



Agenda

DATE 8/4/15 TIME 9:25am
SERVED BY Robert Wood
RECEIVED BY Liaigastig

SANTA FE WATER CONSERVATION COMMITTEE MEETING
CITY HALL - 200 LINCOLN AVE.
CITY COUNCILORS' CONFERENCE ROOM
TUESDAY, AUGUST 11, 2015
4:00 PM TO 6:00 PM

1. CALL TO ORDER
2. ROLL CALL
3. APPROVAL OF AGENDA
4. APPROVAL OF CONSENT AGENDA
5. APPROVAL OF MINUTES JULY 14, 2015 - WATER CONSERVATION COMMITTEE MEETING
6. CONSENT ITEMS
7. CONSENT AGENDA
 - A. INFORMATIONAL
 - i. WERS PRESENTATION (Doug Pushard, 40 minutes)

DISCUSSION ITEMS:

8. CLIMATE ACTION TASKFORCE (Councilor Ives, 10 minutes)
9. VACANCIES ON THE CONSERVATION COMMITTEE (Robert Wood, 5 minutes)
10. DIFFERENCES IN SOIL MOISTURE AT CURB CUTS WITH AND WITHOUT RAIN GARDENS INSTALLED AT THE SANTA FE COMMUNITY COLLEGE – (Aaron Kauffman, 15 minutes)

INFORMATIONAL ITEMS:

11. GROUP REPORTS FROM WATER CONSERVATION COMMITTEE INITIATIVES: (Councilor Ives, 40 minutes)
 - A. GROUP #5-WATER SYSTEM MAP (10 minutes)
 - B. GROUP #2- WATER CONSERVATION EDUCATION/OUTREACH (10 minutes)
 - C. GROUP #3- WATER CONSERVATION CODES, ORDINANCES & REGULATIONS – LEGISLATIVE UPDATE (10 minutes)
 - D. GROUP #4- REESTABLISH TREND OF NET ANNUAL REDUCTIONS IN PER CAPITA WATER USAGE AND IDENTIFYING LARGE WATER USERS (10 minutes)
 - E. GROUP #1 – TREATED WASTE WATER AS DRINKING WATER SOURCE. (5 Minutes)

MATTERS FROM STAFF:

- Vacancies - Water Conservation Staff & Committee – UPDATE.
- Website and advertising – UPDATE.
- Drought, Monsoon/El Nino, and ESA - UPDATE SUMMARY

MATTERS FROM COMMITTEE:

MATTERS FROM PUBLIC:

NEXT MEETING – THURSDAY, SEPTEMBER 10, 2015:

CAPTIONS: MONDAY, AUGUST 24, 2015 @ 3 PM. PACKET MATERIAL: WEDNESDAY, SEPTEMBER 30, 2015 @ 3 PM.

ITEMS FOR NEXT AGENDA:

ADJOURN.

Persons with disabilities in need of accommodations, contact the City Clerk's office at 955-6520, five (5) working days prior to meeting date.

WATER CONSERVATION COMMITTEE
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JULY 14, 2015

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Roll Call/Call to Order	The Water Conservation Committee Meeting was called to order by the Chair, at 4:00 pm in the City Councilor's Conference Room. A quorum was present at the time of roll call.	Page 2
Approval of Agenda	Mr. Woods informed the WCC members that Rick Carpenter was going to talk about the Water Map, he might be in later and his report would fall under staff reports. Mr. Woods said he is not listed on the agenda as he will not be doing regular updates anymore. <i>Mr. Michael moved to approve the agenda as noted, second by Mr. Wiman, motion carried by unanimous voice vote.</i>	Page 2
Approval of Consent Agenda	No Action needed	Page 2
Approval of Minutes, June 9, 2015	Corrections: Page 3: QWEL – correct spelling. Page 4 – Last paragraph – Mr. Michael said when he purchased his washer the salesperson who offered a rebate was a commissioned sales person. <i>Mr. Michael moved to approve the minutes as amended, second by Mr. Roth, motion carried by unanimous voice vote.</i>	Page 2
CONSENT AGENDA	No Action Needed	Page 2
Discussion Items (Cont'd) • Climate Action Task Force • Vacancies on the Water Conservation Committee	Informational, no formal action.	Page 3-4
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Next Meeting	Tuesday, August 11, 2015	Page 7
Adjournment and signature	Meeting was adjourned at 5:45 pm	Page 7

**SANTA FE WATER CONSERVATION COMMITTEE MEETING
TUESDAY, JULY 14, 2015
4:00 PM TO 5:45 PM**

MINUTES

1. CALL TO ORDER

Chair called the meeting to order at 4:00 pm in the City Councilor's Conference Room. A quorum is reflected in roll call.

2. ROLL CALL

Present:

Peter Ives, Chair
Stephen Wiman
Tim Michael
Bill Roth
Doug Pushard
Giselle Piburn

Not Present - Excused

Lisa Randall
Grace Perez

Others Present:

Robert Wood, Water Conservation Specialist, Sr.
J.D. Shagrough, Intern, Water Division
Andy Otto, Santa Fe Watershed Association
Mary Shrivitt, Audience

Fran Lucero, Stenographer

3. Approval of Agenda

Mr. Woods informed the WCC members that Rick Carpenter was going to talk about the Water Map, he might be in later and his report would fall under staff reports. Mr. Woods said he is not listed on the agenda as he will not be doing regular updates anymore.

Mr. Michael moved to approve the agenda as noted, second by Mr. Wiman, motion carried by unanimous voice vote.

4. Approval of Consent Agenda

None

5. Approval of Minutes June 9, 2015

Corrections:

Page 3: QWEL – correct spelling.

Page 4 – Last paragraph – Mr. Michael said when he purchased his washer the salesperson who offered a rebate was a commissioned sales person.

Mr. Michael moved to approve the minutes as amended, second by Mr. Roth, motion carried by unanimous voice vote.

DISCUSSION ITEMS:

A. Climate Action Task Force (Councilor Ives, 10 minutes)

The Chair reported that the recommendations from the Land, Water and Food Sub-Committee for the Climate Action Task Force will be presented to the Mayor and City Council on August 12, 2015.

The Land, Water and Food sub-committee are recommending the following three items:

- 1) Asking the city to further coordinate and determine whether or not the proposals contained in the Watershed Associations publication on the watershed in terms of handling our arroyos and what we can be doing whether or not that can be undertaken by the city and sort of update the city's plan with regards to arroyos based upon current available funding. There are about ten projects throughout the city concentrating on arroyos with the greatest concentration along Arroyo Chamiso and the Santa Fe River. Work on the assessment of the arroyos for aquifer recharge.

Mr. Wood asked if that is one project or on-going maintenance of the arroyos.

The Chair said that the Watershed report included both and the objective is to update that Arroyo report.

- 2) Storm water in that same context, looking at what can be done in connection with the storm water system, slowing it down primarily allowing it to seep down and recharge.
- 3) Proposal regards to parks and that we look at conservation efforts and if we are able to utilize conservation of water in parks that we take the amount of fund savings and dedicate those funds to maintenance.

Another item discussed was developing ways to reuse and recycle water.

It was noted that the Storm Water Management Plan is on the website. Mr. Otto said that the other plan is the Watershed Report on Arroyos done in 2012 for the city; this is the report we plan to update which is 3 years old.

Mr. Woods asked; regarding storm water improvements are they going to be working on a long term plan or snap shot plan?

Chair said that the effort currently in place is to update the Storm Water Plan based on the significant size of the storm events we have had in the last 2 years. One of the maps shows where they have essentially recorded 100 year events and some maps show 500 year flows. Mr. Roth said that one of those events went through his home as well.

Mary Shrivitt – I think that the plan for the storm water also has other components in addition to the short and long term that Mr. Woods is referring to and that they are also divided out by start in the county and flow in the city and start in the city and flow in the county. Ms. Shrivitt stated that the county has already identified some and we need to back in to that.

The Chair stated that he would like to maintain discussion on the Jemez-Sangre Regional water planning efforts. We have been through the few several meetings facilitated by contracted individuals for the Inter State Stream Commission with participation from the ISC and the OSE. The primary objective in the short-term is by the end of June was to compile a laundry list from all the stakeholders in the geographic area which define the Jemez-Sangre regional planning efforts of jurisdiction. The Chair was not sure who created that Jemez-Sangre construct jurisdiction in the first instance but it crosses over several watersheds. The Chair does have a copy of the original

plan and preparation has started on updating this document. The longer list of projects is quite long. The state is trying to redefine how they allocate money on the state basis to water projects around the state and they all feed in to the Water Trust Board. The city does direct projects to the Water Trust Board every year and most recently the possibility of putting in a 4 million gallon storage tank at Buckman so when we have a lot of production from the Watershed or from the San Juan Chama or well water that we don't have to get in to the city because the demand isn't that high to create additional storage to create resiliency. A clearer scope of services needs to be identified. Santa Fe County Commissioner Holian, a representative for Los Alamos and Espanola and the Chair are the four Co-chairs for this process. ISE guidelines have been received; our approach will be broader. We will look at interregional water plant issues, looking at potential leasing regimes and other means of trying to insure that water is delivered and used by those in most need. Look at the epic of water use as a vital natural resource vs. looking at it as a commodity. The Chair will continue to provide updates.

B. Vacancies On the Water Conservation Committee - Robert Wood

Mr. Wood said this is an on-going process, an advertisement came out 2 weeks ago asking people who have any interest to send a resume and cover letter, there are two open positions at this time. The process needs more attention from the WCC; Mr. Wood said that demographically the committee should be looking at the districts that we are lacking representation. The Chair said he believes that it is District 3 and 4 where we could use additional people.

Mr. Pushard does have a recommendation and he will send to Mr. Wood for processing of interest. Directions are to send a short bio and letter of interest. Mr. Wood also asked that the city councilor also have an opportunity to submit names. The Chair asked that an e-mail be sent to the city councilors and give them that opportunity to submit candidates for consideration.

Mr. Michael shared concern and questioned the process that was taken in making the announcement for the openings. Staff said that they took it upon themselves to do a request of interest for the Water Conservation Committee openings. The Chair said that there is a process and that the decision is made at the Mayor's Office level for those candidates who show interest. The Mayor brings them to the City Council for final consensus and approval.

The Chair asked that Noah Burke do an e-mail blast to the Neighborhood Associations. Mr. Wood will seek approval for this request.

INFORMATIONAL ITEMS:

1. GROUP REPORTS FROM WATER CONSERVATION COMMITTEE INITIATIVES:

a) Group # 2 – Water Conservation Education Outreach

Mr. Michael reported that he met with Mr. Carpenter and Mr. Wood about 2 weeks ago to find out where the members of the Education Outreach committee could participate. There was discussion on commercial rebates. From that discussion it was learned that the next day there would be an Ad that the city released saying, "It Is Not Coming Back" and it was in response to a letter received from a constituent. The question is if the WCC agrees to full page ads on water conservation. Mr. Michael asked the Chair if he knew of any objections from the 2 councilors.

Mr. Wood said that the campaign and the Ad were pulled and they are working on a new Ad. There were Ads already positioned before the end of the FY that were halted. Mr. Wood said that there is strong collaboration and coordination in doing a media package to send out a united and consistent message. With this example, Mr. Wood said they will need to start again and try to re-engage those entities for support of the advertising campaign.

Mr. Michael said that knowing there are many calls of concern that come to the city, he would ask that Mr. Wood triage those concerns in order to be consistent with advertising and marketing.

Mr. Wood extended congratulations to the former director, Laurie Trevizo who worked so hard on previous marketing campaigns that were successful.

