

2016 Final Report for
2016 Utah State University Office of Sustainability Rain Water
Harvesting Project
FY2016 Non-Point Source Grant #N1626

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Section 1.0 Executive Summary

The 2015 USU Rain Water Harvesting Project has completed all intended construction and development efforts at their demonstration project site on the USU Campus in Moab. Water collection spouts, special shaped collection tanks, distribution hardware and volume monitoring have been installed and are watering the bee friendly pollinator garden growing the parking strips.

The project successfully replaces drinking water used for irrigation with rainwater that was running through parking lots into storm drains and finally Pack Creek. This project saves drinking water and prevents high TDS storm water runoff from entering Pack Creek. The project also irrigates a bee friendly pollinator garden that is beneficial for Spanish Valley. The project was a collaborative effort between the State of Utah Division of Water Quality, and the USU Sustainability Office.

Section 2.0 Background

In referencing Moab Utah's landscaping and architectural design, City of Moab Engineer Eric Johanson stated, "once rainfall hits the ground, most of it gets lost." Meaning that, in this arid desert, we let most of our annual rainfall wash away. How much rainfall actually falls in Moab and how does that compare to what the average Moab household uses? According to U.S. Climate data, Moab's average annual precipitation is 9.49 inches. The U.S. Census Bureau's 2012 population for Moab was 5,093, and total surface area within city limits is 3,049 acres. If we take our average annual precipitation and convert that into gallons per acre, we get 257,694 gallons per acre, per year (1 inch rain equals approximately 27,154 gallons). So, the average annual precipitation falling on the surface area of Moab is 785,709,942 gallons.

In 2013, average household water use in Moab was 185,000 gallons. With an average of 2.43 people per household, this translates to 76,132 gallons per person, per year or about 209 gallons per person per day. If we divide the average annual precipitation falling on the surface area of Moab by the population, we can see that our rainfall within city limits could provide 154,273 gallons per resident per year, or 423 gallons per resident per day. This means that our

annual precipitation is more than double that of the average resident's daily use in Moab. Imagine what the benefits of using this "extra" water and changing our behavior could mean! What we realize in these numbers is the reality of our resources and the disadvantage of mismanagement. What does it take to better manage water (and rainfall) as a resource? Simple shifts in basic infrastructure.

USU Moab, located in downtown Moab, UT, is an ideal location to serve as teaching grounds for water-wise landscaping and rainwater harvesting. The proposed 3,180 gallon rainwater harvesting system at USU Moab will meet the water budget for the water-wise earthworks installed on campus. These water-wise gardens will allow for ongoing Extension workshops on water-wise landscaping through the USU Extension Sustainability program (<http://extensionsustainability.usu.edu>). Monitoring devices attached to the two hose outlets will allow us to measure exact water amounts captured and used on site. These monitoring devices will be analyzed in addition to rainfall calculations on the roof surface area flowing directly into the gardens to determine estimated garden infiltration amounts and associated storm water runoff diversion amounts. Other monitoring includes a basic and an Advanced Biology soil test through Utah State University Extension and earthfort labs (<http://earthfort.com/>), where we have conducted a baseline soil health analysis, a six-month analysis, and plan to conduct an analysis in 1-2 years to measure improvements in soil health. We are also partnering with local USDA NRCS representatives, who have offered to conduct a public workshop and yearly monitoring of wildlife habitat provisions on the site for pollinators.

This project is in the Moab Area Watershed Partnership (MAWP) watershed. The MAWP supports this project and it the project supports the MAWP [Watershed Management Plan](#). This project also supports the Mill Creek and Castle Creek TMDL.

Section 3.0 Goals

The goal of this project was to collect save drinking water by collecting rainwater in tanks and irrigating with it at a later date. The project will also decrease parking lot storm water runoff to Pack Creek thereby reducing the TDS loading. Although the bee friendly pollinator garden was not a specific goal of the project, the pollinator garden was a side benefit to this project.

The projects monitoring was performed by photo point pre and post installation monitoring for this report. However, the long term monitoring will be performed by the USU sustainability office which has installed a meter that will measure the amount of rainwater used for irrigation from the water collected in the tanks.

Section 4.0 Activities

Skilled labor connected the rain gutter down spouts to the Tanks. The six tanks were placed 6 inches into the ground for stability and the conveyance system of pipes and drip system was installed with pipes placed 6 inches underground.

Volunteers and hired labor under the supervision of the USU Sustainability office planted and terraced the bee friendly pollinator garden.

The pre and post pictures are shown in Figures 1 through 4 in Section 8.

