
MEMORANDUM

Project No.: 0312-034-01

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To: Stephanie Griffin, P.E. Freese and Nichols, Inc.

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Project: Region C Water Supply Plan – Water Conservation Strategies

Subject: Cost Information Associated with Implementation of BMPs

BACKGROUND

The purpose of this memorandum is to provide further insight into costs associated with the implementation of water conservation best management practices (BMPs). Prior to this inquiry, basic information detailing which water providers were implementing water conservation BMPs was obtained from the Region C water conservation and reuse survey in late 2007. In addition to identifying which water providers were implementing BMPs, this survey identified various costs associated with the implementation of BMPs. From the water providers implementing these water conservation measures, 24 were selected to further query for more comprehensive cost information for implementation of the water conservation BMPs. In addition to requesting cost information, the respondent was asked open-ended questions to identify which BMPs required the least amount of implementation effort or cost but proved the most effective. Lessons learned from the implementation of these water conservation measures were also requested.

Of the implemented BMPs, low-flow plumbing fixture rules are already accounted for in the water demand projections and will not be discussed in this memorandum.

METHODS

As mentioned, 24 water providers were contacted and queried about water conservation BMP implementation. The water providers were chosen based on location and size of population/customer base. Both Water User Groups (WUGs) and Wholesale Water Providers (WWPs) were contacted. All of the BMPs recommended in the *2006 Region C Water Plan* for the basic and expanded packages were represented by the chosen water providers. The recommended water conservation packages are as follows:

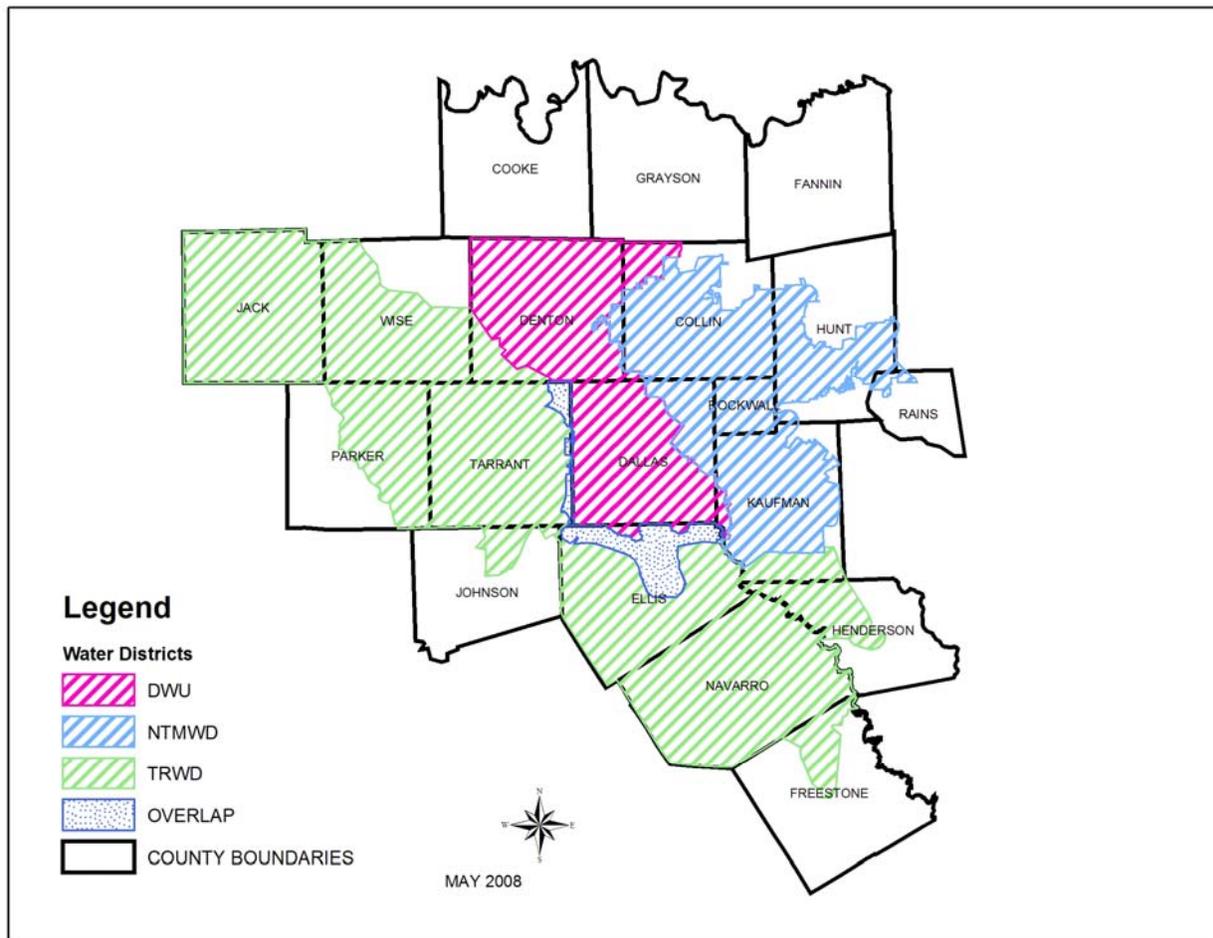
Basic Water Conservation Package:

