

look for



HUD Water Wednesdays

Incorporating Green Infrastructure into Housing & Community Development Projects

11/10/2015

Charlotte Ely, EPA

Andy Lipkis, TreePeople

Daniel Ransom, Tucson Water

Neal Shapiro, City of Santa Monica

Housekeeping

- All attendees are muted to minimize background noise.
- Please type questions into the questions/chat box in your GoToWebinar panel. We will have a dedicated time for Q&A.
- A recording of this presentation will be posted on the WaterSense website at <http://epa.gov/watersense/hudwebinars>



Poll Question



- Have we met?
 - Yes, I attended one of the earlier live webinars.
 - Kind of, I watched one of the recorded webinars.
 - No, this is my first time!

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Today's Presenters



Charlotte Ely, Region 9 WaterSense liaison



Daniel Ransom, Tucson Water



Neal Shapiro, City of Santa Monica



Andy Lipkis, TreePeople

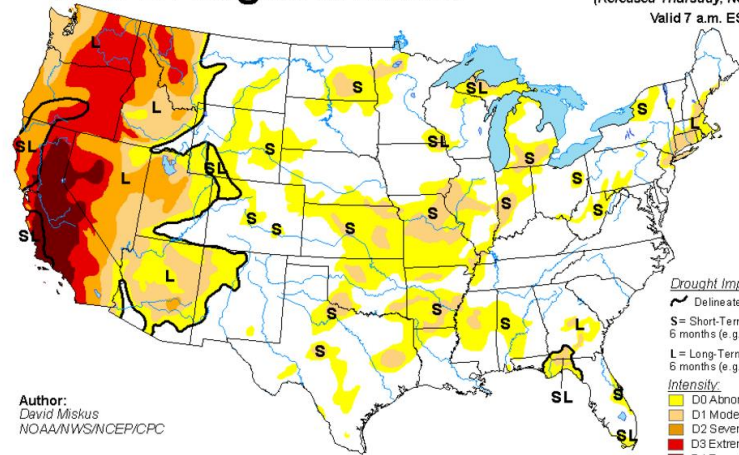


The Bigger Picture

- Energy/Water Nexus
- Costs
- Water Use
- Weather and Climate
- The Opportunity

U.S. Drought Monitor

November 3, 2015
 (Released Thursday, Nov. 5, 2015)
 Valid 7 a.m. EST

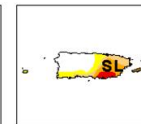
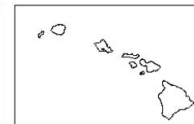
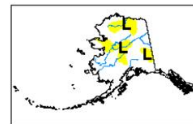


Author:
 David Miskus
 NOAA/NWS/NCEP/CPC

Drought Impact Types:
 ~ Delineates dominant impacts
 S = Short-Term, typically less than 6 months (e.g. agriculture, grasslands)
 L = Long-Term, typically greater than 6 months (e.g. hydrology, ecology)

Intensity:
 Yellow D0 Abnormally Dry
 Orange D1 Moderate Drought
 Red D2 Severe Drought
 Dark Red D3 Extreme Drought
 Black D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.



<http://droughtmonitor.unl.edu/>

EPA and WaterSense - the why and what

look for



**Water shortages
expected in 36 states**

Communities face
major infrastructure
investments

**Consumers challenged
by rising utility bills**

Much of water used
outdoors is wasted

**No ENERGY STAR-like
program for water**

2006



Identify high-performing
technology

Promote water efficient
behavior/action

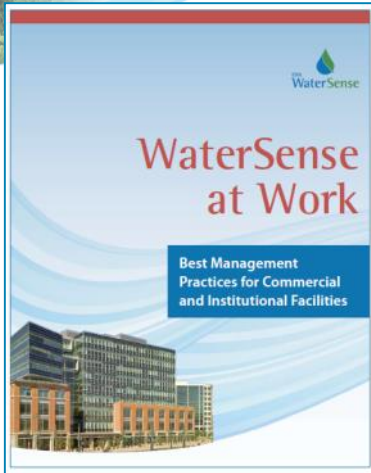
Help consumers
save money

Reduce need to
expand infrastructure
capacity

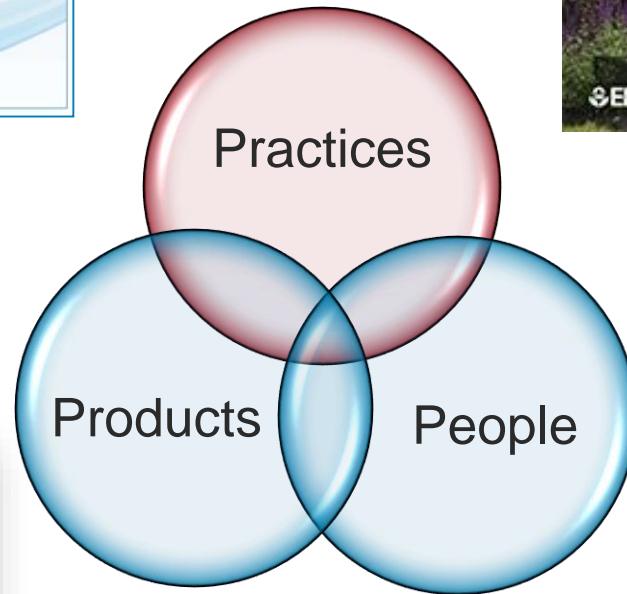
Save water for
critical needs

WaterSense Approaches

look for



Actions that can be taken to reduce water use -- at home, outdoors and at work



Specific fixtures and technologies save water



Partners reach users to change behavior





What we have covered to date

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- Webinar 1 - How to identify water-efficient WaterSense labeled products and purchase them through the Quantity Quotes bulk purchasing platform
- Webinar 2 - How to communicate with residents about water efficiency
- Webinar 3 – How to build more water efficient housing using WaterSense and LEED criteria
- Webinar 4 – Covered a variety of best management practices (BMPs) for multi-family housing
- Webinar 5 – Tracking Water and Energy Savings
- Webinar 6 – Reusing Greywater

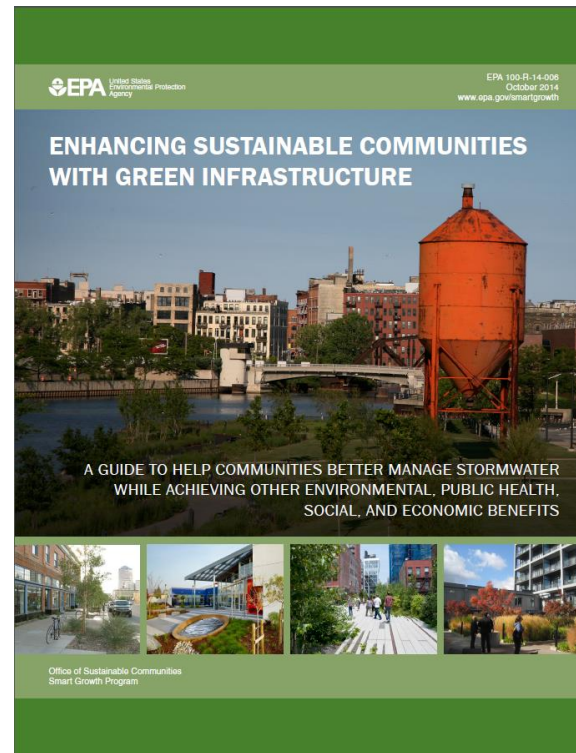
<http://epa.gov/watersense/hudwebinars>

EPA Resources

look for



New!
GI Green
Infrastructure
Wizard

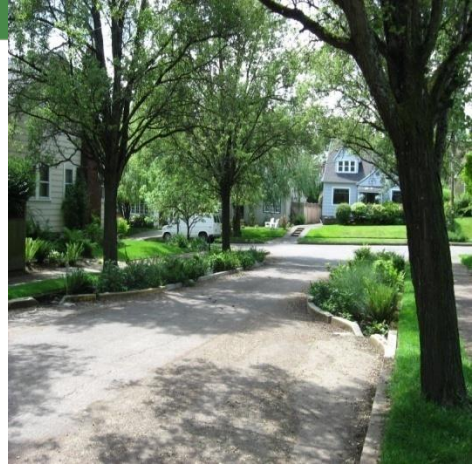


**WaterSense
at Work**

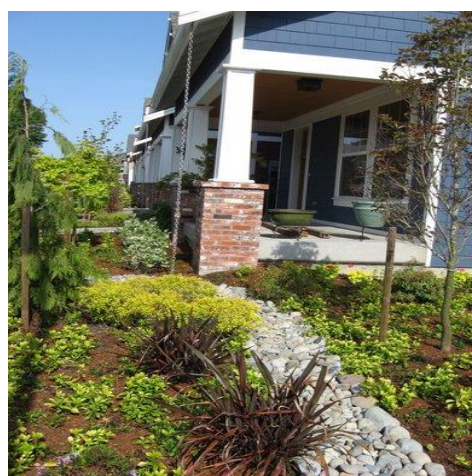
**Best Management
Practices for Commercial
and Institutional Facilities**



