Oklahoma Comprehensive Water Plan
2012 Update

Drinking Water Infrastructure
Needs Assessment by Region

April 2011

This study was funded through an agreement with the Oklahoma Water Resources Board under its authority to update the Oklahoma Comprehensive Water Plan, the state's long-range water planning strategy, due for submittal to the State Legislature in 2012. Results from this and other studies have been incorporated where appropriate in the OCWP's technical and policy considerations. The general goal of the OCWP is to ensure reliable water supplies for all Oklahomans through integrated and coordinated water resources planning and to provide information so that water providers, policy-makers, and water users can make informed decisions concerning the use and management of Oklahoma's water resources.

Prepared by CDM under a cooperative agreement between the United States Army Corps of Engineers and the Oklahoma Water Resources Board

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Acronyms

AF	acre-foot
AFY	acre-feet per year
CDM	Camp Dresser & McKee Inc.
DWINS	Drinking Water Infrastructure Needs Survey
DWSRF	Drinking Water State Revolving Fund
EPA	U.S. Environmental Protection Agency
GWUDI	groundwater under the direct influence
LF	linear feet
MG	million gallons
mgd	million gallons per day
O&M	operations and maintenance
OCWP	Oklahoma Comprehensive Water Plan
OWRB	Oklahoma Water Resources Board
PWA	Public Works Authority
RWD	Rural Water District
RWS & SWMD	Rural Water System and Surface Water Management District
SCADA	supervisory control and data acquisition
WTP	water treatment plant

Section 1
Executive Summary

As part of the update to the Oklahoma Comprehensive Water Plan (OCWP), Camp Dresser & McKee Inc. (CDM) prepared cost estimates to meet the drinking water infrastructure needs for the next 50 years. While it is difficult to account for changes that may occur within this extended period, it is necessary to evaluate, at least on the order-of-magnitude level, the long range costs of providing potable water to the state's citizens, industries, and farmers. The results of this study identify needs that individual providers may be unable to meet without assistance. Meeting the drinking water needs for the next 50 years requires support and funding assistance by various state and federal agencies.

In this study, project cost estimates are developed for a selection of existing water providers. These costs are weighted, using a methodology similar to the U.S. Environmental Protection Agency (EPA) system for determining national drinking water infrastructure costs, to develop 13 regional cost estimates. The regional cost estimates then are summed to provide a statewide cost estimate to meet drinking water needs for the next 50 years.

This report is organized in three main sections. Section 1 serves as an introduction and a summary of the study and includes abbreviated description of methodology and results. Section 2 provides a detailed description of the methodology used to develop cost estimates. This section includes lists of assumptions made, types of projects included or excluded by the study, and sources used to develop projects and costs. Section 3 summarizes the regional and statewide cost estimates developed as part of this task. Sections 4 through 16 provide details about each of the regional cost estimates. These provide comprehensive information on selected providers, project lists used, and other information used to develop the regional cost estimates.

1.1 OCWP Methodology

The OCWP methodology is similar to EPA's methodology presented in the report *2009 Drinking Water Infrastructure Needs Survey [DWINS] and Assessment: Fourth Report to Congress.* In this OCWP report, the term "2007 DWINS" is used to encompass the EPA method, cost models, and results associated with the most recent survey. This task uses the 13 regions, developed as part of other OCWP tasks, as the basis for developing cost estimates. Figure 1-1 illustrates the OCWP method.

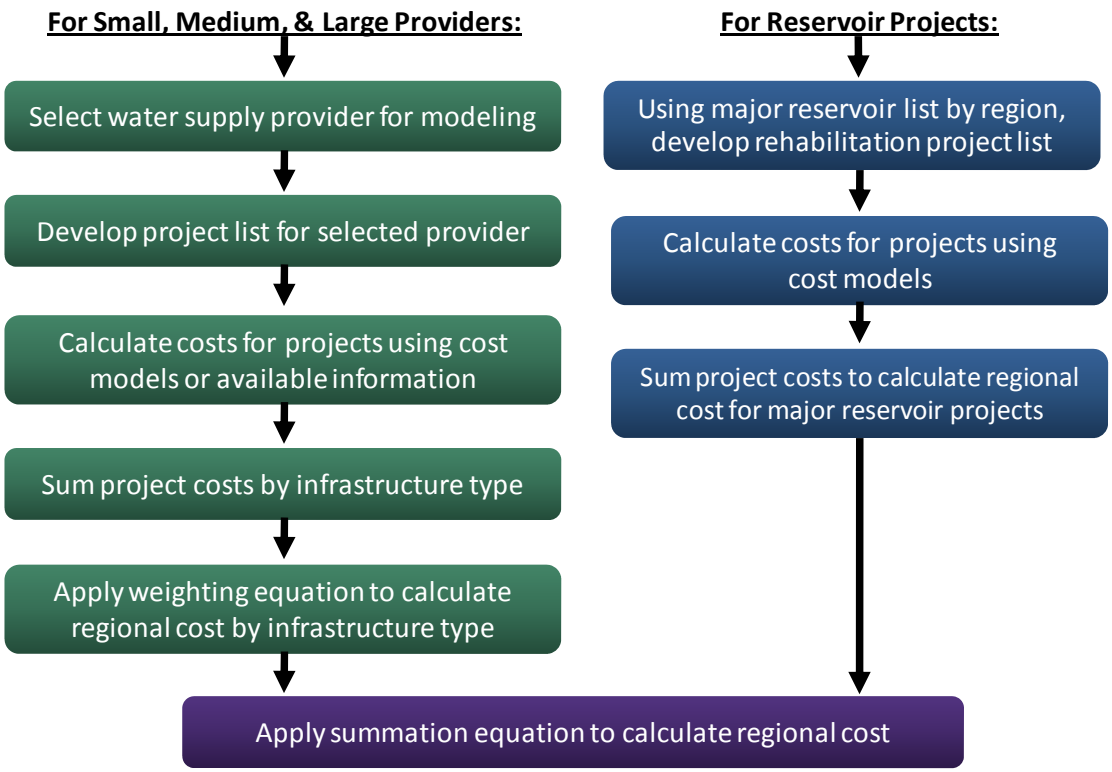

Figure 1-1. OCWP Drinking Water Infrastructure Needs Assessment Approach

Equations 1-1 and 1-2 represent the summation equations used to calculate regional costs.

*Drinking Water Infrastructure Costs by Infrastructure Type and by Stratum = Number of Systems in Stratum / Number of System Sampled * Sum of Project Costs for Systems Sampled by Infrastructure Type*

Equation 1-1 Cost by Infrastructure Type and by Stratum (or Size)

Drinking Water Infrastructure Costs by Stratum = Sum of Drinking Water Infrastructure Costs by Infrastructure Type and by Stratum

Equation 1-2 Cost by Region for Stratum

A few of the key similarities between the OCWP and 2007 DWINS methodologies include the following:

- The OCWP study used the same definition for small, medium, and large systems. Categorization of water providers was based on projected 2060 population and project size was based on projected 2060 total demands including retail, system losses, and sales (more information on projections may be found in the *Water Demand Forecast Report* available on the Oklahoma Water Resources Board [OWRB] website).

- The OCWP study used the same infrastructure type classification of distribution and transmission, treatment, storage, source, and other. Generally, the definitions of each category are the same between the 2007 DWINS and this study.
- The OCWP study used the same source water classification.
- The OCWP study used the same definition of project costs.
- The OCWP study used the same 2007 DWINS cost models except when EPA cost models were unavailable.
- The OCWP study excluded all new reservoir projects similar to the 2007 DWINS. While new reservoirs are a key part of meeting current and future water supply needs for Oklahoma, the cost associated with developing new reservoirs depends significantly on the local decisions. These decisions include whether to oversize for recreation, aesthetic or environmental reasons, comparison between cost and reliability, and location.

A few of the key differences between the OCWP and 2007 DWINS methodologies are listed below:

- The OCWP study included all types of projects, not just those eligible for Drinking Water State Revolving Fund (DWSRF) program. Examples of projects that were included in the OCWP study but not in the 2007 DWINS are dam and reservoir rehabilitation projects and projects specifically for new growth. Cost were split into DWSRF eligible and non-eligible categories to help define the level of financial support that could be potentially be sought by applicants for DWSRF loans administered by OWRB.
- The OCWP study used a 50-year planning horizon compared to the 20-year planning period for the 2007 DWINS.
- The OCWP study included projects that have been funded since the 2007 and 2008 surveys.
- The OCWP study developed project lists for selected providers while the 2007 DWINS relied on projects submitted by each survey respondent.

Section 2 of this report provides more information on the methodology developed for estimating drinking water infrastructure costs.

1.2 Regional Cost Estimates

Fifty-five of the 776 OCWP providers were selected for cost modeling. OCWP providers are those included in the 2008 OCWP survey and for which water demand projections were created. The selected providers, using the methodology outlined above and described in

detail in Section 2 of the report, were used to calculate the infrastructure costs of the region and state.

Across the state, approximately $38 billion (in 2007 dollars) is required to meet the drinking water infrastructure needs for the next 50 years. Figure 1-2 illustrates the total drinking water infrastructure costs to meet the water needs until 2060 by region. The Central region has the largest need, comprising over 31 percent of the state's need. Middle Arkansas has the second largest need, comprising nearly 17 percent.

Table 1-1 illustrates the costs by size category and period. Small providers have the largest overall drinking water infrastructure costs comprising nearly 46 percent of the state's need. The largest infrastructure costs occur in the 2041 – 2060 period.

Table 1-1 Statewide Drinking Water Infrastructure Cost Summary by Category

Category [A]	Potential Funding Source [B]	Present - 2020 Infrastructure Need (millions of 2007 dollars)	2021-2040 Infrastructure Need (millions of 2007 dollars)	2041-2060 Infrastructure Need (millions of 2007 dollars)	Total Period Infrastructure Need (millions of 2007 dollars) [C]
Small	DWSRF Eligible	$3,400	$4,990	$8,730	$17,120
	Non-DWSRF Eligible	$40	$70	$70	$180
Small Subtotal		$3,440	$5,060	$8,800	$17,300
Medium	DWSRF Eligible	$4,320	$4,050	$6,120	$14,490
	Non-DWSRF Eligible	$50	$60	$60	$170
Medium Subtotal		$4,370	$4,110	$6,180	$14,660
Large	DWSRF Eligible	$1,720	$1,170	$1,690	$4,580
	Non-DWSRF Eligible	$50	$20	$20	$90
Large Subtotal		$1,770	$1,190	$1,710	$4,670
Reservoir	DWSRF Eligible	$0	$0	$0	$0
	Non-DWSRF Eligible	$100	$250	$810	$1,160
Reservoir Subtotal		$100	$250	$810	$1,160
Total		$9,680	$10,610	$17,500	$37,790

A. Large systems are those serving more than 100,000 people, medium systems are those serving between 3,301 and 100,000 people and small systems are those serving 3,300 and fewer people. The "reservoir" category includes all regional reservoir rehabilitation projects.

B This study assumes that distribution projects for new growth and all reservoir projects are non-DWSRF eligible. All other projects were assumed to be DWSRF eligible. Cost were split into these categories to help define the level of financial support that could be potentially be sought by applicants for DWSRF loans administered by OWRB.