- b) Group #3 – Water Conservation Codes, Ordinances & Regulations – Legislative Update
Mr. Pushard sent an e-mail to the committee talking about the Capital Outlay Budget approved by the State. Mr. Pushard said that it did not show a lot of awards for water. In the first Capital Outlay request there were many requests that did not receive approval.

Green Building Code Committee – by next meeting they will bring language for the green building code for in house construction.

The Chair said he is still interested in green plumbing for in the house.

Mr. Pushard said there isn't anything in the code that says it would preclude inside victory gardens, he will look at the codes and provide an update at the next meeting.

Mr. Ross said that they have been very specific about not bringing grey water back in to the house.

The Chair said he wants to be assured that discussions continue on the food security perspective, what you can do 365 days a year and when we had the capacity we had it in the code we could decide what we do for food issues. From a leadership role we look forward to making changes to affordable housing codes and issues on how we can build cheaper better.

WERS working group added more members, we have 13 states in the working group, they have finalized the inside portion, they are working on the outside portion and they should have something next month to pilot. They will have the EPA tool – it was based on that. One of the people we have added to the working group is from the Irrigation Association and one from the EPA group.

Chair asked if they could do a presentation on the interior at next meeting.

Mr. Pushard said they could do WERS inside demonstration presentation.

Mr. Pushard said that they use LEED, no one considers water coolers, water softeners, and you are probably missing 30% of the water use in the house. It depends on the verifier to look at the equipment. Once we get the inside down then we can talk to the committee about doing a whole house rebate. It would then allow for us to do a full house renovation. That would get the builders very excited and rebates would be higher.

Mr. Wood said it would have to be a staged model and Mr. Pushard totally agreed.

It was noted that in Option B – we already have on the books, reducing the water use, reducing the fees that the builder would have to bring to the table based on lower water use. 64,000 gallons is what we give under Option B

Mr. Roth said we should go back to looking at the base line number.

Chair asked if we know what the ideal number is. At some point we will need to know what the paradigm is.

Mr. Pushard said he would like to discuss in a future meeting the definition of Water Conservation.

Mr. Roth asked if the name could be changed from Water Conservation Committee to possibly Water Resource Committee.

The Chair said that the scope would need to be re-discussed.

Mr. Wiman would like to have someone come in from OSE to talk about what we can and can't do with storm water. It would be good to work with Mr. Otto to get someone from OSE to discuss this item and to have legal counsel present for questions and answers. It would be good to have a water attorney present.

Chair: Asked Mr. Wood if he could get someone to talk about water legalities – City Attorney should be asked first.

We should try to break the question in to segments and get someone from OSE first. Compacts that were signed to allocate water are important to review. What can we do and not do with storm water under current statute. We have been told we can't irrigate with storm water, yet it is being done in Albuquerque with a special permit.

- c) Group #4 – Re-establish trend of Net Annual Reductions in per capita water usage and identifying large water users.

Mr. Michael – Nothing to report.

- d) Group #5 – Water System Map
Mr. Wiman reported that he and Mr. Otto met with Ms. Quita Ortiz, Water Conservation Education and Compliance Specialist and felt that the mapping project is on a back burner due to other committed priorities.

The Chair asked for clarification, this is a GIS project and asked if we have staff in GIS to do this. Quita is not in GIS and is working on priorities as assigned by her Manager.

The Chair will follow up with GIS to get this done. The Chair would like to know what data sets we have and what format they are in. Mr. Wiman will follow up with that information.

MATTERS FROM STAFF:

- Search Process for Water Conservation Staff – UPDATE.

J.D. Shagrough is a 2nd year intern, working on rebates and water resources.

Water Conservation Manager – Position advertisement did close; there were 3 finalists. Negotiations are moving forward on the selection process.

Water Enforcement Position – We are in deep need of this position, that position is only good through October. The Chair would like to have a daily report on where the process is in HR for this position.

MATTERS FROM COMMITTEE:

Mr. Wiman – Under informational items, add on group to look at treated waste water as a drinking water source different from the purification water – Sub-Group #1

Mr. Wiman will not be at the August meeting, he will report in September.

Mr. Wiman – Legal needs to make sure everything is properly quoted on water restricting – we need to take a technical stand as it goes against the ordinance. Has anyone pursued this with legal?

Mr. Wood said that the wording has been changed on the website. Mr. Wiman said it has not been changed it still has restricted.

Mr. Wood said the ordinance is the overriding document. The chair said to send through the proper channels to make the changes and that a report be sent back to him on the status.

Mr. Pushard: We are no longer getting the drought monsoon update.

Mr. Wood said that Mr. Carpenter will prepare a memo and he will give the update in summary form of changes from the standard report. The chair recommended that a full report be done on a quarterly basis. Mr. Pushard would like to receive the summary report in the packet even if it is redundant.

Mr. Pushard asked if Group 4 should be eliminated as Mr. Michael is the only one on that committee. The Chair said this should be an item for discussion on next month agenda for action. Mr. Michael said the title is redundant and action can be taken at next meeting. Mr. Pushard said they had previously suggested the creation of a new Storm Water Group.

Ms. Perez said she has had calls on fluoridation and who can address that in the city. Those questions would go to Alex Puglisi in the Water Department. The Chair said that since the 50's the city has fluoridated their water.

MATTERS FROM PUBLIC:

Report from September 2014 – QWEL report has been published.
Reports should be requested through Caryn Grosse or E-mail Mr. Wood.

Mr. Otto, Watershed Association told the WCC members that more information would follow on the Water Forum this fall.

Mr. Aaron Kaufman gave a great presentation on Storm Water Catchments at the recent River Commission meeting. WCC members would like to have Mr. Kaufman present on this topic at a future meeting.

NEXT MEETING – TUESDAY, AUGUST 11, 2015:

CAPTIONS: MONDAY, JULY 27, 2015 @ 3 PM PACKET MATERIAL: WEDNESDAY, JULY 29, 2015 @ 3 PM

ITEMS FOR NEXT AGENDA:

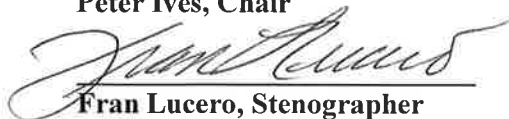
- Follow Up: Mr. Aaron Kaufman to do presentation on storm water catchments.
- Elimination of Group 4 and Creation of a new Storm Water Group.
- Definition of Water Conservation.

ADJOURN

There being no further information to come before the Water Conservation Committee, the meeting was adjourned at 5:45 pm.

Signature Sheet:

Peter Ives, Chair



Fran Lucero, Stenographer

Existing home with EPA upgrades & RW reuse, START HERE

Building Information

New or Existing?	EXISTING	# of bedrooms	3	House footprint in sf	2,000.00
Type	Single Home	# of floors	1	Roof pitch	0.00 in 12
# of units total		ave. floor to floor ht	9	Roof Type	Asphalt <Default>
Sample set size		main HW pipe dia.	0.75	Roof sf	2000.00

Climate Information

Average Annual Rain	16.07	MUNICIPAL OVERRIDE: Average Annual Rain	TBD
Average Annual ETO	4.41	MUNICIPAL OVERRIDE: Average Annual ETO	TBD
Average Annual Watering Months	TBD	MUNICIPAL OVERRIDE: Average Annual Watering Months	TBD

Site Information

Lot Size (sf)	16000.00	Maximum Allowable Irrigation Per Code	
Encroachments	200.00	Please only use one method if required by code, otherwise leave both as zero	
Under Roof (sf)	2000.00	OR	by %
Remaining Lot (sf)	13800.00		by sf
			0.00
			13,800.00

Collection / Infiltration / Land Use Worksheet

All Turf (sf)	500.00	3.62%	Directed Imp. Paving (sf)	0.00	0.00%
New Softscape (sf)	2,000.00	14.49%	Remaining Impervious (sf)	0.00	0.00%
Existing Softscape (sf)		0.00%	Prohibited Landscape Area (sf)	1,000.00	7.25%
Water Features (sf)	0.00	0.00%	Other (sf)	10,300.00	74.64%
Permeable Paving (sf)	0.00	0.00%	must total 100%	0 sf to go	100.00%
TOTAL	2,500.00				

Building Code / Green Program Specific Water Use Prescriptive Information

If the Building Code and Green Building Program values are left blank, the WERS Program will be the default.

(Currently, this feature is not active in the pilot program)

Indoor Requirements (Allowances)	WERS	Municipal	Green
Start Here	Indoor Use WERS	Capture & Usage	Exterior Use DESIGN
			Verification Sun ..

Existing home, Indoor WERS before changes

IU1 Indoor Fixtures and Appliances

*** PLEASE DO NOT USE "COPY AND PASTE" ANYWHERE IN THIS TABLE ***

Fixture or Appliance	Industry Baseline GPF / GPM / GPC /	Existing Units GPF / GPM / GPC /	Prescriptive Path? Minimum Prescriptive Path Units GPF / GPM / GPC / etc. <small>(Base on information provided on the "Start Here" tab.)</small>	Proposed Units GPF / GPM / GPC /	Applicable to Project?	Proposed or Actual Daily Use in Gallons	Gallons Saved Over Baseline	Gallons Saved Over Existing	Percent Saved Per Fixture <small>(Baseline vs. Proposed)</small>	Installation or Testing Confirmed?	Notes
A Toilet (GPF)	1.60	5.00	1.28	5.00	Y	100.00	0.00	0.00	0.00%	N	
B Showerhead (GPM)	2.50	2.50	2.00	2.50	Y	50.00	0.00	0.00	0.00%	N	
C Lavatory (GPM)	2.20	2.50	1.50	2.50	Y	12.50	0.00	0.00	0.00%	N	
D Kitchen Faucet (GPM)	2.20	2.50	2.20	2.50	Y	40.00	0.00	0.00	0.00%	N	
E Dishwasher (GPC)	6.50	6.50	4.25	6.50	Y	6.50	0.00	0.00	0.00%	N	
F1 Washer Size in CF		5.00		5.00						N	
F2 Washer WF	9.50	9.50	9.50	9.00	Y	45.00	2.50	0.00	5.26%	N	
G Water used to reach 100 degrees (GPU)	2.00	2.00	1.50	2.00		80.00	0.00	0.00	0.00%	N	
H Indoor Water Features in Gallons/Day (See worksheet below)		0.00	N/A	0.00	Y	0.00	N/A	0.00	N/A	N	

334.00 2.50 0.00 Total

AVERAGE Rainwater reuse gal/day credit:

0.00

AVERAGE Greywater reuse gal/day credit:

0.00

AVERAGE Adjusted usage gal/day:

334.00

MINIMUM REQUIRED
INDOOR WERS SUBTOTAL

84

Project INDOOR WERS SUBTOTAL

128

NOT FINAL

The WERS (Water Efficiency Rating Score) is based on 0 to 100 with 0 being the best performing home.