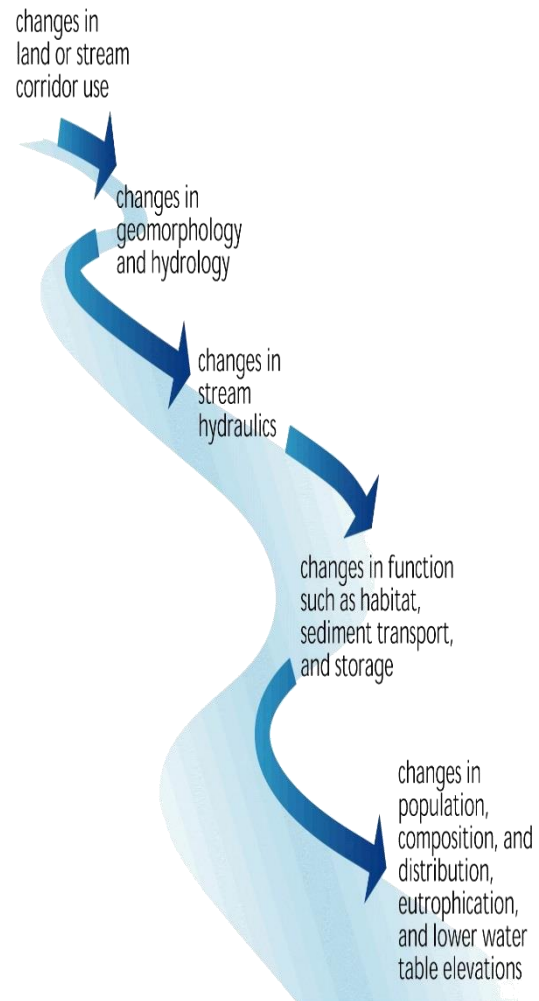
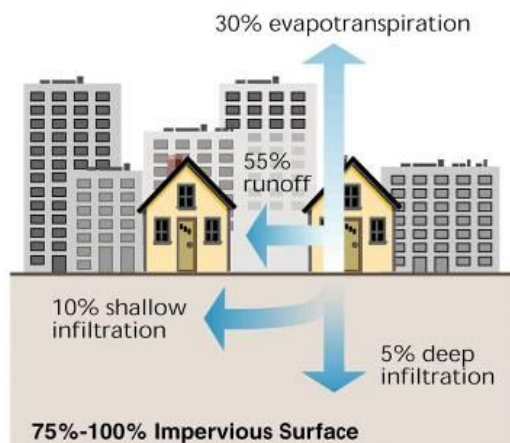
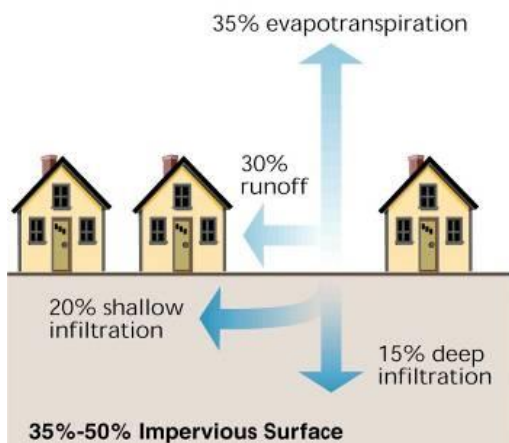
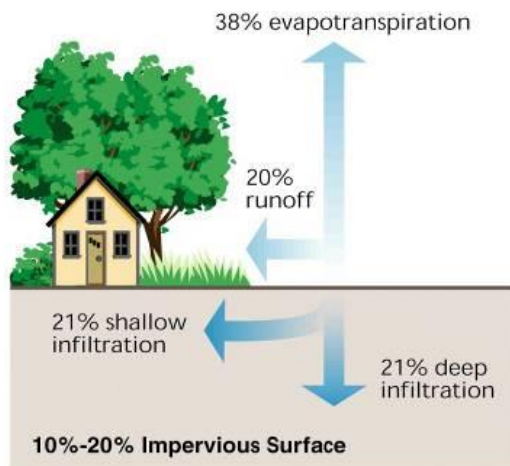
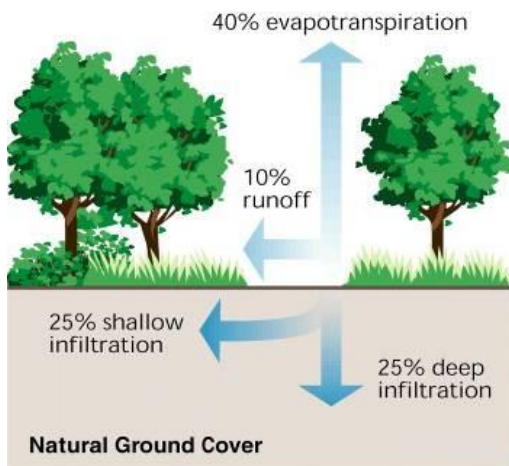
- **Publications**
- **Green Infrastructure website**
 - www.epa.gov/giwiz
 - www.epa.gov/green-infrastructure
- **Technical assistance**
- **Funding**
 - Urban Waters Small Grants program (closes 11/20)
 - Environmental Justice Collaborative Problem Solving Grants



Green Infrastructure: What is it?



Impermeable surfaces, Impaired water



look for



The Benefits





Poll Question



- Where are you on considering green infrastructure?
 - I'm doing it!
 - I need to learn more before deciding.
 - I'm skeptical as to whether it makes sense for me.
 - Rainwater harvesting is banned in my area.

Incorporating Green Infrastructure into Housing Developments



HUD Water Wednesdays
November 10, 2015

WaterReliability



Why Harvest Rainwater?



- Reduce potable water use (demand reduction)
- Reduce dependency on drinking water in landscapes – on average 27% of the water used goes to outdoor irrigation
- Water is a precious resource
- Rainwater is free! (The water, not the infrastructure)
- Water quality – rainwater is best water for soil and plants (no salt, free natural fertilizer, helps balance pH of our alkaline soil)
- Stormwater management – reduce on-site flooding and pollutant discharge and reduce downstream flooding



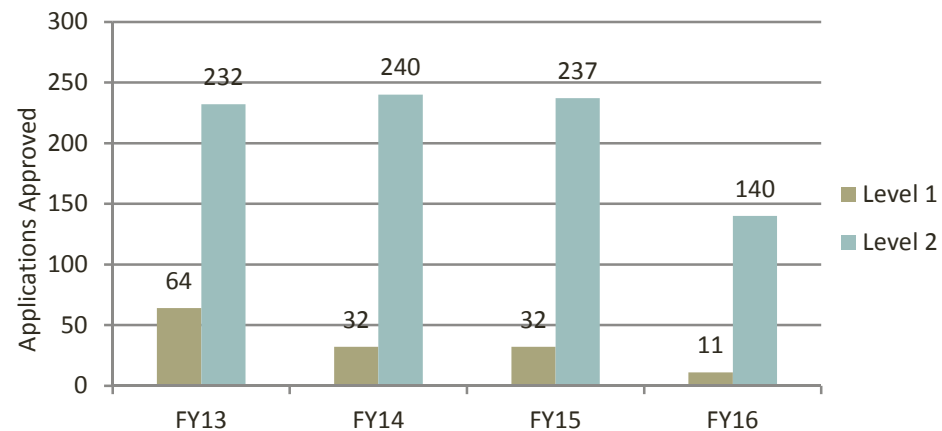
Rainwater Harvesting Incentives Rebate Program



- The program was introduced in June 2012. It was expanded July 1, 2015, to include curb cuts/core drilling and small commercial customers

Rainwater Harvesting Rebate

	FY 15/16	Cumulative
Applications Approved:	151	988
Expenditure:	\$ 204,672	\$ 1,235,815
Estimated Gallons Saved:	0	0
Estimated Acre-Feet Saved:	0	0



Rainwater Harvesting Incentives Rebate Program



Who qualifies?

