City of Santa Fe

Agenda

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SANTA FE WATER CONSERVATION COMMITTEE MEETING
CITY HALL - 200 LINCOLN AVE.
CITY COUNCILORS' CONFERENCE ROOM
TUESDAY, DECEMBER 10, 2013
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 NOVEMBER 5, 2013 WATER CONSERVATION COMMITTEE MEETING
6. CONSENT AGENDA
   - A. WATER CONSERVATION EDUCATION & OUTREACH: EVENTS UPDATE (Laurie Trevizo)
   - B. UPDATE ON 3RD PARTY SURVEYS (Laurie Trevizo)
     - i. RESIDENTIAL END USE WATER SURVEY
     - ii. DEMAND ELASTICITY

DISCUSSION ITEMS:

7. DROUGHT, MONSOON AND WATER RESOURCE MANAGEMENT UPDATE (Rick Carpenter)
8. INTRODUCTION TO POSAC MEMBERS (Councilor Ives, 20 minutes)

INFORMATIONAL ITEMS:

9. REBATE ANALYSIS (Councilor Ives, 40 minutes)
10. GROUP REPORTS FROM WATER CONSERVATION COMMITTEE INITATIVES: (Councilor Ives, 60 minutes)
    - A. GROUP #4- REESTABLISH TREND OF NET ANNUAL REDUCTIONS IN PER CAPITA WATER USAGE AND IDENTIFYING LARGE WATER USERS (12 minutes)
    - B. GROUP #5- DOMESTIC WELLS WITHIN THE CITY LIMITS (12 minutes)
    - C. GROUP #1 – WATER CONSERVATION & DROUGHT MANAGEMENT PLAN UPDATE (12 minutes)
    - D. GROUP #2- WATER CONSERVATION EDUCATION/OUTREACH (12 minutes)
    - E. GROUP #3- PROMOTE OUTDOOR WATER CONSERVATION (12 minutes)

MATTERS FROM STAFF:

11. APPROVED 2014 MEETING CALENDAR

MATTERS FROM COMMITTEE:

NEXT MEETING – TUESDAY, JANUARY 14, 2014:

CAPTIONS: December 27, 2013 @3 pm PACKET MATERIAL: January 3, 2014 @3 pm

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.

CITY OF SANTA FE

MINUTES

Water Conservation Committee

Fran Lucero, Stenographer

11/5/2013

DRAFT UNTIL APPROVED

SANTA FE WATER CONSERVATION COMMITTEE MEETING
CITY HALL - 200 LINCOLN AVE.
CITY COUNCILORS' CONFERENCE ROOM
TUESDAY, NOVEMBER 5, 2013
4:00 PM TO 6:00 PM

1. CALL TO ORDER

The meeting was called to order by Councilor Peter N. Ives, Chair, at 4:00 pm on November 5, 2013, in the City Councilor's Conference Room, City Hall, Santa Fe, New Mexico.

2. ROLL CALL

MEMBERS PRESENT
Councilor Peter N. Ives, Chair
Tim Michael
Lisa Randall
Stephen K. Wiman
Grace Perez
Giselle Piburn
Karyn Schmitt
Bill Roth

NOT PRESENT
Doug Pushard
Melissa McDonald
1 Vacancy

OTHERS PRESENT
Senator Peter Wirth
Nancy Avidisian
Laurie Trevizo, Water Conservation Officer
Caryn Grosse, City Staff
Fran Lucero, Stenographer

Introduction of Senator Peter Wirth. Senator Wirth sits on the Senate Conservation Committee and has served the New Mexico Legislature for 10 years.

The Chair will pursue filling the vacant position by recommendation of Nancy Avidisian.

3. APPROVAL OF AGENDA

Giselle Piburn moved to approve the agenda as presented, second by Grace Perez, motion carried by unanimous voice vote.

4. APPROVAL OF CONSENT AGENDA

Tim Michael moved to approve the consent agenda as presented, second by Bill Roth, motion carried by unanimous voice vote.

5. APPROVAL OF MINUTES OCTOBER 8, 2013 WATER CONSERVATION COMMITTEE MEETING

6. CONSENT AGENDA

A. 2014 WATER CONSERVATION COMMITTEE SCHEDULE (Laurie Trevizo)

B. DROUGHT, MONSOON AND WATER RESOURCE MANAGEMENT UPDATE (Rick Carpenter) (NOT PRESENT)

C. UPDATE ON 3RD PARTY SURVEYS (Laurie Trevizo)
   i. RESIDENTIAL END USE WATER SURVEY
   ii. DEMAND ELASTICITY

DISCUSSION ITEMS:

7. 2014 LEGISLATIVE RECOMMENDATIONS (Councilor Ives, 20 minutes)

Open Discussion

The Chair provided Senator Wirth with a brief description of the Executive Order of which the Water Conservation operates under. Chair Ives offered the services of the committee members should there be a need for testimony or education on water conservation during the upcoming legislative session.

It was noted that #9 is the rebate analysis and this information could be a useful statistic in promoting water conservation. Mr. Michael's explained that the City of Santa Fe for the last few years has provided a water report that details the rebate program and the success of this program. Committee members have used this as a basis of information to evaluate how rebates have worked; how they have saved water for the city, how does it work for the customer, has the promotion worked for the city, etc. The rebates have increased the water rates for the City of Santa Fe which now are relatively high. It is unknown if the rebates have lent themselves to the increase of the water rates. The marginal water rate for the city of Santa Fe is three times higher than the city allotment. The committee is trying to untangle this scenario to review what has happened in the past and what will work in the future.

Tim Michael and Doug Pushard have shared this information with the Water Conservation Office and Laurie is in the review process. She will provide edits to Mr. Michael and Mr. Pushard and it is the hopes to have the report ready by December, 2013.

The Chair wanted to emphasize that the City started the rebate program and the State followed with rebates on clothes washers. The collaboration between municipal utilities and the state on conservation measures is a discussion point for the future.

Senator Wirth said that the days of programs like this where there were targeted dollars coming from the state are very doubtful during this administration. We need to make sure that the dollars that are there are used in the best way possible.

Laurie commented on the funding. The funding for 2010-2011 for the city of Santa Fe and Energy & Minerals was through ARRA funding, which was a onetime chunk of money. How we refund our program now is through a $4.00 levy on water bills which occurs in April and November for every customer other than those who are low income. This money goes in to an account in the city and it has not been used for several years. There is a new roll out plan for these types of rebates per item. There is good funding to last for a while; the city has used approximately $200,000 to $300,000 per year. It is important to continue to utilize and review water analysis to quantify where water use is going. This provides a deeper review of where the rebates should go. Having made this comment, it is important for the state to follow this same advice, "getting our house in order". The city water rebates are available to all water customers, if the state needs to replace their toilets, the state should take advantage of these water rebate programs. As long as there is an account and it isn't a rented building or better said meets the requirements; the city is willing to help. The city has helped many of the hotels in Santa Fe on water conservation.

Senator Wirth asked if the state would pay their levy. Laurie said yes. It depends on the type of building and if they are leased out or if they are paid by the state. Building Services for the State of New Mexico has been very helpful. They will cooperatively participate with the City on a meter system. They will use our (Auto Meter Interface) AMI technology to get real time data.

The Chair announced that the City is going to a new billing system which is very exciting. There will be signals that can be sent electronically to detect water leaks.

Laurie said that they are looking at hourly readings. It cannot do the city of Santa Fe completely. It was noted that 57% of our customers are residential. 40% is dedicated to outdoor use.

The Chair noted that the other area the City of Santa Fe has done a lot on is Water Regulation.

Senator Wirth said that with Santa Fe being a front leader in water conservation; other legislators are beginning to notice. Many of the other municipalities are conscious and complimentary of what is happening in Santa Fe. Whether we do it

during the session as it is a short session or later; the thought is to have Councilor Ives and/or staff give a presentation to the Conservation Committee during the legislative session.

Mr. Roth stated that the Santa Fe Builders Association are focusing on energy consumption and the next code cycle will be driving down towards water use and scoring conservation more heavily.

Laurie spoke for Doug Pushard and Melissa McDonald who provided water harvesting information. The state only has a policy for water harvesting. Colorado and Arizona have it codified for them and they have it in their statutes. There may be problem with the State Engineers, rain water harvesting can only be used for in-door purposes; commercial use is not one of the uses that can be provided. With the lack of legislation to support the use of rain water harvesting in creative ways, we certainly need that support.

Senator Wirth would like a copy of the documents provided by Ms. McDonald and Mr. Pushard. (Laurie to follow up on this request.) There are ways to put in stringent requirements to create a sense of comfort before the stakeholders hold back. I agree 100% that the Homebuilders and the Green Building Association got it extended; it did what tax credits should do, we need that to shift the water.

Ms. Perez discussed feedback from a recent meeting in Arizona. So many of the attendees from other states were so impressed with the success of Santa Fe. It would be great to have that leadership at the State level, water harvesting and grey water is just one example. If there is anything this committee can do, the committee stands ready to support.

Mr. Roth, what is the push back on this from the state?

Senator Wirth said it depends on the piece you are addressing. State Engineer has a large voice in many of these areas of discussion. There is a Grey Water Statute.

The Chair reiterated the offer to supply information and support from staff for presentations and to bring together a communicative dialogue to assist on Water Conservation.

8. REQUEST FOR APPROVAL WATER CONSERVATION POWERPOINT PRESENTATION (20 minutes)

Grace Perez requested consideration and approval of the Water Conservation power point. (Distributed with all edits). Ms. Perez said as a follow up to a request from City Staff on financial needs; she could envision 6 presentations per year which would not require city money to fund for advertisement.

Mr. Michael did concur that he has included the edits from city staff and asked for a vote and support from this Committee for approval.

The Chair said that he would like to see the power point updated as new information becomes available. Water system and water dynamics are living systems through cycles.

Laurie said that the goal was to make a clear presentation. Comments are minimal and the language changes were to provide clarity for this power point consideration by the committee. The Chair expressed his thank you for making the changes.

Mr. Roth: Question on Commercial Rebates – Water Harvesting.

Laurie: We will rebate commercial water harvesting if it goes to their irrigation.

Year Round Water Restrictions: Water request in restaurants, lodging and linen changes – add change of linen for extended stays or for long term guests.

Notice is required under the first bullet, what does that mean.

Grace Perez: The person in the restaurant has to ask for water to get it.
Caryn: The requirement is that they provide signs on the table or on the menu.
Chair: Add – signage required to the power point.

Mr. Roth: Define GPCD (Gallons per Capita per Day) (For the customer - Annual water consumption). Ms. Perez said that when making the presentation they would explain the acronym(s).

Chair: Conservation Programs, slides – Increase training and it mentions QWEL (Qualified Water Efficient Landscaper).

Mr. Michael moved to approve the Water Conservation in Santa Fe Power Point with the edits as noted, second by Mr. Roth, motion carried by unanimous voice vote.

The Chair provided his thank you to all members of the Committee and the working group for finalizing the Power Point. We should continue to communicate and identify the targeted audience; provide Laurie a list of where the presentations will be made or have been made. The Chair asked that Laurie research any TV or Radio opportunities to make this announcement and presentation.

INFORMATIONAL ITEMS:

9. REBATE ANALYSIS (Councilor Ives, 20 minutes)
Discussed above.

10. GROUP REPORTS FROM WATER CONSERVATION COMMITTEE INITATIVES: (Councilor Ives, 60 minutes)

A. GROUP #3- PROMOTE OUTDOOR WATER CONSERVATION (12 minutes)

Events: Brain storming meeting to gather information on water conservation measures. A presentation will be made to the Realtors Association tomorrow. Nancy Avidisian added that Stephen Wiman from the Water Conservation Committee and a representative from the State Engineers Office will also make a presentation. The representative from State Engineers Office will do a briefing on the Water Rights settlement. Information will be gathered and hear what their ideas are. This will take place on November 6, 2013 at 9:00 am. Second is a meeting of the AIA Lunch Meeting on January 9, 2014. The time allowed is approximately 30-45 minutes and the power point would be a good format for this venue. The Water Conservation Committee members are all invited.

B. GROUP #4 - REESTABLISH TREND OF NET ANNUAL REDUCTIONS IN PER CAPITA WATER USAGE AND IDENTIFYING LARGE WATER USERS (12 minutes)

Mr. Michael reported that this group is moving along and report was included in the packet. The data received from parks will be useful to identify how much water is used in the parks and the amount of turf area.

Ms. Schmitt said if we could establish a good relationship with the Parks Department and establish a good model we could work with other municipalities. Looking at trying to find rebates for outdoor water use. There is something in the market by using an existing clock that would respond to water conservation. Ms. Schmitt will continue to do research on these clocks. Ms. Schmitt said that if you can even get a homeowner to reduce watering once a week that is a remarkable savings. There are other variables when you focus on clocks and outdoor water conservation; Karyn will continue to do research on this option which would also result in rebates. If this is found as a suitable idea, more information will be provided.

Laurie invited Group 4, as they are developing all the criteria for commercial water rebates, to attend a future meeting to collaborate. More information to follow on meeting date.

C. GROUP #5 - DOMESTIC WELLS WITHIN THE CITY LIMITS (12 minutes)

(Group 5 report included in packet.)

Mr. Wiman made reference to a report from Amy Lewis. Mr. Wiman will provide this report to Laurie for distribution to the committee.

Maxine Paul is interested in doing master work for her thesis in Water Conservation. She is doing work through the Water Resources Program at UNM – Status of Domestic Wells in Santa Fe. She has an undergraduate degree from Columbia. Mr. Wiman will meet with her and provide more information next month. The Chair would welcome an opportunity to talk to Ms. Paul. Laurie noted that there is a very short timeline as she plans to graduate next summer.

Update: Information in the packet was referred to the City Attorney's Office for review prior to City Attorney Zamora's exit. At this time no update on the report is available. More information to follow when the City Attorney's office has provided information to Laurie.

D. GROUP #1 – WATER CONSERVATION & DROUGHT MANAGEMENT PLAN UPDATE (12 minutes)

Ms. Perez stated that they have met two times. The meeting packet includes a draft of the guiding principles. They are there for review, suggestions, and/or additions or re-wording. At the meeting of Group #1, the overall schedule was reviewed. Goal is to provide information to the Water Conservation Committee for the Water Drought Plan which is due in 2015. Next step is to take the input from the Realtors Association meeting and the AIA meeting to develop committee goals, strategies and objectives. At Doug's request, input was requested from all the working groups to submit items that are important in their groups. At the next meeting they will discuss any changes to the guiding principles and items from all groups. The meeting will be held on November 15th. This is a working draft and will not come to the committee until February 15th, 2014.

E. GROUP #2- WATER CONSERVATION EDUCATION/OUTREACH (12 minutes)

Done

MATTERS FROM STAFF:

Laurie Trevizo: It was asked if a point of contact could be provided for each working group. In cases where information is requested, it is more efficient to respond to one contact person per group, if at all possible, and information can be disseminated to each group member by that contact person.

Claudia Borchert will be leaving her post with the city of Santa Fe on November 15th. There will be a pot luck held for her on Thursday, November 7th. At this time, any questions related to Claudia's role in the city will be directed to Rick Carpenter.

Laurie announced that they have a new Water Conservation Project Manager – Rachel Wexler who is working on rebate processing. She is also attending the QWEL training and is working on the poster contest.

MATTERS FROM COMMITTEE:

Next month discussion on the Drought Monsoon Water report.

ITEMS FOR NEXT MEETING – TUESDAY, DECEMBER 10, 2013:

Introduction of POSAC members

CAPTIONS: November 20, 2013 @3 pm PACKET MATERIAL: November 22, 2013 @3 pm

ADJOURN

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

SIGNATURE PAGE:

_____
City Councilor Peter Ives, Chair

_____
Fran Lucero, Stenographer

City of Santa Fe, New Mexico

memo

Date: November 26, 2013

To: Water Conservation Committee

From: Laurie Trevizo, Water Conservation Manager

Via: Rick Carpenter, Water Resources and Conservation Manager
Nick Schiavo, Public Utilities Department and Water Division Director

RE: Update on Water Conservation Office Fall 2013 Events

The City of Santa Fe Water Conservation Office hosted a number of events this fall that provided education and outreach opportunities to a variety of audiences.