C Small differences in values may result from rounding.

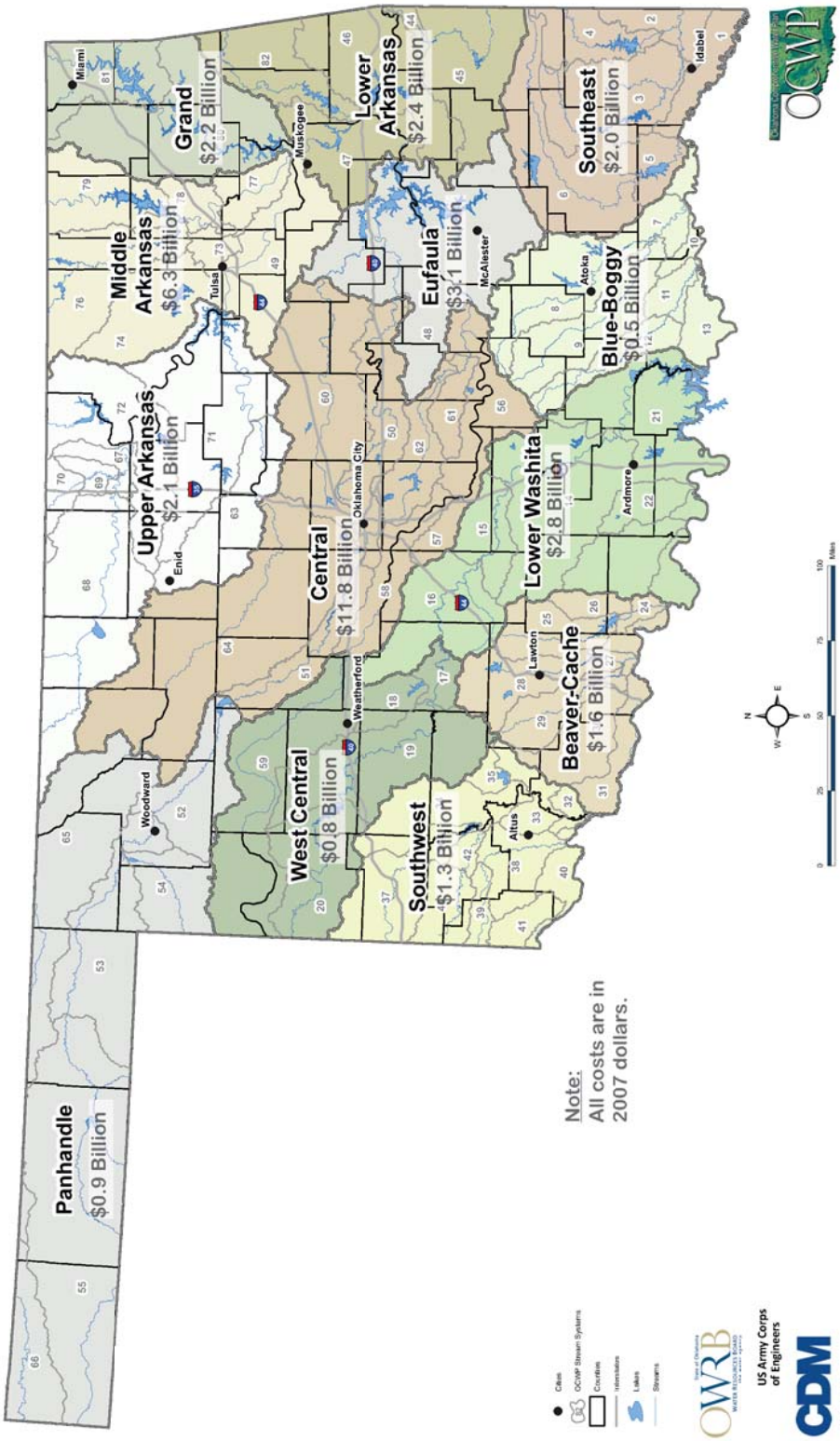

Figure 1-2. Drinking Water Infrastructure Needs

Section 2
Cost Estimating Approach

As part of the update to the OCWP, CDM prepared construction cost estimates to meet the drinking water infrastructure needs for the next 50 years. This section provides detailed information on the cost estimating methodology used in this study. This section begins with a description of the EPA system for determining national drinking water infrastructure. This subsection provides a foundation of knowledge, since the OCWP method is similar to the EPA system. Next, this section describes the OCWP cost estimating approach. This subsection includes a comparison to the EPA system, assumptions made, and sources of information.

2.1 Background: EPA Drinking Water Infrastructure Needs Assessment

The Safe Drinking Water Act requires EPA to periodically assess the needs of the nation's water systems and use the results for allocating the DWSRF. Since the first survey was completed in 1994/1995, EPA has made changes to improve and more accurately reflect the 20-year costs of infrastructure needs.

The most recent EPA survey was completed in 2007. The report *2009 Drinking Water Infrastructure Needs Survey and Assessment: Fourth Report to Congress* presents the methodology utilized by EPA to determine water needs and results from the survey. When cost estimates were unavailable, EPA utilized cost models to estimate the project costs. The report *2007 Drinking Water Infrastructure Needs Survey and Assessment: Modeling the Cost of Infrastructure* (cost models) documents these cost models. In this OCWP report, the term "2007 DWINS" is used to reference the actual survey and all documentation related specifically to this survey. The 2007 DWINS is the basis for the OCWP cost estimating methodology.

To develop the water infrastructure costs, EPA sent a survey requesting drinking water infrastructure needs information to all large providers and a statistically significant portion of medium providers in each state. For small providers, EPA sent qualified personnel to complete surveys at a statistically significant portion of small systems across the country. The surveys collected project descriptions and cost estimates if available. Project costs provided in the survey were adjusted to reflect January 2007 dollars. Projects are limited to water system needs eligible for DWSRF program.

The cost models were primarily based on project costs received through the 2007 DWINS survey. The cost models are appropriate for developing estimates of drinking water infrastructure costs on a broad basis but should not be used to estimate the cost of specific projects for individual systems for planning or financing purposes. The cost models utilize minimal project information that is generally available, such as design capacity and pipeline size. The cost models provide cost in January 2007 dollars.

The description below focuses on the large, medium, and small community water systems portion of the 2007 DWINS. EPA defined large systems as those serving more than 100,000 people, medium systems as those serving between 3,301 and 100,000 people, and small systems as those serving 3,300 and fewer people. Community water systems are defined as public water systems that serve at least 15 connections used by year-round residents or that regularly serve at least 25 residents year-round.

To develop the state need for large water systems, EPA summed all eligible project costs received. The simple method, shown in Equation 2-1, is possible since all large systems were surveyed.

Large System Drinking Water Infrastructure Costs = Sum of Project Costs for Systems Surveyed

Equation 2-1

EPA weighted the project costs included in the survey to determine the state need for medium water systems. Equation 2-2 illustrates this method.

Medium System Drinking Water Infrastructure Costs = Number of Systems in Stratum / Number of System Sampled * Sum of Project Costs for Systems Sampled

Equation 2-2

For small systems, EPA calculated a national average small system need and multiplied it by the number of small providers in the state to determine the state's small water system need. This approach is shown by Equation 2-3.

Small System Drinking Water Infrastructure Costs = Number of Systems in Stratum * National Average Small System Need

Equation 2-3

Calculated project costs were multiplied by adjustment factors to account for regional differences in construction costs.

Using the collected information, EPA created state level water needs. Then, EPA summed the states' needs along with American Indian and Alaskan Native village water systems and costs associated with proposed and recently promulgated regulations (developed separately) to develop a national 20-year need. EPA presented the results by system size and project type. Project types included distribution and transmission, treatment, storage, source, and other.

2.2 OCWP Regional Cost Development

This section describes the details of the OCWP approach. It starts with a general description and comparison with EPA's method. Then a discussion on how specific providers were selected and sources of information is incorporated. Finally, this section discusses how project lists were developed and provides a list of common assumptions necessary to estimate costs.

2.2.1 OCWP Method: A General Overview

The OCWP method is similar to EPA's 2007 DWINS approach in many ways with only a few key differences. This task used the 13 regions, developed as part of other OCWP tasks, as the basis for developing cost estimates. Figure 2-1 illustrates the OCWP method. Several of these topics are discussed in more detail in subsequent sections.

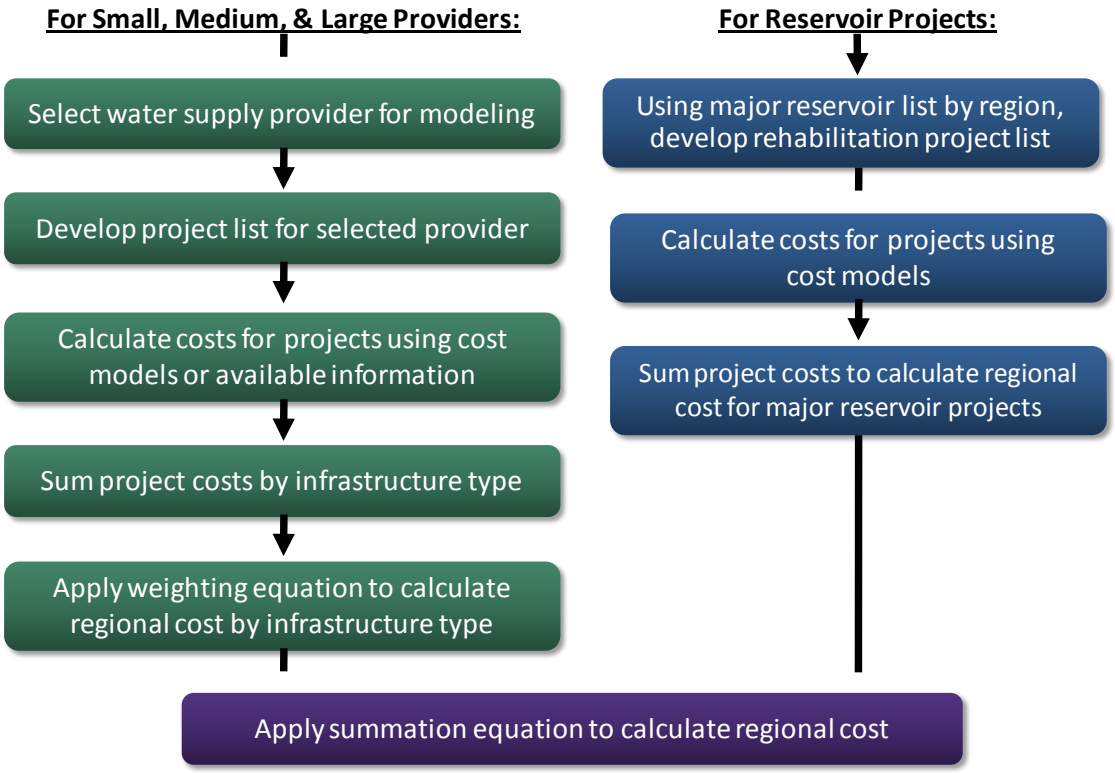

Figure 2-1. OCWP Drinking Water Infrastructure Needs Assessment Approach

Equations 2-4 through 2-11 are used to calculate regional and state level costs.