- Single-family residential and small commercial Tucson Water customers
- Small commercial is a property with a single meter that is 5/8 or 3/4 inches. Properties with more than one meter or meters larger than 3/4 inches do not qualify
- Applicants must attend an approved three-hour workshop to qualify (37% of applicants are attending the workshop after the system has been installed)

Two levels

- Applicants may apply for both a passive and active rebate not exceeding \$2,000 for the combination

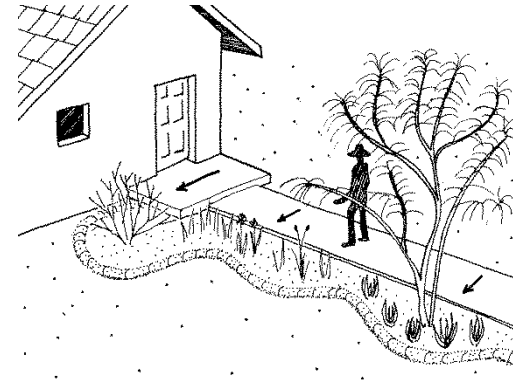


Rainwater Harvesting Rebate



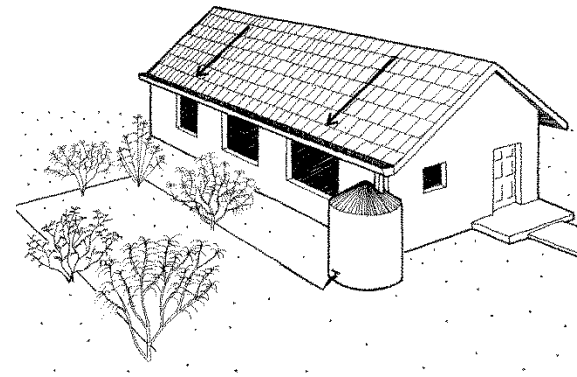
Level 1 – Simple/Passive:

- Incentive – 50% of the costs of eligible materials and labor up to \$500



Level 2 – Complex/Active:

- Incentive – rebate up to \$2,000 based on gallon capacity of cistern
 - \$0.25 per gallon capacity of 50-799 gallon cistern
 - \$1.00 per gallon capacity of 800 gallon and larger cistern



Evaluation for Effectiveness



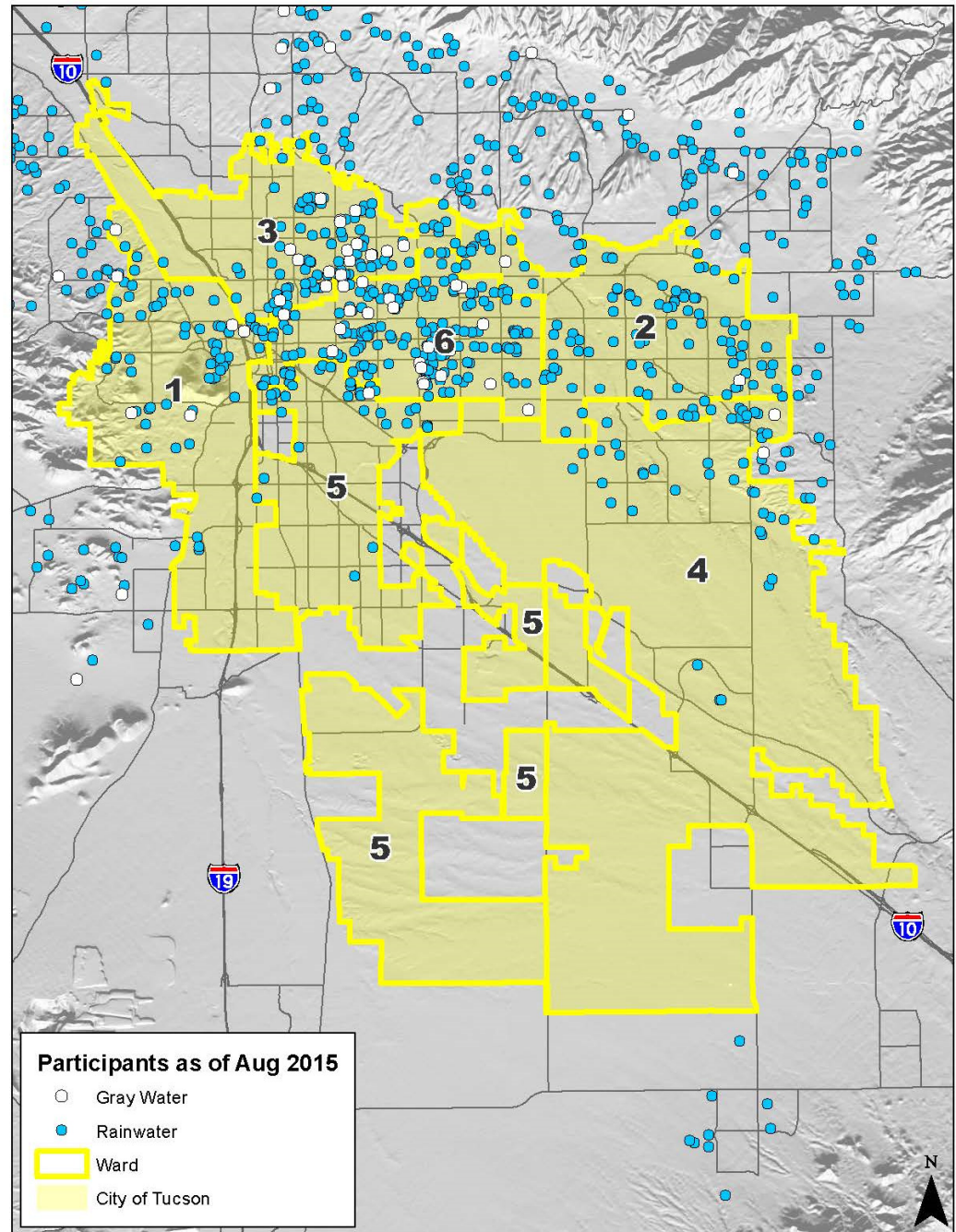
- Participation – workshop participants, applications, and spatial distribution
- Cost-Benefit Analysis – costs, benefits, and payback period
- Water Savings (Demand Reduction)



Rebate Stats:

- Nearly 1,000 applications approved
- Average rebate: \$1,250
- 15% - Level 1; 85% - Level 2
- 29% of workshop participants have received a rebate