- Low-flow plumbing fixtures rules
- Public and school education
- Water use reduction due to increasing water prices
- Water system audit, leak detection and repair, and pressure control
- New efficient residential clothes washer standards

Expanded Water Conservation Package

- BMPs listed in the Basic Water Conservation Package
- Water conservation pricing structure
- Water waste prohibition
- Coin-operated clothes washer rebate
- Residential customer water audit
- Industrial, commercial, and institutional (ICI) general rebate
- ICI water audit, water waste reduction, and site-specific conservation program
- Reuse of treated wastewater effluent

Attachment A includes a matrix summarizing the water providers contacted for this study, the number of customers they serve, and the BMPs they have implemented. Attachment B details the questions asked and the responses received from each provider. The following graphic details the location of each of the water providers and their service area relative to Region C.



Selected Regional Water Providers

RESULTS

The following section lists the BMPs implemented by the group of water providers and includes, where available, actual costs of implementation and estimates of water savings.

BASIC WATER CONSERVATION PACKAGE

PUBLIC AND SCHOOL EDUCATION

Public and school education programs conserve water by teaching water-conserving behavior to water customers and reinforcing such behavior through periodic reminders. The goal is to make the public aware of the importance of

water conservation in managing and sustaining existing water supplies and avoiding or delaying the building of new sources or facilities. Tools to effectively communicate water conservation to the public include the use of print, radio, and television advertising; direct distribution of conservation literature; special events; and informative web sites. School education programs provide water conservation curriculum material at appropriate grade levels.

Seventeen of the twenty-four water providers have implemented public and school education programs. Actual water savings attributable to public and school education programs are difficult to quantify. However, public education is essential in leading to a change of customer water use norms. Educational programs also add to the successful implementation and effectiveness of other BMPs. Table 1 below shows the costs and estimated savings reported by the responding entities.

TABLE 1: REPORTED COSTS AND ESTIMATED WATER SAVINGS OF PUBLIC AND SCHOOL EDUCATION BMP PROGRAMS

ENTITY	ESTIMATED STARTUP COST	ESTIMATED ANNUAL COST	ESTIMATED WATER CONSERVED DUE TO THE BMP (in Gallons)
City of Dallas	Not Reported	\$1,200,000	NA
City of Denton	Not Reported	Not Reported	NA
City of Fort Worth	Not Reported	\$200,000	NA
City of Mansfield	\$2,300	\$2,300	Still collecting data
City of North Richland Hills	\$15,499	\$15,499	Have not received report back yet.
City of Terrell	\$500	\$200	NA
City of Weatherford	\$6,000	Not Reported	NA
North Texas Municipal Water District	\$2,000,000	\$1,600,000	Recent drought (2006-07) with Water IQ and mandatory water restrictions in place, an estimated annualized 12 to 15% reduction was achieved and during the peak summer months, an estimated reduction of 200 million gallons per day was achieved.
City of Arlington	\$0	\$35,000	NA
City of Carrollton	\$2,000	\$6,000	NA
City of Lewisville	\$1,000	\$800	NA

It was found that larger water providers typically have budgets that range from \$35,000 to \$1.6 million dollars to fund public and school education programs. Further, the majority of the smallest water providers typically have not implemented public and school education programs. Depending on the media used, public education messages can reach outside of a water provider's customer base and reach outside of the normal service area. The majority of responding entities reported that they coordinate with other entities in disseminating a common water conservation message. Further, many of the entities were open to the idea of contributing monetarily to a region wide education initiative. Some entities suggested that the North Central Texas Council of Governments would be a valuable resource in coordinating a region wide conservation message.

Large wholesale water providers such as Dallas, North Texas Municipal Water District (NTMWD), Fort Worth, and Tarrant Regional Water District, have implemented large scale water education initiatives. These entities coordinate with customer water providers to further spread the water conservation message, and are looking for other methods to educate customers. These water providers have substantial budgets (millions of dollars) for implementing these education initiatives.

While water savings are difficult or impossible to attribute to education, any water savings can partially be attributed to public education. The broad scope of educational programs work to change long term water use behaviors and advertise available water conservation measure programs those customers can participate in and thereby lead to a more immediate water savings.

INCREASING WATER PRICES

Water consumption generally decreases with increasing water rates. Therefore, increases in real water prices over time should conserve water.

Seventeen of the twenty-four entities participating in this study have increased their water prices. Table 2 below shows the costs and estimated savings reported by the responding entities. The majority of the entities viewed this BMP as one of the most effective BMPs due to its low implementation cost. Implementation cost was found to vary with the size of the entity. Larger entities incurred greater costs in implementing price increases due to mailing of bill fliers announcing the increase and conducting public meetings concerning the price increases. The majority of surveyed entities did not provide specific dollar amounts for implementation of this BMP.

