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Audit Report

WATER CONSERVATION II:
Reliability of Proposed and Current
Conservation Strategies

April 25, 2007

Office of the City Auditor
Austin, Texas

Audit Team

Robert Elizondo, CIA, CGAP, Auditor-In-Charge
Joselito Cruz
Joan Ewell, CISA, CCSA
Olga Ovcharenko

Assistant City Auditor

C'Anne Daugherty, CPA, CIA

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Office of the City Auditor



301 W. 2nd Street, Suite 2130
P.O. Box 1088
Austin, Texas 78767-8808
(512) 974-2805, Fax: (512) 974-2078
email: oca_auditor@ci.austin.tx.us
website: <http://www.ci.austin.tx.us/auditor>

Date: April 25, 2006
To: Mayor and Council
From: Stephen L. Morgan, City Auditor
Subject: AWU – Conservation II: Reliability of Water Savings Projections and Measurements

I am pleased to present this audit report on the reliability of water savings projections for proposed outdoor and City/Utility conservation strategies previously presented to the Council's Water Conservation Task Force (WCTF), as well as the reliability of water savings calculations for current conservation strategies. Also included in this report is an assessment of the controls for the Water Conservation division's performance measurement, tracking, documentation and reporting processes.

We found that the water savings projections for proposed outdoor conservation strategies are reasonable with a few qualifications. We also found water savings projections for proposed City/Utility strategies to be reasonable. However, we did have some concerns about the costs and feasibility of implementing some of these strategies.

We also found that water savings calculations for current conservation strategies are consistent with best management practices. Where conservation division staff deviated, they cite good reasons and use historical water savings data in their calculations. We could not, however, confirm the accuracy of a few of the reported numbers.

This audit is one product of the on-going audit initiative at the Austin Water Utility (AWU), which began in FY 2006 as part of our annual audit plan as approved by Council.

We appreciate the cooperation and assistance we received from the Austin Water Utility's personnel during this audit.

Stephen L. Morgan, CIA, CGAP, CFE, CGFM
City Auditor

COUNCIL SUMMARY

This audit arose from the on-going risk assessment of the Austin Water Utility, along with specific Council questions about the reliability of conservation performance measurements, and was conducted in conjunction with the work of the Water Conservation Task Force.

Our objective was to assess the reliability of projected water savings from proposed conservation strategies being presented to the WCTF, including the underlying assumptions, algorithms and methodologies used to develop the projections, as well as to assess the reliability of reported water savings from current conservation strategies.

We found that:

- Estimated water savings calculated by AWU staff for proposed outdoor and City/Utility strategies, as presented to the WCTF, are reasonable and reliable with a few qualifications.

For outdoor strategies, our concerns center on the risk that some of the proposed strategies may not be achievable.

For City/Utility strategies, our concerns stem from both the costs and difficulties involved in implementing those strategies.

- Water savings calculations for current conservation strategies are consistent with best management practices, but we could not confirm the accuracy of some of the reported numbers.

Performance measurement calculations, tracking, documentation and reporting processes contain control weaknesses that make a few of the reported numbers error prone. For instance, currently three of the seven publicly reported performance measures are internally inconsistent, indicating one or more errors and/or error types in calculating and/or reporting.

- Conservation division staff will have to improve controls in their processes in order to prepare for an increased workload from the implementation of proposed conservation strategies.

Written procedures are not available for all processes, and tracking by strategy will need to be refined in order to account for all savings and costs in a way that allows for ease in monitoring performance against projections.

We have offered four recommendations that we believe will improve quality, transparency, and availability of information provided by the Utility to decision-makers and to customers. These recommendations address weak controls in the processes of calculating, tracking, documenting and reporting performance information. The Austin Water Utility's management has agreed with all four of these recommendations and has already begun implementing two of them.

We'd like to thank the staff at the Austin Water Utility for the cooperation and assistance that we received during this audit.

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ACTION SUMMARY
AU07102 – AWU Conservation II:
Reliability of Proposed and Current Strategies



Rec. #	Recommendation Text	Management Concurrence	Proposed Implementation Date
1	In order to provide reliable and valid data for Council members to use in making their decisions about proposed City/Utility conservation strategies, the Austin Water Utility's Assistant Director of Environmental Affairs and Conservation should compile estimates of the implementation costs as well as the steps required to implement the proposed programs and should make that information available to Council through fiscal notes to proposed ordinances.	Concur	To be determined, as rules and ordinances are brought for approval
2	To allow for the validation of water savings calculations, and prepare for the increased workload from additional conservation strategies, the Austin Water Utility's Assistant Director of Environmental Affairs and Conservation should implement a more consistent process for documenting and verifying reported savings, including the upgrading of the WCTS to a truly automated processing system.	Concur	By 5/31/07, the scope and timeframe for WCTS improvements will be defined, and manual documentation improvements will be implemented

- | | | | |
|---|---|--------|-----------------------------------|
| 3 | <p>To strengthen the controls over the Industrial and Commercial Rebate program, and to make sure that water savings from that program are consistently counted and verified prior to the issuance of rebates, the Austin Water Utility’s Assistant Director of Environmental Affairs and Conservation should implement a more consistent process for documenting and verifying reported savings. This includes clarifying the rules for when water savings are counted or reported; standardizing forms for both pre- and post-implementation water usage reviews by AWU; and adding independent supervisory verification of calculated savings.</p> | Concur | 5/31/07 |
| 4 | <p>To prepare for future reporting and monitoring by outside sources, the Austin Water Utility’s Assistant Director of Environmental Affairs and Conservation should direct Conservation Division staff to consult with the City Demographer and ensure that accurate demographic data is used in all water savings formulas. Additionally, the Assistant Director should implement changes to processes that enable the tracking of water savings and costs by conservation strategy and, review the process of transmitting performance data through AWU divisions to the Budget office to determine why inaccurate data is shown in e-Perf, the City’s performance measurement system.</p> | Concur | 5/31/07, and ongoing consultation |

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BACKGROUND

Water conservation as an approach to managing critical future water needs has become an issue of increasing concern and attention.

The Austin Water Utility (AWU or the Utility) is municipally-owned and charged with supplying water to customers within and outside the corporate city limits of Austin, as well as the communities of Rollingwood, Sunset Valley, Pflugerville and Round Rock, one water control and improvement district, five water supply corporations, seven municipal utility districts, and three private utilities.

The Utility's 2006 Water Service Population was 820,765 (Retail 766,428 & Wholesale 54,337) through over 197,000 service connections in a service area of over 538 square miles.

State conservation efforts. The State of Texas has recognized the critical need for strategies that manage water supply and demand to meet ongoing water needs. The State Water Plan of 2002 was the result of a first round of regional water planning mandated by the State. That plan cited conservation -based water management as one of the most effective strategies to help meet water shortfall challenges and ensure that the future water needs of Texans are met. According to that plan, conservation strategies have the potential to extend existing supplies, reduce consumer costs, and meet wildlife and other natural resource needs. In addition, water conservation, including water reuse, may provide economical alternatives to more expensive water supply solutions.

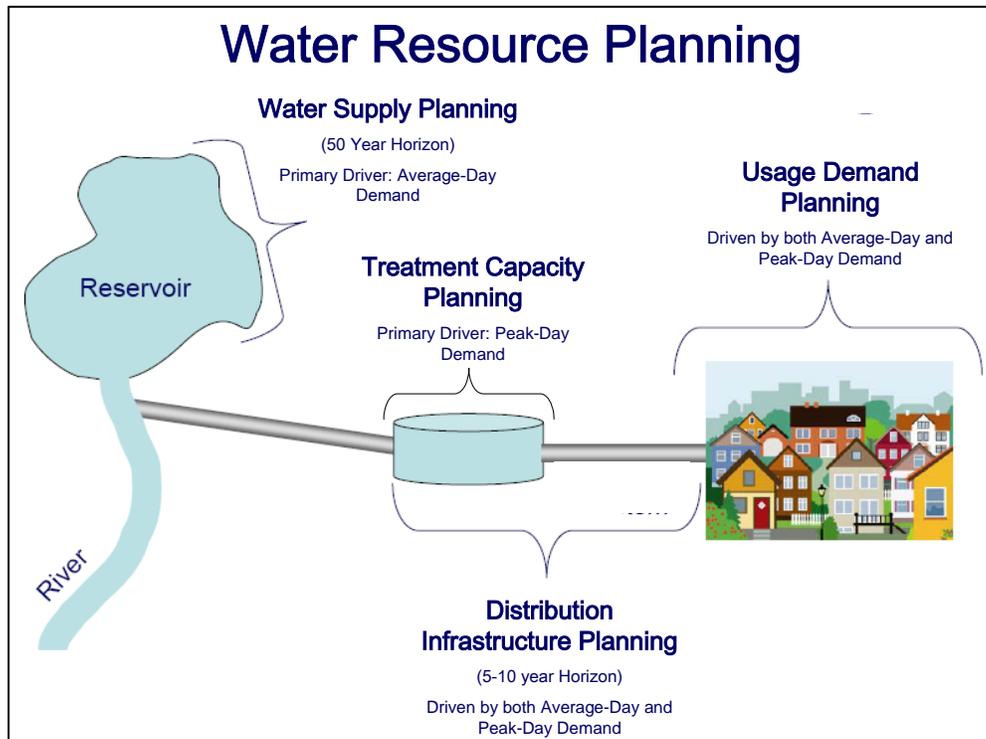
A second round of planning led the 78th Texas Legislature to create the Water Conservation Implementation Task Force (state task force) in an effort to realize water conservation's full potential. The state task force was directed to review, evaluate, and recommend optimum levels of water-use efficiency and conservation for Texas and to concentrate on issues related to (1) best management practices, (2) implementation of conservation strategies contained in regional water plans, (3) statewide public-awareness, (4) state funding of incentive programs, (5) goals and targets for per-capita water use considering climatic and demographic differences, and (6) evaluation of state oversight and support of conservation.

