

**Governor's Water Augmentation,
Innovation, and Conservation Council
Non-AMA Groundwater Committee
January 6, 2022**



Agenda

- I. Welcome and Recap – *Rep. Gail Griffin and Jamie Kelley, Committee Co-Chairs*
- II. Further Discussions on Water Management Strategies – *Jamie Kelley, Committee Co-Chair*
- III. Overview of Available Voluntary Options and Tools to Address Water Availability – *Carol Ward, ADWR Deputy Assistant Director*
- IV. Next Steps
- V. Adjournment



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I. Welcome and Recap



*Rep. Gail Griffin and Jamie Kelley
Non-AMA Groundwater Committee Co-Chairs*

II. Further Discussions on Water Management Strategies



Jamie Kelley

Non-AMA Groundwater Committee Co-Chair

Rural Groundwater Management: Choices/Possible Features

“Buckets” of Choices:

- Those that relate to **governance and structure** (how should decisions be made, across what geography, who has what authorities and responsibilities, etc.)
- Those that relate to **groundwater management “tools”** (specific programs, authorities, practices)

Both sets of choices can be informed by a foundational question:

What are the various possible objectives/goals/needs for additional groundwater management in rural areas?

Examples of “Governance” Choices/Issues

How is groundwater management structured, how are decisions made, and by whom?

- **Area/extent.** What is the appropriate area/extent of management?
- **Criteria.** What are the appropriate criteria for “designating” an area for special/new groundwater management?
- **Designation.** How and by whom should an area be designated? What are the available process(es)?
- **Goals.** How should the goals for management be established?
- **State/local control.** How should state and local control be allocated or balanced? What are the roles for different levels of government and decision-making?

Examples of “Governance” Choices/Issues (cont.’d)

How is groundwater management structured, how are decisions made, and by whom?

- **Selection of management plans and actions.** Who identifies the appropriate management “tools” and how? (Is a management plan created? By whom? How is it approved?)
- **Implementation.** How and by whom are management tools implemented?
- **Changes.** Can management goals, plans, and tools be amended? Rescinded? Under what conditions?
- **Funding and resources.** How are management activities funded and resourced?

Examples of “Tools” Choices/Issues

*What management “tools”/programs/authorities should be made available?
E.g.:*

- **Planning tools**
 - Management plans and management goals
 - Study and advisory boards
 - Monitoring and modeling

- **Conservation tools**
 - Conservation ordinances
 - Tiered water rates
 - Best management practices
 - Limits on quantities of individual uses
 - Limits on certain types of uses

- **Allocative tools**
 - Assignment of defined water rights or interests
 - Trading of groundwater rights or interests

Examples of “Tools” Choices/Issues (cont.’d)

*What management “tools”/programs/authorities should be made available?
E.g.:*

- **Protection of existing uses or resources**
 - Groundwater mitigation or offset programs
 - Well or groundwater withdrawal permitting
 - Well-spacing or impact requirements
 - Protection zones
- **Reuse & replenishment tools**
 - Use of recycled water
 - Aquifer recharge
 - Aquifer storage and recovery

Examples of “Tools” Choices/Issues (cont.’d)

*What management “tools”/programs/authorities should be made available?
E.g.:*

- **Land use-related tools**
 - Assured or adequate water supply program
 - Integrated local land and water planning
 - Conservation easements
- **Supportive tools**
 - Financing mechanisms
 - Educational & community engagement programs
 - Data tools & informational websites

III. Overview of Available Voluntary Options and Tools to Address Water Availability



Carol Ward, ADWR Deputy Assistant Director

Voluntary Water Management Strategies



Roosevelt Dam, credit SRP



Superstition Mountain Recharge Project, credit City of Chandler



Graywater use, credit Tucson Water Graywater Guide



LID feature, credit C. Ward



Credit: SteveMartino.net



Objectives

FOCUS: conservation and efficiency best management practices; graywater reuse, water harvesting, and low impact development