Spooky Showerhead Swap:
October 31, 2013

In response to the message included in the October Utility Bills, the Water Conservation Office swapped out 74 showerheads!

QWEL (Qualified Water Efficient Landscaper) Training:
November 5-6 & 12-14, 2013

Twenty-three participants signed up for the Qualified Water Efficient Landscaper (QWEL) training, co-sponsored by the Water Conservation Office and the New Mexico Water Conservation Alliance. Twenty attended the course and took the examination.

11th Annual Children's Poster Contest:
Theme: Saving Water is Always in Season!
Marketing: News Release October 11, 2013
Extended Submittal Deadline: December 13, 2013
Judging: January 2014 (Day to be determined)

The annual poster calendar is a favorite in the Santa Fe community. Winners of the poster contest receive a prize package that includes conservation kits for saving water at home. The grand prize winning poster is displayed for a year on the back of a city bus and on the calendar cover. First through third place winners will be featured monthly in the 2015 calendar. The Water Conservation Office has already begun receiving posters, although the deadline has been extended to December 13, 2013.

City of Santa Fe, New Mexico

memo

Date: November 6, 2013

To: Public Utilities Committee

From: Laurie Trevizo, Water Conservation Manager

Via: Rick Carpenter, Water Resources and Conservation Manager
Nicholas Schiavo, Public Utilities Department and Water Division Director

RE: Update on 3rd Party Water Conservation Studies- "Residential End Use Study"

Background: In early 2011 the City of Santa Fe was approached to participate in an update to the 1999 Residential End Use Study conducted by Aquacraft. The City of Santa Fe was featured as a case study in the original 1999 study. This study investigates water use patterns in residential housing across the US and Canada.

The City of Santa Fe's Water Division is a Level 2 participant on the Aquacraft consulting team's contract to update and Expand Residential End Uses of Water. As a Level 2 utility participant, City of Santa Fe Water Division is providing in-kind services with ITT queries of the billing system.

Research Approach: The research for this study largely follows the methods established in the 1999 Residential End Uses of Water study with some notable differences.

- North American mail survey (Level 2)
- Research database
- Data analysis and modeling to answer a broad range of research objectives
- Establishment of efficiency benchmarks
- Comprehensive and accessible final report

Current Status of Project: In October of 2012 surveys were mailed to the City of Santa Fe Water Utility customers. The project is still ongoing and in the final stages. Researchers are comparing datasets and creating regression curves to model end use consumption between municipalities.

The draft report is expected in early 2014 and will include information on saturation rates for toilets, clothes washers and showerheads based on region. Some preliminary results indicate that water savings have occurred in residential use since the 1999 study.

The Water Conservation Office will use the results of this data to determine future residential indoor water use programs to offer City of Santa Fe water customers.

City of Santa Fe, New Mexico

memo

Date: November 6, 2013

To: Public Utilities Committee

From: Laurie Trevizo, Water Conservation Manager

Via: Rick Carpenter, Water Resources and Conservation Manager
Nicholas Schiavo, Public Utilities Department and Water Division Director

RE: Update on 3rd Party Water Conservation Studies – "Demand Elasticity Study"

Background: In 2011 the City of Santa Fe was approached to participate in the Demand Elasticity Study which looks at water demand responses to drought. This study includes 7 other case studies (municipalities). The Demand Elasticity project is sponsored by the Alliance for Water Efficiency (AWE) and the Walton Foundation. The goal of the study is to determine the extent of demand elasticity during a drought as influenced by demand management (conservation) programs implemented by a water utility prior to and post drought events.

The study will determine:

1. The effectiveness of long-term demand management programs (water conservation programs) resulting in decrease, increase or no impact on customers willingness to conserve during drought events.
2. The types of long-term water conservation programs and how these programs relate to different customer classes using randomly selected phone surveys.
3. Provide guidance for water planners in determining acceptable levels of water conservation programs during future drought events and offer recommendations for fairness and for minimizing economic impacts.

Project Status: In August 2012, approximately 100 randomly selected phone surveys were conducted.

In December 2012, the project manager visited Santa Fe to collect personal interviews with Water Division Management and Policy Makers. The researchers have also completed a review of water conservation planning documentation and ordinances. In May 2013 a draft report was circulated to participants requesting comments.

As of October 2013 the primary researcher has dropped out of the project and the AWE plans to refocus the efforts to get the study back on track, a webinar is planned in mid-November with all participating agencies. The AWE plans to continue the project with the data that was collected.

Upon evaluation of the demand elasticity study results the Water Conservation Office will use the results of this document to determine the effectiveness of the current water conservation programs offered to our water utility customers.

MEMORANDUM

TO: **City of Santa Fe Public Utilities Committee**
City of Santa Fe Water Conservation Committee
Buckman Direct Diversion Board

FROM: **Rick Carpenter, Water Resources and Conservation Manager** RC

VIA: **Nick Schiavo, Acting Public Utilities Department and Water Division Director** NSA

DATE: **November 20, 2013**

SUBJECT: **Update on Drought, Monsoon, and Water Resource Management**

CURRENT UPDATE – GENERAL WATER RESOURCE MANGEMENT

As the Committee/Board is aware, our region is still suffering through a severe drought. Our region has gone through two consecutive years of record drought and heat. It is now apparent that we are wrapping up a third consecutive year of severe drought and abnormal heat which will present significant challenges to all water purveyors, utilities, and irrigators going forward into next year. Even though much of the State and our region have received moderate monsoonal rains overall in July and August, and with much of the state receiving record high monsoonal rains in September, most of the state of New Mexico remains in "severe to extreme" drought conditions. New Mexico appears to be the epicenter of the western U.S. drought. Weather prediction models indicate that, at least through January of this year, drought conditions in the southwest (especially Arizona and New Mexico) should be neutral to below average precipitation (snow) and above average temperatures, therefore, overall drought conditions will likely still persist at least through the beginning of next year. Runoff into regional river basins and reservoirs is expected to be normal to below normal.

This current drought is extreme, but what sets it apart from previous extreme droughts is that, absent significant winter snow the rest of this year, the region will enter into next spring and summer without very much carry-over water in regional reservoirs – they are at low levels (except for the local McClure reservoir in Santa Fe). For example, Heron reservoir (San Juan-Chama Project water) is currently at 30% of capacity. This condition could make next year much more challenging than the current year has been. However, the City of Santa Fe has invested in a robust and diverse portfolio of four distinct water supply sources that allows for flexibility in meeting demand: Buckman well field, City well field, Canyon Road Water Treatment Plant on the Upper Santa Fe River, and the Buckman Direct Diversion on the Rio Grande.

Earlier this year, BoR/USACoE models indicated the probability of critically low flows in the Rio Grande at Otowi Gage, and they were correct - the last few months have seen flows as low as about 350 cubic feet per second (CFS). In a "normal" year flow ought to be around 1,000 cfs or more. However, during the prolonged rains of September 10th – 17th, the record-breaking rains produced flows exceeding 8,000 cfs at times at Otowi Gage. Flows over the last two or three weeks have been in the range of 1,000 cfs (+/-).

Over the last few weeks, given that river flows in the Rio Grande and upper Santa Fe River have been up and since turbidity and solids have been down, CRWTP and BRWTP have been providing much more of the water supply to meet demands when compared to the previous summer months.

LOCAL CONDITIONS

Source of Supply Utilization Summary

October 2013

City Wells	48.36mg	148.42af
Buckman Wells	104.11mg	319.51af
CRWTP	14.88mg	45.67af
BRWTP	86.81mg	266.41af
Other Wells(Osage, MRC, etc)	*3.62mg*	*11.12af*

Upper Santa Fe River/CRWTP

	Total Combined Reservoir Level	Santa Fe Snow Gage	Reservoir Inflow
October 23, 2013	67.1%	12.0 inches	3.00 MGD
5-Year Average This Date (2008 – 2012)	50.34%	6.25 inches	0.94 MGD

Heading into September, water resource managers for the City were expecting the Canyon Road Water Treatment Plant to experience significant supply shortfalls later this year and into next year – due in part to severely reduced inflows resulting from the drought, but also due to the planned construction projects inside of the reservoir footprints. However, as of November 20th, and due to the recent heavy rains, storage in McClure reservoir is up from 29.0% to 81.2% (or about 2,400 acre-feet), with total combined storage (Nichols and McClure) at 67.1% and increasing daily. Flows into Nichols are being by-passed due to construction on the new intake facility. Inflows are expected to continue for the near future and so McClure has been releasing a small about of water (about 3 – 5 cfs) in order to avoid spilling water over the spillway and to avoid flooding the construction area(s).

Buckman Regional Water Treatment Plant

The last few summer months have seen flows as low as about 350 cubic feet per second (CFS). In a "normal" year flow at this time of the year ought to be around 1,000 cfs or more. However, during the prolonged rains of September 10th – 17th and ensuing runoff, the record-breaking rains produced flows exceeding 8,000 cfs at times at Otowi Gage. Turbidity and suspended sediment has also been very high, especially following intense monsoonal rain storms (as high as 7,020 ntu). For this reason, the BDD Project was more-or-less shut down during the months of July, August, and most of September, but was able to produce in the range of 3 – 4 mgd through most of October and thus far through November, due to reduced turbidity and flows at approximately 1,000 cfs in the river.

Rio Grande Basin

Surface flows in the Rio Grande and its tributaries have been well below normal, storage levels in regional reservoirs are very low currently (but rising due to recent storms), and the federal BoR recently stated that if there is no "meaningful moisture" received this winter/spring then this would mark the lowest water levels ever in New Mexico reservoirs prior to entering into a new irrigation season. The recent rains have helped river flows (at least temporarily) and regional reservoirs are receiving needed inflow, but normal to above normal snow pack is still needed this coming winter or reservoir levels will still be critically low heading into next irrigation season. Recent weather forecast models seem to be suggesting that snow pack this coming winter may be disappointing.

San Juan Basin

The streamflow forecast for the San Juan River Basin is 75 percent of the 30 year avg. (1981-2010) for 2013. San Juan-Chama contractors have received full allocation of San Juan-Chama Project water this year (up from a previous forecast of only 80%). However, most of this water has already been used by the larger purveyors and irrigators in the middle Rio Grande, and so they are no longer calling for/releasing their water. The water that is currently in the Rio Grande at Otowi Gage is therefore not so much imported San Juan-Chama water as it is environmental flows and native Rio Grande water. However, when water quality conditions permit, the BDD Project is still able to call for and receive its allocation of San Juan-Chama water.

It should be stressed that, conditions could significantly worsen for San Juan Chama Project deliveries next year if the drought persists (i.e., low snow pack this coming winter in the San Juan Basin), due to a lack of carry-over storage in Heron Reservoir and other reservoirs in the system. Heron is currently at a historic low level of 30% of capacity for this time of year. If conditions do not change, after deliveries are made out of Heron Reservoir this year, that reservoir will be heading into the next water –year at very low levels. Deliveries to SJCP contractors could be significantly curtailed next year as a result.

A Review of the City of Santa Fe Water Conservation Rebate Program – DRAFT

This report will include 2013 entire year data and will be Summary and Report will be written/updated/completed when this information is available in mid-January.

Executive Summary:

Santa Fe, New Mexico has had a rebate program since 2004 and has kept records on rebates awarded by year, by device, amount rewarded and water saved. This data is the basis of this study. The overarching intent of this analysis is to examine what worked, why and determine best practices based on this history.

The City is one of the leading cities in the United States on gallons of water consumed per person per day. In order to achieve this low water consumption the City has deployed a wide array of programs including: rebates, regulations, education, promotions, and water-use restrictions. Water conservation programs have become wide spread and this is partially due to the lack of new water, but also due to the cost of new water being more expensive than conserved water.

Rebates have become a common tool to promote efficient water use. One of the unique benefits of a rebate program is that expenditures, water savings and other variables can be analyzed and compared to the cost of producing water.

Water conservation cannot be entirely evaluated dependently. Other factors also will affect water usage. Some of these are water rates, droughts, regulations, increased public awareness and economic conditions.

Based on a review of the City's water conservation rebate program from 2004-2013, this review finds that:

Devices and technologies installed since 2004 as a result of rebate programs have the potential to provide approximately 1,250 acre-feet of water savings for the life of the devices or technologies. The total amount rebated is more than 1.6 million dollars, or approximately $1,300 per acre-foot of water saved.

Overview

The City of Santa Fe (City) has had water conservation rebate programs in one form or another beginning in 2003. Since that time, the City has awarded thousands of rebates to water utility customers, and the water use rate (gallons per capita per day), the total annual water consumption (acre-feet), and peak daily water consumption (gallons per day) have all declined. Although a number of factors, including rising water prices, extended drought, increased public awareness, and poor economic conditions may be partially responsible for these declines, the rebates and actions taken as part of the rebate programs have contributed to the reduced levels of water consumption.

This analysis is an attempt to identify and in part quantify aspects of the City's rebate programs that have been most effective in terms of the number of rebates, the water savings achieved, the benefit to the City, and the benefit to the customer.

The purpose of this paper is to investigate Santa Fe's water conservation rebate programs in order to:

- Understand how well the rebate programs meet the needs and expectations of both the City and the customer (the recipient of the rebates),
- Identify approaches and factors that have been successful in promoting rebates, and
- Describe some of the barriers that the customer faces in participating in the rebate program.

This paper is primarily based on information from the City of Santa Fe Annual Water Reports[1] for the years of 2009 through 2012. The most recent, the 2012 Annual Water Report, is dated April 2013. The reports include data back to 2004, and this data is the primary basis for this paper. Data from these reports and other sources has been assembled into spreadsheets and into tables in this report. A portion of the data in the spreadsheets is included in tables in the body of the report, and in more extensive tabulations in the Appendix.

This paper is organized as follows:

Part 1. History, Distribution and Water Savings Factors. This part includes a history and description of the rebate programs and a table of current rebate amounts. It also includes details on the number of rebates awarded and the distribution among the residential and commercial sectors, the amount of the rebates as the rebate programs have changed through time, and a table of the water savings factors that indicate the projected water savings for each device.

Part 2. City Economic Factors. This part addresses economic factors relating to the rebate program as it relates to the City. It provides information on the total amounts that the City has awarded to customers, based on the number of rebates and the amount provided for each rebate as indicated in Part 1. It includes a table that provides an estimate of the potential water savings as a result of the rebate programs, which results in economic savings to the City because this water will not have to be produced. Based on these savings, this section provides an estimate of the time in years that will be required for the City to recoup its investment in the rebates. It also includes an estimate of the payback period to the City by device type.

Part 3. Customer Economic Factors. Beginning with a tabulation of the price of the devices, this part investigates potential water savings and economic benefits from the perspective of the customer. It discusses the net cost of devices, the value of water and sewer savings, and the customer payback periods.

[1] The reports are available at http://www.santafenm.gov/index.aspx?NID=2300.

Part 4. Non-economic Factors. This part provides information on the degree of difficulty for the customer to install water saving devices, and on the level of promotion of the rebates, described as the duration of the rebate program and the number of promotional activities.

Part 5. Relationship of the Number of Rebates to Customer Factors. Presuming that rebate program success can be measured in part by the number of rebates awarded, this part relates the number of rebates to the customer factors described in the previous parts.

Part 6. Balanced Rebate and Payback Periods. This part determines the point of equilibrium between payback periods for the City and the customer. This balanced rebate approach could be used as a tool to evaluate rebate amounts in the future.

Part 7. Conclusions.

The intent for Part 1-4 is to present the data and information with a minimum of conclusions and in general conclusions are contained in Part 7. There may be some discussion of the data in the previous part, but only limited conclusions.

Part 1: History, Distribution by Population and Sector, Current Rebates, and Annual Summary Details

The purpose of Part 1 is to provide a review of historical rebate programs and a summary of current programs. This part includes:

- a brief history of the rebate programs,
- a discussion relating the number of rebates to population and to the number of utility connections, and indicating the distribution of rebates by commercial or residential sector[2],
- a table of current rebates, and
- a concluding section that provides details and tables showing the year-by-year by number of rebates and history of rebate amounts.