Large System Drinking Water Infrastructure Costs by Infrastructure Type = Sum of Project Costs for Systems Surveyed by Infrastructure Type

Equation 2-4 Large System Cost by Infrastructure Type

Large System Drinking Water Infrastructure Costs = Sum of Large System Drinking Water Infrastructure Costs by Infrastructure Type

Equation 2-5 Large System Cost by Region

*Medium System Drinking Water Infrastructure Costs by Infrastructure Type = Number of Systems in Stratum / Number of System Sampled * Sum of Project Costs for Systems Sampled by Infrastructure Type*

Equation 2-6 Medium System Cost by Infrastructure Type

Medium System Drinking Water Infrastructure Costs = Sum of Medium System Drinking Water Infrastructure Costs by Infrastructure Type

Equation 2-7 Medium System Cost by Region

*Small System Drinking Water Infrastructure Costs by Infrastructure Type = Number of Systems in Stratum / Number of System Sampled * Sum of Project Costs for Systems Sampled by Infrastructure Type*

Equation 2-8 Small System Cost by Infrastructure Type

Small System Drinking Water Infrastructure Costs = Sum of Small System Drinking Water Infrastructure Costs by Infrastructure Type

Equation 2-9 Small System Cost by Region

Regional Drinking Water Infrastructure Costs = Sum of Small, Medium and Large Systems Sampled by Infrastructure Type + Sum of Regional Reservoir Projects

Equation 2-10 Regional Level Cost

State Drinking Water Infrastructure Costs = Sum of Regional Drinking Water Infrastructure Costs

Equation 2-11 State Level Costs

Similarities between the OCWP and 2007 DWINS methodologies include the following:

- The OCWP study used the same definition for small, medium and large systems. Categorization of water providers was based on projected 2060 population and project size is based on projected 2060 total demands including retail, system losses, and sales (more information on projections may be found in the *Water Demand Forecast Report* available on the Oklahoma Water Resources Board [OWRB] website).
- The OCWP study used the same infrastructure type classification of distribution and transmission, treatment, storage, source and other. Generally, the definitions of each category are the same between the 2007 DWINS and this study.
  - The distribution and transmission category included all infrastructure required to transport both raw and finished water. Typically raw water infrastructure was called transmission while finished water infrastructure was labeled as distribution.
  - The treatment category included all aspects of raw water treatment.
  - The storage category included all finished water storage and only raw water storage that are onsite and part of the treatment process.
  - The source category included surface water intakes, wells, and spring collectors. For the OCWP study, dams and reservoirs also were included as part of the source water category.

  - The other category included all projects that do not meet one of the above category definitions.

- The OCWP study used the same source water classification. Systems are categorized as surface water if they have at least one source that is surface water or groundwater under the direct influence (GWUDI) of surface water. Systems are categorized as groundwater if they do not have a surface water or GWUDI source. If a water system purchased water from another provider, it was grouped with the groundwater category (EPA, in the 1995 assessment, found that purchased water suppliers costs more closely resembled those of groundwater systems.) The SWDIS primary source classification determined the water supply source type.

- The OCWP study used the same definition of project costs. Cost estimates assumed complete construction costs including engineering and design, purchase of raw materials and equipment, construction and installation labor, and final inspection. Costs associated with system operation and maintenance (O&M) were not included.

- The OCWP study used the same 2007 DWINS cost models except where EPA cost models are unavailable. Documentation on source and cost is provided in the OCWP cost model table, located in Appendix A. One example of this is dam and reservoir rehabilitation projects.

- The OCWP study excluded all new reservoir projects similar to the 2007 DWINS. While new reservoirs are a key part of meeting current and future water supply needs for Oklahoma, the cost associated with developing new reservoirs depends significantly on the local decisions. These decisions include whether to oversize for recreation, aesthetic or environmental reasons, comparison between cost and reliability, and location.

Differences between the OCWP and 2007 DWINS methodologies are listed below:

- The OCWP study included all types of projects, not just those eligible for DWSRF program. Examples of projects that were included in the OCWP study but not in the 2007 DWINS are dam and reservoir rehabilitation projects and projects specifically for new growth.

- The OCWP study used a 50-year planning horizon compared to the 20-year planning period for the 2007 DWINS.

- The OCWP study used several sources of information including:

  - Oklahoma system specific information that was available from the 2007 DWINS.

  - The 2008 OCWP survey, which collected information on existing infrastructure and planned improvements. Cost information was not collected in this survey. More information may be found in the *Provider Survey Summary Report* available on the OWRB website.

  - Regional or provider water studies and master plans to supplement the above resources.

- The OCWP project lists included drinking water infrastructure items necessary to meet the 2060 projected annual average day water demands. This study did not evaluate additional infrastructure that may be needed to meet the peak day demands on which water projects typically are based. The 2007 DWINS did not distinguish between annual average and peak day demands since participants provided project size.

- The OCWP study used incremental periods (2020, 2040, and 2060) to calculate costs.

- The OCWP study included projects that have been funded since the 2007 and 2008 surveys.

- The OCWP study developed project lists for selected providers while the 2007 DWINS relied on projects submitted by each survey respondent. The process to select water supply providers is discussed in Section 2.2.2 and more information is provided on the project list development process in Section 2.2.3.

- The OCWP study did not determine Native American water demands separately, determining instead that these needs are included through the various demand categories encompassing the state of Oklahoma.

2.2.2 OCWP Method: Selecting Providers

Many factors were evaluated in order to select water supply providers for inclusion in the OCWP study cost modeling. This section describes the selection process.

Starting with the OCWP water provider list for each region, providers were grouped by stratum: large, medium, small, surface water, and groundwater. All large, surface water providers were selected for cost modeling. There were no large, groundwater providers. For other stratums, selecting at least one water supply provider in each stratum was the goal. The quality and quantity of available data were the more important selection criteria. Secondary criteria included choosing providers that were representative of each stratum in population size served and were representative of the different counties within the region. Figure 2-2 shows a decision tree that illustrates the selection process.

In most of the regions and in most of the stratums, there was at least one water service provider suitable for cost modeling. Where there was not a suitable water service provider, other methods were used to estimate costs. One example occurred in regions where there was not a medium groundwater provider but there were medium purchased water providers. In this situation, a neighboring region's medium groundwater stratum was used for cost estimating. In this example, the modification was made at the regional level and was reflected in the regional summation. Another example occurred in regions when there was a suitable stratum provider except that this provider did not complete fully the distribution piping section of the 2008 OCWP survey, which was necessary for project list development. In this situation, a second water provider, similar in population size, was

used to estimate existing distribution piping size, length and age. In this example, the modification was made at the project list level and was reflected in the worksheet.

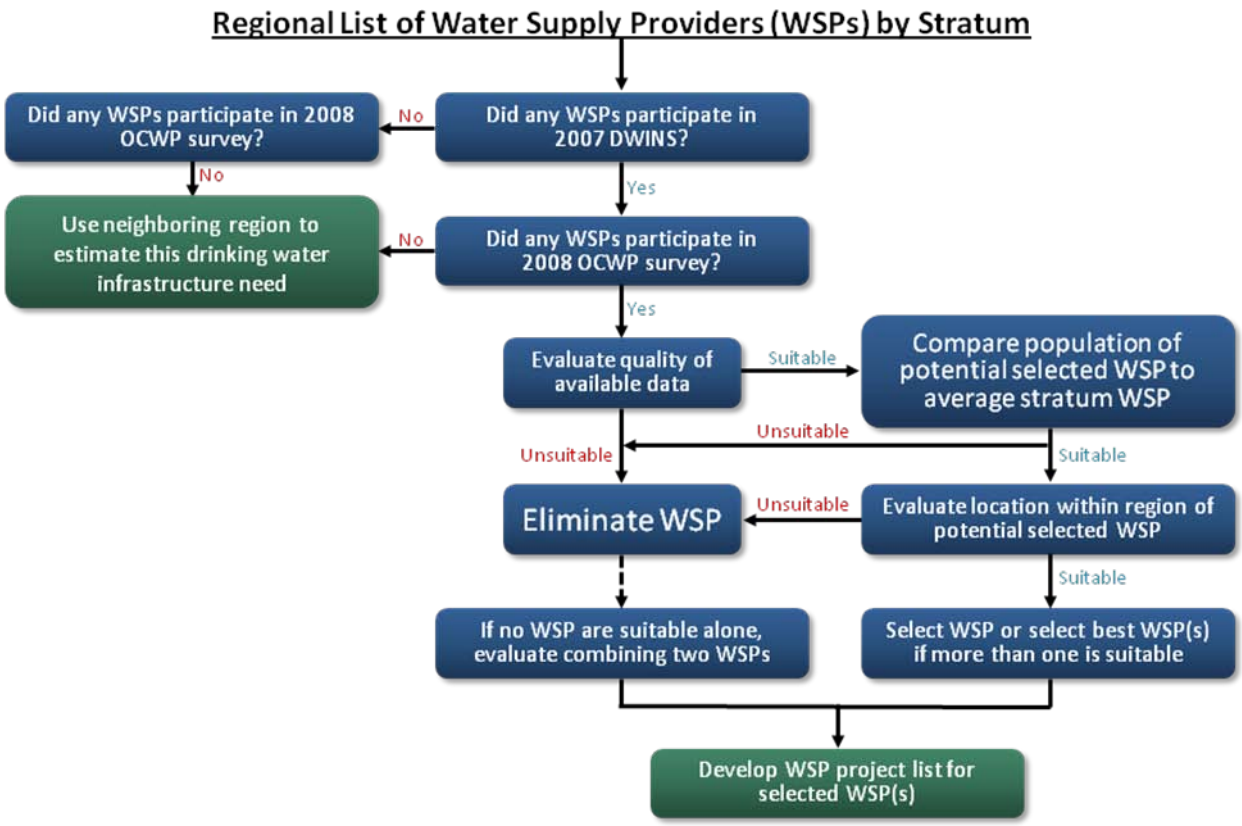

Figure 2-2. Provider Selection Decision Tree

2.2.3 OCWP Method: Developing Project List

The next cost-modeling step was developing a project list for each selected provider. To reduce the subjectivity of this step, a list of standard assumptions was developed and used unless better information was available.

The first step in developing the provider's project list was to incorporate the 2007 DWINS projects. The 2007 DWINS information provided project name and basic design information required for cost modeling. When the 2007 DWINS projects contain cost information, it was included in the OCWP study. In this study, all 2007 DWINS projects occurred in the present to 2020 period.

Project development worksheets for surface water and groundwater sources were developed. Information developed as part of other OCWP tasks and provided in the 2008 OCWP survey were used to complete this form. The OCWP standard assumptions supplemented the available information. The worksheet provides a standard method for

estimating types of projects needed, project size, and project date. Examples of the worksheets are in Appendix B.

In the absence of project descriptions, reasonable suppositions were made so that project lists could be developed for individual water providers. The intent was not to make detailed project lists but provide basic project information that enabled use of the 2007 DWINS cost models listed in Appendix A. The following items were typical of the assumptions:

- If 2060 annual average day water demands exceed permitted water supplies, it is assumed that the current source water will be utilized in the current proportions to meet the 2060 demand. This task did not evaluate whether there is available supply at the existing water sources as part of this task. Costs for wells followed EPA cost model R1, which includes costs associated with siting, drilling, and developing a well to completion. Costs for surface water intakes followed EPA cost model R7.

