

AGENDA

**COUNCIL WATER ISSUES COMMITTEE
NOTICE OF PUBLIC MEETING
Wednesday, July 5, 2017
10:00 a.m.**

**Prescott City Hall
Lower Level Conference Room
201 South Cortez St., Prescott, Arizona
(928) 777-1100**

The following Agenda will be considered by the Council Water Issues Committee at its meeting on **Wednesday, July 5, 2017, at 10:00 a.m.** in the Lower Level Conference Room, 201 South Cortez Street, Prescott, Arizona. One or more members of the Council may be attending this meeting through the use of a technological device.

- A. Call to Order.
- B. Roll Call.

COUNCIL WATER ISSUES COMMITTEE MEMBERS:

Chairman Jim Lamerson
Member Steve Blair
Member Steve Sischka

- C. Approval of Minutes of the June 6, 2017, Council Water Issues Committee Meeting
- D. Alternative Water Portfolio Update
- E. Rainwater Harvesting Policy
- F. Adjournment

CERTIFICATION OF POSTING OF NOTICE

The undersigned hereby certifies that a copy of the foregoing notice was duly posted at Prescott City Hall on _____ at _____ m. in accordance with the statement filed by the Prescott City Council with the City Clerk.

Virginia Mefford, Interim City Clerk

COUNCIL WATER ISSUES
COMMITTEE
REGULAR MEETING
TUESDAY, JUNE 6, 2017
PRESCOTT, ARIZONA

MINUTES OF THE REGULAR MEETING OF THE COUNCIL WATER ISSUES COMMITTEE HELD ON JUNE 6, 2017, in the LOWER LEVEL CONFERENCE ROOM, located at CITY HALL, 201 SOUTH CORTEZ STREET, Prescott, Arizona.

A. Call to Order.

Mayor Pro Tem Lamerson called the meeting to order at 9:01 a.m.

B. Roll Call.

COUNCIL WATER ISSUES COMMITTEE MEMBERS:

Present:

Chairman Jim Lamerson
Member Steve Blair
Member Steve Sischka arrived 9:06 am.

Absent/Excused

Staff Present:

Michael Lamar, City Manager
Virginia Mefford, Deputy City Clerk
Clyde Halstead, Assistant City Attorney
Craig McConnell, Regional Programs Director
Leslie Graser, Water Resources Manager

C. Approval of minutes of the May 2, 2017, Council Water Issues Committee meeting.

COUNCILMAN BLAIR MOVED TO APPROVE THE MINUTES OF THE MAY 2, 2017, WATER ISSUES COMMITTEE MEETING; SECONDED BY MAYOR PRO TEM LAMERSON; PASSED 2-0.

D. Alternative Water Portfolio Update

Leslie Graser, Water Resource Manager, reviewed the Alternative Water Budget. She said for Calendar Year 2017 (January 1, 2017, through December 31, 2017), alternative water was made available ("budgeted") by Council in the categories below; the current remaining unallocated balances are also indicated:

Water Issues Committee Meeting Minutes

	Budget	Amount of Budget Remaining
1. Residential	70 acre-feet	21.35 acre-feet (AF) ¹
2. Commercial	100 acre-feet	100 acre-feet

Ms. Graser said no single project was eligible for allocation of more than 50% of the annual budgeted quantity (residential or commercial), or of the remaining balance during the calendar year.

Ms. Graser said at year-end 2017, if the preceding quantities are fully allocated, 50 AF would be the opening balance for Calendar Year 2018 according to the policy adopted December 13, 2016, which identified an annual transfer of 50 AF from the vacant, residentially zoned tract reservation (until that reservation is extinguished). The actual volume recommended for 2018 may be more than 50 AF, depending upon any unallocated, year-end 2017 balance.

Water Service Agreement (WSA) Requests on this Agenda

Application No.	Applicant	Type of Development	Total Project Qty Required	Alternative Water		
				GGW ²	Reserved	Not Reserved ³
17-008	W.D. Properties	21 APTS	2.52 AF	0.35 AF		2.17 AF
17-012	Hooper	1 SFR	0.25 AF			0.25 AF
17-014	Satu Dewi Ltd	1 duplex (2 MF)	0.30 AF	0.15 AF		0.15 AF
17-015	Vinton	1 SFR + 2 APTS	0.55 AF	0.25 AF		0.30 AF

SFR = single-family residence MF = multi-family APTS = apartments

¹ 28.35 AF – 7.0 AF set aside pending U.S.VETS MF housing grant (Res. No. 4385-1596, 5/23/17)

² GGW = eligible for Pre-1998 grandfathered groundwater

³ Requires allocation from remaining current calendar year alternative water budget (21.35 AF)

Mayor Pro Tem Lamerson asked Ms. Graser for clarification on the threshold for administrative approval of water service agreements by the City Manager.