History

This section is a summary of the more specific details of the rebate programs found in the last section of this part. The information is largely taken from the chronology of the water conservation and rebate programs found in the City of Santa Fe Annual Water Reports and from portions of the Water Conservation and Drought Management Plan[3]. A chronology of relevant resolutions can be found in Appendix I.

City of Santa Fe Water Conservation rebates began in September 2003 with a $30 rain barrel rebate to single-family residential City water customers. In November of that year, the City initiated rebates for high-efficiency washing machines and hot water recirculators. Rebate programs expanded from 2004 through 2009, and almost 4,500 rebates were awarded, including rebates for rain barrels, clothes washing machines, hot water recirculators, and a small number of commercial devices. In 2009, the City added rebates for outdoor devices such as rain and moisture sensors, evapotranspiration irrigation controllers, and pressure reducing valves, although no rebates were awarded.

The rebate program was modified in 2010. Commercial rebates were made available for high-efficiency toilets, water-free urinals and specific commercial process efficiency improvements. The City initiated rebates for residential high-efficiency toilets, and discontinued rebates for hot water recirculators. Rebates were provided for rain barrels and cisterns. The City provided a rebate for high-efficiency clothes washing machines that was augmented by a State rebate. Almost 2,000 rebates were awarded during 2010.

The current rebate program began in May 2011. The program provides rebates for the same devices as in 2010, but at slightly different amounts. To the current date, more than 2,000 rebates have been awarded under this program. The total includes rebates for commercial high-efficiency toilets and water-free urinals, high efficiency clothes washers and toilets, and rain barrels, cisterns and rain sensors.

Money for rebates is supplied by an eight dollar-a-year fee (four dollars, two times a year) that is added to the water bill of each City Water Utility account. With approximately 55,000 accounts, this amounts to $440,000 that is available each year to pay for rebates[4].

[2] Accounts are considered to be in either the commercial or the residential sector. “Commercial” refers to commercial, industrial and institutional accounts. The majority of commercial rebates have been awarded to lodging facilities (hotels/motels). “Residential” refers to single or multi-family residential accounts, mixed-use communities, home offices and businesses operated out of the home. No rebates have been awarded to multi-family residential accounts.
[3] http://savewatersantafe.com/wp-content/uploads/2013/05/CitySF-Water-Conservation-and-Drought-Mangement-Plan-2010.pdf
[4] A description of source of funding of the City rebate program is included in the Appendix

Number of Rebates Relative to Population and Connections, and Distribution by Sector

This section is included to provide an indication of the overall penetration of the rebate programs.

One measure of penetration, which may be useful for comparison to rebate programs of other cities, is the number of rebates awarded relative to the population. Another potentially useful measure is the number of rebates relative to the number of connections, because the number of connections is approximately the number of City Water Division customers.

Table 1 below provides information on the number of rebates relative to both population and connections. It also separates the rebates by commercial and residential sector and separates single-family residential connections from multi-family residential and other connections. The information regarding distribution of rebates by sector may be useful in directing future rebate amounts or promotional efforts to specific customer or sector groups.

Detailed population statistics are provided in Appendix V. City population values (from U.S. Census data[5] for the City of Santa Fe) are shown in the table. As of July 1, 2012, Santa Fe had a population of approximately 69,200. The population on the same date in 2013 is estimated to be 69,900. According to the annual water reports and City records, at the end of 2012, there were a total of 7,959 rebates, and as of July 1, 2013, the total had reached 8,501. There were approximately 55,000 water utility connections in 2012, distributed among commercial, single-family residential, and multi-family and other accounts. The table indicates that the City has achieved over 20% penetration in the residential sector and less than 10% penetration in the commercial. The low penetration into the commercial sector may be due to the fact that significant commercial rebates were not available until 2010.

Table 1
Rebate Distribution by Sector

	July 1, 2012	Total through June 2013
Population	69,200	69,900 est[a]
Total Rebates	7,959	8,501
• Commercial	1,371	1,632
• Residential	6,588	6,869
Total Connections	54,949[b]	55,200[c]
• Commercial (approximate)	16,480[d]	16,560[d]
• Single-family Residential (approximate)	30,220[d]	30,360[d]
• Multi-family Residential and Other (approximate)	8,240[d]	8,280[d]
Total Rebates as percent of Population	11.5%	12.2%
Total Rebates as percent of Total Connections	14.5%	15.4%
• Commercial Rebates, percent of Commercial Connections	8.3%	9.9%
• Residential Rebates, percent of Single-family Residential Connections	21.8%[e]	22.6%[e]

[a]Population estimated at 1.0% annual growth rate, [b]From City Water Division data, [c]Connections estimated at 0.79 times population from City Water Division data., [d]Commercial, single-family residential and multi-family residential approximations are from City Water Division records indicating that connections are distributed at 30%, 55% and 15% respectively among the categories, [e]No rebates have been awarded to multi-family residential accounts.

[5] U.S. Census Bureau, Population Division. Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2012. Found at http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml, September 1, 2013.

Current Rebates

Table 2 shows the current rebates. Rebate applicants must be water customers of the City of Santa Fe Water Division. Rebates are for the exchange of existing devices to efficient technologies, and do not apply to purchases for new homes or new construction and development.

Table 2
Current Rebates

	Rebate for (Device or Technology)	C, R, Or Both[a]	Rebate Amount $
Indoor	High-Efficiency Clothes Washer		
	• Top-Load Machine	Both	350
	• Front-Load Machine	Both	150
	High-Efficiency Toilet (HET)		
	• Residential	R	175
	• Commercial Hotel/Motel	C	125
	• Commercial Tank-Type	C	250
	• Commercial Flushometer	C	500
	Water-Free Urinal	Both	500
	Commercial Process Efficiency	C	Site-specific
Outdoor	Rainwater Harvesting		
	• Rain Barrel 50-99 gallon	Both	12
	• Rain Barrel 100-199 gallon	Both	25
	• Rain Barrel 200-299 gallon	Both	50
	• Cistern	Both	0.25 per gallon

[a]Rebates available to commercial Accounts (C), residential accounts (R), or both (Both)

History of Number of Rebates Awarded and Rebate Amounts

This section provides additional details on the rebate programs, with emphasis on the annual distribution of rebates and on the changes in rebate amounts. A table of number of rebates by device is found in Appendix II. Table 3 summarizes the discussion, and Figure 1 shows the number of rebates by year.

The first City of Santa Fe Water Conservation rebates went into effect in September 2003. A single-family residential water customer of the City water utility was eligible for one $30 rebate for the purchase of a rain barrel. In November of that year, the City made rebates available for high-efficiency washing machines and hot water recirculators. A residential water customer was eligible for one $100 rebate for the purchase of either a hot water recirculator or a clothes washer. From 2004 to 2009, some 2,461 high-efficiency clothes washer, 1,736 rain barrel and 270 hot water recirculator rebates were awarded. During this same time, commercial rebates were available for air cooled ice machines and for replacement dishwashers. Rebates were awarded for six air cooled ice machines and one commercial dishwasher. .Also in 2009, the City initiated outdoor rebates for rain and moisture sensors, evapotranspiration irrigation controllers, pressure reducing valves, and other outdoor devices, although none were awarded.

The rebate program was updated in 2010. The City provided rebates for commercial high-efficiency toilets of three types: flushometer valve, tank-type installed in locations other than lodging facilities (hotels/motels), and tank-type installed in hotels/motels. Some 848 rebates were awarded for commercial high-efficiency toilets. Commercial rebates were also made available for water-free urinals (24 awarded), the exchange of front-loader or the replacement of top-loader clothes washing machines (4), and for specific commercial process efficiency improvements (1).

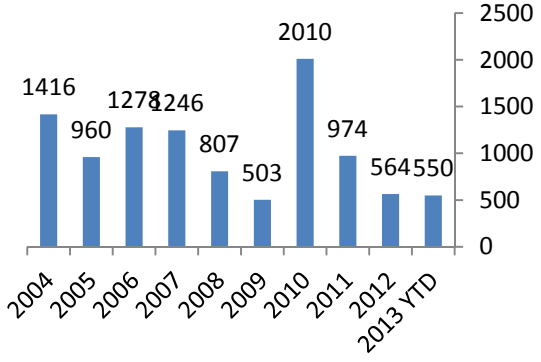
In 2010, the City rebate for the purchase of a high-efficiency clothes washing machine was $480. For a portion of the year, the State of New Mexico, using funding from the American Recovery and Reinvestment Act, provided an additional $200 clothes washing machine rebate[6]. A total of 817 clothes washing machine rebates were awarded. The City also provided rebates for residential high-efficiency (1.26 gallons-per-flush) toilets (236) and discontinued rebates for residential hot water recirculators. Rebates were available for rain barrels (39), cisterns (2) and other outdoor devices. The state clothe washing machine rebate program was discontinued before the end of the year, and the City rebate program ran out of funds in August.

Table 3
Summary of Number of Rebates

Rebate	2004-2009	2010	2011-2013	Total
Commercial HE Toilet	NA	848	743	1,591
Water-Free Urinal	NA	24	5	29
Commercial HE Clothes Washer	NA	4	0	4
Air-Cooled Ice Machine	6	NA	NA	6
Commercial Dishwasher	1	NA	NA	1
Commercial Process Efficiency	NA	1	0	1
Hot Water Recirculator	270	NA	NA	270
Residential HE Toilet	NA	236	575	811
Residential Clothes Washer	2,461	NA	NA	2,461
Residential HE Clothes Washer	NA	817	696	1,513
Rain Barrel, Unspecified	1,736	NA	NA	1,736
Rain Barrel, 50-299 gallon	NA	39	32	71
Cistern	NA	2	3	5
Rain Sensor	0	0	2	2
Other Outdoor Devices	0	0	0	0
Total	4,474	1,971	2,056	8,501
Commercial Total	7	877	748	1,632
Residential Total	4,467	1,094	1,308	6,869

The current rebate program, which began on May 1, 2011[7], reinstated rebates for the same devices as in 2010, but at slightly different amount as indicated in Table 2. Under this program (2011 to date), some 743 rebates have been awarded for commercial high-efficiency toilets and 5 for water-free urinals. Residential rebates have been awarded for high-efficiency toilets (575), high efficiency clothes washers (696), rain barrels (32), cisterns (3) and rain sensors (2). At the present time, the City is accepting applications for rain barrels and cisterns, but not for the other outdoor devices that had been available for rebate under the previous program.

Figure 1
Number of Rebates Awarded by Year



As of July 2013, a total of 1,632 commercial rebates had been awarded. Some 97% were for high-efficiency toilets, and almost three-quarters were at hotels and motels. Almost all of the rebates have been awarded since the beginning of 2010.

Although "residential" refers to both single and multi-family residential accounts, no rebates have been awarded to multi-family residential accounts. As of July 2013, a total of 6,869 residential rebates had been awarded, including indoor and outdoor devices. Almost three-quarters of the residential rebates have been for indoor devices. Outdoor rebates have been dominated by rain barrels, with most of the rain barrel rebates being awarded prior to 2010.

[6] http://www.emnrd.state.nm.us/ecmd/documents/ProgramDescription.pdf
[7] A description of source of funding of the City rebate program is included in the Appendix

Clothes washer rebates accounted for almost 60% of the total residential rebates. The greatest number of rebates was awarded in 2010 largely due to the number (782) of top loader clothes washer replacements. Presumably, the large number of clothes washer replacement rebates was the result of the $200 State of New Mexico rebate in addition to the City rebate.

As previously discussed, rebate amounts have changed as the rebate programs have changed. Rebate amounts are proposed by the Water Conservation Office and adopted by City Ordinance. Table 4 lists the changes over time for both Commercial and Residential accounts. The information on these changes may be useful in comparing the rebate amounts to the number of rebates awarded.

Table 4
Historical Rebate Amounts
(Dollars)

Commercial HE Toilet, Flushometer	NA	504	500
Commercial HE Toilet, Tank Type not in Hotel/Motel	NA	504	250
Commercial HE Toilet, Tank Type in Hotel/Motel	NA	504	125
Water-Free Urinal	NA	630	500
Commercial HE Clothes Washer, Top Loader replacement	NA	480	350
Commercial HE Clothes Washer, Front Loader exchange	NA	180	150
Air-Cooled Ice Machine	200	NA	NA
Commercial Dishwasher	400	NA	NA
Commercial Process Efficiency	NA	874	b
Hot Water Recirculator	100	NA	NA
Residential HE Toilet	NA	175	175
Residential Clothes Washer, Unspecified	100	NA	NA
Residential HE Clothes Washer, Top Loader replacement	NA	480[c]	350
Residential HE Clothes Washer, Front Loader exchange	NA	180	150
Rain Barrel, Unspecified	30	NA	NA
Rain Barrel, 50-99 gallon	NA	12	12
Rain Barrel, 100-199 gallon	NA	25	25
Rain Barrel, 200-299 gallon	NA	50	50
Water Harvesting (Cistern)	NA	0.25	0.25
Rain Sensor	NA	40	40[d]
Moisture Sensor	NA	75	75[d]
Evapotranspiration Controller	NA	300-750	300-750[d]
Press Reducing Valve	NA	120-525	120-525[d]
Other Outdoor Devices	NA	2-5	2-5[d]

[a]NA indicates that rebates were not available
[b]Site-specific amount
[c]Does not includes the $200 rebate from the State of New Mexico
[d]Rebates for these devices were not available in 2013

Part 2: City Economic Factors

The purpose of Part 2 is to consider, from the perspective of the City, factors relating to the economics and water savings of rebates. Regarding the source of funds for the rebate programs, as indicated in Part 1, money for rebates is supplied by a fee that is added to City water bills. The fee program is not discussed here, but a description of the fee program is included in Appendix II.

This part includes:

- information on the total City rebate expenditures, based on the number of rebates and the amount provided for each rebate as indicated in Part 1.
- a discussion and table of water savings rates, and a table that relates the rebate cost to the amount of water saved for the life of the rebated device,
- a table that provides an estimate of the potential water savings as a result of the rebate programs, which results in economic savings to the City because this water will not have to be produced
- an estimate of the time in years that will be required for the City to recoup its investment in the rebate programs
- an estimate of the payback period to the City by device type.

City Rebate Expenditures

Table 5 lists the total amounts that the City has rebated to customers, based on the number of rebates and the amount provided for each rebate.

Table 5
Rebate Program Expenditures
(Dollars)

Year	Expenditures for Commercial Rebates	Expenditures for Residential Rebates	Total
2004	0	46,230	46,230
2005	0	46,530	46,530
2006	600	59,090	59,690
2007	1,000	61,540	62,540
2008	0	61,490	61,490
2009	0	50,300	50,300
2010	444,706	424,216	868,922
2011	64,375	128,999	193,374
2012	1,500	130,749	132,249
2013 YTD	32,625	67,159	99,784
Total	544,806	1,076,302	1,621,108

As the table indicates, the majority of expenditures have been from 2010 to the present, with more than half in 2010. The 2010 spike in rebates was in part the result of the previously mentioned a state rebate program. The table does not include state rebate expenditures. The table indicates that total City expenditures for rebates from 2004-2013 are in excess of $1,600,000, roughly two-thirds for residential rebates, and one-third for commercial.

Water Savings Rates

For the devices or technologies that are available for a rebate, the City has calculated annual water savings rates[8]. These numbers are used as a basis for the City to estimate how much water will be saved each year as a result of a rebate.

The water savings rate (WSR) is the amount of water that a water saving device is estimated to save in a year. The City generally expresses the WSR in acre-feet per year (afy). The value of the WSR depends on the savings of each device and on the frequency of its use. In part, rebate amounts have changed as the WSR has been adjusted.

As an example, for a high efficiency (1.26 gallons per flush) toilet, the City estimates that the high efficiency toilet uses 0.4 gallons of water per flush less than a low-flow toilet. Using typical household data – 5.1 flushes per day per person and 2.3 persons per household (11.7 flushes per household per day)– the water savings resulting from changing a low-flow toilet to a high efficiency toilet are 1,713 gallons per year, or 0.0053 acre-feet per year (afy). Therefore, the water savings rate is 0.0053 acre-feet per year.