- Rehabilitation of existing major reservoirs was assumed to occur every 100 years. The amount of storage for rehabilitation is based on the municipal water supply storage. If unknown, the full normal pool storage was used. Reservoirs with no designated municipal water supply storage were included in the study but show zero in the rehabilitation column in the reservoir table in each individual region's section. The project date is calculated from the construction date of the reservoir. The project has a cost of $1,000 per AF of storage. This type of project was not included in the 2007 DWINS.

- EPA cost model X1 was used to determine infrastructure costs necessary to bring raw water from the source to treatment system. To determine the parameters needed for modeling, a single pipeline with a diameter sized to carry all of the needed capacity and a distance of 25 miles (or 132,000 linear feet [LF]) was used. For surface water, it was assumed that raw water pumps are required and costs for the pumps were developed using EPA cost model R8. When a water treatment plant (WTP) project was planned, the costs associated with raw water pumping was included in EPA cost model T10 for the WTP project.

- For the purpose of this study, it was assumed that water treatment infrastructure would be rehabilitated every 30 years. When water demand exceeds current treatment capacity, additional treatment capacity to meet projected demand was included. In the absence of more specific information, it was assumed that existing and new treatment of surface water was in the form of a conventional filter plant. Costs for the conventional treatment plant were determined using EPA cost model T10 for rehabilitation/expansion of WTP. For treating groundwater, costs were determined using EPA cost model T22 for groundwater chemical feed (no distinction between new and rehabilitation). Other costs models were used as necessary to accommodate different types of water treatment. If the existing treatment capacity was unknown, this study included a rehabilitation/expansion project to meet the projected 2060 water demands.

- This study used EPA cost model P1 to account for finished water pumps.
- In order to estimate the needs associated with a growing distribution system infrastructure, it was assumed that the distribution system total length grows in proportion to population growth. Costs were calculated using EPA cost model M1 for new distribution piping.
- It was assumed that the water system would have approximately 10 percent of their treatment capacity in finished water storage. In the absence of more specific information, this study used EPA cost model S2 for ground-level water storage. EPA cost model S1 was used for elevated water storage.
- While the deterioration rate of transmission lines and distribution mains varies considerably based on pipe material, soil conditions, and corrosiveness of the drinking water, this study assumed that pipe would be replaced or rehabilitated every 75 years or, stated in a different way, approximately 1.3 percent of the existing inventory would be replaced or rehabilitated annually. Approximately 0.65 percent of pipe would be replaced and costs determined using EPA cost model M1 for new pipe. The remaining 0.65 percent of pipe would be rehabilitated and costs determined using EPA cost model M1 for rehabilitated pipe. This cost model included all components required for distribution not limited to pipe, installation, hydrants, valves, and site work.
- Costs associated with purchasing water were not specifically developed. However, water infrastructure needs associated with providers that use only purchased water were included in the regional water needs through the use of the EPA finding that the needs of providers that purchase water was similar to the needs of providers who utilize groundwater.

2.2.4 OCWP Method: Summation of Projects

With completed project lists and costs, Equations 2-4 through 2-11 were used to calculate regional and statewide drinking water infrastructure costs. The results are presented in Section 3 of this report.

Section 3
Summary of Regional Drinking Water Infrastructure Costs

Using the methodology outlined in Section 2, drinking water infrastructure cost estimates were developed for each of the 13 regions. This section summarizes the costs. Details on the individual regions can be found in Sections 4 through 16.

There are 776 OCWP providers in the state. OCWP providers are those included in the 2008 OCWP survey and for which water demand projections were created. Table 3-1 shows the number of water providers by stratum. Fifty-five providers were selected for cost modeling. The selected providers' costs were extrapolated using the equations presented in Section 2 to calculate the infrastructure costs of the region and state.

Table 3-1. Number of OCWP Providers by Stratum

	Population [A]	Surface Water [B]	Groundwater [C]	Total [D]
Large	>100,000	5	0	5
Medium	3,301 – 100,000	100	100	200
Small	<3,300	69	502	571
Total		**174**	**602**	**776**

[A] Population based on 2060 projection (see *Water Demand Forecast Report* for more details on projections).
[B] Systems are classified as surface water if they have at least one source that is surface water or groundwater under the direct influence of surface water.
[C] Systems are classified as groundwater if they do not meet surface water definition above or if they only purchase water.
[D.] From the time of the original survey, the number of providers has decreased due to normal ODEQ review procedures.

Across the state, approximately $38 billion (in 2007 dollars) is required to meet the drinking water infrastructure needs for the next 50 years. Figure 3-1 illustrates the total drinking water infrastructure costs to meet the water needs until 2060 by region. Table 3-2 identifies costs by region and period. The Central region has the largest need, comprising over 31 percent of the state's need. Middle Arkansas has the second largest need, comprising nearly 17 percent.

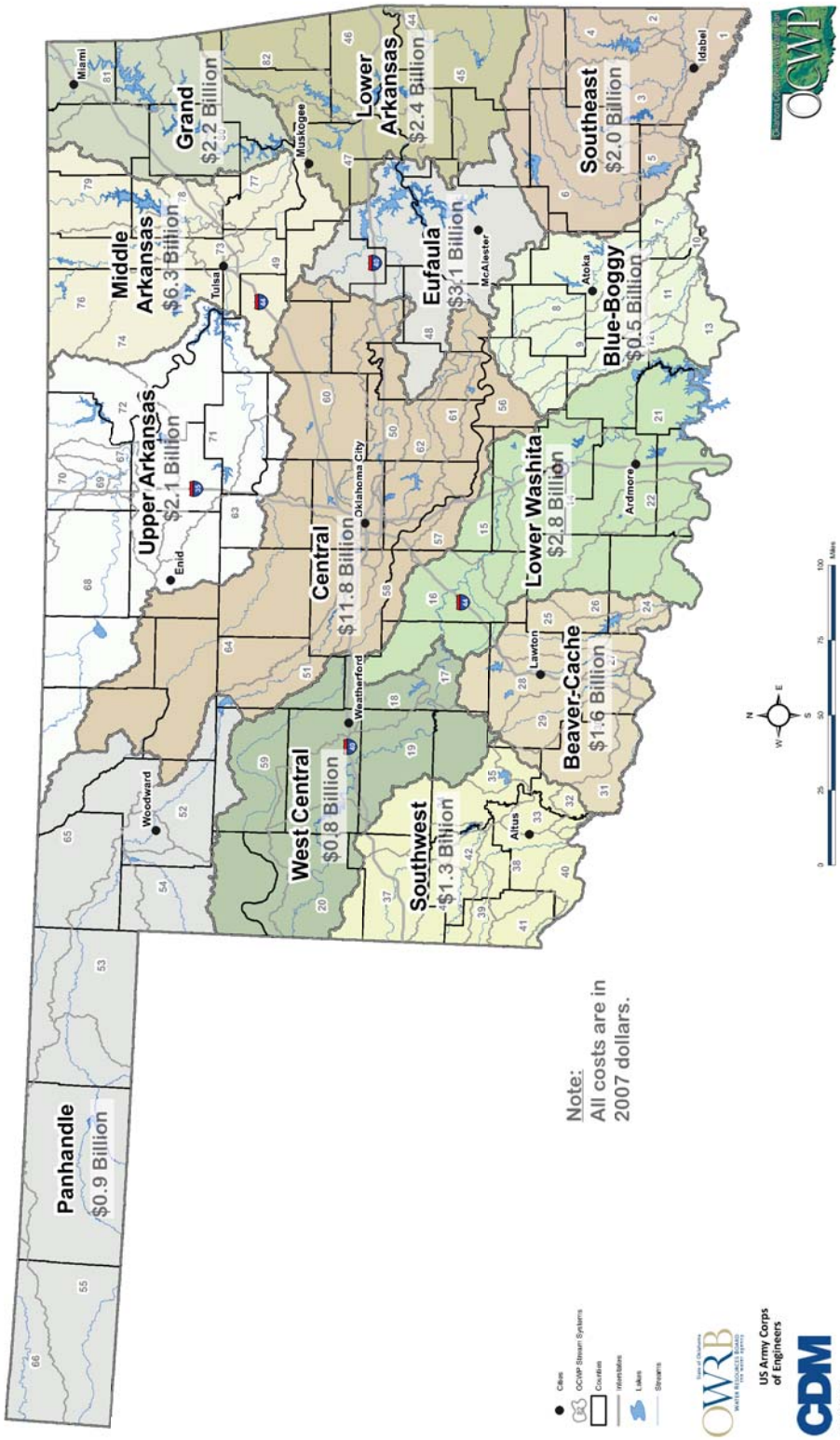

Figure 3-1. Drinking Water Infrastructure Needs

Table 3-2. Drinking Water Infrastructure Cost Summary by Region

Region	Present - 2020 Infrastructure Need (millions of 2007 dollars)	2021 - 2040 Infrastructure Need (millions of 2007 dollars)	2041 - 2060 Infrastructure Need (millions of 2007 dollars)	Total Period Infrastructure Need (millions of 2007 dollars)[A]
Beaver-Cache	$740	$490	$380	$1,610
Blue Boggy	$100	$360	$40	$500
Central	$2,700	$990	$8,130	$11,820
Eufaula	$530	$1,570	$1,030	$3,130
Grand	$510	$1,040	$600	$2,150
Lower Arkansas	$440	$580	$1,370	$2,390
Lower Washita	$1,200	$1,140	$470	$2,810
Middle Arkansas	$1,300	$1,420	$3,540	$6,260
Panhandle	$340	$360	$240	$940
Southeast	$280	$1,100	$640	$2,020
Southwest	$400	$560	$310	$1,270
Upper Arkansas	$1,040	$580	$490	$2,110
West Central	$100	$430	$250	$780
Total	$9,680	$10,620	$17,490	$37,790

A. Small differences in values may result from rounding.

Table 3-3 illustrates the costs by size category and period. Small providers have the largest overall drinking water infrastructure costs comprising approximately 46 percent of the state's need. The largest infrastructure costs occur in the 2041 – 2060 period.

Table 3-3. Statewide Drinking Water Infrastructure Cost Summary by Category

Category [A]	Potential Funding Source [B]	Present - 2020 Infrastructure Need (millions of 2007 dollars)	2021-2040 Infrastructure Need (millions of 2007 dollars)	2041-2060 Infrastructure Need (millions of 2007 dollars)	Total Period Infrastructure Need (millions of 2007 dollars)[C]
Small	DWSRF Eligible	$3,400	$4,990	$8,730	$17,120
	Non-DWSRF Eligible	$40	$70	$70	$180
Small Subtotal		$3,440	$5,060	$8,800	$17,300
Medium	DWSRF Eligible	$4,320	$4,050	$6,120	$14,490
	Non-DWSRF Eligible	$50	$60	$60	$170
Medium Subtotal		$4,370	$4,110	$6,180	$14,660
Large	DWSRF Eligible	$1,720	$1,170	$1,690	$4,580
	Non-DWSRF Eligible	$50	$20	$20	$90

Table 3-3. Statewide Drinking Water Infrastructure Cost Summary by Category, continued

Category [A]	Potential Funding Source [B]	Present - 2020 Infrastructure Need (millions of 2007 dollars)	2021-2040 Infrastructure Need (millions of 2007 dollars)	2041-2060 Infrastructure Need (millions of 2007 dollars)	Total Period Infrastructure Need (millions of 2007 dollars)[C]
Large Subtotal		$1,770	$1,190	$1,710	$4,670
Reservoir	DWSRF Eligible	$0	$0	$0	$0
	Non-DWSRF Eligible	$100	$250	$810	$1,160
Reservoir Subtotal		$100	$250	$810	$1,160
Total		$9,680	$10,610	$17,500	$37,790

A Large systems are those serving more than 100,000 people, medium systems are those serving between 3,301 and 100,000 people and small systems are those serving 3,300 and fewer people. The "reservoir" category includes all regional rehabilitation reservoir projects.

