Southwest Oklahoma
Water Supply Action Plan

Near-term Implementation

Mid-term Implementation

Long-term Implementation

Enhancing Water Supply Reliability for All of Southwest Oklahoma

REPORT | May 2014

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SOUTHWEST OKLAHOMA

WATER SUPPLY ACTION PLAN

FINAL
May 2014

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WATER SUPPLY ACTION PLAN

TABLE OF CONTENTS

Page

1.0 ACTION PLAN PURPOSE AND GOALS 1
2.0 REGIONAL WATER SUPPLY OVERVIEW 1
2.1 Regional Water Supply Sources 1
2.2 Projected Water Demands 2
2.3 Water Supply Issues and Ongoing Actions 3
3.0 WATER SUPPLY ACTION PLAN 3
3.1 Overview of the Action Plan 3
3.2 Near-Term Strategies 8
3.2.1 Additional Water Conservation 9
3.2.2 Drought Response Plan 10
3.2.3 Additional Groundwater Supplies 10
3.2.4 Southwest Oklahoma Water Supply Action Plan Advisory Committee 12
3.3 Mid-Term Strategies 13
3.3.1 Non-potable Reuse of Treated Effluent 13
3.3.2 Rehabilitate City of Altus Reservoir 14
3.3.3 Divert Additional Flows to Existing Storage 14
3.3.4 Interconnection of Distribution Systems 15
3.4 Long-Term Strategies 16
3.4.1 New or Expanded Reservoir Development 16
3.4.2 Potable Reuse of Treated Effluent 16
3.4.3 New Transbasin Sources 17
3.5 Next Steps 18

LIST OF APPENDICES

Appendix A Summary of County Level Demand Projections
Appendix B Summary of Previous Reports
Appendix C List of Referenced Reports

LIST OF TABLES

Table 1 Water Supply Strategies and Actions 4

LIST OF FIGURES

Figure 1 Phased Implementation Plan 7

1.0 ACTION PLAN PURPOSE AND GOALS

Scarcity of water resources has been a part of life in Southwest Oklahoma since before statehood. Residents and farmers in this part of the state have always had to be diligent and creative in working to capture as much water as possible during the wet years to get them through the dry years that are prevalent in Southwest Oklahoma.

The Territorial Legislature recognized the difficult situation facing Western Oklahoma farmers. In 1897, the Legislature provided tax incentives to individuals who constructed and maintained irrigation systems. A tax deduction of eight dollars for the first acre, four dollars for the second, and one dollar for each additional acre was allowed for impounded water.

The history of this region is peppered with stories and examples of early day residents attempting develop the water resources of the region. These include W.H. Fullerton's 1890 Turkey Creek reservoir and irrigation system, primitive dams across the North Fork of the Red River, and a number of wells in the region. These efforts culminated in the development of the Lugert-Altus irrigation project, which was completed in 1947.

As population in the region continued to grow, providing drinking water for Altus and the surrounding communities was becoming more and more challenging. In 1960, communities in the area began working with the Bureau of Reclamation to develop additional water resources near Mountain Park. With the much help from U.S. Representative Tom Steed, a dam was completed on Otter Creek in 1975. Since then, the Tom Steed Reservoir and Mountain Park Master Conservancy District (MPMCD) has been providing municipal water to Altus, Snyder, Frederick and Mountain Park.

The area has continued to experience growth, and with it, the challenges of providing a reliable source of good quality water. The goal of the Southwest Oklahoma Water Supply Action Plan is to bring the communities in the region together to work collectively toward securing the future of the region for decades to come. This Southwest Oklahoma Water Supply Action Plan (referred to below as the SWAP, or Action Plan) identifies steps to be taken to move Southwest Oklahoma forward in the face of increasing drought and securing a sustainable economy for generations to come.

2.0 REGIONAL WATER SUPPLY OVERVIEW

2.1 Regional Water Supply Sources

Southwest Oklahoma relies on a combination of surface water (streams, rivers, and reservoirs) and groundwater aquifer supplies (including shallow alluvial wells and deep bedrock groundwater wells). The 2012 Oklahoma Comprehensive Water Plan (OCWP) reported that surface water supplies 38 percent of demand in the region, with alluvial and bedrock groundwater supplying the remaining 28 percent and 34 percent of demand, respectively.

As documented in the OCWP, the following are the major water supply sources in Southwest Oklahoma:

- Surface water: The region is supplied by three major rivers: the North Fork of the Red River, the Elm Fork of the Red River, and the Salt Fork of the Red River.
- Alluvial groundwater: The majority of currently allocated alluvial groundwater withdrawals in the region are from the North Fork of the Red River aquifer, Tillman Terrace aquifer, and from non-delineated minor aquifers.
- Bedrock groundwater: Currently allocated and projected withdrawals are primarily from the Blaine and Ogallala major bedrock aquifers, and to a lesser extent, the Elk City and minor aquifers.

Water supply availability and water quality present significant challenges for surface water and groundwater alike. Surface water resources can be vulnerable to extended drought conditions, even with significant reservoir storage, and surface water permits are fully allocated in portions of the region. Surface water quality issues include elevated levels of total dissolved solids (TDS) and sulfates, posing issues for public water suppliers and crop irrigators alike. Decreasing water levels in storage in both the Lugert-Altus project and Tom Steed Reservoir has shown a direct correlation to water quality impacts as well. The OCWP noted that the Area VI chloride control project on the Elm Fork of the Red River has been studied for many years by the U.S. Army Corps of Engineers, and may be a potential viable source of additional water through diversion to existing infrastructure or pumped directly into Lugert-Altus Reservoir.

The OCWP projected that the continued use of alluvial groundwater in Southwest Oklahoma could cause withdrawals to exceed recharge rates in some areas, particularly in summer. However, there are significant quantities of groundwater in storage. The OCWP also forecasts that bedrock groundwater withdrawals will exceed recharge rates in many parts of the region, but again referenced the seasonality of those impacts and the large volumes of water in the region's deep aquifers. However, water quality constraints do affect the use of the region's groundwater supplies. High mineral content, TDS, and nitrates and other parameters across the region can affect the ability to use groundwater supplies for potable water supply or irrigation or drive a need to treat or blend those supplies before use.

2.2 Projected Water Demands

The SWAP was initiated by a proactive group of water interests, comprised largely of Public Water Suppliers, AAFB representatives, agricultural producers, and involved members of the public and local economies. The intent of the SWAP is to provide an implementable plan to firm up the reliability of supplies for all water users in the region.

The OCWP projected water demands from a 2010 baseline estimate of water use out to 2060 in 10-year increments, aggregating demands for each water use sector on a county level and on a watershed or "basin" level. Appendix A presents the OCWP county-level demand projections for Jackson, Tillman, Harmon, and Greer Counties, the four counties most directly driving the SWAP. The OCWP's defined water use sectors include Public

Water Supply (including municipalities and rural water districts), self-supplied residential (e.g., domestic well users), crop irrigation, livestock, oil and gas, thermoelectric power, and self-supplied industrial (not on a public water supply system). Of these seven water use sectors, crop irrigation comprises about 93 percent of the four-county demand. Public water supply represents 5 percent of the demand, with lesser use but important economic contributions coming from all remaining sectors.

2.3 Water Supply Issues and Ongoing Actions

The extended drought from late 2010 through the present has directly impacted all of Southwest Oklahoma. As such, reliability of supplies is at the forefront of public attention and a daily challenge for water providers and users across Southwest Oklahoma. As noted above, water quality challenges are exacerbated by decreased reservoir levels under drought conditions. Southwest Oklahomans have responded positively, however, with significant curtailment of water use to help manage limited supplies through these times of drought. MPMCD staff report that its customers have reduced use some 40 percent in response to the low lake levels and continued drought. In addition, several water suppliers are actively pursuing additional groundwater supplies to increase supply reliability, as further detailed in the Action Plan below. Furthermore, conservation programs and drought management actions are being employed more than at any time in the region's history to address supply limitations now and into the future.

The City of Altus is actively working to bring its existing reverse osmosis (RO) water treatment facility back online, to provide greater flexibility in the City's ability to treat water from Lake Altus when necessary, address disinfection byproduct water quality concerns, and provide for possible future treatment of groundwater supplies if/as needed. The RO facility was shut down in 2011 due to significant water losses (low treated water recovery rates), high operating costs, and operational issues. The facility will use different pretreatment technology (conventional treatment instead of ultrafiltration) to address those issues.

3.0 WATER SUPPLY ACTION PLAN

3.1 Overview of the Action Plan

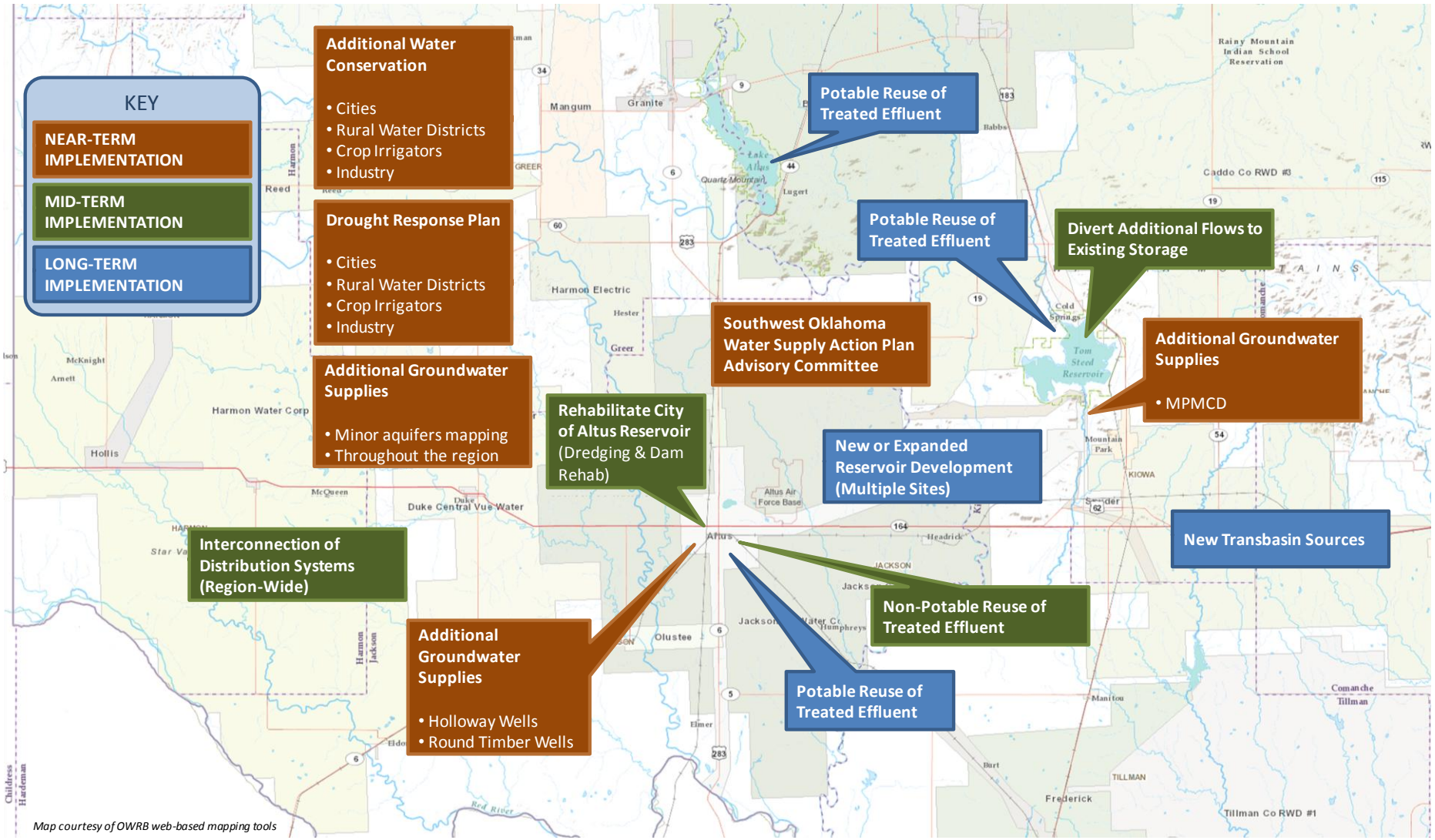
The Southwest Oklahoma Water Supply Action Plan ("SWAP" or "Action Plan," for short) was developed through a detailed review of past studies and reports, coupled with a series of meetings with key water stakeholders in the region that represent a diverse set of water interests and uses. A summary of key information from past reports is provided in Appendix B, and a list of referenced reports is included as Appendix C.

The Action Plan (Table 1) provides a phased, targeted approach to addressing near and long-term water supply improvements, driven largely by the amount of time needed to implement each water supply strategy. Phased implementation of the major Action Plan components is also depicted on Figure 1.