Notably, the water savings rate for a high-efficiency toilet in a hotel/motel is only 0.0022 acre-feet per year, and less than that of a residential toilet because of the lower frequency of use (4.8 flushes per day) compared to 11.7 per day for a household toilet.

Water savings rates (annual water savings in acre-feet per year) are shown in Table 6.

If the useful life of a device is known or can be estimated, the WSR and the useful life can be used to estimate the lifetime water savings from the device. Most devices are assumed to have a useful life of 10 years, although for air-cooled ice machines and commercial dishwashers a value of 5 years is used.

By dividing the rebate amount by the lifetime water savings, the cost (the cost of the rebate) to save an acre foot of water can be calculated.

Table 6
Water Savings Rates

Device	Water Savings Rate (acre-feet per year)
Commercial HE Toilet, Flushometer	0.0336
Commercial HE Toilet, Tank Type not in Hotel/Motel	0.0168
Commercial HE Toilet, Tank Type in Hotel/Motel	0.0022
Water-Free Urinal	0.0420
HE Clothes Washer, Top Loader replacement	0.0233[a]
HE Clothes Washer, Front Loader exchange	0.0088[b]
Air-Cooled Ice Machine	0.67
Commercial Dishwasher	1.15
Commercial Process Efficiency	0.45
Hot Water Recirculator	0.0215
Residential HE Toilet	0.0053
Residential Clothes Washer, Unspecified	0.0250
Rain Barrel, Unspecified	0.0015
Rain Barrel, 50-99 gallon	0.0008
Rain Barrel, 100-199 gallon	0.0015
Rain Barrel, 200-299 gallon	0.0031
Water Harvesting (Cistern)	0.000015
Other Outdoor Devices	Not Calculated

[a]Both commercial and residential
[b]Both commercial and residential

[8] http://www.santafenm.gov/index.aspx?NID=2300.

For the current rebates, costs to save and acre-foot of water are shown in Table 7 below. Costs range from almost $5,700 for high-efficiency toilet in a hotel/motel to about $1,200 for a water-free urinal. The median cost of $1,600 is near the City's overall cost of water production, as discussed in a subsequent section.

Table 7
Rebate Cost per acre-foot of Water Saved

Device	Water Savings Rate acre-feet per year	Useful Life yrs	Lifetime Water Savings acre-feet	Rebate $	Cost $ per acre-foot
Commercial HE Toilet, Flushometer	0.0336	10	0.336	500	1,488
Commercial HE Toilet, Tank Type not in Hotel/Motel	0.0168	10	0.168	250	1,488
Commercial HE Toilet, Tank Type in Hotel/Motel	0.0022	10	0.022	125	5,682
Water-Free Urinal	0.042	10	0.42	500	1,190
HE Clothes Washer, Top Loader replacement	0.0233	10	0.233	350	1,502
HE Clothes Washer, Front Loader exchange	0.0088	10	0.088	150	1,705
Residential HE Toilet	0.0053	10	0.053	175	3,302
Rain Barrel, 50-99 gallon	0.0008	10	0.008	12	1,500
Rain Barrel, 100-199 gallon	0.0015	10	0.015	25	1,667
Rain Barrel, 200-299 gallon	0.0031	10	0.031	50	1,613
Water Harvesting (Cistern)	0.000015	10	0.00015	0.25 per gallon	c

[a]Both commercial and residential
[b]Both commercial and residential
[c]Depends on the cistern capacity, which is unspecified

Potential Water Savings

The preceding information can be used to evaluate the overall effectiveness of rebates from the City's perspective. This information is summarized in Table 8 below. The values in the rows for the years 2004 – 2013 are, for each device, the product of the number of rebates times the water savings factors from Table 6. The units are acre-feet per year.

The row labeled "Sum, afy" is the sum of the rows above, with units of acre-feet per year. If all devices had 10 year useful lives, total saving would be just 127.54 times 10 years, or 1275.4 acre-feet

The next row is the estimated useful life of the device in years. The row labeled "Potential Water Savings, af" is the product of the estimated annual water savings times the useful life. This value is the total potential water savings in acre-feet for the life of the device.

It is meaningful to sum the total potential water savings. The partial sums for commercial and residential rebates are indicated. The grand total (sum of residential and commercial rebates) is shown at the bottom right.

Table 8
Potential Water Savings of Installed Devices

	Commercial								Residential								
Year	Flushometer Valve HET	Tank Type HET	Hotel/Motel HET	Water Free Urinal	HE Clothes Washer replacement and exchange	CPE (Commercial Process Efficiency)	Air Cooled Ice Machine	Dishwashers	Hot Water Recirculators	HE Toilet	Washing Machines	HE Clothes Washer replacement for top loader	HE Clothes Washer exchange for front loader	Rain Barrels	Rain Barrel 50-299 g	Water Harvesting	
2004									1.33		5.80			0.842			7.972
2005									0.99		8.30			0.437			9.727
2006							0.67	1.15	0.77		10.85			0.605			14.045
2007							3.35		1.05		11.40			0.552			16.352
2008									0.73		13.68			0.170			14.580
2009									0.92		11.50						12.420
2010	6.62	3.23	1.01	1.01	0.07	0.45				1.25		18.22	0.31		0.079	0.000030	32.24903
2011	0.07	0.22	1.01	0.21						0.92		6.20	0.31		0.012	0.000030	8.95203
2012		0.10								1.35		5.31	0.36		0.018	0.000015	7.138015
2013			0.57							0.78		2.61	0.12		0.009		4.089
Sum, afy	6.69	3.54	2.60	1.22	0.07	0.45	4.02	1.15	5.81	4.30	61.53	32.34	1.10	2.60	0.12	0.000075	**127.54**
Useful Life, yrs	10	10	10	10	10	10	5	5	10	10	10	10	10	10	10	10	
Potential Water Savings, af	66.9	35.4	26.0	12.2	0.7	4.5	20.1	5.8	58.1	43.0	615.3	323.4	11.0	26.0	1.2	0.0001	**1249.6**
	Total Commercial							**171.6**	Total Residential							1078.0	**1249.6**

The table indicates that for the useful life of the devices, almost 172 acre-feet of water (sum of Commercial Potential Water Savings) will be saved by commercial devices, and almost 1,078 acre-feet (sum of Residential Potential Water Savings) by residential devices already installed. This amounts to a total of almost 1,250 acre-feet of total potential water savings. This results in economic savings to the City because this amount of water will not have to be produced. Taking the 1,250 acre-feet and dividing by the direct costs of this savings from Table 9 ($1,621,108) equates to a cost of about $1,300 per acre-foot of water saved.

Rebate Programs Payback Period to the City

The City of Santa Fe Long-Range Water Supply Plan[9] Appendix Table I-1 provides an estimate of capital and operating and maintenance (O&M) costs for water production. The sum of costs for 2013 (O&M existing sources, capital cost, and O&M new sources) is about $16,318,000. Overall water demand for 2012 is reported in *Santa Fe Trends 2013*[10]to be 9,777 acre-feet. If 2013 demand is the same as in 2013, dividing the cost by the water demand results in an average cost for water production of $1,670 per acre-foot.

Simple payback can be calculated by dividing the amount of the expenditure (dollars) by the amount the annual return (dollars per year). The annual return is the overall savings rate (127.54 afy) times the water production cost ($1,670 per acre-foot).

P = payback period, years
E = expenditure, dollars
SR = savngs ratge, afy
C = water production cost

$$P = E/(SR*C)$$

$$P = \frac{\$1{,}621{,}108}{127.54 \text{ af/y} \times \$1{,}670 \text{ af}} = 7.6 \text{ years}$$

An alternative method of estimating the payback period is to divide the overall value of $1,300 per acre foot saved (indicated in the previous section) by the cost of water production ($1,670 per acre-foot) and multiply the result by the useful life of the devices. A useful life of ten years can be used since that is the life of most of the devices.

$$\frac{\$1{,}300 \text{ per acre foot saved}}{\$1680 \text{ per acre-foot produced}} \times 10 \text{ yrs} = 7.7 \text{ yrs}$$

Device Payback Period to the City

Similar to the first method used above to calculate the overall payback period for the rebate program, payback periods for each rebate can be calculated (Table 9). Rebates are an expense for the City and a saving for the customer. Larger rebates result in longer payback periods for the City. For the City, the payback period for each rebate is calculated as follows:

[9] http://www.santafenm.gov/index.aspx?NID=2312
[10] http://www.santafenm.gov/DocumentCenter/View/40200

$$\frac{\text{Rebate (\$)}}{\text{The device's Water Savings Rate (af/y) x Water Production Cost (\$1,670/af)}} = \text{City Payback Period (yrs)}$$

Table 9
City Payback Periods by Device

Device	Rebate $	Water Savings Rate afy	Payback Period Years
Flushometer Valve HE Toilet	500	0.0336	8.9
Tank Type HE Toilet	250	0.0168	8.9
Hotel/Motel HE Toilet	125	0.0022	34.0
Water Free Urinal	500	0.0420	7.1
Commercial Process Efficiency	874	0.4500	1.2
Air Cooled Ice Machine	200	0.6700	0.2
Dishwasher	400	1.1500	0.2
Hot Water Recirculator	100	0.0125	4.8
HE Toilet	175	0.0053	19.8
Washing Machine	100	0.0250	2.4
HE Clothes Washer replacement for top loader	350	0.0088	23.8
HE Clothes Washer exchange for front loader	150	0.0088	10.2
Rain Barrel	30	0.0015	12.0
Rain Barrel 50-99 gal	12	0.0008	9.0
Rain Barrel 100-199 gal	25	0.0015	10.0
Rain Barrel 200-299 gal	50	0.0031	9.7

City payback periods for water saving devices range from 0.2 years to more than 34 years. Presumably, the City would prefer to have payback periods less than or equal to the life of the device. If they are longer, the consumer will be buying a replacement device before the payback period before the city has recouped its investment in the first one, or the first one is completed, and assuming a rebate will be collected again. Several devices have payback periods greater than the useful life.

Part 3: Customer Economic Factors

The purpose of this part is to consider economic factors relating to rebates from the perspective of the customer. Beginning with a tabulation of the price of the devices, this part investigates potential water savings and economic benefits. It discusses the net cost of devices, the value of water and sewer savings, and the customer payback periods.

This part includes:

- information on the purchase price of devices available for rebates,
- an estimate of the value to the customer of water and sewer savings, and
- a calculation of the customer payback period

Customer Purchase Price

To calculate customer payback period, it is necessary to know the net cost of the device (purchase price minus rebate), the water savings factor, and the value of water and sewer savings. The following discusses the relationship of these factors, beginning with purchase price.

The purchase price of a device and the net cost (price minus rebate) are both factors that affect the willingness of a customer to purchase a water-saving device. Table 12 provides information on purchase price. The rebate amounts shown in earlier tables can be subtracted from the price below to estimate the net cost.

Costs for these devices were generated through Internet searches for the specific type of device, finding multiples of the devices and then calculating the low, high and median price. This results in a device price for 2013 that may not reflect past price but is used for consistent comparison.

There is a wide variety of prices available for these devices. It is apparent that if a customer shopped aggressively for a specific device lower prices are available. The above prices were not sale prices which could also lower the cost of the device.

There is no requirement in the City program that the device be purchased locally.

Table 12
Purchase Price of Appliance or Device[11] [12]
(Dollars)

Commercial Devices	Low Cost	High Cost	Median Cost
HE Toilet - Flushometer Valve	279	487	383
HE Toilet - Tank Type	150	1,500	300
Water-Free Urinal	300	1,200	600
Commercial Clothes Washer - top loader replacement	750	1085	765
Commercial Clothes Washer - front loader exchange	1,375	1,700	1,485
Air Cooled Ice Machine	1,787	4,725	2,156
Dishwashers	2,799	24,368	5,681
Residential Devices			
Hot Water Recirculators	80	210	170
High-Efficiency Toilets	98	1,500	190[a]
Clothes Washing Machines	630	1,400	760
HE Clothes Washer - top loader replacement	700	810	720
HE Clothes Washer - front loader exchange	630	1,400	760
Rain Barrel 50-99 gal	120	385	175
Rain Barrel 100-199 gal	300	510	405
Rain Barrel 200-299 gal	500	750	700
Cisterns ($ per gallon)	0.55	2.62	1.22
Rain Sensor	16	63	19
Moisture Sensor	32	400	179
ET Controllers	320	1,495	500
Irrigation Pressure Reducing Spray Head	5	23	8
Irrigation Pressure Reducing Valve	53	68	53

[a] Median price adjusted from $250 to $190 as this is the price most often seen in the City awards based on conversation with City personnel

[11] Tax in Santa Fe is 8.1875% is not included in the purchase price of the device as it is not required that the device be purchased within the city. If this amount was included it would extend the payout period to the customer.

Value of Water and Sewer Savings

As discussed above, to calculate customer payback period, it is necessary to estimate the value of water and sewer savings. This section provides the basis for the water and sewer savings.

Beginning March 2009, City water rates have increased 8.2% per year to the current base residential volume charge (marginal rate) of $6.06 per 1000 gallons. During the May – August irrigation season, the rate is $6.06 per 1000 gallons for the first 10,000 gallons, and $21.72 per 1,000 gallons thereafter; for the remainder of the year, the rate is $6.06 per 1,000 gallons for the first 7,000 gallons, and $21.72 per 1000 gallons thereafter.

The marginal rate of $6.06 per 1000 gallons is consistent with the City's cost of water production. That is, $6.06 per 1000 gallons is $1,975 per acre-foot, which is slightly more than the City's average cost of water production of $1,700 per acre foot.

However, the $6.06 per 1,000 gallons marginal cost of water of is not the total cost to the customer. The residential sewer charge is also based on water consumption, at $3.58 per 1,000 gallons[13]. Both of these are taxed at 5%. Therefore, the total cost to the customer, based on water consumption, is $10.12 per 1,000 gallons of water.

This equates to a cost of $3,300 per acre foot of water, making the economics of water saving different for the customer than for the City. The economics are also different if water consumption is greater than the base levels of 7,000 or 10,000 gallons. For consumption greater than base levels, total marginal cost to the customer comes to $26.57 per 1,000 gallons of water. This amounts to a cost of almost $8,700 per acre foot of water.

Customer Payback Period

With the information presented in the previous sections on purchase price, rebate amounts, value of water, and the water savings rates, it is possible to calculate the customer payback period.

Rebates are an expense for the City and a saving for the customer. Larger rebates result in longer payback periods for the City.

Rebates reduce the cost to the customer. Therefore, larger rebates result in shorter customer payback periods.

For the customer, the payback period for each rebate (by device) is calculated as:

$$\frac{\text{Price} - \text{Rebate (\$)}}{\text{Water Savings (af/y)} * \text{Water and Sewer Savings (\$3,300 or \$8,700 / af)}} = \text{Customer Payback Period (yrs)}$$

Savings to the customer in the form of rebates is money that, if spent locally, stimulates the City's economy through the "local multiplier effect."

[13] http://www.santafenm.gov/DocumentView.aspx?DID=9351

Table 13
Customer Payback Periods by Device

Device	Median Price $	Rebate $	Water Factor, afy	Payback years @ $3,300 af	Payback years @ $8,700 af
HE Toilet, Flushometer Valve	383	500	0.0336	<1	<1
HE Toilet, Tank Type	300	250	0.0168	<1	<1
HE Toilet, Tank Type, Hotel/Motel	300	125	0.0022	24.1	9.1
Water-Free Urinal	600	500	0.0420	<1	<1
Commercial HE Clothes Washer, top loader replacement	765	350	0.0233	5.4	2.0
Commercial HE Clothes Washer, front loader exchange	1,485	150	0.0088	46.0	17.4
Air-Cooled Ice Machine	2,156	200	0.6700	<1	<1
Commercial Dishwasher	5,681	400	1.1500	1.4	0.5
Hot Water Recirculator	170	100	0.0125	1.7	0.6
Residential HE Toilet, Tank Type	190	175	0.0053	<1	<1
Residential Clothes Washer	760	100	0.0250	8.0	3.0
Residential HE Clothes Washer, top loader replacement	720	350	0.0233	4.8	1.8
Residential HE Clothes Washer, front loader exchange	760	150	0.0088	21.0	8.0
Rain Barrel	325	30	0.0015	59.6	22.6
Rain Barrel 50-99 gal	175	12	0.0008	61.7	23.4
Rain Barrel 100-199 gal	405	25	0.0015	76.8	29.1
Rain Barrel 200-299 gal	700	50	0.0031	63.5	24.1

Rebate payback periods range from less than one year to more than 76 years. Payback periods for base rate water consumption are roughly three times longer than the payback periods at the top tier water and sewer rate.

