conservation program budget had been spent to date, 10 months into the fiscal year. Per the April discussion with C&E, some funds within the budget had been reassigned to meet the needs of individual rebate programs. Mr. Ransom and Mr. Molina fielded and answered questions from members.
6. **Presentations related to identification of Rainwater & Stormwater Management Program sites** – Chairperson McCoy indicated that the three presentations to follow were intended to help identify decision-making criteria, as C&E and Tucson Water begin a site-selection process for rainwater harvesting demonstration sites, as directed by M&C on March 3, 2015, and discussed by C&E on April 8, 2015.
 - a. **Catlow Shipek: Process for Identifying Green Infrastructure Sites** – Member Shipek conducted a presentation entitled "Assessing Green Infrastructure Opportunities to Realize Community Goals." [Presentation slides accompany the Legal Action Report.] He indicated that the presentation was drawn from a joint Watershed Management Group, City of Tucson Ward I, and Pima County Flood Control study of flooding impacts in the Airport Wash area. The study helped to identify and prioritize sites in the area which could receive optimal benefits from Green Infrastructure retrofits or installations.
 - b. **Evan Canfield, Pima County Flood Control: Identifying Neighborhoods or Arteries Prone to Stormwater Flooding** – Mr. Canfield conducted a presentation entitled "Stormwater Management for Supply and Flood Mitigation." [Presentation slides accompany the LAR.] His presentation reviewed current Pima County Flood Control District (FCD) efforts to identify sub-watershed level drainage patterns and problems through the Tucson area, and focused on methods and data being developed in the Ruthrauff Basin. He indicated that a crucial element to identifying local drainage problems would be communication between C&E, Tucson Water staff, and Ward offices.

Mr. Canfield's presentation also examined FCD data from the Airport Wash area study mentioned in Member Shipek's presentation.

- c. **Mead Mier, PAG: Vulnerability Index Maps** – Ms. Mier conducted a presentation entitled "Green Infrastructure Prioritization Tool: A Vulnerabilities and Opportunities Map." [Presentation slides accompany the LAR.] She discussed PAG's Green Infrastructure Prioritization Web Map [<http://gismaps.pagregion.com/PAG-giMap/#/About>]. The tool is an interactive online map used to identify opportunities for beneficial use of stormwater in the Tucson area. Map layers include concentrations of populations vulnerable to surface-level heat exposure, as well as tree canopy data, transportation/pedestrian data, street-level water-flow paths, and City Ward boundaries.

Member McLain departed at 4:39 p.m. and returned at 4:41 p.m.; Member Murphy departed at 4:41 p.m. and returned at 4:42 p.m.

Discussion followed between members, staff, and Mr. Arnquist about how information from these presentations would be used for site selection, how stakeholders would provide input

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into the site identification process, and whether members would have an opportunity to vote on the validity of using Conservation Fund money for these demonstration projects.

Mr. Molina indicated that staff would provide a proposal for further steps in implementing the rainwater harvesting demonstration projects at the first C&E meeting of FY 2016 [the September 2015 meeting].

- 7. Three-Year C&E Workplan & FY 2015-16 Budget Update** – Chairperson McCoy introduced the item. She pointed out that C&E was seeking evaluation criteria for conservation programs and for uses of the Conservation Fund. She drew attention to the various suggestions for new programs proposed by C&E members, requests for budget expenditures by Mayor & Council, and similar topics recently raised before the subcommittee. She indicated that, in the past, the subcommittee had followed a 3-year workplan, based on Tucson Water staff's yearly work requirements and intended to guide members and staff in scheduling agenda items and discussing Conservation Program goals and progress. Chairperson McCoy proposed that the subcommittee and staff return to the workplan format to guide future meetings, beginning with FY16.

Mr. Molina presented an updated C&E 3-year workplan [this handout is included with the LAR]. He indicated that the Public Information and Conservation office has limited staff and must carefully manage staff time. He indicated that items required for C&E review appear on the workplan, such as end-of-year and mid-year reports, and budget timeframes. He indicated that timeframes would be flexible for longer-term items such as rainwater/stormwater harvesting program discussions.

Members and staff discussed the workplan. Chairperson McCoy asked members to consider the plan and to return to the June meeting with comments.

8. Future Meetings/Agenda Items –

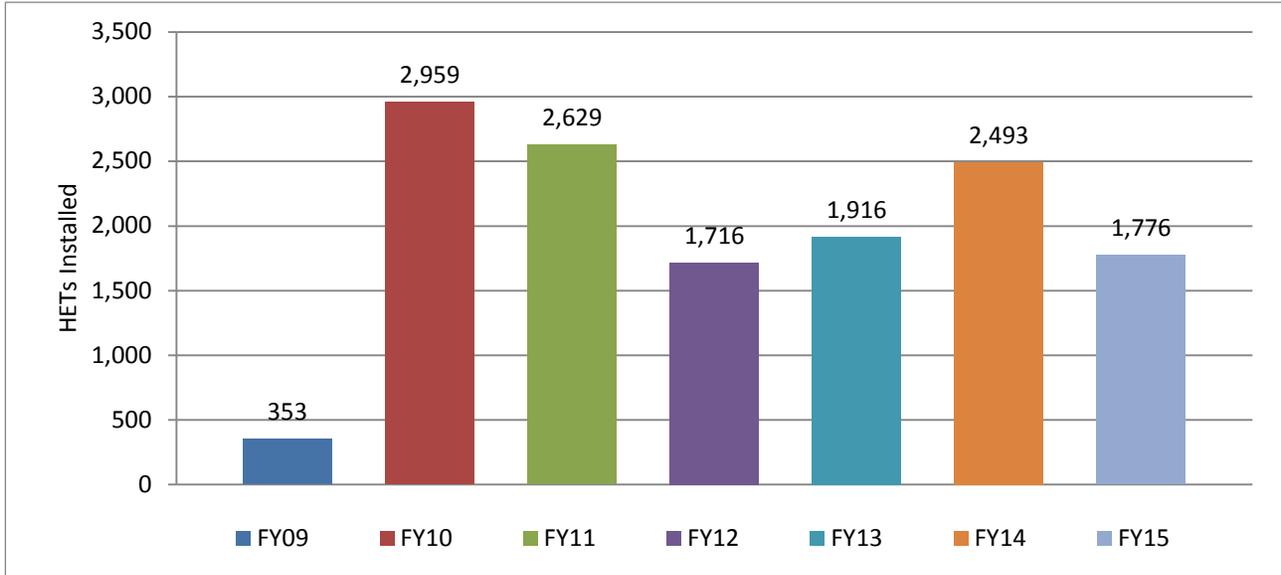
- June: CWAC & TW Conservation Program Roles
- September: Staff proposal on rainwater harvesting demonstration site program

- 9. Adjournment** – The meeting was adjourned at 5:15 p.m.

**Tucson Water
Incentive Program Implementation
FY 2014-15 Through April**

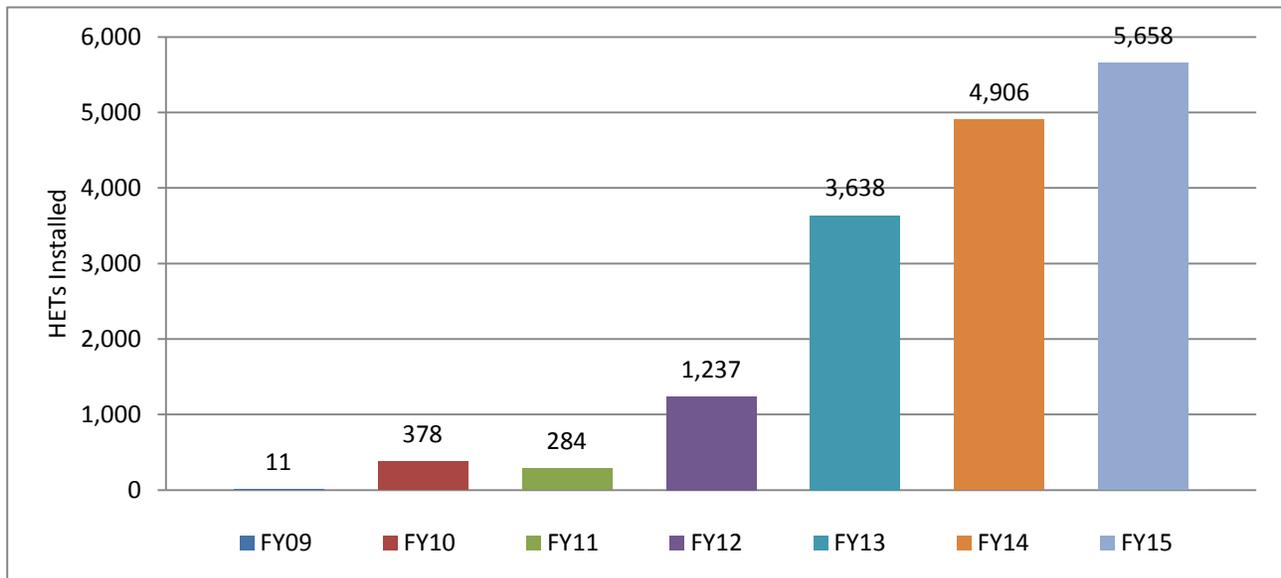
Single-Family HET Rebate

	FY 14/15	Cumulative	Start Date: Jul-08	
HETs Installed	1,776	13,842	Staff Labor Hours	0
Expenditure ¹	\$ 145,590	\$ 1,144,302	Budget	\$ 200,000
Estimated Gallons Saved	13,288,920	394,656,980	Percent of Budget	73%
Estimated Acre-Feet Saved	41	1,211		



Multi-Family HET Rebate

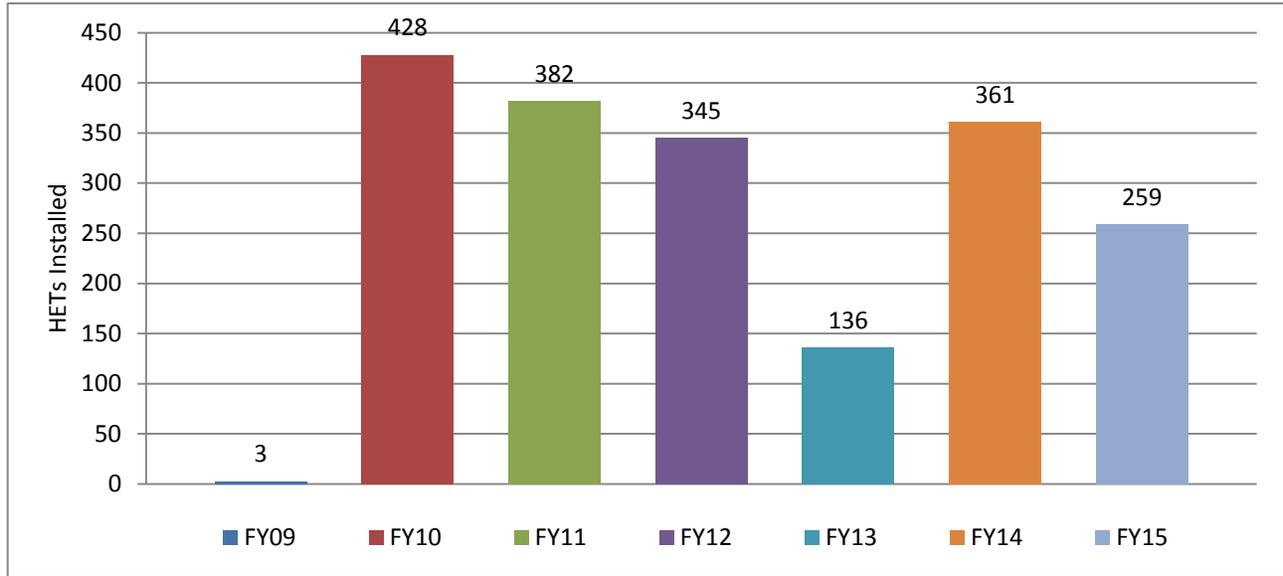
	FY 14/15	Cumulative	Start Date: Jul-08	
HETs Installed	5,658	16,112	Staff Labor Hours	0
Expenditure ¹	\$ 559,961	\$ 1,579,365	Budget	\$ 598,000
Estimated Gallons Saved	42,335,985	262,613,303	Percent of Budget	94%
Estimated Acre-Feet Saved	130	806		



**Tucson Water
Incentive Program Implementation**

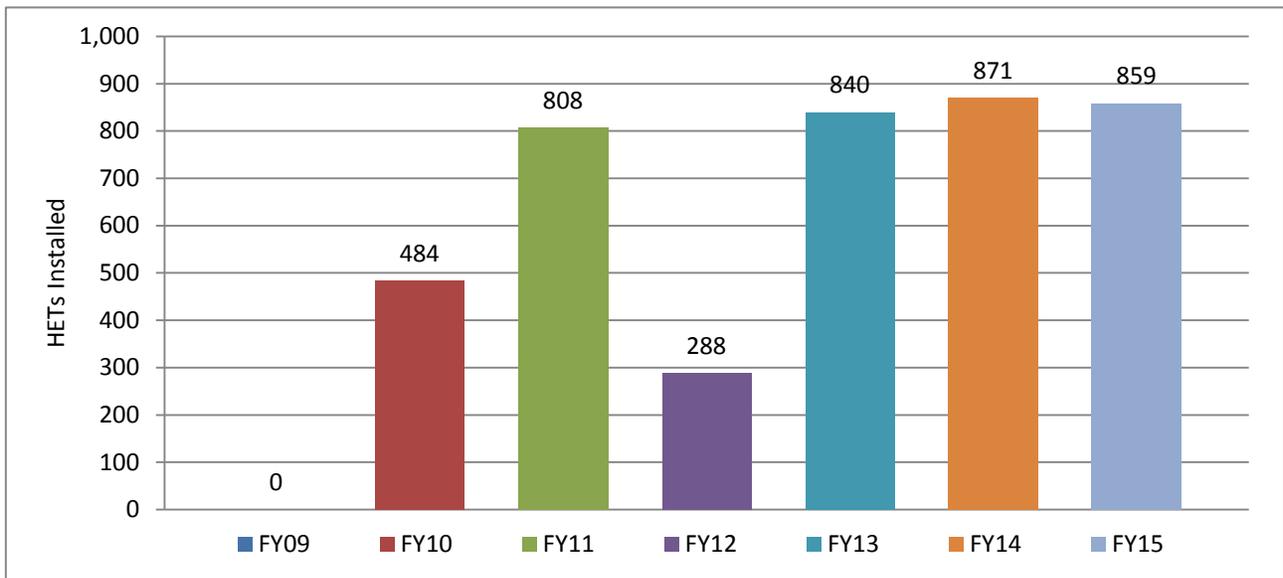
Commercial HET Rebate

	FY 14/15	Cumulative		Start Date: Jul-08
HETs Installed	259	1,914	Staff Labor Hours	0
Expenditure ¹	\$ 23,214	\$ 165,106	Budget	\$ 30,000
Estimated Gallons Saved	2,646,980	74,278,960	Percent of Budget	77%
Estimated Acre-Feet Saved	8	228		



Low-Income HET Direct Install

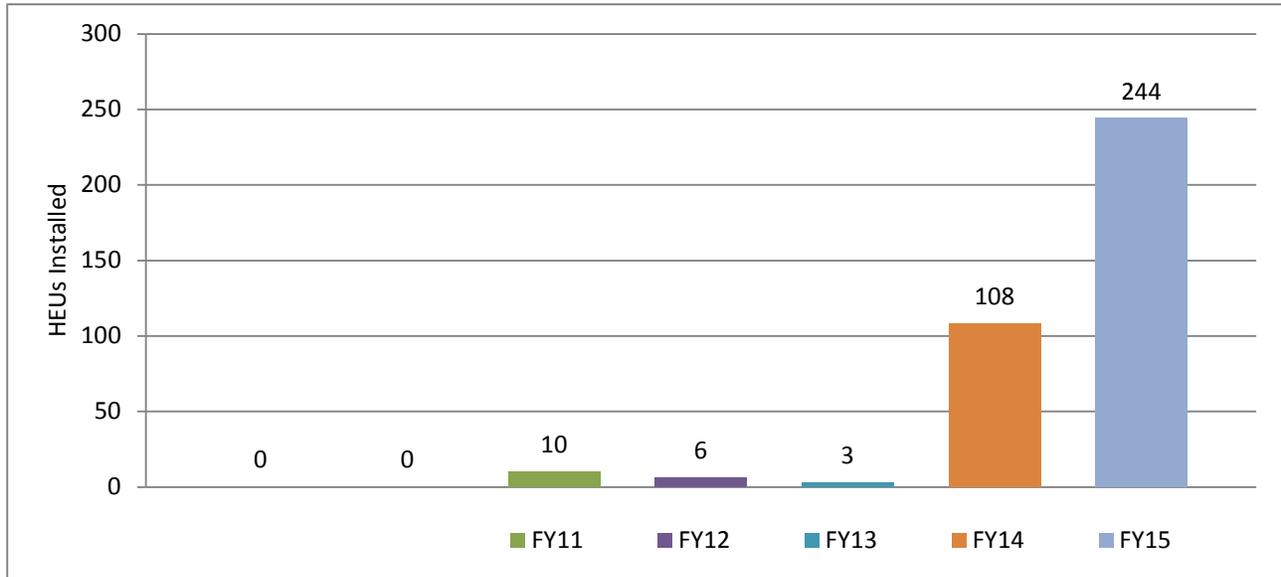
	FY 14/15	Cumulative		Start Date: Oct-09
HETs Installed	859	4,150	Staff Labor Hours	0
Expenditure ¹	\$ 282,460	\$ 1,522,759	Budget ²	\$ 317,000
Estimated Gallons Saved	7,368,073	113,368,818	Percent of Budget	89%
Estimated Acre-Feet Saved	23	348		



**Tucson Water
Incentive Program Implementation
FY 2014-15 Through April**

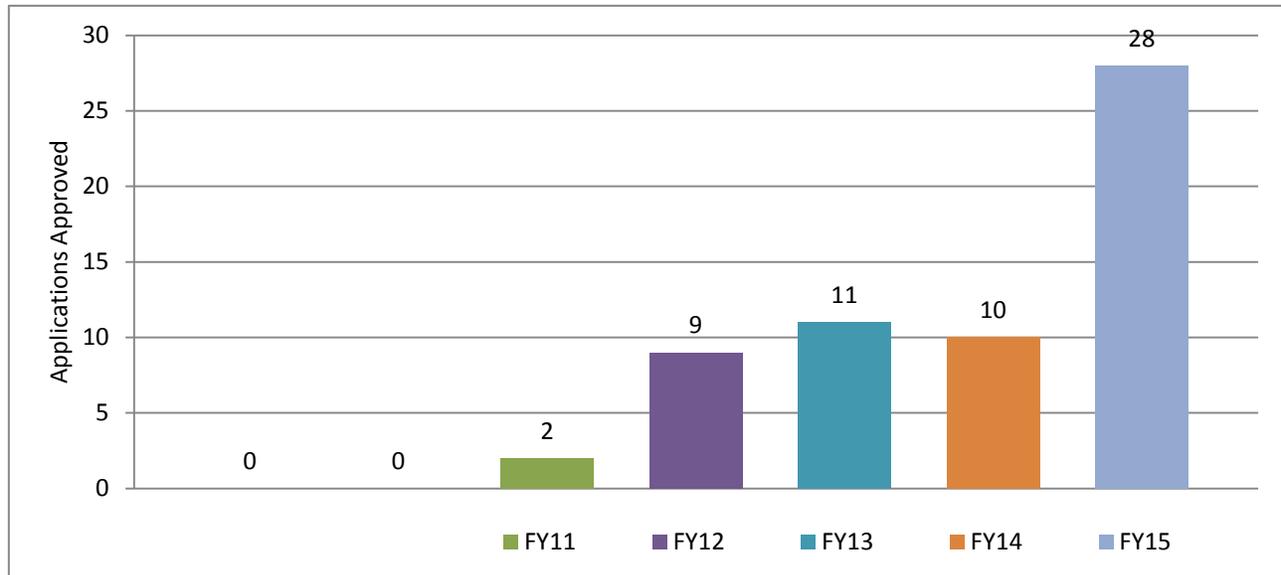
High-Efficiency Urinal Rebate

	FY 14/15	Cumulative	Start Date: Jan-11	
HEUs Installed	244	371	Staff Labor Hours	0
Expenditure ¹	\$ 120,500	\$ 177,000	Budget	\$ 125,000
Estimated Gallons Saved	4,363,940	9,711,555	Percent of Budget	96%
Estimated Acre-Feet Saved	13	30		



Gray Water Rebate

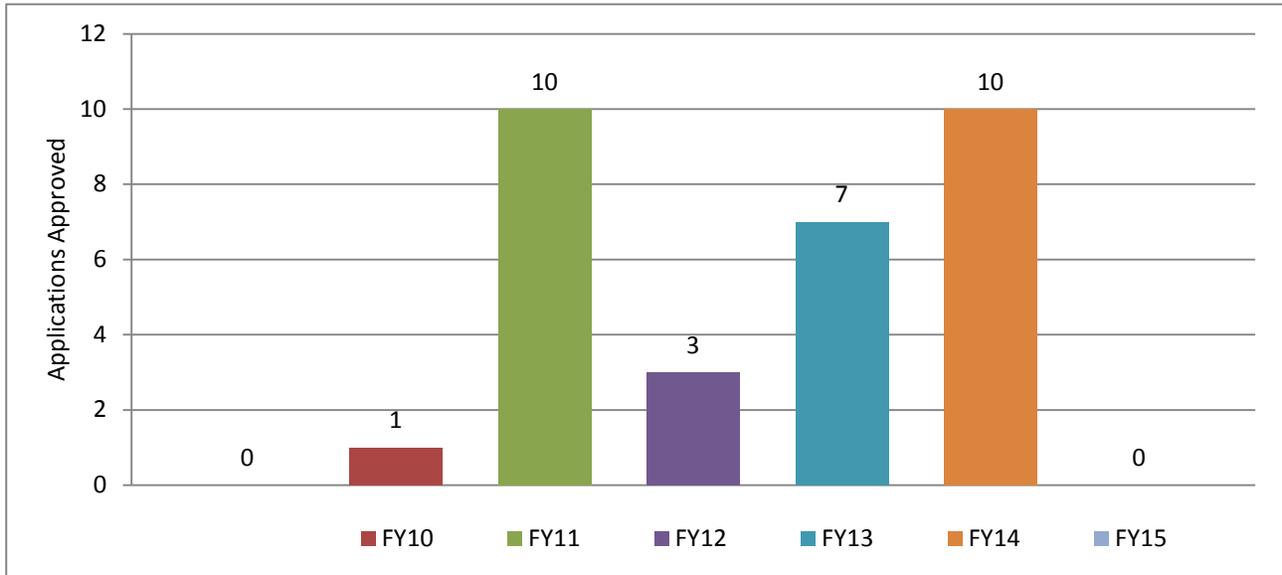
	FY 14/15	Cumulative	Start Date: Jan-11	
Applications Approved	28	60	Staff Labor Hours	0
Expenditure ¹	\$ 12,933	\$ 23,587.62	Budget	\$ 20,000
Estimated Gallons Saved	364,868	1,654,937	Percent of Budget	65%
Estimated Acre-Feet Saved	1	5		