B This study assumes that distribution projects for new growth and all reservoir projects are non-DWSRF eligible. All other projects were assumed to be DWSRF eligible. Cost were split into these categories to help define the level of financial support that could be potentially be sought by applicants for DWSRF loans administered by OWRB.

C Small differences in values may result from rounding.

Table 3-4 presents the cost by period and infrastructure type. Distribution and transmission projects make up the majority, approximately 85 percent, of the drinking water infrastructure costs in the state. Water treatment projects are the second most significant infrastructure costs, comprising nearly 10 percent of the statewide total.

Table 3-4. Statewide Drinking Water Infrastructure Costs by Infrastructure Type

Period	Potential Funding Source [A]	Distribution and Transmission (millions of 2007 dollars)	Treatment (millions of 2007 dollars)	Storage (millions of 2007 dollars)	Source (millions of 2007 dollars)	Other (millions of 2007 dollars)	Major Reservoir Projects in Region [B] (2007 dollars)	Total Infrastructure Need (millions of 2007 dollars) [C]
Present-2020	DWSRF Eligible	$7,250	$1,480	$280	$430	$0	$0	$9,440
	Non-DWSRF Eligible	$100	$0	$0	$0	$40	$100	$240
Present-2020 Subtotal		$7,350	$1,480	$280	$430	$40	$100	$9,680
2021-2040	DWSRF Eligible	$9,530	$630	$20	$40	$0	$0	$10,220
	Non-DWSRF Eligible	$150	$0	$0	$0	$0	$250	$400
Present-2040 Subtotal		$9,680	$630	$20	$40	$0	$250	$10,620
2041-2060	DWSRF Eligible	$14,870	$1,630	$0	$40	$0	$0	$16,540
	Non-DWSRF Eligible	$150	$0	$0	$0	$0	$810	$960
Present-2060 Subtotal		$15,020	$1,630	$0	$40	$0	$810	$17,500
Total		$32,050	$3,740	$300	$510	$40	$1,160	$37,800

A This study assumes that distribution projects for new growth and all reservoir projects are non-DWSRF eligible. All other projects were assumed to be DWSRF eligible.
B. The "reservoir" category includes all regional rehabilitation reservoir projects.
C. Small differences in values may result from rounding.

Section 4
Beaver-Cache Regional Infrastructure Costs

This section provides some general information about the Beaver-Cache region, identifies water providers selected for modeling and their project lists, and provides a cost summary for this region.

4.1 Beaver-Cache –Regional Description

The Beaver-Cache Watershed Planning Region is a 3,288-square-mile area in the southwest quadrant of Oklahoma, spanning from the southern portion of Caddo County in the north to the Red River on the south, and including all or portions of Tillman, Comanche, Cotton, Grady, Stephens, Kiowa, and Jefferson Counties. There are 31 OCWP providers in this region. OCWP providers are those included in the 2008 OCWP survey and for which water demand projections were created. Table 4-1 shows the number of Beaver-Cache water providers by stratum.

Table 4-1. Beaver-Cache Region – Number of OCWP Providers by Stratum

Provider Size	Population [A]	Surface Water [B]	Groundwater [C]	Total
Large	>100,000	1	0	1
Medium	3,301 – 100,000	1	3	4
Small	<3,300	4	22	26
Total		**6**	**25**	**31**

[A] Population classification was based on 2060 projection (see *Water Demand Forecast Report* for more details on projections).

[B] Systems were classified as surface water if they have at least one source that is surface water or groundwater under the direct influence of surface water.

[C] Systems were classified as groundwater if they do not meet surface water definition or if their primary source of water is purchased from another provider.

4.2 Beaver-Cache – Developing Project Lists

Four providers were used for cost modeling. The following sections discuss the project lists for each of these providers.

4.2.1 Beaver-Cache – Large Water Providers

The Beaver-Cache region has one large surface water OCWP provider.

4.2.1.1 Surface Water Providers

The City of Lawton participated in the 2007 DWINS and the 2008 OCWP survey. Using the methodology described in Section 2.2, a project list was created.

Source Water Projects

No source water projects were identified in the 2007 DWINS. Using the project list worksheet, two surface water intake rehabilitation projects for Lake Ellsworth and Lake Lawtonka were included in the OCWP study.

Treatment Projects

A 40-million-gallons-per-day (mgd) conventional WTP rehabilitation project was identified in the 2007 DWINS. Using the project list worksheet, a new 10-mgd conventional WTP

project in 2040 and rehabilitation of a 40-mgd WTP in 2060 were included in the OCWP study.

Storage Projects

Approximately 11 million-gallon (MG) finished water rehabilitation projects were identified in the 2007 DWINS. No other projects were identified using the project list worksheet.

Distribution and Transmission Projects

Rehabilitation of two 25-mgd, one from each source identified above, and a new 10-mgd raw water transmission lines were identified using the project list worksheet. No transmission lines were identified in the 2007 DWINS.

Many distribution projects were identified in the 2007 DWINS and project list worksheet. Projects included rehabilitation and replacement of existing pipelines, installation of new pipelines to accommodate anticipated growth, replacement of water meters, replacement of lead service lines, and rehabilitation of booster pump stations.

Other Projects

No projects were identified in this infrastructure category.

4.2.1.2 Groundwater Providers

There were no large groundwater providers in this region.

4.2.1.3 Summary

Table 4-2 presents the drinking water cost through 2060 of the Beaver-Cache large provider stratum by infrastructure type. Figure 4-1 illustrates the drinking water costs over time.

Table 4-2. Beaver-Cache Region – Large Water Provider Costs by Infrastructure Type

Period [A]	Distribution and Transmission (millions of 2007 dollars)	Treatment (millions of 2007 dollars)	Storage (millions of 2007 dollars)	Source (millions of 2007 dollars)	Other (millions of 2007 dollars)	Total Infrastructure Need (millions of 2007 dollars)
Present-2020	$103	$50	$3	$4	$0	$160
2021-2040	$64	$21	$0	$0	$0	$85
2041-2060	$24	$50	$0	$0	$0	$74
Total	$191	$121	$3	$4	$0	$319

[A] Small differences in values may result from rounding.

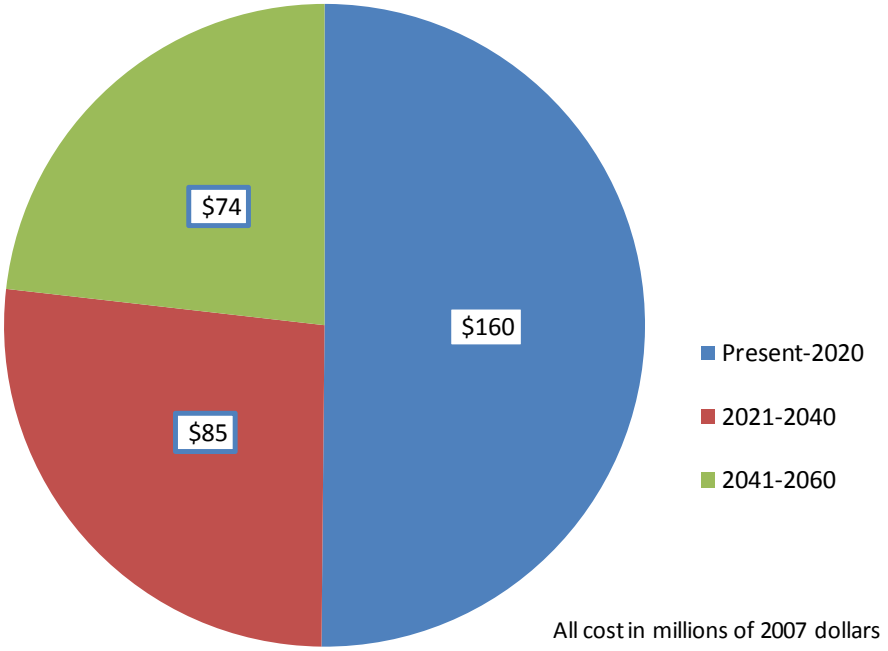

Figure 4-1. Beaver-Cache Region – Large Water Providers Costs Over Time

4.2.2 Beaver-Cache – Medium Water Providers

The Beaver-Cache region has four medium OCWP water providers. Information about each of these providers is shown in Table 4-3.

Table 4-3. Beaver-Cache Region – Medium OCWP Providers

SWDIS Identifier	Provider Name	County	Source Water Type [A]	Did they participate in 2007 DWINS?	Did they participate in 2008 OCWP survey?	Projected 2060 Population [B]	Were they selected for cost modeling?
OK3001602	Comanche Co RWD #1	Comanche	SWP	No	Yes	3,536	No
OK3001654	Comanche Co RWD #4	Comanche	SWP	No	No	4,419	No
OK3003401	Jefferson Co Cons RWD #1	Jefferson	SWP	No	Yes	4,595	No
OK1011401	Frederick	Tillman	SW	No	Yes	5,935	Yes

[A] SW – Surface Water, GW – Groundwater, P – Purchased Water, GU – Groundwater Under Direct Influence of Surface Water. Systems are classified as surface water if they have at least one source that is surface water or groundwater under the direct influence of surface water (SW and GW designations). Systems are classified as groundwater if they do not meet surface water definition or if their primary source of water is purchased from another provider (GW, SWP, and GWP designations).

[B] Population based on 2060 projection (see Water Demand Forecast Report for more details on projections).

4.2.2.1 Surface Water Providers

There is one medium surface water provider in the Beaver-Cache region. The City of Frederick participated in the 2008 OCWP survey. Using the methodology described in Section 2.2, a project list was created.

Source Water Projects

Using the project list worksheet, two surface water intake rehabilitation projects for Lake Frederick and Tom Steed Reservoir were included in the OCWP study.

Treatment Projects

Using the project list worksheet, rehabilitation of 2-mgd WTP in 2040 was included in the OCWP study.

Storage Projects

Using the project list worksheet, rehabilitation of 0.2 MG of finished water storage tank was included in the OCWP study.

Distribution and Transmission Projects

Rehabilitation of two raw water transmission lines, one from each source identified above, with a total capacity of 3.5 mgd, was identified using the project list worksheet.

Many distribution projects were identified in the project list worksheet. Projects included rehabilitation and replacement of existing pipelines and installation of new pipelines to accommodate anticipated growth.