- 1) Provide perspective on the potential for additional conservation
- 2) Share some sources of information on the many best practices implemented in Arizona
- 3) Provide links to resources and additional information that support implementation
- 4) Discussion of committee goals and priorities for this topic

Note: resources and information sources are examples and not comprehensive



Questions for Consideration

- Does the committee want to undertake the development of recommendations to support additional efficiency and conservation outside the AMAs?
- Does the committee wish to develop recommendations regarding graywater reuse, rainwater/stormwater harvesting, and low impact design?
 - consider overlap with the stormwater harvesting discussion in the LTWA Committee

If so, how would the committee like to prioritize and pursue developing these recommendations?



Conservation Potential

The potential for demand reductions is dependent on how complex factors unfold and the degree to which demand reductions have already been implemented

Water demand characteristics, supply systems and portfolios, opportunities, and measures implemented to date are among the factors influencing potential

There is significantly more efficiency and conservation to achieve on a broad scale and it will typically be the most affordable and easiest “new” supply to secure

Typically, efficiency and conservation alone won't be sufficient; a suite of solutions will need to be employed to ensure long-term water supply reliability



Conservation Potential, Trends: More Information

[Colorado River Basin Supply and Demand Study \(2012\)](#)

Defined current and future imbalances in water supply and demand in the Colorado River Basin and the adjacent areas of the Basin States that receive Colorado River water for approximately the next 50 years and developed and analyzed adaptation and mitigation strategies to resolve those imbalances.

[Moving Forward Report \(2015\)](#)

Documents opportunities and potential actions to address the future water supply and demand imbalances projected in the 2012 Colorado River Basin Water Supply and Demand Study. Includes comprehensive appendices of policies, programs, funding opportunities, and case studies of conservation and efficiency efforts, broken out by state



Conservation Potential, Trends: More Information

[USGS Estimated Use of Water in the United States](#)

The USGS compiles data to produce water-use information aggregated at the county, state, and national levels. Every five years, data at the county level are compiled into a national water-use data system and State-level data are published. Website provides information on water use trends over time.

[EPA WaterSense](#)

WaterSense® is a voluntary, public-private partnership program sponsored by the U.S. Environmental Protection Agency (EPA) that is a label for water-efficient products, a resource for helping consumers and businesses conserve water, and a catalyst for market transformation. Annual reports document progress in the uptake of water efficient products and programs.



Conservation Potential, Trends: More Information

[Residential End Uses of Water](#) (1998), AWWA Research Foundation

[Residential End Uses of Water, Version 2: Executive Report](#) (2017), Water Research Foundation

Nationally recognized benchmarking studies for residential water uses. The 2017 report documents trends in residential end uses and describes anticipated reductions in residential water use.

[Multi-City Single Family Water Use Study](#) (2019)

Research funded through ADWR's Water Management Assistance Program and undertaken by the Cities of Glendale and Phoenix and the Town of Gilbert. Investigated the extent to which water use by single family dwellings varies across Phoenix Metropolitan Area, and why, to inform future water use scenarios and understand demand reduction potential.

Recalibrating our Planning Assumptions: Causes and Consequences of Declining Domestic Demand. Gary Woodard. AZWater Association Conference. May 2014.

A Forecast Model of Single Family Residential Water Demand for Pima County. Gary Woodard. SAWUA Board Meeting. November 2014.



Best Practices – Resources – Moving Forward

[Moving Forward Report \(2015\)](#)

Result of two years of work by a broad group of expert stakeholders representing the municipal and industrial, agricultural, and environmental and recreational sectors from across the Colorado River Basin to understand the opportunities and challenges to water management strategies to address the imbalance between water demands and available supply.

Compiled current and historical conservation and reuse efforts and documented trends in municipal and industrial conservation and reuse in areas receiving Colorado River water. Documented agricultural efficiency, conservation, and production.

Includes comprehensive appendices of policies, programs, funding opportunities, and case studies of conservation and efficiency efforts, broken out by state.