Rainwater Harvesting and Gray Water Rebate Program Participants



Legend

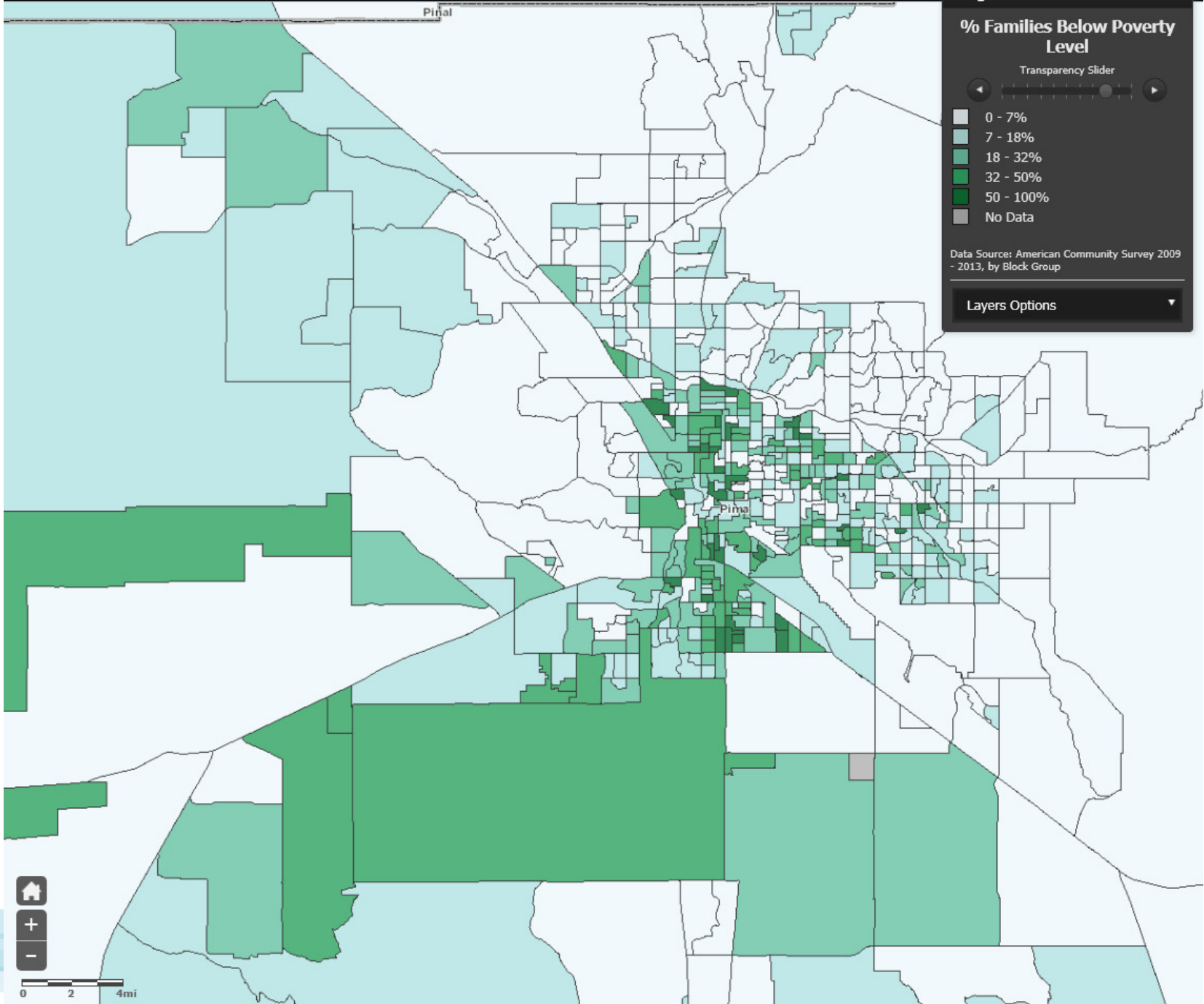
% Families Below Poverty Level

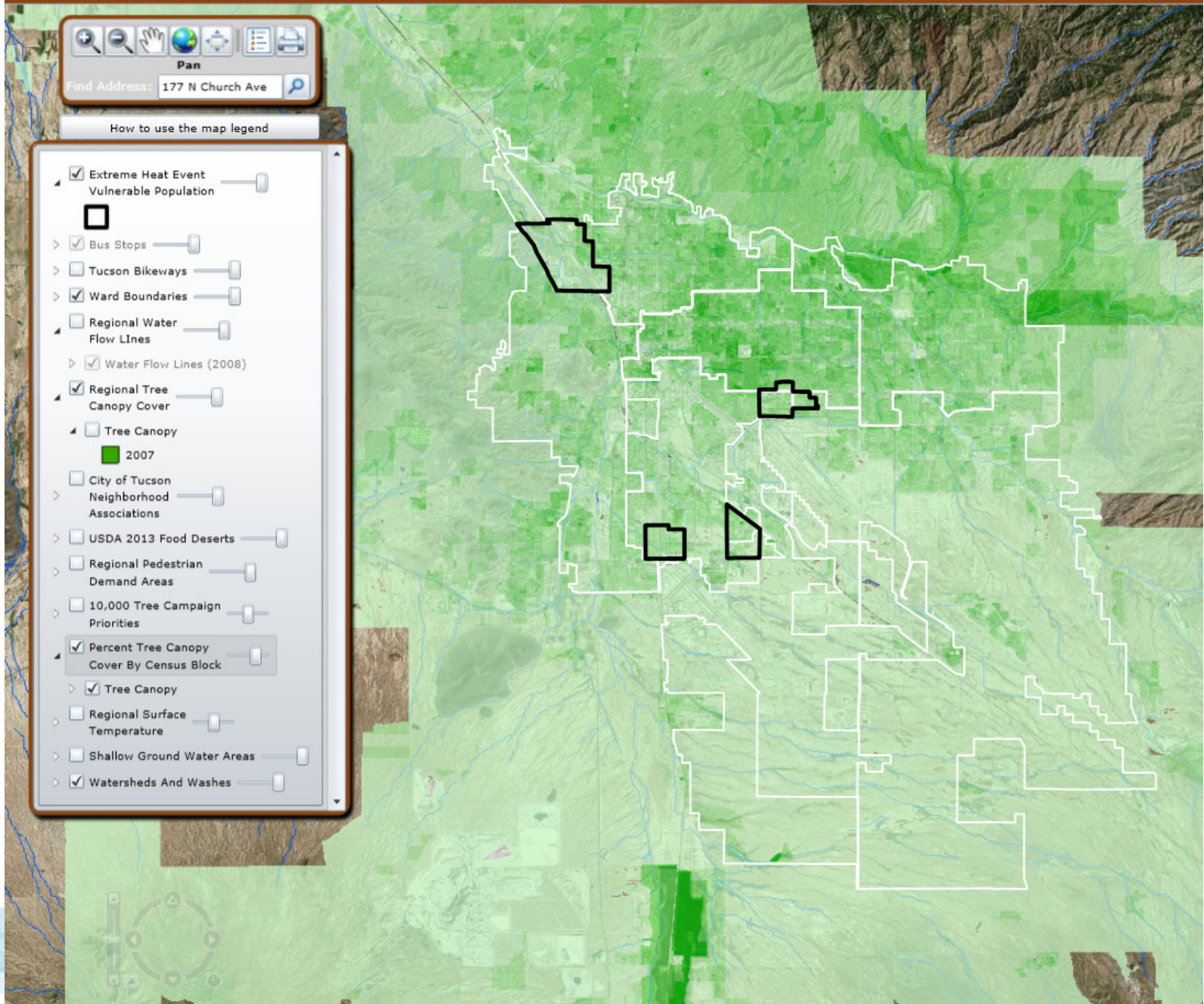
Transparency Slider

- 0 - 7%
- 7 - 18%
- 18 - 32%
- 32 - 50%
- 50 - 100%
- No Data

Data Source: American Community Survey 2009 - 2013, by Block Group

Layers Options





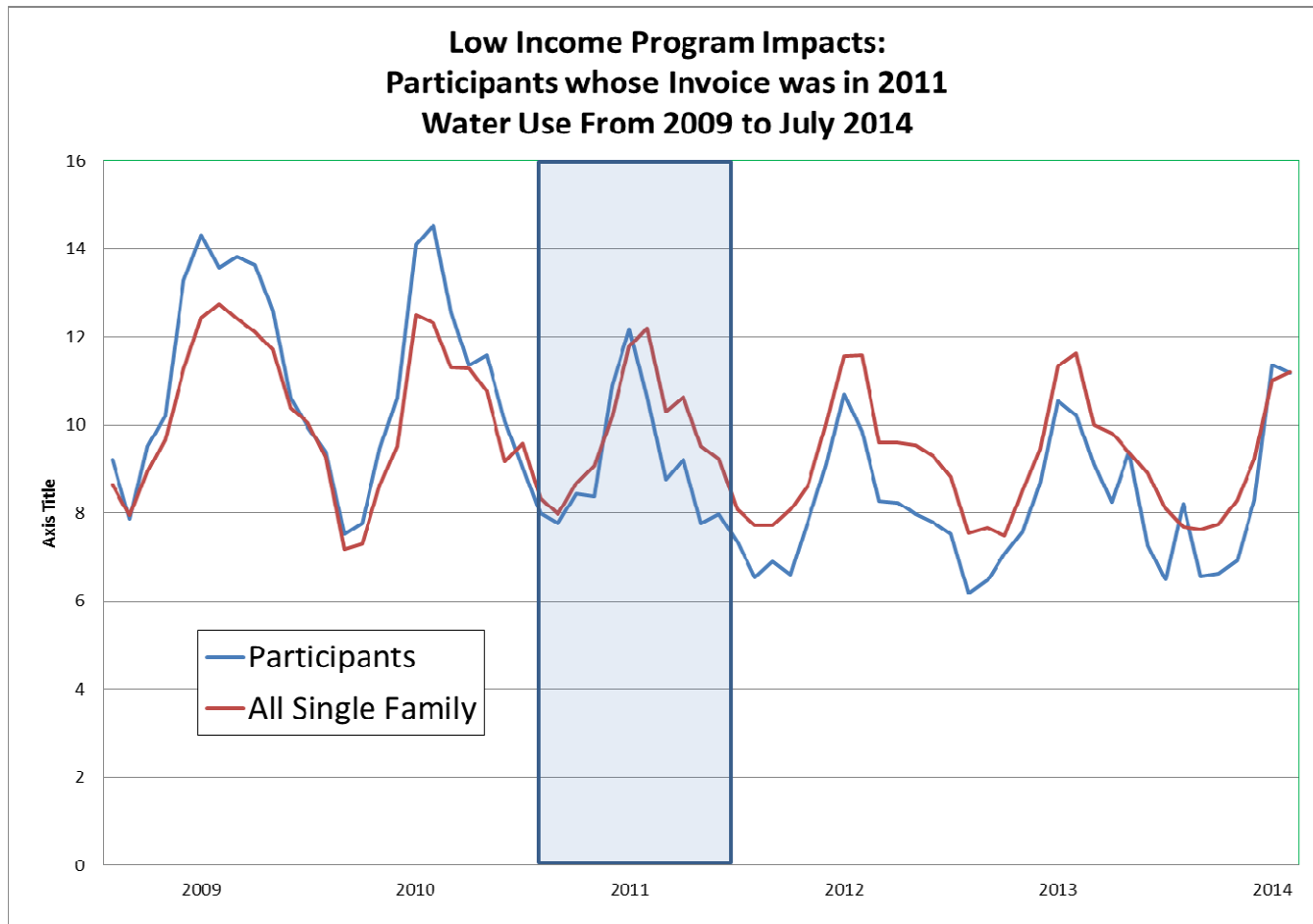
Simple Payback: Active Rainwater Harvesting