CONSERVATION

BASELINE VS. PROPOSED

GALLONS PER:

day 2.50

month

75.00

year

912.50

SAVINGS PER:

day \$0.02

month

\$0.45

year

\$5.53

CONSERVATION

EXISTING VS. PROPOSED

GALLONS PER:

day NO DATA

month

NO DATA

year

NO DATA

SAVINGS PER:

day NO DATA

month

NO DATA

year

NO DATA

Existing home with EPA upgrades & RW reuse, Indoor WERS

	Fixture or Appliance	Industry Baseline GPF / GPM / GPC /	Existing Units GPF / GPM / GPC /	Prescriptive Path? N Minimum Prescriptive Path Units GPF / GPM / GPC / etc. <small>(Base on information provided on the "Start Here" tab.)</small>	Proposed Units GPF / GPM / GPC /	Applicable to Project?	Proposed or Actual Daily Use in Gallons	Gallons Saved Over Baseline	Gallons Saved Over Existing	Percent Saved Per Fixture <small>(Baseline vs. Proposed)</small>	Installation or Testing Confirmed?	Notes
A	Toilet (GPF)	1.60	5.00	1.28	1.28	Y	25.60	6.40	74.40	20.00%	N	
B	Showerhead (GPM)	2.50	2.50	2.00	2.00	Y	40.00	10.00	10.00	20.00%	N	
C	Lavatory (GPM)	2.20	2.50	1.50	1.50	Y	7.50	3.50	5.00	31.82%	N	
D	Kitchen Faucet (GPM)	2.20	2.50	2.20	2.20	Y	35.20	0.00	4.80	0.00%	N	
E	Dishwasher (GPC)	6.50	6.50	4.25	4.25	Y	4.25	2.25	2.25	34.62%	N	
F1	Washer Size in CF		5.00		5.00						N	
F2	Washer WF	9.50	9.50	9.50	5.00	Y	25.00	22.50	0.00	47.37%	N	
G	Water used to reach 100 degrees (GPU)	2.00	2.00	1.50	2.00		80.00	0.00	0.00	0.00%	N	
H	Indoor Water Features in Gallons/Day <small>(See worksheet below)</small>		0.00	N/A	0.00	Y	0.00	N/A	0.00	N/A	N	

	217.55	44.65	96.45	Total
AVERAGE Rainwater reuse gal/day credit:	25.96			
AVERAGE Greywater reuse gal/day credit:	0.00			
AVERAGE Adjusted usage gal/day:	191.59			

MINIMUM REQUIRED
INDOOR WERS SUBTOTAL

84

Project INDOOR WERS SUBTOTAL

74

NOT FINAL

The WERS (Water Efficiency Rating Score) is based on 0 to 100 with 0 being the best performing home.

CONSERVATION BASELINE VS. PROPOSED	GALLONS PER:	day	44.65	month	1,339.50	year	16,297.25
	SAVINGS PER:	day	\$0.27	month	\$8.12	year	\$98.76
CONSERVATION EXISTING VS. PROPOSED	GALLONS PER:	day	96.45	month	2,893.50	year	35,204.25
	SAVINGS PER:	day	\$0.58	month	\$17.53	year	\$213.34

Existing home with EPA upgrades & RW reuse, Exterior design

EU1 Design Parameters

1.1 Area Calculations (from "Start Here Tab")

New Softscape (sf)	2000.00	Water Features (sf)	0.00	Total areas available for land / softscape, water feature, or	2500.00
Existing Softscape (sf)	0.00	Permeable Paving (sf)	0.00		

1.2 Potential ETO in Inches per Month

Maximum Eto 7.79
(for reference only)

Average Monthly Eto 4.41
(for reference only)

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1.64	2.30	3.45	5.13	6.52	7.79	7.24	6.14	5.01	3.75	2.32	1.62

1.3 Water Baseline by Month in Gallons

Average Monthly Baseline in Gallons 6872.55
(for reference only)

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2556.37	3589.87	5378.46	8001.36	10156.50	12137.16	11286.24	9567.31	7813.35	5845.62	3612.51	2525.90

1.4 Water Allowance by Month in Gallons

Max Baseline Percentage 100.00% Ave. Monthly Allowance in Gallons 6872.55
(for reference only)

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2556.37	3589.87	5378.46	8001.36	10156.50	12137.16	11286.24	9567.31	7813.35	5845.62	3612.51	2525.90

1.5 Average Rainfall in Inches per Month

Average Monthly Rainfall in Inches 1.34
(for reference only)

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0.81	0.80	0.95	1.12	1.65	1.24	2.39	2.76	1.64	1.28	0.70	0.73

1.6 Average Peak ALLOWABLE Monthly Rainfall

Ave. Peak Monthly Rainfall 1.15
(for reference only)

MAX ALLOWED Peak % 45.00% Ave. Peak ALLOWABLE MRF. 0.52
modified (for reference only)

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0.36	0.36	0.43	0.50	0.74	0.56	1.08	1.24	0.74	0.58	0.32	0.33

EU2 Proposed Design Analysis

(Please note - if using another third-party program for analysis, leave all items in this section as zero and proceed to line 2.2)

2.1 OPTION ONE: Landscape / Water Requirement

Use of the following pull-downs affects the "Average Peak ALLOWABLE Rainfall" percentage.

Rain Sensor present? (10%)

Smart Controller present? (10%)

Please complete the table below with the information that best describes the proposed outdoor design.

Zone	Hydrozone / Area (sf)	Plant / Feature Type & Water Requirement	KL	Irrigation Type	DULQ	LWRH (G/M) average
1	500.00	Turfgrass - Low	0.6	Rotor	0.7	909.85
2	2000.00	Shrubs - Medium	0.5	Drip/Micro	0.8	2497.24
3	0.00	Permeable Hardscape	0		0	0.00
4	0.00	Pool, Spa, or Water Feature	0.8	No Irrigation	0.65	0.00
5		<select plant / feature type>	0		0	0.00
6		<select plant / feature type>	0		0	0.00
7		<select plant / feature type>	0		0	0.00
8		<select plant / feature type>	0		0	0.00
9		<select plant / feature type>	0		0	0.00
10		<select plant / feature type>	0		0	0.00
11		<select plant / feature type>	0		0	0.00
12		<select plant / feature type>	0		0	0.00
13		<select plant / feature type>	0		0	0.00
14		<select plant / feature type>	0		0	0.00
15		<select plant / feature type>	0		0	0.00
Total Area	2500.00	Landscape / Water Requirement for Site (G/M)				3407.09

All documentation for section 2.1 and installed items above have been verified. (Only to be used by the WERS

<select answer>

2.2 OPTION TWO: Landscape / Water Requirement Via Third-Party Program

2.2 OPTION TWO: Landscape / Water Requirement Via Third-Party Program

OUTDOOR WATER USE CALCULATION PROGRAM

Are calculations being done for this home?

<select answer>

If so, which third-party program is being used?

<select third-party program>

If other, please provide the name & URL of the program.

OUTDOOR WATER USE DESIGN PROFESSIONAL

Design Professional of Record

Name

Phone

Email

Program under which the design professional is certified?

<select design professional certificatio

If other, please provide the name & URL of the program.

OUTDOOR WATER USE REDUCTION

Please enter the information for outdoor water use results from the third-party program used to calculate outdoor water use.

6500.00

sf / area Upon Which Calculations were based

6872.55

Average Water Baseline by Month in Gallons / Month

6872.55

Average Water Allowance Gallons / Month

650.00

AVE. Landscape / Water Required for Site in G/M

90.54%

Average Reduction in Percent Compared to Allowance

All documentation for section 2.2 and installed items within the documentation have been verified. (Only to be used by the WFRS Professional)

<select answer>

2.3 NON-PERMANENT IRRIGATION AFFIRMATION

Use this section only if there is landscaping but no irrigation for the project.

Xeriscaping?

<select answer>

Percent of softscape?



Start Here

Indoor Use WERS

Capture & Usage

Exterior Use DESIGN

Verification

2.4 Water Use Reduction Summary (Sub-Total)**Project is using WERS for calculations**

3465	Average Reduction (gallons)	\$21.00	Average Cost Savings / Month
50%	Average Reduction (percent)	\$252.01	Average Cost Savings / Year

EU3 Outdoor Water Reuse*Tied to capture & usage tab*

3.1 Combined Available ave gal/day **24.10** ave gal/month **723.08** ave gal/year **8677.00**

3.2 Reuse Offset

Landscape / Water Requirement per Month without off	3407.09
Landscape / Water Requirement per Month with offset	2684.01

EU4 Summary After Reuse Analysis**4.1 Water Use Reduction Summary****Project is using WERS for calculations**

4188.55	Average Reduction (gallons)	\$25.38	Average Cost Savings / Month
61%	Average Reduction (percent)	\$304.59	Average Cost Savings / Year

4.2 Project OUTDOOR WERS SUBTOTAL

50	Without Reuse Offset	39	With Reuse Offset
NOT FINAL		NOT FINAL	

Signature Section

Verifier

Date

Verification Summary

WERS REPORT

Builder

of JOE BUILDER

Verification

of WERS VERIFIER

Project

1234 HOMEOWNER WAY SANTA FE NM

Report Date: 7/1/2015

This report is for: SF City WCC

**Please complete the information in the white boxes.
*Orange boxes are pull-downs that require a response.
*Purple boxes and grey boxes need no action.
Cells with small red triangles have additional guidance provided in a "My input" box.

WR1 SUMMARY

Indoor Use and Conservation Summary

AVERAGE CONSERVATION
BASELINE VS. PROPOSED

GALLONS PER YEAR:

15,065.38

SAVINGS PER YEAR:

\$91.30

AVERAGE CONSERVATION
EXISTING VS. PROPOSED

GALLONS PER YEAR:

35,204.25

SAVINGS PER YEAR:

\$213.34

Outdoor Use and Conservation Summary

AVERAGE CONSERVATION
ALLOWANCE VS. PROPOSED

GALLONS PER YEAR:

41,585.55

SAVINGS PER YEAR:

\$252.01

Combined Use and Conservation Summary

AVERAGE CONSERVATION
BASELINE VS. PROPOSED

GALLONS PER YEAR:

56,650.92

SAVINGS PER YEAR:

\$343.30

WERS

68

NO OFFSETS

NOT FINAL

WITH OFFSETS

58

The WERS is based on the total water use requirements of the proposed design in comparison to an established baseline. For indoor, the baseline is the EPA Water Act of 1992 for the standard plumbing fixtures. For outdoor, the baseline is 25% of the peak average monthly rainfall deducted from the average monthly ETo for the project site as provided by the EPA.



City of Santa Fe NEWS RELEASE

www.santafenm.gov

FOR IMMEDIATE RELEASE

Date: July 15, 2015

Contacts: Rick Carpenter, Water Resources and Conservation Manager, (505) 955-4206, rrcarpenter@santafenm.gov;

Matt Ross, Public Information Officer, (505) 955-6045, mross@ci.santa-fe.nm.us

Santa Fe Seeks Members for Water Conservation Committee Vacancies

Santa Fe, NM – The City of Santa Fe is now accepting applications for three vacant positions to represent Districts 1 and 4 on its Water Conservation Committee. As an advisory group for the City, the Committee assists with policy recommendations and evaluates specific programs related to water conservation.

The Water Conservation Committee was established in 2002 to promote water conservation and advise elected officials on relevant topics.

The Committee provides input on the identification, implementation and effectiveness of various water conservation programs including policy, rebates, media and public outreach, and education.

Committee members dedicate their time to attend regular meetings to be from 4pm to 6pm at City Hall on the second Tuesday of each month. Additional time may be required to address various agenda items. Community members who have interest and/or professional expertise in water conservation are invited to submit the appropriate documents as outlined below.

Members serve three years and may be re-appointed to multiple terms.

Please submit a letter of interest and brief resume to Rick Carpenter, Water Resources and Conservation Manager, Public Utilities Department, at rrcarpenter@santafenm.gov. You may also contact the Water Conservation Committee Chair, Peter Ives, at pnives@santafenm.gov.

Please submit information within one month of this posting.

Dear City Councilor:

You are aware that Water Conservation is important to all of the citizens of Santa Fe. Recently the Water Conservation Committee lost several key members and we are seeking well informed, dedicated persons to help advise Water Conservation with direction and insight.

We are asking you for your assistance with this search.

Per Resolution 2008-40, "The committee shall be appointed by the Mayor and consist of ten members, not including the chair. The membership shall be balanced with no more than two persons per group.