Best Practices – Management Plans

A series of regulatory management plans must be developed to assist the AMAs toward their statutory management goals.

Built with extensive local stakeholder input and guidance from local Groundwater Users Advisory Councils.

Serve as an in-state technical resource, a valuable starting point for information and guidance.

Each plan includes conservation programs and best practices.

The BMP lists, developed by the stakeholders, working with ADWR staff, provide comprehensive compilations and definitions of the approved best management practices available to the water use sectors.

100+ BMPs are covered. They are not specific to the AMAs and are widely applicable, standard practices.



Best Practices – Management Plans - Agriculture

Draft 5MP Agricultural BMPs list

Category 1 - Water Conveyance System Improvements: A farm’s water conveyance system allows water to be conveyed from an irrigation district delivery point or a well head for irrigation of each field.

Lined Ditch	Pipelines	Drainback System
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Category 2 – Farm Irrigation System Improvements: the methods by which a farm field is irrigated. Farm irrigation systems include slope, modified slope, level or near level, sprinkler, trickle or drip, or any combination thereof.

Slope systems without uniform grades with tailwater reuse	Uniform slope systems without tailwater reuse	Uniform slope systems without tailwater reuse
Uniform slope systems with tailwater reuse	Uniform slope within an irrigation district that captures and redistributes return flows	Modified slope systems
High pressure sprinkler systems	Minimum qualifying low pressure sprinkler systems	Minimum qualifying trickle irrigation systems
Near level systems	Level systems	Qualifying low pressure sprinkler systems
Qualifying trickle irrigation systems		



Best Practices – Management Plans - Agriculture

Category 3 – Irrigation Water Management Practices: include management practices that, when implemented properly, will increase a farm’s overall efficiency of water application in a growing season.

Laser or GPS touch-up	Low pressure sprinkler system annual maintenance	Trickle irrigation advanced maintenance drip trip or line replacement program
Alternate row irrigation	Furrow checks	Angled rows/Angled borders/contour farming
Surge irrigation	Temporary sprinklers	Participation in an educational irrigation water management practice
Participation in an irrigation scheduling service	Participation in an irrigation district program to increase the flexibility of water deliveries	Measure flow rates to determine the amount of water applied
Soil moisture monitoring	Computer based modeling using meteorological data	

Category 4 – Agronomic Management Practices: include management practices that, when implemented properly, will increase a farm’s overall efficiency of water application in a growing season.

Crop rotation	Crop residue management	Soil and water quality testing
Alternate row irrigation	Furrow checks	Angled rows/Angled borders/contour farming
Pre-irrigation surface conditioning	Transplants	Mulching
Shaping furrow or bed	Planting in bottom of furrow, bed, or border	Chemical maintenance of trickle irrigation system
Use of polyacrylamide in applied irrigation		



Best Practices – Management Plans - Municipal

[Draft 5MP Municipal BMPs list](#)

Category 1 - Education and Public Awareness: designed to raise awareness of the need for water conservation or to educate and/or train a specific audience on water conservation practices.

Local or Regional Conservation Campaign	Special Events, Programs, and Community Presentations	Residential Adult Education and/or Training Program
Non-Residential Adult Education and/or Training Program	Youth Education	Xeriscape Demonstration Garden
Industry and/or Regional Partnerships		

Category 2 - Targeted Outreach and Consultation: designed to develop a relationship between customers and their water providers. These BMPs should increase a provider’s involvement with its customers through outreach and/or consultation related to water conservation.

New Homeowner Outreach	Residential Audit and Landscape Consultation	Non-Residential Audit and Landscape Consultation
Residential Water Budget	Non-Residential Water Budget	Customer High Water-Use Inquiry Resolution
Customer High Water-Use Notification		



Best Practices – Management Plans - Municipal

Category 3 - Physical System Evaluation and Improvement: designed to reduce water loss by evaluating water distribution systems for leaks and/or malfunctioning equipment and implementing plans to correct the issues.