- Payback assuming water collected was a new source
 - One 50 gallon rain barrel filled five times collects 250 gallons annually – resulting in a **\$1.24** value based on current water rates
 - One 865 gallon cistern filled five times collects 4,325 gallons annually – resulting in a **\$21.45** value based on current water rates
 - One 2,825 gallon cistern filled five times collects 14,125 gallons annually – resulting in a **\$70.06** value based on current water rates
- Based on water cost of \$4.96/1,000 gal.
- 60+ year payback?



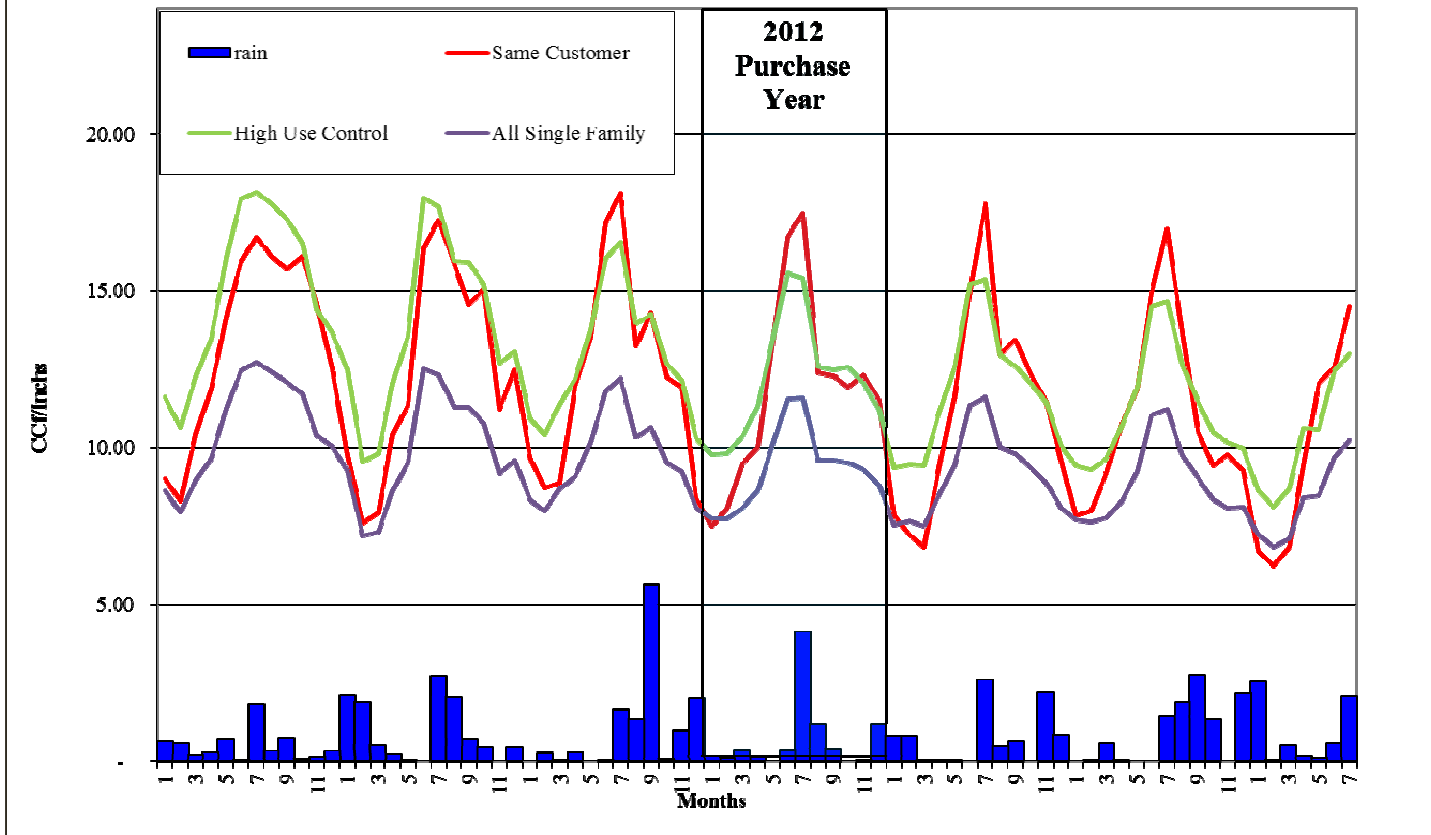
Water Savings: A Successful Low-Income HET Program



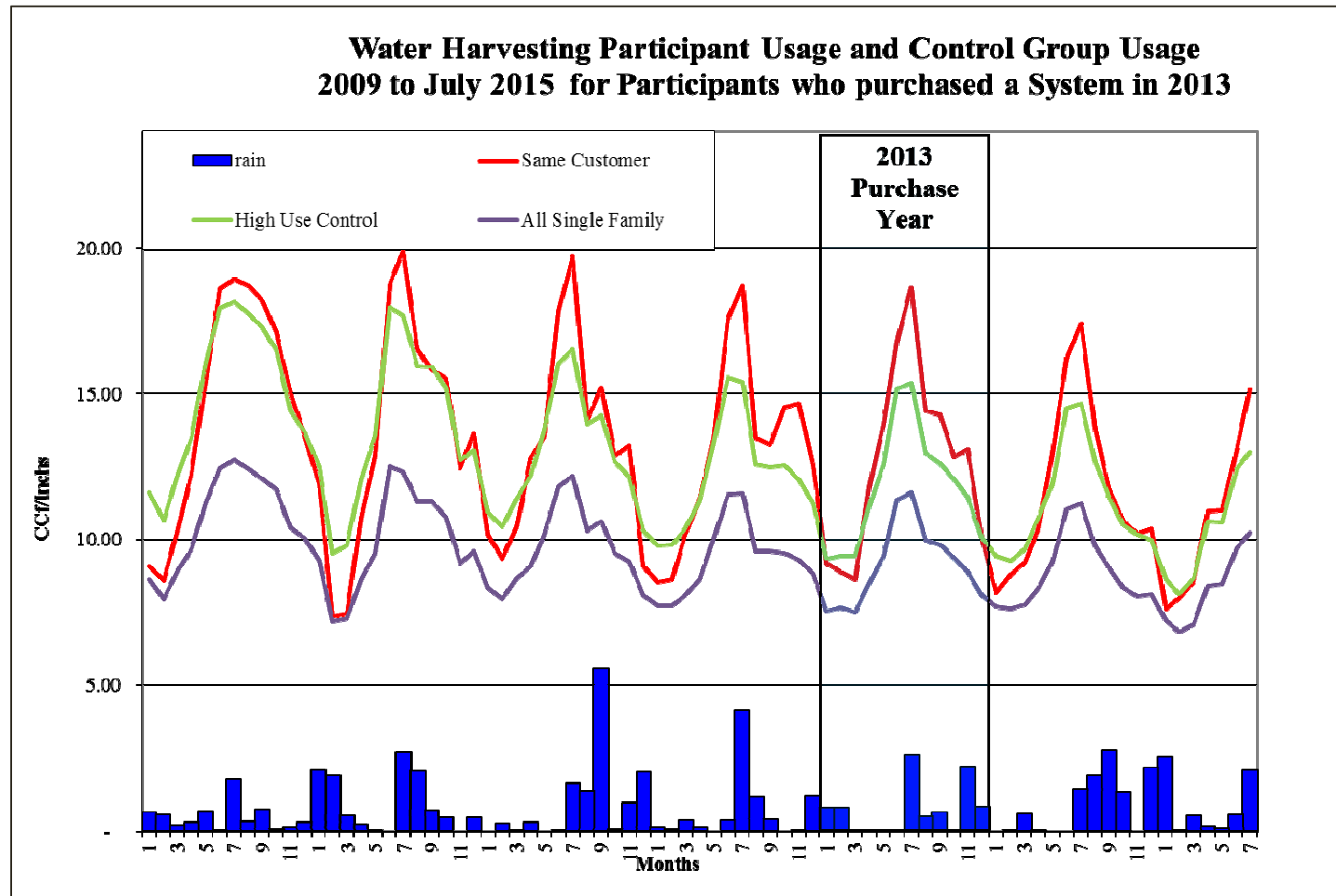
2012 Participant Analysis



**Water Harvesting Participant Usage and Control Group Usage
2009 to July 2015 for Participants who purchased a System in 2012**