Part 4: Non-economic Factors

This part provides information on the degree of difficulty for the customer to install water saving devices, and on the level of promotion of the rebates, described as the duration of the rebate program and the number of promotional activities.

Degree of Difficulty in Installing Device

Non-economic factors may affect the success of a specific rebate. One of these factors may be the effort to install. (For example, a hot water recirculator typically requires a plumber to install versus a clothes washer that is delivered, installed and the old unit hauled away by the store from which it was purchased.) Table 14 below ranks the installation effort from low to high for both commercial and residential devices, with low being easy to do.[14]

Table 14
Estimated Installation Effort of Rebated Devices

Commercial Devices	Ranking*
HE Toilet - Flushometer Valve	4
HE Toilet - Tank Type	3
Water-Free Urinal	4
Clothes Washer - Replacement for top loader	2-4
Clothes Washer - Exchange for front loading washer	2-4
Air Cooled Ice Machine	3-5
Dishwashers	4-5
Residential Devices	
Hot Water Recirculators	4-5
High-Efficiency Toilets	2
Clothes Washing Machines	1
HE Clothes Washer replacement for top loader	1
HE Clothes Washer exchange for front loading washer	1
Rain Barrel 50-99 gal	2
Rain Barrel 100-199 gal	2
Rain Barrel 200-299 gal	2
Cistern (Water Harvesting)	5
Rain Sensor	2
Moisture Sensor	1-2
ET Controllers	4
Irrigation Pressure Reducing Spray Head	3-4
Irrigation Pressure Reducing Valve	3

1 – Requires little to no effort
2 – Some effort required, but typically doable by an someone with mechanical skills
3 – Requires expertise and potentially specialized tools
4 - Requires contractor or licensed professional, no permit or building modifications
5 – Contractor required and may require building modification and/or permit

[14] These rankings assume purchaser is a normal home owner or business and not a contractor/installer. Rankings for this analysis from meetings with City of Santa Fe Water Division personnel.

Duration and Extent of Rebate Promotion by Device

Two other factors may affect the success of a rebate program. One is the length of time the rebate was available (the underlying assumption being that the longer the rebate was available, the greater the awareness). The other factor is the number of ways the rebate was promoted, such as advertising and word of mouth (the underlying assumption being that the more ways a rebate was promoted, the greater the awareness).

The marketing avenues used by the City include: websites, brochures (single or multiple, displayed in city display stands and stores), newspapers (Santa Fe New Mexican, other papers), theater, TV, water bill inserts, radio shows, press releases, bus ads, published articles and vendor-purchased advertisements.

Table 15
Market Awareness of Rebated Devices

Commercial Devices	Length of Program	How Promoted*
HE Toilet - Flushometer Valve	2010 – Present	1,2,3,4,5,6,9,10,11,12,13,14
HE Toilet - Tank Type	2010 – Present	1,2,3,4,5,6,9,10,11,13,14
Water-Free Urinal	2010 – Present	1,2,3,4,5,6,9,10,11,12,13,14
Clothes Washer - Replacement for top loader	2010 – Present	1,2,3,4,5,6,9,10,11,12,13,14
Clothes Washer - Exchange for front loading washer	2010 – Present	1,2,3,4,5,6,9,10,11,12,13,14
Air Cooled Ice Machine	2006 and 2007?	None
Dishwashers	2006 and 2007?	None
Residential Devices		
Hot Water Recirculators	2004 – 2009	
High-Efficiency Toilets	2010 – Present	1,2,3,4,5,6,9,10,11,13,14
Clothes Washing Machines	2004 – 2009	1,3,4,5,6,9,10,11,12,13,14
HE Clothes Washer replacement for top loader	2010 – Present	1,2,3,4,5,6,9,10,11,13,14
HE Clothes Washer exchange for front loading washer	2010 – Present	1,2,3,4,5,6,9,10,11,13,14
Rain Barrel 50-99 gal	2010 – Present	1,3,4,5,9,10,11
Rain Barrel 100-199 gal	2010 – Present	1,3,4,5,9,10,11
Rain Barrel 200-299 gal	2010 – Present	1,3,4,5,9,10,11
Cisterns	2010 – Present	1,3,4,5,9,10,11
Rain Sensor	Aug 2009 – Sept 2012	1,3,4,5,9,10
Moisture Sensor	Aug 2009 – Sept 2012	1,3,4,5,9,10
ET Controllers	Aug 2009 – Sept 2012	1,3,4,5,9,10
Irrigation Pressure Reducing Spray Head	Aug 2009 – Sept 2012	1,3,4,5,9,10
Irrigation Pressure Reducing Valve	Aug 2009 – Sept 2012	1,3,4,5,9,10

Based on meeting with City personnel the above table was created. Promotion vehicles included:

1. Water Conservation Website
2. City Website
3. Brochures
4. City Display Stands
5. Vendor Display Stands
6. Print Media
7. Theater Advertising
8. Television Advertising
9. Water Bill Inserts
10. Radio Advertising
11. Press Releases
12. Vendor-purchased Advertising
13. Byline Article
14. Media Coverage

Table 16 provides the total number of months a rebate was available and the total number of ways it was promoted. This method assumes each type of promotion is equal, which may not be the case. For example, vendor-purchased advertising and promotion costs the City nothing and yet amplifies the message of a specific rebate.

In 2013, the City launched a new website and makes it easier to find rebates and the related rebate forms.

Table 16
Rebate Duration and Number of Ways Promoted

Commercial Devices	Months of Rebate	Total Number of Ways Promoted
HE Toilet - Flushometer Valve	48	12
HE Toilet - Tank Type	48	11
Water-Free Urinal	48	12
Clothes Washer - Replacement for top loader	48	12
Clothes Washer - Exchange for front loading washer	48	12
Air Cooled Ice Machine	12	0[a]
Dishwashers	12	0[a]
Residential Devices		
Hot Water Recirculators	72	0[a]
High-Efficiency Toilets	48	11
Clothes Washing Machines	72	11
HE Clothes Washer replacement for top loader	48	12
HE Clothes Washer exchange for front loading washer	48	12
Rain Barrel 50-99 gal	48	7
Rain Barrel 100-199 gal	48	7
Rain Barrel 200-299 gal	48	7
Cisterns	48	7
Rain Sensor	49	6
Moisture Sensor	49	6
ET Controllers	49	6
Irrigation Pressure Reducing Spray Head	49	6
Irrigation Pressure Reducing Valve	49	6

[a]No record of promotional activities

Part 5: Relationship between the Number of Rebates and Customer Factors

Presuming that rebate program success can be measured in part by the number of rebates awarded, this section relates the number of rebates to the customer factors described in the previous sections.

Number of Rebates Related to Price of Device and Rebate Amount

Table 17 summarizes the number of rebates awarded, the rebate amount and the median price of a device.

Table 17
Relationship of Device Price and Rebate Amount
to Number of Rebates Awarded

Commercial Devices	Median Price of Device[15] $	Rebate Amount[a] $	No. of Rebates Awarded
HE Toilet - Tank Type (Hotel/Motel)	300	125	1181
HE Toilet - Flushometer Valve	383	500 (504, 2004-2009)	199
HE Toilet - Tank Type	300	250 (504, 2004-2009)	211
Water-Free Urinal	600	500 (630, 2004-2009)	29
Clothes Washer - Replacement for top loader	800	350 (480, 2004-2009)	2
Clothes Washer - Exchange for front loader	800	150 (180, 2004-2009)	2
Air Cooled Ice Machine	2,156	200 (2004 to 2009)	6
Dishwashers	5,681	400 (2004 to 2009)	1
Residential Devices			
Hot Water Recirculators	170	100 (2004 to 2009)	270
High-Efficiency Toilets	190	175	811
Clothes Washing Machines	800	100 (2004 to 2009)	2,461
HE Clothes Washer replacement for top loader	800	350 (480[b] in 2010)	1,388
HE Clothes Washer exchange for front loader	800	150 (180 in 2010)	125
Rain Barrel 50-99 gal	210	12	38
Rain Barrel 100-199 gal	325	25	10
Rain Barrel 200-299 gal	475	50	23
Cisterns	2/gallon	0.25/gallon	5
Rain Sensor	19	40	2
Moisture Sensor		75	0
ET Controllers	500	300-750	0
Irrigation Pressure Reducing Valve[c]	53	120	0
Irrigation Pressure Reducing Spray Head	9	5	0

[a] 2013 rebate amount unless stated otherwise
[b] In 2010, the state of New Mexico rebate program added $250 to this rebate amount.
[c] 3/4"

[15] Table 12

In the commercial device category, 439 rebates were awarded for high-efficiency toilets (flushometer valve and tank-type) and water free urinals. Rebates for these devices covered at least 80% of the cost of the device.

For clothes washers, dishwashers, and air cooled ice machines, only 11 commercial rebates were awarded. For these devices, the rebate covered only 10-50% of the cost of the device.

Therefore, the relationship between price and rebate may affect the success of the commercial rebate program, at least to some degree. For most commercial devices, there appears to be a correlation between price of the device, the rebate amount and the number of rebates granted. However, this correlation does not explain number of rebates awarded to Hotels/Motels for HETs, for which the rebate covered only 42% of the price. Here the large number of rebates may be attributed to the water saved and the resulting operating cost savings to the commercial customer.

In the residential rebate category, rebates for hot water recirculators and high-efficiency toilets were more than one-half of the cost of the devices and more than 1,000 rebates were awarded. Rebates for top loader replacements ranged from 45% to more than 90% (in 2010, with the additional $250 State rebate) of the cost, and almost 1,400 rebates were awarded. In the case of clothes washer rebates, over 51% of these rebates were awarded in 2010. Rebates for front loader exchanges were about 20% of the cost, and only 125 rebates were awarded. Rebates for rain barrels were about 10% or less of the cost of the rain barrel and 71 were awarded.

From 2004-2009, the rebate for clothes washing machines was less than 15% of the price of the machine and yet almost 2,500 rebates were awarded. Here, the price/rebate relationship does not account for the number of rebates granted. The high number of these rebates awarded during this period may not be due to the cost/rebate relationship, but other factors such as advertising efforts or promotion by vendors.

In looking at the number of rebates granted for all outdoor devices other than rain barrels in 2009-2011, only two rebates were granted. This occurred despite the rebate amount being greater than the median cost of the device.

As shown in 2010 with the addition of the $250 state rebate[16], increasing rebates relative to the cost of the appliance does drive residential behavior. However, as shown in other rebates there must be other factors at play because price alone is not a sole predictor of rebate success. Tentatively, it might be concluded that the most successful rebates for residential customers are at least one-half the cost of the device.

[16] State Rebate information
http://www.emnrd.state.nm.us/ecmd/documents/JustificationExecutiveSummary11-5-09.pdf

Number of Rebates Related to Payback Periods

Table 18 below relates the payback period data to the number of rebates awarded.

Table 18
Relationship of Customer Payback Period
to Number of Rebates Awarded

Device	Payback years @ $3,300 af	Payback years @ $8,700 af	Number of Rebates
Commercial			
HE Toilet, Flushometer Valve	-1.1	-0.4	1,181
HE Toilet, Tank Type	0.9	0.3	199
HE Toilet, Tank Type, Hotel/Motel	24.1	9.1	211
Water-Free Urinal	0.7	0.3	29
Commercial HE Clothes Washer, top loader replacement	5.4	2.0	2
Commercial HE Clothes Washer, front loader exchange	46.0	17.4	2
Air-Cooled Ice Machine	0.9	0.3	6
Commercial Dishwasher	1.4	0.5	1
Residential			
Hot Water Recirculator	1.7	0.6	270
Residential HE Toilet, Tank Type	0.9	0.3	811
Residential Clothes Washer	8.0	3.0	2,461
Residential HE Clothes Washer, top loader replacement	4.8	1.8	1,388
Residential HE Clothes Washer, front loader exchange	21.0	8.0	125
Rain Barrel	59.6	22.6	38
Rain Barrel 50-99 gal	61.7	23.4	10
Rain Barrel 100-199 gal	76.8	29.1	23
Rain Barrel 200-299 gal	63.5	24.1	5

For commercial rebates, the High-Efficiency Flushometer has a short payback period for the customer and received the largest number of rebates. Commercial tank type toilets had a large number of rebates and a short payback period. Hotel/Motel had a significant number of rebates awarded despite the payback period being much longer than other payback periods. This may be due to the need to replace these devices, regardless of rebate dollars; but also this number may just reflect very few Hotel/Motels taking advantage of the rebate program.

Interestingly, the Air-cooled ice-machines, Commercial Dishwaters, and waterless urinals had short customer payback periods but only a few rebates were awarded. The market size for air-cooled ice-machines and commercial dishwaters may limit the overall number of rebates that are possible.

Excluding Hotel/Motel rebate awards, there seems to be a relationship between customer payback periods and the number of rebates granted.

For residential rebates, there is a correlation between short customer payback periods and greater number of rebates, with the exception of Clothes Washer (on the first rebate program in 2004).

Rain barrels programs with long payback periods for the customer have not been as successful as the others programs.

Number of Rebates Related to Degree of Difficulty

Table 19 below relates the installation effort for the device with the number of rebates awarded[17] and are shown in Table 14.

Table 19
Relationship of Installation Effort
to Number of Rebates Awarded

Commercial Devices	Ranking	No. of Rebates Awarded
HE Toilet - Flushometer Valve	4	199
HE Toilet - Tank Type	3	211
Water-Free Urinal	4	29
Clothes Washer - Replacement for top loader	2-4	2
Clothes Washer - Exchange for front loading washer	2-4	2
Air Cooled Ice Machine	3-5	6
Dishwashers	4-5	1
Residential Devices		
Hot Water Recirculators	4-5	270
High-Efficiency Toilets	2	811
Clothes Washing Machines	1	2461
HE Clothes Washer replacement for top loader	1	1388
HE Clothes Washer exchange for front loading washer	1	125
Rain Barrel 50-99 gal	2	38
Rain Barrel 100-199 gal	2	10
Rain Barrel 200-299 gal	2	23
Cistern (Water Harvesting)	5	5
Rain Sensor	2	2
Moisture Sensor	1-2	0
ET Controllers	4	0
Irrigation Pressure Reducing Spray Head	3-4	0
Irrigation Pressure Reducing Valve	3	0

For commercial devices, there is not a correlation between effort and number of rebates awarded either due to lack of a relationship or insufficient data.

For residential devices, with the exception of hot water recirculators, there is not a correlation between effort and number of rebates awarded either due to lack of a relationship or insufficient data.

[17] These rankings assume purchaser was a normal homeowner or business and not a contractor. Rankings for this analysis came from meetings with City of Santa Fe Water Division personnel.

Number of Rebates Related to Promotional Efforts

Promotion effectiveness is generally a combination of length of promotion and the number of ways a device is promoted. The Promotional Factor is determined by multiplying the duration of the rebate program in months with the total number of ways promoted. For this analysis, it is assumed that all promotional vehicles are equal.

Table 20 below relates the duration of the rebate program and the number of ways promoted with the number of rebates awarded.