Ms. Graser explained it would be for less than 4 units.

NO ACTION WAS TAKEN.

E. Rainwater Harvesting Policy

Craig McConnell, Regional Programs Director, said at the Study Session of April 25, 2017, several Councilmember's expressed an interest in recognizing the contribution rainwater harvesting could make in reducing outdoor potable water use, by offering, as an additional incentive, a lesser unit allocation (enabling more units per acre-foot of water) for residences built with qualifying installations. As stated then, the subject was previously raised by the Water

Water Issues Committee Meeting Minutes

Issues Committee, at which time the Water Resource Management Division recommended the following:

Rainwater harvesting – Water-Efficient Residential Development, as described herein, relies upon EPA WaterSense® best practices, including outdoor (landscaping) improvements. No specific consideration was proposed for rainwater harvesting as a means of reducing potable outdoor water use; however, it should be noted that the City offers a conservation rebate for installing qualifying storage (<http://waterrebates.com/az-prescott>), and the homeowners will benefit from recurring savings on their water bills.

Mr. McConnell said some concerns were expressed at the Study Session regarding offering a lesser unit allocation as described: to what type(s) of rainwater harvesting the incentive would apply (barrels, above or below-ground cisterns), how to determine the reduction quantity (the fraction of an acre-foot offset in potable water use provided by the rainwater harvesting), whether the rainwater harvesting equipment would be properly maintained, sediment removed, etc., and consistently used in the long-term future. Additionally, it was conceivable that to the extent a property with rainwater harvesting was more extensively landscaped to take advantage of that irrigation source, in years of drought, if the rainwater harvesting storage/replenishment was insufficient to properly sustain the landscaping, an increase in potable water could actually result.

Mr. McConnell said to more fully address this topic, Resolution No. 4380-1589 directed:

Section 3 THAT the Water Resource Management Division shall conduct additional research, engage appropriate stakeholders and experts, and report to the Council Water Issues Committee, and said Committee shall provide a recommendation and/or alternatives to the Council within sixty (60) days of the date hereof, for further consideration of rainwater harvesting as it relates to unit allocations for residential development.

Mayor Pro Tem Lamerson briefed Councilman Siscka on his arrival what had been discussed at the meeting so far.

Councilman Siscka asked how deep into the topic of rainwater harvesting and incentives the discussion should go.

Mr. McConnell suggested that any City program be kept simple; similar comments were received from community stakeholders on the survey sent to them.

Mr. McConnell stated that the results of the survey and recommendations from the Water Resource Management Division would be presented to the Committee at the July meeting.

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F. Applications for Water Service Agreements

1. W.O. Properties (WSA 17-008)

Ms. Graser presented, and showed a map regarding the area of interest.

Ms. Graser said Water Service Agreement Application No. WSA 17-008 was submitted on March 6, 2017, by W.O. Properties, seeking an alternative water allocation for a new apartment complex consisting of 21 units. The application was accepted in accordance with the Water Management and Calendar Year 2017 Alternative Water Allocation Policy. APN 113-03-005 is part of the Dameron Park Addition, and zoned Multi-family Medium (MF-M). The one (1) single-family residence now located upon the property would be removed.

Ms. Graser said Site Plan SI17-002 was also submitted for the project, and at their April 27, 2017, meeting, the Planning & Zoning Commission recommended approval of the site plan by Council.

Ms. Graser said due to this property having one (1) existing single-family residential unit, 0.35 acre-foot (AF) of grandfathered groundwater was available to offset, in part, the water necessary for the apartments. Following Council revision of the unit allocations of alternative water required for residential development at their May 9, 2017, meeting, and with the assumption that the 21 units will be separately metered (sub-metered), a total of 2.52 AF will be necessary; applying the 0.35 AF credit, the net alternative water required would be 2.17 AF: $21 \text{ units} \times 0.12 \text{ AF/unit} - 2.52 \text{ AF} - 0.35 \text{ AF} = 2.17 \text{ AF}$.

Mr. McConnell commented that the W.O. Properties application does not meet any of the three Policy 16 exemptions. Accordingly, it is deemed a new apartment application for which the Policy prescribes deferral. Alternatively, the applicant may submit to the Water Resource Management Division a statement describing the particular community benefit the project would bring, for transmittal to/review by the Committee, and subsequent consideration by the Council. The applicant had been informed of this status.

Mayor Pro Tem Lamerson asked if the applicant could come back and re-submit at a later date for further consideration.

Mr. McConnell said that was correct.

Councilman Blair said that it would not be in the community's interest to facilitate building apartments that will sit empty. He asked what the total number of approved but unbuilt apartments is.

Mr. McConnell responded that there are over 1,000 unbuilt apartment units for which water has been allocated.