Table 1 Water Supply Strategies and Actions				
Water Supply Strategies	**Components**	**0- to 2-Year Action Plan**	**2- to 5-Year Action Plan**	**5+ Year Action Plan**
Near-Term Implementation: Increase Efficiency / Local Supplies				
Additional Water Conservation	• Additional efficiency measures for Public Water Supply systems, including Altus AFB, and Crop Irrigation	• Inventory and document existing conservation measures and practices (PWS and Crop Irrigation) • Identify and share best practices (PWS and Crop Irrigation) • Assess potential costs and water savings of lining LAID canals • Evaluate Oklahoma Comprehensive Water Plan savings by county and determine applicability of OCWP measures • Develop/update conservation plans and programs (PWS and Crop Irrigation) • Identify crop irrigation research project and submit for USDA's National Integrated Water Quality Program (NIWQP) grant	• Consider implementation of additional more aggressive conservation measures • Monitor and adjust conservation plans • Potentially implement initial phase of LAID canal lining	• Monitor and adjust conservation plans • Potentially implement remaining phases of LAID canal lining
Drought Response Plan	• Specific actions to be taken at specific supply trigger points • Consistency between users of shared surface water resources • Phased response plan to reflect stages of supply shortages	• Inventory and document existing drought response triggers and measures (PWS and Crop Irrigation) • Identify and share best practices • Consider Unified Drought Response Plan for users of shared surface water supplies	• Monitor and adjust drought response triggers and plans	• Monitor and adjust drought response triggers and plans
Additional Groundwater Supplies	• Augmentation of Tom Steed supplies in transmission with new alluvial wells • Additional groundwater wells to augment existing supplies (Public Water Supply systems, including Altus AFB, and Crop Irrigation) • Reinstate Altus Round Timber wells and transmission line • Red River Chloride Control Project (local implementation and Bureau of Reclamation Upper Red River Basin Study)	• Evaluate groundwater/surface water quality compatibility for transmission lines (Tom Steed and other blended supplies) • Evaluate groundwater/surface water flow interaction in North Fork Red River • Map regional groundwater resources based on known wells yield and quality • Identify most viable well sites (potential yield, water quality and treatment requirements, volume in storage, recharge rates, proximity to users) • Identify additional groundwater sources for Mountain Park MCD customers to take additional pressure off Tom Steed Reservoir • Monitor/participate in Bureau of Reclamation Basin study	• Investigate potential use of Tillman Terrace aquifer for City of Altus or others • Confirm permit availability for additional targeted groundwater wells • Funding/financing plan • Ongoing groundwater monitoring (levels and quality) • Update North Fork Red River maximum annual yield study/hydrologic survey • Implement recommendations of Bureau of Reclamation Basin study	• Consider need for additional groundwater wells • Ongoing groundwater monitoring (levels and quality)

Table 1 Water Supply Strategies and Actions				
Water Supply Strategies	**Components**	**0- to 2-Year Action Plan**	**2- to 5-Year Action Plan**	**5+ Year Action Plan**
Southwest Oklahoma Water Supply Action Plan Advisory Committee	• Cooperative committee to monitor and steer implementation of Action Plan	• Form committee to drive joint accountability and implementation of Southwest Oklahoma Water Supply Action Plan • Provide single source for relevant studies and data • Coordinate, advocate for, and monitor Action Plan implementation • Develop an integrated capital improvements plan	• Continued monitoring and adaptive management of Action Plan; update Action Plan (and CIP) as needed	• Continued monitoring and adaptive management of Action Plan; update Action Plan (and CIP) as needed
Mid-Term Implementation: Enhance Existing Supplies				
Non-Potable Reuse of Treated Effluent	• Irrigation, industrial, and other non-potable reuse applications consistent with ODEQ non-potable water reuse regulations	• Develop Altus and AFB Reuse Plan (inventory supply availability from water reclamation facilities, compare effluent quality to ODEQ regulatory requirements, identify large water use sites/customers and screen for potential non-potable uses) • Customer and public outreach	• Consider applicability of reuse for smaller communities • Develop funding/financing plan • Design initial phase of Altus/AFB non-potable reuse plan	• Implement initial phase of Altus/AFB non-potable reuse plan • Implement non-potable reuse system expansion
Rehabilitate City of Altus Reservoir	• Dredging to recuperate capacity • Rehabilitation of dam	• Evaluate benefits and costs of dredging and dam rehabilitation to maintain capacity and asset longevity	• Preliminary planning and design of improvements, as appropriate based on evaluation of costs and benefits	• Implementation of improvements, as appropriate based on evaluation of costs and benefits
Divert Additional Flows to Existing Storage	• Additional creek diversions to Tom Steed Reservoir • Other diversion opportunities	• Inventory previous work on additional diversions and identify/prioritize potential opportunities • Estimate additional yield and cost for widening Elm Creek Diversion Channel into Tom Steed	• Develop funding/financing plan • Widen Elm Creek Diversion Channel to increase capacity and flows into Tom Steed • Assess potential sizing/yield/cost for new diversion into Tom Steed	• Design, construct, and implement new diversion from creek(s) into Tom Steed • Monitor yield of additional diversions
Interconnection of Distribution Systems	• Add piping interconnections for emergency and/or regular supply sharing between systems (municipal, rural and military water systems)	• Compile mapping of existing transmission and distribution systems • Identify and cost options for redundant Altus AFB connections • Estimate costs and prioritize system interconnections • Identify funding/financing vehicles	• Develop interlocal agreements • Planning, design, and construction of priority interconnections • Evaluate connecting Cache to Lawton to take additional pressure off Tom Steed during drought	• Continued operation of interconnected systems • Identification of additional cost-effective interconnection opportunities

Table 1 Water Supply Strategies and Actions				
Water Supply Strategies	**Components**	**0- to 2-Year Action Plan**	**2- to 5-Year Action Plan**	**5+ Year Action Plan**
Long-Term Implementation: Implement New Sources of Supply				
New or Expanded Reservoir Development	• Additional NRCS dams • Reassess feasibility of raising Lugert and/or Tom Steed dams • Consider new surface water reservoir	• Inventory potential NRCS sites • Integrate analyses of new reservoir sites and/or raising existing dams, yields, and costs into Bureau of Reclamation Basin study	• Prioritize one or more reservoir sites for permitting and funding/financing plan	• Implement reservoir project, contingent on 0-5 year Action Plan results
Potable Reuse of Treated Effluent	• Consider augmentation of existing surface water supplies with treated effluent (indirect potable reuse) • Consider direct potable reuse (water reclamation plant followed by advanced water treatment and distribution)	• Initial public outreach • Monitor ODEQ regulatory process • Coordinate availability of treated effluent with non-potable reuse plans	• Continue public outreach • Define treatment and infrastructure requirements for indirect or direct potable water reuse; develop conceptual infrastructure schematic; develop planning-level costs • Determine role of potable reuse in light of other mid-term and long-term supplies • Develop potable water reuse implementation plan (if applicable)	• Continue public outreach • Implement potable water reuse projects (indirect or direct potable reuse)
New Transbasin Sources	• Evaluate feasibility of new transbasin supplies	• Monitor and evaluate regional/state processes evaluating major transbasin supply projects • Compare costs, benefits, and implementation challenges to alternate approaches	• Continue to monitor regional/state processes • Initiate detailed study if/as appropriate	• Initiate implementation if/as appropriate



Map courtesy of OWRB web-based mapping tools

PHASED IMPLEMENTATION PLAN

FIGURE 1

SOUTHWEST OKLAHOMA
WATER SUPPLY ACTION PLAN

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pw://Carollo/Documents/Client/OK/Altus/9501A00/Deliverables/Figure 1

Strategies are outlined in three groups:

- **Near-term implementation strategies** expand on the region's successes in making efficient use of existing supplies, and also includes measures that can increase water supply or enhance water supply planning starting immediately.
- **Mid-term implementation strategies** are designed to supplement or enhance existing supplies in the region. These strategies require more time for implementation, but do not have significant institutional, regulatory, or technical hurdles to overcome.
- **Long-term implementation strategies** focus on implementation of new water supply sources. Long-term strategies have the longest implementation time because of the regulatory, financing, and/or technical challenges associated with developing new water supply sources.

Near-term strategies are first and foremost intended to reduce drought vulnerabilities in the region. These actions are strongly recommended – even if normal precipitation returns to the region in the near future – to increase the number and types of supply sources available to Southwest Oklahoma water users. These actions will not only help increase supply reliability under the current drought conditions, but equally importantly, will strengthen the ability of Southwest Oklahoma water users to prepare for and mitigate the effects of the inevitable next drought.

For each near-term, mid-term, and long-term water supply strategy, the Action Plan identifies one or more components with specific actions on an implementation timeline. The timeline organizes the implementation actions for each supply strategy into the following time frames:

- 0- to 2-Year Action Plan.
- 2- to 5-Year Action Plan.
- 5-Year and Beyond ("5+ Year") Action Plan.

The timeline provides sequential steps for implementation of the recommended strategy so that the resulting water supply can be available when it is needed. For example, while a new reservoir is a long-term strategy, there are activities that need to be completed sooner (e.g., site identification and permitting) that can take years – or even a decade or more for some projects – to complete.

3.2 Near-Term Strategies

The SWAP identifies four near-term strategies:

- Additional water conservation,
- Develop drought response plan,
- Additional groundwater supplies, and
- SWAP Advisory Committee.

Table 1 provides 0- to 2-Year, 2- to 5-Year, and 5+ Year actions for each of these strategies, as described below.

3.2.1 Additional Water Conservation

Increasing water use efficiency through additional conservation measures and programs is a key component of managing supplies for reliability and cost-effective use. Conservation is a vital strategy for public water suppliers (for example, the Town of Snyder, City of Altus, Jackson County Water Corporation), and military users (Altus Air Force Base, or AAFB) and crop irrigators. There may be opportunities for industrial water users and other water use sectors to increase efficiencies as well.

Conservation measures and programs are activities that water users engage in everyday, regardless of whether the region is in drought, and represent consistent water savings. Everyday conservation actions can directly translate into drought preparation and mitigation, by reducing water use that in turn alleviates demand on surface water reservoirs and other existing supplies, and maintains greater supplies in storage for use in times of drought.

The Action Plan calls for developing and updating conservation plans, implementing the programs, and monitoring and adjusting conservation plans and programs to maintain or improve efficiency.

During the 0- to 2-year period, stakeholders will build upon existing programs that are already in place. They will review previous studies and accepted best practices to determine which additional conservation activities are most likely to be embraced by their customers (and thus result in the most efficient use of local supplies). Conservation activities may include increased metering, increasing tiered rate structure, community education, or others. The City of Altus is also investigating potential grants to start replacing meters in its distribution system with smart meters that can provide more direct feedback to users and aid in conservation efforts.

This includes assessing the costs and potential water savings of Lugert-Altus Irrigation District (LAID) canal lining, validating the potential savings identified in the Oklahoma Comprehensive Water Plan (OCWP) conservation analyses for public water supply and crop irrigation systems in Southwest Oklahoma counties, and developing or updating conservation plans for each public water supply system using Tom Steed Reservoir, AAFB, and irrigation districts. The 0- to 2-Year Action Plan also calls for identifying crop irrigation research needs and applying for a USDA grant to support the research.

Implementation of additional conservation programs stemming from those plans is shown in the 2- to 5-Year Action Plan period. During this time (and continuing through the future), the effectiveness of the conservation programs is evaluated and adjustments are made to continue activities that improve water use efficiency and modify or eliminate programs that do not have a positive impact on water savings. Additionally, large-scale conservation projects, like lining irrigation canals or widespread implementation of efficient landscape or crop irrigation technologies, can be phased to better match available capital funds.

Appendix B provides information on potential conservation savings from two past reports. The *Appraisal Report for Water Supply Augmentation of W.C. Austin Project, Oklahoma* estimated approximately 14,000 acre-feet per year (AFY) of water savings through the replacement and installation of new measurement structures, additional remote monitoring, and new regulating reservoirs within the LAID canals. The *2012 Update to the Oklahoma Comprehensive Water Plan* (2012 OCWP) evaluated how moderate and substantially expanded conservation activities affects water demand projections. Projected water savings for the Southwest Oklahoma counties from 2012 OCWP conservation activities are summarized in Appendix B. The 2012 OCWP estimated approximately 3,000 AFY of water savings in Southwest Oklahoma by implementing a moderate level of additional conservation for public water suppliers and approximately 32,000 AFY of water savings for a moderate level of additional conservation activities for irrigated agriculture.

3.2.2 Drought Response Plan

A drought response plan describes activities that are used temporarily during water supply shortages. Unlike conservation measures, drought response measures are not employed under normal supply conditions. An example of a drought response measure is limiting outdoor watering in communities when lake levels reach a pre-determined low level. Users of Tom Steed Reservoir supplies have already shown significant temporary reductions in their use by employing drought management measures during the current extended drought.

The intent of this strategy is to:

- Share best practices in drought management.
- Document drought management “trigger points” and phased drought response actions for major water users throughout Southwest Oklahoma, tailored to local systems and needs.
- Provide additional consistency in how demands are managed during regional droughts, particularly where there are multiple users of a single surface water supply source.