The state task force developed the Best Management Practices Guide (BMP Guide) for use by regional planning groups and political subdivisions responsible for water delivery service. The BMP Guide consists of 21 municipal, 14 industrial, and 20 agricultural BMPs. The practices contained in the BMP Guide are voluntary efficiency strategies that save a quantifiable amount of water, either directly or indirectly, and that can be implemented within a specified timeframe. The adoption of any BMP is entirely voluntary, although it is recognized that once adopted, certain BMPs may have some regulatory aspects to them (e.g., implementation of a local city ordinance).

Overall, the state task force strongly endorsed voluntary water conservation, including water reuse, as critical if the water-supply needs of future generations of Texans are to be met.

Water Supply Planning. Planning to meet the water resource needs of a service area involves both peak- and average-day demand as well as annual demand. Peak-day water demand is the amount of water needed on the day of highest water usage during any given year. Peak-day demand typically occurs in the summer due to outdoor watering. Average-day demand is the average daily amount of water used over the entire year. Both peak- and average-day demands are typically measured in million gallons per day (MGD).

**Exhibit 1
Relationship of Water Resource Planning Elements**



SOURCE: City Council Briefing on Water Supply Strategies, June 08, 2006

The importance of peak-day demand is that if peak-day demand exceeds capacity within the system, including all treatment plants, pump stations and reservoirs combined, a series of events could take place beginning with low water pressure in parts of the system which can lead to problems meeting the requirements for fire suppression, and ultimately (although somewhat unlikely given AWU’s history) even backflow problems and “boil water” alerts. Therefore, peak-day demand projections are the primary drivers of system treatment capacity requirements.

Average demand projections, on the other hand, are the primary drivers of the total amount of water supply needed as part of water resource planning. As such, average-day demand has more effect on total water supply costs than on treatment capacity requirements.

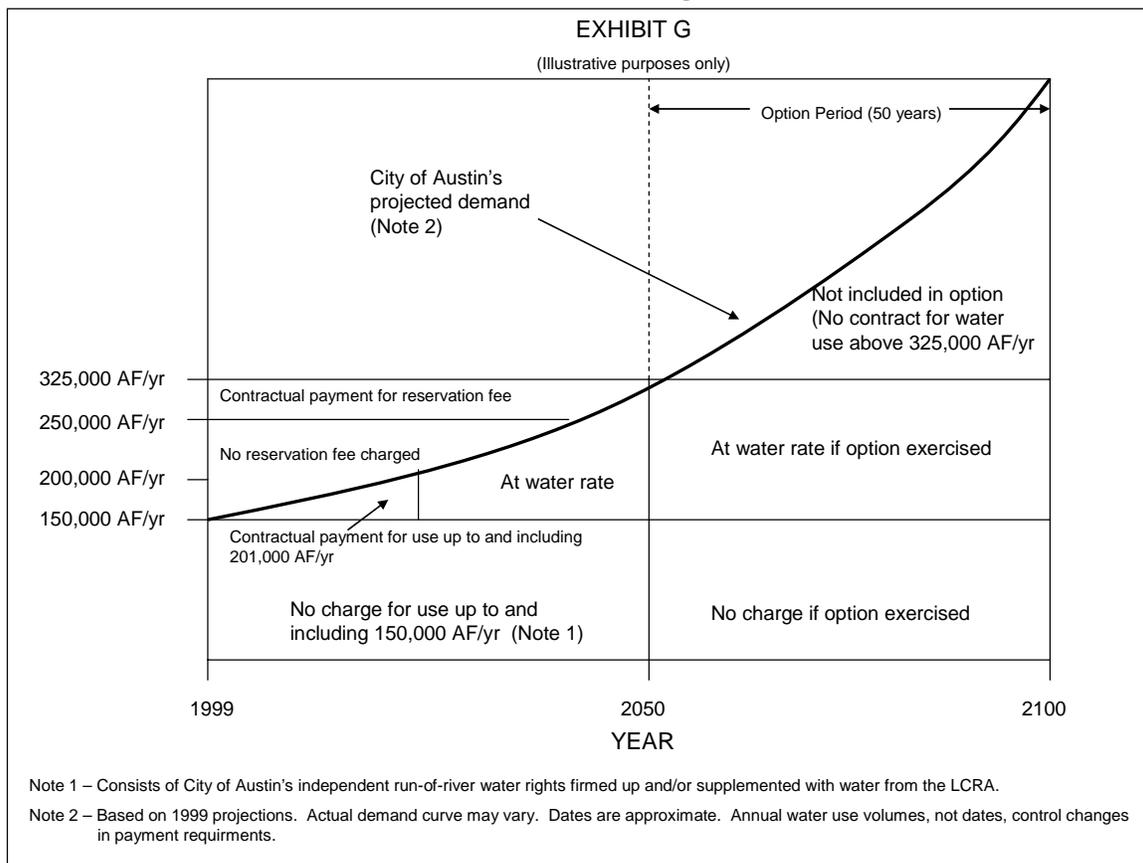
The Utility has projected that the City would need an additional water treatment plant by 2011 in order to meet peak-day demand. Therefore, the City is moving ahead with preliminary engineering planning for a new water treatment plant.

Annual demand is the total amount of water used over the entire year and is important to both facilities planning and water supply costs. Annual demand is often measured in acre-feet (AF). An Acre-Foot of water is the amount of water needed to cover an acre of land with 1 foot of water and is equal to approximately 325,851 gallons. In Austin in FY05, reported peak-day demand was approximately 237 MGD, average-day demand was 141 MGD, and annual demand was just under 158,000 AF, which translates to approximately 51 billion gallons.

Water Savings. For purposes of this report, the phrase “water savings” will refer to the amount of decrease in peak-day and average-day demand as measured in millions of gallons per day (MGD).

Water Supply Costs. The City of Austin purchases water from the Lower Colorado River Authority. State “run-of-the-river” rights laws entitle the City to use up to 150,000 Acre-Feet (AF) of water per year without charge. In 1999, as part of the water supply agreement with the Lower Colorado River Authority (LCRA), the City reserved the right to purchase up to 350,000 AF per year in exchange for a reservation fee of \$72,662,552. Additionally, the City prepaid \$27,337,448 for water above the 150,000 AF level at \$105 per Acre-Foot (the rate on the date of the contract) until such time as the City’s demand reaches 201,000 AF per year.

**EXHIBIT 2
LCRA Contract Diagram**



SOURCE: Exhibit G from First Amendment to December 10, 1987 Comprehensive Water Settlement Agreement between City of Austin and LCRA dated October 7, 1999, reproduced by OCA auditors.

As previously mentioned, the City used just under 158,000 AF in 2005. Without a prepayment supply agreement, the cost of the Acre-Feet over the 150,000 State-mandated amount would have been approximately \$800,000 at the 1999 rate of \$105 per AF.

Once the City's annual demand for water goes above 201,000 AF per year in two consecutive years, the City must pay the going rate per AF for use over the 150,000 AF per year. The increase in cost will depend on the LCRA's water prices at the time, as shown in Exhibit 2 on the previous page.

As another example, the 2007 rate set by the LCRA's Board of Directors is \$126 per AF. Therefore, if the City were to have reached the 201,000 AF level of demand last year and again this year, it would have to pay \$6,426,000 for the 51,000 AF over the State-mandated level. AWU analysts estimate that this would require a 4.1% increase in current water rates.

Conservation efforts are being made to extend the date that the City exceeds the 201,000 AF level out to approximately 2040. However, it is important to note that when that level is reached, the LCRA's rate per AF will more than likely be much more than the current \$126. Usage levels are also increasing, driven mostly by population growth.