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Mayor Pro Tem Lamerson said that balancing apartment inventory and demand is what's important to the community.

Councilman Blair said that due to the limited availability of alternative water, new apartment projects should continue to be looked at carefully as to whether they're needed.

Mr. McConnell said that when alternative water is allocated, it is accompanied by a performance requirement. Although the water is tied up for the performance period, if the project is not built, the water service agreement expires, and the unused alternative water is returned to the General Pool as a resource available for other projects.

NO ACTION WAS TAKEN.

2. Kirk N. & Connie S. Hooper (WSA 17-012)

Ms. Graser presented, and showed a map regarding the area of interest.

Ms. Graser said the Water Service Agreement Application No. WSA17-012 was submitted April 26, 2017, seeking an alternative water allocation for an existing single-family residence on land within the City limits. For water service, the subject residence currently relies on the meter serving the adjacent lot due to both parcels previously being under single ownership. She said this request can be administratively approved by the City Manager. According to the 2017 Water Management Policy, as amended, an alternative water allocation of 0.25 acre-foot was required.

Mr. McConnell said that a separate meter for the subject parcel is required by the City Code.

Councilman Sischka asked who would pay for the connection.

Mr. McConnell said that it is the responsibility of the property owner.

Mayor Pro Tem Lamerson brought up the subject of fire protection.

Councilman Blair said that it was ironic that there was a water impact fee for connection to the City system, but no impact fee for fire protection of the separate parcel.

Mayor Pro Tem Lamerson said he understood the frustration. The City has to provide fire protection without any extra fee to help pay for it.

Mr. McConnell commented that there was a presumption that alternative water would be available for the new meter required by the City Code. If the property owners came in today to split the lot, they would be directed to a Pre-Application Conference, and provided information regarding zoning, water, and other aspects. If no alternative water was available for the separate meter, the lot could not be split.

NO ACTION WAS TAKEN

3. Satu Dewi Ltd (WSA 17-014)

Ms. Graser presented, and showed a map of the project area.

Ms. Graser said the Water Service Agreement Application No. WSA17-014 was submitted on May 22, 2017, by Steve Perry, representative for Satu Dewi Ltd, seeking an alternative water allocation for a new duplex on land within the City limits. The parcel had a current and committed groundwater supply for one (1) dwelling unit. The project will require an allocation of alternative water by the City to augment the current and committed groundwater supply in order to serve the increased water demand of two (2) dwelling units. She said per the City Water Management and Calendar Year 2017 Alternative Water Allocation Policy, as amended, the applicant submitted Water Service Agreement Application No. WSA17-014. This request can be administratively approved by the City Manager. According to the Policy, an alternative water allocation of 0.15 acre-foot was required.

NO ACTION WAS TAKEN.

4. Jacob Vinton (WSA 15-015)

Ms. Graser presented, and showed a map of the project area.

Ms. Graser said the Water Service Agreement Application No. WSA17-015 was submitted May 12, 2017, by Jacob Vinton, seeking water service for a new single-family residence and two (2) new apartment units to be located on land not presently developed for residential use within the City limits. The parcel had a current and committed groundwater supply for one (1) single-family dwelling unit. The project will require an allocation of alternative water to augment the current and committed groundwater supply, in order to serve the two apartment units: 2 units x 0.15 acre-foot (AF) per unit = 0.30 AF. She said per the City Water Management and Calendar Year 2017 Alternative Water Allocation Policy, as amended, the applicant submitted Water Service Agreement Application No. WSA17-015. This request can be administratively approved by the City Manager. As stated, an alternative water allocation of 0.30 AF will be required.

NO ACTION WAS TAKEN.

G. Change of July Meeting time/date to 9:00 am, Wednesday, July 5, 2017

Mr. McConnell corrected the meeting start time to 10:00 am on July 5, 2017.

Ms. Hoy introduced Mr. Fred Oswald, and said that he was a rainwater harvesting guru.

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Mr. Oswald said he was a retired mechanical engineer from NASA. He commented that education on the rainwater harvesting is needed.

Mayor Pro Tem Lamerson said rainwater harvesting can encourage using less potable water.

Councilman Sischka mentioned that the current City water conservation incentive for rainwater harvesting is a one-time utility bill credit.

Jim Holt, in the audience, shared that the Upper Verde River Watershed Protection Coalition would be embarking on a rainwater harvesting project.

Mayor Pro Tem would be curious to see how the government would look at this from a private sector point of view.

Councilman Blair said he would like to see a landscape forum, to educate on various xeriscape landscaping for the backyard.

Ms. Hoy said they did hold meetings on landscaping ideas, and they had various videos online.

The Committee members commented that additional education and discussion of rainwater harvesting would be beneficial to the community.