**Tucson Water
Incentive Program Implementation**

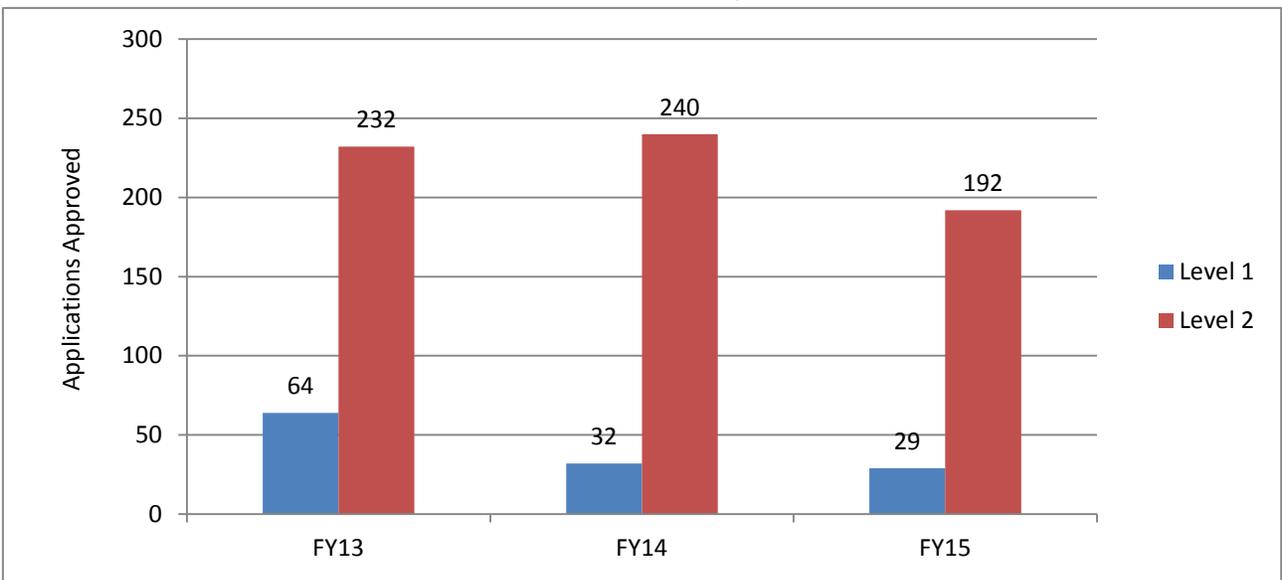
Irrigation Efficiency Rebate

	FY 14/15	Cumulative		Start Date: Jul-08
Applications Approved	0	31	Staff Labor Hours	0
Expenditure ¹	\$ -	\$ 246,290	Budget	\$ -
Estimated Gallons Saved	0	25,064,550	Percent of Budget	
Estimated Acre-Feet Saved	0	77		



Rainwater Harvesting

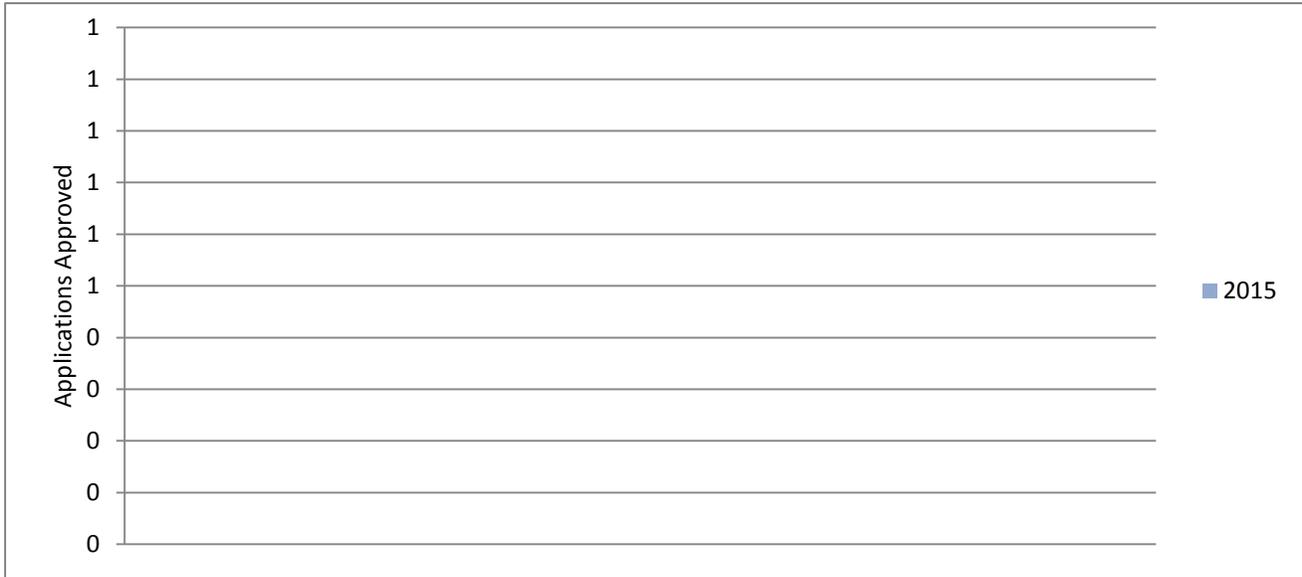
	FY 14/15	Cumulative		Start Date: Jun-12
Applications Approved	221	789	Staff Labor Hours	0
Expenditure ¹	\$ 258,470	\$ 962,468	Budget	\$ 350,000
Estimated Gallons Saved	0	0	Percent of Budget	74%
Estimated Acre-Feet Saved	0	0		



**Tucson Water
Incentive Program Implementation
FY 2014-15 Through April**

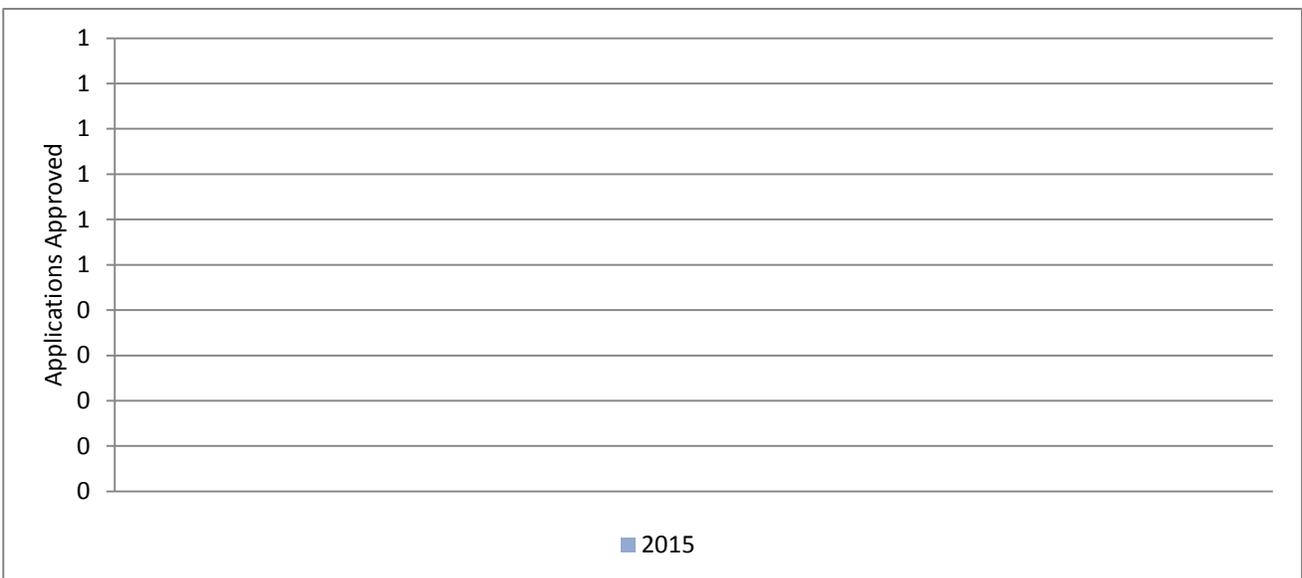
High-Efficiency Clothes Washer Rebate

		Cumulative			Start Date: TBD
Applications Approved		0	0	Staff Labor Hours	0
Expenditure ¹	\$	-	\$ -	Budget	\$ -
Estimated Gallons Saved		0	0	Percent of Budget	
Estimated Acre-Feet Saved		0	0		



Commercial Efficiency Upgrade Rebate

		FY 14/15	Cumulative			Start Date: TBD
Applications Approved		0	0	0	Staff Labor Hours	0
Expenditure ¹	\$	-	\$ -	-	Budget	\$ -
Estimated Gallons Saved		0	0	0	Percent of Budget	
Estimated Acre-Feet Saved		0	0	0		

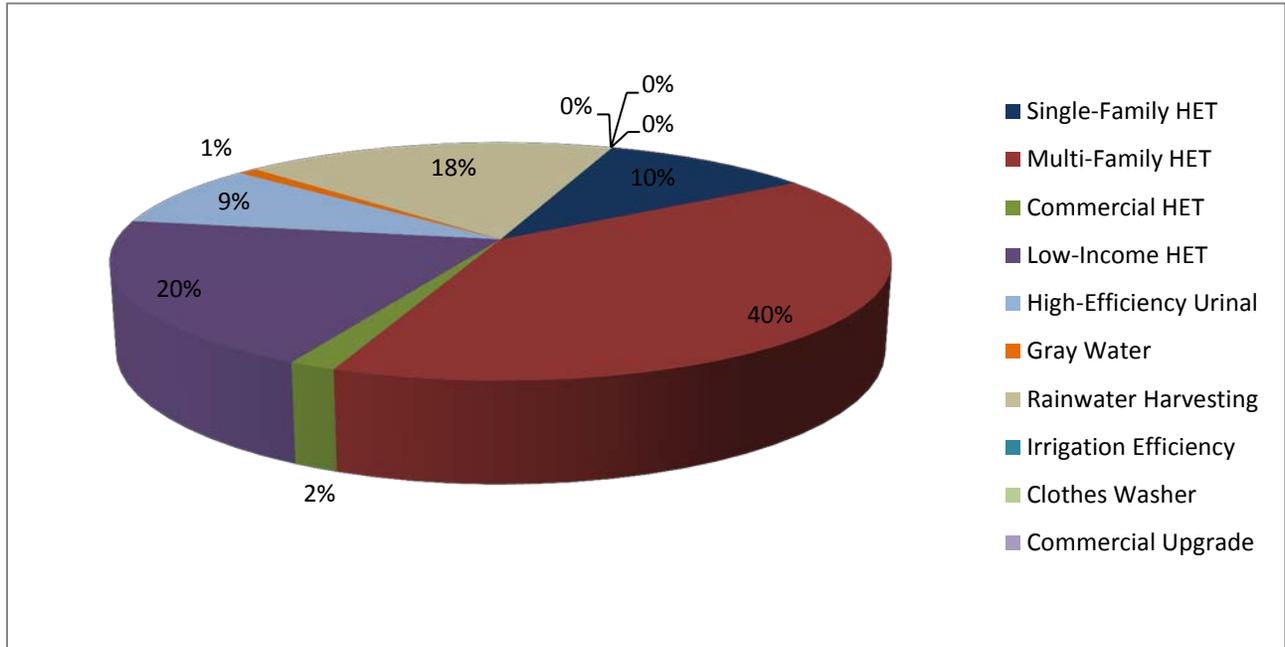


**Tucson Water
Incentive Program Implementation**

Program Totals

	FY 14/15	Cumulative		
HETs/HEUs Installed	8,796	36,389	Staff Labor Hours	0
Expenditure ¹	\$ 1,403,127	\$ 5,820,877	Budget	\$ 1,640,000
Estimated Gallons Saved	70,368,766	881,349,102	Percent of Budget	86%
Estimated Acre-Feet Saved	216	2,705		

Expenditures by Program for FY 2014-15



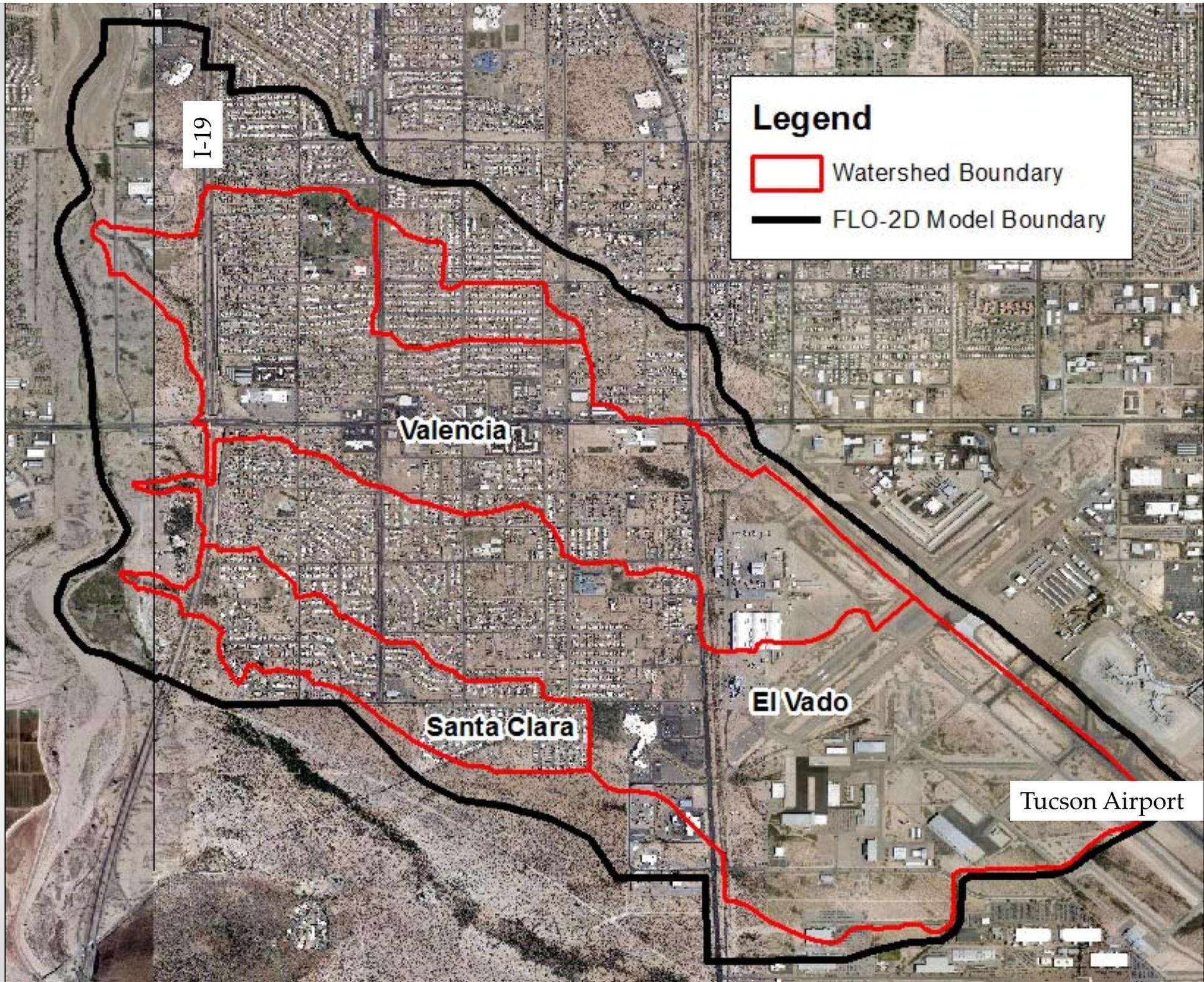
The numbers and expenditures in this report reflect when the rebate or expenditure is approved and not when paid. This report is an operational report and not intended to reconcile with financial reports.

¹The expenditure does not include the cost of staff time

²The budget for the low-income HET direct install program is combined from two object codes. Toilet installation is categorized in professional services and the cost of the toilet and misc. materials is categorized in materials. All other rebate program expenditures are in the object code for efficiency programs.

Assessing Green Infrastructure Opportunities to Realize Community Goals





Cost Benefit Analysis

Direct economic values:

- Water conservation
- Air quality Improvement
- Energy savings
- Reduced street maintenance from shaded pavement
- Stormwater runoff reduction
- Property value increases
- Avoided gray infrastructure

Indirect economic values:

- Social value of water conservation
- Greenhouse gas emissions reductions
- Flood Risk Reduction
- Energy for CAP & Groundwater pumping
- Stormwater pollution reduction
- Urban Heat Island reduction

Residential Rain Garden & Street Harvesting Benefit/Cost Ratio Initial Results



Model representation



On-the-ground potential practice



Benefit/Cost Ratio:

\$4.4 / \$1

\$2.9 / \$1

Direct benefits only:

\$3.1 / \$1

\$1.9 / \$1

Green Streets

Benefit/Cost Ratio Initial Results



Model representation

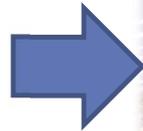


Photo: Wheat Design Group

On-the-ground potential practice



Benefit/Cost Ratio:

\$2.1 / \$1

Direct Value Only:

\$1.5 / \$1

Parking Lots and In-Street Features: Bustin' Up Asphalt!



Model representation



Before

On-the-ground potential practice

After

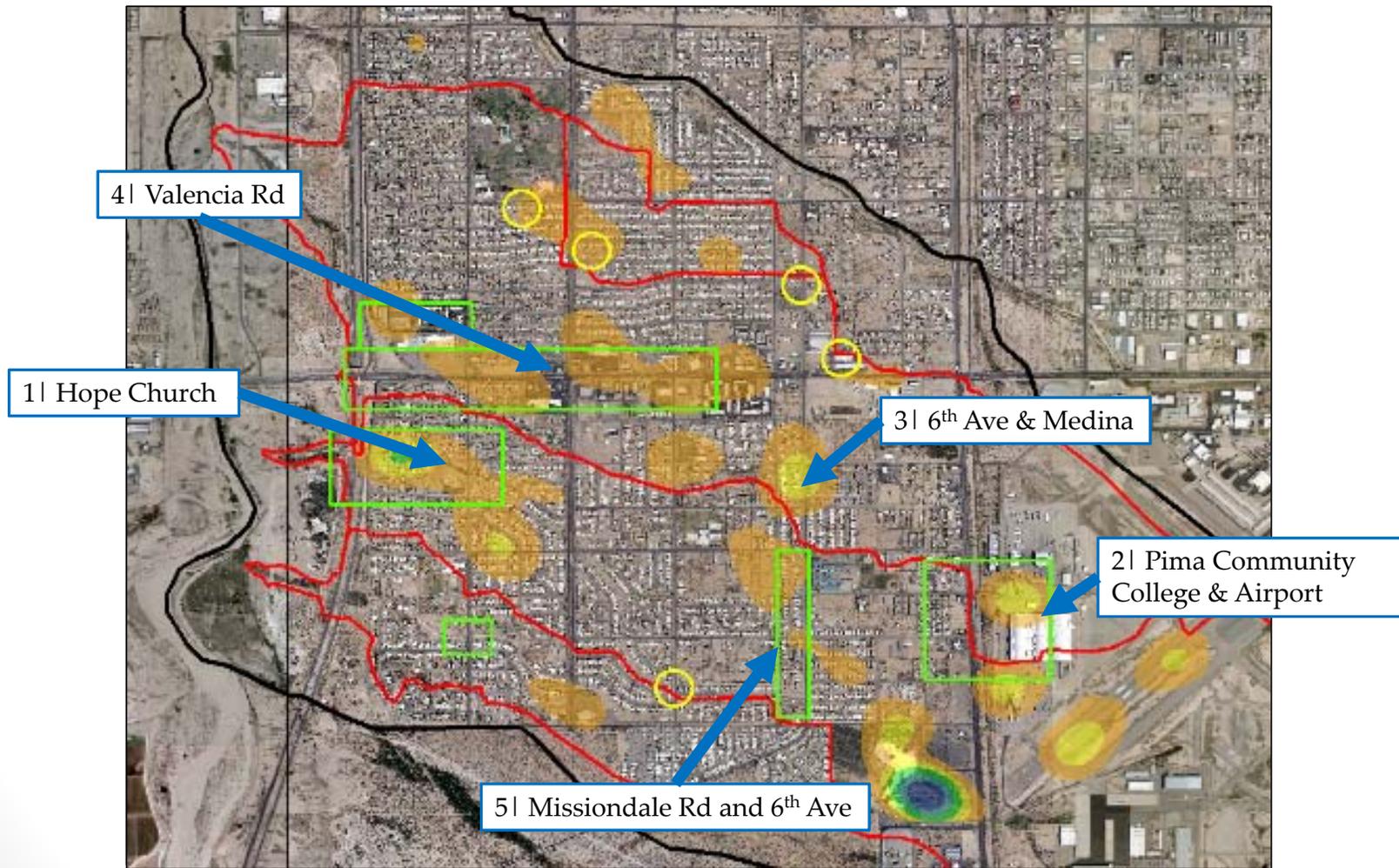
Benefit/Cost Ratio:

\$0.5 / \$1

Initial Results

- ✓ For **every \$1** a community **invests** in rain gardens and green streets **over \$2-4 of value are created** when accounting for **direct and indirect** economic values.

GSI Performance: Identifying Target Areas



Identifying the Low Hanging Fruit

- TW Residential Rebates:
 - Residential Sites – Modification of existing landscape areas
 - Rights-of-ways – Modification of existing landscape areas
- Ordinances and Policies:
 - Commercial Redevelopment – Commercial Rainwater Harvesting Ordinance
 - Roadway Redevelopment – Green Streets Active Practice Guidelines
- **What is missing:**
 - Neighborhood scale retrofits (e.g. Dunbar Spring, Northwest Neighborhood, Rincon Heights)
 - Schools, Churches, Parks, and Existing Commercial
 - Existing roadways (pedestrian and bicycling corridors)

Identification of Future Opportunities

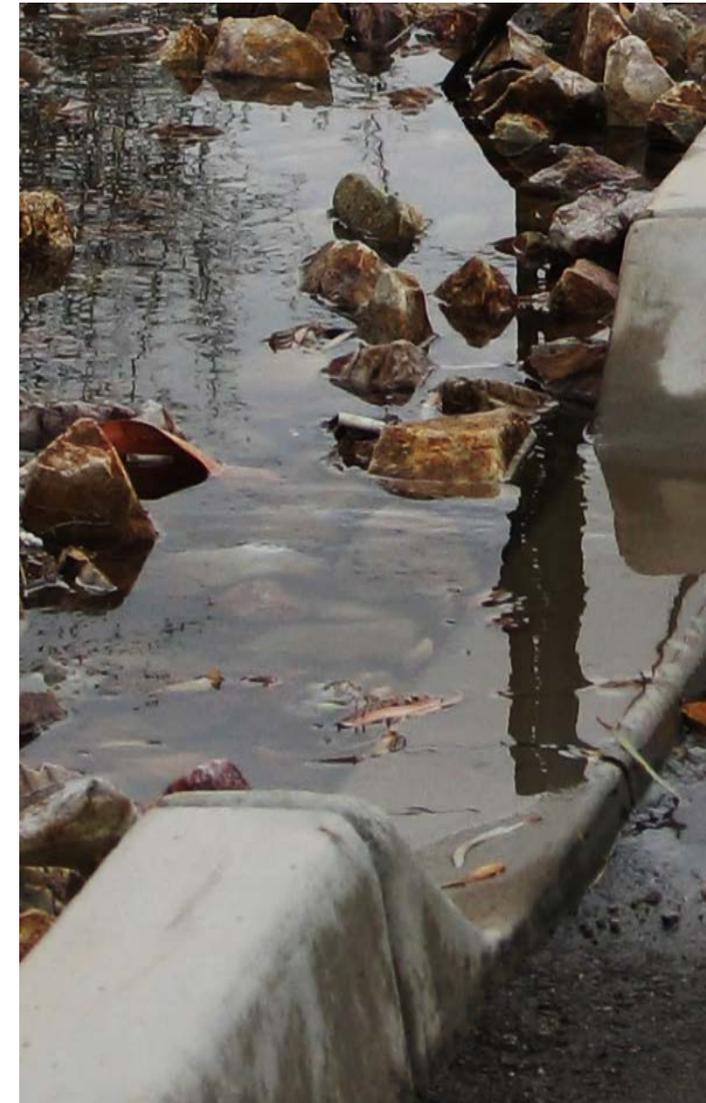
- Produce a flow accumulation grid from a digital elevation model
 - Shows where flow paths occur
 - Indicates contributing area upstream
- Create filters based on available data
 - Utility locations, street widths, shade prioritization map, etc
 - Or overlay with community-based needs – Shade Map Prioritization Tool, Flood risk maps or drainage complaints, Redevelopment plans, etc
- Review selected areas for practicality
 - Desktop Analysis: Google map and street view
 - Other landscape use/type spatial data layers
- Prioritize based on stated community needs/goals
 - Flooding, Heat Island Reduction, Water conservation, Traffic calming, etc