The first activities, shown in the 0- to 2-year period, are to determine what drought response measures are being used within the region currently, then use the best practices to consider implementation of a unified drought response plan. The unified plan would provide specific actions to be taken at specific water supply trigger points and be applicable to all users of a shared water supply. Following implementation of the drought response plan, the effectiveness of the program should be monitored and adjusted as necessary, as shown in the 2 to 5 and greater than 5-year periods.

3.2.3 Additional Groundwater Supplies

This strategy reinstates existing unused groundwater wells and adds new groundwater wells to increase local water supply. Having a “balanced portfolio” of surface water and groundwater supplies will help users throughout the region better manage supplies and

increase supply reliability. This includes taking advantage of surface water in wetter years, and reducing surface water use by increasing groundwater use in dry times.

To implement this strategy, the Action Plan calls for investigation of groundwater quantity and quality, assessing the compatibility of blending groundwater and surface water, and identifying the most viable well sites in the 0- to 2-year timeframe. Later activities focus on acquiring permits, funding, and implementing recommendations (new wells, rehabilitating existing wells, treatment, etc.) along with continuing monitoring of groundwater supplies. Key elements of this strategy include:

- Reinstating the City of Altus Round Timber and Holloway wells in north Texas.
- Investigating new well sites and implementing wells in rural water districts and other outlying areas.
- Addition of wells by the Mountain Park Master Conservancy District (MPMCD) to augment Tom Steed Reservoir supplies and increase water delivery capacity to MPMCD customers.

The City of Altus is actively working to bring the Round Timber and Holloway well fields back online, supported in part by an Oklahoma Emergency Drought Relief Commission grant awarded in early 2014. The wellfield ceased operation years ago due to high operating costs and treatment requirements during times of high surface water availability. Bringing the wells back online is intended to extend the yield of Tom Steed Reservoir and improve water quality through blending the groundwater and surface water supplies.

Engineering analyses and permitting work are underway to bring the wellfields back online as soon as practical. This includes rehabilitating existing wells and a pump station, and drilling two new wells. Altus anticipates having about 700,000 gallons per day of Holloway well capacity online by late 2014 and an ultimate delivery capacity of about 2 million gallons per day (mgd). In a second phase of the project, Altus will be developing a new 12-inch diameter pipeline (parallel to the existing 18-inch pipeline) for transmission of the water to Altus, and is evaluating treatment needs and approaches to meet potable water quality standards. Initial phases of the reinstated well water could be online later in 2014. Altus may also consider adding groundwater from the TIllman Terrace aquifer in the future.

Similarly, adding new groundwater supplies throughout the region will be beneficial in mitigating regional drought vulnerabilities. However, the minor aquifers in rural areas of the Southwest region have not been mapped or studied in detail, leaving significant questions about the potential well yields, available supplies in aquifer storage, water quality, and treatment needs associated with their use. Many wells in the region are reported to exhibit high salinity levels and/or elevated concentrations of nitrates, making them unusable for potable supply without advanced treatment or blending. Consequently, upfront studies to better map the availability and quality of minor aquifers and identification of favorable well sites is among the early (0- to 2-year) actions in support of this strategy. Identifying additional local groundwater sources as part of MPMCD customers' supply portfolios will also help alleviate pressure on Tom Steed Reservoir supplies.

The MPMCD has initiated work with the Bureau of Reclamation to investigate the implementation of new groundwater wells in areas downstream (south) of the Mountain Park Dam. MPMCD is evaluating siting options for new wells that would pump groundwater into the existing raw water transmission lines to Altus and/or Snyder. Existing agricultural wells downstream of the dam, drilled to a depth of about 100 feet, exhibit significant well yields and good water quality. As part of its investigations, water quality, well yields, and the chemical compatibility of the new groundwater sources with raw water from Tom Steed Reservoir should be investigated to ensure no precipitative reactions or other incompatibilities will arise when blending these sources in the pipelines. Once implemented, the MPMCD wells will augment the reservoir's deliveries to MPMCD's customers and bolster supplies, particularly during drought.

Stakeholders should coordinate with the OWRB to obtain relevant groundwater data from the OWRB's recently-initiated Groundwater Monitoring and Assessment Program (GMAP) as those data become available. For example, the North Fork of the Red River and the Salt Fork of the Red River alluvial aquifers will both have data collected under GMAP in 2014, with Blaine aquifer data to be collected in 2015.

In related work, stakeholders in the region should evaluate groundwater/surface water flow interactions in the North Fork of the Red River in order to identify potential interferences with uses. Currently, the U.S. Bureau of Reclamation is conducting a study of water supplies in the Upper Red River Basin. Stakeholders should monitor and participate in this study as it may result in recommendations that, if implemented, could increase available local water supplies.

In the 2- to 5-year time frame, this strategy includes confirming permit availability for the targeted groundwater well additions, developing a funding/financing plan for the new infrastructure, monitoring groundwater levels and quality on an ongoing basis, working with OWRB to update the North Fork Red River maximum annual yield study and hydrologic survey, and working with the Bureau of Reclamation to implement recommendations from the Upper Red River Basin study. Beyond 5 years, water providers and users should monitor and consider the need for additional groundwater wells and participate in ongoing groundwater monitoring for water levels and water quality trends.

Two previous studies are summarized in Appendix B. One describes reinstating the City of Altus Round Timber Well Field, which is estimated to have a long-term yield of 1.2 mgd and peak supply of 2.5 mgd. This preliminary study indicated that existing wells and transmission pump station would need to be rehabilitated as well as treatment provided to address nitrates, coliform, and iron. As noted above, additional investigations and engineering work are now underway to finalize plans and implementation schedules. A separate study evaluated aquifer recharge to the Blaine Aquifer. It indicated that an average recharge rate of 70 AFY per well could be achieved, thus increasing groundwater supply availability for users in the region.

3.2.4 Southwest Oklahoma Water Supply Action Plan Advisory Committee

This strategy recommends formalizing the membership and roles of an advisory committee to monitor and drive the implementation of the SWAP. Users throughout the region have

already informally organized an ad-hoc committee in recognition of the importance of having an adequate water supply. Through this project, that group has reinforced a regional approach to water supply planning that benefits all users. The SWAP Advisory Committee would formalize the committee and would be responsible for coordinating ongoing updates to the Action Plan while monitoring implementation of the water supply strategies.

The Advisory Committee will develop more specific action items for each strategy, including accountability of specific entities responsible for each strategy with specific schedule milestones to be tracked by the Advisory Committee. The Advisory Committee will also develop a common repository for relevant water supply and water quality data, including the studies compiled during development of this Action Plan. Coordination with the Oklahoma Water Survey will also be an important part of making relevant data accessible to water planners and users.

The Advisory Committee will also be responsible for developing an integrated capital improvements plan (CIP). The purpose of this CIP is to provide stakeholders with a comprehensive planning level cost (not just the cost for individual programs like conservation or interconnection between systems that would be developed as part of the individual evaluations). Since it is unlikely that there is a single water strategy (especially in the near and mid-terms) that can meet the region's water demands, a combination of strategies will be used to meet water needs. The integrated CIP provides a format for packaging supply options and reflecting on combined costs. Initially the CIP projects would be general and have conservative costs, but, as the projects are refined, the CIP would be updated to reflect the selected alternatives and better cost estimates.

The Advisory Committee is not responsible for actual implementation of strategies, as this is the responsibility of the individual stakeholders. However, the Committee serves as an accountability partner so that strategies for managing and developing existing and new supplies are coordinated with one another and progressing toward execution in a timely manner. The Advisory Committee also serves as a forum for discussing adjustments and updates to the SWAP.

3.3 Mid-Term Strategies

The SWAP identifies three mid-term strategies:

- Non-potable reuse of treated effluent,
- Rehabilitate Lake Altus (City of Altus Reservoir)
- Divert additional flows to existing storage, and
- Interconnection of distribution systems.

Table 1 provides 0- to 2-Year, 2- to 5-Year, and 5+ Year actions for each of these strategies, as described below.

3.3.1 Non-potable Reuse of Treated Effluent

Non-potable reuse provides a way to beneficially use treated wastewater effluent from water reclamation facilities while offsetting the use of potable supplies for applications that

do not require potable-quality water. An example of non-potable reuse is irrigation of a golf course by pumping treated water meeting Oklahoma Department of Environmental Quality (ODEQ) standards from the treatment facility to the golf course.

The first steps in the Action Plan are to inventory available supplies from water reclamation facilities in the region and evaluate compatibility with potential non-potable uses for larger irrigation and industrial water use sites. Facilities with surface water discharges and those with mechanical treatment facilities (e.g., City of Altus, rather than non-discharging systems and lagoons) are more likely to meet ODEQ treatment and water quality requirements. Development of non-potable water reuse plans are included in the first phase of implementation for the City of Altus and the AAFB.

Lessons learned from initial efforts in larger communities can be extended to smaller communities in later periods. Design of the first phase of non-potable reuse for larger stakeholders is shown in the 2- to 5-Year Action Plan, with implementation occurring in the greater than 5-Year Action Plan. There may also be opportunities for intergovernmental cooperation on water reuse, such as the potential to supply reclaimed water from the City of Altus' facility to the AAFB for use in nonpotable irrigation and industrial applications on the base.

The 0- to 2-Year Action Plan also recommends beginning customer and public outreach and education. Open communication and consistently addressing public concerns about reuse are effective at cultivating support and changing preconceived perceptions about reuse. The key is to begin education and outreach soon, so when the water provider is ready to implement a reuse project, the public is not surprised. There is a wealth of public outreach guidance material available from industry organizations such as the WateReuse Association.

3.3.2 Rehabilitate City of Altus Reservoir

Maintaining existing water storage and delivery assets is of critical importance for their continued use as part of the region's water infrastructure and reliable water resources portfolio. This action calls for maintaining the City of Altus' existing reservoir. In the initial two-year action period, the costs and benefits of dredging the reservoir to recover storage capacity lost to sedimentation will be investigated. At the same time, an assessment of dam rehabilitation needs and costs will be conducted for this reservoir. Subsequent activities in the 2-to-5 year planning period and the longer-term planning period include detailed planning, design, and implementation of the dredging and dam improvements as appropriate, based on the findings of the initial investigations.

3.3.3 Divert Additional Flows to Existing Storage

During times of drought, low lake levels at Lake Altus and Tom Steed Reservoir provide clear visual evidence of supply limitations. However, in times of higher precipitation and runoff, there are significant stream flows in the vicinity of these reservoirs that go uncaptured due to infrastructure limitations. This water supply strategy proposes assessing additional creek diversions to Tom Steed Reservoir as well as other potential diversion opportunities. In the 0- to 2-Year Action Plan, evaluation and costing of potential diversions

are conducted, This will start with an inventory of the evaluations that have already been completed, and prioritizing among the potential diversion opportunities.

One concept that shows significant potential is widening the existing Bretch Diversion Canal that is used to convey flows diverted from Elm Creek to Tom Steed Reservoir. Preliminary assessments by the MPMCD indicate that the diversion structure has excess capacity, such that the constraint on the ability to divert flows is associated with the capacity of the canal. Building on this initial assessment, the 0- to 2-Year Action Plan calls for estimating the cost and additional yield for widening the canal.

In the 2- to 5-Year Action Plan, a funding/financing plan and design and construction for the canal widening should be completed. If technically and economically feasible, this strategy can provide additional water supply to the region within 5 years. The 2- to 5-Year Action Plan also calls for assessing diversion of additional creek flows into Tom Steed, including a creek east of the reservoir that could potentially have flow diverted by gravity into the reservoir. If feasible, new diversions into Tom Steed Reservoir would likely be implemented in the greater than 5-year timeframe.

3.3.4 Interconnection of Distribution Systems

This water supply strategy builds upon existing interconnections between public water supply systems and adds additional interconnections. Interconnections can be operated on an ongoing basis or on an emergency-only basis, and can be used to share untreated water supplies or potable-quality water between neighboring systems. The 2012 update of the Oklahoma Comprehensive Water Plan included an inventory of existing public water supply system interconnections in Southwest Oklahoma in the Southwest Watershed Planning Region Report.

The purpose of the interconnections is to provide diversity in supply sources and strengthen reliability. For example, during a drought when surface water supplies are low, it is helpful to have groundwater as an alternate supply. Alternatively, when an individual supply source (e.g., a groundwater pump) is temporarily out of service, access to alternate supplies helps reduce impacts to the system's customers. In addition, the AAFB has expressed interest in increasing its water supply redundancy, which could be achieved in whole or in part by increasing regional supply interconnections.

Increasing the connectivity between public water supply systems increases access to a diversity of supply sources for all connected systems. In the 0- to 2-Year Action Plan, compiling and reviewing transmission and distribution system maps is proposed to confirm existing system interconnections and their use, and to determine where new interconnections make sense in terms of supply redundancy and capital costs. In the 2- to 5-Year Action plan, interagency agreements can be made along with design and construction of the priority connections. Other potential connections, such as connecting Cache to Lawton's supply for use in times when Tom Steed Reservoir is low but Lawton's lakes are less impacted (such as in 2014) could be explored during this timeframe. If the connections are phased, the second phase could be completed in the greater than 5-year timeframe.