H. Adjournment

There being no further business to be discussed, the Council Water Issues Committee adjourned the Public Meeting of June 6, 2017, at 9:39 a.m.

JIM LAMERSON, Chairman

ATTEST:

Virginia Mefford, Interim City Clerk

COUNCIL WATER ISSUES COMMITTEE AGENDA MEMO July 5, 2017
DEPARTMENT: City Manager (Water Resource Management)
AGENDA ITEM: Alternative Water Portfolio Update

Approved By:	Date:
Water Resource Manager: Leslie Graser	
Regional Programs Director: Craig McConnell	

Summary

For Calendar Year 2017 (January 1, 2017, through December 31, 2017), alternative water was made available ("budgeted") by Council in the categories below; the current remaining unallocated balances are as indicated:

	<u>Budget</u>	<u>Amount of Budget Remaining</u>
1. Residential	70 acre-feet	20.65 acre-feet (AF) ¹
2. Commercial	100 acre-feet	100 acre-feet

¹ 21.35 AF – 0.7 AF administratively approved projects on June 6, 2017, agenda = 20.65 AF

No single project is eligible for allocation of more than 50% of the applicable preceding quantity (residential or commercial), or of the remaining balance during the calendar year.

At year-end 2017, if the preceding quantities are fully allocated, 50 AF would be the opening balance for Calendar Year 2018 according to the policy adopted December 13, 2016, which identified an annual transfer of 50 AF from the vacant, residentially zoned tract reservation (until that reservation is extinguished). The actual volume recommended for 2018 may be more that 50 AF, depending upon any unallocated, year-end 2017 balance.

As of June 20, 2017, no new water service agreement applications have been submitted for placement on this July 6, 2017, agenda.

Recommended Committee Action: Information item.
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COUNCIL WATER ISSUES COMMITTEE AGENDA MEMO July 5, 2017
DEPARTMENT: City Manager (Water Resource Management)
AGENDA ITEM: Rainwater Harvesting Policy

Approved By:	Date:
Water Resource Manager: Leslie Graser	
Regional Programs Director: Craig McConnell	

Background

At their Voting Meeting of May 9, 2017, the Council adopted Resolution No. 4380-1589, amending the "Water Management and Calendar Year 2017 Alternative Water Allocation Policy." The resolution included the following direction regarding rainwater harvesting:

Section 3 THAT the Water Resource Management Division shall conduct additional research, engage appropriate stakeholders and experts, and report to the Council Water Issues Committee, and said Committee shall provide a recommendation and/or alternatives to the Council within sixty (60) days of the date hereof, for further consideration of rainwater harvesting as it relates to unit allocations for residential development.

Prior to the May 9, 2017, meeting, rainwater harvesting was discussed at two other Council meetings, April 25, 2017, and September 13, 2016. At the Study Session of April 25, 2017, several Council members expressed an interest in recognizing the contribution rainwater harvesting can make in reducing outdoor potable water use by offering, as an additional incentive, a lesser unit allocation (enabling more units per acre-foot of alternative water) for residences built with qualifying installations. As stated then, the subject was previously raised by the Council Water Issues Committee, at which time the Water Resource Management Division recommended the following:

Rainwater harvesting – Water-Efficient Residential Development, as described herein, relies upon EPA WaterSense® best practices, including outdoor (landscaping) improvements. No specific consideration is proposed for rainwater harvesting as a means of reducing potable outdoor water use; however, it should be noted that the City offers a conservation rebate for installing qualifying storage (<http://www.waterrebates.com/az-prescott>), and the homeowner will benefit from recurring savings on their water bill.

Concerns were expressed at the April 25, 2017, Study Session regarding offering a lesser unit allocation as suggested: to what type(s) of rainwater harvesting the incentive would apply (barrels, above or below-ground cisterns), how to determine the reduction quantity (the fraction of an acre-foot offset in potable water use provided by the rainwater harvesting), whether the rainwater harvesting equipment would be properly maintained, sediment removed, etc., and consistently used in the long-term future. Additionally, it was pointed out that to the extent a property with rainwater harvesting is more

AGENDA ITEM: Rainwater Harvesting Policy

extensively landscaped to take advantage of that irrigation source, in years of drought, if the rainwater harvesting storage/replenishment is insufficient to properly sustain the landscaping, it is conceivable that an increase in potable water could actually result.

At the September 13, 2016, Voting Meeting, a representative of Dorn Homes addressed questions about the Antelope Crossing subdivision preliminary plat, a workforce housing project. Councilman Blair spoke on the benefit of rainwater harvesting, and asked if the developer would consider installing two rainwater cistern systems per house. The Dorn Homes representative said he was willing to consider that, and would work with the Citizens Water Advocacy Group (CWAG) and the City. Councilwoman Wilcox moved to approve preliminary plat PP16-001 for Antelope Crossing with the additional requirement that rainwater harvesting systems be built with each residence. The action subsequently passed.