Distribution System Leak Detection and Mitigation	Meter Repair or Replacement	Advanced Metering Infrastructure (AMI) Installation
Advanced Metering Infrastructure (AMI) Maintenance and Utilization	Approved Comprehensive Water System Audit Program	

Category 4 - Sustainable Water Governance: designed to reduce water use within the provider's service area by implementing ordinances or tariffs. Includes conservation rate structures.

Low-Water-Use Landscape Requirements	Water Tampering and/or Water Waste Prohibition	Plumbing Requirements
Water Feature Limitations	Water-Efficient Model Home Landscape Requirements	Graywater or Rainwater System Requirements
Water Intensive Commercial User Requirements	Landscape Watering Restrictions	Water-Efficient Hot Water Device or System Requirements
Retrofit on Resale	Non-Residential Landscape Water-Use Efficiency Standards	Conservation Rate Structure



Best Practices – Management Plans - Municipal

Category 5 - Residential Conservation Incentives: designed to encourage residential water users to reduce water use through no interest or low interest loans, financial rebates, and other incentives.

Residential Customer Assistance	Residential Toilet Incentive	Residential Smart Irrigation Technology Incentive
Residential Water-Efficient Appliance Incentive	Residential Graywater Incentive	Residential Rainwater Harvesting Incentive
Residential Xeriscape Installation and/or Conversion Incentive		

Category 6 - Non-Residential Conservation Incentives: designed to encourage non-residential water users to reduce water use through no interest or low interest loans, financial rebates, and other incentives.

Commercial and Industrial Customer Incentive	Non-Residential Toilet and/or Urinal Incentive	Non-Residential Smart Irrigation Technology Incentive
Non-Residential Water-Efficient Appliance Incentive	Non-Residential Graywater Incentive	Non-Residential Rainwater Harvesting Incentive
Non-Residential Xeriscape Installation and/or Conversion Incentive		



Best Practices – Management Plans - Municipal

Category 7 - Planning: related to planning and long-term sustainability of water supply.

Land Use Planning and Water Utility Coordination and Communication	Staff Education or Training	Non-Residential Water-Use Plan
Integrated Long-Range Planning	Conservation-Oriented Development	

Category 8 – Research, Analysis, and Innovation: designed to encourage water providers to conduct systematic evaluations of conservation measures already implemented, research and implement state-of-the-art water conservation technologies and techniques, and/or develop or try new technologies and techniques.

Market Surveys and/or Focus Groups	Research of a New Technology and/or Technique	Pilot Plan Development for a New Technology and/or Technique
Piloting a New Technology and/or Technique	Quantitative Evaluation of Actual Water Savings of an Existing Best Management Practice (BMP) or of a New or Emerging Technology Practice	



Best Practices – Management Plans - Industrial

In the AMAs, certain industries that have their own groundwater rights are defined as industrial water users, including: dairies, cooling facilities, power plants, mines, turf facilities, and golf courses.

Best practices, developed with stakeholder input, are described in the plans for many of these sectors

Base conservation requirements include best practices such as measures such as cycles of concentration for cooling towers, water budgets, and design specifications for efficiency and minimizing water use



Best Practices - Arizona Conservation Reports & Surveys

[ADWR Municipal Provider Conservation Report](#) - describes the programs, best practices, and which practices each provider in the Non-Per Capita Program implements. More details about each provider's efforts can be obtained from the annual provider reports.

2010 Summary of Municipal Conservation Programs in Arizona ([Intro](#) & [Summary](#)) - Survey of 162 large municipal providers yielded responses from 60 providers inside the AMAs and 2 outside the AMAs. Collectively reported they implemented approximately ~750 BMPs.

Reports provide examples of the conservation and efficiency measures and programs implemented in the state and enable stakeholders to explore what others are doing.



Best Practices - Muni Conservation & Efficiency Groups

Conservation & Efficiency Committee, [AZWater Association](#) (local AWWA section)

Committee comprising conservation and efficiency members from utilities across the state to network and facilitate information sharing, among other goals. Replaced the long-standing Statewide Water Conservation Sharing Group.