TABLE 2: REPORTED COSTS AND ESTIMATED WATER SAVINGS OF INCREASING WATER PRICES BMP PROGRAMS

ENTITY	ESTIMATED STARTUP COST	ESTIMATED ANNUAL COST	ESTIMATED WATER CONSERVED DUE TO THE BMP (in Gallons)
City of Fort Worth	Not Reported	\$15,000	Not Reported
City of Mansfield	\$0	\$0	Still Collecting Data
City of Terrell	\$500	\$200	12,000,000
City of Allen	\$0	\$0	Tough to Quantify, No Formulas
City of Arlington	\$0	\$0	Not Reported
City of Carrollton	\$0	\$0	Not Reported
City of Lewisville	\$0	\$0	Not Reported

Reported costs for the implementation and maintenance of this BMP ranged from no cost to \$15,000. Differences in cost could be attributable to the amount of public interaction in implementing a price increase. The City of Fort Worth reported that they hold meetings prior to implementing a price increase and include bill fliers announcing the proposed price increase prior to implementation. These administrative costs can add to the cost of the BMPs implementation.

WATER SYSTEM AUDIT, LEAK DETECTION AND REPAIR, AND PRESSURE CONTROL

In 2003, the 78th Texas Legislature passed House Bill (HB) 3338, which requires all retail public utilities that provide potable water to perform a water system audit to identify system water losses. Apparent water losses include water that was

actually used but not accounted for, such as customer meter errors or theft. Accounting for apparent losses increases a utility's revenue but does not reduce water usage. Real losses include overflows at the water treatment plant and leakage from the water distribution system. Identifying and preventing real losses decreases a utility's costs and decreases water usage. Real losses are the target of this water conservation strategy. Leak detection and repair and pressure control are two elements of a proactive water loss control program.

Fifteen of the twenty-four entities participating in this study have implemented pro-active leak detection and repair programs, and all of the entities have been required to perform a water system audit to identify system water losses. Table 3 below shows the costs and estimated savings reported by the responding entities. The effectiveness and cost of this BMP are difficult to determine based on a region wide view due to the difference in size of participating entities, and the fine line of leak detection and repair as a conservation measure as opposed to regular operation and maintenance procedures. Table 1 below summarizes cost and water savings reported by responding entities.

TABLE 3: REPORTED COSTS AND ESTIMATED WATER SAVINGS OF WATER SYSTEM AUDIT, LEAK DETECTION AND REPAIR, AND PRESSURE CONTROL BMP PROGRAMS

ESTIMATED STARTUP COST	ESTIMATED STARTUP COST	ESTIMATED ANNUAL COST	ESTIMATED WATER CONSERVED DUE TO THE BMP (in Gallons)
North Texas Municipal Water District	Not Reported	\$550,000	500,000
City of Dallas	\$400,000	\$3,800,000	220,000,000
City of Fort Worth	Not Reported	\$600,000	NA
City of Mansfield	Part of CIP	\$100,000	NA
City of Terrell	\$30,000	Not Reported	5,000,000
City of Allen	\$0	\$125,000	NA
City of Arlington	\$0	\$388,000	NA
City of Carrollton	\$9,000	\$25,000	NA
City of Frisco	Not Reported	\$250,000	NA
City of Lewisville	\$150,000	\$150,000	NA

Reported costs of implementing this BMP ranged from \$9,000 to \$400,000 for startup costs and \$25,000 to \$3,800,000 for annual costs. Reported water savings were given by three entities: NTMWD and the Cities of Dallas and Terrell. NTMWD reported discovering six two-gallon per minute leaks that resulted in a loss (savings) of 500,000 gallons. The City of Dallas reported a savings of 220 million gallons since implementing their program in 2004 at a water saving cost of approximately \$54 per thousand gallons saved. The City of Terrell reported a water savings of 5 million gallons since implementing their program in October 2006 at a water saving cost of approximately \$6 per thousand gallons saved.

Larger entities are more likely to have implemented pro-active leak detection and repair programs that have necessitated the acquisition of additional equipment and personnel. Two entities reported that additional personnel were acquired for leak detection and repair (Fort Worth and Carrollton). However, the City of Carrollton's additional personnel were not acquired specifically for pro-active leak detection and repair. Several of the smaller entities reported that they do not have the budget to add equipment and personnel for a pro-active program.

One lesson learned by the City of Aubrey in the implementation of their leak detection and repair program is the importance of customer detected leaks. Aubrey is a small city with limited resources for leak detection and repair. The representative of the City of Aubrey reported that most leaks detected in the city are detected by customers. This shows the importance of educating customers in ways to identify leaks.

Since fully pro-active leak detection and repair programs are not fully in place throughout the region and since water system audit results have only been reported one time, it is difficult to quantify the effectiveness of the BMP to date. However, a majority of the respondents to the study expressed that every leak is a priority and is repaired. This shows the inherent value of leak detection and

repair programs whether they are a part of a pro-active program or standard operation and maintenance.

FEDERAL RESIDENTIAL CLOTHES WASHER STANDARDS

Title 10 Part 430 of the Code of Federal Regulations (CFR) requires residential clothes washers manufactured on or after January 1, 2004 to be 22 percent more energy-efficient than pre-2004 models and clothes washers manufactured on or after January 1, 2007, to be 35 percent more energy-efficient than pre-2004 models. The decrease in the consumption of water with these units is corollary to the energy efficiency standards on residential clothes washers. In other words, energy efficient clothes washers tend to use less water.

Since this is a federally mandated standard for manufacturers to follow, all entities surveyed should realize the benefits of this BMP over time, provided the federal residential clothes washer standards remain in effect for the foreseeable future. There should be no cost for implementation of this BMP to the entities surveyed. None of the entities who responded to the surveys reported any cost or savings related to this BMP.