Other Projects

No projects were identified in this infrastructure category.

4.2.2.2 Groundwater Providers

Three medium providers are grouped in this category because they primarily purchase water. However, since there was not a provider suitable for cost modeling, the Lower Washita region was used to estimate the cost for this stratum.

4.2.2.3 Summary

Table 4-4 presents the drinking water cost through 2060 of the Beaver-Cache medium provider stratum by infrastructure type. Figure 4-2 illustrates the drinking water costs over time.

Table 4-4. Beaver-Cache Region – Medium Water Provider Costs by Infrastructure Type

Period [A]	Distribution and Transmission (millions of 2007 dollars)	Treatment (millions of 2007 dollars)	Storage (millions of 2007 dollars)	Source (millions of 2007 dollars)	Other (millions of 2007 dollars)	Total Infrastructure Need (millions of 2007 dollars)
Present-2020	$37	$1	$2	$0	$0	$40
2021-2040	$246	$6	$0	$2	$0	$254
2041-2060	$12	$0	$0	$0	$0	$12
Total	$295	$7	$2	$2	$0	$306

[A] Small differences in values may result from rounding.

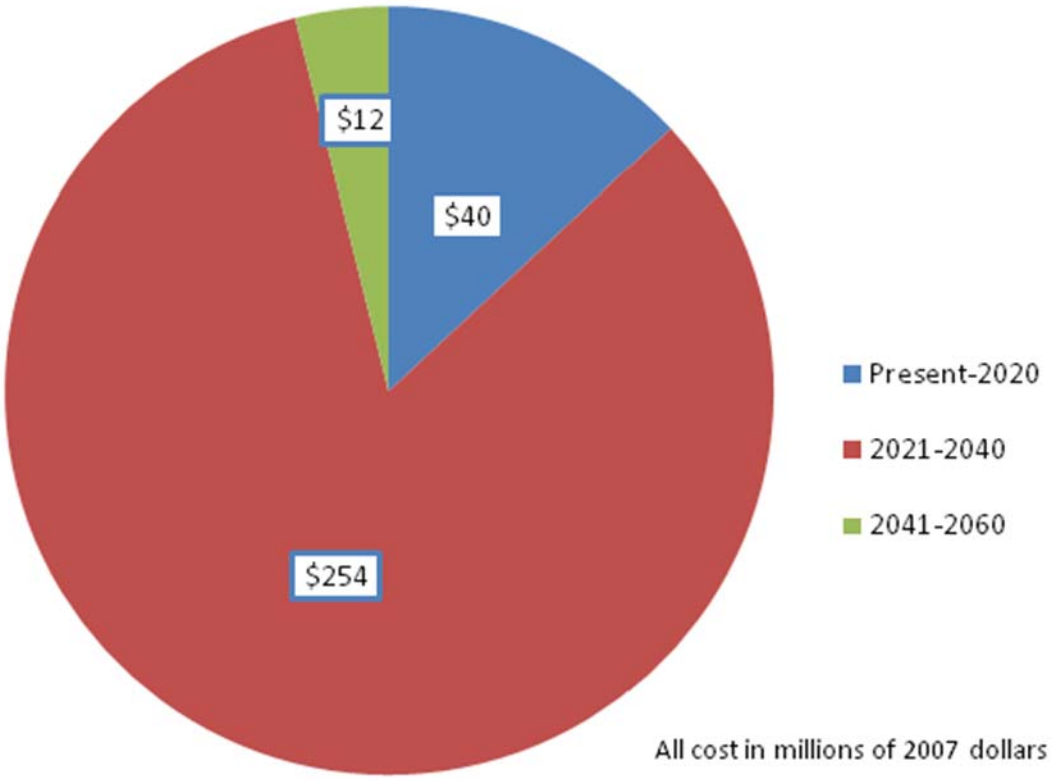

Figure 4-2. Beaver-Cache Region – Medium Water Providers Costs Over Time

4.2.3 Beaver-Cache – Small Water Providers

The Beaver-Cache region has 26 small OCWP water providers. Information about each of these providers is shown in Table 4-5.

Table 4-5. Beaver-Cache Region – Small OCWP Providers

SWDIS Identifier	Provider Name	County	Source Water Type [A]	Did they participate in 2007 DWINS?	Did they participate in 2008 OCWP survey?	Projected 2060 Population [B]	Were they selected for cost modeling?
OK2000806	Apache	Caddo	GW	No	Yes	1,892	Yes
OK2001601	Sterling PWA	Comanche	GW	No	Yes	960	No
OK2001602	Comanche Co RWD #3	Comanche	SWP	No	No	998	No
OK2001604	Comanche Co RWD #2	Comanche	GW	No	No	867	No
OK2001607	Cache	Comanche	GW	No	No	2,992	No
OK2001608	Chattanooga PWS	Comanche	GW	No	Yes	688	No
OK2001609	Indiahoma	Comanche	SWP	No	Yes	435	No
OK2001610	Elgin PWS	Comanche	GW	No	Yes	1,881	No

Table 4-5. Beaver-Cache Region – Small OCWP Providers, continued

SWDIS Identifier	Provider Name	County	Source Water Type [A]	Did they participate in 2007 DWINS?	Did they participate in 2008 OCWP survey?	Projected 2060 Population [B]	Were they selected for cost modeling?
OK2001612	Fletcher	Comanche	GW	No	No	1,289	No
OK3001603	Medicine Park	Comanche	SWP	No	Yes	460	No
OK3001675	Faxon	Comanche	GWP	No	No	172	No
OK3001680	Geronimo	Comanche	SWP	No	No	1,203	No
OK1011305	Walters	Cotton	SW	No	Yes	3,010	No
OK1011306	Temple	Cotton	SW	No	Yes	1,263	No
OK2001702	Cotton Co RWD #2	Cotton	GW	No	No	2,201	No
OK3001701	Devol	Cotton	GWP	No	Yes	160	No
OK3001702	Cotton Co RWD # 1	Cotton	GWP	No	No	660	No
OK1011201	Waurika PWA	Jefferson	SW	No	Yes	2,441	No
OK3003405	Ryan	Jefferson	SWP	No	No	986	No
OK1011101	Comanche PW	Stephens	SW	No	Yes	1,821	Yes
OK2006905	Stephens Co RWD #3 (Meridian)	Stephens	GW	No	Yes	1,722	No
OK2007102	Hollister	Tillman	GWP	No	No	60	No
OK2007103	Grandfield	Tillman	SWP	No	Yes	1,275	No
OK2007104	Davidson	Tillman	SWP	No	No	426	No
OK2007107	Tillman Co RWD #1	Tillman	SWP	No	Yes	1,676	No
OK3007101	Manitou	Tillman	SWP	No	Yes	317	No

[A] SW – Surface Water, GW – Groundwater, P – Purchased Water, GU – Groundwater Under Direct Influence of Surface Water. Systems are classified as surface water if they have at least one source that is surface water or groundwater under the direct influence of surface water (SW and GW designations). Systems are classified as groundwater if they do not meet surface water definition or if their primary source of water is purchased from another provider (GW, SWP, and GWP designations).

[B] Population based on 2060 projection (see Water Demand Forecast Report for more details on projections).

4.2.3.1 Surface Water Providers

There are four small surface water providers in the Beaver-Cache region. The Comanche Public Works participated in the 2008 OCWP survey and was selected for modeling. Using the methodology described in Section 2.2, a project list was created.

Source Water Projects

Using the project list worksheet, one surface water intake rehabilitation projects for Comanche Lake was included in the OCWP study.

Treatment Projects

Using the project list worksheet, a 1.9-mgd WTP rehabilitation in 2040 was included in the OCWP study.

Storage Projects
Using the project list worksheet, rehabilitation of 0.2 MG of finished water storage tank was included in the OCWP study.

Distribution and Transmission Projects
Rehabilitation of one raw water transmission line with a capacity of 1.9 mgd was identified using the project list worksheet.

Many distribution projects were identified in the project list worksheet. Projects included rehabilitation and replacement of existing pipelines and installation of new pipelines to accommodate anticipated growth.

Other Projects
No projects were identified in this infrastructure category.

4.2.3.2 Groundwater Providers

There are 22 small providers in this category; 13 of these primarily purchase water. The City of Apache was selected for cost modeling. Apache participated in the 2008 OCWP survey. Using the methodology described in Section 2.2, a project list was created.

Source Water Projects
Using the project list worksheet, a well rehabilitation project for 0.21 mgd was included in the OCWP study. The project date was based on the average age of Apache's existing wells.

Treatment Projects
Using the project list worksheet, a 0.21-mgd groundwater chemical treatment was included in the OCWP study. Information on Apache's existing treatment technology was unknown.

Storage Projects
Using the project list worksheet, rehabilitation of 0.02 MG of finished water storage tank was included in the OCWP study.

Distribution and Transmission Projects
Rehabilitation of one raw water transmission line with a capacity of 0.21 mgd was identified using the project list worksheet.

Many distribution projects were identified in the project list worksheet. Projects included rehabilitation and replacement of existing pipelines and installation of new pipelines to accommodate anticipated growth. In addition, a 0.21 pumping project was included in the OCWP study.

Other Projects
No projects were identified in this infrastructure category.

4.2.3.3 Summary

Table 4-6 presents the drinking water cost through 2060 of the Beaver-Cache small provider stratum by infrastructure type. Figure 4-3 illustrates the drinking water costs over time.

Table 4-6. Beaver-Cache Region – Small Water Providers Costs by Infrastructure Type

Period [A]	Distribution and Transmission (millions of 2007 dollars)	Treatment (millions of 2007 dollars)	Storage (millions of 2007 dollars)	Source (millions of 2007 dollars)	Other (millions of 2007 dollars)	Total Infrastructure Need (millions of 2007 dollars)
Present-2020	$471	$5	$1	$1	$0	$478
2021-2040	$123	$23	$1	$0	$0	$147
2041-2060	$295	$0	$0	$0	$0	$295
Total	$889	$28	$2	$1	$0	$920

[A] Small differences in values may result from rounding.