The Utility's Water Conservation Division has been working to reduce demand as much as feasible. In the 1990s, the City projected that it would need to reduce current and future demand by approximately 50,000 AF per year to extend the total contracted water supply to 2050. Therefore, the Austin City Council established a water conservation goal to reduce peak day demand by ten percent.

To do this, the Water Conservation Division has designed and instituted a variety of programs for all customers, including incentives to conserve water, services to reduce demand (e.g., irrigation audits), and educational programs.

In support of this effort, the Utility engaged a consultant to work with the Utility's Water Conservation Division to evaluate various conservation strategies. The consultant evaluated twelve water conservation strategies that have the potential for significantly lowering peak-day demand over the next five years. These strategies are organized in the following three categories:

- Indoor strategies are intended to reduce the water used inside a house and/or building.
- Outdoor strategies are intended to reduce water usage outside a house and/or building and are the ones that have the biggest impact on peak-day water demand.
- City/Utility strategies are intended to reduce water usage by the City, and also include things that the Water Utility can do to reduce overall water usage throughout the City.

More recently, there has been renewed interest by the City in finding opportunities for greater water savings.

Most recent conservation efforts. In June 2006, the Austin City Council voted to direct the City Manager to begin immediate implementation of aggressive water conservation strategies and report back by the end of fiscal year 2008. Additionally, the Council created the Water

Conservation Task Force (WCTF) in September of 2006 to recommend additional conservation strategies. The WCTF included City officials as well as appointed representatives from various Council boards and commissions. Other stakeholders had an opportunity to provide input during work sessions and meetings.

The WCTF policy document is scheduled to go before Council on May 3, 2007 for consideration and adoption. That document includes recommendations for ordinances and resolutions outlining additional conservation strategies to implement. The policy document will serve as a guide for necessary ordinance changes and future budgetary decisions.

Using water savings estimates and other projections provided by the AWU Conservation Division staff, in January 2007 the taskforce recommended aggressive water conservation measures and set goals to reduce peak day usage by one percent per year for 10 years. Because of the importance of the AWU estimates and projections of water savings for each strategy, OCA was asked to provide assurance on their reliability.

Other AWU Divisions are also involved in conservation efforts. Along with the Water Conservation activity, Water Reuse is another activity under the Water Conservation and Reuse program that is important to the reduction of water demand. This activity's savings are also reported along with conservation efforts, but organizationally, is not integrated with the Conservation Division.

Additional definitions. For purposes of this audit, something being "valid" means that it what it purports to be, and is relevant and meaningful. Additionally, "reliable" will refer to data that can be trusted with confidence.

Origins of this audit. The Austin City Council's Audit and Finance Committee (AFC) approved a Risk and Vulnerability Assessment (RVA) of the Austin Water Utility (AWU) as part of the Office of the City Auditor's (OCA) 2006 Service Plan. Continued audit work resulting from the RVA was approved by the AFC as part of OCA's 2007 Service Plan. Among other issues, the RVA identified both conservation and water loss within the City's system as two significant issues affecting Austin's level of water use. An audit of water loss is scheduled to begin in the late-FY 07 to early-FY08 timeframe.

This audit arose from that risk assessment, along with specific Council questions about the reliability of conservation performance measurements, and was conducted in conjunction with the work of the task force.

OBJECTIVES, SCOPE, AND METHODOLOGY

Audit Objectives:

The objectives of this audit are to:

1. Identify other Texas Cities that own their own water utilities.
2. Assess the reliability of reported water savings from current conservation strategies, including the underlying assumptions, algorithms and methodologies.
3. Assess the reliability of projected water savings from proposed conservation strategies being presented to the WCTF, including the underlying assumptions, algorithms and methodologies used to develop the projections. The assessment follows the grouping of strategies as follows:
 - a. Indoor strategies
 - b. Outdoor strategies
 - c. City and Utility strategies.
4. Describe the City of Austin's capability to provide customers with feedback on water usage, and identify and describe additional customer feedback provided by the City of San Antonio.

To accommodate the Water Conservation Task Force (WCTF) work schedule, the results of objectives 1, 3a, and 4 were issued on December 12, 2006 at a meeting of the Council Audit & Finance Committee. That report was entitled *Water Conservation I: Reliability of Water Savings Projections for Indoor Strategies*.

A memorandum report to the WCTF, issued January 5, 2007 addressed Objectives 3b and c. Findings contained in that document are summarized in this report. The full text of the memorandum report is included in Appendix B. Objective 2, including an assessment of the controls for the Water Conservation Division's performance, tracking and reporting processes, is addressed in this report.

Scope:

The scope of this audit includes data used in current performance measures of AWU conservation activities beginning with Fiscal Year 2005, except for reported cumulative water savings, which includes yearly savings from 1994 to present. It also includes data provided to the WCTF related to water savings associated with the proposed future indoor water conservation strategies developed jointly by AWU Water Conservation Division staff and their consultant. Some of those projections for were made from data dating back to 1990.

The reliability of data on past and projected water usage levels and water production data was not addressed in this audit.

Methodology:

To assess the reliability of reported water savings, as stated in Objective 2, we compared the Utility's calculation methodologies to those found in the State Best Management Practices Guide (BMP guide). To assess the controls of the Conservation division's tracking and reporting processes, we interviewed key personnel and reviewed policies and procedures, in order to flowchart and analyze the processes.

In accordance with Generally Accepted Government Auditing Standard 7.58, we determined the reliability of the data used in AWU and consultant reports related to water conservation efforts by analyzing and testing the data and calculations as well as comparing to recognized benchmarks.

We considered whether laws, regulations, provisions of contract or grant agreements were significant to the audit objectives and concluded that there is no significant risk of non-compliance with provisions of contract or grant agreements. We determined that there was some weakness in controls related to some of the give-away and rebate programs. We discussed these weaknesses with the utility's internal audit team which is currently auditing controls of the rebate programs.

This audit was conducted in compliance with the Generally Accepted Government Auditing Standards.

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AUDIT RESULTS

The Austin Water Utility's Conservation division presented estimated water savings and costs for proposed conservation strategies to the Water Conservation Task Force in January 2007. We found those estimates to be reasonable and reliable with a few qualifications. These concerns were mainly related to the estimates of population and implementation costs. The division's methodology for calculating water savings from conservation strategies currently in place were found to conform to best practices, however we were unable to vouch for the accuracy of some of the numbers produced because of problems retrieving the supporting documentation. We believe that the conservation division's processes would benefit from several improvements in the process they use to collect, calculate, and monitor performance prior to the implementation of proposed strategies. Additionally, the division's process to report performance measures warrants a review due to several inconsistencies in reporting that were identified.

Estimates of water savings from proposed conservation strategies, as presented to the Water Conservation Task Force (WCTF), are reasonable and reliable with a few qualifications.

The Conservation division estimated water savings and costs for proposed outdoor and City/Utility strategies presented to the WCTF. We reviewed the calculations and found that they are reasonable and valid. However, we did note some concerns about the reliability of the population estimates used and the implementation of some of the proposed strategies.

While the estimates of water savings for proposed outdoor strategies were found to be reasonable, we did note a few concerns. The success of future outdoor conservation strategies rests upon the reliability of population estimates. Our concerns, which are enumerated as footnotes to the Attachment B of our January 5, 2007 memo to the WCTF as shown in Appendix B, mainly address the risk that some of the proposed strategies may not be achievable.

For example, some savings projections are dependent on population projections done by an AWU consultant which were not reconciled to projections done by the City Demographer, the recognized expert on the City's demographics. Ultimately, the success of those strategies is dependant on how accurate the consultant's projections are compared to actual population growth within the AWU service area. Some additional risks we noted, were that the following assumptions may be optimistic:

- the number of households that would choose to implement a xeriscape landscaping option, and
- the number of irrigation audits that can be performed on a daily basis.

We also noted several concerns that could affect the success of proposed City and Utility strategies. City strategies are actions that the City and Utility can undertake to increase water savings. Most of our concerns stem from the costs involved in implementing those strategies. For example, the costs identified with achieving 4.8 mgd in savings from a leak detection program do not include the actual cost of repairing and/or replacing leaking pipes. Another example is the extension of reuse water lines. While the estimated cost is \$12.5 million, in order to achieve the desired results it is assumed that all participants in the City's CIP process will

support building the needed projects within five years. This may be overly optimistic. A listing of our concerns is shown in the notes to Attachment C of our January 5, 2007 memo to the WCTF as shown in Appendix B.

Water savings calculations for current conservation strategies are consistent with best management practices, but we could not confirm the accuracy of some of the reported numbers.