3.4 Long-Term Strategies

The SWAP identifies three long-term strategies:

- New or expanded reservoir development,
- Potable reuse of treated effluent, and
- New transbasin sources.

Table 1 provides 0- to 2-Year, 2- to 5-Year, and 5+ Year actions for each of these strategies, as described below.

3.4.1 New or Expanded Reservoir Development

This supply strategy evaluates increasing water supply using a new reservoir or modifications to existing reservoirs to expand capacity. These options require significant study, regulatory permitting, and funding/financing strategies, and tend to have longer design and construction periods. In the 0- to 2-year period, the focus is on critically evaluating previously-studied projects in terms of firm yield and cost so that one or more sites can be selected for further refinement (and possible initiation of permitting) in the 2- to 5-year period. Included in this evaluation will be raising existing dams at Lake Altus and/or Tom Steed Reservoir, new major reservoir sites, and investigation of potential new or expanded Natural Resources Conservation Service (NRCS) dams.

The 2012 OCWP compiled a list of reservoir sites across the state. Fifteen reservoir sites are located within the region and key attributes are summarized in Appendix B. These sites have varying levels of known information, meaning that some sites have been studied more, like Cookietown Reservoir, while others have virtually no information available, like Coopertown. Other examples of new reservoirs that have been previously studied in the region include a new reservoir upstream of Lake Altus (Trico Reservoir) and a new reservoir downstream of Lake Altus to supplement irrigation water supplies (Cable Mountain Reservoir). All reservoirs require additional technical evaluation and funding/financing analyses before design and permitting can begin. All reservoir analyses should be coordinated with the Bureau of Reclamation's ongoing Basin Study in the area, which is considering multiple long-range supply options.

Implementation is shown in the greater than 5-ear Action Plan, as it is anticipated that 20 years or more may be needed to develop a new reservoir from beginning of studies through construction of dam and infrastructure.

3.4.2 Potable Reuse of Treated Effluent

This supply strategy proposes the use of highly-treated effluent (or reclaimed water) from water reclamation facilities for drinking water supply purposes. Potable reuse offers an opportunity to make full or nearly-full use of the reclaimed water resource year-round, as opposed to non-potable reuse which often has significant seasonality to its demand due to nonpotable irrigation applications.

Direct potable reuse (DPR) is distinguished from indirect potable reuse (IPR) in that there is no environmental buffer between water reclamation plants and potable treatment plants with DPR. Although numerous IPR projects have been implemented across the southwest part of the U.S. in the past decade, DPR has quickly become the focus of much of the water community's research efforts. Drought conditions and severe supply limitations in some parts of the country – such as the unprecedented supply shortages in California and parts of Oklahoma and Texas – have quickly escalated the role of potable reuse, to the point where some communities are bypassing IPR in favor of DPR. Communities like Big Spring, Texas, Cloudcroft, New Mexico, and Wichita Falls, Texas have all begun implementation or operation of DPR systems in light of significant limitations in local availability of alternate water supplies.

In Southwest Oklahoma, potable reuse could be accomplished through indirect methods (like augmentation of Tom Steed Reservoir or Lake Altus with reclaimed water) or direct methods (water reclamation plant followed by blending of reclaimed and traditional source waters feeding an advanced water treatment before distribution to customers). Recharging groundwater with reclaimed water before using it for potable supply is another IPR strategy that could be considered.

ODEQ is currently developing rules for indirect potable reuse via surface water augmentation. In the 0- to 2-Year Action Plan, the SWAP proposes public outreach (could be done in conjunction with outreach for non-potable reuse), monitoring ODEQ regulatory development, and coordinating an assessment of treated effluent availability based on non-potable reuse plans. When ODEQ issues IPR regulations, potential potable reuse projects can be developed as part of an overall long-term water supply plan and, if appropriate, implemented during later planning periods.

3.4.3 New Transbasin Sources

Over the years, several major transbasin water supply projects have been considered at a conceptual planning level of detail. One example is a major transmission pipeline from southeastern Oklahoma to western parts of the state (including Southwest Oklahoma), first analyzed generally in the 1980 Oklahoma Comprehensive Water Plan. Costs for that conceptual transmission system were updated in the 2012 update of the Oklahoma Comprehensive Water Plan. While technically possible, significant challenges to implementing such a project remain in institutional considerations and in the costs of implementing such a major infrastructure project. Other trans-basin opportunities may also be possible, but will have similar types of challenges due to the distance from Southwest Oklahoma to other reliable sources of supply.

Before new basin transfers are considered, it is incumbent upon all water users to evaluate all options within their areas and be the most efficient water users that they can be. From a cursory, conceptual cost review of transporting water from major trans-basin water projects, it appears that these types of projects are not feasible in the foreseeable future, considering the local options. The cost of constructing a large pipeline, power costs of pumping water, operation and maintenance, environmental studies and reviews, and potential mitigation of environmental impacts, coupled with the fact that the federal government is no longer subsidizing the cost of major construction projects, makes these major trans-basin water

projects difficult to implement. Nevertheless, ongoing activities should continue to evaluate and develop more cost-effective projects that can bring a reliable supply to Southwest Oklahoma.

The 0- to 2-Year Action Plan calls for monitoring and evaluating ongoing regional and state processes as they continue to investigate the feasibility of such projects. It also calls for comparing costs, benefits, and implementation challenges to alternate projects with supply sources located in or closer to Southwest Oklahoma. These efforts should continue to be monitored through active participation by Southwest Oklahoma representatives, and if appropriate, detailed studies may be initiated in the 2- to 5-year or greater than 5-year timeframes.

3.5 Next Steps

From a review of the population projections published in the OCWP, it appears that the strategies discussed in this report, if implemented expeditiously, will have the impact of providing a reliable water supply to all water needs with the exception of irrigated agriculture for the foreseeable future. This includes meeting the future needs of the MPWCD, AAFB, and rural water suppliers. Irrigated agriculture will, however, benefit from the continued implementation of efficient water use technologies and practices, and from the implementation of additional water supplies and conservation practices in the public water supply sector, which will in turn reduce pressure on existing supplies for all users.

Even within the 0- to 2-year period, there are numerous actions in the SWAP that can and should be taken to increase supply reliability. A logical first step is to form the SWAP Advisory Committee. This Advisory Committee can help determine which of the SWAP activities to pursue first – that is, which of the SWAP strategies offer the most benefits to the region or are most likely to be accepted by stakeholders. Some activities, like monitoring ODEQ regulatory development on potable water reuse, are an on-going activity without a specific start and end date. Some activities, like conservation and drought response plans, make sense to pursue as a region so that there is consistency between suppliers. Others, like reinstating the Round Timber wells, should be pursued by individual stakeholders (with reporting on progress, lessons learned, etc. benefiting all). As projects are developed, the Advisory Committee can and should update the SWAP to reflect the latest information and refine next steps.

APPENDIX A – SUMMARY OF COUNTY LEVEL DEMAND PROJECTIONS

APPENDIX A

SUMMARY OF COUNTY LEVEL DEMAND PROJECTIONS (ALL VALUES IN ACRE-FEET PER YEAR) FROM OKLAHOMA COMPREHENSIVE WATER PLAN 2012 UPDATE

JACKSON COUNTY	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Public Water Supply	4,619	4,899	5,129	5,314	5,467	5,590
Self-Supplied Residential	112	119	124	129	133	135
Crop Irrigation	101,716	103,765	105,813	107,862	109,434	111,960
Livestock	592	646	701	755	809	864
Oil and Gas	29	60	100	151	211	280
Thermoelectric Power	0	0	0	0	0	0
Self-Supplied Industrial	601	586	614	636	654	669
Total Demand	**107,669**	**110,075**	**112,482**	**114,846**	**116,708**	**119,498**

TILLMAN COUNTY	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Public Water Supply	1,345	1,388	1,418	1,447	1,477	1,521
Self-Supplied Residential	80	81	83	85	87	89
Crop Irrigation	18,163	18,412	18,661	18,910	19,101	19,408
Livestock	889	895	900	905	911	916
Oil and Gas	41	75	121	177	243	319
Thermoelectric Power	0	0	0	0	0	0
Self-Supplied Industrial	0	0	0	0	0	0
Total Demand	**20,518**	**20,852**	**21,183**	**21,524**	**21,818**	**22,254**

HARMON COUNTY	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Public Water Supply	789	797	821	845	870	894
Self-Supplied Residential	0	0	0	0	0	0
Crop Irrigation	26,455	27,191	27,927	28,664	29,229	30,137
Livestock	565	577	589	602	614	626
Oil and Gas	3	4	5	6	8	9
Thermoelectric Power	0	0	0	0	0	0
Self-Supplied Industrial	0	0	0	0	0	0
Total Demand	**27,812**	**28,569**	**29,343**	**30,117**	**30,720**	**31,665**

GREER COUNTY	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Public Water Supply	1,037	1,049	1,049	1,067	1,085	1,103
Self-Supplied Residential	0	0	0	0	0	0
Crop Irrigation	6,064	8,255	10,445	12,636	14,317	17,016
Livestock	442	442	443	443	444	444
Oil and Gas	6	8	10	13	16	19
Thermoelectric Power	0	0	0	0	0	0
Self-Supplied Industrial	0	0	0	0	0	0
Total Demand	**7,548**	**9,754**	**11,947**	**14,159**	**15,861**	**18,582**

APPENDIX B – SUMMARY OF PREVIOUS REPORTS

		Technical Details						Recommendations			New Information
Project Type	Project Name(s)	Available Supply (AFY)	Infrastructure Required	Estimated Project Cost	Cost Estimate Date	Estimated Project Cost (today's dollars)	Calculated Unit Cost ($/AFY)	Preferred Alternative (if applicable)	Actionable Idea	Data gaps and unresolved issues	Permitting or institutional changes
Conservation	Conservation Savings in OCWP Southwest Region from Scenario I Passive	2,208									
Conservation	Conservation Savings in OCWP Southwest Region from Scenario I Metering	83									
Conservation	Conservation Savings in OCWP Southwest Region from Scenario I Leak Detection	308									
Conservation	Conservation Savings in OCWP Southwest Region from Scenario I High Efficiency Plumbing	-									
Conservation	Conservation Savings in OCWP Southwest Region from Scenario I Education	375									
Conservation	Conservation Savings in OCWP Southwest Region from Scenario I Conservation Rates	66									
Conservation	Conservation Savings in OCWP Southwest Region from Scenario II Passive	2,208									
Conservation	Conservation Savings in OCWP Southwest Region from Scenario II Metering	263									
Conservation	Conservation Savings in OCWP Southwest Region from Scenario II Leak Detection	543									
Conservation	Conservation Savings in OCWP Southwest Region from Scenario II High Efficiency Plumbing	685									
Conservation	Conservation Savings in OCWP Southwest Region from Scenario II Education	826									
Conservation	Conservation Savings in OCWP Southwest Region from Scenario II Conservation Rates	198									
Conservation	Conservation Savings in OCWP Southwest Region from Scenario I Irrigated Agriculture	31,097									
Conservation	Conservation Savings in OCWP Southwest Region from Scenario II Irrigated Agriculture	42,927									
New Groundwater Wells	Recharge to Blaine Aquifer	70 AFY/well average recharge rate	Inlet structure Wells - 12-inch diameter, 155 to 270 feet deep					Gravity flow recharge wells which intercepted surface runoff and channeled the untreated water into cavities within the aquifer			- Requires surface water and groundwater permits
New Reservoir	Bally Mountain Reservoir	N/A		N/A	N/A	#N/A	N/A		OCWP Res. Viability Level 0	No other information found	

		Technical Details						Recommendations			New Information
Project Type	Project Name(s)	Available Supply (AFY)	Infrastructure Required	Estimated Project Cost	Cost Estimate Date	Estimated Project Cost (today's dollars)	Calculated Unit Cost ($/AFY)	Preferred Alternative (if applicable)	Actionable Idea	Data gaps and unresolved issues	Permitting or institutional changes
New Reservoir	Cookietown Reservoir, Cache Creek Project	34,700	Rolled earth filled with 30' crest width 2-50'x 20.3' gates	$ 99,000,000	1/1/1978	$ 358,000,000	$ 10,300		OCWP Res. Viability Level 4	Eight other potential reservoir sites were studied; Hatchetville, Walters, Temple, Red Run, Randlett, Loveland, Faxon and West Cache Creek. Cookietown is deemed the most feasible. Portions of OK-36 are within the reservoir perimeter. Good dependable yield Medium cost per unit Low/Medium proximity to demand	
New Reservoir	Coopertown Reservoir	N/A		N/A	N/A	#N/A	N/A		OCWP Res. Viability Level 0	No other information found	
New Reservoir	Geronimo Reservoir	84,000	Zoned earth filled embankment	N/A	N/A	#N/A	N/A		OCWP Res. Viability Level 1		
New Reservoir	Greer Reservoir	25,000	Zoned earth filled embankment	N/A	N/A	#N/A	N/A		OCWP Res. Viability Level 1	Unsuitable without extensive treatment due to natural salt contamination.	
New Reservoir	Headrick Lake, Navajo Reservoir, Cable Mountain Reservoir	108,000	Zoned earth filled embankment	$ 243,000,000	3/1/2005	$ 317,000,000	$ 2,900		OCWP Res. Viability Level 1	Unsuitable for M&I without extensive treatment. Not feasible until Elm Creek Chloride control is implemented. ~40 miles Downstream of Altus Dam Requires improving or rerouting pipe from Tom Steed Reservoir to Altus Could support irrigation in both Jackson and Tillman counties Requires pumping to LAID system and chloride control (deep well injection)	
New Reservoir	Lebos Lake	15,000		N/A	N/A	#N/A	N/A		OCWP Res. Viability Level 1	Also considered by the Bureau of Reclamation for 15,000 AF of imported water.	
New Reservoir	Mangum Reservoir, Lower Mangum Damsite	18,494	Zoned earth filled embankment Suitable at damsite, karst features (sinkholes, caves, disappearing streams, springs and underground water courses) exist south of the uppermost reaches of the reservoir.	N/A	N/A	#N/A	N/A		OCWP Res. Viability Level 4	Potential for upstream water loss in the Commissioner Bend area due to faulting and karst features. No pre-existing cost data Good dependable yield Medium proximity to demand	
New Reservoir	Mangum Reservoir, Upper Mangum Site	39,656	Zoned earth filled embankment with 30' crest width 9-21.7' x 50' gates gypsum-Karst features exist at or near the site	$ 38,680,000	1/1/1973	$ 193,000,000	$ 4,900		OCWP Res. Viability Level 2	Relocate 1.14 miles of paved county road, relocate 25,000' of 12-inch pipeline, Subsequent studies by the Bureau of Reclamation (Jackson 1991) and U.S. Army Corps of Engineers 1993, 1995 and 1999) concluded the Upper Mangum Site was unsuitable.	