The membership shall include persons with the following kinds of expertise:

- (1) Landscaping water conservation practices;
- (2) Building construction practices;
- (3) Creating and/or implementing education programs;
- (4) Familiarity with land use policies;
- (5) Familiarity with hydrology, engineering or other forms of water-related technical expertise;
- (6) Water quality and water harvesting/water reuse and
- (7) The perspectives of other constituency groups that are an important part of a comprehensive discussion and strategy on water conservation. These other constituencies include homeowners, business owners, youth and state government."

Per Rules and Procedures for Committees, Article 7, Section 1, E-F. "The City of Santa Fe will strive to obtain and retain on the membership of each City of Santa Fe citizens' board, commission, and committee a geographical balance between the four voting districts for municipal elections. The Mayor is encouraged, when filling vacancies on the City's boards, commissions, or committees, to endeavor to obtain the names of qualified and interested citizens from cross-section of the community by issuing public notices requesting applications when insufficient names are readily available."

Attached is the most recent application request – Please forward to anyone who may fill the qualifications as listed.

Please have interested persons submit a letter of interest and brief resume to Rick Carpenter, Water Resources and Conservation Manager, Public Utilities Department, at rrcarpenter@santafenm.gov . You may also contact the Water Conservation Committee Chair, Peter Ives, at pnives@santafenm.gov .

Thank you for your continued interest in saving water in Santa Fe.

Stormwater Irrigation: Can Retention Basins Significantly Improve Soil Moisture?

July 2015

Aaron Kauffman, Southwest Urban Hydrology LLC



The following report was completed for the Soil and Water Conservation Commission with funding from the Water Quality Conservation Grant Program. Administrative support and project collaboration was provided by the Santa Fe-Pojoaque SWCD.

Abstract

Vegetation planted around rain gardens and bio-retention basins presents an opportunity to remediate stormwater pollutants, diversify habitat, and improve community aesthetics in urban settings. In semi-arid regions where water resources are scarce however, it is unclear whether stormwater captured in these basins is sufficient to sustain plant growth without supplemental irrigation. This study examined whether soil moisture could be significantly improved at parking lot curb cuts with rain gardens compared to curb cuts without rain gardens. Results from nine months of monitoring indicate that average volumetric water content of soils in rain gardens significantly increased at multiple depths over areas without rain gardens. Enhancements in soil moisture in rain gardens could potentially sustain vegetation for extended periods without precipitation and thus reduce the burden on potable and effluent water sources for irrigation in urban settings.

Introduction

During recent years there has been a growing national recognition that shrubs and trees in urban landscapes have both environmental and commercial value. Research has shown that vegetation along streets and parking lots can lower urban temperatures and energy consumption; filter, degrade, and accumulate stormwater contaminants; and positively influence consumer behavior by enhancing aesthetics to building exteriors. Research by the city of Albuquerque Parks Department revealed that for every dollar spent in public tree maintenance, \$1.31 in benefits were returned from tree canopy in the form of carbon sequestration, air quality improvements, reduced energy consumption, etc (Vargas et al. 2006). Despite these benefits, adoption of urban forestry by municipalities and commercial developers in the arid Southwest can be hindered by the high costs of irrigation and public concern over potable water use during times of drought. For example, between 2007 and 2012 water use by the city of Santa Fe Parks Division averaged 101.8 million gallons/year while irrigation costs amounted to \$1.35 million/year (Santa Fe New Mexican, April 14, 2013).

One potential method to alleviate water consumption could be through the establishment of rain gardens and bio-retention basins that harvest stormwater as passive irrigation for urban forestry projects. Questions remain however, as to whether these basins can supplement vegetation year-round in the absence of irrigation systems.

Objectives

To assess the efficacy of basins at improving passive irrigation for plants, volumetric water content (VWC) was monitored at curb cuts with and without rain gardens at the Santa Fe Community College. Specific research questions addressed included:

- Is VWC in the soil profile significantly different between curb cuts without rain gardens (i.e. controls) and curb cuts with rain gardens (i.e. treatments)?
- Is there a significant difference in VWC at varying depths of the soil profile?
- How does the VWC in the soil profile vary in time?
- How does precipitation drive VWC fluctuations at varying depths and treatments?

Study Area

The Kids' Campus asphalt parking lot at the Santa Fe Community College is approximately 25,000 square feet with seven evenly spaced curb cuts on the western edge that serve as drainage. Historically stormwater was allowed to exit the curb cuts onto mild slopes (less than 5%) with a mixture of native grasses. Soils are generally described as Alire loam which includes a well drained mixture of loams and clay loams in the first 45 inches of a typical profile (USDA: NRCS Web Soil Survey).

In October of 2012 and April 2013 two rain gardens were constructed to harvest stormwater from parking lot curb cuts. The dimensions of the basins are approximately 15'x10'x1' for a maximum catchment volume of 1,122 gallons. Over the course of a year with 12 inches of precipitation and no individual storms exceeding one inch, it is expected that the basins would harvest at least 13,464 gallons of stormwater runoff. Basin bottoms were mulched with three inches of wood chips and planted with grasses tolerant of temporary inundation by water. Basin berms were planted with shrubs and trees including Three-leaf sumac (*Rhus trilobata*), False indigo (*Amorpha fruticosa*), Patmore green ash (*Fraxinus pennsylvanica*) and Honey locust (*Gleditsia triacanthos*). Vegetation selection criteria was based on plants that were drought tolerant, helped improve pollinator habitat, demonstrated ability to remediate common stormwater pollutants, and were native or adapted to the region without being invasive. Supplemental irrigation was not provided to plants during soil moisture monitoring (i.e. August 2014-June 2015).

Field Methods

On August 23, 2014 5-inch diameter holes were augured 13 feet west of four curb cuts draining the Kids' Campus parking lot. Two of the holes were created in undisturbed native grasses (Control) and two were excavated in the bottom of the rain gardens (Treatment). The

holes were augured 30-inches in depth. Decagon 5TM soil moisture probes were installed vertically into each hole 30 inches below the soil surface before four additional probes were installed horizontally into the soil profile at 6, 12, 18, and 24 inches below the soil surface (total of 20 probes) (Figures 1 and 2). The probes below 18 inches were expected to account for soil moisture beyond the influence of evaporation. The probes between 30 inches and the surface were expected to provide estimates of available soil moisture for transpiration. Excavated soil was reinserted into the holes at comparable bulk density prior to disturbance.

Probe cables were threaded through plastic conduit (to prevent mastication by rodents) and attached to metal fence posts approximately 25 inches west of the augured holes (Figures 3 and 4). The cables were connected to Decagon EM50 data loggers that recorded hourly VWC (m^3/m^3) for 715mL of soil volume per probe. An Onset tipping bucket precipitation gauge was also attached to one of the fence posts to record precipitation (in/hour and in/day).

Analytical Methods

Hourly VWC data for each probe was downloaded and organized by depth and treatment. To assess whether treatments and soil depth influenced VWC, a two-way ANOVA with replication was used on data pooled by rain gardens and controls. Two sample T-tests were used to determine statistical differences by treatments and depths. All statistical comparisons were evaluated at the $\alpha = 0.10$ level of significance. In order to examine the influence of precipitation on soil moisture responses and compare diurnal fluctuations by soil depth and season, VWC data was averaged by treatment and charted against daily or hourly precipitation depth.

Results and Discussion

Treatment and Depth

Comparisons of VWC revealed significant differences in soil moisture by treatment ($F(1, 131030) = 109389.6, p = 0$) and depth ($F(4, 131030) = 7862.9, p = 0$) (Figure 5). The interaction of treatment and depth also resulted in significant differences in mean VWC ($F(4, 131030) = 14422.3, p = 0$). Rain gardens improved VWC 11%, 3%, 24%, 10%, and 49% over comparable depths in soils without water catchment basins. While these increases in VWC could lead to improved growing conditions for plants, the changes appeared to be random across the soil profile (Figure 6). It was expected that rain gardens would increase soil moisture by creating more residence time (i.e. ponding) for stormwater to infiltrate the soil surface, but sustaining soil moisture through time was likely a function of organic matter and soil texture. Organic matter from the wood mulch might have influenced VWC at shallow depths where evaporation was

shielded, while differences in water holding capacity by soil textures could have affected VWC throughout the soil profile measured.

According to a Web Soil Survey, Alire loam (i.e. soil at the site) has at least five distinct layers of loam and clay loam textures in the top 45 inches of a typical profile (USDA: NRCS). Assuming soil layers were spatially uniform across the study area, excavating the rain gardens six inches in depth prior to implementing soil moisture probes could have resulted in soil probes being located in disparate soil textures from the control sites (i.e. the rain garden probes inserted 6 inches below the soil surface in basins already excavated 6 inches would lead to that probe being closer to 12 inches deep in control areas). Comparisons of soil moisture probes offset by depth and overlaid on a diagram with typical Alire loam soil profile resulted in more symmetrical VWC lines as seen in Figure 7. Increases in rain garden VWC at 6, 12, 18, and 24 inches in depth over corresponding control depths of 12, 18, 24, and 30 inches amounted to 12%, 8%, 14%, and 47% respectively. It is not clear why VWC diverges rapidly at 24 inches in the rain gardens compared to 30 inches in the controls, however this result is encouraging in the context of vadose zone soil moisture (i.e. groundwater recharge). By maintaining higher moisture in the soil profile, gravitational movement of water to deeper parts of the soil profile could more easily occur.

Fluctuations through Time and Influence of Precipitation

Total precipitation depth measured during the nine month study was 6.23 inches. Precipitation was divided into daily measurements and plotted against hourly VWC averaged between the rain gardens and controls for each depth (Figures 8-12). Chart observations show that soil moisture often spiked with an input of precipitation, however on some occasions the controls did not display a response to precipitation at multiple depths. It is assumed that the concentration of water in rain gardens aided precipitation events as small as 1/100 inch to percolate through the soil profile whereas runoff at control sites did not have the residence time necessary to infiltrate and percolate to depths as shallow as 6 inches.

Spikes in VWC were generally assumed to correspond with saturation of soils. As the VWC dropped and leveled off within a day or two after storms, field capacity (i.e. maximum amount of water a soil texture will hold against gravity) was met. According to Saxton and Rawls (2006) field capacity for loam and clay loam soils is 28% and 36% respectively. Without additional precipitation inputs, evapotranspiration will cause VWC to taper downward towards permanent wilting point (i.e. VWC where plants cannot extract water from the soil). Permanent wilting point (PWP) for loam and clay loam soils is 14% and 22% respectively. Average VWC in the rain gardens and controls did not reach PWP during the 9 months of monitoring (Table 1). By the end of 28 days (March 21st-April 17th) without measurable precipitation however, average VWC in the controls did reach approximately 23% at 6, 12, and 18 inches below the soil surface (Figures 8-10). This represented an 11.9%, 8.9%, and 5.5% decline in VWC during the dry period for the 6, 12, and 18 inch control site depths respectively. Rain garden VWC during the

same dry period only dropped 3.2%, 6.7%, and 1.0% for comparable depths. By April 17th rain garden VWC was 29%, 26%, and 31% at 6, 12, and 18 inches in depth, meaning that plant available water content (i.e. the VWC range between field capacity and PWP) was never in jeopardy of being lost. These results indicate that despite the controls having access to stormwater runoff through curb cuts, the absence of ponding at these sites could limit plant available water content during extended periods without precipitation. This is important to consider with regard to whether curb cuts without basins are sufficient to sustain plants in the absence of potable or effluent irrigation.