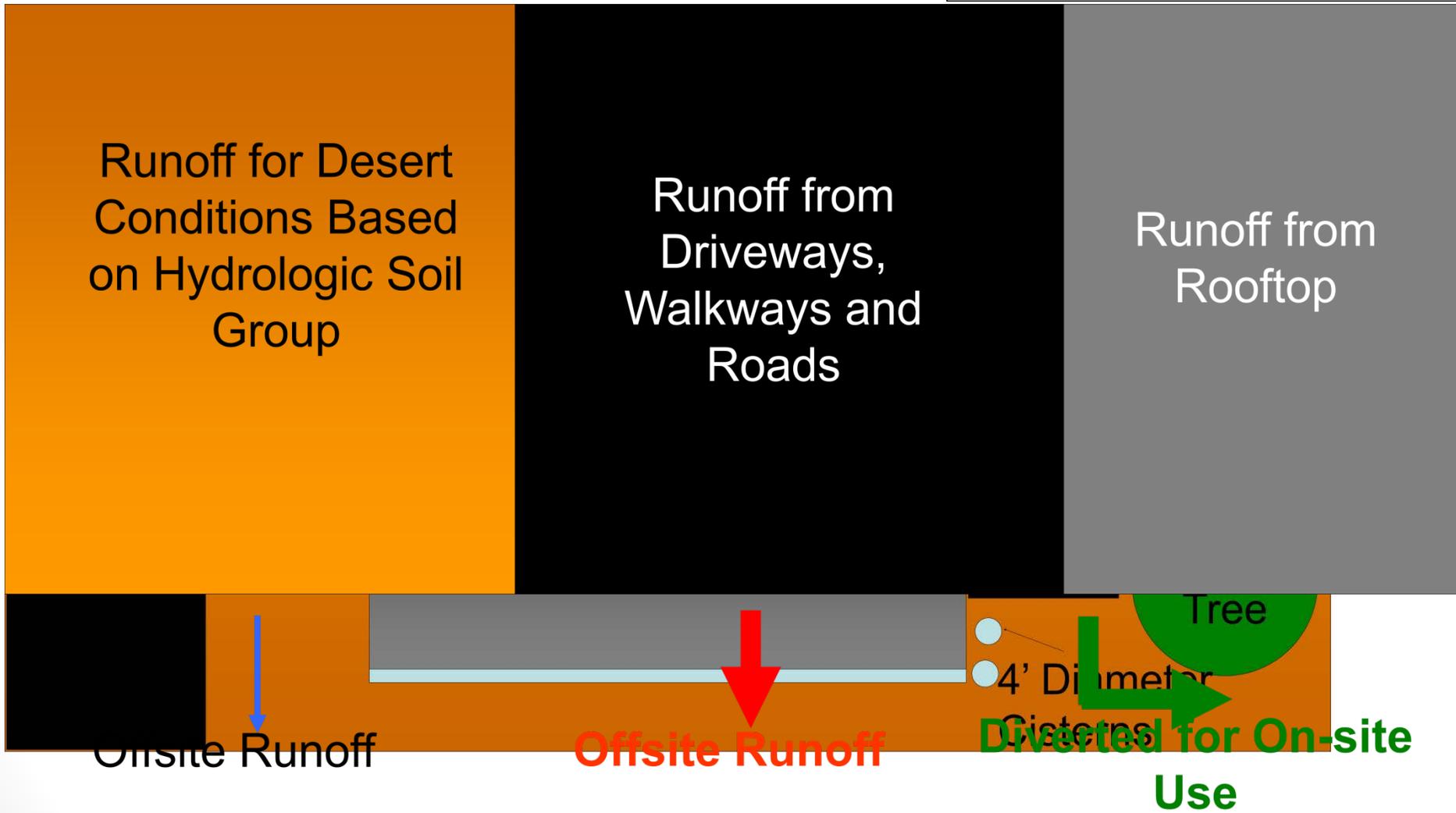
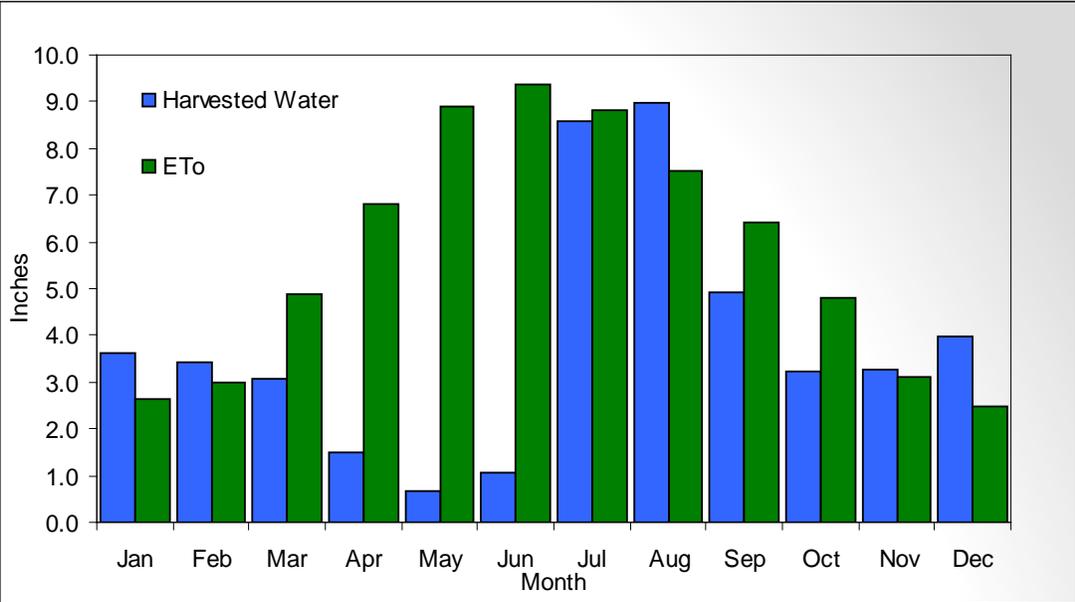
Stormwater Management for Supply and Flood Mitigation

Evan Canfield



CWAC C & E, May 13, 2015





A Prototype Analysis for Determining the Stormwater Retention and Water Supply Benefits of Cisterns
Canfield & Shipek 2007

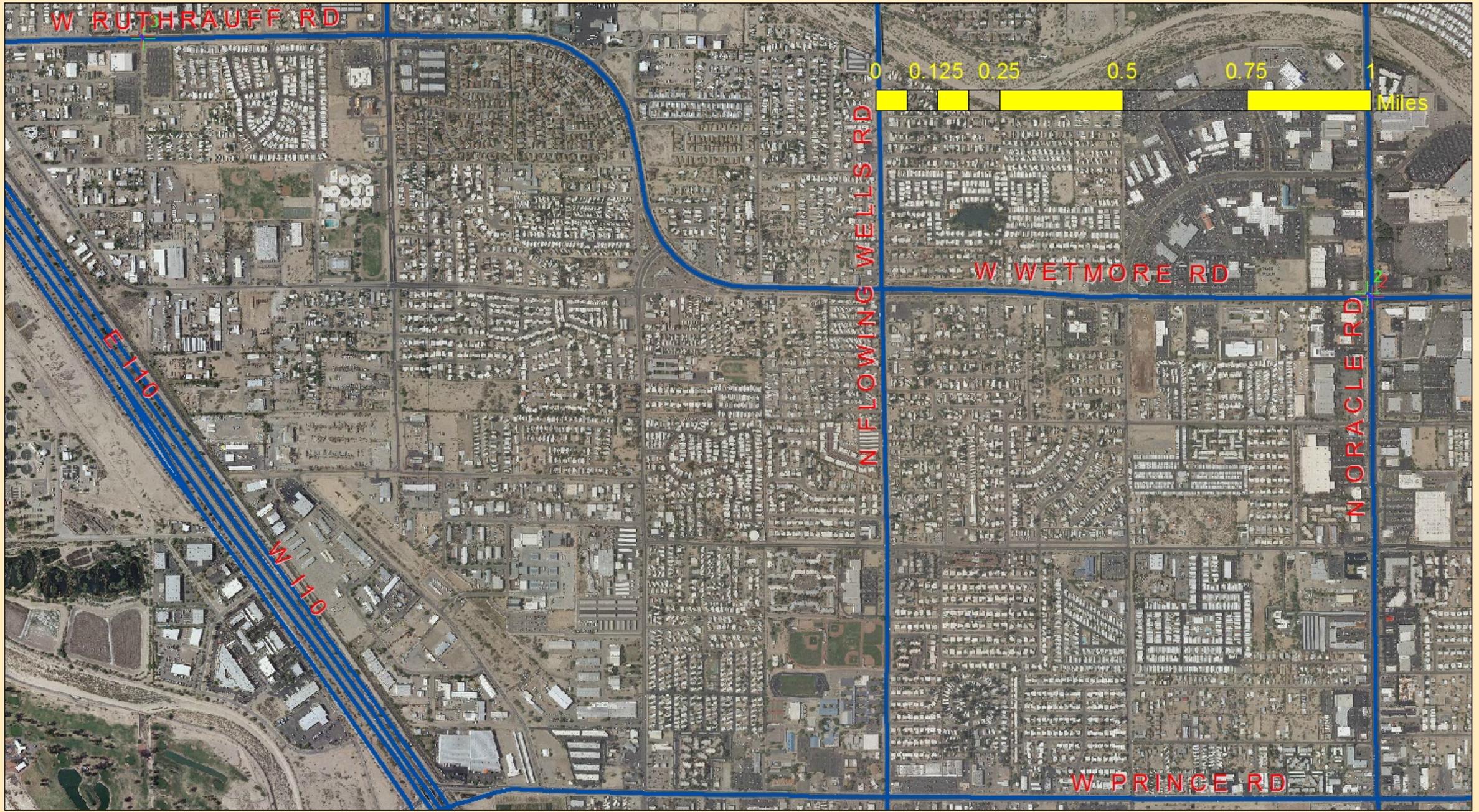
City of Tucson and Pima County Stormwater Harvesting and Management as a Supplemental Water Source Technical Paper

Water and Wastewater Infrastructure,
Supply and Planning Study, Phase II

May 2009

Purpose to evaluate:

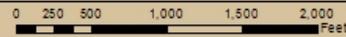
- Availability and reliability of stormwater and rainwater as a supplemental water source.
- Viability of using stormwater or rainwater to recharge groundwater.
- Legal constraints associated with water rights and water quality.
- Cost effectiveness of obtaining stormwater or rainwater as a supplemental source.



PIMA COUNTY
FLOOD CONTROL
Pima County Regional Flood Control District
97 E Congress - 3rd Floor
Tucson, Arizona 85701-1207
(520) 724-4600, FAX: (520) 724-4621
<http://www.rfcd.pima.gov>

Project Area - 2011

1 inch = 1,000 feet

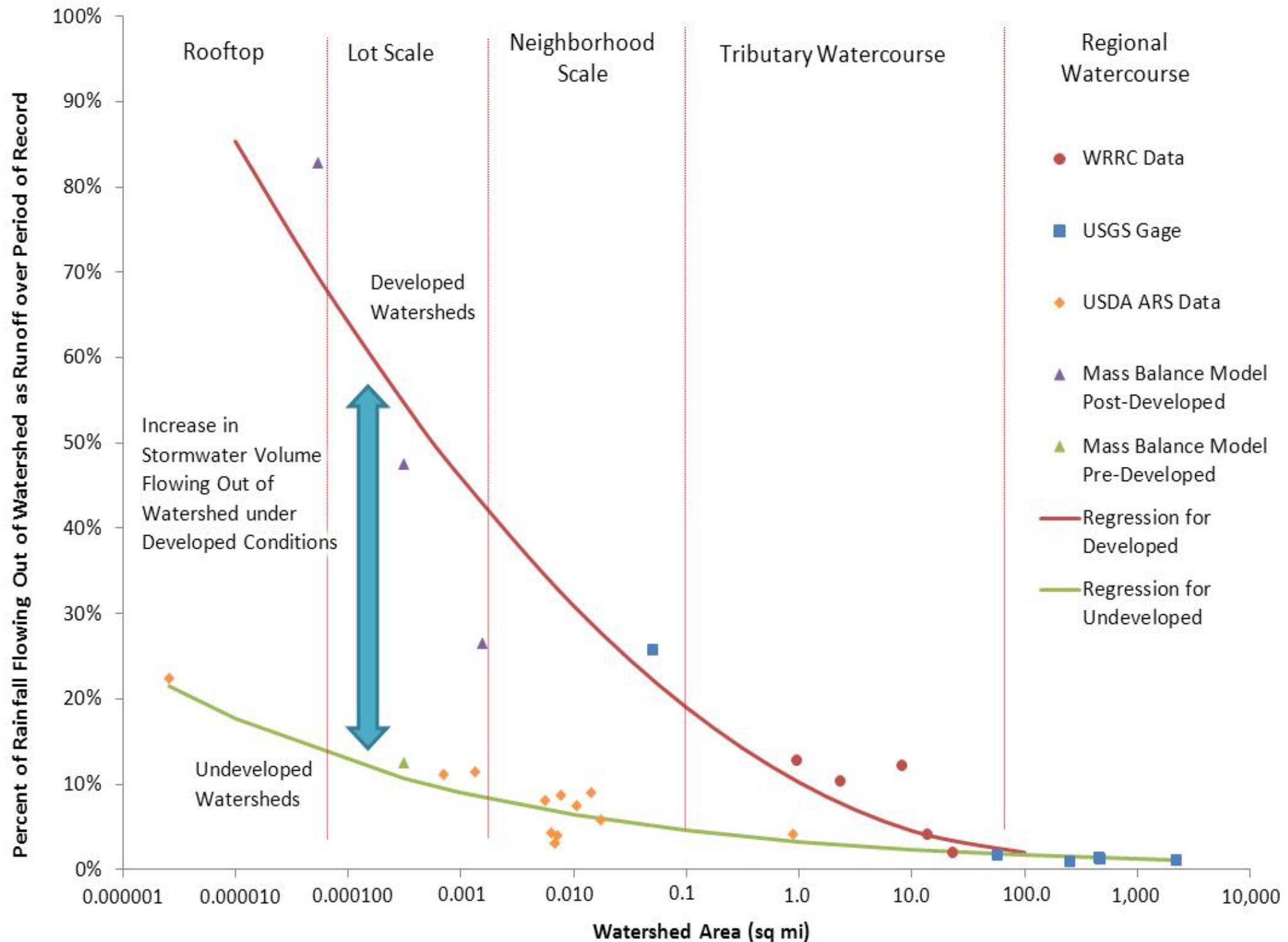


Date:

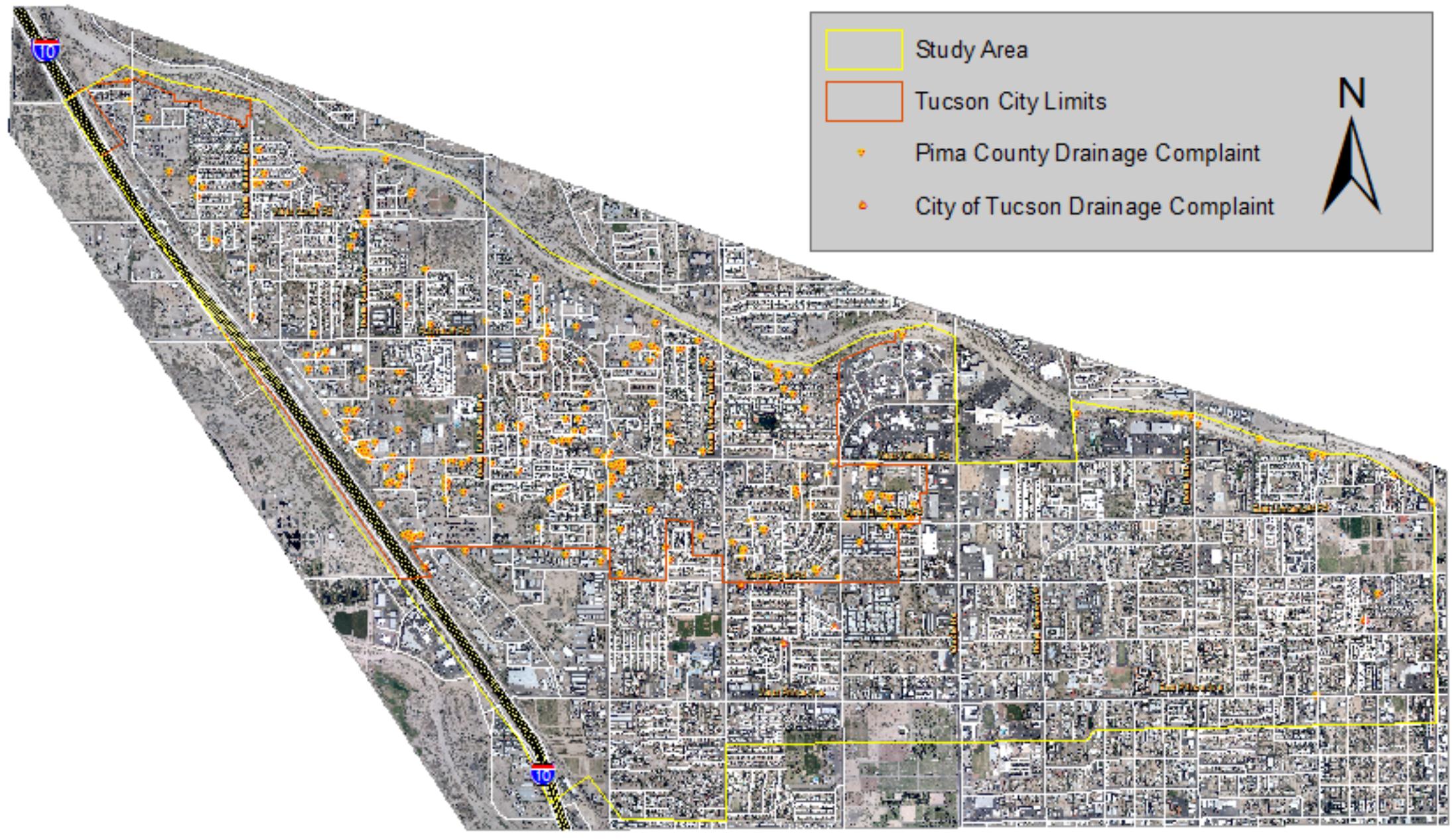
The information depicted on this display is the result of digital analyses performed on a variety of databases provided and maintained by several governmental agencies. The accuracy of the information presented is limited to the collective accuracy of these databases on the date of the analysis. The Pima County Regional Flood Control District makes no claims regarding the accuracy of the information depicted herein.

This product is subject to the GIS Division Disclaimer and Use Restrictions.

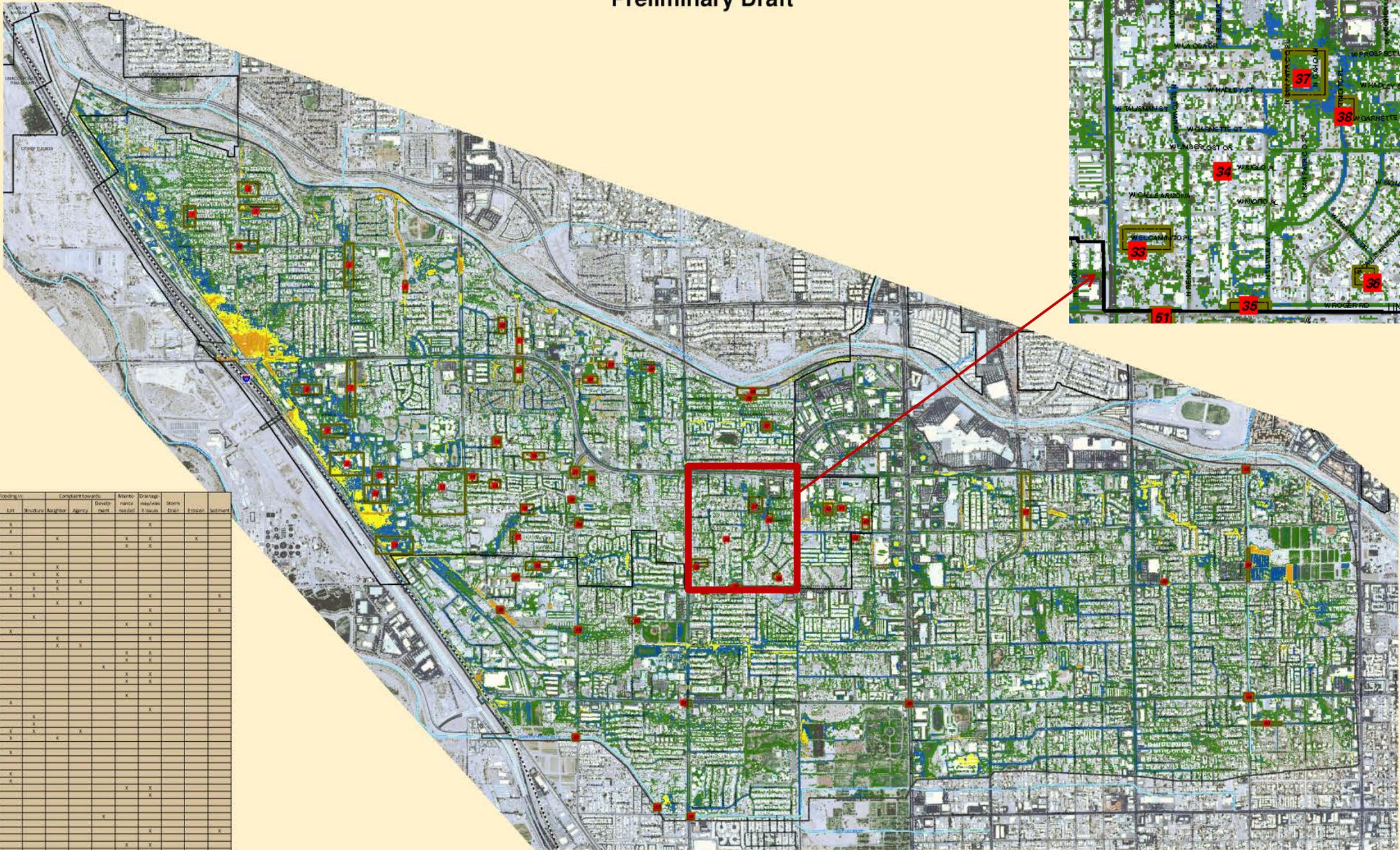
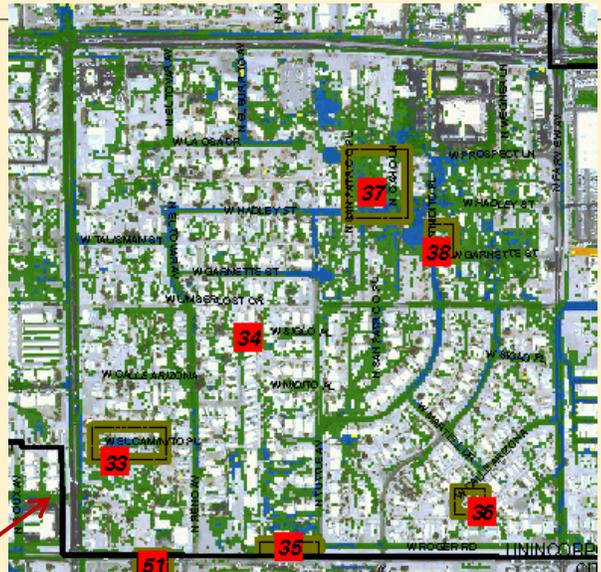
'Harvestable' Water (Rainwater/Stormwater) decreases with increased watershed size



Drainage Complaints in Ruthrauff Basin Management Plan



Preliminary Draft



ID	Flooded in			Complaint towards			Marked	Drainage	Storm	Erosion	Settlement
	Street	Lot	Structure	Neighbor	Agency	Examiner					
1	X										
2	X	X					X	X			X
3	X	X					X	X			
4				X			X	X			X
5							X	X			
6	X	X									
7	X			X							
8			X	X							
9	X	X	X	X							
10	X		X	X							
11	X	X	X	X							X
12	X	X									
13			X	X							
14			X				X	X			X
15			X				X	X			
16			X	X			X	X			
17	X						X	X			
18			X	X			X	X			
19			X				X	X			
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27	X						X	X			
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29			X				X	X			
30			X				X	X			
31	X		X	X	X		X	X			
32	X		X	X	X		X	X			
33	X		X	X	X		X	X			
34	X	X					X	X			
35	X						X	X			
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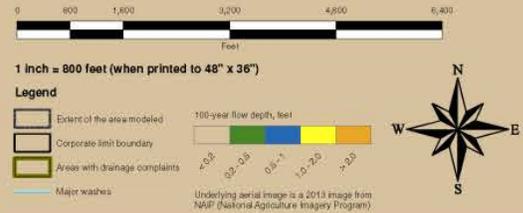


Ruthrauff Basin Management Plan Preliminary Draft 100-year Flood Depth Map

This map shows the flood flow depths that are predicted to occur during the 100-year storm with a 3-hour rainfall duration. Modeling was performed with the HEC-RAS program. This program simulates rainfall runoff during a storm event and the resulting flow direction, depths, and velocities. HEC-RAS models flow within a grid of discretized cells; in this case the grid size is 15 feet (square).
The elevations used in the model were derived from the 2002 DTM (Pima Association of Governments) DEM (Digital Elevation Model). Adjustments have been made to elevations where significant changes have occurred since 2002.