		Technical Details						Recommendations			New Information
Project Type	Project Name(s)	Available Supply (AFY)	Infrastructure Required	Estimated Project Cost	Cost Estimate Date	Estimated Project Cost (today's dollars)	Calculated Unit Cost ($/AFY)	Preferred Alternative (if applicable)	Actionable Idea	Data gaps and unresolved issues	Permitting or institutional changes
New Reservoir	Mountain View Reservoir	50,000	Embankment with 30' wide crest 11-21.7' x 50' gates	$ 34,240,000	1/1/1973	$ 171,000,000	$ 3,400		OCWP Res. Viability Level 3	41,000' of 24 inch natural gas pipeline. SH-113 crosses extreme eastern inlet and far eastern site of dam. High dependable yield Low proximity to demand Low cost per unit -WPRS Hydro - "Highest value fishery resource"	
New Reservoir	Port Lake	9,000	Zoned embankment with 30' wide crest 7-21.8' x 50' gates	$ 23,660,000	1/1/1973	$ 118,000,000	$ 13,100		OCWP Res. Viability Level 3	Relocate 2 miles of SH 55, improve 11 miles of secondary road, relocate 1500 feet of 26-inch gas pipeline, relocate 3 miles of county road Low dependable yield Medium cost per unit Medium proximity to demand	
New Reservoir	Rainy Mountain Creek Reservoir	5,000	Embankment with 30' wide crest 5-21.3' x 50' gates	$ 23,900,000	1/1/1973	$ 119,000,000	$ 23,800		OCWP Res. Viability Level 3	34,800' of 138kv power line, Relocate Rainy Mountain Indian Mission and cemetery, 39000' of 16 inch oil pipeline Low dependable yield Medium cost per unit Low/Medium proximity to demand	
New Reservoir	Snyder Lake	10,600	Zoned embankment with 30' wide crest 3-21.2' x 50' gates	$ 24,250,000	1/1/1974	$ 113,000,000	$ 10,700		OCWP Res. Viability Level 3	Relocate 10 miles of county road and 10 miles of rural electric power line Good dependable yield Low/Medium proximity to demand Medium cost per unit	
New Reservoir	Temple Reservoir	117,000	Zoned earth filled embankment	N/A	N/A	#N/A	N/A		OCWP Res. Viability Level 1	- No cost in Cache Creek Concluding Report, noted that not economically feasible until petroleum reserves are depleted	
New Reservoir	Trico Lake	32,000	Zoned earth filled embankment	$ 373,000,000	3/1/2005	$ 487,000,000	$ 15,200		OCWP Res. Viability Level 1	Would be used to replace Altus Reservoir in the event conveyance was used to convert Altus Reservoir into terminal storage. WPRS Hydro - "Highest valued fishery resource Upstream of Altus Dam - used to capture sediment prior to Altus Reservoir.	

	Reference Information				Technical Details	Recommendations
Project Name(s)	**Keywords**	**Report**	**Publishing Org.**	**Publish Date**	**Estimated Water Savings in 2060 (AFY)**	**Actionable Idea**
Modernization of Irrigation District		Appraisal Report Water Supply Augmentation W.C. Austin Project, Oklahoma	US Dept of Interior, BOR	Mar-05	14,175	Replacement of about 15 existing check structures with automatic gates Rehab about 15 existing mesurement structures and install 15 new structures Expand SCADA at 15 sites Replace/relocate 30-35 turnouts New regulating reservoirs Install 10 new wasteway measurement structures
Conservation Savings - Beckham County - Scenario I - PSR, Passive	Beckham County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	482	Scenario I - PSR, Passive
Conservation Savings - Beckham County - Scenario I - PSR, Metering	Beckham County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - PSR, Metering
Conservation Savings - Beckham County - Scenario I - PSR, Leak Detection	Beckham County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - PSR, Leak Detection
Conservation Savings - Beckham County - Scenario I - PSR, Conservation Rates	Beckham County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - PSR, Conservation Rates
Conservation Savings - Beckham County - Scenario I - PSR, Education Programs	Beckham County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	136	Scenario I - PSR, Education Programs
Conservation Savings - Beckham County - Scenario I - PSR, High Eff Plumbing	Beckham County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - PSR, High Eff Plumbing
Conservation Savings - Beckham County - Scenario II - PSR, Passive	Beckham County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	482	Scenario II - PSR, Passive
Conservation Savings - Beckham County - Scenario II - PSR, Metering	Beckham County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	21	Scenario II - PSR, Metering
Conservation Savings - Beckham County - Scenario II - PSR, Leak Detection	Beckham County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario II - PSR, Leak Detection
Conservation Savings - Beckham County - Scenario II - PSR, Conservation Rates	Beckham County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario II - PSR, Conservation Rates
Conservation Savings - Beckham County - Scenario II - PSR, Education Programs	Beckham County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	227	Scenario II - PSR, Education Programs
Conservation Savings - Beckham County - Scenario II - PSR, High Eff Plumbing	Beckham County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	123	Scenario II - PSR, High Eff Plumbing
Conservation Savings - Beckham County - Scenario I - PSNR, Passive	Beckham County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	108	Scenario I - PSNR, Passive
Conservation Savings - Beckham County - Scenario I - PSNR, Metering	Beckham County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - PSNR, Metering
Conservation Savings - Beckham County - Scenario I - PSNR, Leak Detection	Beckham County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - PSNR, Leak Detection

	Reference Information				Technical Details	Recommendations
Project Name(s)	**Keywords**	**Report**	**Publishing Org.**	**Publish Date**	**Estimated Water Savings in 2060 (AFY)**	**Actionable Idea**
Conservation Savings - Beckham County - Scenario I - PSNR, Education Programs	Beckham County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - PSNR, Education Programs
Conservation Savings - Beckham County - Scenario I - PSNR, High Eff Plumbing	Beckham County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - PSNR, High Eff Plumbing
Conservation Savings - Beckham County - Scenario II - PSNR, Passive	Beckham County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	108	Scenario II - PSNR, Passive
Conservation Savings - Beckham County - Scenario II - PSNR, Metering	Beckham County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	11	Scenario II - PSNR, Metering
Conservation Savings - Beckham County - Scenario II - PSNR, Leak Detection	Beckham County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario II - PSNR, Leak Detection
Conservation Savings - Beckham County - Scenario II - PSNR, Education Programs	Beckham County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	72	Scenario II - PSNR, Education Programs
Conservation Savings - Beckham County - Scenario II - PSNR, High Eff Plumbing	Beckham County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	78	Scenario II - PSNR, High Eff Plumbing
Conservation Savings - Beckham County - Scenario I - SSR, Passive	Beckham County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	54	Scenario I - SSR, Passive
Conservation Savings - Beckham County - Scenario I - SSR, Education	Beckham County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - SSR, Education
Conservation Savings - Beckham County - Scenario I - SSR, High Eff Plumb	Beckham County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - SSR, High Eff Plumb
Conservation Savings - Beckham County - Scenario II - SSR, Passive	Beckham County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	54	Scenario II - SSR, Passive
Conservation Savings - Beckham County - Scenario II - SSR, Education	Beckham County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	14	Scenario II - SSR, Education
Conservation Savings - Beckham County - Scenario II - SSR, High Eff Plumb	Beckham County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	14	Scenario II - SSR, High Eff Plumb
Conservation Savings - Beckham County - Scenario I - Irr Ag	Beckham County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	484	Scenario I - Irr Ag
Conservation Savings - Beckham County - Scenario II - Irr Ag	Beckham County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	1,181	Scenario II - Irr Ag
Conservation Savings - Greer County - Scenario I - PSR, Passive	Greer County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	118	Scenario I - PSR, Passive
Conservation Savings - Greer County - Scenario I - PSR, Metering	Greer County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - PSR, Metering
Conservation Savings - Greer County - Scenario I - PSR, Leak Detection	Greer County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - PSR, Leak Detection
Conservation Savings - Greer County - Scenario I - PSR, Conservation Rates	Greer County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	18	Scenario I - PSR, Conservation Rates
Conservation Savings - Greer County - Scenario I - PSR, Education Programs	Greer County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	27	Scenario I - PSR, Education Programs
Conservation Savings - Greer County - Scenario I - PSR, High Eff Plumbing	Greer County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - PSR, High Eff Plumbing

	Reference Information				Technical Details	Recommendations
Project Name(s)	**Keywords**	**Report**	**Publishing Org.**	**Publish Date**	**Estimated Water Savings in 2060 (AFY)**	**Actionable Idea**
Conservation Savings - Greer County - Scenario II - PSR, Passive	Greer County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	118	Scenario II - PSR, Passive
Conservation Savings - Greer County - Scenario II - PSR, Metering	Greer County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario II - PSR, Metering
Conservation Savings - Greer County - Scenario II - PSR, Leak Detection	Greer County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario II - PSR, Leak Detection
Conservation Savings - Greer County - Scenario II - PSR, Conservation Rates	Greer County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	35	Scenario II - PSR, Conservation Rates
Conservation Savings - Greer County - Scenario II - PSR, Education Programs	Greer County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	44	Scenario II - PSR, Education Programs
Conservation Savings - Greer County - Scenario II - PSR, High Eff Plumbing	Greer County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario II - PSR, High Eff Plumbing
Conservation Savings - Greer County - Scenario I - PSNR, Passive	Greer County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	15	Scenario I - PSNR, Passive
Conservation Savings - Greer County - Scenario I - PSNR, Metering	Greer County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - PSNR, Metering
Conservation Savings - Greer County - Scenario I - PSNR, Leak Detection	Greer County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - PSNR, Leak Detection
Conservation Savings - Greer County - Scenario I - PSNR, Leak Detection	Greer County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - PSNR, Education Detection
Conservation Savings - Greer County - Scenario I - PSNR, Education Programs	Greer County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - PSNR, Education Programs
Conservation Savings - Greer County - Scenario I - PSNR, High Eff Plumbing	Greer County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - PSNR, High Eff Plumbing
Conservation Savings - Greer County - Scenario II - PSNR, Passive	Greer County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	15	Scenario II - PSNR, Passive
Conservation Savings - Greer County - Scenario II - PSNR, Metering	Greer County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario II - PSNR, Metering
Conservation Savings - Greer County - Scenario II - PSNR, Leak Detection	Greer County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario II - PSNR, Leak Detection
Conservation Savings - Greer County - Scenario II - PSNR, Education Programs	Greer County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	7	Scenario II - PSNR, Education Programs
Conservation Savings - Greer County - Scenario II - PSNR, High Eff Plumbing	Greer County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	11	Scenario II - PSNR, High Eff Plumbing
Conservation Savings - Greer County - Scenario I - SSR, Passive	Greer County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - SSR, Passive
Conservation Savings - Greer County - Scenario I - SSR, Education	Greer County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - SSR, Education
Conservation Savings - Greer County - Scenario I - SSR, High Eff Plumb	Greer County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - SSR, High Eff Plumb
Conservation Savings - Greer County - Scenario II - SSR, Passive	Greer County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario II - SSR, Passive
Conservation Savings - Greer County - Scenario II - SSR, Education	Greer County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario II - SSR, Education