EXPANDED WATER CONSERVATION PACKAGE

WATER CONSERVATION PRICING STRUCTURE

As water rates increase, water consumption generally declines and vice versa. Therefore, changes in water pricing structure which charge higher unit rates at higher levels of water use should conserve water. Potential conservation rate structures include increasing block rates, base and excess usage rates, and seasonal rates. This BMP is akin to the increasing overall water rates BMP but the provider is not increasing overall revenues, just charging more for usage above specified thresholds. There are fundamental uses of water that users will continue to consume regardless of pricing structure. These fundamental uses of water are accounted for in the lower block or base rate structures. Uses beyond

the fundamental water usage are what the water conservation pricing structure BMP targets, such as excessive outdoor water use.

Of the twenty-four entities surveyed, eleven have implemented some form of water conservation pricing structure. Table 4 below shows the costs and estimated savings reported by the responding entities. The entities surveyed viewed this as one of the most successful BMPs in terms of ease and cost of implementation. However, no specific cost figure was provided by these entities for implementing this BMP.

TABLE 4: REPORTED COSTS AND ESTIMATED WATER SAVINGS OF WATER CONSERVATION PRICING STRUCTURE BMP PROGRAMS

ESTIMATED STARTUP COST	ESTIMATED STARTUP COST	ESTIMATED ANNUAL COST	ESTIMATED WATER CONSERVED DUE TO THE BMP (in Gallons)
City of Fort Worth	\$10,000	\$15,000	Not Reported
City of Mansfield	\$0	\$0	Still Collecting Data
City of Terrell	\$0	\$0	12,000,000
City of Allen	\$0	\$0	Tough to Quantify, No Formulas
City of Arlington	\$0	\$0	Not Reported

WATER WASTE PROHIBITION

To eliminate water waste, a utility may enact and enforce ordinances to prohibit wasteful activities including, but not limited to; irrigation water waste, once-through use of water in commercial equipment, non-recirculation systems in all new conveyer and in-bay automatic car washes and commercial laundry systems, non-recycling decorative water fountains, and installation of water softeners that do not meet certain regeneration efficiency and waste discharge standards.

Ten of twenty-four entities surveyed indicated that they have implemented some form of water waste prohibition ordinance. Enforcement of that ordinance is the only quantifiable element in terms of cost for this BMP. Table 5 below shows the

costs and estimated savings reported by the responding entities. Of the surveyed entities, the City of Dallas, the City of Fort Worth, and the City of Allen have funded programs to enforce water waste ordinances. The City of Dallas and the City of Fort Worth within their respective departments, employ multiple personnel to police water waste. For example, the City of Fort Worth reported that they have added two enforcement personnel to enforce water waste ordinances. The City of Allen water department funds ½ of one of the four city code enforcement officers (\$45,500 annually – salary and benefits). All four code enforcement officers are required to police water waste within the city.

TABLE 5: REPORTED COSTS AND ESTIMATED WATER SAVINGS OF WATER WASTE PROHIBITION BMP PROGRAMS

ESTIMATED STARTUP COST	ESTIMATED STARTUP COST	ESTIMATED ANNUAL COST	ESTIMATED WATER CONSERVED DUE TO THE BMP (in Gallons)
City of Mansfield	\$0	\$0	Still collecting data
City of Allen	\$0	\$0	Tough to Quantify, No Formulas
City of Frisco	Not Report	Not Reported	24,570,000
City of Lewisville	\$0	\$0	Not Reported

RESIDENTIAL CUSTOMER WATER AUDIT

Under this strategy, an auditor reviews a customer’s bill to determine whether it is within normal seasonal parameters, reviews water use habits with the customer, and performs an on-site walk-through. If necessary, the auditor will teach the customer how to read the water meter, to evaluate the landscaping and irrigation system, to check for leaks, to review conservative water use habits, and, if the customer wishes, to install water saving devices. The auditor then provides a report and water saving suggestions.

The residential customer water audit is a valuable tool in promoting water conservation measure programs. Currently seven of the entities participating in this survey have implemented residential customer water audit programs. These include City of Dallas, City of Fort Worth, City of Arlington, City of Denton, City of

Carrollton, City of Frisco and City of Wylie. Table 6 below shows the costs and estimated savings reported by the responding entities.

TABLE 6: REPORTED COSTS AND ESTIMATED WATER SAVINGS OF RESIDENTIAL CUSTOMER WATER AUDIT BMP PROGRAMS

ESTIMATED STARTUP COST	ESTIMATED STARTUP COST	ESTIMATED ANNUAL COST	ESTIMATED WATER CONSERVED DUE TO THE BMP (in Gallons)
City of Dallas	\$55,000	\$50,000	NA
City of Fort Worth	Not Reported	\$50,000	NA
City of Carrollton	\$55,000	\$55,000	NA

Audits are effective means to distribute low-flow plumbing fixtures and other water saving features. An advantage to providing fixtures during water audits is that they are installed during the visit by the auditor. In contrast to a give away program, an audit ensures the proper installation of fixtures and other water saving devices. Audits are also useful in stopping water loss. Often audits involve leak detection and minor repairs at the customer’s home.