Diurnal Fluctuations

One of the primary reasons for sustained VWC in the upper soil profile of the rain gardens could be that wood mulch reduces water loss from evaporation. Diurnal fluctuations in VWC were examined for the first week of each seasonal trimester during the 9 month study (i.e. September 1st-7th, December 1st-7th, and March 1st-7th). Charts plotting hourly precipitation against seasonal VWC for 6 and 12 inches below the soil surface are presented below (Figures 13-18). Observations of diurnal soil moisture fluxes (i.e. waviness of the VWC measurements by day and night) are clear in the top six inches of each season. The diurnal signal of the VWC data becomes less obvious at 12 inches in depth for each season, particularly in the rain garden measurements for September. While the diurnal fluctuations never appear to shift more than 1% for any given 24-hour period, the downward trend of VWC during periods without precipitation is clear. For example, during the first week of September VWC at 6 inches in depth dropped 1.8% in the rain gardens versus 2.9% in the controls. Observational fluctuations in VWC were not evident at depths greater than 18 inches.

Conclusion and Management Implications

There are different methods to assess the value of passive irrigation provided by rain gardens. One important factor to consider is the economic savings associated with the cost of water for irrigation. After exceeding seasonal threshold water consumption quantities and associated delivery charges, the city of Santa Fe charges approximately \$0.02/gallon (\$21.72/1000 gallons) for water. Based on this value, the rain gardens measured at the Kids' Campus would capture \$269.28 of free water from associated runoff during an average year of precipitation (13,464 gallons/year). In contrast, the city irrigates trees in street medians with two 5-gallon emitters twice per week for four hours during establishment and four hours every two weeks as they become older (personal communication). This would amount to \$6.40/tree/month and \$1.60/tree/month respectively. Once trees are established they are irrigated manually if soil moisture drops below 23% (i.e. the approximate VWC that control sites reached in mid-April during monitoring). These numbers indicate that the potential economic savings in irrigation

costs from rain gardens could be substantial. These savings are less meaningful however, if passive irrigation in basins cannot sustain vegetation in the absence of irrigation systems.

Studies indicate that water consumption by trees will vary depending on species, maturity, growing conditions, and other factors. On a warm (~ 0.25 inches ET) spring or fall day a mature tree ($\sim 100\text{ft}^2$ of canopy) might use 7.8 to 14.6 gallons of water per day (Table 2). Based on average VWC at the Kids' Campus monitoring site, the 150ft^2 rain gardens are estimated to hold approximately 821 gallons of water in the 30-inch soil profile (Table 3). This amounts to 124 gallons (0.33 gallons/ft^3 of soil) more than the control sites and 294 gallons (0.79 gallons/ft^3 of soil) above permanent wilting point. Based on these estimates, rain gardens might harbor ~ 8 to 16 days of extra water in the soil profile over curb cuts without rain gardens and ~ 20 to 38 days of extra water above permanent wilting point (Table 2). These inferences appear to be corroborated at rain gardens with less mature trees during a dry spell between March 21st and April 17th.

Measurements of VWC provided from September 2014 through May 2015 indicate that rain gardens can significantly improve soil moisture over areas without catchment basins and potentially sustain mature trees in the absence of irrigation systems. It should be noted that precipitation in the first half of 2015, particularly during the month of May, was above normal for the area around Santa Fe and New Mexico in general. Further monitoring of soil moisture during normal and below normal periods of precipitation, as well as during summer months (June through August), is critical to determining the value of rain gardens during periods of plant stress and the height of the growing season.

Figures and Tables

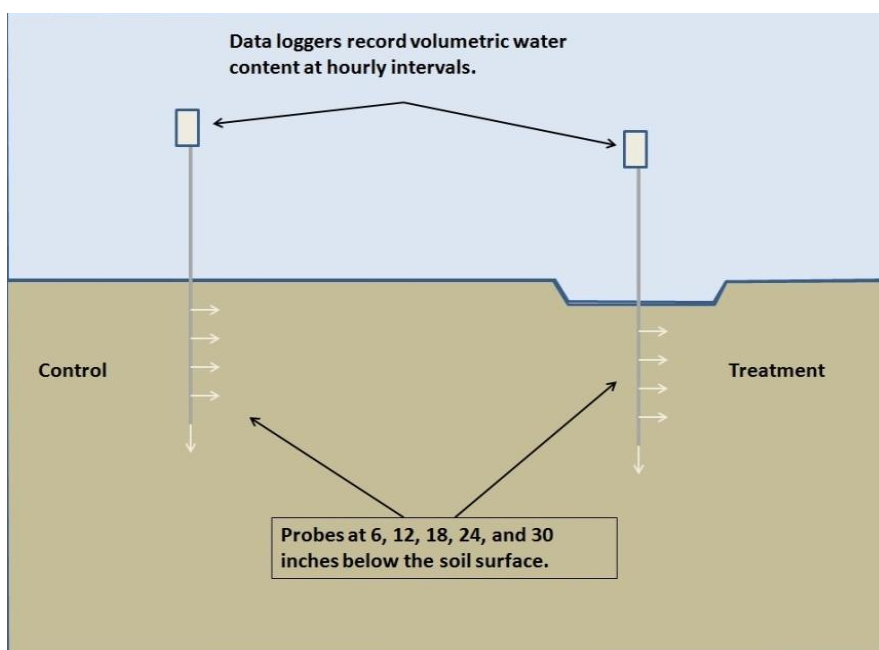


Figure 1. Diagram of field methods used to assess volumetric water content by treatment and soil profile depth.



Figure 2. Decagon 5TM soil moisture probes inserted into an Alire Loam soil profile at 6 inch intervals below the soil surface.



Figure 3. Curb cut without a rain garden (i.e. Control).



Figure 4. Curb cut with a rain garden (i.e. Treatment).

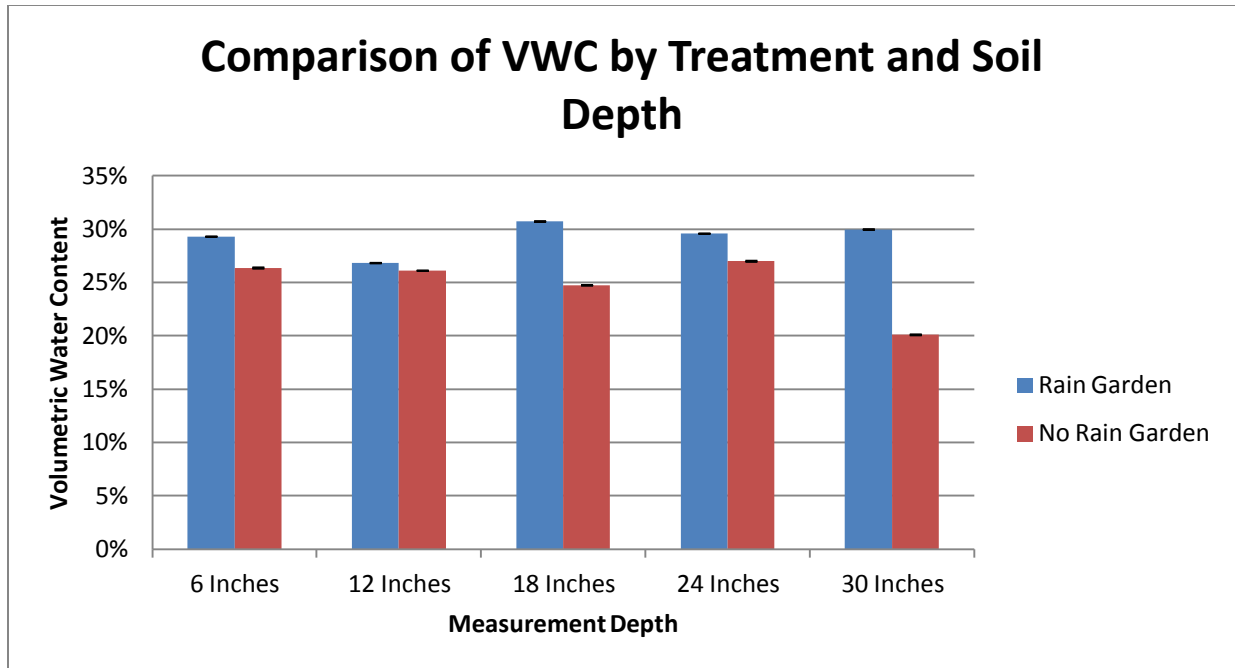


Figure 5. Mean Volumetric Water Content (90% Confidence Intervals) by depth and treatment for a 9-month period (September 1, 2014-May 30, 2015).

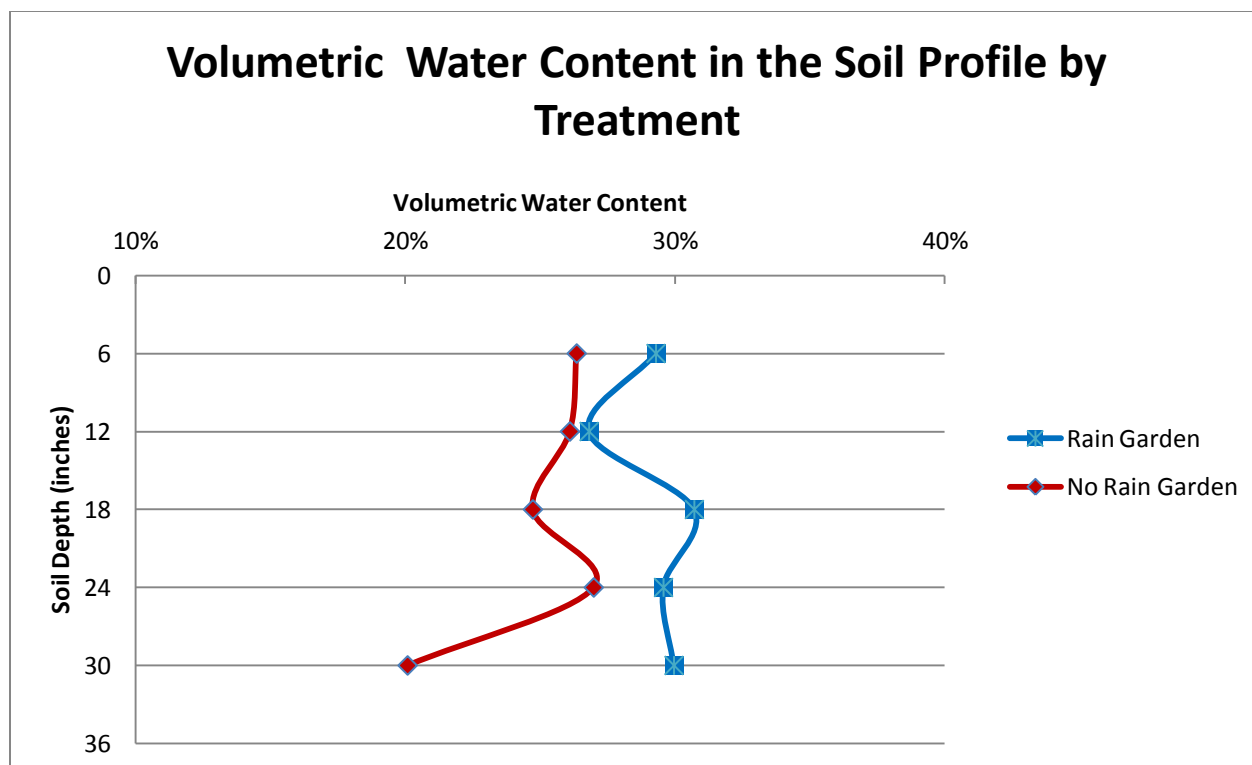


Figure 6. Average volumetric water content in the soil profile measured over 9-months at the Santa Fe Community College.