Measured against the State's BMP Guide, the AWU Conservation Division's water savings are calculated correctly. However, the process of documenting the support for some of the important factors in the calculation needs some improvement, without which we cannot confirm the accuracy of the reported savings from some of the strategies already in place.

The formulas and assumptions regarding estimated water savings by strategy used in the calculations for current conservation efforts are consistent with the State's Best Management Practices Guide. AWU Conservation staff use a set number of gallons saved per unit, multiplied by units (i.e., free toilets issued, rebates issued, audits performed, etc.) to arrive at monthly savings per conservation strategy. The gallons saved per-unit used for each strategy were compared to the Texas Water Development Board's BMP Guide. We found that, in most cases, the water savings amounts are consistent with the Guide. Where differences were noted, AWU Conservation staff had good reasons for deviating from the guide. For example, the use of documented historical water savings data from irrigation audits performed by the Conservation staff was substituted for the estimated savings from such audits contained in the BMP Guide. A listing of current AWU Conservation strategies is shown in Exhibit 3 below.

Exhibit 3
Current AWU Conservation Strategies

Program Group	Conservation Strategy	Calculated Water Savings per Input (gals/day)	Inputs used in Calculation of Water Savings	Comments
Giveaway& Sales Items				
	Toilets	Residential = 25 Multifamily = 30 Commercial = 34	Number of Toilet vouchers redeemed	Data received from other Conservation Div Staff and from company redeeming free toilet vouchers
	Showerheads	7	Showerheads issued	Data received from other Conservation Div Staff
	Faucet Aerators	4	Aerators issued	"
	Rain Barrels	6	Rain Barrels sold	"
	Hose Timers	5	Timers sold	"
	Rain Shutoffs	20	Shutoffs sold	"
	Restaurant Spray Valves	200	Spray valves issued	"
Rebate Programs				
	Toilet Rebates	Residential = 25 Multifamily = 30 Commercial = 34	Number of Toilets Rebated (Note1)	Data received from other Conservation Div Staff
	Clotheswasher Rebates	Residential = 15 MF & Commercial = 45	Rebates issued	"
	Irrigation Rebates	100	Rebates issued	"
	WaterWise Rebates	100	Rebates issued	"
	Rainwater Rebates	79	Rebates issued	"
	Rainbarrel Rebates	6	Rebates issued	"
	Commercial Rebates	Varies	Varies	See note 2 below
	Grinder Rebates	400	Rebates issued	"
	Dental Vacuum Pump R	720	Rebates issued	"
Audit Programs				
	Irrigation Audits	100	Audits performed	Data received from other Conservation Div Staff
	Indoor Audits	Varies	Audits performed	"
	ICI Audits	Varies	Audits performed	"
Education Programs				
	Dowser Dan Shows	1	Attendees	Data received other Conservation Div Staff
	Water in Our World	1	Attendees	"
	Xeriscape & Rainwater	1	Attendees	"
	Peak-day Campaign	1	Attendees	"
Plumbing Code Programs				
	Certificate of Occupancy – SF Homes	25	Certificates issued	Data received from One-Stop Shop
	Certificate of Occupancy – Multi-Family Units	34	Certificates issued	"
	Certificate of Occupancy – Commercial	34	Certificates issued	"
	Commercial Landscape Ordinance	100	Certificates issued	"
Water Reuse Programs				
	Infrastructure extensions	Varies	Linear Feet installed	See note 3 below
	Commercial connections	Varies	Connections made	See note 3 below

SOURCE: OCA comparison, March 2007

- Notes: 1. Toilet rebates can be issued for multiple toilets per household, therefore the number of toilets is the input used.
2. Data is received from other Conservation division staff. The commercial rebates program is set up to offer up to \$40,000 in rebates to industrial, commercial, and institutional customers towards the cost of installing new equipment and processes that conserve water at existing facilities. It is separate from other rebate programs for plumbing fixtures and irrigation system upgrades, and calls for reduced water consumption of at least 300 gallons per day, which must be documentable. Additionally, all projects must be pre-approved through a proposal process.
3. Data is received from Reuse Program Coordinator. The Water Reuse program tracks the additions, in linear feet, to the existing re-use infrastructure, along with the number of additional connections to the system.

AWU Conservation division personnel, over time, have used inconsistent demographic data in calculating the savings amount for low-flow toilets. While the formula being currently used is in line with the Best Management Practices Guide, it includes demographic data that appears not to be current for Austin. Additionally, different demographic data was used to arrive at estimated future savings for strategies proposed to the WCTF.

Reported performance measures for current strategies contain a figure of 25.7 gallons to calculate water savings for low-flow toilets. The Conservation division arrived at this amount in the 1990s using demographic data specific to only 15 zip code areas within the City of Austin. According to the City Demographer, there are currently 48 zip code areas either wholly or partially within the City of Austin's jurisdiction.

More recently, division staff have used the same formula with the figure 13.7 gallons to calculate water savings for low-flow toilets for future savings projections presented to the WCTF. An AWU consultant arrived at this figure using a combination of projected Austin demographics and a 1998 National study.

Both calculations use the same formula outlined in the BMP Guide, but the demographic inputs are different. Therefore, a review of demographics specific to Austin is necessary to ensure that all current and future savings calculations are reasonable. In the future, it may be necessary to revise the savings calculations when there are significant changes to the demographic makeup of the AWU service area. Such changes may require the re-statement of savings figures for the time period affected by the demographic inputs.

We cannot confirm the accuracy of the actual reported savings for some strategies because retrieval of the supporting documentation is either impossible or extremely resource consuming. Although the program coordinator reviews the monthly savings calculations, auditor attempts to reconcile a sample of the current water savings figures with supporting documentation found that most of the reporting of monthly figures is done through e-mails to the program coordinator.

In most cases, supporting documents (i.e., free toilet vouchers, rebate forms, irrigation audit reports, etc.) for those figures are reviewed by the program coordinator when received. However, some of these supporting documents are filed without listing the items that make up the value reported. For some programs, inputs into calculations are not easily documented. For plumbing code programs, only a total number of certificates of occupancy issued for the year is given to the coordinator. For educational programs, only the number of attendees is provided.

For commercial rebates, there is no standardized form for both pre- and post-implementation water usage reviews by AWU, and no independent supervisory review of actual water savings. Additionally, the rules for when water savings are counted or reported are not adequately defined.

The Conservation Division’s manual performance measurement tracking and reporting processes would benefit from more effective use of its automated resources. As shown in Exhibit 4 below, all but one of the program groups use manual processes and electronic spreadsheets to report water savings. An automated system, the Water Conservation Tracking System or WCTS, is used to track most conservation activities by applicant but is not used for performance reporting by strategy. Problems with the database design and reporting features of the system currently cause report queries to be inaccurate and preclude use of the system for reporting or verifying reported performance by tracing back to the supporting documentation without extraordinary efforts. Also, not all program categories are tracked through WCTS. For example, the Commercial Rebate program, the largest driver of reported water savings from conservation, are only tracked using individual staff files and are not entered into WCTS.

Therefore, improvements to the design and reporting features of the system are necessary in order to ensure that after the supervisory review of the monthly water savings calculations, the inputs into those calculations could still be traced back to the supporting documentation without extraordinary efforts. Additional improvements could enable efficient tracking and reporting of all performance measurement data.

EXHIBIT 4
Summary of AWU Performance Measurement Processes
by Conservation Program Groups

Program Group	Supervisory Review of Reported Inputs	Manual or Automated Processes ^{Note 1}	Inputs can be easily verified to supporting docs	Written Procedures
Free Items	Monthly	Manual	Yes	Yes
Rebates	Semi-Monthly	Both	Yes	Yes ^{Note 2}
Audits	Monthly	Manual	No	Yes ^{Note 3}
Plumbing Code	None ^{Note 4}	Manual	No	No
Educational	None ^{Note 5}	n/a	No	No
Water Reuse ^{Note 7}	None ^{Note 6}	Manual	Yes	No

SOURCE: OCA Analysis, February 2007

- NOTES: 1. An automated process is one that uses an automated system to summarize input data and produce performance data, as well as allow for review of the data contained within the system. While some inputs are made from various programs into WCTS, the process cannot be considered “automated” because the system is not set up to do more than hold data for those processes.
2. The Commercial rebates program does not have written procedures.
3. Some procedures have been written for irrigation audits, but they have not been included in the division’s procedures manual.
3. Plumbing Code inputs consist of gathering the number of certificates of occupancy issued at year end
4. Educational program inputs consist of gathering the number of attendees at education sessions each month.
5. Water Reuse inputs come from the Reuse program coordinator at year-end.
6. Water reuse programs are organizationally separate from the AWU Conservation Division but savings are reported through the Conservation Division.