The reach of water audits on a community level is fairly restricted. The City of Carrollton reported that of the 6,000 offers for water audits given in a year; only 400 customers accepted the offer. The City of Carrollton and several other entities extend offers for water audits to customers whose water use exceeds a set amount. These entities also offer water audits to customers who volunteer for the audits.

Saved water amounts were not reported by the participating entities. However, with accounting procedures documenting the number of audits done in a year and the number of fixtures installed, water savings could be estimated.

INDUSTRIAL, COMMERCIAL, AND INSTITUTIONAL GENERAL REBATE

Under this strategy, water user groups would encourage ICI customers to convert to water-saving equipment and practices by rebating a portion of the acquisition and installation cost of water-saving equipment.

Costs and water savings associated with this BMP are highly variable due to the complexities and intricacies of ICI practices and processes. These practices and processes range from commercial dish washing units to water cooling towers to highly advanced processing units. The resulting costs associated with this BMP are highly individualized and would presumably vary from year to year. Of the entities surveyed, two of the twenty-four providers reported the implementation of this BMP. However, none of the reporting entities provided costs associated with the implementation of this BMP.

INDUSTRIAL COMMERCIAL, AND INSTITUTIONAL WATER AUDIT, WATER WASTE REDUCTION AND SITE-SPECIFIC CONSERVATION PROGRAM

The industrial, commercial, and institutional (ICI) water audit, water waste reduction program, and site-specific water conservation program is a regional strategy that is intended to serve as a way to identify, evaluate, and implement water conservation for individual ICI customers.

The City of Dallas is the only one of the twenty-four entities surveyed that has implemented an ICI water audit. The City of Dallas reported an initial startup cost of \$25,000 and a yearly program cost of \$50,000. Estimates of water saved were not reported by the City of Dallas.

ADDITIONAL BMPS IMPLEMENTED BY SELECT WATER PROVIDERS

SINGLE-FAMILY REBATE PROGRAM FOR WATER EFFICIENT CLOTHES WASHERS

A single-family water-efficient clothes washer rebate program would offer rebates or incentives for replacement of clothes washers in single-family homes that have not been retrofitted with water-efficient clothes washers. Federal residential clothes washer energy standards that took effect in 2007 are projected to result in significant water savings. All inefficient clothes washers will eventually be

replaced without a rebate program. However, a single-family water-efficient clothes washer rebate program would accelerate the natural replacement of inefficient clothes washers.

The City of Allen is the only entity participating in this study that has implemented this BMP. The City of Allen implemented this BMP in 2006 and provided 483 rebates through 2006 and 2007 at a cost of \$60,000. Data obtained from the City of Allen web site¹ can be used to estimate the water savings and unit cost of this measure. Assuming that inefficient washers use 40 gallons per load of laundry and 400 loads are done in a year, then 483 inefficient washers would use approximately 7.73 million gallons per year. If the 483 washers were post-2007 highly efficient machines at 18 to 25 gallons per normal load, then the approximate water used would be 3.48 to 4.83 million gallons per year, and a water savings of 2.90 to 4.25 million gallons per year would be achieved. In this instance, the City of Allen has spent \$60,000 on rebates for 483 washing machines and now realizes a water savings of approximately 2.90 to 4.25 million gallons per year over the life of the washer (approximately 13 years). As the washers continue to conserve water over their useful life, the projected cost of the BMP would be approximately \$1.09 to \$1.59 per thousand gallons saved, assuming that these washers would not have been replaced with efficient washers due to the federal residential clothes washer energy standards that took effect in 2007.

This BMP is used to accelerate the effect of the national washer efficiency standards. Since after 2007 only efficient washers are available for sale, the older, inefficient washers will eventually be replaced with the efficient washers. The water savings of efficient washers can be obtained without any expense from the water provider as the washers are naturally replaced. However, in the case discussed above, the rebate program was introduced prior to the time the

¹ Available URL: <http://www.cityofallen.org/commservices/Rebate/RebateItemFAQ.htm#FAQwash>

2007 standards took effect, thereby encouraging customers to purchase water efficient appliances.

At the point when all available washers are efficient, freeriders could become an implementation issue. Freeriders are defined as program participants that, in the absence of a rebate program, would have purchased efficient clothes washers at their own expense but instead took advantage of the rebate program. The rebate program incurs a cost for distributing rebates to freeriders but does not save water, because the savings would have been realized anyway at private expense.

TIME OF DAY WATER RESTRICTIONS and TWICE PER WEEK IRRIGATION

Time of day water restrictions and twice per week irrigation are BMPs geared toward reducing outdoor water usage.

Of the twenty-four entities surveyed, City of Dallas, City of McKinney, City of Fort Worth, and the City of Arlington reported to have instituted a year round time of day watering restriction. The City of McKinney reported to have implemented a recurring twice per week irrigation ordinance. Costs for implementing these BMPs may include public education and enforcement. Enforcement costs reported by various entities are discussed under the water waste prohibition section of this memorandum.

RAIN AND FREEZE SENSORS

Rain and freeze sensors turn off irrigation systems during times of sufficient rainfall or when the ambient, outdoor air temperature is below freezing. Five of the entities participating in this study (City of Dallas, City of Fort Worth, City of Arlington, City of Allen, and City of Carrollton) have implemented rain and freeze sensor ordinances, giveaways, or rebate programs. The City of Allen and the City of Carrollton provided information concerning program costs, and the City of Carrollton provided information related to the number of sensors given to

customers. Table 7 below shows the costs and estimated savings reported by the responding entities.