	Reference Information				Technical Details	Recommendations
Project Name(s)	**Keywords**	**Report**	**Publishing Org.**	**Publish Date**	**Estimated Water Savings in 2060 (AFY)**	**Actionable Idea**
Conservation Savings - Greer County - Scenario II - SSR, High Eff Plumb	Greer County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario II - SSR, High Eff Plumb
Conservation Savings - Greer County - Scenario I - Irr Ag	Greer County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	900	Scenario I - Irr Ag
Conservation Savings - Greer County - Scenario II - Irr Ag	Greer County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	3,569	Scenario II - Irr Ag
Conservation Savings - Harmon County - Scenario I - PSR, Passive	Harmon County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	58	Scenario I - PSR, Passive
Conservation Savings - Harmon County - Scenario I - PSR, Metering	Harmon County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - PSR, Metering
Conservation Savings - Harmon County - Scenario I - PSR, Leak Detection	Harmon County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	26	Scenario I - PSR, Leak Detection
Conservation Savings - Harmon County - Scenario I - PSR, Conservation Rates	Harmon County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - PSR, Conservation Rates
Conservation Savings - Harmon County - Scenario I - PSR, Education Programs	Harmon County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	23	Scenario I - PSR, Education Programs
Conservation Savings - Harmon County - Scenario I - PSR, High Eff Plumbing	Harmon County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - PSR, High Eff Plumbing
Conservation Savings - Harmon County - Scenario II - PSR, High Eff Plumbing	Harmon County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	58	Scenario II - PSR, Passive Plumbing
Conservation Savings - Harmon County - Scenario II - PSR, Passive	Harmon County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	58	Scenario II - PSR, Passive
Conservation Savings - Harmon County - Scenario II - PSR, Metering	Harmon County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario II - PSR, Metering
Conservation Savings - Harmon County - Scenario II - PSR, Leak Detection	Harmon County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	42	Scenario II - PSR, Leak Detection
Conservation Savings - Harmon County - Scenario II - PSR, Conservation Rates	Harmon County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	15	Scenario II - PSR, Conservation Rates
Conservation Savings - Harmon County - Scenario II - PSR, Education Programs	Harmon County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	36	Scenario II - PSR, Education Programs
Conservation Savings - Harmon County - Scenario II - PSR, High Eff Plumbing	Harmon County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	15	Scenario II - PSR, High Eff Plumbing
Conservation Savings - Harmon County - Scenario I - PSNR, Passive	Harmon County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	9	Scenario I - PSNR, Passive
Conservation Savings - Harmon County - Scenario I - PSNR, Metering	Harmon County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - PSNR, Metering
Conservation Savings - Harmon County - Scenario I - PSNR, Leak Detection	Harmon County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	4	Scenario I - PSNR, Leak Detection
Conservation Savings - Harmon County - Scenario I - PSNR, Education Programs	Harmon County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - PSNR, Education Programs
Conservation Savings - Harmon County - Scenario I - PSNR, High Eff Plumbing	Harmon County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - PSNR, High Eff Plumbing
Conservation Savings - Harmon County - Scenario II - PSNR, Passive	Harmon County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	9	Scenario II - PSNR, Passive

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Project Name(s)	**Keywords**	**Report**	**Publishing Org.**	**Publish Date**	**Estimated Water Savings in 2060 (AFY)**	**Actionable Idea**
Conservation Savings - Harmon County - Scenario II - PSNR, Metering	Harmon County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario II - PSNR, Metering
Conservation Savings - Harmon County - Scenario II - PSNR, Leak Detection	Harmon County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	7	Scenario II - PSNR, Leak Detection
Conservation Savings - Harmon County - Scenario II - PSNR, Education Programs	Harmon County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	4	Scenario II - PSNR, Education Programs
Conservation Savings - Harmon County - Scenario II - PSNR, High Eff Plumbing	Harmon County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	6	Scenario II - PSNR, High Eff Plumbing
Conservation Savings - Harmon County - Scenario I - SSR, Passive	Harmon County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - SSR, Passive
Conservation Savings - Harmon County - Scenario I - SSR, Education	Harmon County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - SSR, Education
Conservation Savings - Harmon County - Scenario I - SSR, High Eff Plumb	Harmon County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - SSR, High Eff Plumb
Conservation Savings - Harmon County - Scenario II - SSR, Passive	Harmon County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario II - SSR, Passive
Conservation Savings - Harmon County - Scenario II - SSR, Education	Harmon County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario II - SSR, Education
Conservation Savings - Harmon County - Scenario II - SSR, High Eff Plumb	Harmon County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario II - SSR, High Eff Plumb
Conservation Savings - Harmon County - Scenario I - Irr Ag	Harmon County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	4,525	Scenario I - Irr Ag
Conservation Savings - Harmon County - Scenario II - Irr Ag	Harmon County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	6,092	Scenario II - Irr Ag
Conservation Savings - Jackson County - Scenario I - PSR, Passive	Jackson County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	511	Scenario I - PSR, Passive
Conservation Savings - Jackson County - Scenario I - PSR, Metering	Jackson County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - PSR, Metering
Conservation Savings - Jackson County - Scenario I - PSR, Leak Detection	Jackson County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	124	Scenario I - PSR, Leak Detection
Conservation Savings - Jackson County - Scenario I - PSR, Conservation Rates	Jackson County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	48	Scenario I - PSR, Conservation Rates
Conservation Savings - Jackson County - Scenario I - PSR, Education Programs	Jackson County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	109	Scenario I - PSR, Education Programs
Conservation Savings - Jackson County - Scenario I - PSR, High Eff Plumbing	Jackson County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - PSR, High Eff Plumbing
Conservation Savings - Jackson County - Scenario II - PSR, Passive	Jackson County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	511	Scenario II - PSR, Passive
Conservation Savings - Jackson County - Scenario II - PSR, Metering	Jackson County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	46	Scenario II - PSR, Metering
Conservation Savings - Jackson County - Scenario II - PSR, Leak Detection	Jackson County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	203	Scenario II - PSR, Leak Detection

	Reference Information				Technical Details	Recommendations
Project Name(s)	**Keywords**	**Report**	**Publishing Org.**	**Publish Date**	**Estimated Water Savings in 2060 (AFY)**	**Actionable Idea**
Conservation Savings - Jackson County - Scenario II - PSR, Conservation Rates	Jackson County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	121	Scenario II - PSR, Conservation Rates
Conservation Savings - Jackson County - Scenario II - PSR, Education Programs	Jackson County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	182	Scenario II - PSR, Education Programs
Conservation Savings - Jackson County - Scenario II - PSR, High Eff Plumbing	Jackson County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	131	Scenario II - PSR, High Eff Plumbing
Conservation Savings - Jackson County - Scenario I - PSNR, Passive	Jackson County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	114	Scenario I - PSNR, Passive
Conservation Savings - Jackson County - Scenario I - PSNR, Metering	Jackson County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - PSNR, Metering
Conservation Savings - Jackson County - Scenario I - PSNR, Leak Detection	Jackson County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	66	Scenario I - PSNR, Leak Detection
Conservation Savings - Jackson County - Scenario I - PSNR, Education Programs	Jackson County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - PSNR, Education Programs
Conservation Savings - Jackson County - Scenario I - PSNR, High Eff Plumbing	Jackson County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - PSNR, High Eff Plumbing
Conservation Savings - Jackson County - Scenario II - PSNR, Passive	Jackson County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	114	Scenario II - PSNR, Passive
Conservation Savings - Jackson County - Scenario II - PSNR, Metering	Jackson County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	24	Scenario II - PSNR, Metering
Conservation Savings - Jackson County - Scenario II - PSNR, Leak Detection	Jackson County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	108	Scenario II - PSNR, Leak Detection
Conservation Savings - Jackson County - Scenario II - PSNR, Education Programs	Jackson County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	58	Scenario II - PSNR, Education Programs
Conservation Savings - Jackson County - Scenario II - PSNR, High Eff Plumbing	Jackson County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	83	Scenario II - PSNR, High Eff Plumbing
Conservation Savings - Jackson County - Scenario I - SSR, Passive	Jackson County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	22	Scenario I - SSR, Passive
Conservation Savings - Jackson County - Scenario I - SSR, Education	Jackson County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - SSR, Education
Conservation Savings - Jackson County - Scenario I - SSR, High Eff Plumb	Jackson County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - SSR, High Eff Plumb
Conservation Savings - Jackson County - Scenario II - SSR, Passive	Jackson County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	22	Scenario II - SSR, Passive
Conservation Savings - Jackson County - Scenario II - SSR, Education	Jackson County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	4	Scenario II - SSR, Education
Conservation Savings - Jackson County - Scenario II - SSR, High Eff Plumb	Jackson County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	6	Scenario II - SSR, High Eff Plumb
Conservation Savings - Jackson County - Scenario I - Irr Ag	Jackson County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	22,164	Scenario I - Irr Ag
Conservation Savings - Jackson County - Scenario II - Irr Ag	Jackson County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	23,870	Scenario II - Irr Ag

	Reference Information				Technical Details	Recommendations
Project Name(s)	**Keywords**	**Report**	**Publishing Org.**	**Publish Date**	**Estimated Water Savings in 2060 (AFY)**	**Actionable Idea**
Conservation Savings - Kiowa County - Scenario I - PSR, Passive	Kiowa County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	186	Scenario I - PSR, Passive
Conservation Savings - Kiowa County - Scenario I - PSR, Metering	Kiowa County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - PSR, Metering
Conservation Savings - Kiowa County - Scenario I - PSR, Leak Detection	Kiowa County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	30	Scenario I - PSR, Leak Detection
Conservation Savings - Kiowa County - Scenario I - PSR, Conservation Rates	Kiowa County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - PSR, Conservation Rates
Conservation Savings - Kiowa County - Scenario I - PSR, Education Programs	Kiowa County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	26	Scenario I - PSR, Education Programs
Conservation Savings - Kiowa County - Scenario I - PSR, High Eff Plumbing	Kiowa County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - PSR, High Eff Plumbing
Conservation Savings - Kiowa County - Scenario II - PSR, Passive	Kiowa County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	186	Scenario II - PSR, Passive
Conservation Savings - Kiowa County - Scenario II - PSR, Metering	Kiowa County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	6	Scenario II - PSR, Metering
Conservation Savings - Kiowa County - Scenario II - PSR, Leak Detection	Kiowa County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	48	Scenario II - PSR, Leak Detection
Conservation Savings - Kiowa County - Scenario II - PSR, Leak Detection	Kiowa County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	11	Scenario II - PSR, Conservation Detection
Conservation Savings - Kiowa County - Scenario II - PSR, Conservation Rates	Kiowa County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	11	Scenario II - PSR, Conservation Rates
Conservation Savings - Kiowa County - Scenario II - PSR, Education Programs	Kiowa County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	43	Scenario II - PSR, Education Programs
Conservation Savings - Kiowa County - Scenario II - PSR, High Eff Plumbing	Kiowa County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	48	Scenario II - PSR, High Eff Plumbing
Conservation Savings - Kiowa County - Scenario I - PSNR, Passive	Kiowa County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	24	Scenario I - PSNR, Passive
Conservation Savings - Kiowa County - Scenario I - PSNR, Metering	Kiowa County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - PSNR, Metering
Conservation Savings - Kiowa County - Scenario I - PSNR, Leak Detection	Kiowa County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	16	Scenario I - PSNR, Leak Detection
Conservation Savings - Kiowa County - Scenario I - PSNR, Education Programs	Kiowa County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - PSNR, Education Programs
Conservation Savings - Kiowa County - Scenario I - PSNR, High Eff Plumbing	Kiowa County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - PSNR, High Eff Plumbing
Conservation Savings - Kiowa County - Scenario II - PSNR, Passive	Kiowa County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	24	Scenario II - PSNR, Passive
Conservation Savings - Kiowa County - Scenario II - PSNR, Metering	Kiowa County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	3	Scenario II - PSNR, Metering
Conservation Savings - Kiowa County - Scenario II - PSNR, Leak Detection	Kiowa County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	27	Scenario II - PSNR, Leak Detection
Conservation Savings - Kiowa County - Scenario II - PSNR, Education Programs	Kiowa County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	14	Scenario II - PSNR, Education Programs