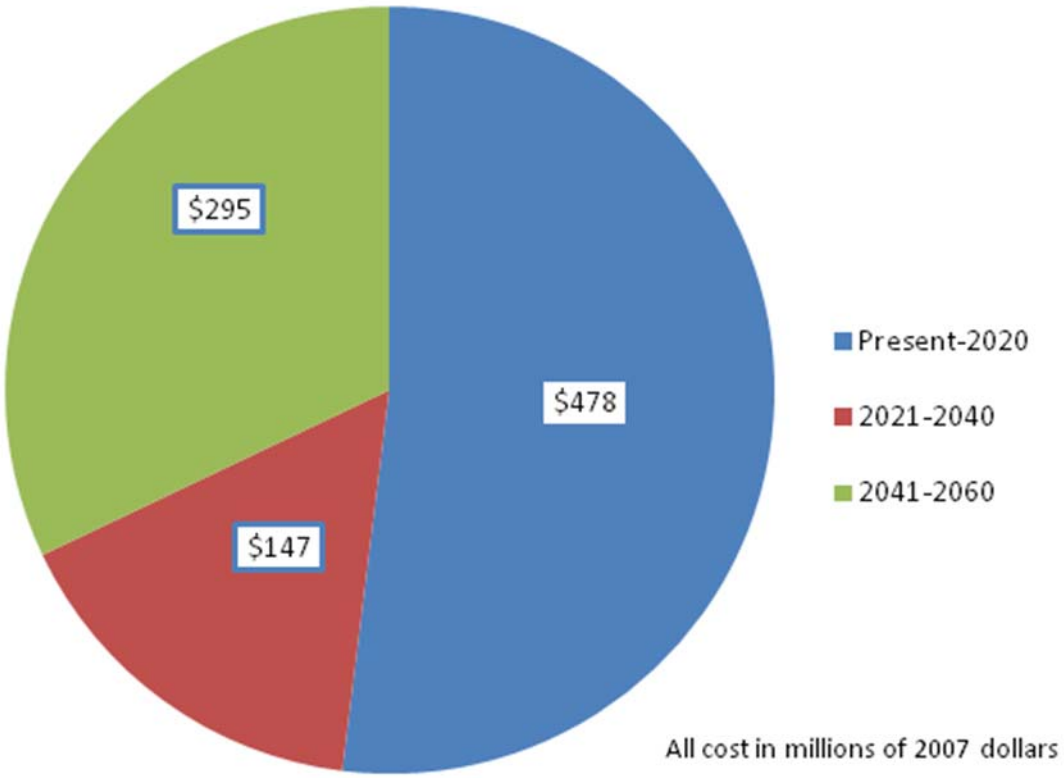

Figure 4-3. Beaver-Cache Region – Small Water Providers Costs Over Time

4.3 Beaver-Cache – Regional Major Reservoir Projects

There are six major reservoirs in the Beaver-Cache region. Table 4-7 identifies the reservoirs and project size. Figure 4-4 illustrates project cost over time.

Table 4-7. Beaver-Cache Region – Major Reservoir Rehabilitation Projects

Reservoir Name	Storage Considered for Rehabilitation [A] (AF)	Project Year
Comanche Lake	2,500	2060
Dave Boyer Lake	936	2040
Lake Ellsworth	68,700	2080
Lake Frederick	9,663	2080
Lake Lawtonka	64,000	2020
Waurika Lake	167,600	2080

[A] The amount of storage for rehabilitation is based on the municipal water supply storage. If unknown, the full normal pool storage was used. Reservoirs with no designated municipal water supply storage were included in the study but show zero in the rehabilitation column.

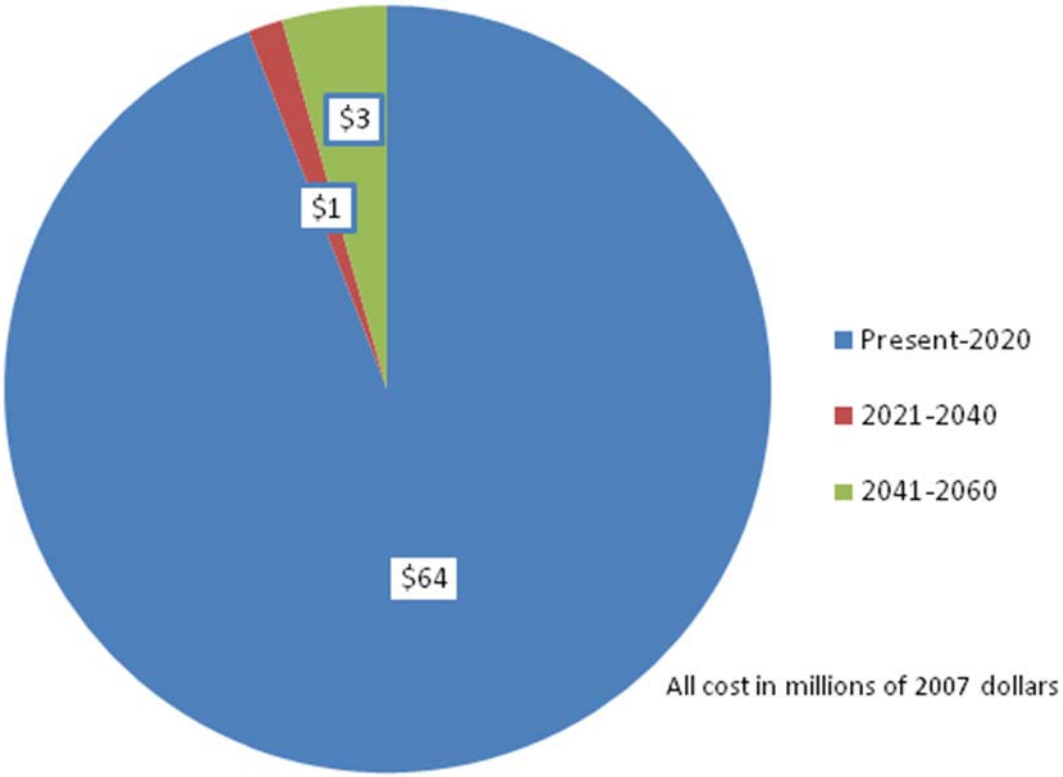

Figure 4-4. Beaver-Cache Region – Major Reservoir Rehabilitation Costs Over Time

4.4 Beaver-Cache – Regional Cost Summary

This section presents the Beaver-Cache regional drinking water infrastructure costs over the next 50 years. Table 4-8 identifies costs by provider size and project year. Distribution and transmission projects make up the majority, over 85 percent, of the infrastructure costs with water treatment and source water projects in distant second and third places, respectively. Small providers have the largest overall drinking water infrastructure costs. The largest infrastructure costs occur within the next 20 years.

Table 4-8 Beaver-Cache Region – Drinking Water Infrastructure Cost Summary

Category [A, C]	Potential Funding Source [B]	Present - 2020 Infrastructure Need (millions of 2007 dollars)	2021-2040 Infrastructure Need (millions of 2007 dollars)	2041-2060 Infrastructure Need (millions of 2007 dollars)	Total Period Infrastructure Need (millions of 2007 dollars)
Small	DWSRF Eligible	$480	$140	$290	$910
	Non-DWSRF Eligible	$0	$0	$0	$0
Small Subtotal		$480	$140	$290	$910
Medium	DWSRF Eligible	$40	$250	$10	$300
	Non-DWSRF Eligible	$0	$0	$0	$0
Medium Subtotal		$40	$250	$10	$300
Large	DWSRF Eligible	$160	$80	$70	$310
	Non-DWSRF Eligible	$0	$0	$0	$0
Large Subtotal		$160	$80	$70	$310
Reservoir	DWSRF Eligible	$0	$0	$0	$0
	Non-DWSRF Eligible	$60	$0	$0	$60
Reservoir Subtotal		$60	$0	$0	$60
Total		$740	$470	$370	$1,580

A See Table 4-1 for more information on provider size. The "reservoir" category includes all regional reservoir rehabilitation projects.

B This study assumes that distribution projects for new growth and all reservoir projects are non-DWSRF eligible. All other projects were assumed to be DWSRF eligible.

C Small differences in values may result from rounding.

Section 5
Blue Boggy Regional Infrastructure Costs

This section provides some general information about the Blue Boggy region, identifies water providers selected for modeling and their project lists, and provides a cost summary for this region.

5.1 Blue Boggy – Regional Description

The Blue Boggy Watershed Planning Region is a 3,670-square-mile area in the southeast quadrant of Oklahoma, reaching from southern Hughes County in the north and the Red River on the south, and including all or portions of Pontotoc, Coal, Pittsburg, Johnston, Atoka, Bryan, Pushmataha, Murray, and Choctaw Counties. There are 41 OCWP providers in this region. OCWP providers are those included in the 2008 OCWP survey and for which water demand projections were created. Table 5-1 shows the number of Blue Boggy water providers by stratum.

Table 5-1. Blue Boggy Region – Number of OCWP Providers by Stratum

Provider Size	Population [A]	Surface Water [B]	Groundwater [C]	Total
Large	>100,000	0	0	0
Medium	3,301 – 100,000	4	1	5
Small	<3,300	2	34	36
Total		**6**	**35**	**41**

[A] Population classification was based on 2060 projection (see *Water Demand Forecast Report* for more details on projections).

[B] Systems were classified as surface water if they have at least one source that is surface water or groundwater under the direct influence of surface water.

[C] Systems were classified as groundwater if they do not meet surface water definition or if their primary source of water is purchased from another provider.

5.2 Blue Boggy – Developing Project Lists

Three providers were used for cost modeling. The following sections discuss the project lists for each of these providers.

5.2.1 Blue Boggy – Large Water Providers

The Blue Boggy region has no large OCWP providers.

5.2.2 Blue Boggy – Medium Water Providers

The Blue Boggy region has five medium OCWP water providers. Information about each of these providers is shown in Table 5-2.

Table 5-2. Blue Boggy Region – Medium OCWP Providers

SWDIS Identifier	Provider Name	County	Source Water Type [A]	Did they participate in 2007 DWINS?	Did they participate in 2008 OCWP survey?	Projected 2060 Population [B]	Were they selected for cost modeling?
OK1010401	Atoka PWS	Atoka	SW	No	Yes	5,011	No
OK1010402	Coalgate PWA	Coal	SW	Yes	Yes	3,941	Yes
OK1010412	Atoka County RWS & SWMD #4	Atoka	SW	No	Yes	5,942	No
OK1010601	Durant	Bryan	SW	Yes	Yes	24,516	No
OK3000704	Bryan County RW&SD #5	Bryan	SWP	Yes*	Yes	6,939	No

[A] SW – Surface Water, GW – Groundwater, P – Purchased Water, GU – Groundwater Under Direct Influence of Surface Water. Systems are classified as surface water if they have at least one source that is surface water or groundwater under the direct influence of surface water (SW and GW designations). Systems are classified as groundwater if they do not meet surface water definition or if their primary source of water is purchased from another provider (GW, SWP, and GWP designations).

[B] Population based on 2060 projection (see Water Demand Forecast Report for more details on projections).

5.2.2.1 Surface Water Providers

There are four medium surface water providers in the Blue Boggy region. Colgate Public Works Authority (PWA) participated in the 2007 DWINS and 2008 OCWP survey. Colgate PWA was selected for cost modeling. Using the methodology described in Section 2.2, a project list was created.

Source Water Projects

Using the project list worksheet, one surface water intake rehabilitation project for Colgate Reservoir was included in the OCWP study. The 2007 DWINS identified seven well rehabilitation projects.

Treatment Projects

Rehabilitation projects for the 1.2-mgd WTP in 2020 and 2060 were included in the OCWP study. Additional, the 2007 DWINS identified a chlorination rehabilitation project.

Storage Projects

Rehabilitation projects totaling 0.73 MG of finished water storage were identified in the 2007 DWINS and were included in the OCWP study.

Distribution and Transmission Projects

Rehabilitation of one raw water transmission line with a capacity of 1.5 mgd was identified using the project list worksheet.

Many distribution projects were identified in the project list worksheet and the 2007 DWINS. Projects included rehabilitation and replacement of existing pipelines and installation of new pipelines to accommodate anticipated growth. Additionally, the 2007 DWINS identified some valves, flushing hydrants, and water meter replacement projects.

Other Projects

No projects were identified in this infrastructure category.