TABLE 7: REPORTED COSTS AND ESTIMATED WATER SAVINGS FOR RAIN AND FREEZE SENSOR BMP PROGRAMS

ESTIMATED STARTUP COST	ESTIMATED STARTUP COST	ESTIMATED ANNUAL COST	ESTIMATED WATER CONSERVED DUE TO THE BMP (in Gallons)
City of Allen	\$0	\$2,000	NA
City of Carrollton	\$20,000	\$0	NA

An important lesson learned from the City of Carrollton is the importance of public outreach and education in making this BMP successful. The entity implemented a sensor giveaway program by purchasing 2,000 sensors in 2006. In addition to advertising the sensor giveaway on the internet and other resources, the entity brought sensors to water conservation workshops and other educational programs to distribute to the public. However, the most important distribution technique was in association with the residential irrigation audits the entity performs for their customers. Sensors distributed during the audit were installed by the auditor which ensured the immediate use of the sensor as opposed to possible delayed or non-use when otherwise distributed.

EVAPOTRANSPIRATION IRRIGATION CONTROLLERS

Evapotranspiration (ET) irrigation controllers are centralized controllers that tailor irrigation scheduling to local conditions by using a weather station to track the local microclimate and automatically calculate an irrigation scheduling program. ET systems measure key climatic conditions and use the data to calculate a local ET factor. By taking into account the rate at which water is consumed by weather conditions, an ET system will initiate an irrigation schedule based on plant water needs and soil conditions. An added benefit of these controllers is that they can detect breaks in the systems.

Of the entities surveyed, the Cities of McKinney and Frisco have implemented ET irrigation controller programs. These programs utilize rebate programs for the purchase of approved ET irrigation control systems in order to offset the costs of the systems. After the installation and entity verification that the ET controller is working properly, the owners are exempt from certain lawn irrigation restrictions. Neither of the cities who have implemented this BMP reported any cost nor water savings associated with the BMP.

CONCLUSIONS AND SUGGESTIONS

The majority of water providers have implemented their BMPs fairly recently, which makes the overall effectiveness of the BMPs difficult to quantify in terms of water savings and cost of BMP implementation. Procedures and protocols to quantify BMP effectiveness in terms of savings on a per capita basis and costs per BMP should be developed and utilized. As utilities gain more experience with these water conservation programs, their quantification methods will become more evident.

ATTACHMENT A
MATRIX OF WATER PROVIDERS, 2007 POPULATION
PROJECTIONS, AND TYPES OF BMPS IMPLEMENTED

TYPE OF BEST MANAGEMENT PRACTICE		WATER USER GROUPS										WHOLESALE WATER PROVIDERS														
		CITY OF ALLEN	CITY OF ARLINGTON	CITY OF AUBREY	CITY OF AZLE	CITY OF CARROLLTON	CITY OF CHICO	CITY OF FRISCO	CITY OF LEWISVILLE	CITY OF MCKINNEY	CITY OF PLANO	CITY OF WYLIE	CITY OF DALLAS	CITY OF DENTON	CITY OF FORT WORTH	CITY OF MANSFIELD	CITY OF NORTH RICHLAND HILLS	CITY OF TERRELL	CITY OF WAXAHACHIE	CITY OF WEATHERFORD	ROCKETT SPECIAL UTILITY DISTRICT	NORTH TEXAS MUNICIPAL WATER DISTRICT	TARRANT REGIONAL WATER DISTRICT	TRINITY RIVER AUTHORITY OF TEXAS	UPPER TRINITY REGIONAL WATER DISTRICT	
Basic Water Conservation Package	• Low-flow plumbing fixtures rules	X		X	X	X		X		X		X		X	X			X	X	X			X			
	• Public and school education	X	X			X	X	X	X	X	X	X	X	X	X	X	X						X			X
	• Water use reduction due to increasing water prices	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X									
	• Water system audit, leak detection and repair, and pressure control	X	X			X	X	X	X	X	X			X	X	X										
	• New efficient residential clothes washer standards	X													X									X		
Expanded Water Conservation Package	• Water conservation pricing structure	X	X			X	X							X	X		X			X	X					
	• Water waste prohibition	X				X		X	X	X	X	X														
	• Coin-operated clothes washer rebate																									
	• Residential customer water audit		X			X		X																		X
	• Industrial, commercial, and institutional (ICI) general rebate																									X
Other BMPs	• ICI water audit, water waste reduction, and site-specific conservation program				X																					
	• Reuse of treated wastewater effluent				X			X	X														X	X		X
	• Rebate program for water efficient washing machines	X																								
	• Rain and freeze sensors		X									X														
	• ET irrigation controller rebates							X		X																
2007 POPULATION PROJECTION		78,286	366,217	2,500	13,818	120,154	1,300	38,000	31,550	122,000	255,000	33,441	1,280,500	113,800	686,850	58,069	64,050	6,698	28,702	25,000	37,500	NOT REPORTED	NOT REPORTED	NOT REPORTED	NOT REPORTED	

ATTACHMENT B
2008 SUPPLEMENTAL SURVEY RESPONSES

NORTH TEXAS MUNICIPAL WATER DISTRICT

Cost of Best Management Practices (BMPs)

1. In your opinion, which of the BMPs required the least amount of effort and cost to implement?
In comparing the BMP for Public and School Education to reuse of treated wastewater effluent, the reuse of treated effluent would require the least amount of effort and cost to implement.