Conservation Efficiency Advisory Group convened by AMWUA since the share information, discuss issues, and facilitate cooperation and coordination in the development and implementation of regional water efficiency, conservation, and sustainability efforts.



Best Practices - ADWR Resources

ADWR provides extensive resources to support the efficiency and conservation efforts of the regulated community and the general public on its website

ADWR Technical Staff:

Council Staff: John Riggins, Jenna Norris, Nadene Hubbard

Drought and Conservation Programs: Némesis Ortiz-Declet

Community Water System Program: Catherine Riedel

Rural Programs: Karen Modesto

AMA Municipal Planner: Colette Pansini

AMA Industrial Planner: Nick Redendo

AMA Agricultural Planner: vacant



Best Practices – Planning, Implementation, Resources

[Drought & Conservation - How Do They Work Together fact sheet](#)

Assists Arizona's Community Water Systems in developing drought preparedness and conservation plans.

[Matching Service Area Characteristics with BMPs](#)

A matrix designed to assist providers in choosing water conservation measures that best fit their service area needs.

[Guidelines for Preparing Water Conservation Plans](#)

Describes the water conservation measures that water utilities can use to design water conservation programs. As part of their conservation plans, planners should consider, at a minimum, each of the measures specified in the Basic, Intermediate or Advanced Guidelines, depending on which set of Guidelines apply to the water system. Chapter 3 assists water providers in developing a system profile by taking inventory of existing resources and conditions (see Worksheet 3-1, page 47).



Best Practices - Planning, Implementation - Resources

[Handbook of Water Use and Conservation: Homes, Landscapes, Businesses, Industries, Farms](#)

464-page handbook by noted expert Amy Vickers that describes water use characteristics, water audit steps, and **over 100 efficiency measures for homes, landscapes, industries, businesses, and farms**. Provides estimated water savings and related benefits and costs for the measures and offers many case studies.

[AWWA M52 Water Conservation Programs Planning Manual](#)

Provides water utilities and water professionals with information to develop, implement and measure the success of a water conservation program. The second edition reflects progress within water conservation and efficiency, including updated water loss control methodology and the evaluation of cost-effective measures.



Best Practices - Planning, Implementation - Resources

[G480 American National Standards Institute \(ANSI\) Standard for Water Conservation Program Operation and Management](#)

AWWA utility management standard. Designed to serve water, wastewater, and reuse utilities, their customers, owners, service providers, and regulators. Includes formal management and operation guidelines. Describes the critical elements of an effective water conservation program.

[AWWA M36 Water Audits and Loss Control Programs, Fourth Edition](#)

This manual, paired with AWWA's free Water Audit Software, gives utilities the guidance to establish and improve their water loss program.



Best Practices - Planning, Implementation - Resources

Irrigation Management Service (IMS)

Mobile irrigation lab assists farmers with on-site irrigation technical assistance with the goal to provide technical irrigation services to as many producers as possible. A long-standing program funded through the ADWR Water Management Assistance Program. Annual reports of activities available on the [WMAP page](#).

[The USDA Natural Resources Conservation Service \(NRCS\)](#)

NRCS works with landowners, land operators, and others through conservation planning and assistance to benefit the soil, water, air, plants, and animals for productive lands and healthy ecosystems. NRCS uses science-based technology, tools, and applications to support sound natural resources conservation. The service provides conservation innovation grants, technical guides, standards, and assistance, tools and resources.



Best Practices - Planning, Implementation - Resources

[The Irrigation Association](#)

The leading membership organization for irrigation equipment and system manufacturers, dealers, distributors, designers, consultants, contractors and end users. Dedicated to promoting efficient irrigation technologies, products and services.

Offers [seven certification programs](#) for professionals specializing in turf, landscape, golf course, and agricultural irrigation. Certified irrigation contractors, designers with a landscape and turf irrigation specialty, or golf and landscape irrigation auditors qualify for the EPA WaterSense program.