Modeling is not complete at this time and this map is provided to demonstrate progress. Future improvements to the model will include addition of storm drains and culverts not yet modeled. Storm drain and culvert modeling is made complex in the east half of the study area. Modeling of these structures has not occurred along the west side and may significantly alter the results along the railroad embankment and other areas.
The use of this map is strictly for informational purposes only.

Exhibit prepared by:
JE Fuller Hydrology & Geomorphology
40 E. Helen Street
Tucson, AZ 85705
IPS | 12/04/2014



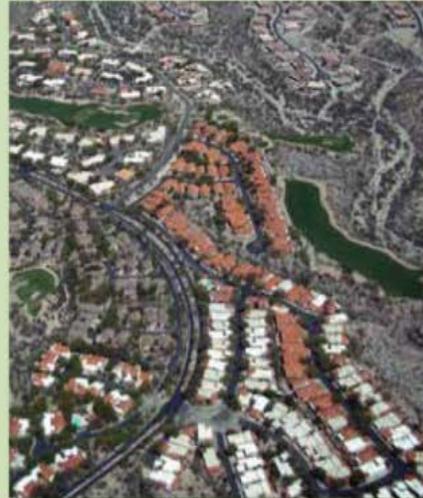
Underlying aerial image is a 2013 image from NAIP (National Agriculture Imagery Program)

City / County

Water & Wastewater Infrastructure, Supply and Planning Study

2011-2015

Action Plan for Water Sustainability



A City of Tucson and Pima County
Cooperative Project

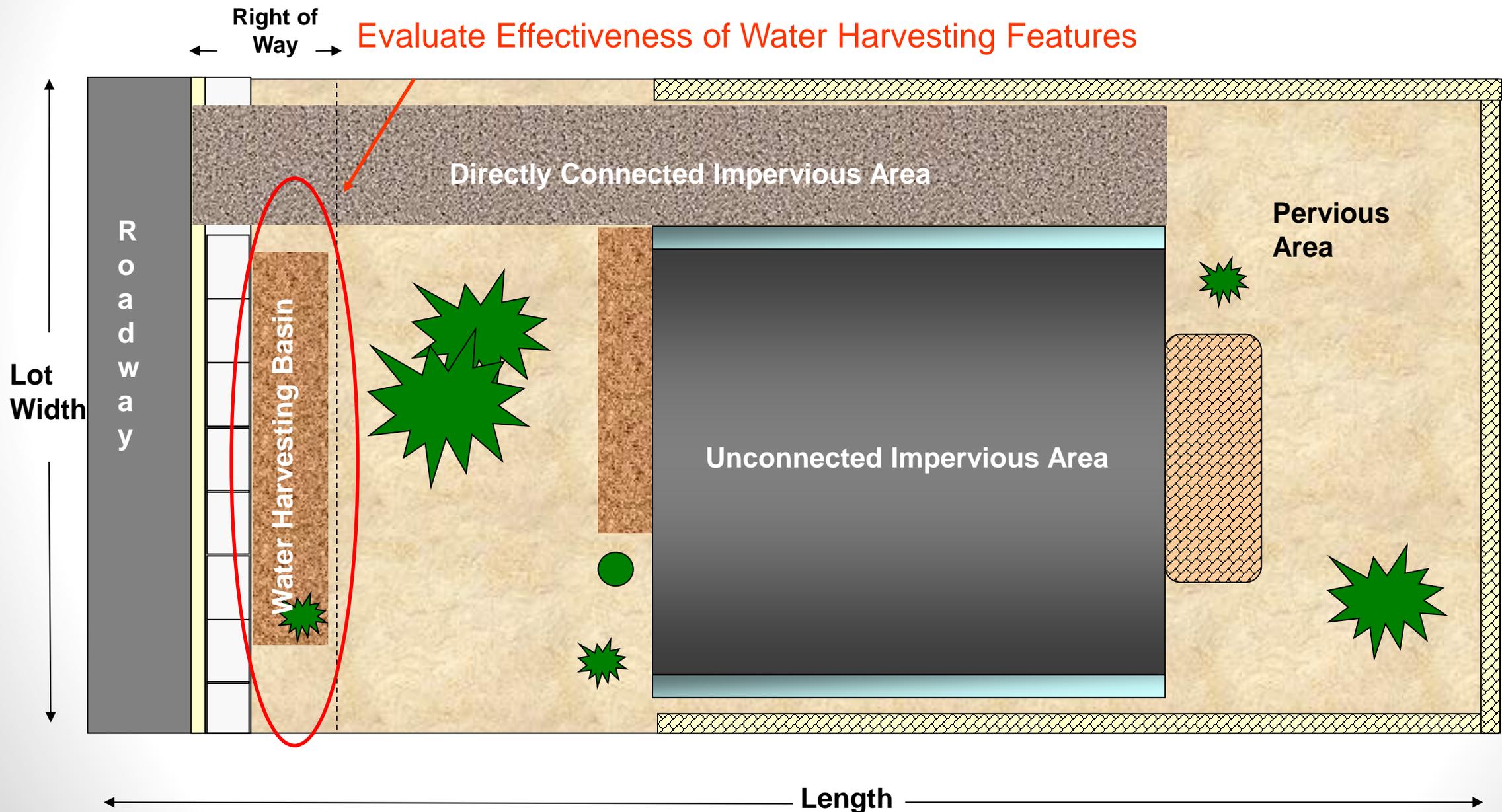
Applicable Goal

Demand Management Goal #5: *Increase the use of rainwater and stormwater to reduce demands on potable supplies.*

Action Plan

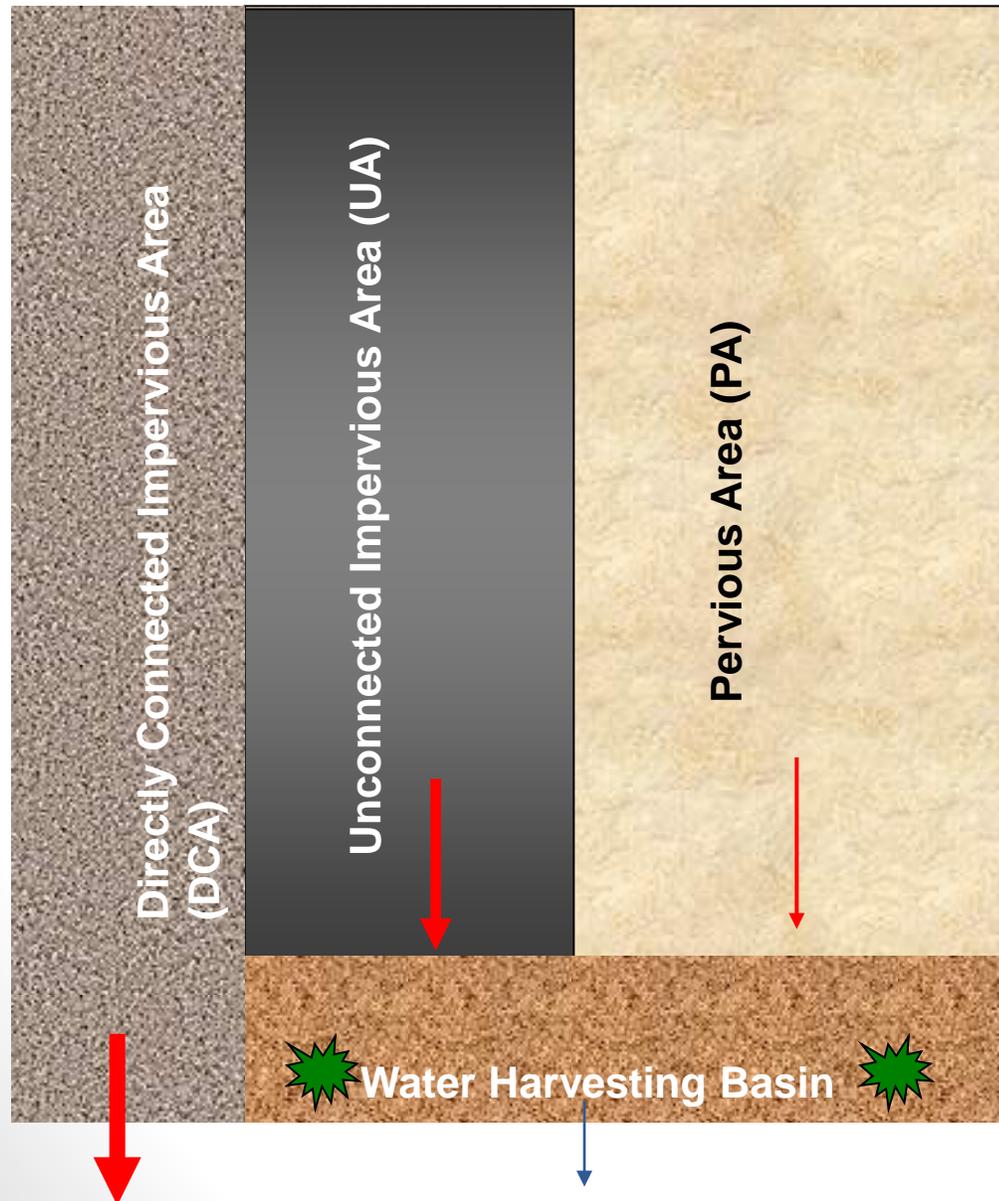
Demand Management Action Plan #7: *Develop Design guidelines for neighborhood stormwater harvesting to encourage the creation of habitat and water efficient landscapes.*

Lot Scale Evaluation (1/5 acre lot example)



Conceptual Model

Conceptual Representation



Mathematical Representation

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)}$$

Q is the total depth of runoff (inches);
 P is the daily rainfall depth of precipitation (inches);
 S is the potential abstraction (inches)

$$S = \frac{1000}{CN} - 10$$

CN is the Curve Number.

Rainwater off lot from Directly Connected:

$$Vol_{(DCA)i} = Q_i(f(CN_{DCA}, P_i)] \times Area_{DCA}$$

Rainwater in to Water Harvesting Basin:

$$Vol_{(UA)i} = Q_i(f(CN_{UA}, P_i)] \times Area_{UA}$$

$$Vol_{(PA)i} = Q_i(f(CN_{PA}, P_i)] \times Area_{PA}$$

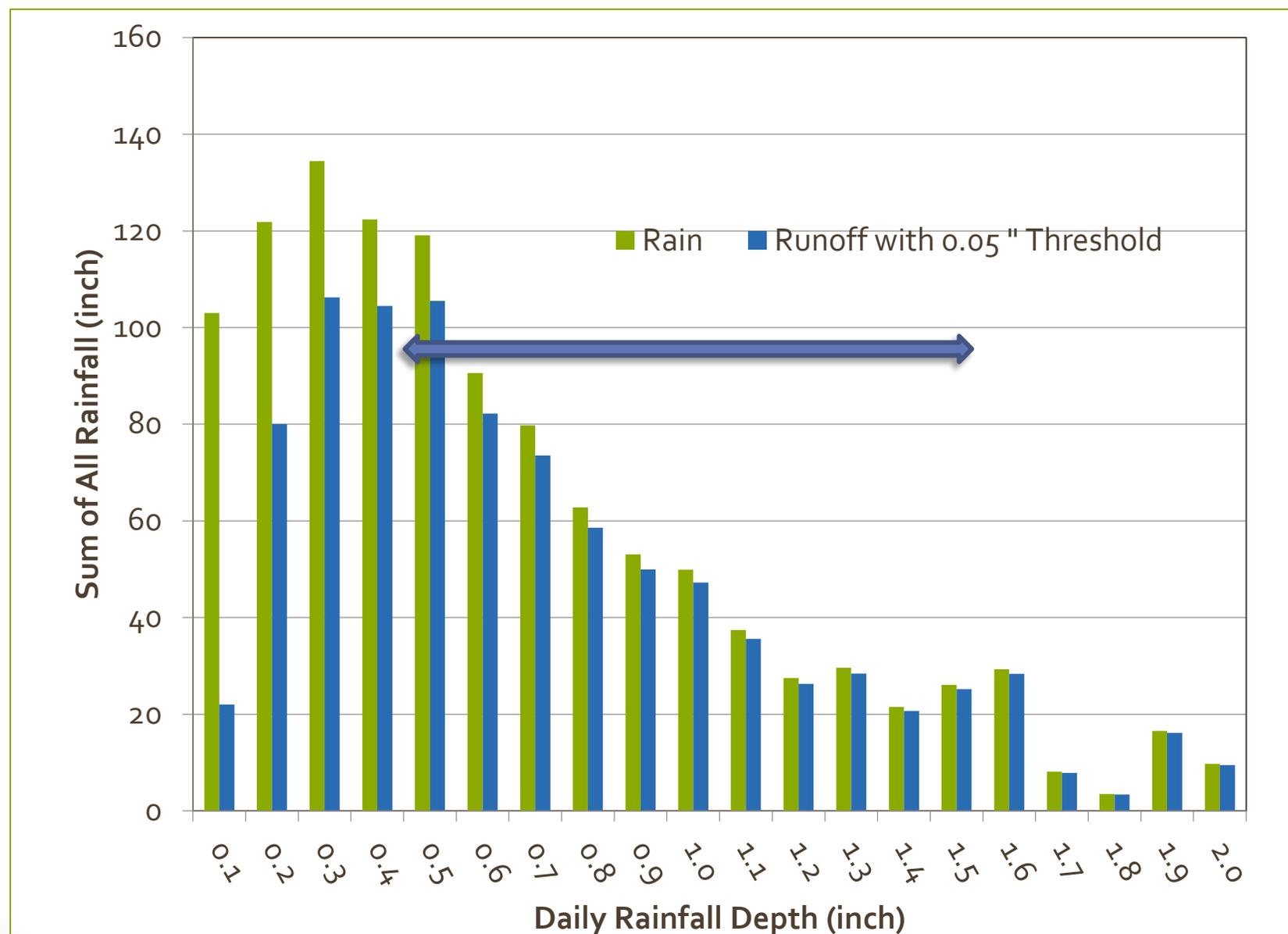
Storage Accounting in Basin:

$$Storage(i) = Storage(i - 1) + \Delta Storage$$

$$\Delta Storage = Rainwater_i - ET_i \quad (ET_{o_{AZmet}} * Kc)$$

Selection of Rainfall Event for Sizing GI/LID Practices

Based on Daily Rainfall Collected at University of Arizona Between 1895 and 2000



Airport Wash South Basin Management Plan

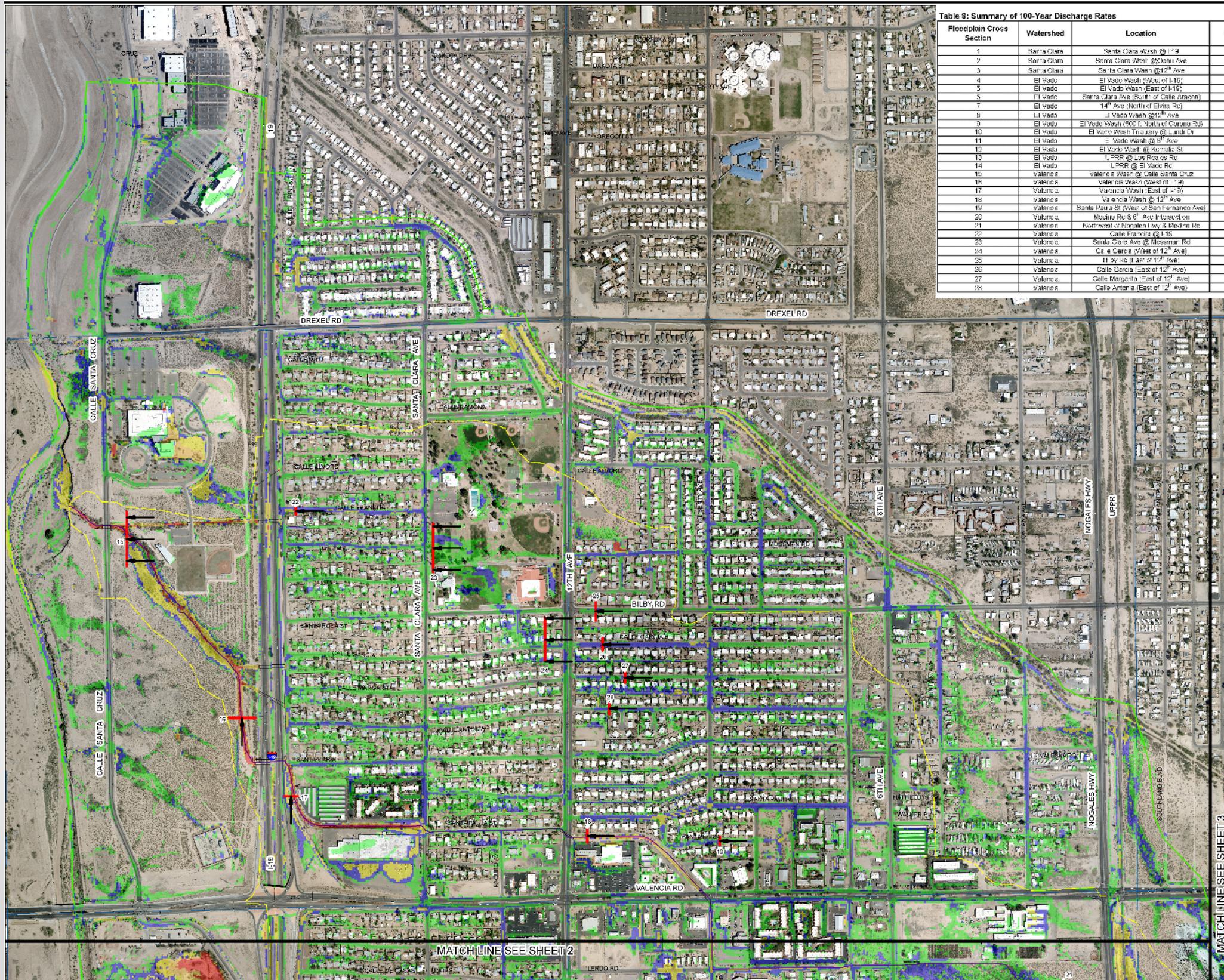


Table 8: Summary of 100-Year Discharge Rates

Floodplain Cross Section	Watershed	Location	Q100 (cfs)
1	Santa Clara	Santa Clara Wash @ 1st	272
2	Santa Clara	Santa Clara West @ 2nd Ave	194
3	Santa Clara	Santa Clara Wash @ 12th Ave	40
4	El Vado	El Vado Wash (W. of 1st)	250
5	El Vado	El Vado Wash (East of 1st)	352
6	El Vado	Santa Clara Ave (South of Calle Arroyo)	30
7	El Vado	14th Ave (North of El Vado Rd)	102
8	El Vado	El Vado Wash @ 2nd Ave	333
9	El Vado	El Vado Wash (W. of 1st) @ 1st	231
10	El Vado	El Vado Wash (W. of 1st) @ 2nd	51
11	El Vado	El Vado Wash @ 3rd Ave	228
12	El Vado	El Vado Wash @ 4th Ave	180
13	El Vado	El Vado Wash @ 5th Ave	142
14	El Vado	El Vado Wash @ 6th Ave	137
15	Valencia	Valencia Wash @ Calle Santa Cruz	592
16	Valencia	Valencia Wash (West of 1st)	559
17	Valencia	Valencia Wash (East of 1st)	550
18	Valencia	Valencia Wash @ 12th Ave	174
19	Valencia	Santa Clara St (West of San Fernando Ave)	84
20	Valencia	Molina Rd @ 6th Ave Intersection	92
21	Valencia	Northwest of Nogales Hwy & Medina St	90
22	Valencia	Calle Paloma @ 1st	55
23	Valencia	Santa Clara Ave @ Moser Rd	75
24	Valencia	Calle Garcia (West of 12th Ave)	30
25	Valencia	11th Ave (East of 12th Ave)	71
26	Valencia	Calle Garcia (East of 12th Ave)	71
27	Valencia	Calle Margarita (East of 12th Ave)	20
28	Valencia	Calle Antonio (East of 12th Ave)	36

Legend

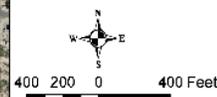
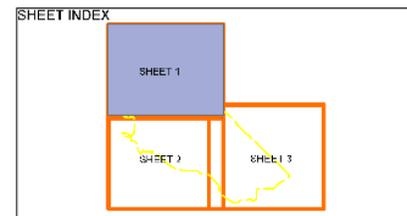
- FLO-2D 100 YEAR DISCHARGE X-SEC FLOW ARROW
- FLO-2D 100 YEAR DISCHARGE X-SEC
- FLO-2D MODELING AREA BOUNDARY
- 18V5 WATERSHED BOUNDARY
- FLO-2D FLOW DEPTH (FT)**
- Var**
- 0.000 - 0.200
- 0.201 - 0.500
- 0.501 - 1.000
- 1.001 - 2.000
- 2.001 - 3.000
- 3.001 - 10.000

NOTES:

- FLO-2D STUDY AREA IS APPROXIMATELY 5.84 SQ. MILES.
- FLO-2D STUDY AREA HAS ABOUT 723,403 GRID CELLS WITH 1' 5" FT GRID SIZE.
- HIGHER FLOW DEPTHS FROM EITHER 1 HOUR OR 3 HOUR STORM FLO-2D MODEL'S WERE SHOWN ON THIS MAP.

MAPPING REFERENCE DATA:

- VERTICAL DATUM - NAVD83
- HORIZONTAL PROJECT ON ARIZONA STATE PLANE CENTRAL NAVD HARN
- AERIAL PHOTO PROVIDED BY PIMA COUNTY, DATED 2008.
- LIDAR DATA PROVIDED BY PIMA COUNTY, DATED 2008.



PRELIMINARY

PROJECT NO.	13-013
CLIENT	JRWV
DESIGNER	JRWV
CHECKER	HRM
DATE	05/21/2014
REV DATE	
REV DATE	

CMG DRAINAGE ENGINEERING, INC.
 3555 W. MOUNTAIN AVENUE, TUCSON, ARIZONA 85710
 PHONE: (520) 883-4221 FAX: (520) 883-4127

FIGURE NO. 6
 100-YEAR MAXIMUM FLOW DEPTH AND DISCHARGE RATE MAP FOR VALENCIA, EL VADO, AND SANTA CLARA WATERSHEDS AIRPORT WASH (SOUTH) BASIN MANAGEMENT STUDY

SHEET 1 OF 3

MATCH LINE SEE SHEET 2

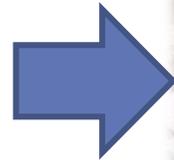
MATCH LINE SEE SHEET 3

10% & 25% Scenario: Green Stormwater Infrastructure Retrofits

1. Residential Parcels: ~1/3 of available landscape for selected parcels delineated as rain gardens. Included streetside basins if appropriate for the space.