Three of the Conservation Division’s seven current performance measures could not be internally reconciled. The City’s e-Perf performance measurement system reports data on the performance of City programs to the public. Performance data should be reliable, accurate and valid. It should allow users (mgmt/council/etc.) to determine whether conservation programs are meeting their goals. A comparison of Conservation division water savings data to figures reported on the City’s e-Perf system and Budget documents, found that cumulative savings figures as reported were inaccurate.

Problems found include:

- The measure “Yearly reduction in water use (Acre-feet) through conservation and reuse” does not include water savings from reuse in the cumulative totals for FY05 and, consequently, subsequent years.
- The numbers reported for the measure “Cumulative peak-day gallons of water saved since 1993” do not match annual values for FY 04, FY 05, and & FY 06 as calculated by the Conservation division.
- For the years FY 05 and FY 06, the values reported in e-Perf for the measure “Yearly peak-day reduction in water usage – gallons per day (GPD)” do not match the spreadsheet calculating that measure prepared by the Conservation division.

We were unable to determine the cause for the inconsistencies, however it is possible that the reason for the problem is that the data goes through multiple “hands” prior to being input into the e-Perf system.

The increase in workload from future conservation strategies will necessitate improved controls in order to avoid inconsistent calculations, and to facilitate comparison between the Conservation Division’s future performance and what they have projected.

An increased work load and increased scrutiny of reported measures by decision makers will exacerbate the need for documentation of measurement calculation processes, consistent use of demographic data, consistency between reported strategy groupings, and tracking of costs by strategy.

The AWU Conservation division’s workload will increase once Council approves implementation of additional conservation strategies that were presented to the WCTF. A total of 5 new indoor, 7 new outdoor and 8 new City/Utility strategies were presented to and accepted by the WCTF. The estimated costs of these programs over a 10-year period estimated by AWU staff to exceed \$43 million, including the addition of 21 FTEs and 10 vehicles.

Written procedures exist for compiling, calculating and reporting performance of only three of the six program groups: (1) free products, (2) rebates, and (3) irrigation and indoor audit programs. Other processes, such as the education and plumbing code programs are not as complicated, however new employees would benefit from having written procedures to follow. Written procedures also ensure consistency in performance reporting from one reporting period to another.

Inconsistent groupings are used for reporting performance of conservation strategies. The Conservation division groups current conservation strategies using the commonly accepted categories of Residential, Multi-Family, and Commercial groupings. However, they grouped the proposed future strategies as follows: Indoor, Outdoor, and City/Utility strategies, when they were presented to the WCTF. Both are acceptable, however when proposed strategies are

implemented, the Conservation division will need to track and report actual water savings and costs in a way that allows for ease in monitoring performance against projections.

Conservation division staff will have to adjust their tracking processes in order to measure the cost against the benefits of each strategy. Estimates given to the WCTF for proposed conservation strategies included estimated costs for personnel and other resources. The Utility is not currently prepared to track personnel costs by conservation strategy. That capability would have to be programmed into both tracking and reporting systems to allow reporting of strategy performance compared to its cost.

Recommendations

01. In order to provide reliable and valid data for Council members to use in making their decisions about proposed City/Utility conservation strategies, the Austin Water Utility's Assistant Director of Environmental Affairs and Conservation should compile estimates of the implementation costs as well as the steps required to implement the proposed programs and should make that information available to Council through fiscal notes to proposed ordinances.

MANAGEMENT RESPONSE: CONCUR

Water Conservation staff has provided estimates of the implementation costs for each of the Water Conservation Task Force recommendations, and implementation details where possible and appropriate. Water Conservation staff intends to refine the cost estimates as the recommendations proceed through the stakeholder and rule/ordinance writing processes, and will provide implementation details when the rules and ordinances are brought for approval. The Water Conservation Acting Division Manager is overseeing these efforts. Action is currently underway on these strategies and will be completed as the rules and ordinances are brought for approval. The AWU has added an Executive-level position, the Assistant Director of Environmental Affairs and Conservation, as well as completed a reorganization to enhance the conservation efforts, especially in the area of implementing the Water Conservation Task Force recommendations.

-
02. To allow for the validation of water savings calculations, and prepare for the increased workload from additional conservation strategies, the Austin Water Utility's Assistant Director of Environmental Affairs and Conservation should implement a more consistent process for documenting and verifying reported savings, including the upgrading of the WCTS to a truly automated processing system.

MANAGEMENT RESPONSE: CONCUR

Maintenance of the Water Conservation Tracking System (WCTS) resided within CTM, but in 2006 the Utility's Information Technology Services (ITS) Division took on responsibility for maintaining and improving the system. We have identified major upgrades that are needed, and the next step is for Water Conservation and ITS staff to define the scope of improvements and timelines for implementation. In addition, Water Conservation has begun a review of some of its methodologies for collecting and reporting estimated savings, and the reporting of certain measures has been brought entirely within the WCTS tracking system. However, by their nature some performance measures are not able to be reported automatically, and the reporting system will remain a mixture of automated and manually gathered measures. Therefore, until the WCTS database

improvements are completed, we will ensure that the water savings calculations are documented and records are maintained to allow verification of reported savings for all performance measures. After the WCTS improvements are implemented, we will continue to ensure that any manually gathered measures are adequately documented to allow verification. Action is currently underway on these strategies. By May 31, 2007, the Chief Information Officer will develop a scope and timeframe for WCTS improvements, and the Water Conservation Acting Division Manager will make improvements to the manual documentation of performance measures.

03. To strengthen the controls over the Industrial and Commercial Rebate program, and to make sure that water savings from that program are consistently counted and verified prior to the issuance of rebates, the Austin Water Utility's Assistant Director of Environmental Affairs and Conservation should implement a more consistent process for documenting and verifying reported savings. This includes clarifying the rules for when water savings are counted or reported; standardizing forms for both pre- and post-implementation water usage reviews by AWU; and adding independent supervisory verification of calculated savings.
-

MANAGEMENT RESPONSE: CONCUR

Although the highly variable nature of the rebates issued under this program makes standardization difficult, we agree that written procedures would clarify how savings are documented, counted, and reported. The Water Conservation Acting Division Manager will draft standardized tracking forms and written procedures. Implementation is planned for completion by May 31, 2007. Calculated savings are already included in rebate requests that are reviewed by the Division Manager and the Assistant Director.

04. To prepare for future reporting and monitoring by outside sources, the Austin Water Utility's Assistant Director of Environmental Affairs and Conservation should direct Conservation Division staff to consult with the City Demographer and ensure that accurate demographic data is used in all water savings formulas. Additionally, the Assistant Director should implement changes to processes that enable the tracking of water savings and costs by conservation strategy and, review the process of transmitting performance data through AWU divisions to the Budget office to determine why inaccurate data is shown in e-Perf, the City's performance measurement system.
-

MANAGEMENT RESPONSE: CONCUR

AWU recognizes that departments Citywide rely on the City Demographer for statistics, and we will ensure that all calculations are reconciled with the City Demographer statistics. Water Conservation staff will continue to consult with the City Demographer to ensure that demographic data used in formulas is current and accurate, and will periodically revisit any savings formulas that have a demographic component. Staff will continue to track time spent on individual programs to allow for calculation of costs by program. The Water Conservation Division Manager will review the current process used in reporting performance data and ensure that the values are verified before they are reported. The Water Conservation Acting Division Manager is overseeing these efforts. Action is currently underway on these strategies, and we anticipate that implementation will be completed by May 31, 2007.

Issue for Further Study

Balancing Growth and Water Use. One issue that came to our attention in the course of our work is an inherent policy challenge related to Council's water conservation goals and the broader goal of managing water supply and treatment capacity in the City and in the region. The challenge is one of achieving conservation goals in order to make supply and treatment capacity last as long as possible, balanced against the goals of economic growth. There is an inherent policy challenge in making available water resources last, while increasing potential demand for these resources in the course of attracting economic growth to the area. The achievement of these conflicting goals may require more conscious consideration of water use issues in economic development activities.

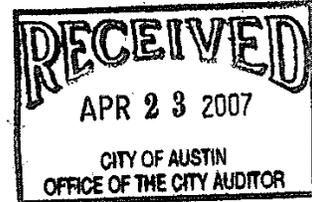
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APPENDIX A
MANAGEMENT RESPONSE

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MEMORANDUM



To: Stephen L. Morgan, City Auditor
From: Rudy Garza, Assistant City Manager
Date: April 19, 2007
Subject: Response to Audit Recommendations

I have reviewed and approved the Austin Water Utility's response to the audit recommendations in OCA's draft report titled "AWU-Conservation II Report." Attached is the Utility's response to the audit recommendations.