Table 20
Relationship of Rebate Duration and Ways Promoted to Number of Rebates Awarded

Commercial Devices	Months of Rebate	Total Number of Ways Promoted	Promotional Factor	Number of Rebates Awarded
HE Toilet - Flushometer Valve	48	12	576	199
HE Toilet - Tank Type	48	11	528	211
Water-Free Urinal	48	12	576	29
Clothes Washer - Replacement for top loader	48	12	576	2
Clothes Washer - Exchange for front loading washer	48	12	576	2
Air Cooled Ice Machine	12	0[a]	0	6
Dishwashers	12	0[a]	0	1
Residential Devices				
Hot Water Recirculators	72	0[a]	0	270
High-Efficiency Toilets	48	11	528	811
Clothes Washing Machines	72	11	792	2461
HE Clothes Washer replacement for top loader	48	12	576	1388
HE Clothes Washer exchange for front loading washer	48	12	336	125
Rain Barrel 50-99 gal	48	7	336	38
Rain Barrel 100-199 gal	48	7	336	10
Rain Barrel 200-299 gal	48	7	336	23
Cisterns	48	7	336	5
Rain Sensor	49	6	288	2
Moisture Sensor	49	6	288	0
ET Controllers	49	6	288	0
Irrigation Pressure Reducing Spray Head	49	6	288	0
Irrigation Pressure Reducing Valve	49	6	288	0

[a] No record of promotional activities

When the State of New Mexico also provided a rebate in addition to the City rebate local merchants[18] advertised the promotion and provided the rebate forms for the state and the City.

Per the State Analysis, 2010 rebated program the rebate at $200 will help with almost the entire additional cost. In addition, water consumption will drop in half. Over the lifetime of the clothes washers supported with rebates, New Mexico will save over 225 million gallons of water. [19] The program started

[18] http://www.searsholdings.com/pubrel/pressOne.jsp?id=2010-04-15-0005219943
[19] http://www.emnrd.state.nm.us/ecmd/documents/JustificationExecutiveSummary11-5-09.pdf

on Earth day (April 22nd, 2010) and by May 15th over 8,000 rebate forms had been downloading from the state website.[20]

Coupled with the City rebated of $180-480 at the time, these combined rebates far exceeded the average costs of a new clothes washing machine and drove the purchase of these water savings devices to an all-time high. So it is very clear that rebate dollars if great enough can drive behavior. The state rebate program was dollar capped and so was very short lived and ran out of rebate dollars within weeks of its inception. The program was widely advertised by counties throughout the state, major merchants

In fact this program was so successful that the City ran out of rebate dollars for the year and had to end its program in July. [21]

This rebate program is a great example that rebate dollars can impact behavior since the program was reinstated from the City in 2011 when dollars became available and had been in effect since 2011. Additionally, for the City there are economic issues relating to water conservation and rebates. Although stable or decreasing water demand resulting from conservation does not contribute to increased revenues (and taxes on these revenues) from the sale of water, the City might expect that funds spent on rebates would be less than the cost of producing an equivalent amount of water. That is, the net effect might be that the City could forego the need to produce as much higher-cost water. On this basis, an effective rebate program could provide an economic boost to the City, even in the face of stable or deceasing water sales by reducing taxes, allowing for more resources to go to the private sector for their use. Additional other less tangible benefits would include the positive image of the City and the improved water supply.

Promotional factor seems to be an indicator of success for residential devices, but not for commercial devices.

Rain Sensor, Moisture Sensor, ET Controllers, Irrigation Pressure Reducing Spray Head, Irrigation Pressure Reducing Valve were all part of the same Outdoor Irrigation Rebate program and the low number of rebates was related to lack of general awareness per City personnel.[22]

[20] http://www.connectamarillo.com/news/story.aspx?id=457109

[21] http://www.thefreelibrary.com/WATER+BILL+REBATE+FUND+DRIES+UP%3B+APPLIANCES+PURCHASED+MONDAY+OR+LATER...-a0231724087

[22] Discussion with Daniel Ransom the City Water Conservation manager at the time of this program.

Part 6: Balanced Rebate and Payback Periods

This part investigates the equilibrium between payback periods for the City and the customer. This balanced rebate approach could be used as a tool to evaluate rebate amounts in the future.

As can be seen in the sections on City and Customer Payback Periods, payback periods on the devices are different for the City and for the customer. Also, as previously mentioned, larger rebates result in longer payback periods for the City and shorter payback periods for the customer. At some rebate amount, the payback periods for the City and for the customer are the same. This rebate is referred to in this document as the "balanced rebate".

By using the equations below, a rebate can be calculated that results in payback periods of equal duration for both the city and customer.

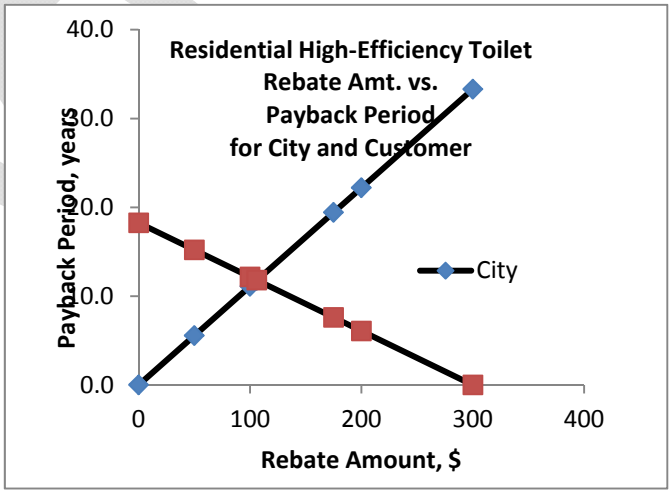
Earlier in this document, we provided the following equations:

$$\text{City Payback Period (yrs)} = \frac{\text{Rebate Amount (\$)}}{\text{Water Savings Rate (af/y) x City Water Production Cost (\$1,700/af)}}$$

$$\text{Customer Payback Period (yrs)} = \frac{\text{Price – Rebate (\$)}}{\text{Water Savings Rate (af/y) x Water \& Sewer Savings (\$3,300 or \$8,700/af)}}$$

With the following definitions:

R = rebate
P = device purchase cost
WSR = water savings rate
City Cost = City water production cost
Customer Value = Customer value of water and sewer savings
F = the ratio of Customer Value to City Cost



First, set the paybacks equal:

R / (WSR x City Cost) = (P – R) / (WSR x Customer Savings)

Cancel WSR and rearrange:

Customer Savings / City Cost = (P-R) / R

Define F to be Customer Savings / City Cost, then:

F = (P-R) / R ;
RF = P-R ;
RF + R = P
R(F +1) = P
or

R = P / (F+1) or

R = P x (City Cost) / (City Cost + Customer Savings)

As can be seen by R = P / (F+1) the balanced rebate depends only on F, the ratio of Customer Value to City Cost, and the price of the device.

Therefore, at particular values of City Cost and Customer Savings, the balanced rebate depends only on the price of the device. At the particular values of $1,670 City Cost and $3,300 Customer Value, the value of [1 / (F+1)] is 0.34. That is, the balanced rebate is a little more than one-third of the price of the device. At the particular values of $1,670 City Cost and $8,700 Customer Value, the value of [1 / (F+1)] is 0.16, or just over one-sixth.

Realistically, with F defined as the ratio of Customer Savings to City Cost, and presuming that the city would not want to sell below cost, the upper limit of f might be one, and the upper limit of 1/F+1 might be one half. So the largest rebate would be one half of the price, and the rebate could be less.

Table 21 below provides the value and payback period of the balanced rebate (columns 4 and 5), compared to the current rebate and city payback period (columns 6 and 7).

Table 21
Balanced Rebates

Device	Water Savings Factor, afy	Price of Device $	Balanced Rebate (.34 x Price) $	Payback at Balanced Rebate yrs	Current Rebate $	City Payback at Current Rebate
Commercial						
HE Toilet - Flushometer Valve	0.0336	383	130	2.3	500	8.8
HE Toilet -Tank Type	0.0168	300	102	3.6	250	8.8
HE Toilet -Tank Type, Hotel/Motel	0.0022	300	102	27.3	125	33.4
Water-Free Urinal	0.0420	600	204	2.9	500	7.0
Commercial Clothes Washer - top loader replacement	0.0233	765	260	6.6	350	8.8
Commercial Clothes Washer - front loader exchange	0.0088	1,485	505	33.8	150	10.0
Air Cooled Ice Machine	0.6700	2156	733	0.6	200	0.2
Dishwashers	1.1500	5681	1932	1.0	400	0.2
Residential						
Hot Water Recirculators	0.0125	170	58	2.7	100	4.7
HE Toilet	0.0053	300	102	11.3	175	19.4
Washing Machines	0.0250	800	272	6.4	100	2.4
HE Clothes Washer replacement for top loader	0.0233	720	245	6.2	350	8.8
HE Clothes Washer exchange for front loader	0.0088	760	258	17.3	150	10.0
Rain Barrels	0.0015	325	111	43.3	30	11.8
Rain Barrel 50-99 g	0.0008	175	60	43.8	12	8.8
Rain Barrel 100-199 g	0.0015	405	138	54.0	25	9.8
Rain Barrel 200-299 g	0.0031	700	238	45.2	50	9.5

Column 2 shows Water Savings Factor and is included as it provides an indication of the effectiveness of the device in saving water, and is used in the payback calculations in columns 5 and 7. The data suggest that devices with low water savings factors (perhaps less than 0.0015 acre-feet per year) may not be good expenditures for either the City or the customer.

Column 3 is the Price of the Device, which is used in calculation of the Balanced Rebate. At the values of $1,700 City Cost and $3,300 Customer Savings, the Balanced Rebate is 0.34 times Price, with a Payback Period that is the same for both the City and the Customer. At the higher water pricing tier, the Balanced Rebate would be about half this amount (0.16 times Price).

The last two columns (Columns 6 and 7) show the Current Rebate amount and the Payback to the City at that amount.

Balanced rebates and payback periods may be useful as guidelines when setting rebate amounts. This is because rebate expenditures with excessive payback periods may not be in the economic interest of either the City or the customer.

Rebates with long payback periods can still be considered, but these would be based on non-economic factors. For example hotel/motel high-efficiency toilets, which have a payback period approaching 30 years, are not a good economic decision for either the City or the customer; however, it does not preclude the rebate being awarded for other reasons as it does result in water savings.

The only current residential balanced rebate with a payback period less than five years is the one for hot water recirculator, but this rebate has been discontinued. None of the other residential balanced rebates have payback periods less than five years. The water savings factor that was attributed to “washing machines” was unusually high (0.0250 acre-feet per year) and even with that factor the balanced rebate had a payback period of 6.4 years. Somewhat discouraging is the payback period associated with high-efficiency toilets of 11.3 years. Rain barrels have payback periods greater than 40 years due to low water savings factors.

Part 7. Conclusions

This section highlights the results of the analysis.

The overall objective of a water conservation rebate program is to save water. Conserved water is cheaper than procuring new water in most cases. A rebate program is a very common method used by cities to conserve water. Measuring the effectiveness of these programs is based on the number of rebates awarded and the amount of water saved to the amount of monies spent.

Regarding the expectations of the City, this paper presumes that water conservation is the primary interest of the City. On this basis, the City would expect that an effective rebate program would produce measurable reductions in the water use rate and stabilize or even reduce overall water demand. The City would like the rebate program to not be excessively expensive and have moderate administration costs, and might also hope that an effective and successful rebate program would improve the City's image.

In this analysis several high level observations are apparent:

- The rebate program has saved the city water at a price less than procuring new water.
- The recently introduced Commercial program is being successful.
- Technology improvements have enabled the City to effectively upgrade and continue saving water.
- The City has opportunity to conserve water with an outdoor rebate program.
- The City has opportunity to conserve water with an effective rebate program for multi-family dwellings.
- Rebates amounts do directly and quickly impact the number of rebates (e.g. more rebates were awarded when the State of New Mexico provided additive rebate funds).
- The City may want to re-evaluate current rebates dollar amounts using the Balanced Rebate approach

On specific aspects of this analysis additional factors uncovered include:

- Given the fixed water pricing to commercial accounts, it is necessary to increase the operating savings in promotion efforts directed towards commercial customers.
- Residents are more interested in immediate paybacks.
- Length and breadth of promotion is a driver for residential rebates.
- Involving local merchants in rebate program is a driver for success and should be part of any new Residential rebated program.
- Effort to install may not be a factor in the success of rebates. Individuals and companies that are interested in water savings devices and that go through the effort to apply for a rebate may not be sensitive to the effort required to install the device.
- Rain barrels are highly visible in Santa Fe, yet less than 100 rebates have been awarded. This would seem to indicate that many people purchase these devices and do not apply for a rebate. Additional research in this area may provide insight in to why.

The customer also expects an economic benefit, such as the installation of a new appliance at no or little cost. They might expect savings from reduced water and sewer bills, or they might expect a functional benefit – the new device might work better or require less maintenance. The customer might expect an aesthetic benefit – the new appliance might look better. Or the customer might expect to benefit from a feeling of meeting a civic responsibility or from confronting pressure from peers.

A view the authors of this paper suggest is that one method of evaluating rebates is that rebates be viewed from both sides of the equation and these views be balanced (i.e. the same for both the customer (the recipient of the rebate) and the promoter (in this case, the City of Santa Fe). For example, the overall objective of a rebate program is to conserve water but as a second order this intent is to maintain the

sustainability of the City and quality of life of its residents. Involving more and more commercial entities and residents in the drive creates a long-term ever-improving water saving cycle.

It should be noted that the total dollars for the rebates is less than the total cost of the rebate programs, which has administrative and staff costs including costs for processing rebate applications and for advertising, in addition to the basic amounts rebated to customers. Participation in the rebate program has changed over time. However, it remains a form-based system requiring the customer to report work and the water conservation staff to verify. Verification can require a few minutes too many hours including a site visit in some cases. The barrier to customers and the work requirement for staff are not investigated in this analysis, but do potentially impact the success of a program. If they were taken into account, administrative costs would increase the cost of the rebate program and extend the payoff periods for the City.

Water conservation cannot be entirely evaluated dependently. Other factors also will affect water usage. Some of these are water rates, droughts, regulations, increased public awareness and economic conditions. This analysis is a starting point for further research. Clearly, the following would add significant data to this research:

- Customer survey post installation to verify actual usage of the device rebated
- Comparative analysis for the market penetration of specific devices by market sector
- Tracking of hours to process rebates and inclusion of these costs in the overall costs to the city
- Survey of sample market to better understand awareness versus promotional efforts
- Better comparative data of the different types of promotion (e.g., city ads versus vendor ads)

Lastly, source of funding for rebate program is crucial. This aspect of the City's rebate program has not be evaluated as part of this study, but provided the funds critical to its implementation.[23] It is the backbone of a rebate program and should be planned out ahead of time. As was seen in this analysis, the City ran out of fund one year due to success of the program. This led to the program being discontinued in one of its best years.

Rebates can drive water conservation and save money for both the City and Customers when implemented correctly. They are a critical tool that should be carefully planned and implemented to achieve long-term sustainable water conservation by driving short-term changes.