Model representation

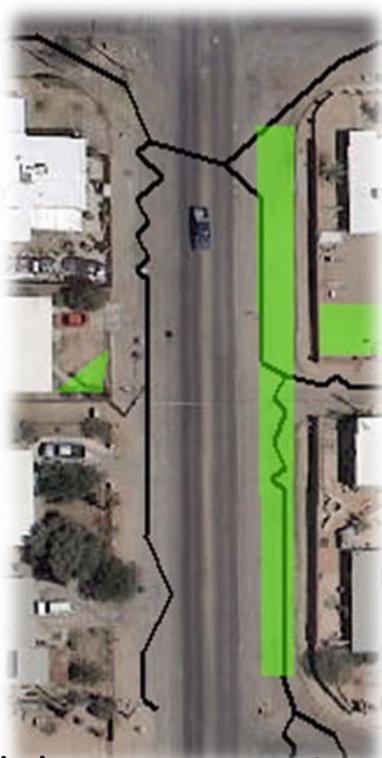


On-the-ground potential practice



10% & 25% Scenario: Green Stormwater Infrastructure Retrofits

2. Street Segments: Apply the COT Green Streets Policy to major arterials and reconstructed streets



Model representation

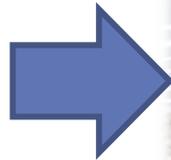
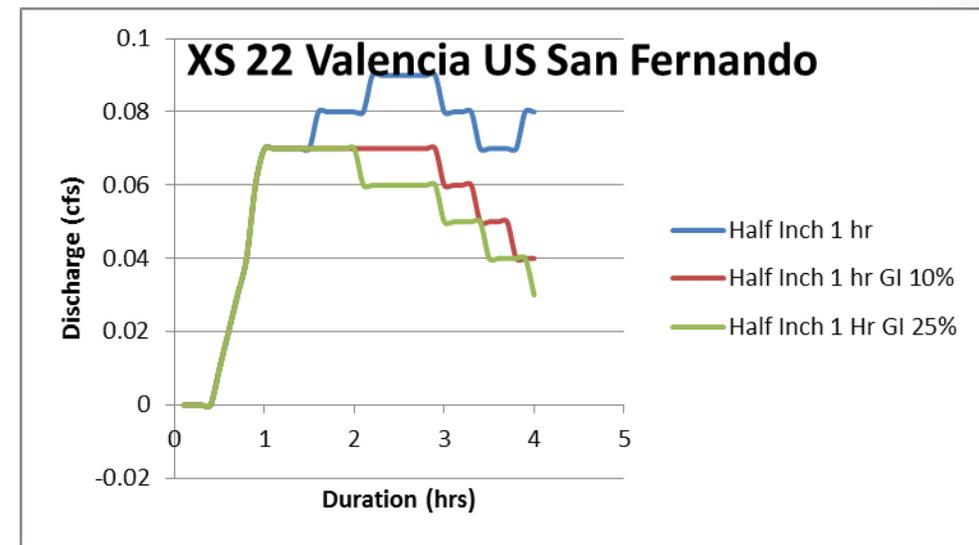
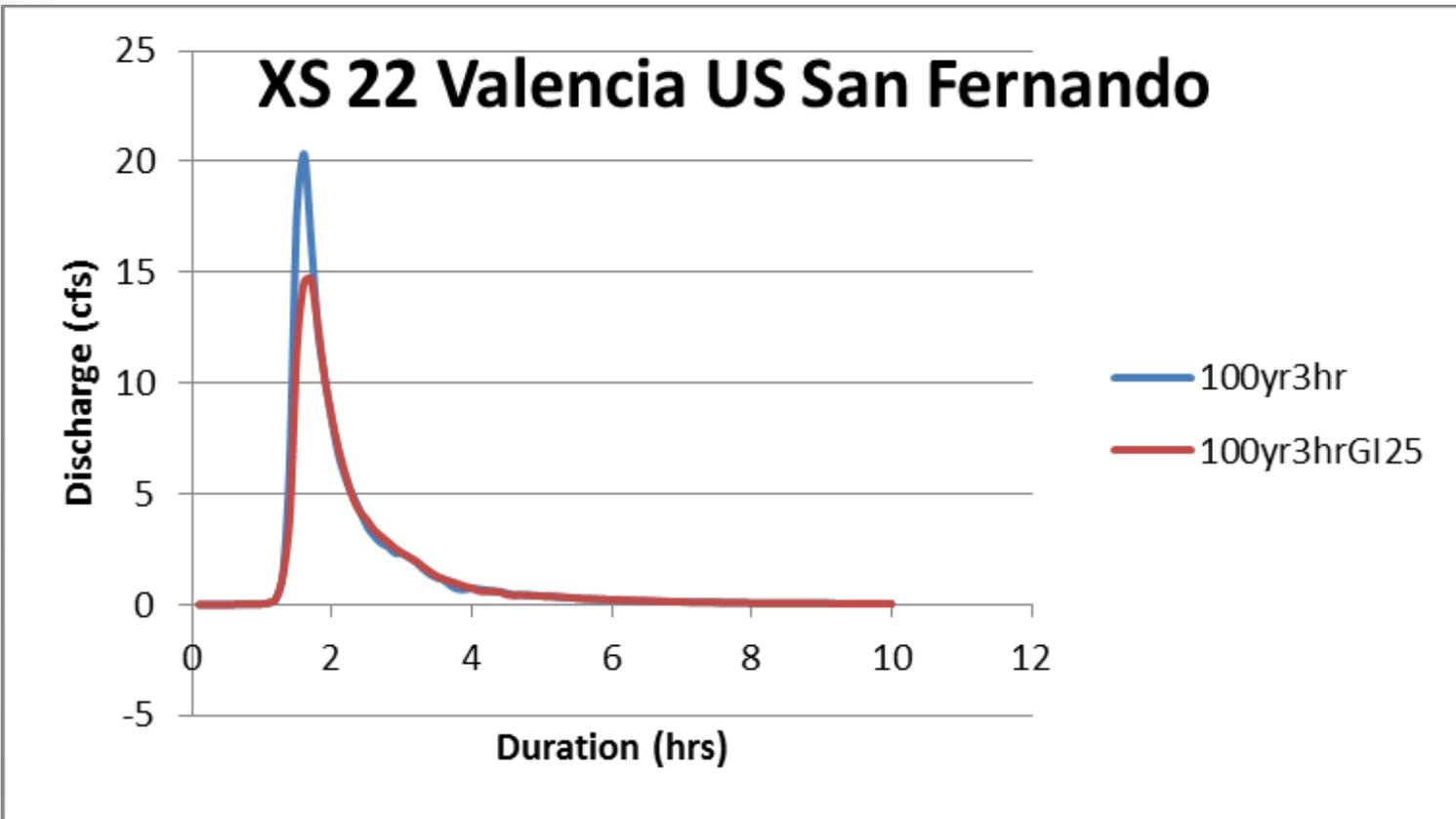
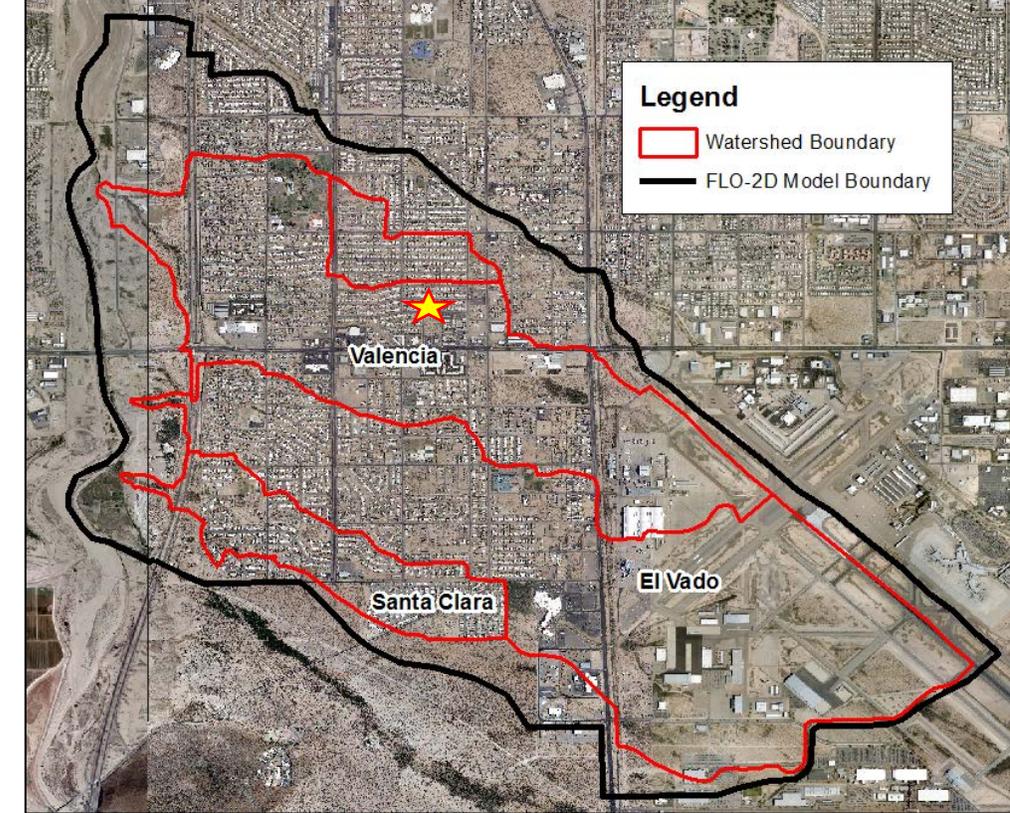


Photo: Wheat Design Group
On-the-ground potential practice

Valencia Residential

Drainage Area:
7 Acres



Thank You!



Evan.canfield@pima.gov

Green Infrastructure Prioritization Web-Map

In other words...

Planning where to grow trees with stormwater



Use PAG's interactive, on-line map to identify opportunities for beneficial use of stormwater to enhance resiliency of urban forests, calm traffic, and improve heat conditions in your neighborhood.

Who can use it?

The tool, useful to both municipal planners and community groups, was created to aid allocation of resources to areas with greatest need and opportunities.

How do I use it?

You can display map layers to analyze the relationships between environmental and social demographics.



What does it feature?

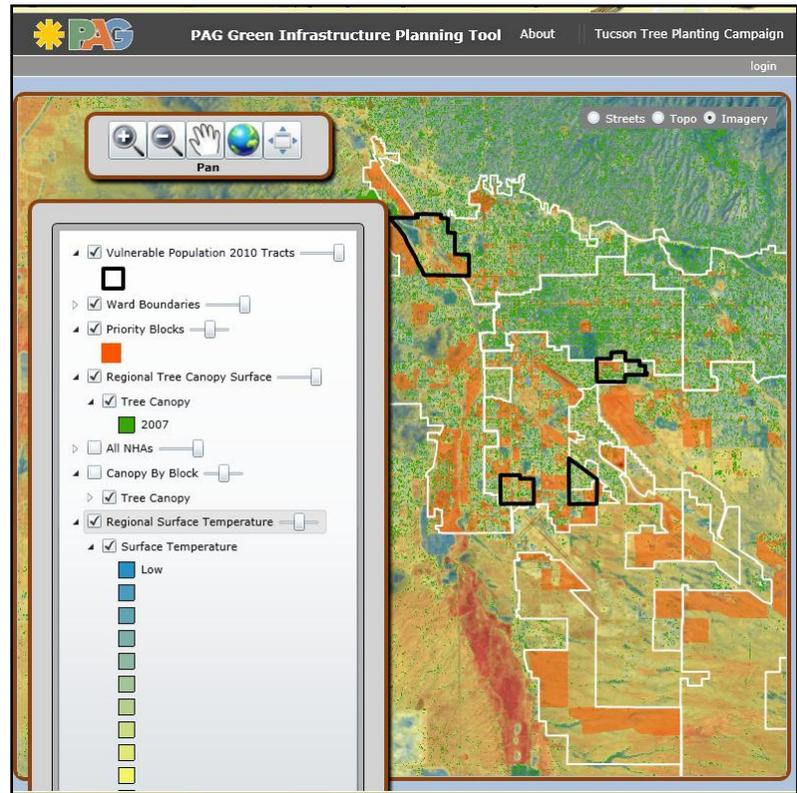
Tree canopy cover, impervious surfaces, and stormwater flow path layers were created through analysis of PAG LiDAR datasets. Additional layers include areas of pedestrian use, bus stops, surface temperature, vulnerable populations, watersheds, neighborhood washes, etc.

Why was it created?

This tool addresses regional goals to improve equitable access to green infrastructure benefits, such as reduced human heat mortality, without increasing irrigation that uses potable water sources, by putting stormwater runoff to beneficial use - all key issues in any desert community.

How were the Priority Areas Selected?

For the 10,000 Trees campaign, the City of Tucson selected blocks that were above average surface temperature and below average tree canopy cover. You are invited to create your own analysis and priorities such as GI to improve shallow groundwater, food deserts, and flooding issues or prioritize projects where stormwater can be used if reclaimed lines aren't available.

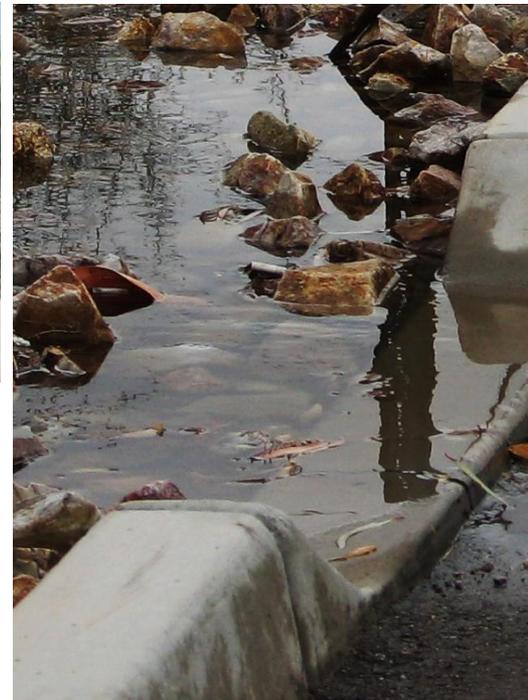


Where can I find it?

<http://GISmaps.PAGregion.com/PAG-giMap>

Ask us about how we can address your planning needs: PAG-GiMap@PAGregion.com

Green Infrastructure Prioritization Tool- A Vulnerabilities and Opportunities Map



Mead Mier
Watershed Planning Lead



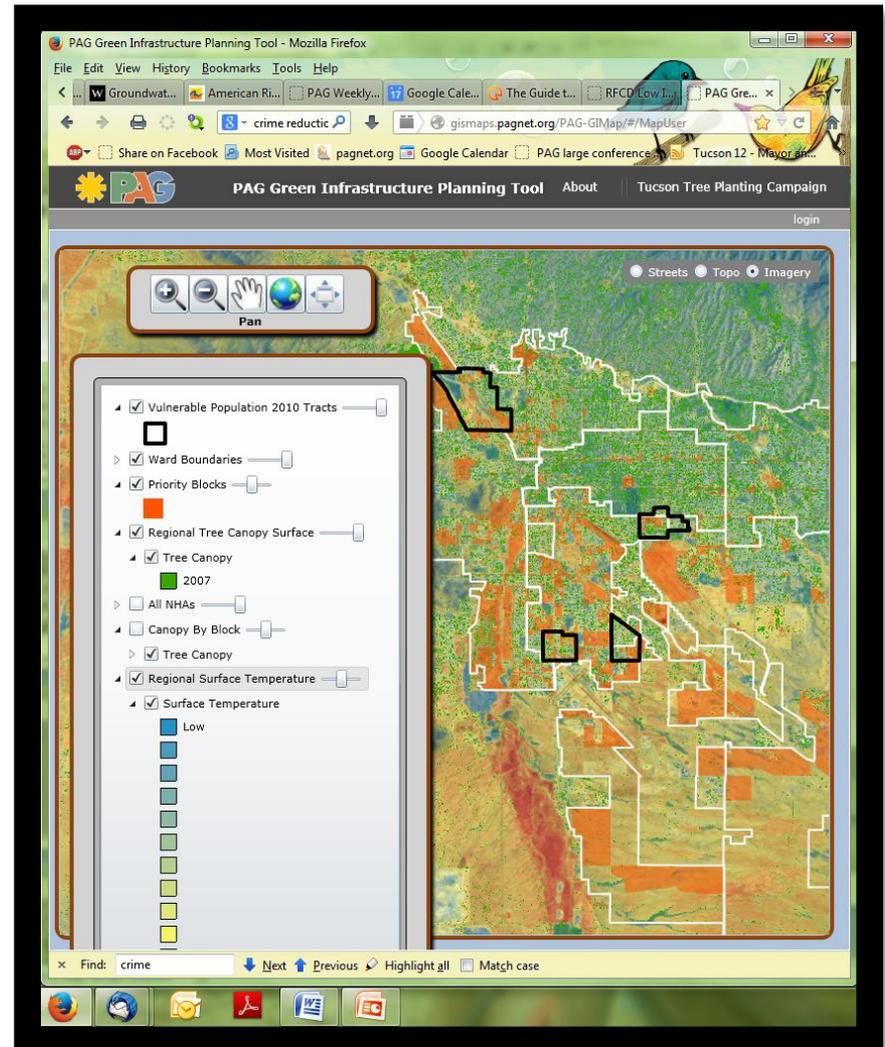
Tool Features

PAG GI Prioritization Tool- an interactive web map

Map Layers

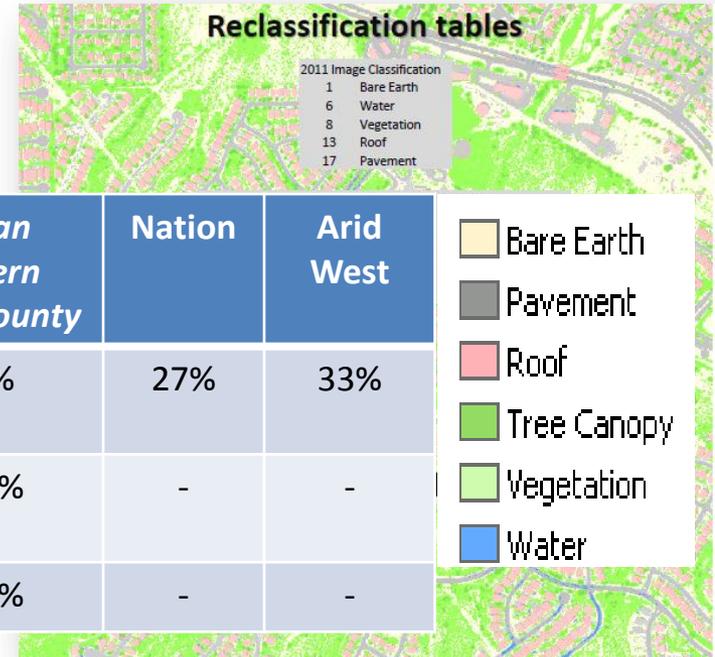
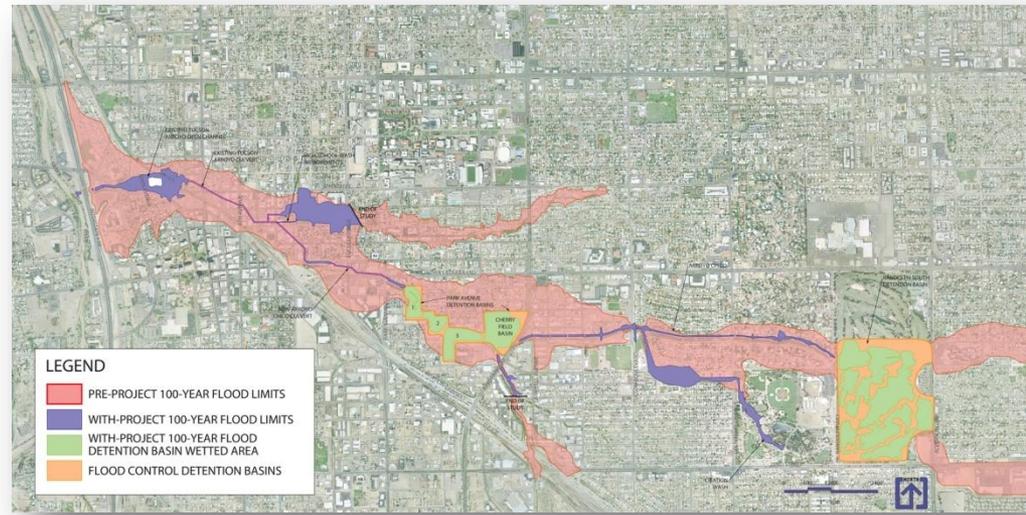
- Vulnerabilities
 - Relative Surface Temp. Exposure
 - Heat Sensitive Demographics
 - Riparian Areas
- Access
 - Tree Canopy
 - Transportation Mobility
- Opportunity
 - Flow Paths
- Other
 - Ward Boundaries

to aid distribution of limited resources



Coming Soon

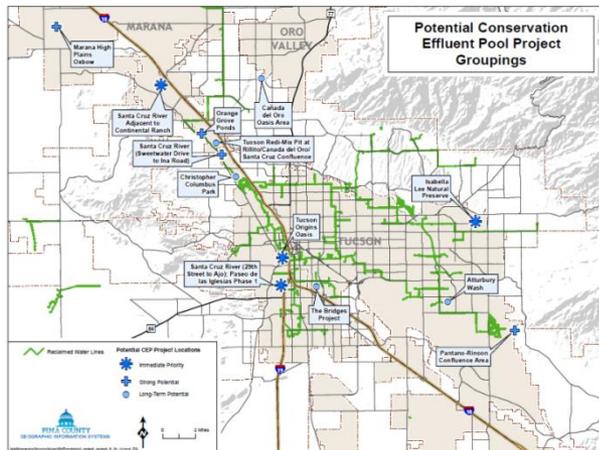
- Concerns
 - Flooding
- Opportunity
 - Pervious
 - Reclaimed Proximity



	<i>Urban Eastern Pima County</i>	Nation	Arid West
Impervious	30%	27%	33%
Rooftops	~10%	-	-
Pavement	~20%	-	-

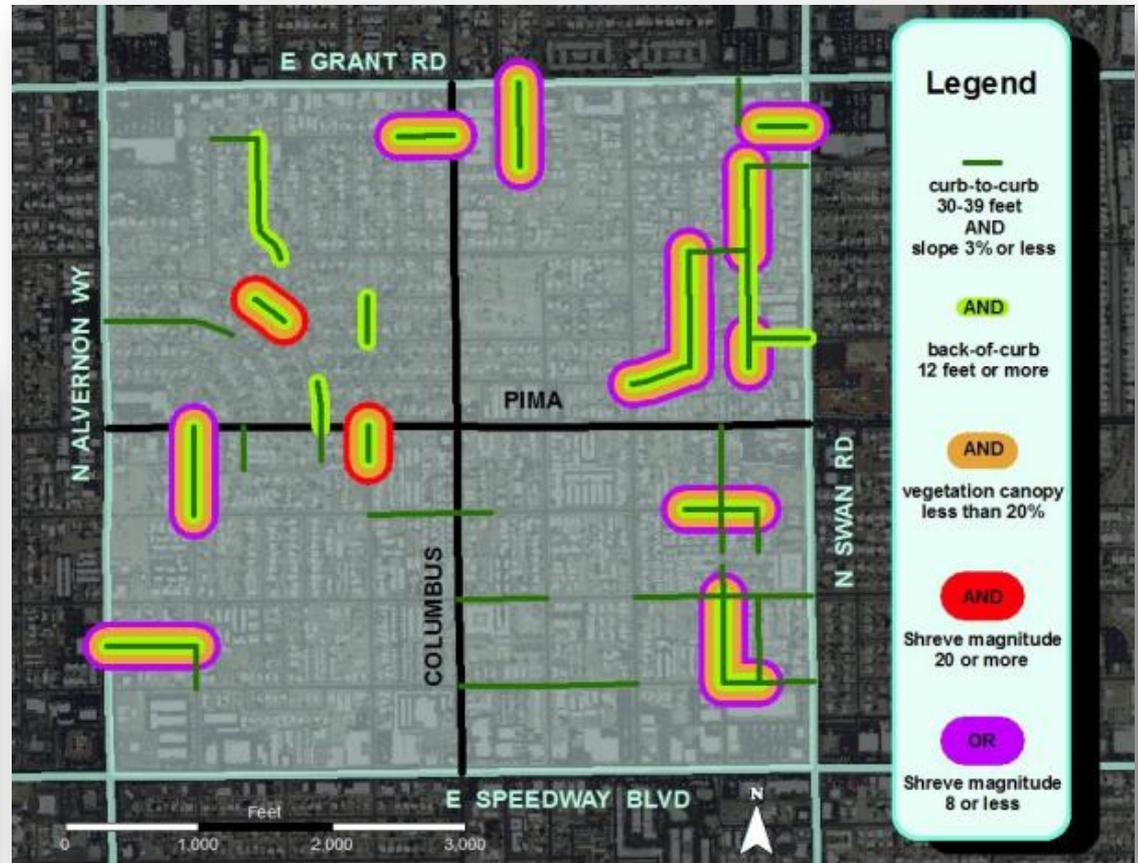
- Bare Earth
- Pavement
- Roof
- Tree Canopy
- Vegetation
- Water