2. In your opinion, which of the BMPs were the most effective in terms of cost?
Both BMPs are effective in terms of cost. Reuse of effluent supplied to golf courses is a valuable reuse of wastewater effluent and enables the golf courses to use reuse supplies rather than a treated, potable water supply of water for irrigation. The public and school education (BMP) is effective as well. Education raises awareness of water issues and the importance for each individual to use water wisely and efficiently. Education, through the repetitive and constant reminder, of water awareness is how the behavior changes regarding water use will develop into fruition as saving of water resources.

3. In your opinion, which of the BMPs proved to be the best value? (Greatest amount of conservation, for the least amount of cost to implement and maintain)
Each BMP has its own unique set of value. The reuse BMP is least expensive for NTMWD to implement in that the cost of the BMP is paid for through the end user. Reuse is also very easy to maintain or continue as long as there is an interest from the end user for the effluent.

The public and school education has long term benefits and values that are related to behavior changes. While the BMP is quite expensive to implement it can have a tremendous amount of success with conservation efforts.

4. Please provide lessons learned from the implementation of these BMPs.
The education and awareness while expensive to implement is a key necessity for behavior change. It is imperative that state funding be allocated to fully achieve the desired level of conservation needed through out the state in order to meet the projected water needs of the future.

CITY OF ALLEN

Cost of Best Management Practices (BMPs)

1. In your opinion, which of the BMPs required the least amount of effort and cost to implement?
Water Conservation Pricing Structure...highest rates for highest tier (>75K gallons). Rates are \$8.31 per 1000 gallons over 75K. When you get into customers pocketbook, they change their patterns.
2. In your opinion, which of the BMPs were the most effective in terms of cost?
Same as above
3. In your opinion, which of the BMPs proved to be the best value? (Greatest amount of conservation, for the least amount of cost to implement and maintain)
Same as above
4. Please provide lessons learned from the implementation of these BMPs.
Groups of people will not conserve regardless of what happens. However 90% of the folks in his opinion do adhere to the conservation message.

CITY OF AUBREY

Cost of Best Management Practices (BMPs)

1. In your opinion, which of the BMPs required the least amount of effort and cost to implement?
Increased water price.
2. In your opinion, which of the BMPs were the most effective in terms of cost?
Increased water price.
3. In your opinion, which of the BMPs proved to be the best value? (Greatest amount of conservation, for the least amount of cost to implement and maintain)
Increased water price.
4. Please provide lessons learned from the implementation of these BMPs.

CITY OF AZLE

Cost of Best Management Practices (BMPs)

1. In your opinion, which of the BMPs required the least amount of effort and cost to implement?
Increasing water rates.
2. In your opinion, which of the BMPs were the most effective in terms of cost?
Increasing water rates.
3. In your opinion, which of the BMPs proved to be the best value? (Greatest amount of conservation, for the least amount of cost to implement and maintain)
Increasing water rates and low flow fixture requirements
4. Please provide lessons learned from the implementation of these BMPs.
People do not understand the value of water, or the cost involved in production

CITY OF CARROLLTON

Cost of Best Management Practices (BMPs)

1. In your opinion, which of the BMPs required the least amount of effort and cost to implement?
Increasing water rates, due to the low cost implementation
2. In your opinion, which of the BMPs were the most effective in terms of cost?
Increasing water rates, based on their low cost of implementation
3. In your opinion, which of the BMPs proved to be the best value? (Greatest amount of conservation, for the least amount of cost to implement and maintain)
Increasing water rates, based on the low implementation cost
4. Please provide lessons learned from the implementation of these BMPs.
Implemented rain and freeze sensor giveaway in 2006; 2000 units bought, 1200 given away as of Feb 2008.

Started an irrigation inspection/ audit in 2007. Invitations sent to customers using more than 25,000 gallons/month. 6000 invitations sent, 400 invitations accepted. Inspections conducted by licensed irrigators, all 400 inspections found ways to increase conservation (leaking pipes, misaligned heads, etc.) Were also able to distribute and install additional rain/freeze sensors.

City is implementing a toilet giveaway program.

CITY OF DALLAS

Cost of Best Management Practices (BMPs)

1. In your opinion, which of the BMPs required the least amount of effort and cost to implement?
 - ✓ **The landscape audit program**
 - ✓ **Cooling Tower Audit Program**
2. In your opinion, which of the BMPs were the most effective in terms of cost?
 - ✓ **Public Outreach Campaign**
 - ✓ **Minor Plumbing Repair/Fixture Replacement Program**
 - ✓ **Rain/Freeze Sensor Rebate Program (now discontinued)**
3. In your opinion, which of the BMPs proved to be the best value? (Greatest amount of conservation, for the least amount of cost to implement and maintain)

In terms of quantifiable water conservation savings, plumbing fixture replacements have consistently proven to yield the best value compared to the initial investment.