[23] A review of the Source of Funding of Santa Fe's rebate program is included in the Appendix

Summary Table

	No. Rebates	Median Cost $	2004 - 2009 Rebate $	2010 Rebate $	2011 - 2013 Rebate $	Water Factor afy	Customer Payback, yrs 2004 - 2009	2010	2011 - 2013	Custome Rebate $ @ 5-yr P
HE Toilet, Flushometer Valve	199	383		504	500	0.0336		<1.0	<1.0	
HE Toilet, Tank Type	211	300		504	250	0.0168		<1.0	0.9	
HE Toilet, Tank Type Hotel/Motel	1181	300		504	125	0.0022		<1.0	24.4	2
Water-Free Urinal	29	600		630	500	0.0420		<1.0	0.7	
Commercial HE Clothes Washer, top loader replacement	2	765		480	350	0.0233		3.2	4.9	3
Commercial HE Clothes Washer, front loader exchange	2	1,485		180	150	0.0088		20.2	21.3	6
Air-Cooled Ice Machine	6	2,156	200			0.6700	0.9	1.0	1.0	
Commercial Dishwasher	1	5,681	400			1.1500	1.4	1.5	1.5	
Commercial Process Efficiency	1			874		0.4500				
Hot Water Recirculator	270	170	100			0.0215	1.0	2.4	2.4	
Residential HE Toilet	811	300		175	175	0.0053		7.2	7.2	2
Residential Clothes Washer	2461	760	100			0.0250				
Residential HE Clothes Washer, top loader replacement	1388	720		480 (730)	350	0.0233		3.2 (<1.0)	4.9	3
Residential HE Clothes Washer, front loader exchange	125	760		180	150	0.0088		20.2	21.3	6
Rain Barrel	1736	325	30			0/0015				
Rain Barrel 50-99 g	38	175		12	12	0.0008		76.0	76.0	2
Rain Barrel 100-199 g	10	405		25	25	0.0015		61.4	61.4	3
Rain Barrel 200-299 g	23	700		50	50	0.0031		42.1	42.1	4
Cistern (Water Harvesting)	5	1.22 / gal		0.25 / gal	0.25 / gal	0.000015		35.8	35.8	
Rain Sensor	2	29		40	40	NC				
Moisture Sensor	0	179		75	75	NC				
ET Controller	0	500		300 - 750	300 - 750	NC				
Press Reducing Valve	0	53		120 - 525	120 - 525	NC				

Appendix I
Santa Fe Rebate History[24]

As previously mentioned, Santa Fe has a long history of water conservation programs and rebates have figured in their programs since almost the very beginning. The City has done a good job of tracking and publishing the results of their water conservation efforts. The programs were changed or retired and replaced with a new one targeting new appliances or changing the dollars involved, but a rebate program has been in place every year since they were started in 2004. Below is a summary of the programs they have been in place over the years.

2002, 2002 Annual Water Budget Requirements (adopted by Resolution 2002-55 and revised by Resolution 2003-106). All new construction served by the City water utility was required to implement stringent water conservation requirements and offset new demand through retrofitting high-use toilets, typically 3.5 or 5 gallons per flush (gpf) with low flush toilets (1.6 gpf) or by purchasing pre-1907 Middle Rio Grande surface water rights.

The City purchased 75 gallon rain barrels for distribution; 1,000 customers were able to purchase one rain barrel each for $35, a significant savings from the actual cost of $74.95. This program only lasted a few months before the supply of rain barrels was exhausted.

2003 Established the Water Budget Program, also known as the Toilet Retrofit Program, was created to track the number of toilet retrofits and accumulated water savings. Water credits were awarded to entities that have retrofitted toilets but have not designated the water credits to a future project.

2004 The first rebate program was introduced and it included hot water recirculators ($100), washing machines ($100) and rain barrels ($30). This program resulted in water savings of 67.26 acre/feet between 2004 and 2009, when this specific program ended.

2005 The Water Rights Transfer Program ordinance modified the offset requirements for new development. The City code changed to require offsets with Middle Rio Grande surface water rights, transferred to the City, instead of toilet retrofits for commercial developments greater than 5 acre-feet and residential developments greater than 10 acre-feet.

2009 A 1998 analysis "Water Use in Santa Fe"[25] was updated to include additional customer sectors. These sectors (e.g. single family, apartment, office, medical, religious, schools, parks) are used in creating development water budgets.

Water Demand Offset Requirements ordinance replaced the Annual Water Budget Requirements (Toilet Retrofit Program). Outstanding toilet retrofit credits were moved into the Water Bank as they are being redeemed. Components of this new code include:

- The development of a Water Budget and a Building Permit Requirement: Applicants are required to offset demand through dedication of water conservation credits or transferred water rights.
- City's Water Budget: Water managers are required to prepare annual accounting of current and projected supply and demand, and allocate water made available by water rights purchases, leases, and conservation measures to meet priorities, including affordable housing.

[24] Complete list of ordinances and resolutions is in Appendix XIII. Most of these ordinances are available online at the City's website.
[25] The report, Water Use in Santa Fe (2009), is available on the City's website at: http://www. santafenm.gov/ DocumentView. aspx?DID=5017.

- City Water Bank: A water bank was established to account for water credits derived from conservation programs and water rights transfers to offset future demand. Some of the credits are available for purchase by developers or for allocation to City priorities.
- Conservation Credit Programs: credits generated by water conservation rebates and water conservation contracts.
- Water Rights Transfer Program: requires that new commercial development greater than 5 acre-feet and residential development greater than 10 acre-feet acquire and transfer water rights to City before obtaining building permit.

2009/55 authorizes the adoption of water conservation programs including rebates for outdoor water saving devices (Resolution 2009-55 modifies Section 25-2.11 SFCC 1987). This program provides rebates on Rain Sensors ($40), Moisture Sensors ($40), ET Controllers (1-6 $300, 7-9 $375, 10-12 $450, 13-18 $575, 19-24 $750), Pressure Reducing Valves (3/4" $120, 1" $150, 1 ½" $400, 2" $525), Pressure Regulating Spray Nozzles ($2), Precision Spray Nozzle ($3), Pressure Regulating Spray Head ($5), and Matched Precipitation Spray Rotors ($5).

2010 A new rebate program was instituted for which credits would now go into the Water Bank instead of the Water Budget Program. Rebates were offered for high-efficiency toilets (HET) ($175/residential, $504/ commercial), water free urinals ($630), high-efficiency clothes washers ($480), rain barrels ($12-$50 depending on size) and water harvesting systems ($0.25/gallon), and for commercial process efficiency, resulting in 32.4626 acre/feet of conservation credits delivered to the Water Bank.

Note: This the 2009 and 2010 rebate programs were funded in part with a grant from the American Recovery and Reinvestment Act of 2009. The program was ended in July 2010 due to depletion of funds.

2011 Beginning May 1, 2011, rebates were reinstated for high-efficiency toilets (HET) ($175/ residential, $125, $250, or $500/commercial depending on type), water free urinals ($500), high-efficiency clothes washers ($150 or $350 depending on type), rain barrels ($12-$50 depending on size) and water harvesting systems ($0.25/ gallon), and for commercial process efficiency, resulting in 9.0402 acre-feet of conservation credits delivered to the Water Bank.

2012 Rebates for the same products and at the same values as 2011 were continued in 2012, resulting in 7.1504 acre/feet of conservation credits delivered to the Water Bank.

Appendix II

Number of Rebates

Rebate / Year →	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
Commercial HE Toilet, Flushometer	NA	NA	NA	NA	NA	NA	197	2	0	0	199
Commercial HE Toilet, Tank Type not in Hotel/Motel	NA	NA	NA	NA	NA	NA	192	13	6	0	211
Commercial HE Toilet, Tank Type in Hotel/Motel	NA	NA	NA	NA	NA	NA	459	461	0	261	1181
Water-Free Urinal	NA	NA	NA	NA	NA	NA	24	5	0	0	29
Commercial HE Clothes Washer, Top Loader replacement	NA	NA	NA	NA	NA	NA	2	0	0	0	2
Commercial HE Clothes Washer, Front Loader exchange	NA	NA	NA	NA	NA	NA	2	0	0	0	2
Air-Cooled Ice Machine	0	0	1	5	NA	NA	0	0	0	0	6
Commercial Dishwasher	0	0	1	0	NA	NA	0	0	0	0	1
Commercial Process Efficiency	NA	NA	NA	NA	NA	NA	1	0	0	0	1
Hot Water Recirculator	62	46	36	49	34	43	NA	NA	NA	NA	270
Residential HE Toilet	NA	NA	NA	NA	NA	NA	236	174	254	147	811
Residential Clothes Washer, Unspecified	232	332	434	456	547	460	NA	NA	NA	NA	2,461
Residential HE Clothes Washer, Top Loader replacement	NA	NA	NA	NA	NA	NA	782	266	228	112	1,388
Residential HE Clothes Washer, Front Loader exchange	NA	NA	NA	NA	NA	NA	35	35	41	14	125
Rain Barrel, Unspecified	561	291	403	368	113	0	NA	NA	NA	NA	1,736
Rain Barrel, 50-99 gallon	NA	NA	NA	NA	NA	NA	15	4	12	7	38
Rain Barrel, 100-199 gallon	NA	NA	NA	NA	NA	NA	5	2	3	0	10
Rain Barrel, 200-299 gallon	NA	NA	NA	NA	NA	NA	19	2	1	1	23
Water Harvesting (Cistern)	NA	NA	NA	NA	NA	NA	2	2	1	0	5
Rain Sensor	NA	NA	NA	NA	NA	NA	0	0	2	NA	2
Moisture Sensor	NA	NA	NA	NA	NA	NA	0	0	0	NA	0
Evapotranspiration Controller	NA	NA	NA	NA	NA	NA	0	0	0	NA	0
Press Reducing Valve	NA	NA	NA	NA	NA	NA	0	0	0	NA	0
Other Outdoor Devices	NA	NA	NA	NA	NA	NA	0	0	0	NA	0
Annual Total	855	669	875	878	694	503	1971	966	548	542	8,501
Commercial Total	0	0	2	5	0	0	877	481	6	261	1,632
Residential Total	855	669	873	873	694	503	1094	485	542	281	6,869

*NA indicates that rebates were not available

Appendix III

List of Terms

Appendix IV

Bibliography

Appendix V
Population Statistics

Although rebates are available to the City Water Division service area population (a number greater than the City population), a count of the population of the service area is not as readily available as is the City population, and City population values (from U.S. Census data[26] for the City of Santa Fe) are shown in the table. As of July 1, 2012, Santa Fe had a population of approximately 69,200. Based on a 1% annual growth rate, the population at the same date in 2013 is estimated to be 69,900. According to the annual water reports and City records, at the end of 2012, there were a total of 7,959 rebates, and as of July 1, 2013, the total had reached 8,501. According to City records, there were approximately 55,000 water utility connections in 2012, distributed among commercial, single-family residential, and multi-family and other accounts as indicated below.

[26] U.S. Census Bureau, Population Division. Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2012. Found at http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml, September 1, 2013.

Appendix VI

Water Savings Rates

Water Savings Rates

For the devices or technologies that are available for a rebate, the City has calculated annual water savings factors[27]. These numbers are used as a basis for the City to estimate how much water will be conserved per awarded rebate by device per year as well as, at least to the present, set the basis for the rebate amounts.

As an example, for a high efficiency (1.26 gallons per flush) toilet, the City uses a basis that the high efficiency toilet uses 0.4 gallons of water per flush less than a low-flow toilet. Using typical household data – 5.1 flushes per day per person and 2.3 persons per household – the water savings resulting from changing a low-flow toilet to a high efficiency toilet are 1,713 gallons per year, or 0.0053 acre-feet per year (afy). Therefore, the water saving factor is 0.0053 acre-feet per year.

Water savings factors (annual water savings per device in acre-feet per year) are tabulated in Table 7 and 8.

Table 7
Commercial Water Savings Factors

Device	Flushometer Valve HE Toilet	Tank Type HE Toilet	Hotel/Motel HE Toilet	Water Free Urinal	HE Clothes Washer replacement for top loader	HE Clothes Washer exchange for front loader	Commercial Process Efficiency	Air Cooled Ice Machine	Dishwasher
Water Savings Factor (acre-feet per year)	0.0336	0.0168	0.0022	0.0420	0.0233*	0.0088*	0.4500	0.67	1.15

*Both Commercial and Residential

[27] http://www.santafenm.gov/index.aspx?NID=2300.

Table 8
Residential Water Savings Factors

Device	Hot Water Recirculators	HE Toilet	Washing Machine	Rain Barrel	Rain Barrel 50-99 g	Rain Barrel 100-199 g	Rain Barrel 200-299 g	Water Harvesting	Rain and Moisture Sensor, ET Controller, Pressure Reducing Valve and other Outdoor Devices
Water Savings Factor (acre-feet per year)	0.0215	0.0053	0.0250	0.0015	0.0008	0.0015	0.0031	0.000015	Not Calculated

Higher water savings factors denote a higher water savings from the specific device (i.e. the higher the number the more the water saved).

Water savings factors have frequency of use built into the factor. For example, tank-type high efficiency toilets and Hotel/Motel toilets are the same device but a different frequency of use is used to calculate the water savings rate.

Appendix VII

Current Santa Fe Rebate Forms

This rebate program is for the replacement of high water use fixtures and appliance with efficient technologies only. The rebates do not apply to purchases for new homes or new construction and development.

To qualify:

- All appliances and fixtures must be purchased after May 1, 2011
- Applicants must be a City of Santa Fe Water customer with an account in their name at the service address where the appliance or fixture is installed and at time of purchase.
- Only original receipt(s) will be accepted. Applications submitted with photocopy receipt(s) will be denied.

The City expanded the Rebate program to allow Home Owner Associates (HOA) to qualify for rebates, but there are several restrictions to this program due to the uniqueness of HOAs.

Clothes Washer Rebate Application – http://www.santafenm.gov/DocumentCenter/View/40859

Commercial Toilet Rebate - http://www.santafenm.gov/DocumentCenter/View/40860

Residential Toilet Rebate - http://www.santafenm.gov/DocumentCenter/View/40860

Water Free Urinal Rebate - http://www.santafenm.gov/DocumentCenter/View/40861

Rainwater Harvesting Rebate - http://www.santafenm.gov/DocumentCenter/View/40862

Appendix VIII

List of Santa Fe Water Conservation Ordinances[28]

1. Ordinance 1996 -16 Establishes Emergency Water Regulations
2. Ordinance 1996-20 Amends 1996-16
3. Ordinance 1996-30 Amends Stage 2 Implementation Plan of Emergency Water Regulations
4. Ordinance 1996-35 Amends Stage 2 Implementation Plan
5. Ordinance 2000-30 Amends 1996-20 with surcharges, restrictions and fines
6. Ordinance 2002-17 Amends Stage 2 and Stage 3 Implementation plans
7. Resolution 2002-25 – Establishes the Santa Fe Water Conservation Committee
8. Ordinance 2002-26 Added Stage 5, ordinance rescinded July 10th
9. Ordinance 2002-55 Establishes requirement for developers to bring water offsets
10. Ordinance 2002-106 – Amends 2002-55
11. Ordinance 2003-12 Amends Irrigation restrictions on parks, schools and athletic fields
12. Ordinance 2006-53 Amends Emergency Water Regulations changing to Orange and Red
13. Resolution 2009-55 Establishes Outdoor Irrigation Rebate Program
14. Ordinance 2010-17 – Adopts Landscape Irrigation Design Standard as guidelines
15. Ordinance 2010-78 – Broadens the rebate program to Home Owner Associations under certain conditions
16. Ordinance 2011-37 – Landscape ordinance, passed and is part of Land Use Code 14-8.8
17. Ordinance 2011-38 Amends to Authorize Suspension of Santa Fe River Target Flows
18. Ordinance 2013-27 – Amends code to provide rebates to commercial accounts to lower their water consumption
19. Resolution 2013-52 – A Resolution in support of "A Water Conservation Campaign Focusing on Voluntary Outdoor Irrigation"
20. City of Santa Fe Plant List – Referenced in the Land Use code and maintained by the Parks Department

[28] Most of these ordinances are available online at the City's website at http://www. santafenm.gov

City of Santa Fe, New Mexico

memo

DATE: June 18, 2009

TO: Public Utilities Committee

VIA: Brian Snyder, Acting Sangre de Cristo Water Division Director BKS

FROM: Claudia Borchert, Water Resource Coordinator
Willam Cassel, Assistant City Attorney

RE: Amendments to the Regulation of Domestic Wells within the Municipal Boundary

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BACKGROUND: To protect the quantity and quality of the local, shared aquifer, the City enacted a domestic well ordinance in 1996, which allows **new** domestic wells to be drilled in the City only under limited circumstances. The City's right to regulate new domestic wells has been challenged multiple times, and has been upheld before the New Mexico Supreme Court. The City has recently become aware of several replacement wells being drilled in the City; it is untested whether the City has jurisdiction over replacement wells or other types of domestic wells as may be permitted by the state.