In consideration of the Council action and direction of Resolution No. 4380-1589, Water Resource Management has further addressed the topic including: (1) review of City data related to rainwater harvesting; (2) compilation of stakeholder input; and (3) evaluation of the US EPA document titled, *Rainwater Harvesting, Conservation, Credits, Codes, and Cost Literature Review and Case Studies*, for information and applicability.

Rainwater Harvesting Rebates

In 2009, the City included rainwater harvesting as a rebate opportunity within the Water Conservation Incentive Program (Resolution No. 4691-0934). In September 2016, the rebate for rainwater harvesting was increased by City Council action (Ordinance No. 5002-1540). The City also migrated its rebate program data from spreadsheets and paper applications into an efficient database (WaterWays) in 2016, to improve customer service and administration. According to WaterWays, since 2009, 52 customers have received the rainwater harvesting rebate (see Figures 1 and 2 below).

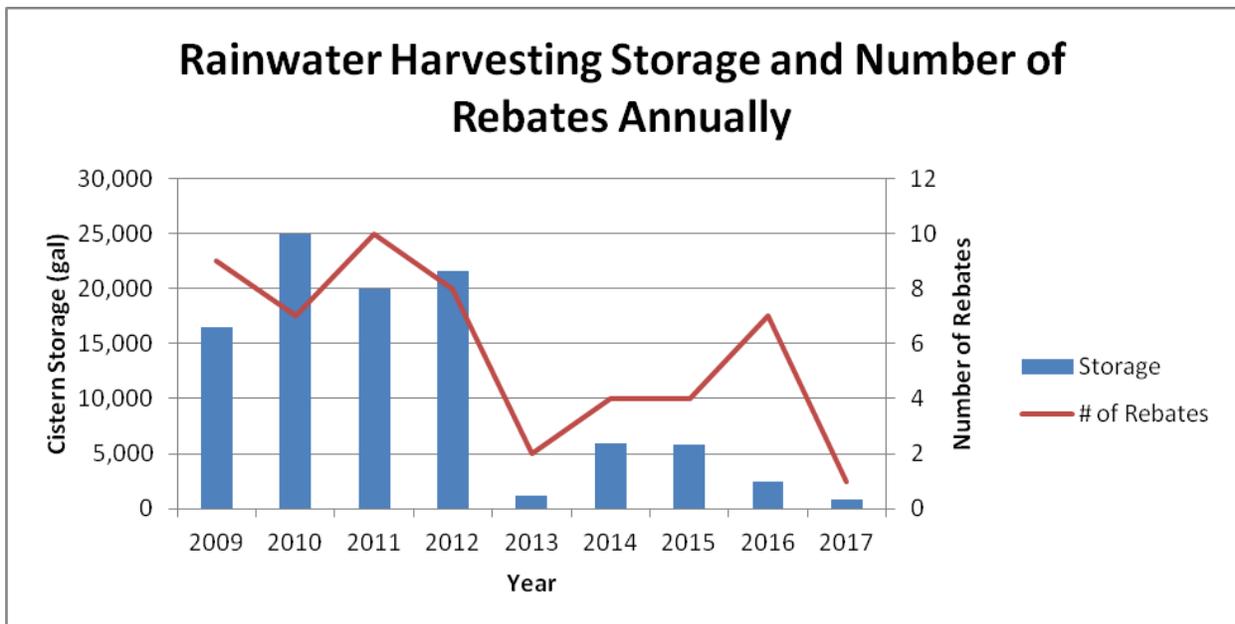


Figure 1: Rainwater harvesting storage and the number of rebates per year.