4. Please provide lessons learned from the implementation of these BMPs.
 - a. **Regarding rebate and incentive programs, make every effort to forecast a minimum level of customer participation**
 - b. **Obtain community buy-in prior to launching a new BMP**
 - c. **Remember to develop a tracking and monitoring mechanism to gauge program effectiveness**
 - d. **Beware of companies claiming to have invented the “ultimate” water saving device—perform due diligence**

CITY OF FORT WORTH

Cost of Best Management Practices (BMPs)

1. In your opinion, which of the BMPs required the least amount of effort and cost to implement?
Initially said water price structure (price increase), but qualified it with an estimation of some of the costs to show that it is not a no cost BMP. Costs are approximate: \$600 for committee meetings, \$4200 for bill inserts announcing the price change, and unquantified internal labor costs associated with determining amounts for price increase and other support for the measure.
2. In your opinion, which of the BMPs were the most effective in terms of cost?
3. In your opinion, which of the BMPs proved to be the best value? (Greatest amount of conservation, for the least amount of cost to implement and maintain)
4. Please provide lessons learned from the implementation of these BMPs.

CITY OF FRISCO

Cost of Best Management Practices (BMPs)

1. In your opinion, which of the BMPs required the least amount of effort and cost to implement?
Low-flow plumbing fixture rules
2. In your opinion, which of the BMPs were the most effective in terms of cost?
Low-flow plumbing fixture rules. As requirement/code very little education and program maintenance are necessary.
3. In your opinion, which of the BMPs proved to be the best value? (Greatest amount of conservation, for the least amount of cost to implement and maintain)
Low-flow plumbing fixture rules
4. Please provide lessons learned from the implementation of these BMPs.
Low-flow plumbing fixture rules

CITY OF LEWISVILLE

Cost of Best Management Practices (BMPs)

1. In your opinion, which of the BMPs required the least amount of effort and cost to implement?
Inserts in customer water bills.
2. In your opinion, which of the BMPs were the most effective in terms of cost?
Inserts in customer water bills
Permanent signs strategically located throughout the City requesting conservation
3. In your opinion, which of the BMPs proved to be the best value? (Greatest amount of conservation, for the least amount of cost to implement and maintain)
Inserts in customer water bills
Permanent signs strategically located throughout the City requesting conservation
4. Please provide lessons learned from the implementation of these BMPs.
Regular ongoing notification – 1 or 2 per season or quarterly per year is not enough.

CITY OF MANSFIELD

Cost of Best Management Practices (BMPs)

1. In your opinion, which of the BMPs required the least amount of effort and cost to implement?
Water conservation price structure
2. In your opinion, which of the BMPs were the most effective in terms of cost?
Water conservation price structure
3. In your opinion, which of the BMPs proved to be the best value? (Greatest amount of conservation, for the least amount of cost to implement and maintain)
Water waste prohibition
4. Please provide lessons learned from the implementation of these BMPs.
Provided that they are educated in water conservation, citizens want to save water.

CITY OF NORTH RICHLAND HILLS

Cost of Best Management Practices (BMPs)

1. In your opinion, which of the BMPs required the least amount of effort and cost to implement?
We have implemented school education on water conservation to elementary 5th grade level students. Education hand outs and faucet devices were given to the kids. We are just starting our BMP Programs.
2. In your opinion, which of the BMPs were the most effective in terms of cost?
Public education on web-site.
3. In your opinion, which of the BMPs proved to be the best value? (Greatest amount of conservation, for the least amount of cost to implement and maintain)
Public awareness and education on publications and on web-site.
4. Please provide lessons learned from the implementation of these BMPs.
Coordination with support entities is vital to implementing programs.

CITY OF PLANO

Cost of Best Management Practices (BMPs)

1. In your opinion, which of the BMPs required the least amount of effort and cost to implement?
The indoor retrofit items have been the easiest to implement. These items are distributed through our Customer and Utility Services Department's service counters. Customers acquire these items by pick up. There is no charge for the items so cashier activities are not necessary. Inventory is kept to a minimum and re orders are easily processed through our vendor.
2. In your opinion, which of the BMPs were the most effective in terms of cost?
The indoor retrofit items are inexpensive yet very effective if installed.
3. In your opinion, which of the BMPs proved to be the best value? (Greatest amount of conservation, for the least amount of cost to implement and maintain)
Same answer and questions 1 and 2.
4. Please provide lessons learned from the implementation of these BMPs.
Showerheads and toilet flappers are the most popular items with the public. Citizens are wary about filling out forms with identifying information to receive items. They seem to be worried that their consumption will be monitored.

CITY OF WYLIE

Cost of Best Management Practices (BMPs)

1. In your opinion, which of the BMPs required the least amount of effort and cost to implement?
Public Education, Water Audit, Leak Detection and Repair.
2. In your opinion, which of the BMPs were the most effective in terms of cost?
Water Audit/Leak Detection and Repairs
3. In your opinion, which of the BMPs proved to be the best value? (Greatest amount of conservation, for the least amount of cost to implement and maintain)
Public Education – The City web site provides tips on how to apply conservation measures on a daily basis.
5. Please provide lessons learned from the implementation of these BMPs.
For water conservation strategies to be affective it will require the participation of City of Wylie employees and the citizens of Wylie. It is difficult to gauge the effectiveness and amount of water conserved in a rapidly growing community like Wylie.