Regional Strategic Planning

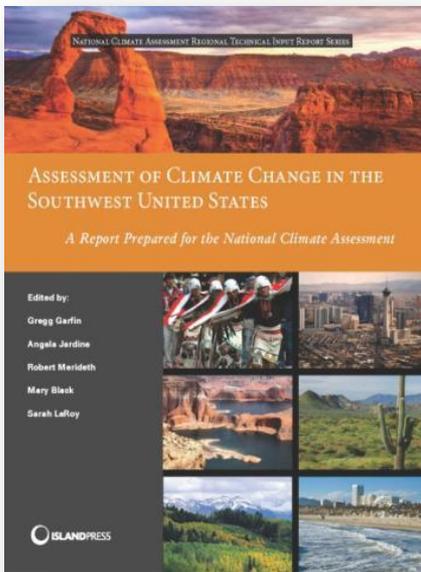


Available

- Tree Counts, Understory
- Requests for Analysis



Concern: Climate Change & UHI

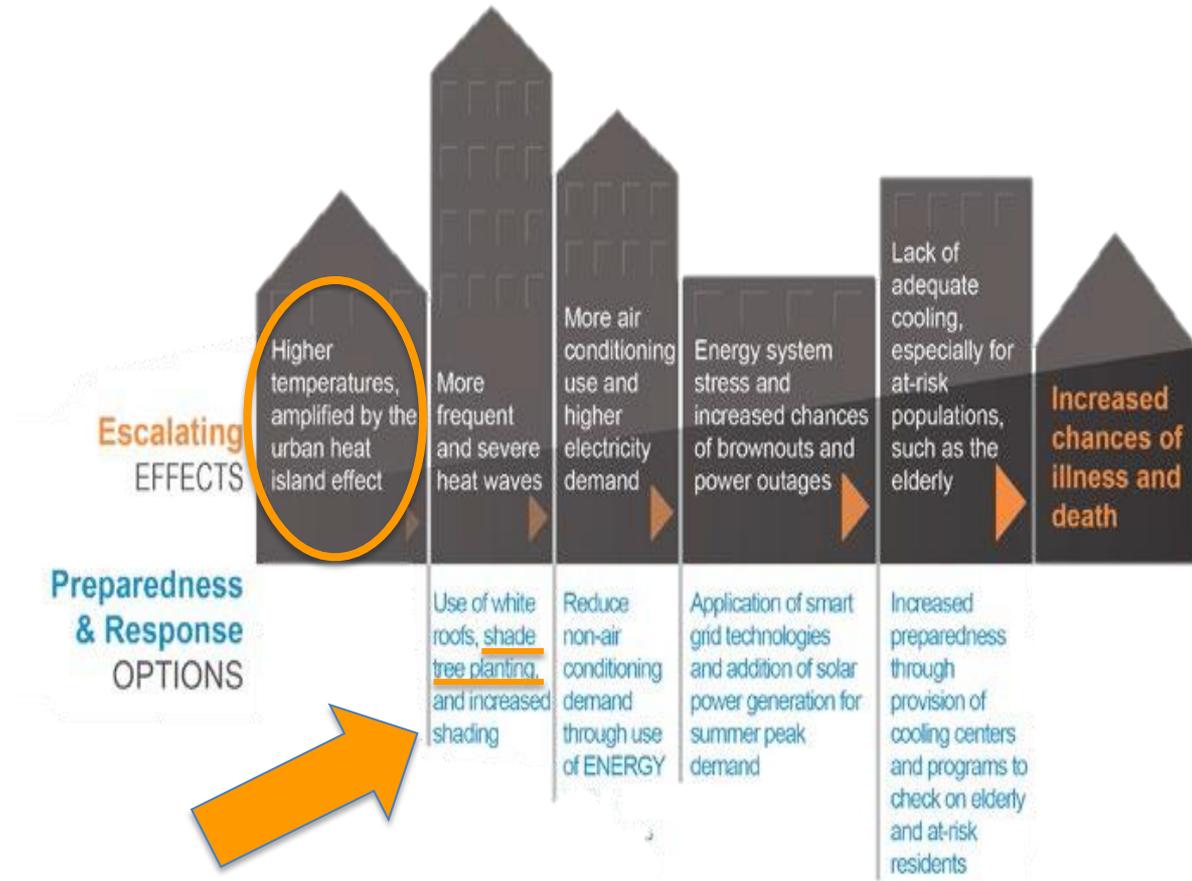


2013 Institute of Environment

Chapter 15. Human Health

Coordinating Lead Authors: Heidi Brown (Univ. of AZ); Andrew C. Comrie (Univ. of AZ); Deborah M Dreschler (CA Air Resources Board)

“**Heat stress**, a recurrent health **problem for urban residents**, has been the leading weather-related cause of death in the United States since 1986. . . – and the **highest rates of RESIDENTS nationally are found in Arizona.**”



Garfin, G., G.Franco, H. Blanco, A.Comrie, P.Gonzalez, T.Piechota, R.Smyth, and R.Waskom, 2014: Ch. 20: Southwest. *Climate Change Impacts in the United States: The Third National Climate Assessment*, J.M.Melillo, Terese (T.C.) Richmond, and G.W.Yohe, Eds, U.S. Global Change Research Programs .

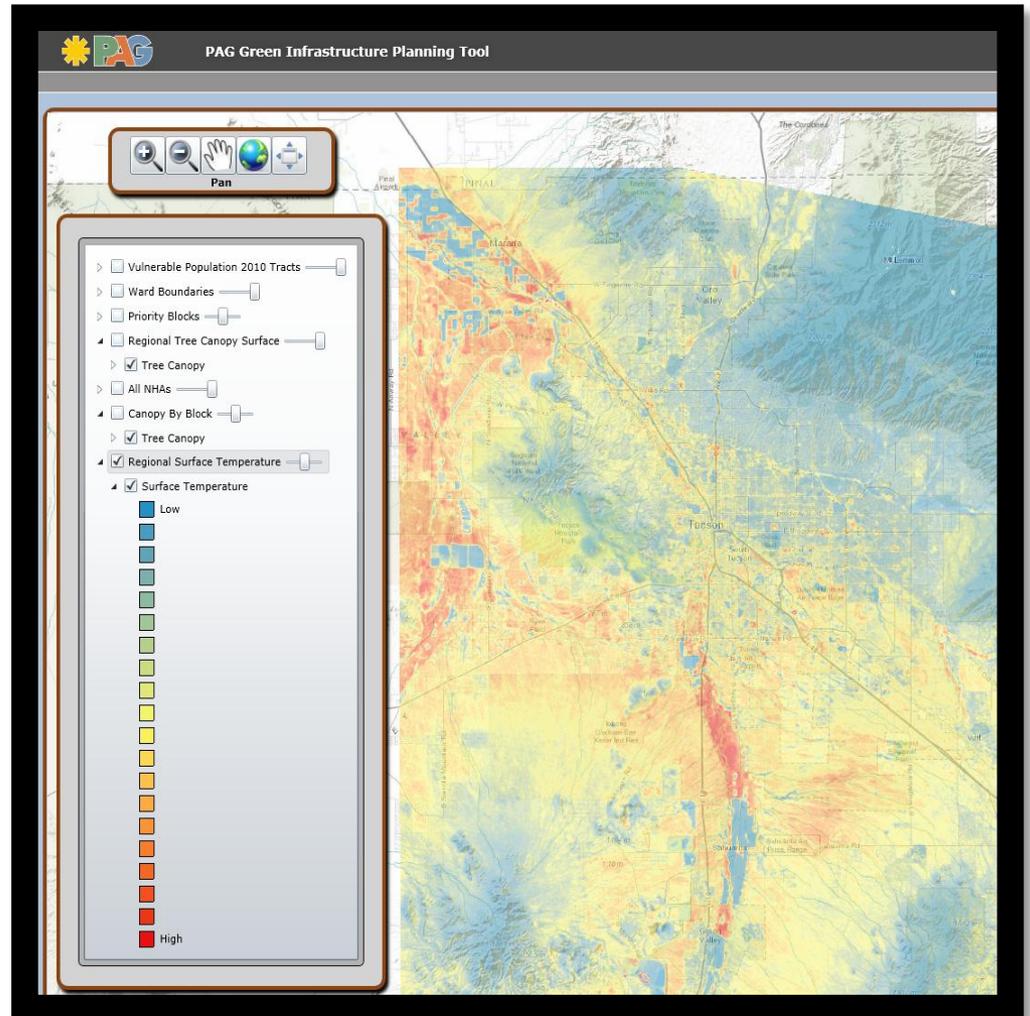
Heat Map

- Surface temperature (2008 data)
 - Landsat data
 - May @ 10 a.m.

Data Source:

Eve Halper: UA Geography Dept. dissertation-Veg., Water Use, Surface Temp.

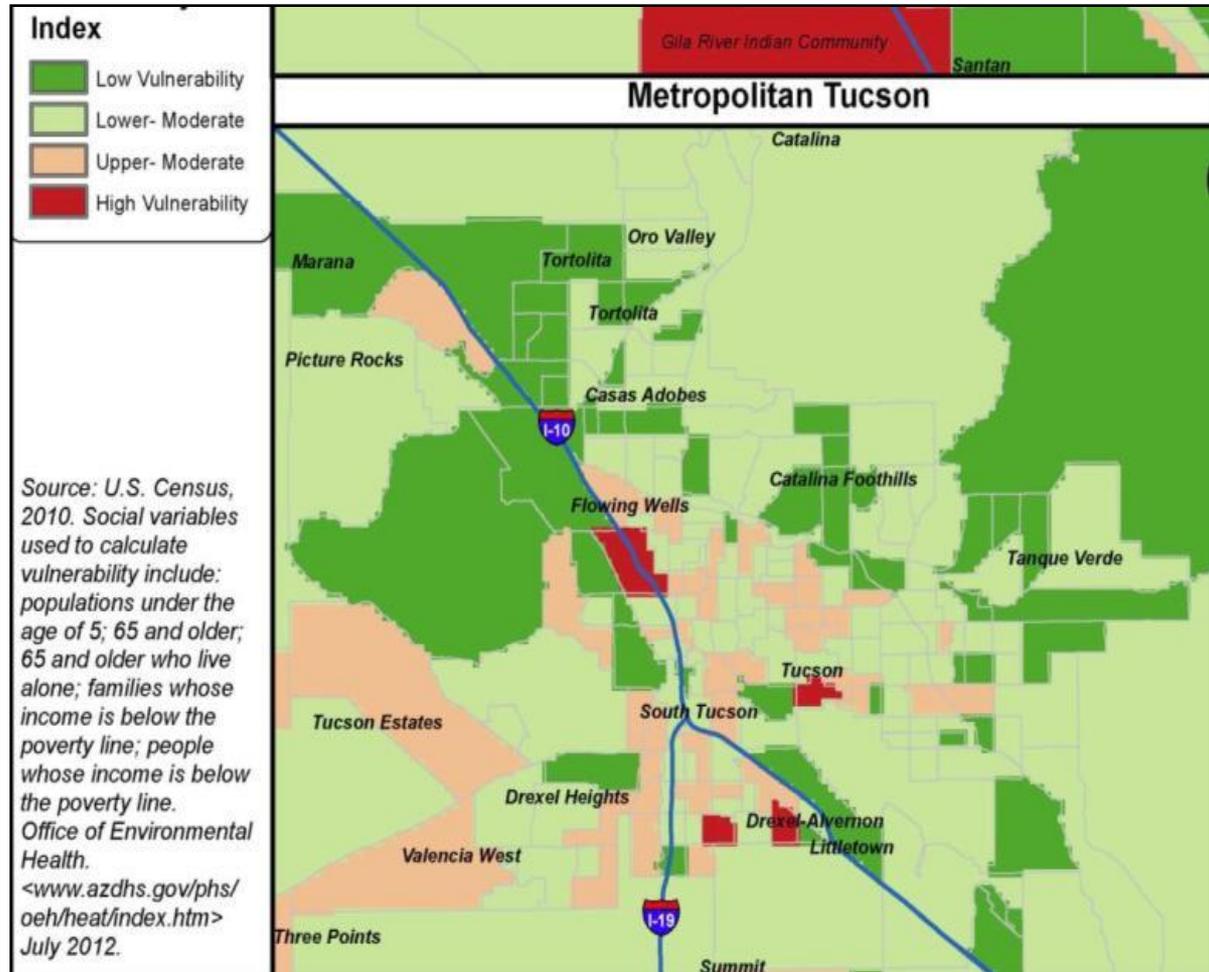
- Water Smart project



Vulnerability Demographics

Az Dept of Health Services: Heat Vulnerability Index

- EPA Env. Justice workshops, Sharon Harlan, Catherine Hahne, Climate Smart



Demographics – equity

Concern: poverty

• **Demographics at risk to heat impacts** (physical, social, and economic factors)

- Older persons (age > 65)
- Infants (age < 1)
- The homeless
- The **poor**
- People who are socially isolated
- People with **mobility** restrictions or mental impairments
- People taking certain medications
- People engaged in vigorous outdoor exercise or work
- Those under the influence of drugs or alcohol

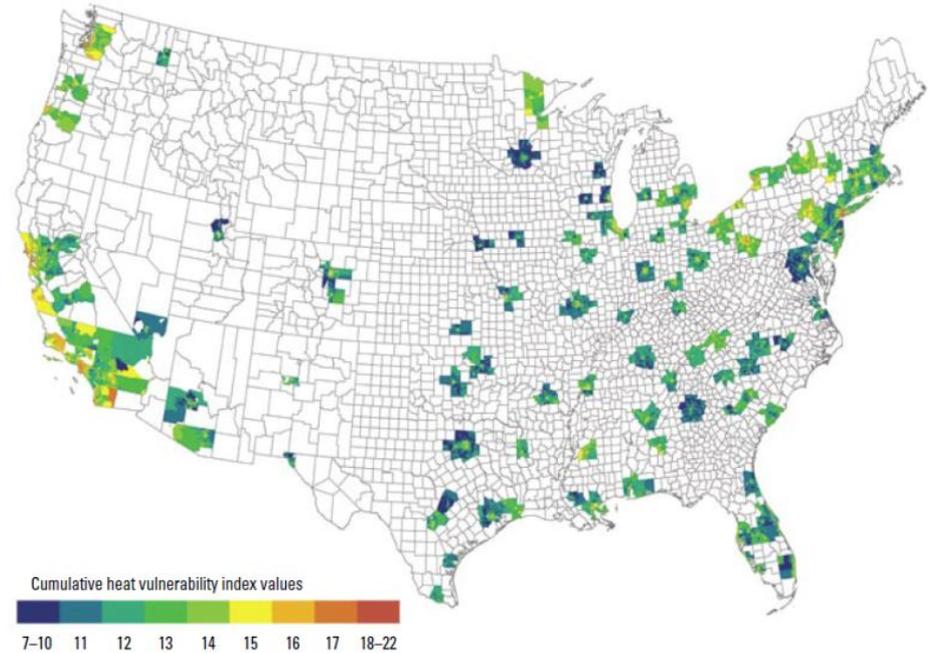
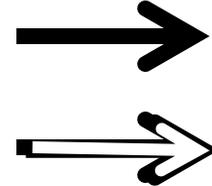
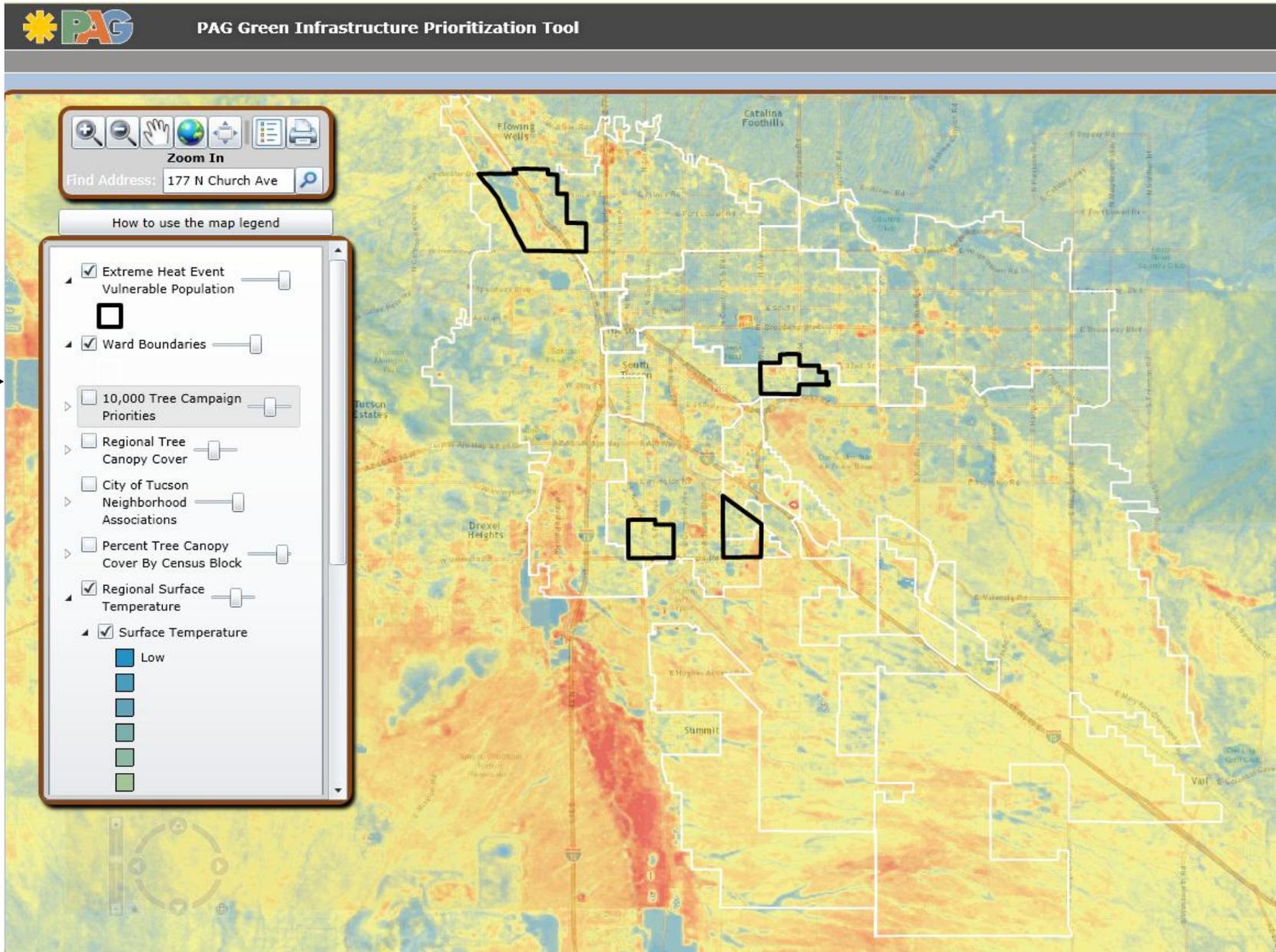


Figure 1. National map of cumulative heat vulnerability index by census tract ($n = 39,794$).

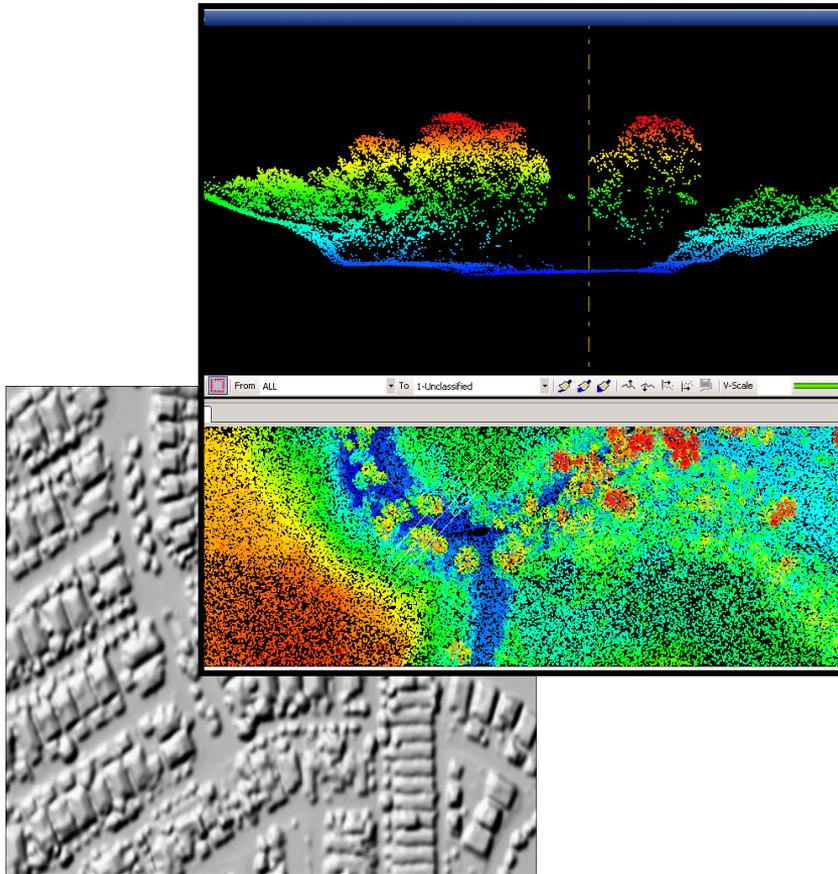
-U.S. Census Bureau American Community Survey (ACS)

-Mapping Community Determinants of Heat Vulnerability, Reid et al

Vulnerable Demographics



LiDAR processed to create the Tree Canopy Map



- **Unique regional asset**
- **Much of Eastern Pima County**
- 2008 data coverage
- Primarily used for Digital Elevation Model (and flood control), has many potential uses

Data Source:

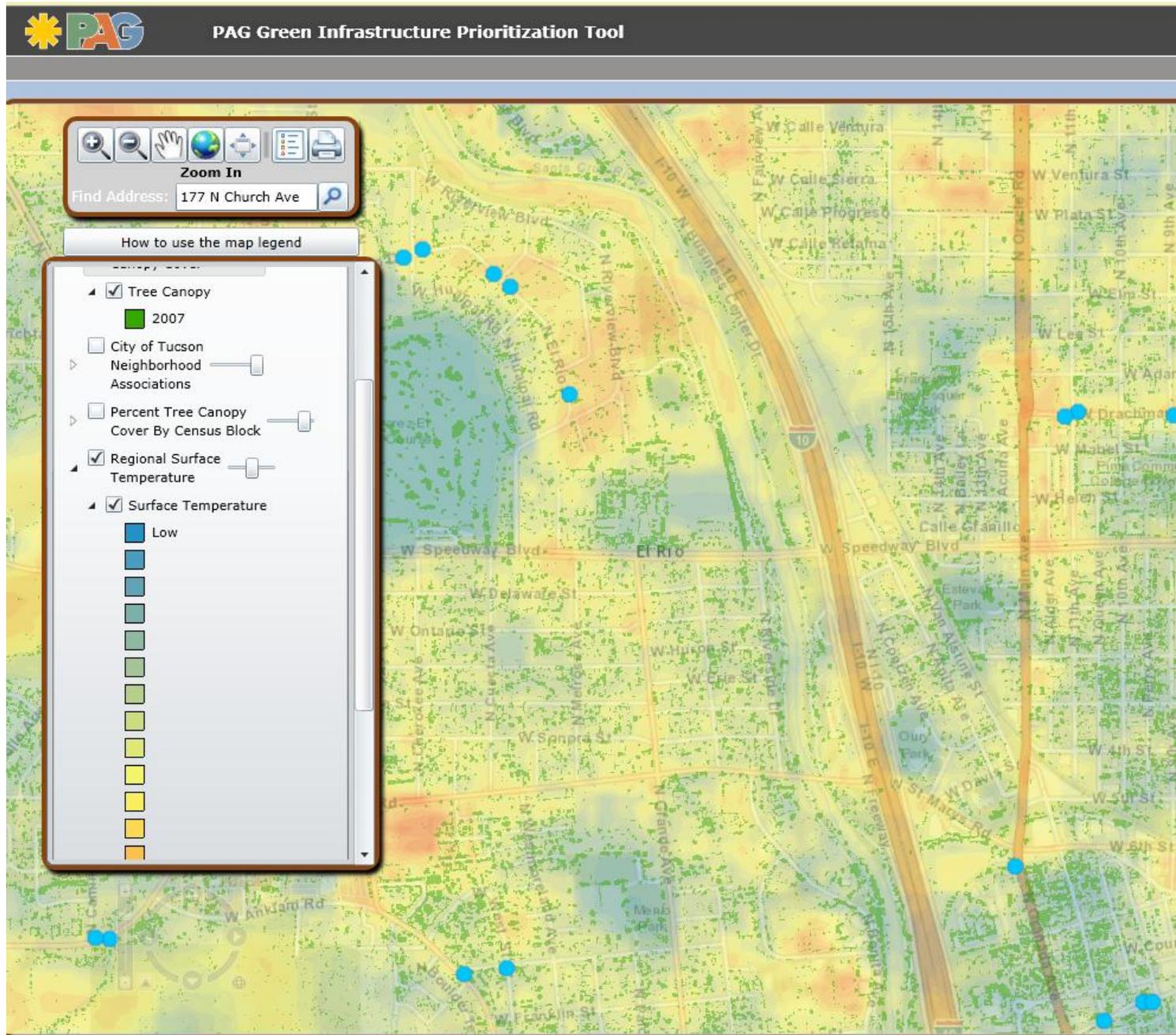
Josh Pope, GIS Manager, PAG: LiDAR

- tree canopy
- PC/ RFCD: Tyson Swetnam and Brian Powell– Cienega Habitat

Surface Temp.