2013 Participant Analysis



Rainwater Harvesting Pilot Program for Low-Income Families



- Sonora Environmental Research Institute, Inc. (SERI)
 - Nonprofit
 - Works with low-income communities
- Increase the number of RWH systems in target area
 - Have trees from Trees for Tucson
 - Verification of low-income
 - Attend rainwater harvesting and tree care workshop
 - Allow access to water use history before and after the installation
 - Allow SERI to monitor and photograph the system
 - Agree to maintain the system after installation



Community Concerns



- Worried about mosquitos
- Want rain barrels and gutters – do not see earthworks as rainwater harvesting
- Do not have funds to participate in rebate program
- Think it will cost a lot of money to water trees
- Additionally, discussions with families indicated a lack of knowledge of:
 - Drought tolerant trees and planting methods
 - Watering needs
 - Use of mulch
 - Rainwater harvesting and general maintenance



Next Steps



- Pilot a revolving loan program for low-income families
- Develop the program with input from the community
- Offer no-interest loans for installing rainwater harvesting systems
 - \$100 to \$400 loans
 - 6 to 9 month short-term loan
- Evaluation of participant actions & work done



Conclusions



- Rainwater Harvesting Rebate has not shown to be effective as a demand management strategy
 - Users are already low water users OR
 - Customers are price-inelastic, care more about landscape than water bill
- If demand reduction is a goal, that needs to be communicated & incentivized
- Make sure that policies are consistent throughout your jurisdiction
- Rainwater Harvesting/Green Infrastructure is an important tool in addressing Stormwater & Climate Change concerns → integrated planning
- Conduct a needs assessment to identify scope of problem, develop policies and budgets, and establish a sound funding mechanism



Questions?

Daniel Ransom, CIC, CID, CLIA, CGIA, CAIS
Water Conservation Program Manager
Daniel.Ransom@tucsonaz.gov
Tucsonaz.gov/water/rebate

WaterReliability



HUD-EPA Water Wednesday Webinar Incorporating Green Infrastructure into Housing Developments

Neal Shapiro

City of Santa Monica's

Office of Sustainability & the Environment

November 10, 2015



Presentation Outline

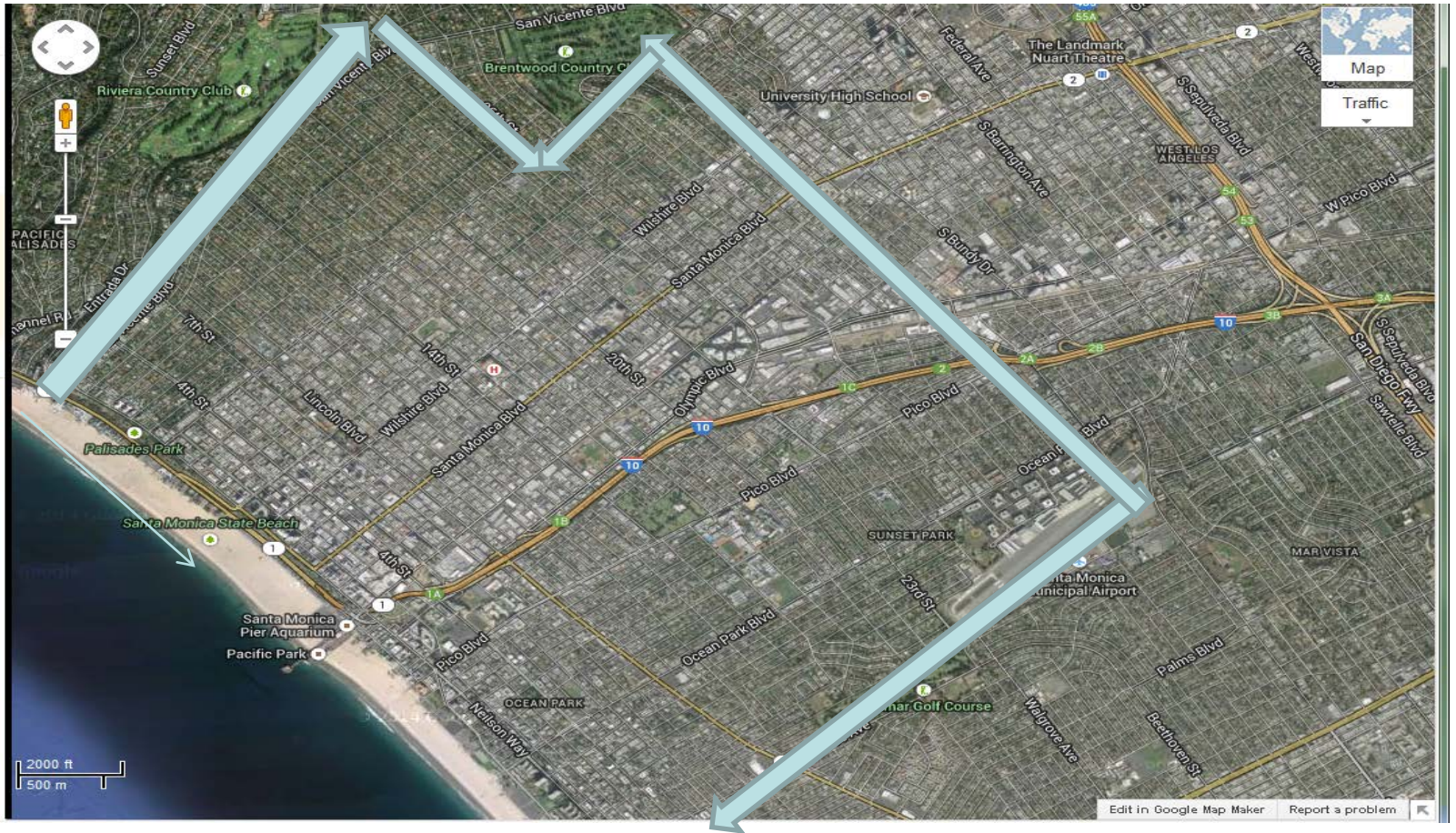
1. Introduction – Overview: Santa Monica Watershed Policy
2. Green Beach Parking Lot Project – rainwater harvesting for infiltration
3. Virginia Avenue Park Library Project – rainwater storage and direct onsite use
4. Conclusions