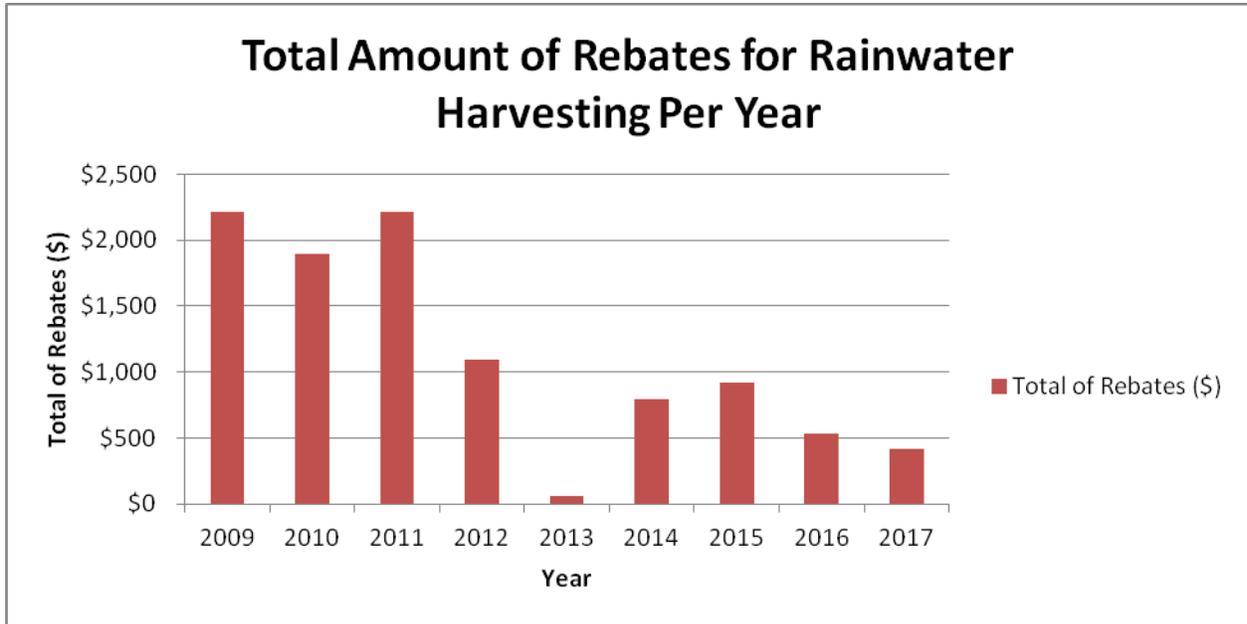


Figure 2: Rainwater harvesting monetary rebates to City of Prescott water customers (the rebate was increased from \$0.10/gal to \$0.50/gal on September 13, 2016, by Ordinance No. 5002-1540)

Stakeholder Input

A questionnaire was sent to three stakeholders to gain their perspectives on rainwater harvesting: an advocacy group (#1), developer (#2), and landscape architect (#3). Table 1 provides the survey questions and responses.

Question	Stakeholder Responses		
	#1	#2	#3
Are you familiar with the City's Water Conservation Rebate Program, which offers a Rainwater Harvesting Rebate of \$0.50/gal of storage? The rebate is added as a credit on the user's water bill.	Yes	Yes	Yes
Considering the City's tiered water rate structure, and the increasing popularity and installation of xeriscaped residences, do you believe that Rainwater Harvesting would be of specific, significant, and continuous benefit to new development?	Yes	Yes	No
Did you install or implement additional landscaping to take advantage of the water stored and made available by a Rainwater Harvesting system?	No	Yes	No
If you have a Rainwater Harvesting System, in years of drought would you rely upon City potable water to sustain your landscaping?	Yes ¹	Yes	Yes ¹
Should the city set aside less water for each new home built that has a rainwater harvesting system, but charge more for the water used in excess of the lower quantity that was set aside?	No	Yes	Yes

¹Stakeholder responded "NA" (not applicable) to a previous question, "If you have a Rainwater Harvesting cistern, do you maintain the catchment, storage, and delivery system?"

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The stakeholders also had the opportunity to provide comments supplemental to the questionnaire. Table 2 is a compilation of that input.

Monthly water bills should be lower if folks use rainwater harvesting instead of pumping groundwater	A legitimate concern is customers relying on City potable water to sustain landscaping in times of drought. Education on how, why, and when to use rainwater harvesting is important.
Promote rainwater harvesting for new and existing homes because: it attracts the public, leads to more interest in xeriscaping, possibly already has lowered the use of rainwater in Prescott.	If a lower water allocation was rewarded, homeowners may invest in a high-water use landscape, and the excess water use will be unpredictable.
Give incentives for creation of rain gardens, storm-water slowing & green infrastructure, wetlands and other habitat creation, native & low water landscape etc.	Rainwater harvesting needs to be coordinated project by project. It can be expensive to install systems large enough to have a meaningful impact on a water budget.
Potable water could potentially be reduced.	Rainwater harvesting can be an eye sore on neighborhoods.
Size of storage tanks to support landscaping through the drier months would be too large for most home developments.	Tighter housing density makes rainwater harvesting a challenge.
Overflow could cause warranty issues with customers and have an effect of drainage on the lots.	