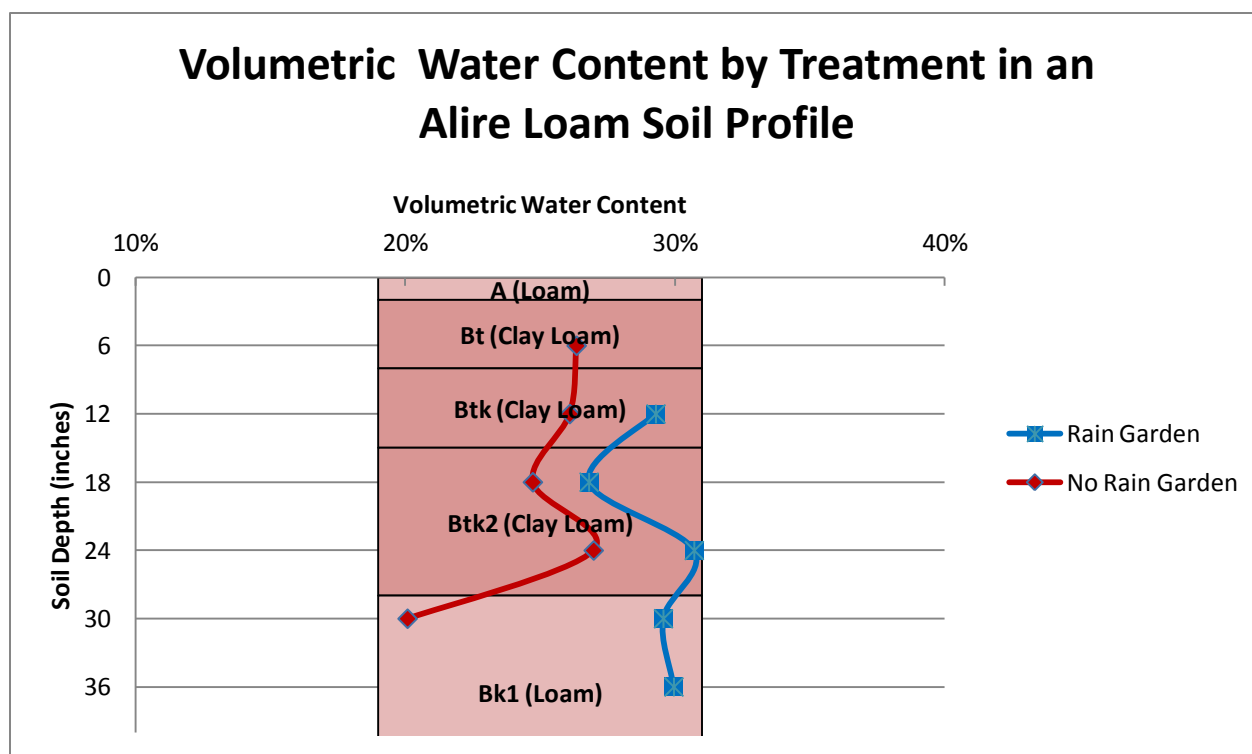


Figure 7. Average volumetric water content in an Alire Loam soil profile measured over 9-months at the Santa Fe Community College. Average measurements are offset according to where soil moisture probes would have been placed in the soil profile after rain garden excavation.

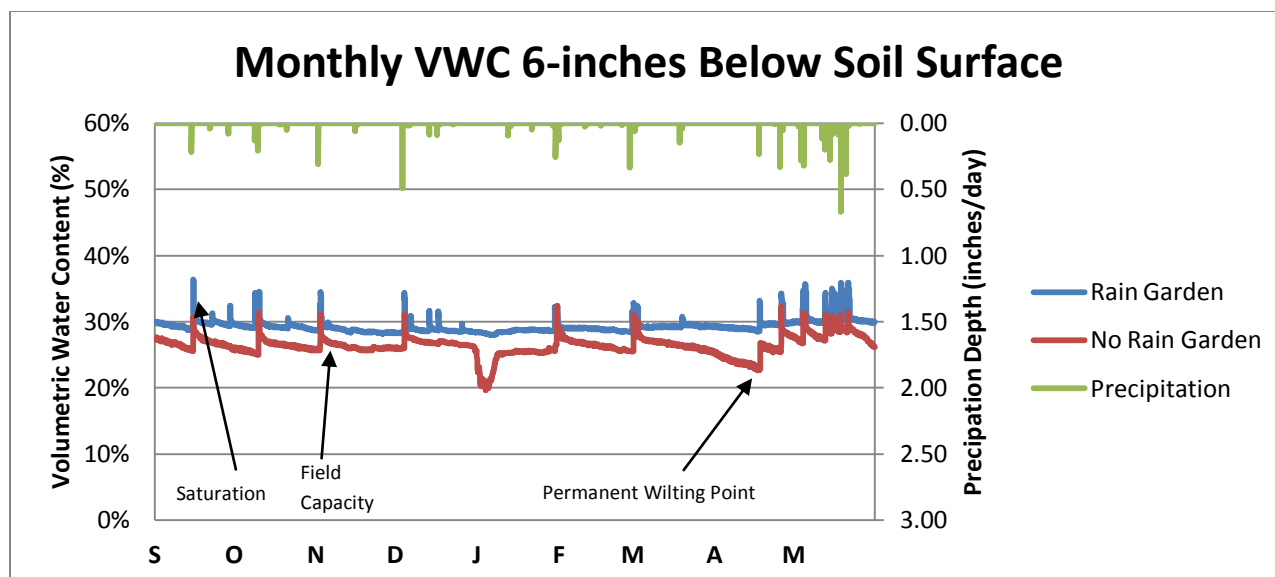


Figure 8. Monthly volumetric water content measurements compared by treatments. The dip in VWC in early January for the control data should be disregarded (probably a consequence of several days of below freezing temperatures).

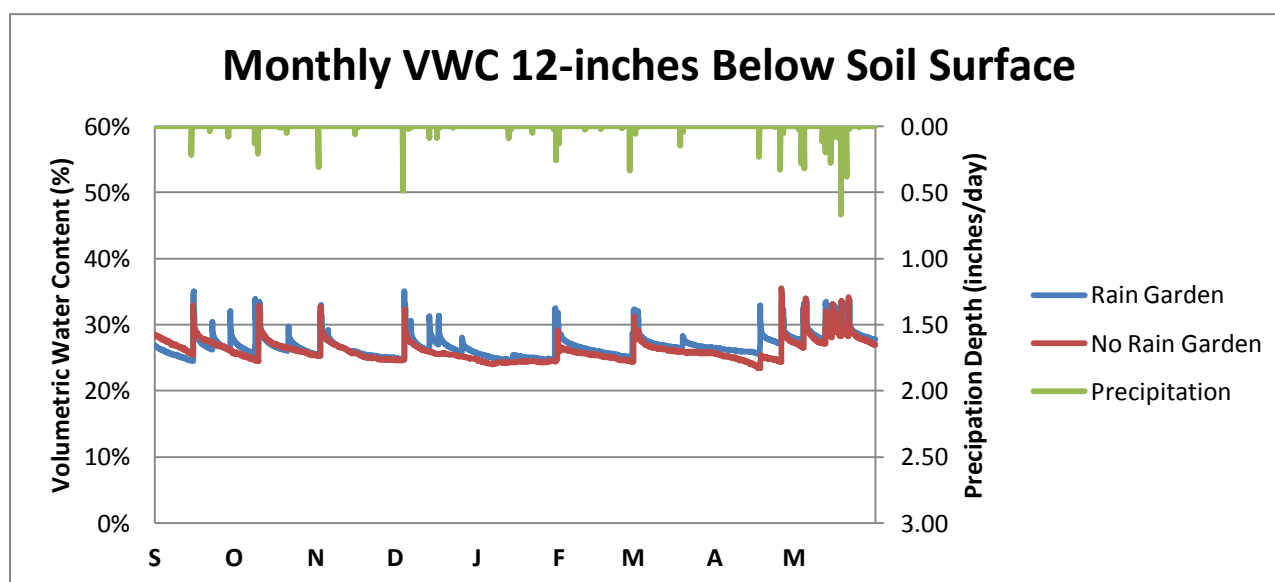


Figure 9. Monthly volumetric water content measurements compared by treatments.

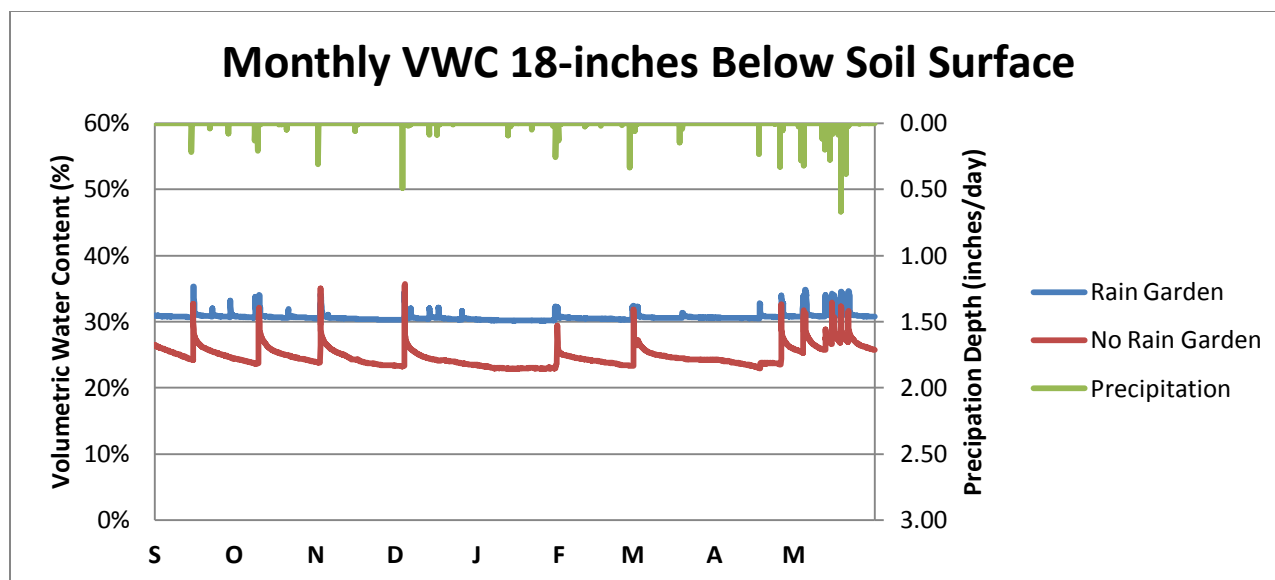


Figure 10. Monthly volumetric water content measurements compared by treatments.

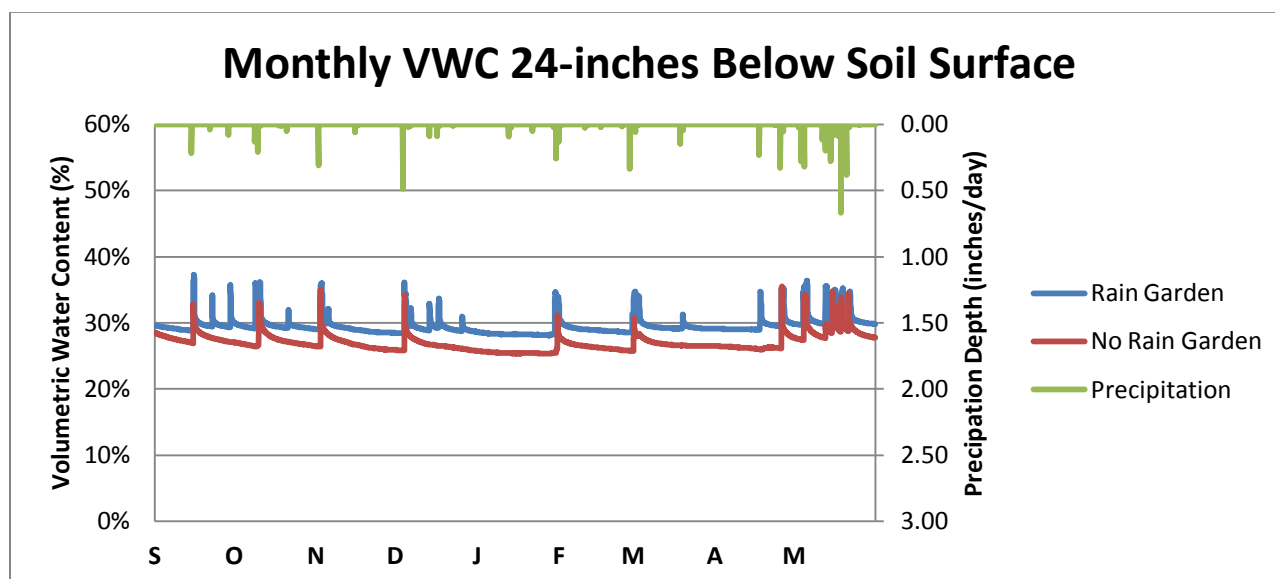


Figure 11. Monthly volumetric water content measurements compared by treatments.