Highest heat mortality in country

Impact of trees and open hardscape is apparent



Heat and Climate Resiliency

Solution: Tree Shade and ET

Can it Make a Difference?

- Reduces air temperature up to 9°
- Cooling energy savings up to 47%
- Reduces surface temperatures up to 45 °



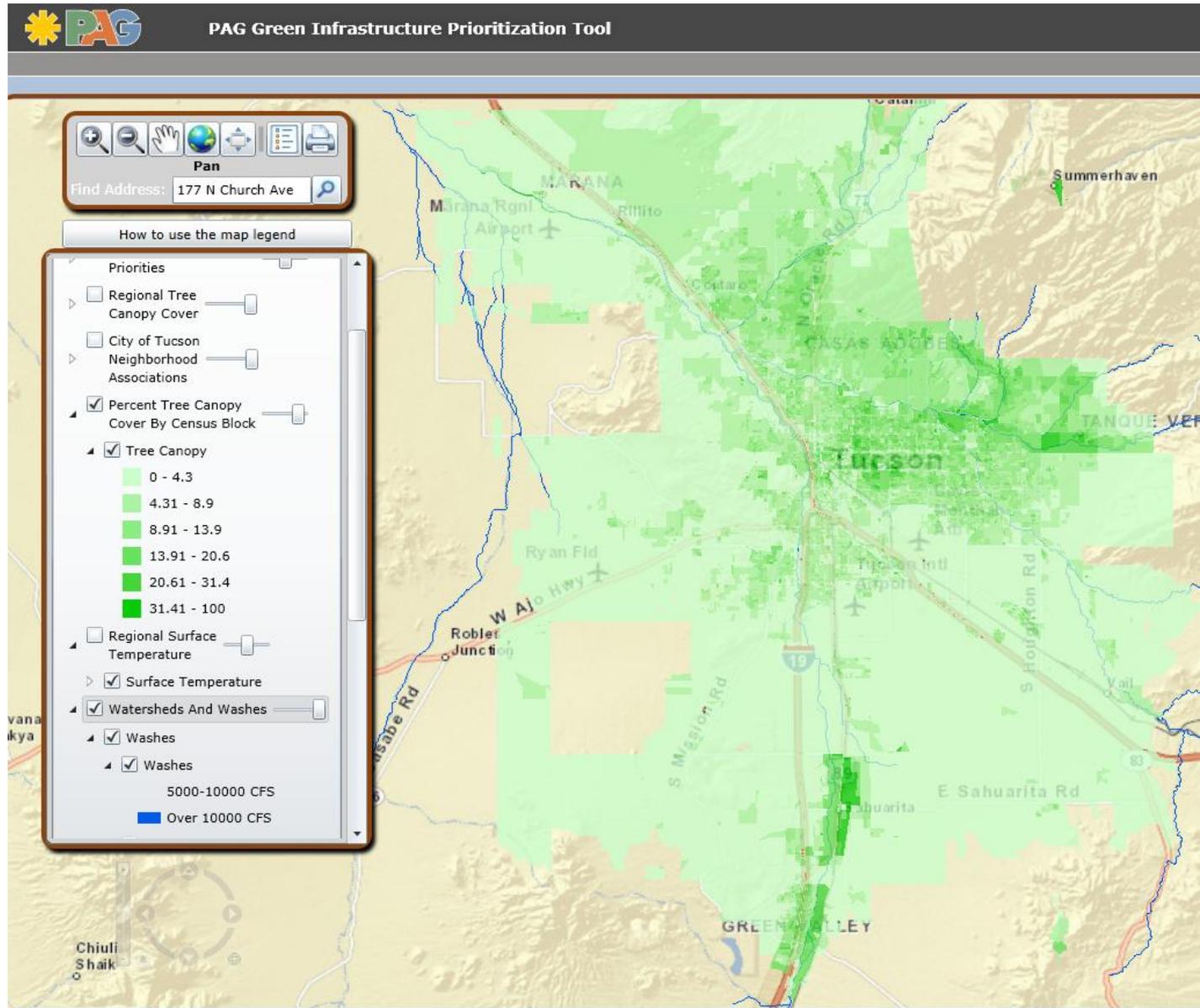
EPA compilation of studies



Canopy Cover

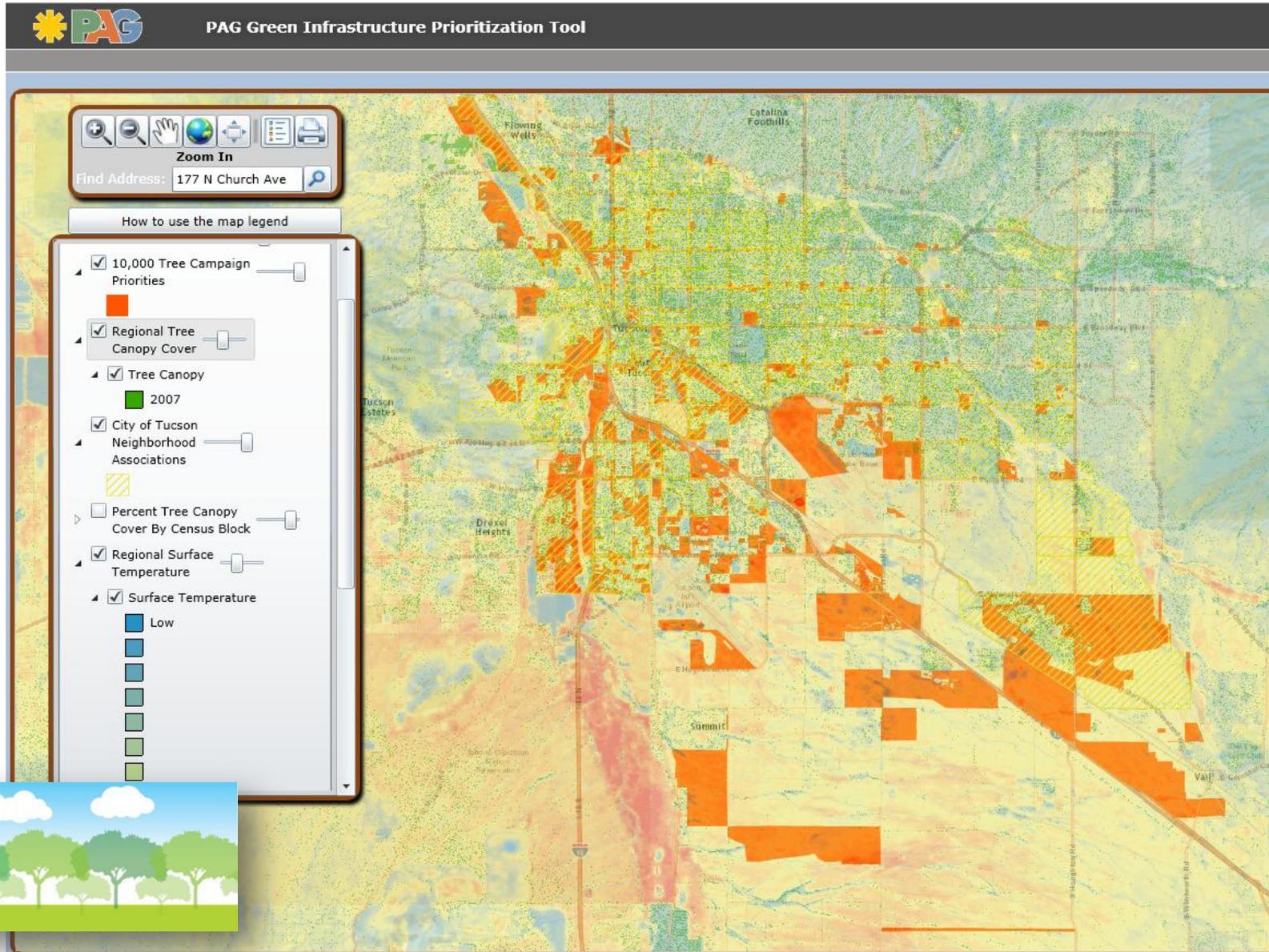


- Uneven distribution
- Natural desert 3%
- Tucson Metro Urban area Avg. 7%
- Arid West Avg. 11%
- 25% Recommended for human environment (PHX)



10,000 Trees Campaign

Query: Above Average Heat
Below Average Canopy



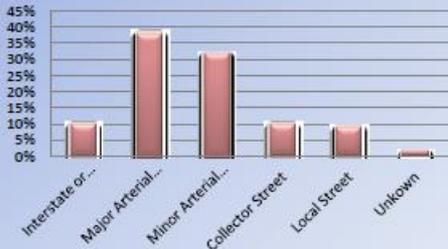
Vulnerability- Isolation and Safety

green,
complete,
livable streets
and
neighborhoods

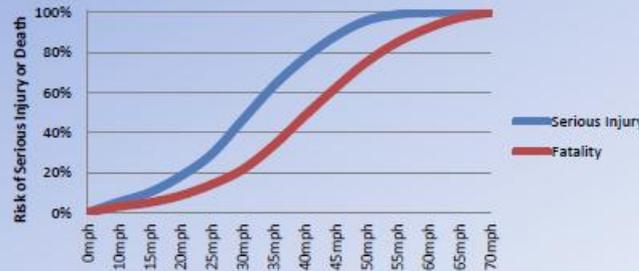


Vulnerability- Isolation and Safety

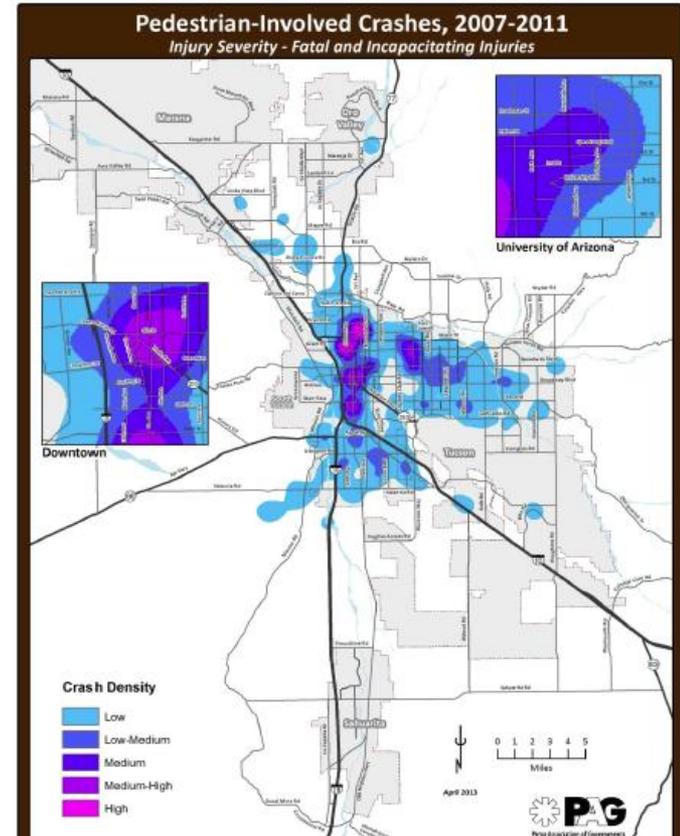
Fatal Pedestrian Crash
Location by Class of Roadway