Rudy Garza, Assistant City Manager
City of Austin

cc: Perwez Moheet, CPA, Acting Director, Austin Water Utility
David Juarez, P.E., Assistant Director, Water Resources Management

Response to Audit Recommendations AWU-Water Conservation II Report

01. In order to provide reliable and valid data for Council members to use in making their decisions about proposed City/Utility conservation strategies, the Austin Water Utility's Assistant Director of Environmental Affairs and Conservation should compile estimates of the implementation costs as well as the steps required to implement the proposed programs and should make that information available to Council through fiscal notes to proposed ordinances.
-

MANAGEMENT RESPONSE: Concur. Water Conservation staff has provided estimates of the implementation costs for each of the Water Conservation Task Force recommendations, and implementation details where possible and appropriate. Water Conservation staff intends to refine the cost estimates as the recommendations proceed through the stakeholder and rule/ordinance writing processes, and will provide implementation details when the rules and ordinances are brought for approval. The Water Conservation Acting Division Manager is overseeing these efforts. Action is currently underway on these strategies and will be completed as the rules and ordinances are brought for approval. The AWU has added an Executive-level position, the Assistant Director of Environmental Affairs and Conservation, as well as completed a reorganization to enhance the conservation efforts, especially in the area of implementing the Water Conservation Task Force recommendations.

02. To allow for the validation of water savings calculations, and prepare for the increased workload from additional conservation strategies, the Austin Water Utility's Assistant Director of Environmental Affairs and Conservation should implement a more consistent process for documenting and verifying reported savings, including the upgrading of the WCTS to a truly automated processing system.
-

MANAGEMENT RESPONSE: Concur. Maintenance of the Water Conservation Tracking System (WCTS) resided within CTM, but in 2006 the Utility's Information Technology Services (ITS) Division took on responsibility for maintaining and improving the system. We have identified major upgrades that are needed, and the next step is for Water Conservation and ITS staff to define the scope of improvements and timelines for implementation. In addition, Water Conservation has begun a review of some of its methodologies for collecting and reporting estimated savings, and the reporting of certain measures has been brought entirely within the WCTS tracking system. However, by their nature some performance measures are not able to be reported automatically, and the reporting system will remain a mixture of automated and manually gathered measures. Therefore, until the WCTS database improvements are completed, we will ensure that the water savings calculations are documented and records are maintained to allow verification of reported savings for all performance measures. After the WCTS improvements are implemented, we will continue to ensure that any manually gathered measures are adequately documented to allow verification. Action is currently underway on these strategies. By May 31, 2007, the Chief Information

Officer will develop a scope and timeframe for WCTS improvements, and the Water Conservation Acting Division Manager will make improvements to the manual documentation of performance measures.

03. To strengthen the controls over the Industrial and Commercial Rebate program, and to make sure that water savings from that program are consistently counted and verified prior to the issuance of rebates, the Austin Water Utility's Assistant Director of Environmental Affairs and Conservation should implement a more consistent process for documenting and verifying reported savings. This includes clarifying the rules for when water savings are counted or reported; standardizing forms for both pre- and post-implementation water usage reviews by AWU; and adding independent supervisory verification of calculated savings.
-

MANAGEMENT RESPONSE: Concur. Although the highly variable nature of the rebates issued under this program makes standardization difficult, we agree that written procedures would clarify how savings are documented, counted, and reported. The Water Conservation Acting Division Manager will draft standardized tracking forms and written procedures. Implementation is planned for completion by May 31, 2007. Calculated savings are already included in rebate requests that are reviewed by the Division Manager and the Assistant Director.

04. To prepare for future reporting and monitoring by outside sources, the Austin Water Utility's Assistant Director of Environmental Affairs and Conservation should direct Conservation Division staff to consult with the City Demographer and ensure that accurate demographic data is used in all water savings formulas. Additionally, the Assistant Director should implement changes to processes that enable the tracking of water savings and costs by conservation strategy and, review the process of transmitting performance data through AWU divisions to the Budget office to determine why inaccurate data is shown in e-Perf, the City's performance measurement system.
-

MANAGEMENT RESPONSE: Concur. AWU recognizes that departments Citywide rely on the City Demographer for statistics, and we will ensure that all calculations are reconciled with the City Demographer statistics. Water Conservation staff will continue to consult with the City Demographer to ensure that demographic data used in formulas is current and accurate, and will periodically revisit any savings formulas that have a demographic component. Staff will continue to track time spent on individual programs to allow for calculation of costs by program. The Water Conservation Division Manager will review the current process used in reporting performance data and ensure that the values are verified before they are reported. The Water Conservation Acting Division Manager is overseeing these efforts. Action is currently underway on these strategies, and we anticipate that implementation will be completed by May 31, 2007.

ACTION PLAN

AU07102 - Conservation I: Reliability of Water Savings Projections for Indoor Strategies

Rec. #	Recommendation Text	Proposed Strategies for Implementation	Status of Strategies	Responsible Person/Phone Number	Proposed Implementation Date
1	In order to provide reliable and valid data for Council members to use in making their decisions about proposed City/Utility conservation strategies, the Austin Water Utility's Assistant Director of Environmental Affairs and Conservation should compile estimates of the implementation costs as well as the steps required to implement the proposed programs and should make that information available to Council through fiscal notes to proposed ordinances.	Water Conservation staff has provided estimates of the implementation costs for each of the Water Conservation Task Force recommendations, and implementation details where possible and appropriate. Water Conservation staff intends to refine the cost estimates as the recommendations proceed through the stakeholder and rule/ordinance writing processes, and will provide implementation details when the rules and ordinances are brought for approval. The AWU has added an Executive-level position, the Assistant Director of Environmental Affairs and Conservation, as well as completed a reorganization to enhance the conservation efforts, especially in the area of implementing the Water Conservation Task Force recommendations.	Underway	Water Conservation Acting Division Manager, Dan Strub, 974-2559	To be determined, as rules and ordinances are brought for approval
2	To allow for the validation of water savings calculations, and	Maintenance of the Water Conservation Tracking System	Underway	Chief Information	By 5/31/07, the scope and

	<p>prepare for the increased workload from additional conservation strategies, the Austin Water Utility's Assistant Director of Environmental Affairs and Conservation should implement a more consistent process for documenting and verifying reported savings, including the upgrading of the WCTS to a truly automated processing system.</p>	<p>(WCTS) resided within CTM, but in 2006 the Utility's Information Technology Services (ITS) Division took on responsibility for maintaining and improving the system. We have identified major upgrades that are needed, and the next step is for Water Conservation and ITS staff to define the scope of improvements and timelines for implementation. In addition, Water Conservation has begun a review of some of its methodologies for collecting and reporting estimated savings, and the reporting of certain measures has been brought entirely within the WCTS tracking system. However, by their nature some performance measures are not able to be reported automatically, and the reporting system will remain a mixture of automated and manually gathered measures. Therefore, until the WCTS database improvements are completed, we will ensure that the water savings calculations are documented and records are maintained to allow verification of reported savings for all performance measures. After the WCTS improvements are</p>		<p>Officer, Brownlee Bowmer, 972-0442</p> <p>Water Conservation Acting Division Manager, Dan Strub, 974-2559</p>	<p>timeframe for WCTS improvements will be defined, and documentation improvements will be implemented</p>
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		implemented, we will continue to ensure that any manually gathered measures are adequately documented to allow verification.			
3	To strengthen the controls over the Industrial and Commercial Rebate program, and to make sure that water savings from that program are consistently counted and verified prior to the issuance of rebates, the Austin Water Utility's Assistant Director of Environmental Affairs and Conservation should implement a more consistent process for documenting and verifying reported savings. This includes clarifying the rules for when water savings are counted or reported; standardizing forms for both pre- and post-implementation water usage reviews by AWU; and adding independent supervisory verification of calculated savings.	Although the highly variable nature of the rebates issued under this program makes standardization difficult, we agree that written procedures would clarify how savings are documented, counted, and reported. The Water Conservation Acting Division Manager will draft standardized tracking forms and written procedures. Calculated savings are already included in rebate requests that are reviewed by the Division Manager and the Assistant Director.	Planned	Water Conservation Acting Division Manager, Dan Strub, 974-2559	5/31/07
4	To prepare for future reporting and monitoring by outside sources, the Austin Water Utility's Assistant Director of Environmental Affairs and Conservation should direct	AWU recognizes that departments Citywide rely on the City Demographer for statistics, and we will ensure that all calculations are reconciled with the City Demographer statistics. Water	Underway	Water Conservation Acting Division Manager, Dan Strub, 974-2559	5/31/07, and ongoing consultation

	<p>Conservation Division staff to consult with the City Demographer and ensure that accurate demographic data is used in all water savings formulas. Additionally, the Assistant Director should implement changes to processes that enable the tracking of water savings and costs by conservation strategy and, review the process of transmitting performance data through AWU divisions to the Budget office to determine why inaccurate data is shown in e-Perf, the City's performance measurement system.</p>	<p>Conservation staff will continue to consult with the City Demographer to ensure that demographic data used in formulas is current and accurate, and will periodically revisit any savings formulas that have a demographic component. Staff will continue to track time spent on individual programs to allow for calculation of costs by program. The Water Conservation Division Manager will review the current process used in reporting performance data and ensure that the values are verified before they are reported.</p>			
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Status of strategies: planned, underway, or implemented.