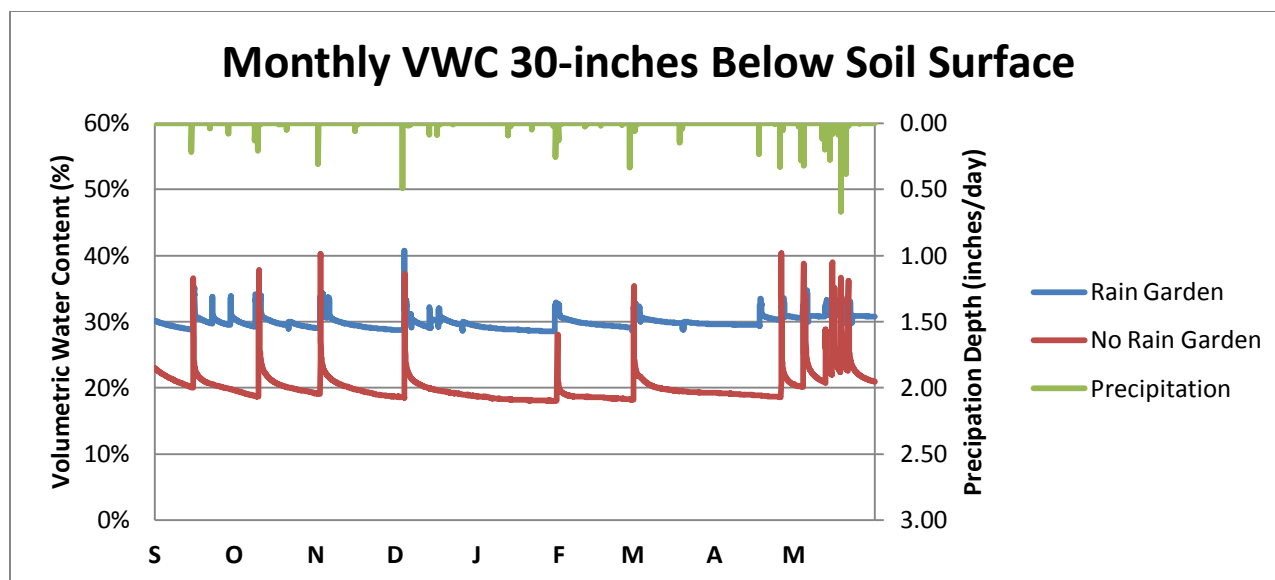


Figure 12. Monthly volumetric water content measurements compared by treatments.

Table 1. Average volumetric water content by treatment and expected soil textures at respective soil profile depths.

Soil Depth	Rain Garden Soil Texture	Rain Garden Average VWC	No Rain Garden Soil Texture	No Rain Garden Average VWC
6	Clay Loam	29%	Clay Loam	26%
12	Clay Loam	27%	Clay Loam	26%
18	Clay Loam	31%	Clay Loam	25%
24	Loam	30%	Clay Loam	27%
30	Loam	30%	Loam	20%

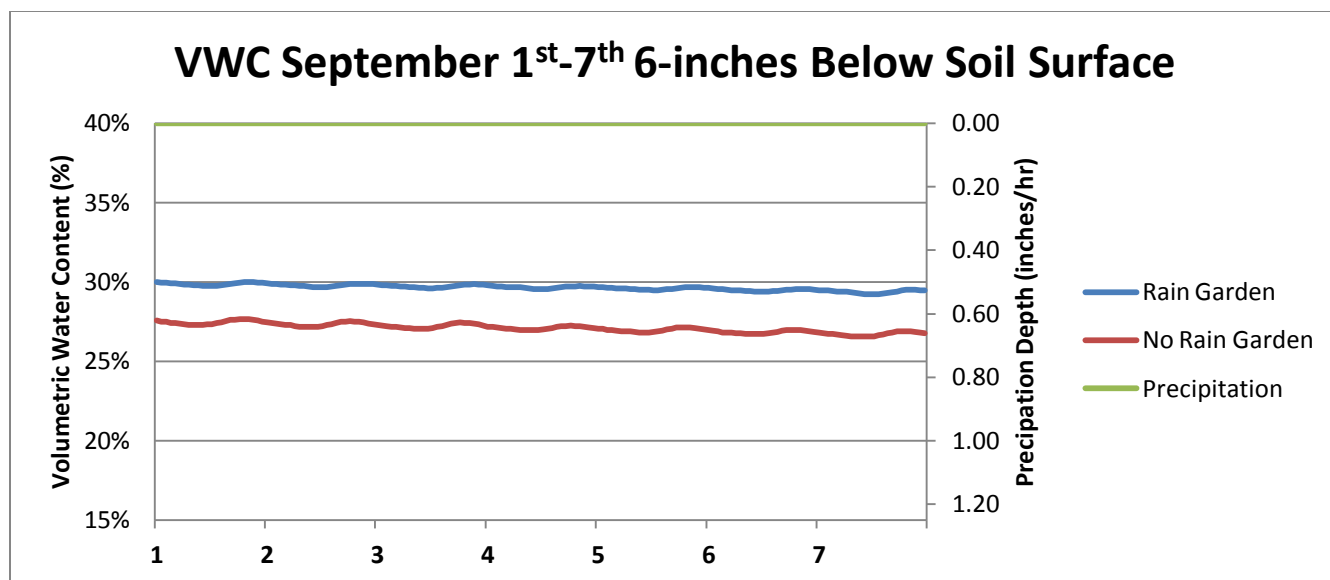


Figure 13. Diurnal fluctuations in volumetric water content by treatment.

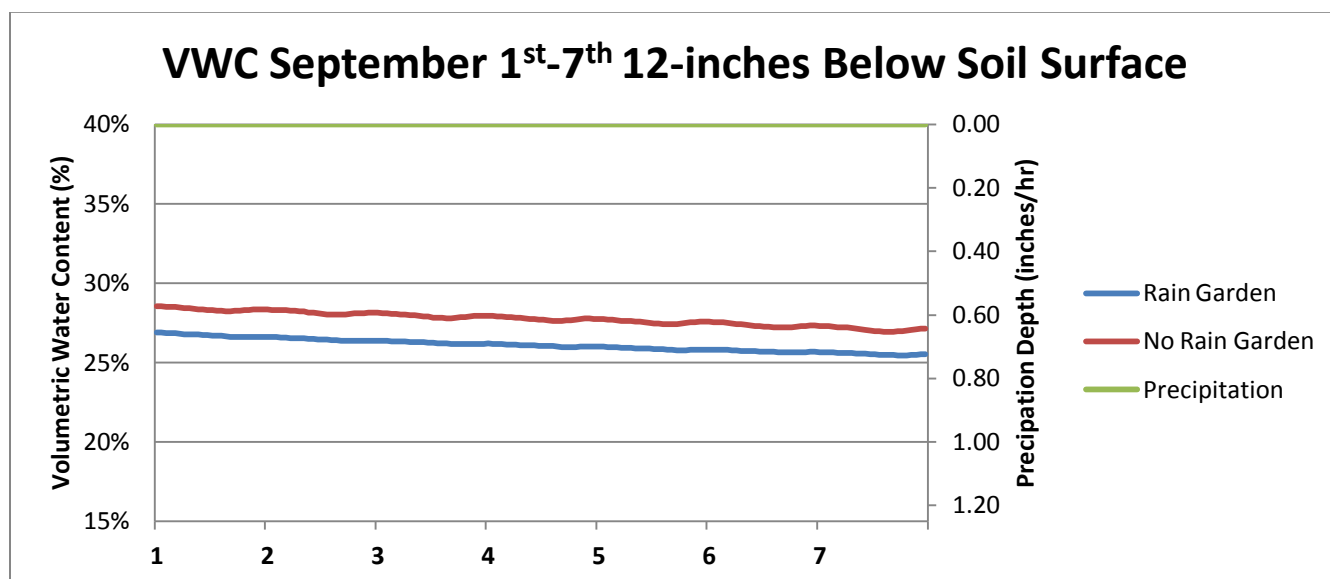


Figure 14. Diurnal fluctuations in volumetric water content by treatment.

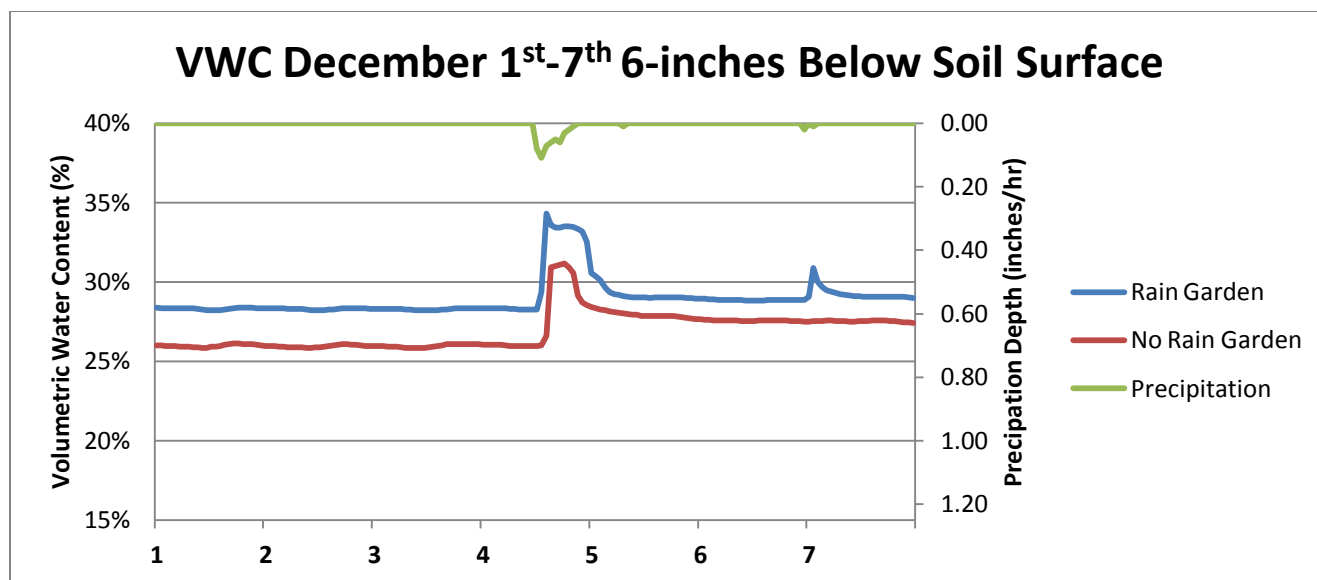


Figure 15. Diurnal fluctuations in volumetric water content by treatment.