Best Practices - Planning, Implementation - Resources

[Alliance for Water Efficiency](#)

A broad, stakeholder based north American association advocating for the efficient use of water. Provides technical expertise, professional networking, an extensive resource library, facilitates research and resource development, and advocates for sound policy and investment in water efficiency. Focused on municipal, industrial, commercial, and institutional efficiency and conservation.

[WaterSense at Work: Best Management Practices for Commercial and Institutional Facilities](#)

Guidance from EPA WaterSense to assist help managers and owners of restaurants, office buildings, hotels, schools, hospitals, and other building types to identify and implement best practices for saving water and energy.



Rainwater / Stormwater Harvesting and Low Impact Design

- **Rainwater harvesting:** generally describes measure to capture of rainwater off the roof in rain barrels, simple landscape contouring to retain rainfall on site; cisterns and systems to deliver captured rainwater to gardens and landscape plants, or even for uses like toilet flushing.
- **Stormwater harvesting:** often used to describe modifying the hydrology of an area to enhance groundwater recharge by retaining and directing surface water flows to infiltrate into the aquifer.
- **Low impact design (LID):** refers to measures to slow and sink rainwater on site and to adopt measures at a larger development scale to manage and retain stormwater on site for multiple benefits.
- The **most practical approach will depend** on a variety of factors — regulation, climate and weather patterns, economics, availability of other water supplies, and culture



Rainwater / Stormwater Harvesting & LID - Resources

[Desert Water Harvesting Initiative](#)

Established by the UA Water Resources Research Center to enhance outreach and communication between utilities, practitioners of water harvesting, academics, and interested citizens.

The Initiative has developed several products designed to increase the understanding and use of water harvesting including:

Water Harvesting Assessment Toolbox - a prototype decision aid

- designed to help communities in the Southwest understand the role water harvesting can play in meeting water resource challenges while providing multiple additional benefits
- introduces water harvesting techniques and suggests ways to implement locally appropriate water harvesting efforts












Rainwater / Stormwater Harvesting & LID - Resources

Low Impact Development Toolkit

- Intended to identify current stormwater management practices and national and regional LID best practices, providing a living document with simple, updatable tools, that can guide the city and their businesses and residents, toward more sustainable stormwater design practices of LID into municipal projects

MEANS TO ACCOMPLISH ACTIONS

TECHNICAL VARIATIONS	MEANS TO ACCOMPLISH ACTIONS								
	GREEN STREET	VEGETATED SWALE	BIORETENTION	PERMEABLE PAVING	CONSTRUCTED WETLANDS	INFILTRATION & UNDERDRAINS	GREEN ROOF	RAINWATER HARVESTING	LANDSCAPE*
	Standard Curb Cut Curb Cut with Sidewing Concrete Flush Curb Grated Curb Cut Curb Cut with Sediment Capture Wheelstop Curb	Meandering or Linear Restored Wash	Vegetated Retention Basin Bioretention Cell Planter	Stabilized Aggregate Porous Asphalt Porous Concrete Structural Grids Permeable Pavers	Constructed Wetlands	Infiltration & Underdrains	Rooftop Garden Downspout Disconnection	Cisterns Above Ground Cisterns Below Ground	Tree Preservation Soil Amendment Impervious Surface Reduction Plant Selection
									



Rainwater / Stormwater Harvesting & LID - Resources

[A Guide to Selecting Underground Water Storage and or Aquifer Augmentation Sites](#)

Provides resources and information that individuals and groups can use as a guide when evaluating underground water storage and aquifer augmentation potential on public or private land, including Arizona State Trust Land

[Potential Water Storage Sites on Arizona State Trust Land](#)

Identifies 331 potential sites across Arizona for potential underground storage and/or aquifer augmentation



Graywater Reuse

Graywater is wastewater collected from the drains of hand-washing sinks, showers, bathtubs, and clothes washing machines.