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APPENDIX B

**MEMORANDUM REPORT
TO
WATER CONSERVATION TASK FORCE
DATED JANUARY 5, 2007**

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City of Austin

MEMO



Office of the City Auditor

301 W. 2nd Street, Suite 2130

P. O. Box 1088

Austin, Texas 78767-8808

(512) 974-2805, Fax: (512) 974-2078

email: oca_auditor@ci.austin.tx.us, web site: <http://www.ci.austin.tx.us/auditor>

Date: January 5, 2007

To: Council Member Lee Leffingwell, WCTF Chair

From: Stephen L. Morgan, City Auditor

Subject: Estimated water savings and customer cost estimates for proposed water conservation strategies as presented to the WCTF by AWU Conservation Division

In response to your request that our office determine whether algorithms and methodologies for measuring conservation performance are valid and accurate, we began an audit of water conservation reporting by the Austin Water Utility.

We are pleased to present the results of our test work on the Phase II and III strategies to the Water Conservation Task Force (WCTF) in time for its final meeting on January 12th. This memo should be considered interim reporting on one of the objectives in our Conservation II audit report, which will be presented at a future meeting of the Audit and Finance Committee. That report will also include the results of our analysis of algorithms and methodologies used by the Utility in measuring current conservation strategy performance.

As previously reported in our Conservation I audit report, the final estimates for proposed indoor strategies presented to the WCTF in Phase I were found to be reliable after revisions by AWU staff. Attachment A provides more detail on our analysis.

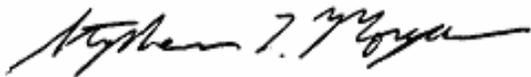
With respect to estimates for proposed outdoor and proposed City and Water Utility strategies presented to the WCTF in Phases II and III, we found the estimates at December 19, 2006 to be reasonable with a few caveats as shown in Attachment C, which provides more detail on our analysis. Those caveats mainly address the achievability of some proposed strategies.

Attachment D provides a summary of all of the proposed strategies using the format that Conservation Division staff expect to use during the final presentation to the WCTF. While the estimates of water savings as well as customer costs and savings were audited by OCA, it should be noted that we did not audit the reasonableness of FTE and program cost estimates,

therefore the cost per gallon saved estimates shown on Attachment D are based on AWU staff projections that have not been validated.

We found that most of the recommendations made as part of the Conservation Part I report have been implemented and were instrumental in allowing us to perform our analysis of the proposed outdoor and City/Utility strategies in a more efficient manner. We appreciate the cooperation and assistance we received from the Austin Water Utility's personnel during this audit.

In accordance with our policy, we have copied the other members of the Council on this memo. However, we understand that, as Chairperson, you will distribute copies to the other members of the Water Conservation Task Force.

A handwritten signature in black ink, appearing to read "Stephen L. Morgan".

Stephen L. Morgan, CIA, CGAP, CFE, CGFM
City Auditor

cc: Mayor Will Wynn
Mayor Pro Tem Betty Dunkerley
Council Member Mike Martinez
Council Member Jennifer Kim
Council Member Brewster McCracken
Council Member Sheryl Cole

Attachment A
Reliability of Projected Savings: Proposed Indoor Strategies

Indoor Strategies	(a)	(b)	(c)	(d)
	AWU Estimates originally presented to WCTF (at 10/13/06)	AWU Revised estimates after WCTF and Public Input (at 10/27/06)	AWU Revised estimates with OCA input (at 11/09/06)	OCA Calculated Estimates (at 11/17/06)
Program	Water Savings (MGD)	Water Savings (MGD)	Water Savings (MGD)	Water Savings (MGD)
Mandatory toilet retrofits	2.20 - 2.70*	2.20 - 2.70*	1.80 - 2.30*	2.081
Sub-metering of MF units	0.7	0.66	0.66	0.620
Plumbing code changes	2.7	1	0.93	0.940
Cooling towers	1.5	0.84	0.84	0.835
Car washes	0.8	0.15	0.15	0.152
Total Savings	7.90 - 8.40*	4.85 - 5.35*	4.38 - 4.88*	4.628
		Diff from OCA	% Variance	
OCA Calculation vs. AWU calc. at present	4.628	4.38 – 4.88*	0.252	5.44%
				within reasonable range

* Note: Because AWU estimates were presented as a range, comparisons were made to the higher number in that range.

Attachment B
Reliability of Projected Savings: Proposed Outdoor Strategies

Outdoor Strategies	(a)	(b)	(c)	(d)	Notes:
	AWU Estimates originally presented to WCTF (at 11/03/06)	AWU Revised estimates after WCTF and Public Input (at 11/17/06)	AWU Revised estimates with OCA input (at 12/18/06)	OCA Calculated Estimates (at 12/20/06)	
Program	Water Savings (MGD)	Water Savings (MGD)	Water Savings (MGD)	Water Savings (MGD)	
Enhanced Water Management	1.29 - 4.12	6.2	6.15	6.155	1
Residential Irrigation System Design Standards	2.7	1.7	1.32	1.319	2
Commercial Irrigation System Design Standards	1.5	0.7	0.74	0.742	3
Residential Landscape Ordinance	0.8	0.8	0.52	0.435	4
WaterWise Landscape Option	Not Included	0.2	0.21	0.213	5
Annual Irrigation System Analysis	1 - 1.4	1.47	1.47	1.473	6
Expanded Irrigation System Analysis	Not Included	0.46	0.63	0.632	7
Total Savings	7.29 - 10.52	11.53	11.04	10.969	
		Diff from OCA	% Variance		
OCA Calculation	10.969				
vs. AWU calc. at present	11.04	0.071	0.65%	within reasonable range	

The AWU calculated figures appear to be reasonable with the following exceptions:

Notes:

- 1 thru 5 - The water savings projections for these strategy are dependent on population projections done by the AWU consultant which were not reconciled to actual population estimates by the City Demographer. Therefore, the success of this strategy is dependent on how accurate these projections are as compared to those of the City Demographer's, and actual population growth within the AWU service area.
- 5 - There was no backup found to support the assumption that 1 out of every 8 new homes will select the xeriscape option for landscaping as was assumed in this calculation.
- 6 - We believe that the 1% growth rate for large properties is somewhat optimistic.
- 7 - We believe that the assumption that two FTEs will be able to perform 4 audits per day 4 days per week is somewhat optimistic as well.

Attachment C
Reliability of Projected Savings: Proposed City/Utility Strategies

City/Utility Strategies	(a)	(b)	(c)	(d)	Notes:
	AWU Estimates originally presented to WCTF (at 12/08/06)	AWU Revised estimates after WCTF and Public Input (at 12/15/06)	AWU Revised estimates with OCA input (at 12/19/06)	OCA Calculated Estimates (at 12/20/06)	
Program	Water Savings (MGD)	Water Savings (MGD)	Water Savings (MGD)	Water Savings (MGD)	
Reducing Water Loss	4.8	4.8	4.8	4.800	1
Reclaimed Water Use	4.0 - 8.0	6.2	6.2	5.948	2
Utility Rates	2.5 - 5.3	5	5	5.000	3
Wet Ponds, Ornamental Ponds, & Green Roofs	0.3	0.3	This strategy was not accepted by WCTF		
Alternative Water Sources	2.4	1	0.11	See note below	4
City Facility Conservation Requirements	0.06	0.1	0.37	0.372	
Pressure Reduction Program	0.13	0.13	0.29	0.294	5
Winter Leak Detection Program	0.2	0.3	0.3	0.312	6
Enhanced Public Education	tbd	n/a	This strategy does not have a water savings amount calculated.		7
Commercial Clothes Washer Program	Not included	0.4	0.43	0.433	8
Total Savings	14.39 - 21.19	18.23	17.07	17.159	
		Diff from OCA	% Variance		
OCA Calculation vs. AWU calc. at present	17.159 17.07	-0.089	-0.52%	within reasonable range	

The AWU calculated figures appear to be reasonable with the following exceptions:

Notes:

- 1 - This strategy addresses a goal of 4.8 mgd water savings from a leak detection program. It does not include the cost of repairing leaks and/or replacing pipes.
- 2 - This strategy assumes that all participants in the CIP process will support building the needed projects within five years to achieve the desired results.
- 3 - There is a risk that this goal may not be achievable due to the inelasticity of demand as cited in the AWU Consultant's report.