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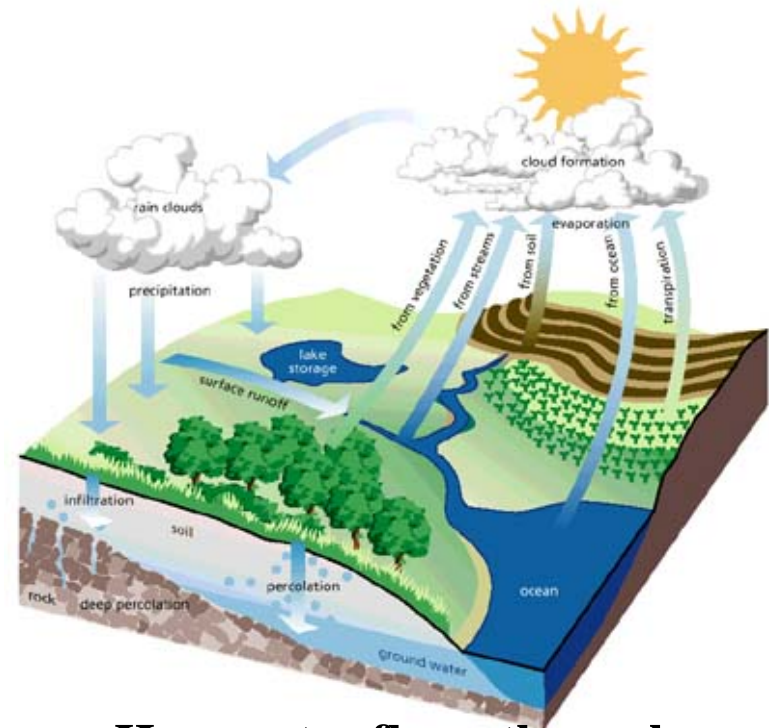
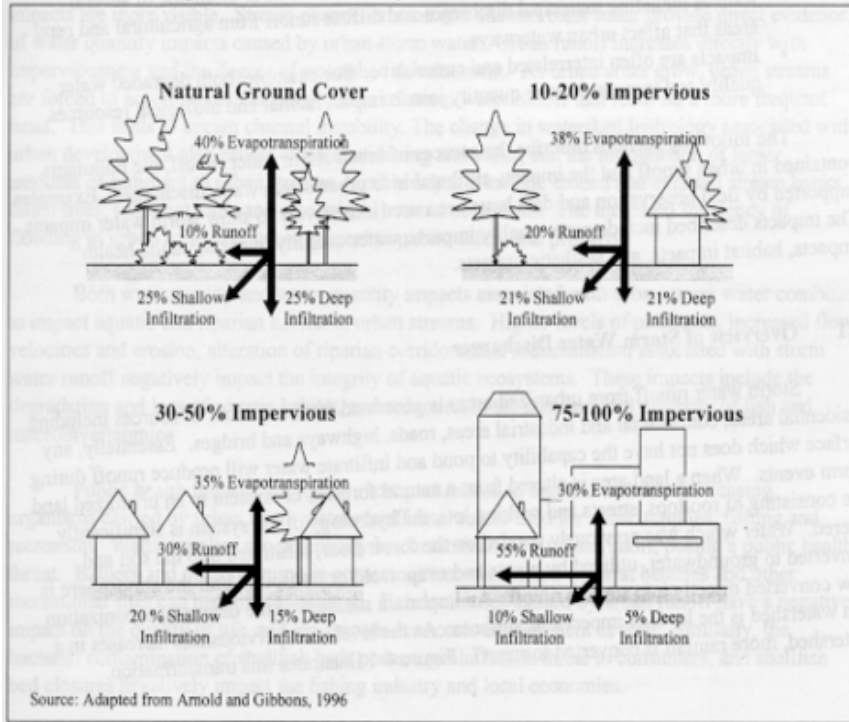
The Problem – Water Quality v. Quantity

- The Southern California Coastal Water Research Project, a leading marine research group in Southern CA, reported that storm water and urban runoff are the leading source of water pollution in the Los Angeles area; storm water pollution has increased 200-700 percent during the last 20 years.
- Stormwater has become a lethal cocktail of pollutants that now constitutes the single greatest source of water pollutants, contributing 50-60 percent of the pollutant load.
- Types and Sources of Pollutants
- According to the US EPA, urban stormwater is the largest source of water quality damage in estuaries, the second largest for wetlands degradation, third largest impairment of lakes and fourth largest source of river damage.



The Watershed Level – Disrupting the Water Cycle

Figure 4-1. Effects of Imperviousness on Runoff and Infiltration



| How water flows through our environment



Runoff Treatment - A Paradigm Hierarchy Shift



City Watershed Management Objectives

- ✓ Treat all dry weather and most wet weather urban runoff in the City
- ✓ Connect land use/design to the Hydrologic Cycle, reducing the disconnect and disruption of water flow
- ✓ Mimic nature; blend into the land
- ✓ Take proactive, watershed approach to reducing urban runoff problems
- ✓ Converting **IMPERMEABLE TO PERMEABLE**
- ✓ **Store** urban runoff (dry/wet weather) for **passive and direct uses** and **pollution treatment – local self-sufficiency**



Tools of the Trade

- Education
- Prevention
- Ordinances
- Treatment
- Maintenance
- Enforcement
- Funding



ORDINANCES

- Urban Runoff Pollution Mitigation Code. 7.10 SMMC – costs borne by property owner.
- Stormwater Utility Parcel Fee, 7.56 SMMC – fund generator, public projects.
- Clean Beaches & Ocean Special Tax. 7.64 SMMC - fund generator, public and private projects.
- Sustainable City Code.
- AB2403 – June 2014, fee changes to votes, include stormwater



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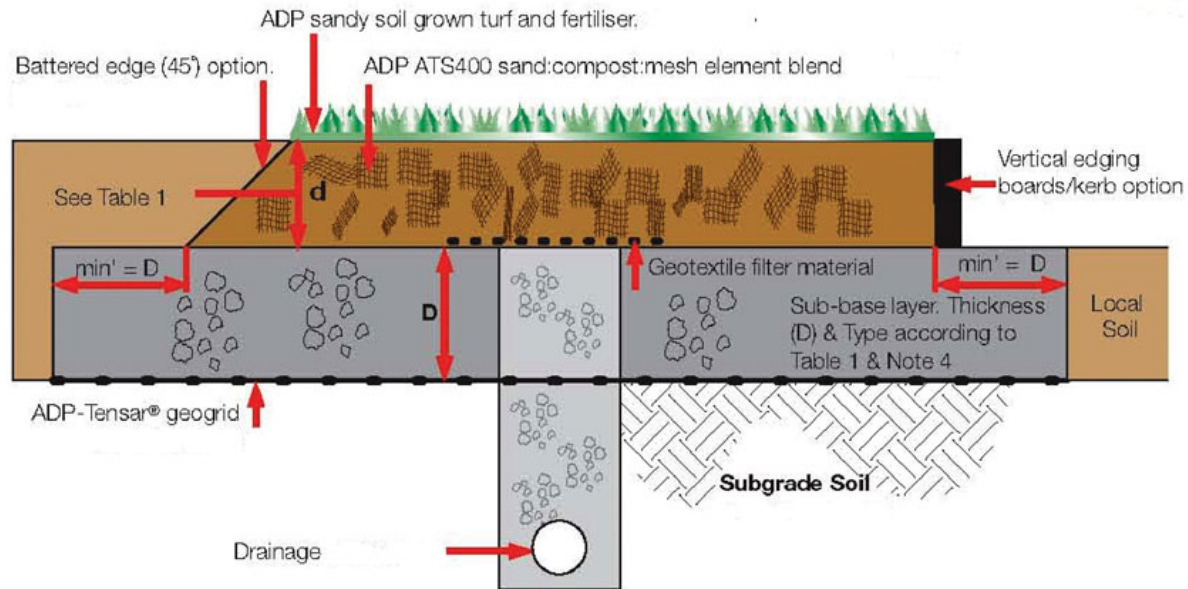
Pre-Construction – Site Before Construction



Pre-Construction Overview of Project Site



Cross-section of Netlon



Construction – Netlon Installation



Opening Day





Beach Green Parking



Green Beach Today



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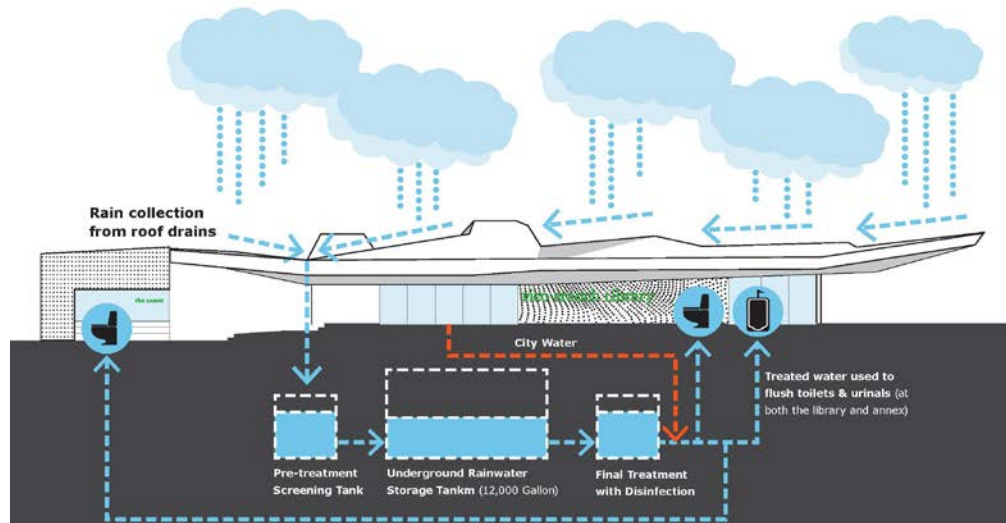












Pico Branch Library Rainwater Harvest System

The library has a rainwater collection and storage system that collects, treats and disinfects rainwater for toilet flushing in the library and adjoining annex. The rainwater harvesting system is antipated to supply non-potable water for seven months out of the year. The system automatically shifts to potable City Water during the dry months of June through October.