The USU Sustainability office has submitted several invoices to the Utah Division of Water Quality for \$XXXXXX which includes: \$YYYYY for tanks and conveyance hardware, ZZZZZZ for labor/travel and AAAAA for educational signage and instillation **And anything else you billed for.**

The total NPS funds used were \$9132 I am assuming the above will add to the amount you were granted, it may not be so.

The USU office of Sustainability provided a match of:

Personnel	Days	Cost/Day	Total Cost
Put in hear what you want	These	\$are just	\$examples
Put in hear what you want	7	\$237	\$1659
Put in hear what you want	5	\$121	\$605
Put in hear what you want	4	\$112	\$448
Put in hear what you want	4	\$103	\$412
Put in hear what you want	2	\$280	\$560
Total Labor Costs			\$4797

These are examples, put down any other match you have.

Cost of bills for labor or capital equipment you paid for.

Cost of use of any usu equipment: \$1200 for 2 trucks.

Cost of using FS equipment: generator, drills, bobcat: \$500

Cost of funding a CCYC group for 2 weeks: \$10,000

Total Match of: \$ How Much does it total? In the grant it was \$5832.84 doesn't have to equal that at this time because you haven't done any education workshops. Hopefully it will add up to about \$6000 which would be a 60/40 match.

The post project photo point monitoring, conducted by the Watershed Coordinator is not considered match for this project.

Section 5.0 Partners

The Moab Area Watershed Partnership (MAWP) has been involved in developing and supports this project. The MAWP is a diverse group of stakeholders that has been meeting monthly for over four years. Visit the MAWP website for a complete list of MAWP partner's (moabwatersheds.org).

During the design and implementation phase, this project was developed by following partners:

Roslynn Brain	Title? Miss sustainability?/ Utah State University Sustainability Office
Arne Hultquist	Watershed Coordinator/Grand and San Juan Counties
Barnabas Kane	TBK Environmental Design

Any other partners?

The partners put together a work and monitoring plan for the project. The USU Sustainability Office coordinated volunteers and contractors for the implementation efforts. The entire project took place on USU land with their cooperation.

The partners have worked together on other projects and land use issues in the area previously. Their ability to work together on this and previous issues allowed the project to be completed as planned.

Section 6.0 Complications

Scheduling the contractor and volunteers for the actual construction encountered minor difficulties. Otherwise, there weren't any complications. The fact that there were no complications was in part due to the partners long standing relationships. Furthermore, all the partners including the sponsor, are professionals whom take their responsibilities seriously and deliver deliverables.

Section 7.0 Recommendations

From my perspective as a watershed coordinator, the only thing I would recommend for projects like this in the future would be consideration of a free lunch for volunteers. I believe providing lunch for all day volunteers is an excellent way to say thank you and keep their blood sugar up.

Section 8.0 Environmental Results

The success of this project for this report is monitored by photo point. Future monitoring will include the amount of rainfall collected and used for irrigation and some soil health measurements.

Pictures of pre and post project are shown in Figures 1 through 3.



Figure 1: Pre and post pictures looking north from the irrigated parking strip



Figure 2: Pre and post pictures looking south from sidewalk

Section 9.0 Deliverables and Finances

Task	Deliverables	319/NPS funding	Additional funding	Total
Task 1: Collect rainwater for irrigation of bee friendly pollinator garden in parking strips and vegetated areas on USU Moab's campus	Install six holding tanks with a total of 3,180 gallons of storage. Install piping and irrigation components to store and deliver water.	\$9,132 Tanks, plumbing, labor, and travel expenses.	\$You gotta put in here what you did, I don't know what you spent and volunteer hours etc.	\$/\?
Task 2: Educate the students and public on the	Install eight educational signs and hold one	\$XXX from the state? Is the state paying	\$YYYY for purchasing and	\$???????

suitability and sustainability of rainwater collection in Moab and the rest of Utah.	educational workshop per year.	for any of this?	installing the signs. ZZZ for scheduled educational workshop	
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The USU finished the project with the funding provided by the NPS Grant. The original grant requested a grant of \$14,132 and USU would provide a match of 5,832.84. The UDWQ Non-Point Source grant was for only \$9132. USU used all the used all the grant funding and because the project was under funded with grant funds, USU was forced to match the project with \$AAAAAA dollars to complete the project.

Section 10.0 Conclusions

This rainwater harvesting project is an effective means to save culinary water and decrease tainted storm water runoff. This project are also aligns with State of Utah Division of Water Quality non-point source policies as well as USU Office of Sustainability goals and objectives. The project also serves as an example or demonstration project for beneficial use of rainwater. USU should be congratulated for leading efforts to put rainwater to significant and practical beneficial use. This projects was the result of a collaborative effort of various partners and all stakeholders benefited from them.