	Reference Information				Technical Details	Recommendations
Project Name(s)	**Keywords**	**Report**	**Publishing Org.**	**Publish Date**	**Estimated Water Savings in 2060 (AFY)**	**Actionable Idea**
Conservation Savings - Kiowa County - Scenario II - PSNR, High Eff Plumbing	Kiowa County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	17	Scenario II - PSNR, High Eff Plumbing
Conservation Savings - Kiowa County - Scenario I - SSR, Passive	Kiowa County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - SSR, Passive
Conservation Savings - Kiowa County - Scenario I - SSR, Education	Kiowa County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - SSR, Education
Conservation Savings - Kiowa County - Scenario I - SSR, High Eff Plumb	Kiowa County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - SSR, High Eff Plumb
Conservation Savings - Kiowa County - Scenario II - SSR, Passive	Kiowa County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario II - SSR, Passive
Conservation Savings - Kiowa County - Scenario II - SSR, Education	Kiowa County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario II - SSR, Education
Conservation Savings - Kiowa County - Scenario II - SSR, High Eff Plumb	Kiowa County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario II - SSR, High Eff Plumb
Conservation Savings - Kiowa County - Scenario I - Irr Ag	Kiowa County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	691	Scenario I - Irr Ag
Conservation Savings - Kiowa County - Scenario II - Irr Ag	Kiowa County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	1,408	Scenario II - Irr Ag
Conservation Savings - Roger Mills County - Scenario I - PSR, Passive	Roger Mills County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	48	Scenario I - PSR, Passive
Conservation Savings - Roger Mills County - Scenario I - PSR, Metering	Roger Mills County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	6	Scenario I - PSR, Metering
Conservation Savings - Roger Mills County - Scenario I - PSR, Leak Detection	Roger Mills County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	16	Scenario I - PSR, Leak Detection
Conservation Savings - Roger Mills County - Scenario I - PSR, Conservation Rates	Roger Mills County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - PSR, Conservation Rates
Conservation Savings - Roger Mills County - Scenario I - PSR, Education Programs	Roger Mills County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	8	Scenario I - PSR, Education Programs
Conservation Savings - Roger Mills County - Scenario I - PSR, High Eff Plumbing	Roger Mills County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - PSR, High Eff Plumbing
Conservation Savings - Roger Mills County - Scenario II - PSR, Passive	Roger Mills County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	48	Scenario II - PSR, Passive
Conservation Savings - Roger Mills County - Scenario II - PSR, Metering	Roger Mills County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	15	Scenario II - PSR, Metering
Conservation Savings - Roger Mills County - Scenario II - PSR, Leak Detection	Roger Mills County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	26	Scenario II - PSR, Leak Detection
Conservation Savings - Roger Mills County - Scenario II - PSR, Conservation Rates	Roger Mills County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	1	Scenario II - PSR, Conservation Rates
Conservation Savings - Roger Mills County - Scenario II - PSR, Education Programs	Roger Mills County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	14	Scenario II - PSR, Education Programs
Conservation Savings - Roger Mills County - Scenario II - PSR, High Eff Plumbing	Roger Mills County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	12	Scenario II - PSR, High Eff Plumbing

	Reference Information				Technical Details	Recommendations
Project Name(s)	**Keywords**	**Report**	**Publishing Org.**	**Publish Date**	**Estimated Water Savings in 2060 (AFY)**	**Actionable Idea**
Conservation Savings - Roger Mills County - Scenario I - PSNR, Passive	Roger Mills County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	8	Scenario I - PSNR, Passive
Conservation Savings - Roger Mills County - Scenario I - PSNR, Metering	Roger Mills County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	2	Scenario I - PSNR, Metering
Conservation Savings - Roger Mills County - Scenario I - PSNR, Leak Detection	Roger Mills County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	5	Scenario I - PSNR, Leak Detection
Conservation Savings - Roger Mills County - Scenario I - PSNR, Education Programs	Roger Mills County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - PSNR, Education Programs
Conservation Savings - Roger Mills County - Scenario I - PSNR, High Eff Plumbing	Roger Mills County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - PSNR, High Eff Plumbing
Conservation Savings - Roger Mills County - Scenario II - PSNR, Passive	Roger Mills County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	8	Scenario II - PSNR, Passive
Conservation Savings - Roger Mills County - Scenario II - PSNR, Metering	Roger Mills County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	5	Scenario II - PSNR, Metering
Conservation Savings - Roger Mills County - Scenario II - PSNR, Leak Detection	Roger Mills County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	9	Scenario II - PSNR, Leak Detection
Conservation Savings - Roger Mills County - Scenario II - PSNR, Education Programs	Roger Mills County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	3	Scenario II - PSNR, Education Programs
Conservation Savings - Roger Mills County - Scenario II - PSNR, Education Programs	Roger Mills County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	5	Scenario II - PSNR, High Eff Programs
Conservation Savings - Roger Mills County - Scenario II - PSNR, High Eff Plumbing	Roger Mills County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	5	Scenario II - PSNR, High Eff Plumbing
Conservation Savings - Roger Mills County - Scenario I - SSR, Passive	Roger Mills County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	13	Scenario I - SSR, Passive
Conservation Savings - Roger Mills County - Scenario I - SSR, Education	Roger Mills County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - SSR, Education
Conservation Savings - Roger Mills County - Scenario I - SSR, High Eff Plumb	Roger Mills County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - SSR, High Eff Plumb
Conservation Savings - Roger Mills County - Scenario II - SSR, Passive	Roger Mills County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	13	Scenario II - SSR, Passive
Conservation Savings - Roger Mills County - Scenario II - SSR, Education	Roger Mills County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	2	Scenario II - SSR, Education
Conservation Savings - Roger Mills County - Scenario II - SSR, High Eff Plumb	Roger Mills County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	3	Scenario II - SSR, High Eff Plumb
Conservation Savings - Roger Mills County - Scenario I - Irr Ag	Roger Mills County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	393	Scenario I - Irr Ag
Conservation Savings - Roger Mills County - Scenario II - Irr Ag	Roger Mills County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	3,336	Scenario II - Irr Ag
Conservation Savings - Tillman County - Scenario I - PSR, Passive	Tillman County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	148	Scenario I - PSR, Passive
Conservation Savings - Tillman County - Scenario I - PSR, Metering	Tillman County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	16	Scenario I - PSR, Metering
Conservation Savings - Tillman County - Scenario I - PSR, Leak Detection	Tillman County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	16	Scenario I - PSR, Leak Detection

	Reference Information				Technical Details	Recommendations
Project Name(s)	**Keywords**	**Report**	**Publishing Org.**	**Publish Date**	**Estimated Water Savings in 2060 (AFY)**	**Actionable Idea**
Conservation Savings - Tillman County - Scenario I - PSR, Conservation Rates	Tillman County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - PSR, Conservation Rates
Conservation Savings - Tillman County - Scenario I - PSR, Education Programs	Tillman County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	34	Scenario I - PSR, Education Programs
Conservation Savings - Tillman County - Scenario I - PSR, High Eff Plumbing	Tillman County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - PSR, High Eff Plumbing
Conservation Savings - Tillman County - Scenario II - PSR, Passive	Tillman County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	148	Scenario II - PSR, Passive
Conservation Savings - Tillman County - Scenario II - PSR, Metering	Tillman County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	39	Scenario II - PSR, Metering
Conservation Savings - Tillman County - Scenario II - PSR, Leak Detection	Tillman County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	41	Scenario II - PSR, Leak Detection
Conservation Savings - Tillman County - Scenario II - PSR, Conservation Rates	Tillman County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	2	Scenario II - PSR, Conservation Rates
Conservation Savings - Tillman County - Scenario II - PSR, Education Programs	Tillman County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	57	Scenario II - PSR, Education Programs
Conservation Savings - Tillman County - Scenario II - PSR, High Eff Plumbing	Tillman County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	38	Scenario II - PSR, High Eff Plumbing
Conservation Savings - Tillman County - Scenario I - PSR, High Eff Plumbing	Tillman County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	22	Scenario I - PSNR, Passive Plumbing
Conservation Savings - Tillman County - Scenario I - PSNR, Passive	Tillman County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	22	Scenario I - PSNR, Passive
Conservation Savings - Tillman County - Scenario I - PSNR, Metering	Tillman County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	5	Scenario I - PSNR, Metering
Conservation Savings - Tillman County - Scenario I - PSNR, Leak Detection	Tillman County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	5	Scenario I - PSNR, Leak Detection
Conservation Savings - Tillman County - Scenario I - PSNR, Education Programs	Tillman County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - PSNR, Education Programs
Conservation Savings - Tillman County - Scenario I - PSNR, High Eff Plumbing	Tillman County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - PSNR, High Eff Plumbing
Conservation Savings - Tillman County - Scenario II - PSNR, Passive	Tillman County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	22	Scenario II - PSNR, Passive
Conservation Savings - Tillman County - Scenario II - PSNR, Metering	Tillman County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	13	Scenario II - PSNR, Metering
Conservation Savings - Tillman County - Scenario II - PSNR, Leak Detection	Tillman County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	13	Scenario II - PSNR, Leak Detection
Conservation Savings - Tillman County - Scenario II - PSNR, Education Programs	Tillman County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	11	Scenario II - PSNR, Education Programs
Conservation Savings - Tillman County - Scenario II - PSNR, High Eff Plumbing	Tillman County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	16	Scenario II - PSNR, High Eff Plumbing
Conservation Savings - Tillman County - Scenario I - SSR, Passive	Tillman County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	13	Scenario I - SSR, Passive
Conservation Savings - Tillman County - Scenario I - SSR, Education	Tillman County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - SSR, Education

	Reference Information				Technical Details	Recommendations
Project Name(s)	**Keywords**	**Report**	**Publishing Org.**	**Publish Date**	**Estimated Water Savings in 2060 (AFY)**	**Actionable Idea**
Conservation Savings - Tillman County - Scenario I - SSR, High Eff Plumb	Tillman County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - SSR, High Eff Plumb
Conservation Savings - Tillman County - Scenario II - SSR, Passive	Tillman County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	13	Scenario II - SSR, Passive
Conservation Savings - Tillman County - Scenario II - SSR, Education	Tillman County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	3	Scenario II - SSR, Education
Conservation Savings - Tillman County - Scenario II - SSR, High Eff Plumb	Tillman County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	3	Scenario II - SSR, High Eff Plumb
Conservation Savings - Tillman County - Scenario I - Irr Ag	Tillman County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	1,594	Scenario I - Irr Ag
Conservation Savings - Tillman County - Scenario II - Irr Ag	Tillman County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	2,542	Scenario II - Irr Ag
Conservation Savings - Washita County - Scenario I - PSR, Passive	Washita County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	188	Scenario I - PSR, Passive
Conservation Savings - Washita County - Scenario I - PSR, Metering	Washita County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	34	Scenario I - PSR, Metering
Conservation Savings - Washita County - Scenario I - PSR, Leak Detection	Washita County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - PSR, Leak Detection
Conservation Savings - Washita County - Scenario I - PSR, Conservation Rates	Washita County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - PSR, Conservation Rates
Conservation Savings - Washita County - Scenario I - PSR, Education Programs	Washita County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	12	Scenario I - PSR, Education Programs
Conservation Savings - Washita County - Scenario I - PSR, High Eff Plumbing	Washita County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - PSR, High Eff Plumbing
Conservation Savings - Washita County - Scenario II - PSR, Passive	Washita County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	188	Scenario II - PSR, Passive
Conservation Savings - Washita County - Scenario II - PSR, Metering	Washita County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	50	Scenario II - PSR, Metering
Conservation Savings - Washita County - Scenario II - PSR, Leak Detection	Washita County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	12	Scenario II - PSR, Leak Detection
Conservation Savings - Washita County - Scenario II - PSR, Conservation Rates	Washita County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	13	Scenario II - PSR, Conservation Rates
Conservation Savings - Washita County - Scenario II - PSR, Education Programs	Washita County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	21	Scenario II - PSR, Education Programs
Conservation Savings - Washita County - Scenario II - PSR, High Eff Plumbing	Washita County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	48	Scenario II - PSR, High Eff Plumbing
Conservation Savings - Washita County - Scenario I - PSNR, Passive	Washita County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	23	Scenario I - PSNR, Passive
Conservation Savings - Washita County - Scenario I - PSNR, Metering	Washita County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	20	Scenario I - PSNR, Metering
Conservation Savings - Washita County - Scenario I - PSNR, Leak Detection	Washita County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - PSNR, Leak Detection

	Reference Information				Technical Details	Recommendations
Project Name(s)	**Keywords**	**Report**	**Publishing Org.**	**Publish Date**	**Estimated Water Savings in 2060 (AFY)**	**Actionable Idea**
Conservation Savings - Washita County - Scenario I - PSNR, Education Programs	Washita County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - PSNR, Education Programs
Conservation Savings - Washita County - Scenario I - PSNR, High Eff Plumbing	Washita County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - PSNR, High Eff Plumbing
Conservation Savings - Washita County - Scenario II - PSNR, Passive	Washita County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	23	Scenario II - PSNR, Passive
Conservation Savings - Washita County - Scenario II - PSNR, Metering	Washita County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	30	Scenario II - PSNR, Metering
Conservation Savings - Washita County - Scenario II - PSNR, Leak Detection	Washita County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	7	Scenario II - PSNR, Leak Detection
Conservation Savings - Washita County - Scenario II - PSNR, Education Programs	Washita County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	7	Scenario II - PSNR, Education Programs
Conservation Savings - Washita County - Scenario II - PSNR, High Eff Plumbing	Washita County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	17	Scenario II - PSNR, High Eff Plumbing
Conservation Savings - Washita County - Scenario I - SSR, Passive	Washita County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	44	Scenario I - SSR, Passive
Conservation Savings - Washita County - Scenario I - SSR, Education	Washita County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - SSR, Education
Conservation Savings - Washita County - Scenario I - SSR, High Eff Plumb	Washita County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	-	Scenario I - SSR, High Eff Plumb
Conservation Savings - Washita County - Scenario II - SSR, Passive	Washita County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	44	Scenario II - SSR, Passive
Conservation Savings - Washita County - Scenario II - SSR, Education	Washita County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	3	Scenario II - SSR, Education
Conservation Savings - Washita County - Scenario II - SSR, High Eff Plumb	Washita County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	11	Scenario II - SSR, High Eff Plumb
Conservation Savings - Washita County - Scenario I - Irr Ag	Washita County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	346	Scenario I - Irr Ag
Conservation Savings - Washita County - Scenario II - Irr Ag	Washita County	OCWP 2012, Water Demand Forecast Report Addendum, Conservation and Climate Change	OWRB	2011	929	Scenario II - Irr Ag

Please refer to existing system interconnections detailed in 2012 Oklahoma Comprehensive Water Plan (Southwest Watershed Planning Region Report) and update to reflect current system interties/agreements.