ISSUE: The proposed amendments extend the City's jurisdiction over domestic wells in the following ways:
a) The amendments restrict the diversion permitted in a domestic well to 0.25 acre-feet from the 1.0 acre-foot as allotted by the Office of the State Engineer. The average City of Santa Fe single family resident uses 0.16 acre-feet.
b) The amendments updates the ordinance with some of the conditions of approval that are currently required within City domestic well permits.
c) The amendments give the City jurisdiction over "other" domestic wells that are seeking an OSE permit. Activities may include replacement, repairing and deepening, supplementing, changing of location, and changing purpose of use. In these circumstances, the City is requiring metering, reporting, access, permission to sample, and appropriate construction.

The amendments are being proposed so that City staff can, over the next few years, evaluate the impact that domestic wells are having on both the quantity and quality of the water in the aquifer. After gathering and analyzing adequate data, the City will better be able to understand if any additional domestic well regulations are appropriate.

STAFF RECOMMENDATION: Staff would like to get input from the PUC on the policy direction within the proposed amendments, and then bring the proposed attached domestic well ordinance amendments through the decision making process.

Maxine Paul
UNM Water Resources Program MWR
Policy and Management Concentration
Expected Graduation: Summer 2014
B.A. Environmental Science, Columbia University, 2010
505 814 4438 // mnp2105@caa.columbia.edu // maxinepaul@unm.edu

An Update for Maxine Paul's Committee:
Domestic Well Policy in Santa Fe
Scope of Work Outline
Professional Project, UNM Water Resources Program

Draft 1
10.11.13

Sections

1. Thesis Committee

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Director and Regents Professor
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Keleher and McLeod Professor of Law
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Water Resources Coordinator
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2. Working Study Questions
    a. *Local Policy Evaluation* of the City of Santa Fe's Domestic Well ~~ordinace~~ordinance:
        i. ~~Recent evaluations show that domestic wells may exceed average regulated quantity of use (Lewis 2012).~~
        ~~1.~~ii. What range of potential impact are all the domestic wells combined having on the aquifer?
            ~~ii.~~1. Recent evaluations show that domestic wells may exceed average regulated quantity of use (Lewis 2012).
            ~~a.~~2. Do current regulations contribute to sustainable (reasonable/ prudent) aquifer usage (< safe yield) for the next 100 years?
        ~~2.~~iii. What is the purpose of domestic well policy in Santa Fe? How does the implementation and design serve/not serve this purpose? What is limit of City's regulating power?
            ~~a.~~1. Potential issues: replacement and supplemental wells, annexation issues, permitting, metering and reporting of existing wells, Consistency with current OSE rules, enforcement actions and procedures, 300 ft rule

    b. *Regional/State/West Policy Implications*: addressing how the city domestic well ordinance and related rules supplement the OSE in a prior appropriation state. (*a more specific question will emerge as I get further into the literature review*)
        i. Stennis, Smith and Bounds case law
        ii. Comparisons to other states methods, legal and regulatory frameworks
        ~~ii.~~iii. County regulations

3. Project goals / outputs
    a. To produce a report evaluating domestic well ordinance and related regulation in the City of Santa Fe, analyzing potential pitfalls and highlights for growth management within the context of county and state regulations, which will fulfill the requirements of a professional project for the Master of Water Resources program at UNM.
    b. To produce and submit for publishing a condensed version of the report focusing on Santa Fe's policy as part of broader western domestic well 'loophole' within prior appropriation that uses Santa Fe as a case study.
        i. Note: Mindy Benson mentioned to me it's possible to write a publishable paper (shorter) and submit that as my final project?
    ~~i.~~c. To produce a database/map identifying all the known wells in the Santa Fe area

4. Action items
    a. Santa Fe City ~~Options~~:
        i. Review of all the wells that have been permitted~~come in through the program~~
            1. Source: CiSF Tracking file

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Comment [CIB1]: Let's talk about the value or not of using this term.

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Comment [CIB2]: With recommendations??

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2. Kyle Harwood tracking

ii. Identify any required follow-up activity for permitted wells
   1. Filing of well log
   2. Metering and reporting
   ~~2.~~3. Create GIS database

iii. Identify pre-existing domestic wells within the City: build GIS database
   1. WATERS/ OSE (Laura Petronis)
   ~~1.~~2. USGS GWSI wells (Laura Petronis)
   ~~2.~~3. Amy Lewis (wells with metering information)
   ~~3.~~4. City sources: Oritz landfill, CB paper files, water quality fair,
   ~~4.~~5. Kyle Sager, in the field visit
   ~~5.~~6. Utility billing: addresses with refuse but no water service
   ~~6.~~7. Peggy ~~Johnsons~~Johnson: Southern Espanola Basin database
   ~~7. USGS~~

iv. Identify type of information looking for from well
   1. Permit, Well log (TD, DTW), Current owner, Good location, Track abandoned wells (Have they been properly abandoned?)

v. Review Policy Process, identify stakeholders:
   1. Participate with ~~of~~ domestic well working group: Stephen Wiman, Pete Balleau, Doug Pushard,
   2. Meet with Councilor Ives
   3. Resolution?
   4. Public meetings
   5. Stakeholder meetings: current domestic well owners, Realtors, Homeowners assoc in relevant areas, well owners in annexations areas
   ~~5.~~
   ~~6.~~
   ~~7. Current domestic well owners~~
   ~~8. Realtors~~
   ~~9. Homeowners assoc in relevant areas~~
   ~~10. Well owners in annexations areas~~

b. OSE / State Regulations
   i. Review domestic well ordinance
   ii. Understand the legal implications of a home rule municipality w.r.t regulating domestic wells
   iii. Review Ci-Co annexation agreement w.r.t. Domestic wells
   iv. Review County exemptions/ restrictions
   v. Review OSE permitting

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c. Review legal challenges (Smith and Stennis)
TBA

d. Implications of Bounds decision
TBA

e. Review related domestic well ordinances of other entities in NM / West
TBA

f. Broader Legal Literature Review
TBA

5. Potential Data
   a. Regional aquifer geology / estimates of the quantity usable (safe yield) – peggy johnson's work
      i. Domestic wells -We don't know how much water we're withdrawing (also cited in Gila_waterdestiny_paper)
   b. City wells, County Wells (14,000) and usage
   c. Other uses and inputs to groundwater
   d. Amy Lewis (wells GIS database)
   e. Models/ predictions – Kyle Hardwood has tracked current groundwater model
   f. Uncertainties – eg. State engineer over estimates return flows of nearby rivers (santa fe r.) due to well drawdowns (gila_waterdestiny_paper)
   g. Externalities – Ecosystems/wetlands, river flow drawdown… rural economies

6. Deadlines (self imposed and for graduation)

   - End of December, 2013: Submission of thesis proposal (15p.) including an abstract, introduction and literature review.
   - May, 2014: Presentation and submission of thesis for summer graduation

   Potential Schedule:

   ***If possible, I would like to meet with each of you once or twice a month*

   - October 2013-December 2013:
     - Proposal write up literature review, establish data contacts, solidify study questions, par down scope of work
   - December 2013-January 2014:
     - Data collection and analysis (GIS, well tracking) Continued literature review
     - research publications
   - January2014-February 2014:
     - Data collection continued as needed,
     - Begin analysis,

Comment [CIB3]: Need to get with Laura Petronis before she goes on maternity leave in January.

    - begin publication draft
- February 2014 – March 2014:
    - con't.
- March-May 2014
    - Above con't,
    - Submit for publication, submit for conferences (or prepare for future deadlines)
    - Presentation and professional project submission

7. Very Partial List of Literature

Balleau, W. P., & Silver, S. E. (2005). Hydrology and administration of domestic wells in New Mexico. *Nat. Resources J.*, *45*, 807.

Benson, R. D. (2011). Alive but irrelevant: The Prior Appropriation Doctrine in today's western water law. *U. Colo. L. Rev.*, *83*, 675.

Bounds v. D'Antonio, 2011 NMCA 11, 149 NM 484.

Bracken, N. (2010). Exempt well issues in the West. *Envtl. L.*, *40*, 141.

Drennan, J. (1997). Lassoing the loophole: the need to rope in the use of the domestic well loophole by subdividers in New Mexico. *Nat. Resources J.*, *37*, 923.

Grant Jr, P. R. (1999). Subsurface geology and related hydrologic conditions, Santa Fe embayment and contiguous areas, New Mexico. *Albuquerque geology: New Mexico Geological Society, Guidebook*, *50*, 425-435.

Miller, A. P. (2003). Rural development considerations for growth management. *Nat. Resources J.*, *43*, 781.

Perramond, E. P. (2012). The politics of scaling water governance and adjudication in New Mexico. *Water Alternatives*, *5*(1), 62-82.

Richardson, J. J., & Dowell, T. (2012). The Implications of Bounds v. State of New Mexico. *Journal of Contemporary Water Research & Education*, *148*(1), 17-23.

Richardson, J. J. (2012). Existing Regulation of Exempt Wells in the United States. *Journal of Contemporary Water Research & Education*, *148*(1), 3-9.

Stennis v. City of Santa Fe, 2008-NMSC-008

Sevionovic, S. P. (1997). Risk in sustainable water resources management. In*proceedings of Rabat symposium sustainable water resources under increasing uncertainty. IAHS Publication* (No. 240, pp. 3-17).

Tarlock, A. D. (2002). The Future of Prior Appropriation in the West. *Natural Resources Journal*, *41*, 769.

Titus, F. B. (2005). On regulating New Mexico's domestic wells. *Nat. Resources J.*, *45*, 853

First Pass at Guiding Principles
9/25/13

- The goals of water conservation adhere to the City charter.
- Protection, preservation of the water supply is a high priority of the Water Division.
- Community awareness, responsibility, participation and education are key elements of a water conscious community.
- The Water Division recognizes its linkage with the regional, national and international watersheds of the Rio Grande and Colorado Rivers.
- Community partnerships are necessary to achieve our water goals.
- Partnerships are necessary to achieve our water goals.
- The precautionary principle provides a framework to help guide decision-making.
- We acknowledge the reality of climate change and the need to develop strategies to address it

SFWCC Working Group #1 Meeting Minutes – Nov 2013

Members Present: Bill, Grace, Doug, Lisa

* Meeting focus was a brainstorm on both long and short term strategies for future conservation efforts – ideas are listed by participant. Explanations of each idea to come, following larger SFWCC group discussion, additions, clarification

Doug	Lisa	Bill	Grace
Storm water vs runoff usage in parks	Real time access to household/building water use	Purple pipe required	City/County working group and coordination
All new buildings required to have gray water stub outs	City as role model	Code revision – 2012 Green Plumbing Code	"Unaccounted for" water audit – where is it actually going?
Demonstration gardens, annual events	Remote access for real time water use on all commercial buildings	Wells within City – ability to measure/manage	What is southwest average for unaccounted for water use
Annual water conservation grant competition	Commercial building water audits, inside and out	Water usage rating system	Permeable paving in the ordinance/code
Irrigation disconnect incentive program – encourage no potable use water for irrigation	Assist commercial properties in drip, plantings, water schedules	State and Federal buildings required to comply with City ordinances	Web based pilot program for real time water use – use SFPS as commercial pilot
Turn LIDS (Landscape Irrigation Design Document) into ordinance			

WG#3 Water Conservation through Regulations and Policies

1. Agreement to start pushing forward to UPC Green Supplement 2012 code. Sent copies out and include Katherine Mortimer. Bill will discuss with her.

2. Agreement to start developing an Water Usage Rating System. Kim thinks the time is right for this.
- Baseline would probably be State Green Building and Santa Fe Code level
- Would rank water use based on new homes since 2009
- Ranking would not start as mandatory but move that way over time
- Discussion on Fee in Lieu of Impact Fee for Water Use
- Ranking would include new techniques that would be available under 2012 UPC Green Supplement
- Goal is to start driving down water usage in new homes - measure/reward
- Goal is to targeted for late 2014.

3. Brainstorming presentations
- Held presentations for Realtors. Session hosted by Stephen Wiman and arranged by Nancy. In attendance additionally were Grace, Karyn and Caryn. Agreed to longer presentation and Nancy working to schedule
- Next presentation to AIA on January 9, 12PM

Action: Would like to see if the City could pull water usage for last 4 years from new homes built and give us an average water usage for just this subset of homes.

2014 SANTA FE WATER CONSERVATION COMMITTEE MEETING SCHEDULE

DATE	LOCATION	TIME
JANUARY 14, 2014	City Councilors' Conference Room	4-6 PM
FEBRUARY 11, 2014	City Councilors' Conference Room	4-6 PM
MARCH 11, 2014	City Councilors' Conference Room	4-6 PM
APRIL 8, 2014	City Councilors' Conference Room	4-6 PM
MAY 13, 2014	City Councilors' Conference Room	4-6 PM
JUNE 10, 2014	City Councilors' Conference Room	4-6 PM
JULY 8, 2014	City Councilors' Conference Room	4-6 PM
AUGUST 12, 2014	City Councilors' Conference Room	4-6 PM
SEPTEMBER 9, 2014	City Councilors' Conference Room	4-6 PM
[1]OCTOBER 7, 2014 10/13/14 Columbus Day	City Councilors' Conference Room	4-6 PM
[1]NOVEMBER 4, 2014 11/11/13 Veteran's Day	City Councilors' Conference Room	4-6 PM
DECEMBER 9, 2014	City Councilors' Conference Room	4-6 PM

City Councilors' Conference Room – 200 Lincoln Avenue
[1]First Tuesday meeting due to Holiday

January 2014

	Sun	Mon	Tue	Wed	Thu	Fri	Sat
1				1	2	3	4
2	5	6	7	8	9	10	11
3	12	13	14	15	16	17	18
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5	26	27	28	29	30	31	

February 2014

	Sun	Mon	Tue	Wed	Thu	Fri	Sat
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March 2014

	Sun	Mon	Tue	Wed	Thu	Fri	Sat
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13	23	24	25	26	27	28	29
14	30	31					

April 2014

	Sun	Mon	Tue	Wed	Thu	Fri	Sat
14			1	2	3	4	5
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18	27	28	29	30			

May 2014

	Sun	Mon	Tue	Wed	Thu	Fri	Sat
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June 2014

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26	22	23	24	25	26	27	28
27	29	30					

July 2014

	Sun	Mon	Tue	Wed	Thu	Fri	Sat
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August 2014

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36	31						

September 2014

	Sun	Mon	Tue	Wed	Thu	Fri	Sat
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39	21	22	23	24	25	26	27
40	28	29	30				

October 2014

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42	12	13	14	15	16	17	18
43	19	20	21	22	23	24	25
44	26	27	28	29	30	31	

November 2014

	Sun	Mon	Tue	Wed	Thu	Fri	Sat
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46	9	10	11	12	13	14	15
47	16	17	18	19	20	21	22
48	23	24	25	26	27	28	29
49	30						

December 2014

	Sun	Mon	Tue	Wed	Thu	Fri	Sat
49		1	2	3	4	5	6
50	7	8	9	10	11	12	13
51	14	15	16	17	18	19	20
52	21	22	23	24	25	26	27
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1 Jan	New Year's Day
20 Jan	Martin Luther King Day
12 Feb	Lincoln's Birthday
14 Feb	Valentine's Day
17 Feb	Presidents Day
4 Mar	Mardi Gras Carnival
9 Mar	Daylight Saving (Start)
17 Mar	St. Patrick's Day
1 Apr	April Fool's Day
18 Apr	Good Friday
20 Apr	Easter
21 Apr	Easter Monday
5 May	Cinco de Mayo
11 May	Mother's Day
17 May	Armed Forces Day
26 May	Memorial Day
8 Jun	Pentecost
9 Jun	Pentecost Monday
14 Jun	Flag Day
15 Jun	Father's Day
4 Jul	Independence Day
1 Sep	Labor Day
11 Sep	September 11th
17 Sep	Citizenship Day
26 Sep	Native American Day
13 Oct	Columbus Day
16 Oct	Boss's Day
18 Oct	Sweetest Day
31 Oct	Halloween
2 Nov	Daylight Saving (End)
11 Nov	Veterans' Day
27 Nov	Thanksgiving
7 Dec	Pearl Harbor
25 Dec	Christmas Day
31 Dec	New Year's Eve

Calendar & Holidays

2014

Calendar-365.com