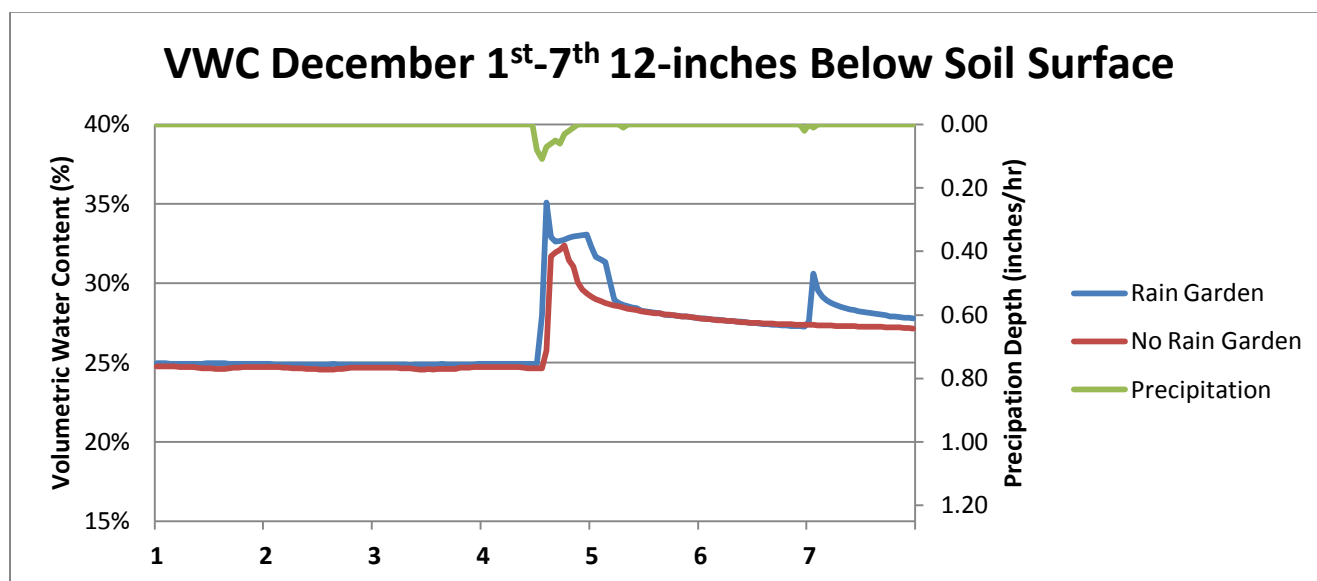


Figure 16. Diurnal fluctuations in volumetric water content by treatment.

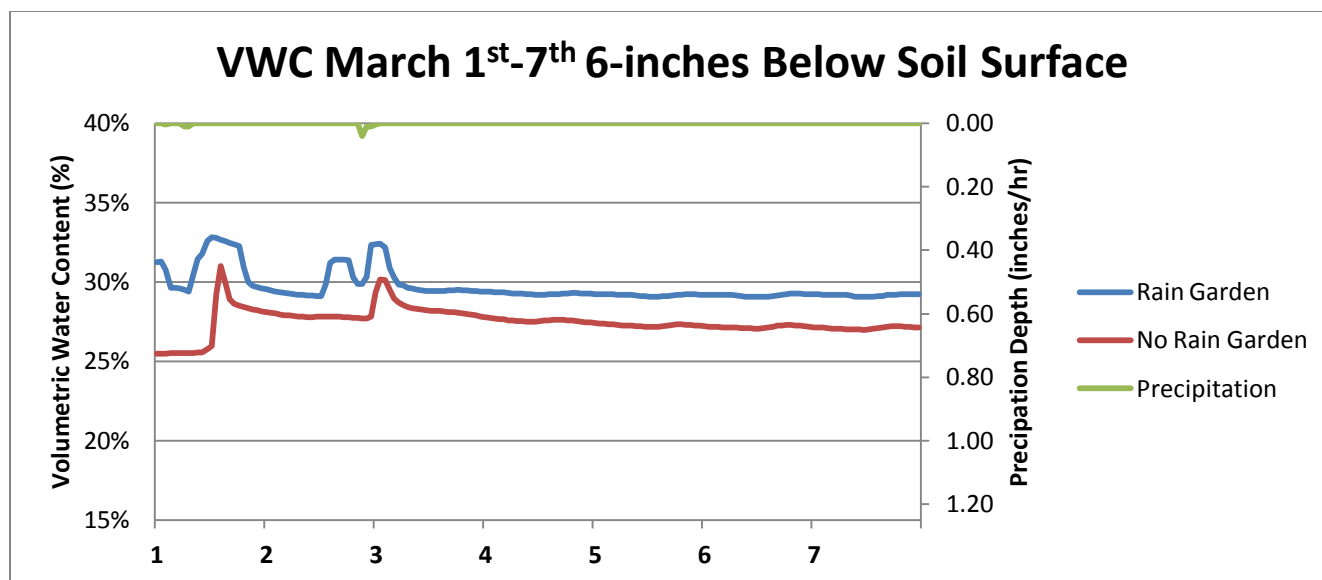


Figure 17. Diurnal fluctuations in volumetric water content by treatment.

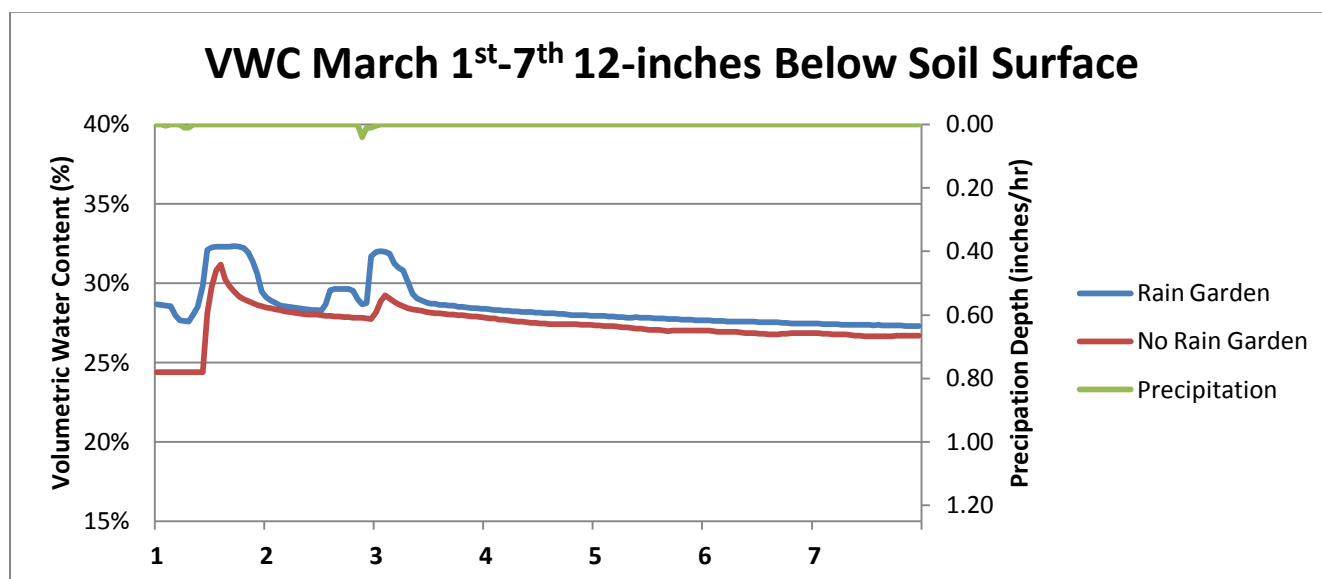


Figure 18. Diurnal fluctuations in volumetric water content by treatment.

Table 2. Estimated water consumption by a mature tree (100 sqft canopy) during a warm (0.25 inches ET) Spring/Fall day. Note that the first two columns are cited in the reference column, while columns three and four are extrapolations based on data from the Santa Fe Community College.

Tree Type	Gallons/Day	Extra Days of Water above Control Sites	Extra Days of Water above PWP	Reference (Gallons/Day)
Not Indicated	7.8	15.9	37.7	University of California Center for Landscape and Urban Horticulture
Fruit Tree	12.5	9.9	23.5	Vossen (2000)
Broadleaf Shade Tree	14.6	8.5	20.2	Utah State University Forestry Extension
Average	11.6	10.7	25.3	

Table 3. Estimated available water content (gallons) by depth, treatment, and anticipated permanent wilting point.

Probe depth	RG Gallons of water in Soil Profile	No RG Gallons of water in Soil Profile (PWP Values)	Difference in Gallons for RG and Control (RG:PWP)
6	164.4	148.1 (123.0)	16.3 (41.4)
12	150.3	146.4 (123.0)	3.9 (27.3)
18	172.2	138.6 (123.0)	33.7 (49.2)
24	166.1	151.5 (79.0)	14.6 (87.1)
30	168.3	112.8 (79.0)	55.5 (89.3)
Total	821.3	697.3 (527.0)	124.0 (294.3)

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Drought, Monsoon/El Nino, and ESA Update

As the Committee/Board is aware, our region is has suffered through a prolonged drought, lasting over four consecutive years of record drought, heat, and wildfires – albeit drought conditions have eased lately due to the reappearance of a strong El Nino. Recent model runs indicate a wetter and cooler than normal remaining summer, fall, and into early winter. However, the models also indicate the return of drought conditions by late spring in 2016, which could present significant challenges to all water purveyors, water utilities, and irrigators going forward. Regional reservoir levels on the Rio Grande and Chama Rivers are still low but rising. Deliveries from the SJCP Project have been recently upgraded. The City has received about 85% of normal firm yield through July 1st of this year. If the active monsoonal precipitation continues it is possible that the City could receive 100% of normal firm yield. There are no Endangered Species Act (ESA) updates, except that an environmental group has resurrected its previous threat to file a Notice of Intent to file suit over the protected status of the Rio Grande Cutthroat Trout. Updates on this, and other endangered species issues, will be made as needed. A draft “Biological Assessment” (BA) has very recently been issued by the BoR (addressing broad ESA coverage for significant listed species such as the SW willow flycatcher and the silvery minnow). However, it is still too soon for City staff, other water management agencies, and related regulatory agencies, to have completed a review of the documents. Updates on this issue will be made as appropriate.

2015 Meeting Schedule

Santa Fe Water Conservation Committee

Location: City Councilors' Conference Room, 200 Lincoln Avenue

Time: 4-6 PM

Day: Second Tuesday of the month (except as noted)

Meeting Date	Caption Deadline, 3 PM	Packet Material Deadline, 3 PM
January 13, 2015	Tuesday, December 23, 2014	Monday, December 29, 2014
February 10, 2015	Monday, January 26, 2015	Wednesday, January 28, 2015
March 10, 2015	Monday, February 23, 2015	Wednesday, February 25, 2015
April 14, 2015	Monday, March 30, 2015	Wednesday, April 1, 2015
May 12, 2015	Monday, April 27, 2015	Wednesday, April 29, 2015
June 9, 2015	Friday, May 22, 2015	Wednesday, May 27, 2015
July 14, 2015	Friday, June 26, 2015	Monday, June 29, 2015
August 11, 2015	Monday, July 27, 2015	Wednesday, July 29, 2015
September 10, 2015 (Thursday)	Monday, August 24, 2015	Wednesday, August 26, 2015
October 15, 2015 (Thursday)	Monday, September 28, 2015	Wednesday, September 30, 2015
November 10, 2015	Monday, October 26, 2015	Wednesday, October 28, 2015
December 8, 2015	Friday, November 20, 2015	Monday, November 23, 2015