Regulated by ADEQ.

Arizona has one of the most permissive graywater polices in the US, particularly for residential use.

Private residences to reuse less than 400 gallons of graywater a day without a written permit, so long as the homeowner complies with a simple set of best management practices, designed to protect public health and the environment. BMPs are described in a simple pamphlet.

There is a permitting process for commercial, multi-family, and large-scale residential users.



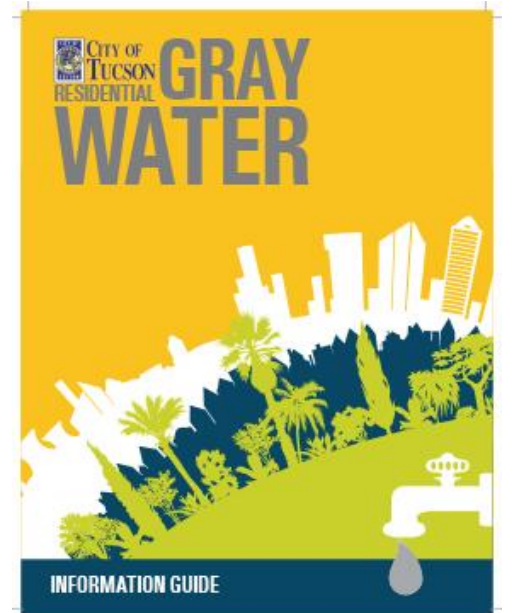
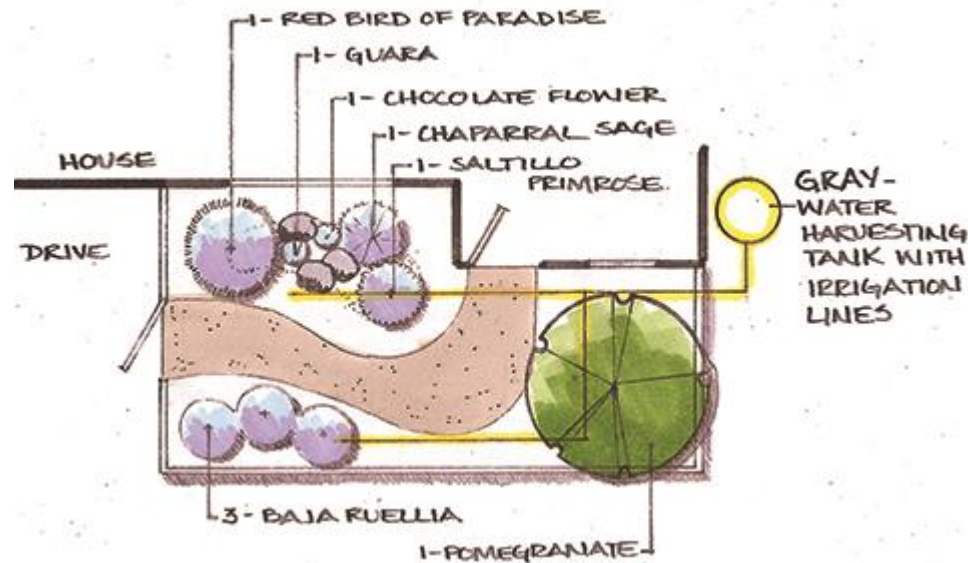
Graywater Reuse - Resources

[City of Tucson Residential Graywater Guide](#)

This guide supports the City of Tucson Residential Graywater Ordinance that requires all new single family homes and duplexes to include in the plans plumbing for graywater distribution.

[Using Gray Water at Home](#)

ADEQ pamphlet on gray water best practices.



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- Does the committee want to undertake the development of recommendations to support additional efficiency and conservation outside the AMAs?
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 - consider overlap with the stormwater harvesting discussion in the LTWA Committee

If so, how would the committee like to prioritize and pursue developing these recommendations?



IV. Next Steps



v. Adjournment