Project Statistics

- **12,000 gallons**
Underground rainwater storage tank capacity
- **85,531 gallons**
Annual estimated demand from efficient flush fixtures (a building of similar size and use would be projected to use 134,740 gallons annually)
- **58,359 gallons**
Annual estimate of the rainwater from the system
- **27,172 gallons**
Annual estimate of potable water usage during dry months
- **80%**
Annual estimate for the reduction in potable water use for flush fixtures in the library and annex due to rainwater harvest system.
- **107,568 gallons**
Annual water savings from efficient flush fixtures and rainwater harvesting
- **68%**
Annual estimate for the reduction in total potable water use (compared to similar baseline buildings) due to rainwater harvesting in conjunction with low-flow plumbing fixtures.

For more information, call 310/ 458-8223, the Watershed and Stormwater Program manager. Visit www.sustainablem.org/runoff



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City of Santa Monica Urban Watershed Management Program

Low Impact Development Strategies:

Beach Green

2030 Barnard Way



← [Completed recreational multi-use field, educational sign in foreground and traditional asphalt parking lot in left background]

← [Blending of plastic matrix pieces into the surface sand/soil layer]

[Aerial view of parking lot BEFORE installation, area in green outlines project site] →

[Netlon™ turf field with parked cars] →

The Beach Green demonstration project is an exciting example of how communities across the country, often cramped for space, can transform existing parking lots into parks and open space vital to sustainable communities; while losing no parking spots, and adding water quality protections from polluted rainwater runoff. The project provides year-round recreation and the same number of parking spaces previously available, and treats rainwater runoff originating from it and the adjacent paved parking lot by incorporating proven techniques often referred to as Low Impact Development strategies (LIDs). Any rainwater runoff flowing to this new open space will percolate into the grass surface for treatment via infiltration, a process where soil and turf root ecology neutralize low-level concentrations of pollutants commonly found in runoff.

Some eighty-three parking spaces or 28,600 square feet of asphalt were converted into the Beach Green space (PHOTO bottom left). During periods when beach parking demand is low, Beach Green and the adjacent paved parking lot (total 75,000 sq ft) remain closed to vehicular traffic and open for recreational play. During busy holidays and warm weekends (approximately six days per year), Beach Green is closed to recreation and available for overflow parking.

Beach Green uses the Netlon Advanced Turf System™ (GRAPHIC back page) with the salt/drought-tolerant Paspalum turf species. The system mixes hundreds of thousands of fabric-like polypropylene mesh matrix pieces (2" x 4") into the soil. The pieces are blended uniformly into the sand-soil medium by a special attachment on a tractor (PHOTO top right). The mesh matrix interlocks with soil particles, providing tensile resistance to the soil matrix. The random orientation of the mesh elements produces a highly reinforced soil mass, thus, allowing cars to park on the turf (PHOTO bottom right). When the grass is established, the roots penetrate and entwine with the mesh elements, further stabilizing the system. The increase in strength is achieved without any reduction in permeability, which provides for the infiltration of rainwater that is taken by turf roots or allowed to percolate into the groundwater. During a year with average rainfall (approximately 12"), this amounts to a total of 560,000 gallons of polluted water that would normally flow to the Santa Monica Bay.

The city received a grant from the State Water Resources Control Board for implementation of this project (Costa-Machado Water Act of 2000, Clean Beaches Initiative, Proposition 13). Additional support came from the city's Department of Cultural and Community Services, the Department of Public Works, and the Office of Sustainability and the Environment.

City of Santa Monica Office of Sustainability and the Environment



City of Santa Monica Urban Watershed Management Program

Low Impact Development Strategies

Rooftop Rainwater Harvesting for Indoor Use

Santa Monica Pico Branch Library

2201 Pico Blvd.



← [Santa Monica Pico Branch Library]

← [12,000 gallon cistern]

Photo by William Short

[underground vortex screening device] →

[advanced treatment train] →

The Santa Monica Pico Branch Library, completed in 2014, is Santa Monica's first municipal building to harvest rainwater for indoor use and to achieve the coveted U.S. Green Building Council's LEED™ Platinum status for innovative design. The project demonstrates the feasibility of harvesting rooftop rainwater for direct onsite indoor use: toilet and urinal flushing. The rainwater harvesting system is a practical solution that promotes overall sustainable water management and helps Santa Monica achieve its aggressive water self-sufficiency goal by 2020.

The rooftop rainwater harvesting project is a Low Impact Development (LID) strategy that implements Best Management Practices (BMPs), a proven approach for addressing urban runoff from new development, redevelopment, and building retrofits.

Rainwater is harvested from the roof of the library and the adjoining community center and then directed to an underground vortex screening device for pre-treatment to remove any sediment and debris (PHOTO bottom left). The water leaving pre-treatment is stored in an adjacent 12,000 gallon cistern (PHOTO top right). Overflow from the cistern is directed to the storm drain. Indoor water demand triggers water to be pumped through an advanced treatment train (PHOTO bottom right) which includes a sand filter, microfiltration and ultra-violet light disinfection. The treated water is stored in a 305-gallon "day" tank. This highly treated water is used for toilet and urinal flushing. In the event that the rainwater cistern is empty, a sensor sends a signal to a valve to release fresh drinking water into the pipe leading from the day tank to the facility.

A one inch rain event harvests 8,300 gallons from the building roofs. In an average year of rainfall, this equates to 100,000 gallons, replacing 80% of the expected annual demand from toilet and urinal flushing in the facility. The project also included two infiltration chambers, not connected to the cistern system, intended to infiltrate other sources of runoff from the site.

City of Santa Monica Office of Sustainability and the Environment





Thank You

310.458.8223

Neal.Shapiro@smgov.net

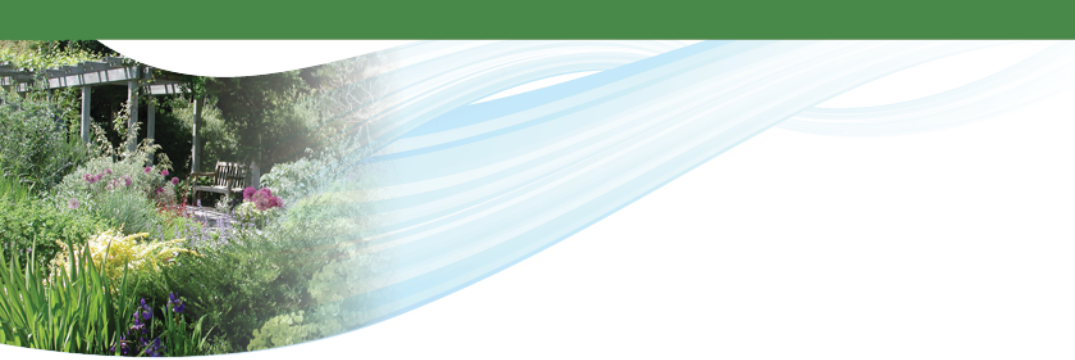
www.SustainableSM.org/runoff

Miracle on Elmer Avenue

look for



Andy Lipkis, TreePeople



Questions?

Enter them into your questions/chat box in GoToWebinar



Poll Question



- Should WaterSense and HUD work together to have more webinars?
 - Yes.
 - No.
 - It depends on what you plan to cover.



Future HUD Water Wednesday Webinars



If you would like to suggest a topic for next year's webinar series, email watersense@epa.gov.

We're specifically looking for strategies to help **affordable housing managers** use water more sustainably.

look for



2015
Green Infrastructure
Webcast Series

***Ahead of the Curve –
Implementing Green Infrastructure in Rural and Growing Communities***

December 8, 2015 (Registration in late November)

1:00pm – 2:30pm EST

GreenStream

To join send an email to join-greenstream@lists.epa.gov

Help HUD Help You!



- In concert with this training, HUD is requesting feedback on water issues via the public forum “Water Watch” on Switchboard.
- <http://switchboard.uservoice.com/forums/293865-water-watch>
- Please let them know (a) what challenges your community or organization is facing with water access and water quality; and (b) what more do you think HUD can do to help?

WaterSense Information

look for



Visit us online!

- www.epa.gov/watersense
 - [HUD webinars at www.epa.gov/watersense/hudwebinars](http://www.epa.gov/watersense/hudwebinars)
 - [BMPs at www.epa.gov/watersense/commercial](http://www.epa.gov/watersense/commercial)
- www.facebook.com/epawatersense
- www.twitter.com/epawatersense

Questions?

E-mail: watersense@epa.gov

Helpline: (866) WTR-SENS (987-7367)