Excerpt from OCWP Southwest Watershed Planning Region Report is provided below.

Providers	SDWIS ID[1]	Sales			Purchases		
		Sells To	Emergency or Ongoing	Treated or Raw or Both	Purchases From	Emergency or Ongoing	Treated or Raw or Both
ALTUS	OK1011501	Jackson Co Water Corp Duke Public Water Authority Quartz Mountain Reg Water Auth Blair Public Works Authority Olustee PWS Martha Creta Water Company	O O O O O O O	T T T T T T T	Mountain Park Master Conservancy District	O	R
BECKHAM CO RWD #1	OK2000505	Sentinel PWS Carter Rocky	O O O	T T T			
BECKHAM CO RWD #3	OK2000547	Hammon		T			
CARTER	OK3000501				Beckham Co RWD #1	O	T
DUKE PWA	OK3003311	Jackson Co Water Corp	E	T	Altus	O	T
ELDORADO	OK3003301				Harmon Water Corp Creta Water Corporation	O O	T R
GOULD PWA	OK3002901				Harmon Water Corp	O	B
GRANITE PWS	OK2002804				Quartz Mountain Reg Water Auth	O	T
HARMON ELECTRIC	OK3002801				Mangum PWS Quartz Mountain Reg Water Auth	O	T
HARMON WATER CORP	OK2002902	Gould PWA Eldorado	O O	B T			
HEADRICK	OK3003302				Jackson Co Water Corp	O	T
HOBART	OK1011502	Frontier Development Auth Butler	O O	T T	Foss Reservoir MCD	O	T
JACKSON CO WATER CORP	OK2003306	Headrick	O	T	Altus Duke Central Vue Water	O E	T T
KIOWA CO RWS&SWMD #1	OK3003804				Quartz Mountain Reg Water Auth	O	T
LONE WOLF	OK2003806				Quartz Mountain Reg Water Auth	O	T
MANGUM PWS	OK2002802	Reed Water Corp Harmon Electric	O O	T T			
MARTHA	OK3003304				Altus	O	T
MOUNTAIN PARK	OK3003807				Snyder	O	T
MOUNTAIN PARK MCD	None	Altus Frederick (Beaver-Cache Region) Snyder	O O O	R R R			
OLUSTEE PWS	OK3003309				Altus Creta Water Corporation	O E	T T
QUARTZ MTN REG WATER AUTH (Wholesaler Only)	OK2003880	Granite PWS Lone Wolf Kiowa Co RWS & SWMD #1 Harmon Electric	O O	T T T	Altus		
REED WATER CORP	OK3002802				Mangum PWS	O	T
ROCKY	OK3007501				Beckham Co RWD #1	O	T

SENTINEL PWS	OK3007505				Beckham Co RWD #1	O	T
SNYDER	OK1011503	Comanche Co RWD #4 Mountain Park, Town of	O O	T T	Mountain Park MCD	O	B
TIPTON	OK2007101				Frederick	O	T

1 SDWIS - Safe Drinking Water Information System

	Reference Information				Players	Technical Details		Recommendations	New Information
Project Name(s)	**Keywords**	**Report**	**Publishing Organization(s)**	**Publish Date**	**Proponents**	**Available Supply (AFY)**	**Infrastructure Required**	**Preferred Alternative (if applicable)**	**Permitting or institutional changes**
Recharge to Blaine Aquifer	Blaine, Recharge	Demonstration and Evaluation of Artificial Recharge to the Blaine Aquifer in Southwestern Oklahoma	OWRB, TR 97-5S	Dec-97	Southwest Water and Soil Conservation District	70 AFY/well average recharge rate	Inlet structure Wells - 12-inch diameter, 155 to 270 feet deep	Gravity flow recharge wells which intercepted surface runoff and channeled the untreated water into cavities within the aquifer	- Requires surface water and groundwater permits

	Reference Information			Technical Details							Recommendations	
Project Name(s)	Report	Publishing Org(s)	Publish Date	Firm Yield (AFY)	Supply Infrastructure Required	Estimated Project Cost	Cost Estimate Date	Notes on what is included and/or excluded in cost estimate	Estimated Project Cost (today's dollars)	Calculated Unit Cost ($/AFY)	Actionable Idea	Data gaps and unresolved issues
Bally Mountain Reservoir	Reservoir Viability Study	OWRB	2012	N/A		N/A	N/A		#N/A	N/A	OCWP Res. Viability Level 0	No other information found
Cookietown Reservoir, Cache Creek Project	Reservoir Viability Study	OWRB	2012	34,700	Rolled earth filled with 30' crest width 2-50'x 20.3' gates	$ 99,000,000	1/1/1978		$ 358,000,000	$ 10,300	OCWP Res. Viability Level 4	Eight other potential reservoir sites were studied; Hatchetville, Walters, Temple, Red Run, Randlett, Loveland, Faxon and West Cache Creek. Cookietown is deemed the most feasible. Portions of OK-36 are within the reservoir perimeter. Good dependable yield Medium cost per unit Low/Medium proximity to demand
Coopertown Reservoir	Reservoir Viability Study	OWRB	2012	N/A		N/A	N/A		#N/A	N/A	OCWP Res. Viability Level 0	No other information found
Geronimo Reservoir	Reservoir Viability Study	OWRB	2012	84,000	Zoned earth filled embankment	N/A	N/A		#N/A	N/A	OCWP Res. Viability Level 1	
Greer Reservoir	Reservoir Viability Study	OWRB	2012	25,000	Zoned earth filled embankment	N/A	N/A		#N/A	N/A	OCWP Res. Viability Level 1	Unsuitable without extensive treatment due to natural salt contamination.
Headrick Lake, Navajo Reservoir, Cable Mountain Reservoir	Reservoir Viability Study	OWRB	2012	108,000	Zoned earth filled embankment	$ 243,000,000	3/1/2005	Includes dam, pump station and canal, and chloride control components	$ 317,000,000	$ 2,900	OCWP Res. Viability Level 1	Unsuitable for M&I without extensive treatment. Not feasible until Elm Creek Chloride control is implemented. ~40 miles Downstream of Altus Dam Requires improving or rerouting pipe from Tom Steed Reservoir to Altus Could support irrigation in both Jackson and Tillman counties Requires pumping to LAID system and chloride control (deep well injection)
Lebos Lake	Reservoir Viability Study	OWRB	2012	15,000		N/A	N/A		#N/A	N/A	OCWP Res. Viability Level 1	Also considered by the Bureau of Reclamation for 15,000 AF of imported water.
Mangum Reservoir, Lower Mangum Damsite	Reservoir Viability Study	OWRB	2012	18,494	Zoned earth filled embankment Suitable at damsite, karst features (sinkholes, caves, disappearing streams, springs and underground water courses) exist south of the uppermost reaches of the reservoir.	N/A	N/A		#N/A	N/A	OCWP Res. Viability Level 4	Potential for upstream water loss in the Commissioner Bend area due to faulting and karst features. No pre-existing cost data Good dependable yield Medium proximity to demand

	Reference Information			Technical Details							Recommendations	
Project Name(s)	Report	Publishing Org(s)	Publish Date	Firm Yield (AFY)	Supply Infrastructure Required	Estimated Project Cost	Cost Estimate Date	Notes on what is included and/or excluded in cost estimate	Estimated Project Cost (today's dollars)	Calculated Unit Cost ($/AFY)	Actionable Idea	Data gaps and unresolved issues
Mangum Reservoir, Upper Mangum Site	Reservoir Viability Study	OWRB	2012	39,656	Zoned earth filled embankment with 30' crest width 9-21.7' x 50' gates gypsum-Karst features exist at or near the site	$ 38,680,000	1/1/1973		$ 193,000,000	$ 4,900	OCWP Res. Viability Level 2	Relocate 1.14 miles of paved county road, relocate 25,000' of 12-inch pipeline, Subsequent studies by the Bureau of Reclamation (Jackson 1991) and U.S. Army Corps of Engineers 1993, 1995 and 1999) concluded the Upper Mangum Site was unsuitable.
Mountain View Reservoir	Reservoir Viability Study	OWRB	2012	50,000	Embankment with 30' wide crest 11-21.7' x 50' gates	$ 34,240,000	1/1/1973		$ 171,000,000	$ 3,400	OCWP Res. Viability Level 3	41,000' of 24 inch natural gas pipeline. SH-113 crosses extreme eastern inlet and far eastern site of dam. High dependable yield Low proximity to demand Low cost per unit -WPRS Hydro - "Highest value fishery resource"
Port Lake	Reservoir Viability Study	OWRB	2012	9,000	Zoned embankment with 30' wide crest 7-21.8' x 50' gates	$ 23,660,000	1/1/1973		$ 118,000,000	$ 13,100	OCWP Res. Viability Level 3	Relocate 2 miles of SH 55, improve 11 miles of secondary road, relocate 1500 feet of 26-inch gas pipeline, relocate 3 miles of county road Low dependable yield Medium cost per unit Medium proximity to demand
Rainy Mountain Creek Reservoir	Reservoir Viability Study	OWRB	2012	5,000	Embankment with 30' wide crest 5-21.3' x 50' gates	$ 23,900,000	1/1/1973		$ 119,000,000	$ 23,800	OCWP Res. Viability Level 3	34,800' of 138kv power line, Relocate Rainy Mountain Indian Mission and cemetery, 39000' of 16 inch oil pipeline Low dependable yield Medium cost per unit Low/Medium proximity to demand
Snyder Lake	Reservoir Viability Study	OWRB	2012	10,600	Zoned embankment with 30' wide crest 3-21.2' x 50' gates	$ 24,250,000	1/1/1974		$ 113,000,000	$ 10,700	OCWP Res. Viability Level 3	Relocate 10 miles of county road and 10 miles of rural electric power line Good dependable yield Low/Medium proximity to demand Medium cost per unit
Temple Reservoir	Reservoir Viability Study	OWRB	2012	117,000	Zoned earth filled embankment	N/A	N/A		#N/A	N/A	OCWP Res. Viability Level 1	- No cost in Cache Creek Concluding Report, noted that not economically feasible until petroleum reserves are depleted
Trico Lake	Reservoir Viability Study	OWRB	2012	32,000	Zoned earth filled embankment	$ 373,000,000	3/1/2005		$ 487,000,000	$ 15,200	OCWP Res. Viability Level 1	Would be used to replace Altus Reservoir in the event conveyance was used to convert Altus Reservoir into terminal storage. WPRS Hydro - "Highest valued fishery resource Upstream of Altus Dam - used to capture sediment prior to Altus Reservoir.

APPENDIX C – LIST OF REFERENCED REPORTS

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The following previous reports were received by the project team during the development of the Southwest Oklahoma Water Supply Action Plan, and were reviewed as part of the planning process.

- Cache Creek Basin Technical Subcommittee, *Cache C reek Basin Historical/Research Information*
- Freese and Nichols, Inc, *Round Timber Well Field Evaluation – Phase I*, November 2013
- Oklahoma Water Resources Board, *Oklahoma Comprehensive Water Plan Phase I*, September 1975
- Oklahoma Water Resources Board, *Oklahoma Comprehensive Water Plan Phase II Interim Report*, September 1977
- Oklahoma Water Resources Board, *Oklahoma Comprehensive Water Plan 2012 Update Water Demand Forecast Report Addendum Conservation and Climate Change*, August 2011
- Oklahoma Water Resources Board, *Oklahoma Comprehensive Water Plan Southwest Watershed Planning Region Report Version 1.1*
- Oklahoma Water Resources Board, *Reservoir Viability Study State of Oklahoma Final Report*, January 2012
- Oklahoma Water Resources Board, *Technical Report 97-4 Blaine Gypsum Groundwater Recharge Demonstration Project Data Report*, October 1997
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- U.S. Department of the Interior, Bureau of Reclamation, *High Plains States Groundwater Demonstration Program Interim Report*, October 1994
- U.S. Department of the Interior, Bureau of Reclamation, *High Plains States Groundwater Demonstration Program 1990 Interim Report*
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