- 4 - This amount is not easily calculated because it is based on too many variables, none of which are supported by data. In order to prepare a reasonable estimate, much would depend on what kind of equipment is used and the number of new projects per year.
- 5 - This strategy addresses houses receiving 80 psi levels in their water systems through a rebate program, and houses to be built with a 65 psi level through an ordinance. It is not known how current houses with a 65 psi level will be brought down to the 50 psi level.
- 6 - This strategy assumes that 1/3 of all households with leaks over 100 gallons per day will be remediated. The success of this strategy depends on whether the households that participate in the program are also, coincidentally, those with average or higher leaks.
- 7 - This strategy does not have any water savings projections as it is an education strategy that is mainly intended to "inform a broad customer base about changes to the Water Use Management restrictions, potential penalties for water waste, and ways to reduce water use." Therefore, OCA has elected to show those program costs (as presented by AWU staff) under the Enhanced Water Use Management Strategy on Attachment D.
- 8 - The water savings projections for this strategy are dependent on population projections done by the AWU consultant which were not reconciled to actual population estimates by the City Demographer. Therefore, the success of this strategy is dependant on how accurate these projections are as compared to those of the City Demographer's, and actual population growth within the AWU service area.

Attachment D Summary of Savings and Cost Estimates for Proposed Conservation Strategies

OCA Audited Estimated Water Savings and Customer Costs, Savings and Payback Periods only. Cost per gallon calculations are based on AWU-projected FTE, Vehicle and Additional Costs (i.e., rebate costs, etc.)

Calculated Water Savings in MGD for this Strategy
 Number of Addt'l FTEs needed for this Strategy
 Number of Addt'l Vehicles needed for this Strategy
 This is the cost of items such as: rebates to be offered
 This is a description of what the Additional Cost amount represents
 Total of (FTEs x \$60k) + (Vehicles x \$25k) + Addt'l Costs
 Total Costs divided by 10 years
 Total Costs divided by (MGD x 1,000,000)
 These are the costs to customers to meet requirements
 These are the savings to customer as a result of the program
 This is how long it takes the customer to recover costs thru savings

Recommended Indoor Strategies	Savings (MGD)	Addt'l FTEs	Addt'l Vehicles	Additional Costs	Description of Addt'l Costs	10-year Program Costs	Average Year City Cost	Total Cost per gallon saved	Cost to Customer	Savings to Customer	Customer Payback Period
Mandatory Toilet Retrofit	2.081	2.00	1.00	\$4,200,297	Rebates for toilet retrofits	\$5,425,297	\$542,530	\$2.61	0 - \$200	\$102.56 per year for 2 toilet household	0 - 3.9 yrs
Submetering	0.620	0.50	0.00	\$0		\$300,000	\$30,000	\$0.48	Landlord = \$125.00 Tenant = \$47.97 per month (prev paid by landlord)	Landlord = \$679.59/yr Tenant = \$103.97/yr	Landlord = 2.375 mo Tenant = none
Plumbing Code Changes	0.940	0.50	0.00	\$0		\$300,000	\$30,000	\$0.32	Varies by equip.	Varies by equip.	Varies by equip.
Cooling Towers	0.835	0.25	0.00	\$0		\$150,000	\$15,000	\$0.18	Large Tower = \$7,000 Small Tower = \$1,000	Large Tower = \$6,769.20 Small Tower = \$1,337.13	Large = 1.323 yrs Small = 2.269 mo.
Car Washes	0.152	0.25	0.00	\$0		\$150,000	\$15,000	\$0.99	None	\$1,319.13 per day for all car washes	No payback period
Total for Recommended Indoor Strategies	4.628	3.50	1.00	\$4,200,297		\$6,325,297	\$632,530				

Recommended Outdoor Strategies	Savings (MGD)	Addt'l FTEs	Addt'l Vehicles	Additional Costs	Description of Addt'l Costs	10-year Program Costs	Average Year City Cost	Total Cost per gallon saved	Cost to Customer	Savings to Customer	Customer Payback Period
Enhanced Water Use Management	6.155	3.00	3.00	\$7,250,000	Enhanced Public Education Strategy Cost as noted below.	\$9,125,000	\$912,500	\$1.48	None None	Residential = \$52.96/mo Commercial = \$39.56/mo	n/a n/a
Residential Irrigation Standards	1.319	4.00	2.00	\$0		\$2,450,000	\$245,000	\$1.86	Varies between \$230 and \$600 (incremental costs only)	\$30.73/mo for avg design std lot (5750 sqft)	7.48 to 19.53 months depending on cost of system
Commercial Irrigation Standards	0.742	2.00	0.00	\$0		\$1,200,000	\$120,000	\$1.62	Addt'l soil varies by sq ft needed. ET controllers range from approx \$200 - \$750	\$55.48 per month	Varies depending on total costs
Residential Landscape Ordinance	0.435	3.00	2.00	\$0		\$1,850,000	\$185,000	\$4.25	Cost of addt'l soil (6-inches) for avg design std lot (5750 sq ft) is \$2,875	\$20.49/mo for avg design std lot (5750 sqft)	11.69 years
WaterWise Landscape Option	0.213	0.50	0.00	\$0		\$300,000	\$30,000	\$1.41	Unknown - builders would set cost	\$19.86/mo	Varies depending on cost
Annual Irrigation System Analysis	1.473	2.00	0.00	\$120,000	10% estimated marketing costs	\$1,320,000	\$132,000	\$0.90	Varies between \$200 and \$800 depending on size of property	Res = \$139.67/mo per acre Comm = \$104.33/mo per acre	Varies depending on cost and size of property
Enhanced Irrigation Audit Program	0.632	2.00	2.00	\$125,000	10% estimated marketing costs	\$1,375,000	\$137,500	\$2.18	None - free audits	\$54.51/mo for avg 17,000 sq. ft. property at residential customer rates	n/a
Total for Recommended Outdoor Strategies	10.969	16.50	9.00	\$7,495,000		\$17,620,000	\$1,762,000				

Recommended City/Utility Strategies	Savings (MGD)	Addt'l FTEs	Addt'l Vehicles	Additional Costs	Description of Addt'l Costs	10-year Program Costs	Average Year City Cost	Total Cost per gallon saved	Cost to Customer	Savings to Customer	Customer Payback Period
Reducing Water Loss	4.800	0.00	0.00	\$6,000,000	Cost of Leak Detection Contract	\$6,000,000	\$600,000	\$1.25	n/a	n/a	n/a
Reclaimed Water Use	5.948	0.00	0.00	\$12,500,000	CIP costs to extend re-use main lines (NOTE: to be done within first 5 years)	\$12,500,000	\$1,250,000	\$2.10	Customers would have varying costs depending on the number of connections (ie., backflow preventers, etc.)	Customers would pay for reclaimed water at a lower rate than for potable water.	Varies depending on cost
Utility Water Rates	5.000	0.00	0.00	\$0		\$0	\$0	\$0.00	n/a	n/a	n/a
Wet Ponds, Ormml Ponds, & Green Roofs	Strategy not accepted by WCTF			\$0		\$0			n/a	n/a	n/a
Alternative Water Sources	Not calculated	0.50	0.00	\$0		\$300,000	\$30,000		Unknown	\$299.67/mo	Varies depending on cost
City Facility Conservation Requirements	0.372	0.00	0.00	\$58,000	Cost to replace toilets and to install ET controllers	\$58,000	\$5,800	\$0.16	Cost of ET Controllers purchased by PARD would vary depending on number & Size	PARD would pay for reclaimed water at a lower rate than for potable water.	n/a
Pressure Reduction Program	0.294	0.00	0.00	\$270,000	Rebates for PRV retrofits	\$270,000	\$27,000	\$0.92	Cost of Pressure Reduction Valve (PRV) varies - installed by builder for new homes /installed by lic plumber for older homes (rebate program)	\$8.39/mo for new customers \$14.67/mo for older customers thru rebate program	Varies depending on cost of PRV and installation
Winter Leak Detection Program	0.312	0.25	0.00	\$0		\$150,000	\$15,000	\$0.48	n/a	\$30.63/mo for residential customers	n/a
Enhanced Public Education	There were no water savings associated with this strategy. Estimated program costs are shown as Additional Costs for the Enhanced Water Use Management Strategy shown above.										
Commercial Clothes Washer Program	0.433	0.25	0.00	\$0		\$150,000	\$15,000	\$0.35	Cost of washers varies	\$0.10 per load at current Multi-Family Rates	Varies depending on cost of washers
Total for Recommended City/Utility Strategies	17.159	1.00	0.00	\$18,828,000		\$19,428,000	\$1,942,800				

Totals for all Strategies	32.757	21.00	10.00	\$30,523,297		\$43,373,297	\$4,337,330				
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