Travel Speeds and Risk of Serious
Pedestrian Injury or Death

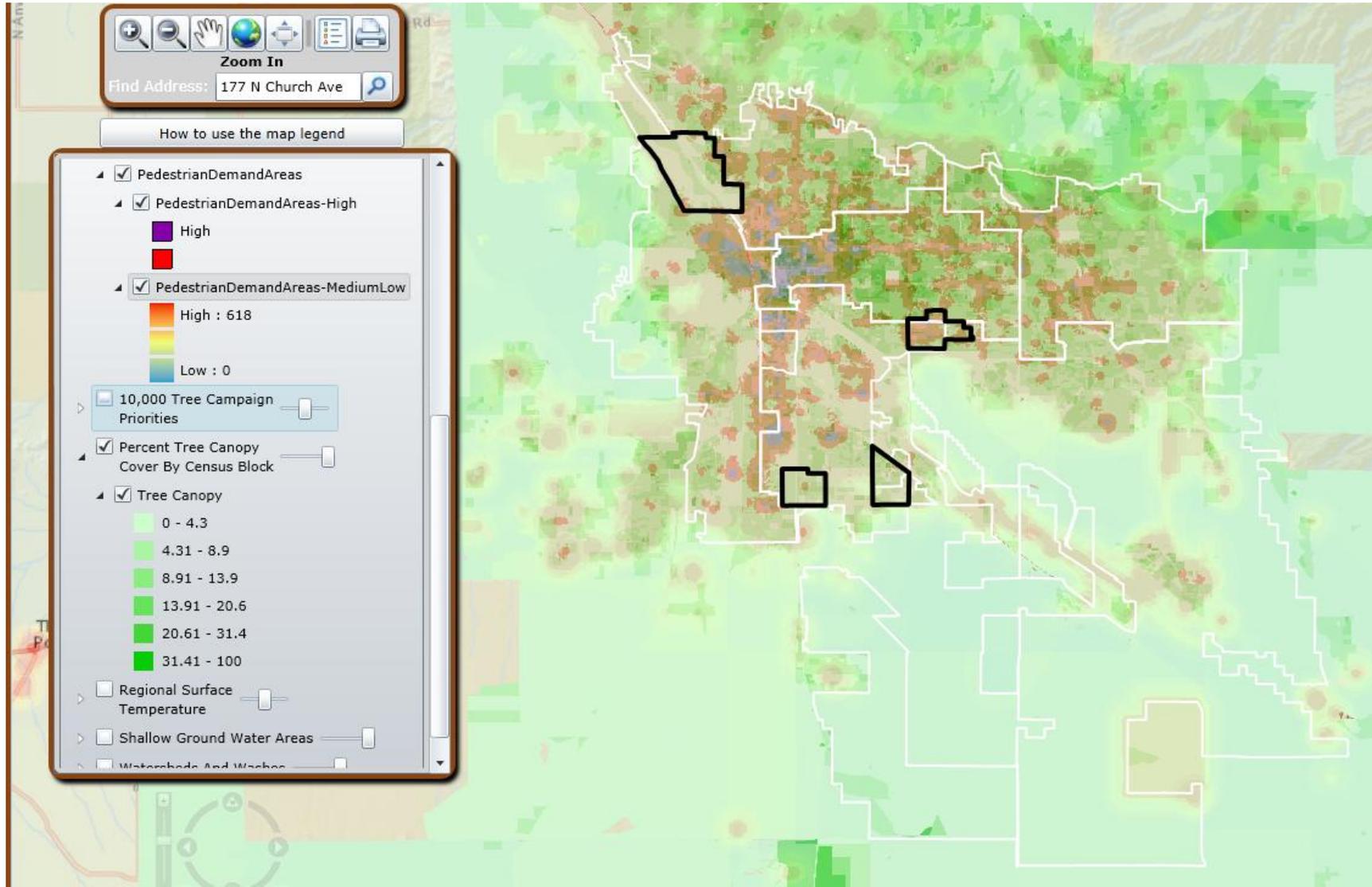


1/3 Don't use Cars
Everyone is pedestrian

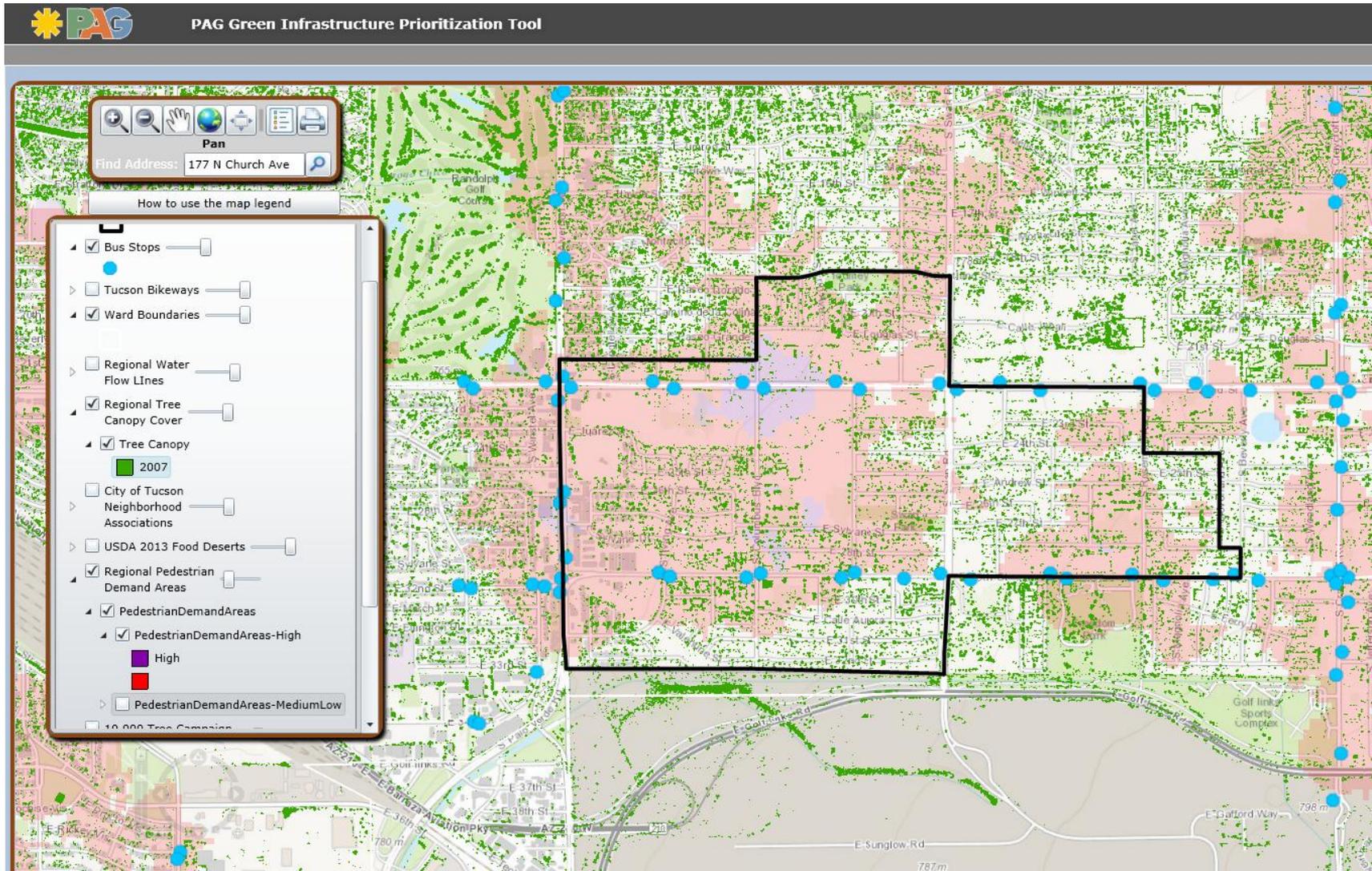


Transportation Mobility

Environmental Justice
Strong Factor in Heat Wave Survival

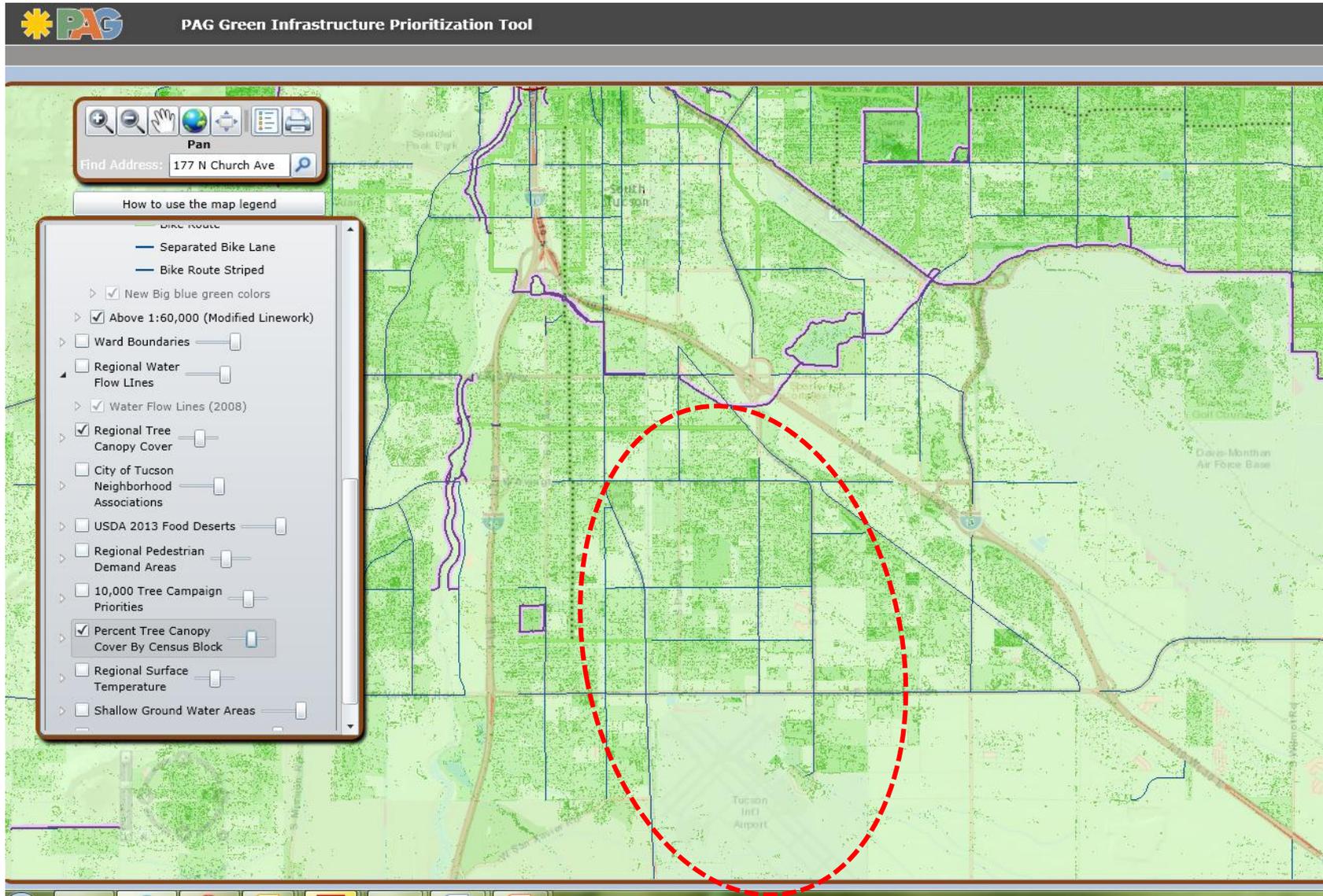


Transportation Mobility

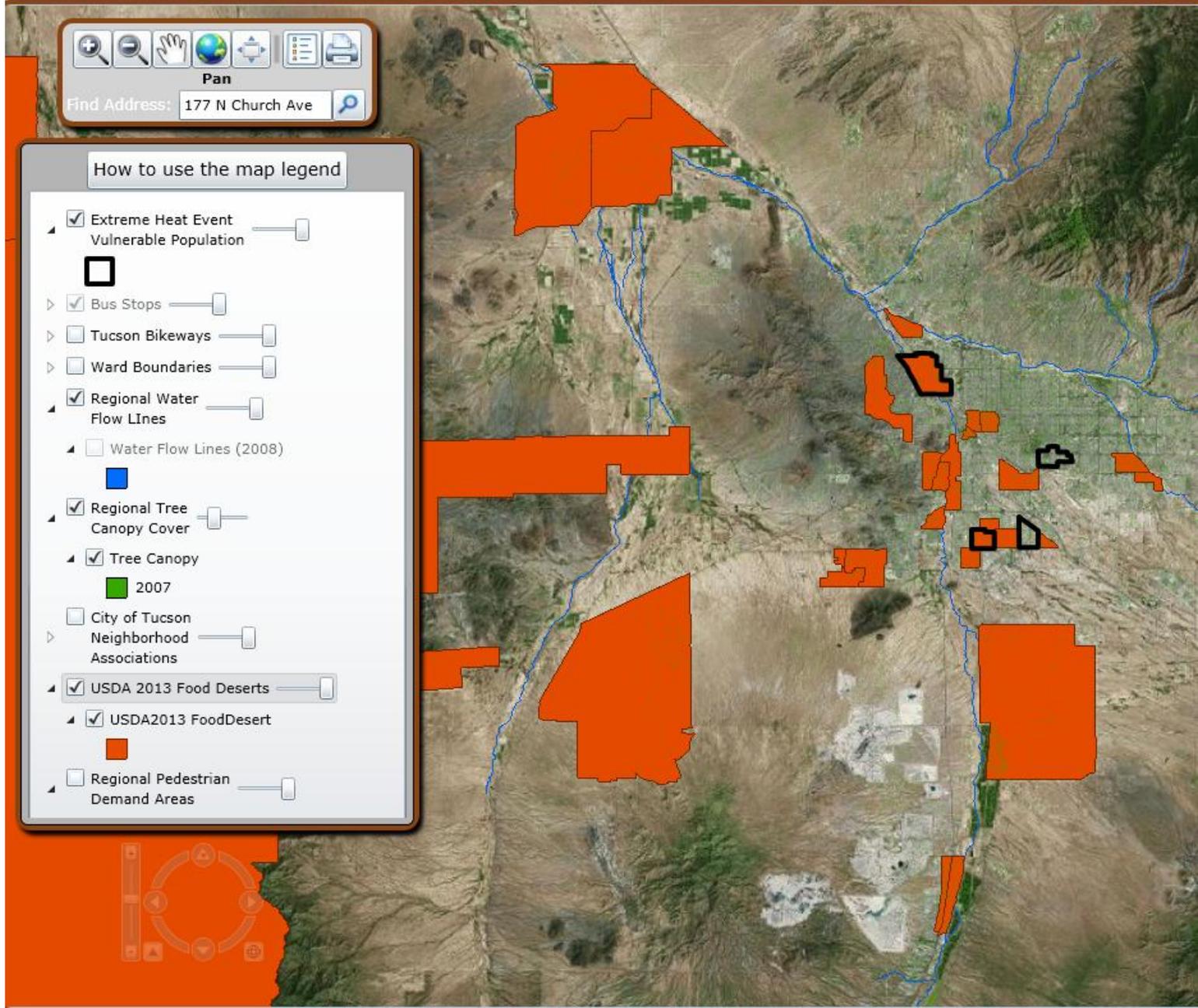


Transportation Corridors

Tourism Beautification
Bike Safety



Food Deserts



Aid
stewardship
(tree care)
and food
security

Demographics- environmental justice

Solution:

Distribution and access to green infrastructure

- Increases of about 3 -10 percent in residential property values associated with the presence of trees and vegetation

But.... Water Required!

Sharon Harlan – Urban Heat Island and Vulnerable Populations



Overview

Resources

Implications

Differences in income, neighborhood environments, temperature, and thermal comfort in eight Phoenix neighborhoods



1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

Dr. Sharon Harlan and her colleagues have been researching the spatial dimensions and health impacts of extreme heat events in the Phoenix metropolitan area on vulnerable populations.

Climate – empowerment

Solution: Stormwater Harvesting

Recognized Stormwater Importance
2008 City/ County Water Study
2010 ADWR Blue Ribbon Panel
2014 AZ Strategic Vision
2015 PAG Regional Council Resolution

Green Infrastructure for Regional Vibrancy

Recognizing the value and continuing potential of Green Infrastructure and Low Impact Development to foster economic vitality, to augment the water resource portfolio and to promote human and ecosystem health.

- *Whereas*, green infrastructure (GI) utilizes stormwater flows to sustain and increase native vegetation and shade trees without increasing potable water use so that societal benefits of connecting people to natural and cultural heritage is realized in urban infill and other built environments, transportation, open space, and natural wash projects; thereby enabling sustainable stormflow irrigation that is resilient to peak drought conditions and outdoor water use restrictions; and
- *Whereas*, low impact development (LID) and the generated vegetation adds shade and beautification resulting in locally and nationally measured economic benefits such as increased home property values, commercial business success, ecotourism, health and fitness, professional expertise, energy efficiency, flood safety, irrigation efficiency, erosion prevention, pavement preservation related to shade, and reduced need for expensive flood control structures; this builds a regional "sense of place" with Sonoran desert branding to enhance investment, business success, and job growth in the region; and
- *Whereas*, trees and vegetation provide health benefits by reducing heat-related illnesses and deaths in vulnerable populations and removing particulates and other pollutants from air; these are strategies recognized by the EPA for cooling, encouraging fitness, improving job access through active and alternative modes of transportation usage, and providing environmental justice benefits to low income, elderly, isolated and minority communities; and
- *Whereas*, GI designs using context sensitive solutions for transportation projects provide life-cycle returns on investment and safety benefits when used for roadway calming, green buffers, and other safety elements for pedestrians, cyclists, and bus riders; and
- *Whereas*, federal and state transportation funding and guidance, including the TIGER grants (Transportation Investment Generating Economic Recovery), Transportation Alternatives Program funds, ADOT's Draft Smart Transportation Guidebook, and Federal Highway Administration objectives, increasingly identify green infrastructure and beneficial use of stormwater as valued project elements.

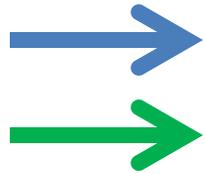
Now, therefore, be it recognized that Pima Association of Governments' Regional Council (PAG) commends the Region for exceeding recommendations put forth in PAG's 2012 Green Infrastructure/Low Impact Development (GI/LID) Resolution for collaborations, guidance, case studies, incentives, return on investment modeling, policy inventories, and incorporating GI/LID principles into regional planning documents. These efforts helped member jurisdictions receive grants, gain federal technical assistance and achieve top national sustainability rankings.

And may it also be recognized that PAG continues to encourage GI/LID, when feasible and affordable, as a valuable element of context sensitive roadway design for public and private development providing multimodal benefits for all ages and abilities. PAG strongly encourages a continued emphasis on regional coordination of GI/LID planning including active engagement among departments and partner jurisdictions for development of sample guidance and policy. PAG further recommends seeking new opportunities to implement green infrastructure measuring how these projects benefit our economic vitality, energy demand, long-term water reliability, heat and drought resilience, urban biodiversity and ecosystem connectivity.

*This Resolution Made by
Pima Association of Governments'
Regional Council on March 26, 2015.*



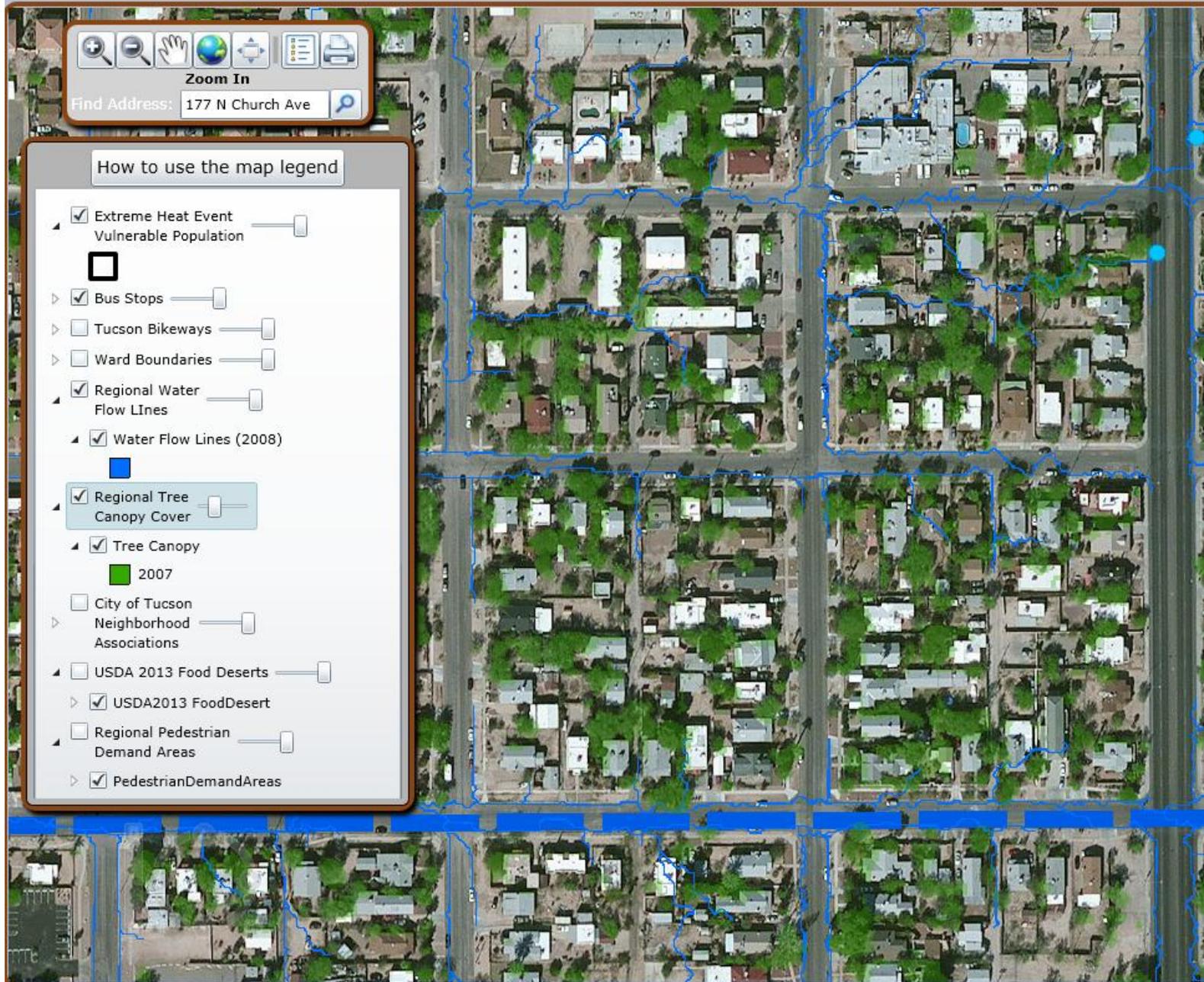
Flow Paths



Important water source to reduce irrigation

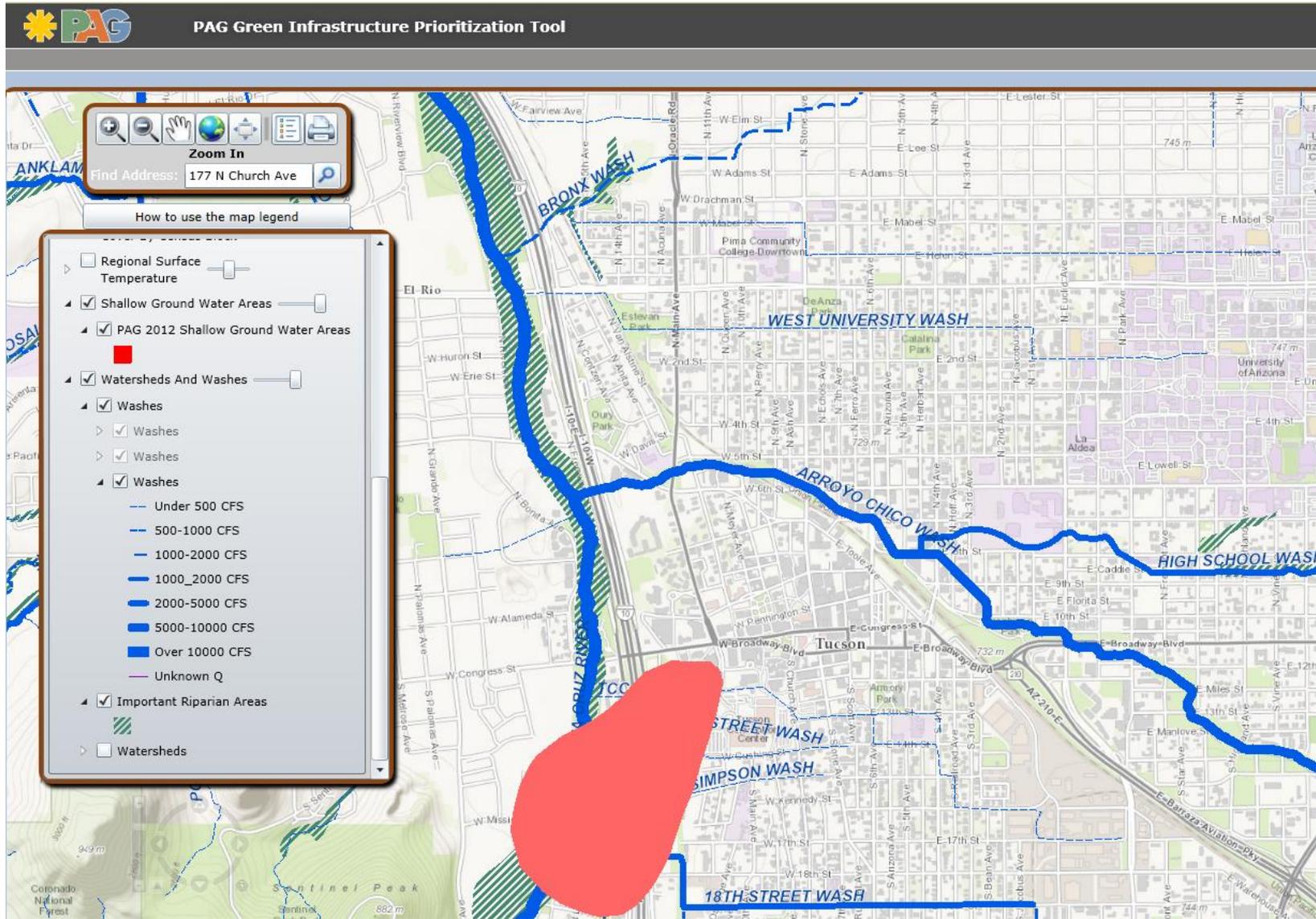
Aid planning efforts and implementation,

Plan which side of street or traffic circle



Washes, Shallow Groundwater, and Riparian Areas

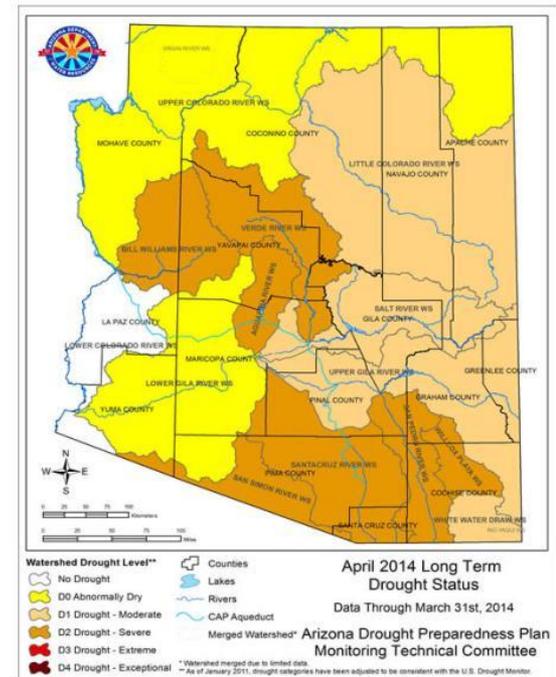
Resilience through drought and groundwater pumping



Water Resources

Aid the reduction of irrigation as needed

- 2000-Local drought
 - Colorado River reservoirs and CAP prevented further status upgrade
- ~2008- Public ROW budget cuts, irrigation reduced
- 2017? - CAP shortages expected
 - Drought Response Plan:
 - Triggers prohibition of non-essential uses and irrigation restrictions in Tucson
 - Encourages use of stormwater



Sources: ADWR, CAP, USBOR, City of Tucson

An aerial photograph of a city, likely Phoenix, Arizona, taken during the "golden hour" of sunset. The sky is filled with dramatic, dark clouds that are illuminated from below by the setting sun, creating a warm, orange glow. The city's buildings and streets are visible in the middle ground, and the surrounding desert landscape with sparse vegetation is in the foreground. In the distance, a range of mountains is silhouetted against the bright sky.

Thank you!

<http://gismaps.PAGregion.com/PAG-GIMap>

Feedback?

Mead Mier
MMier@PAGregion.com

CWAC Conservation and Education Subcommittee
Three-Year Work Plan, FY16-18
5/13/15 DRAFT

FISCAL YEAR 2015-16

<u>Month</u>	<u>Items for Subcommittee Review</u>	<u>Completion/Approval by CWAC</u>	<u>Program Updates & Presentations</u>
July/August 2015	<i>CWAC Summer Break – No Meetings Scheduled</i>		
September 2015	- FY14-15 Annual Report	- FY16-17 Budget Proposal	- Low-Income Toilet Program (CHSPA) - Drought Response Plan & Activities (Internal presentation)
October 2015	- Conservation Planning Process	- FY14-15 Annual Report	- EExchange Program Update - Rainwater & Stormwater Mgmt Plan (Internal presentation)
November 2015	- New Program Ideas & Research*	- Conservation Planning Process	- Project WET Program Update
December 2015	- New Program Ideas & Research		- SmartScape Program Update
January 2016	- Mid-Year Report - New Program Ideas & Research		- Conserve2Enhance Program Update
February 2016		- Mid-Year Report	- Inter-agency Collaboration (Internal presentation) - Zanjero Program Update (Internal presentation)
March 2016			- Commercial/WaterSmart Business Program Update (Internal presentation)
April 2016	- FY16-17 Program Plan		
May 2016	- Five-year Conservation Plan	- FY16-17 Program Plan	
June 2016	- FY17-18 Budget Proposal	- Five-year Conservation Plan	

*New Program Ideas & Research is a designated 3-month period for CWAC Members & Staff to present new program ideas to be considered for evaluation and development in the next fiscal year to start the following July. All ideas should be presented with baseline research completed on resource needs, savings potential and existing case studies and example programs. All ideas will be analyzed using the AWE Conservation Tracking Tool and final determination of programs will be weighed with Conservation Plan goals. Depending on the number and complexity of new program ideas, additional meetings may be scheduled during this time.

FISCAL YEAR 2016-17

<u>Month</u>	<u>Items for Subcommittee Review</u>	<u>Completion/Approval by CWAC</u>	<u>Program Updates & Presentations</u>
July/August 2016	<i>CWAC Summer Break – No Meetings Scheduled</i>		
September 2016	- FY15-16 Annual Report	- FY17-18 Budget Proposal	- Community Partner presentation
October 2016		- FY15-16 Annual Report	- Community Partner presentation - Internal Program update
November 2016	- New Program Ideas & Research		- Community Partner presentation
December 2016	- New Program Ideas & Research		- Community Partner presentation
January 2017	- Mid-Year Report - New Program Ideas & Research		- Community Partner presentation
February 2017		- Mid-Year Report	- Community Partner presentation - Internal Program update
March 2017			- Community Partner presentation - Internal Program update
April 2017	- FY17-18 Program Plan		
May 2017		- FY17-18 Program Plan	
June 2017	- FY18-19 Budget Proposal		

FISCAL YEAR 2017-18

<u>Month</u>	<u>Items for Subcommittee Review</u>	<u>Completion/Approval by CWAC</u>	<u>Program Updates & Presentations</u>
July/August 2017	<i>CWAC Summer Break – No Meetings Scheduled</i>		
September 2017	- FY16-17 Annual Report	- FY18-19 Budget Proposal	- Community Partner presentation
October 2017	- Rainwater & Stormwater Mgmt Strategic Plan**	- FY16-17 Annual Report	- Community Partner presentation - Internal Program update
November 2017	- New Program Ideas & Research	- Rainwater & Stormwater Mgmt Strategic Plan	- Community Partner presentation
December 2017	- New Program Ideas & Research		- Community Partner presentation
January 2018	- Mid-Year Report - New Program Ideas & Research		- Community Partner presentation
February 2018		- Mid-Year Report	- Community Partner presentation - Internal Program update
March 2018			- Community Partner presentation - Internal Program update
April 2018	- FY18-19 Program Plan		
May 2018		- FY18-19 Program Plan	
June 2018	- FY19-20 Budget Proposal		

**Timing of process for developing the Rainwater & Stormwater Management Strategic Plan may change as Fiscal Year 2018 approaches. This strategic plan will guide the utility in developing additional necessary protocols, evaluation metrics and public messaging to ensure the effectiveness of these non-traditional water conservation programs. We expect a plan to be in place at the time the rainwater harvesting rebate pilot is evaluated to ensure effectiveness and consistency with the Five-Year Conservation Plan.



**Citizens' Water Advisory Committee
Conservation & Education Subcommittee
2015 Projected Agenda**



Off-Agenda, for full CWAC approval on June

- C&E communication to M&C re: progress on March 3 motion

June 2015 (date TBD)

- Discussion: Conservation Program Roles for Tucson Water & CWAC
- Conservation Planning Update: Tracking Tool
- Member Proposal: Swimming Pool Retirement Rebate

July & August 2015: CWAC summer recess

September 9, 2015

- C&E comment on FY 14-15 Annual Report
- SERI pilot program update
- Drought Response Plan and Activities (TW Staff)

October 14, 2015

- Conservation Planning Update (TW Staff)
- EEExchange Program Update (TW Staff)
- Rainwater & Stormwater Management Plan (TW Staff)

November 11, 2015

- New Program Ideas & Research (C&E & TW Staff discussion)
- Project WET Program Update

December 9, 2015

- New Program Ideas & Research (C&E & TW Staff discussion)
- SmartScape Program Update

Future Agenda Items without a Date:

- Opportunities for incorporating AMI / AMR technology into conservation & education programs