Analysis of Rainwater Harvesting at the National Level

The US EPA compiled a document, *Rainwater Harvesting, Conservation, Credits, Codes, and Cost Literature Review and Case Studies* (January 2013), for the purpose of reviewing the existing literature in four key areas related to rainwater harvesting: water conservation, stormwater runoff volume and pollution load reduction, code and administration, and cost factors. These topics were further reviewed based on technical, operation and maintenance, programmatic, and predictability merits. The following statements were excerpted from the water conservation section:

- "...the potential for water conservation...varies significantly with factors such as climate, land use, and development type."
- "The water conservation performance of active systems is significantly better than that of passive systems (e.g., rain barrels) due to two primary factors: storage and delivery systems."
- "In general, passive systems (e.g., rain barrels) require only minor maintenance at little or no cost to the system owner. The City and County of San Francisco, CA, lists some basic guidelines for rain barrel maintenance in a 2008 Memorandum of Understanding between the San Francisco Public Utilities Commission, Department of Building Inspection, and Department of Public Health. "
- "There are currently no federal regulations governing rainwater harvesting for non-potable use, and the policies and regulation enacted at the state

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and local levels vary widely from one location to another. Regulations are particularly fragmented with regard to water conservation, as the permissible uses for harvested water tend to vary depending on the climate and reliability of the water supply.”

- “...the efficiency of a rainwater harvesting system for conserving water depends largely on the ability to balance water demands with the supply provided by regional precipitation.”

The complete EPA document is available online at the following link:

www.epa.gov/sites/production/files/2015-11/documents/rainharvesting.pdf

The closing sections of the document, Considerations Requiring Additional Research, and Summary and Recommendations, are provided as Attachment 1 hereto.

Findings of the Water Resources Management (WRM) Division

Based upon the research and evaluation performed and summarized herein, pertinent regulations of the Prescott Active Management Area (PrAMA), and stakeholder input, the following findings are provided by Water Resource Management.

1. Participation by existing City water customers in the rainwater harvesting conservation rebate program (and hence conservation savings, if any) has been minimal to date (not more than 10 rebates in any one year as compared to 21,300 residential water customers).
2. It is arguable that the creation of new rainwater harvesting incentives for new subdivisions, even when accompanied by a public education program, will not bring significant potable water savings, and at best would be premature:
 - Most of the new housing units will be built as "Water-Efficient Residential Development," defined in the "Water Management and Calendar Year 2017 Alternative Water Allocation Policy" (as amended, Resolution No. 4380-1589, May 9, 2017). As it pertains to potable water, a primary focus of this type of development is already reduction of outdoor water use through xeriscaping.
 - There is no data suggesting the buyers of new homes want rainwater harvesting systems, they (and their successors in ownership) are prepared to operate them, and will in fact do so—the Prescott demographic, an older population, is more often seeking lifestyle simplification, including reduced yard and landscaping maintenance.
 - The placement of storage basins on smaller lots (with narrow side-yards enclosed by walls, e.g., Antelope Crossing) is problematic.
 - To the extent a property with rainwater harvesting is more extensively landscaped to take advantage of that irrigation source, in years of drought, if the rainwater harvesting storage/replenishment is insufficient to sustain the landscaping, as has been the case observed throughout the City, an increase in potable

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water would undoubtedly result to protect the landscaping investment.

- On-site inspections of any type after conservations measures are installed to assure compliance/operability would require adding personnel and associated expenses, and should be avoided.
3. It would be prudent to track water usage and assess the recent policy change for “Water-Efficient Residential Development” unit allocations before considering creating another (even lower) unit allocation for development providing rainwater harvesting, and/or a lower water rate recognizing the same. The Antelope Crossing subdivision will provide useful information regarding public perception, implementation, homeowner usage/acceptance of rainwater harvesting, and determination whether it is actually causing a reduction in outdoor water use.
 4. Continuing to offer a rainwater harvesting rebate to the owners of occupied residences, both new and those built in past years, will provide a means for reducing outdoor water use, and lowering water bills.

Attachment

1. Excerpt from US EPA Rainwater Harvesting, Conservation, Credits, Codes, and Cost Literature Review and Case Studies (January 2013)

Recommended Committee Action: **MOVE** to forward this report to the City Council for presentation and discussion at an upcoming Study Session meeting.

Attachment 1

US EPA Rainwater Harvesting Publication (excerpt, 2013)

3. CONSIDERATIONS REQUIRING ADDITIONAL RESEARCH

Although a significant number of research papers and regulatory policies have been developed with regard to rainwater harvesting and stormwater reuse, there are several aspects of rainwater harvesting which may benefit from additional research or policy discussion:

Economics of Rainwater Harvesting – Few cost-benefit analyses of rainwater harvesting systems have been published to date. An analysis assessing the sensitivity to various parameters, including demand, cistern size, and water rates could indicate which measures are most likely to see a quicker payback period, as well as potentially identifying thresholds for each parameter that make ROI's particularly attractive.

A more comprehensive cost-benefit analysis would consider a number of complicated technical and socio-economic factors in addition to the primary considerations noted above, including potential increases in property value and assignment of monetary value to energy savings and reduced environmental impacts. Such an analysis would need to be conducted for a range of climate conditions and development types to better inform decisions about Return on Investment (ROI) and the economic viability of the practice.

Human Health Risks – As discussed previously, many existing regulations already address cross connection and backflow prevention procedures to ensure separation of rainwater from the potable water supply. In most jurisdictions even rain barrels are required to be clearly labeled to reduce the risks of accidental ingestion. However, when it comes to requirements for treatment of harvested rainwater before use, little data is available to objectively assess the appropriate level of treatment needed for a given use and related human exposure. More detailed research regarding the health risks associated with ingestion of rainwater – and importantly, secondary exposures such as mists from irrigation system – and how these risks change depending on factors such as collection area, storage time, and filtration methods, may serve to inform future policy decisions about the acceptable treatment requirements and uses of harvested water as they relate to public health.

Regional and Climate Considerations – Rainfall patterns and climate conditions have a significant impact on the drivers and potential efficacy of rainwater harvesting. In arid areas of the United States, such as the Southwest, where rainfall occurs during a limited period of the year, water conservation and flood prevention may be primary drivers for stormwater capture and on-site use. Communities on the East Coast, however, may realize greater benefit from reduction of pollutant loads or mitigation of combined sewer overflows. A greater understanding of the regional factors associated with rainwater harvesting may help to shape policy decisions and encourage innovation to develop new technologies better suited to the needs and goals of a particular climate region.

Environmental and Ecological Impacts – Rainwater harvesting systems are an effective means for on-site stormwater management and are considered a Low Impact Development technique which helps to match the hydrology of developed land to the pre-development condition. Widespread use of this practice, however, particularly with indoor use of harvested water, may significantly alter the water balance of a site as compared to pre-development hydrology.

Additional research is needed to assess the potential for hydrologic and ecological impacts due to reductions in infiltration, evapotranspiration, and groundwater recharge associated with on-site use of harvested stormwater as compared to other stormwater management techniques.

4. SUMMARY AND RECOMMENDATIONS

This report summarizes the results of a literature review of the research and policy documents representing the current state of the practice in rainwater harvesting in the areas of water conservation, stormwater volume and pollutant load reduction, code, and administration and cost factors.

The key findings from this review and recommendations for future research are summarized below.

4.1 Findings

While the technical and maintenance aspects of rainwater harvesting in each of these topic areas have been well documented in state guidance manuals and other available research, relatively few states have published such manuals and many states have no clearly established regulations governing rainwater harvesting.

In many areas of the country, significant progress has been made at the municipal level to codify, permit, and incentivize the use of rainwater harvesting for both water conservation and stormwater management.

State and local codes addressing rainwater harvesting, while generally similar, tend to vary somewhat in the level of detail provided, particularly as related to cross-connection/backflow prevention requirements, treatment requirements, and associated acceptable uses of harvested water. Regulations addressing the use of rainwater harvesting as a stormwater BMP are generally better defined and more consistent from place to place.

At present, the most prominent driver for broad implementation of rainwater harvesting appears to be stormwater runoff and pollutant load reduction due to the regulatory and financial incentives offered by state environmental agencies and local stormwater utilities.

New control technologies enable the autonomous operation of such systems and provide an opportunity for improved performance of harvesting systems in stormwater control.

Although the water conservation benefits associated with harvesting systems are significant, the availability of low-cost centrally-supplied water throughout much of the United States and other developed countries mitigates the economic benefits associated with water conservation. For example, a 3,200-gallon cistern designed based on the WERF whole-life cost analysis tool to collect runoff for a 1-inch storm event on a 5,000 ft² roof collection area would have a total life cycle cost of about \$31,000 (net present value). Based solely on water conservation benefit (assuming an average municipal water cost of \$2.50 per 1,000 gallons), this system would require the tank to fill with rainwater and be completely drawn down over 3,800 times for payback to be achieved. Note that this payback period is based on the assumption of current average municipal water rates. As mentioned previously, increases in water rates or the implementation of block-based pricing may make rainwater harvesting more cost effective.

The absence of detailed, long-term cost-benefit analyses represents a significant gap in available research related to rainwater harvesting systems.

4.2 Recommendations

National standards, such as the GPMCS, may provide a guide for defining a minimum standard of care in the design of rainwater harvesting systems. If adopted by state and local governments, such codes may help to ensure a level of consistency in local codes across different locations.

A comprehensive cost-benefit analysis conducted for several different climate regions and development types, considering capital and maintenance costs, water rates, stormwater regulations and fees, property values, energy savings, and environmental impacts may provide useful insight into the economic viability of rainwater harvesting practices.

Development of full-cost pricing guidelines of centrally supplied water, including embedded energy-water attributes, will provide a basis of comparison for alternative water supplies such as harvesting systems.

More detailed investigations of human exposure paths and associated health risks, climate factors, and potential ecological impacts of rainwater harvesting are also recommended.