5.2.2.2 Groundwater Providers

One medium provider is grouped in this category because it primarily purchases water. However, since it was not a provider suitable for cost modeling, the Eufaula region was used to estimate the cost for this stratum.

5.2.2.3 Summary

Table 5-3 presents the drinking water cost through 2060 of the Blue Boggy medium provider stratum by infrastructure type. Figure 5-1 illustrates the drinking water costs over time.

Table 5-3. Blue Boggy Region – Medium Water Providers Costs by Infrastructure Type

Period [A]	Distribution and Transmission (millions of 2007 dollars)	Treatment (millions of 2007 dollars)	Storage (millions of 2007 dollars)	Source (millions of 2007 dollars)	Other (millions of 2007 dollars)	Total Infrastructure Need (millions of 2007 dollars)
Present-2020	$55	$16	$3	$3	$0	$77
2021-2040	$15	$0	$0	$0	$0	$15
2041-2060	$11	$15	$0	$0	$0	$26
Total	$81	$31	$3	$3	$0	$118

[A] Small differences in values may result from rounding.

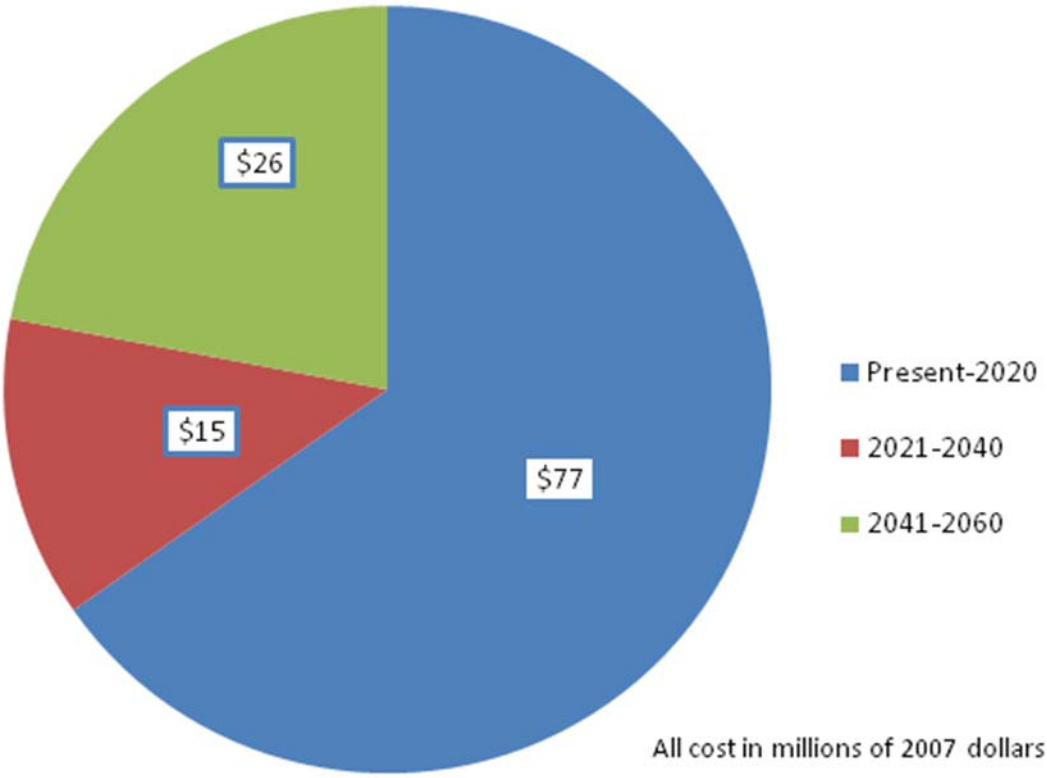

Figure 5-1. Blue Boggy Region – Medium Water Providers Costs Over Time

5.2.3 Blue Boggy – Small Water Providers

The Blue Boggy region has 36 small OCWP water providers. Information about each of these providers is shown in Table 5-4.

Table 5-4. Blue Boggy Region – Small OCWP Providers

SWDIS Identifier	Provider Name	County	Source Water Type [A]	Did they participate in 2007 DWINS?	Did they participate in 2008 OCWP survey?	Projected 2060 Population [B]	Were they selected for cost modeling?
OK1020611	Kiowa	Pittsburg	SW	No	No	876	No
OK2000302	Atoka Co RWD # 3 (Caney)	Atoka	GW	No	No	2,142	No
OK2000701	Kenefic	Bryan	GW	No	No	364	No
OK2000702	Calera, Town Of	Bryan	GW	No	Yes	2,738	No
OK2000703	Caddo	Bryan	GW	No	Yes	1,490	No
OK2000704	Bokchito	Bryan	GW	No	Yes	885	No
OK2000705	Bryan County RWD #7	Bryan	GW	No	Yes	363	No
OK2000707	Achille	Bryan	GW	No	Yes	803	No
OK2000713	Bryan Co RWD # 9	Bryan	GW	No	No	352	No
OK2000716	Colbert PWA	Bryan	GW	No	Yes	3,137	No
OK2001201	Soper	Choctaw	GW	No	Yes	336	No
OK2001204	Choctaw County RWD #1	Choctaw	GW	No	Yes	2,938	No
OK2001205	Boswell PWA	Choctaw	GW	No	Yes	802	No
OK2001501	Lehigh	Coal	GW	No	Yes	566	No
OK2003224	Hughes Co RWD #6 (Gerty)	Hughes	GW	No	Yes	2,045	No
OK2003503	Johnston Co RWS & SWMD #4	Johnston	GW	No	Yes	945	No
OK2003517	Bromide	Johnston	GU	No	Yes	272	Yes
OK2003518	Wapanucka	Johnston	GW	No	Yes	1,864	Yes
OK2003520	Milburn PWA	Johnston	GW	No	Yes	532	No
OK2006202	Allen PWA	Pontotoc	GW	No	No	1,133	No
OK2006203	Stonewall PWA	Pontotoc	GW	No	No	566	No
OK2006206	Roff	Pontotoc	GW	No	No	877	No
OK3000303	Stringtown PWA	Atoka	SWP	No	Yes	2,103	No
OK3000305	Atoka Co RWD # 1 (Wardville)	Atoka	SWP	No	No	212	No

Table 5-4. Blue Boggy Region – Small OCWP Providers, continued

SWDIS Identifier	Provider Name	County	Source Water Type [A]	Did they participate in 2007 DWINS?	Did they participate in 2008 OCWP survey?	Projected 2060 Population [B]	Were they selected for cost modeling?
OK3000306	Atoka Co RWD #2	Atoka	SWP	No	Yes	849	No
OK3000725	Bryan County RWD # 6	Bryan	GWP	No	Yes	1,577	No
OK3001214	Choctaw RWD # 6	Choctaw	SWP	No	Yes	847	No
OK3001501	Clarita Olney Water Co Inc	Coal	SWP	No	No	490	No
OK3001502	Centrahoma Water Co Inc	Coal	SWP	No	No	943	No
OK3001503	Phillips RWD #1	Coal	SWP	No	No	450	No
OK3001504	Roundhill RWD #4	Coal	SWP	No	No	413	No
OK3001505	Coal Co RWD #5	Coal	SWP	No	Yes	660	No
OK3001506	Tupelo PWA	Coal	GWP	No	No	720	No
OK3006105	Pittsburg Co RWD #11 (Kiowa)	Pittsburg	SWP	No	No	708	No
OK3006218	Pontotoc Co RWD # 9	Pontotoc	GWP	No	No	1,428	No
OK3006222	Pontotoc Co RWD # 6 (Fittstown)	Pontotoc	GWP	No	No	926	No

[A] SW – Surface Water, GW – Groundwater, P – Purchased Water, GU – Groundwater Under Direct Influence of Surface Water. Systems are classified as surface water if they have at least one source that is surface water or groundwater under the direct influence of surface water (SW and GW designations). Systems are classified as groundwater if they do not meet surface water definition or if their primary source of water is purchased from another provider (GW, SWP, and GWP designations).

[B] Population based on 2060 projection (see Water Demand Forecast Report for more details on projections).

5.2.3.1 Surface Water Providers

There are two small surface water providers in the Southeast region. The City of Bromide participated in the 2008 OCWP survey and was selected for cost modeling. Bromide is classified as a surface water provider because they utilize GWUDI of surface water. Using the methodology described in Section 2.2, a project list was created.

Source Water Projects

Using the project list worksheet, rehabilitation of existing wells with total capacity of 0.040 mgd was included in the OCWP study.

Treatment Projects

Using the project list worksheet, rehabilitation projects for a 0.040 mgd WTP in 2020 and 2060 were included in the OCWP study.

Storage Projects
Using the project list worksheet, rehabilitation of finished water storage tank for a 0.004 MG was included in the OCWP study.

Distribution and Transmission Projects
A rehabilitation of a 0.04-mgd raw water transmission line was identified using the project list worksheet.

Many distribution projects were identified in the project list worksheet. Projects included rehabilitation and replacement of existing pipelines and installation of new pipelines to accommodate anticipated growth.

Other Projects
No projects were identified in this infrastructure category.

5.2.3.2 Groundwater Providers

There are 34 small providers in this category; 14 of these primarily purchase water. The City of Wapanucka was selected for cost modeling. Wapanucka participated in the 2008 OCWP survey. Johnston County Rural Water System and Surface Water Management District (RWS & SWMD) #4 was used to supplement the distribution information for Wapanucka. Using the methodology described in Section 2.2, a project list was created.

Source Water Projects
Using the project list worksheet, a well rehabilitation project for 0.29 mgd and a new well and well house for 0.12 mgd were included in the OCWP study. The project date was based on the average age of Wapanucka's existing wells.

Treatment Projects
Using the project list worksheet, a 0.66 mgd conventional WTP, based on Wapanucka's existing method of treatment, was included in the OCWP study.

Storage Projects
Using the project list worksheet, rehabilitation of 0.066 MG of finished water storage tank was included in the OCWP study.

Distribution and Transmission Projects
Rehabilitation of one raw water transmission line with a capacity of 0.66 mgd was identified using the project list worksheet.

Many distribution projects were identified in the project list worksheet. Projects included rehabilitation and replacement of existing pipelines and installation of new pipelines to accommodate anticipated growth. In addition, a 0.66-mgd pumping project was included in the OCWP study.

Other Projects
No projects were identified in this infrastructure category.

5.2.3.3 Summary

Table 5-5 presents the drinking water cost through 2060 of the Blue Boggy small provider stratum by infrastructure type. Figure 5-2 illustrates the drinking water costs over time.

Table 5-5. Blue Boggy Region – Small Water Providers Costs by Infrastructure Type

Period [A]	Distribution and Transmission (millions of 2007 dollars)	Treatment (millions of 2007 dollars)	Storage (millions of 2007 dollars)	Source (millions of 2007 dollars)	Other (millions of 2007 dollars)	Total Infrastructure Need (millions of 2007 dollars)
Present-2020	$19	$1	$0	$0	$0	$20
2021-2040	$262	$82	$3	$1	$0	$348
2041-2060	$5	$1	$0	$7	$0	$13
Total	$286	$84	$3	$8	$0	$381

[A] Small differences in values may result from rounding.

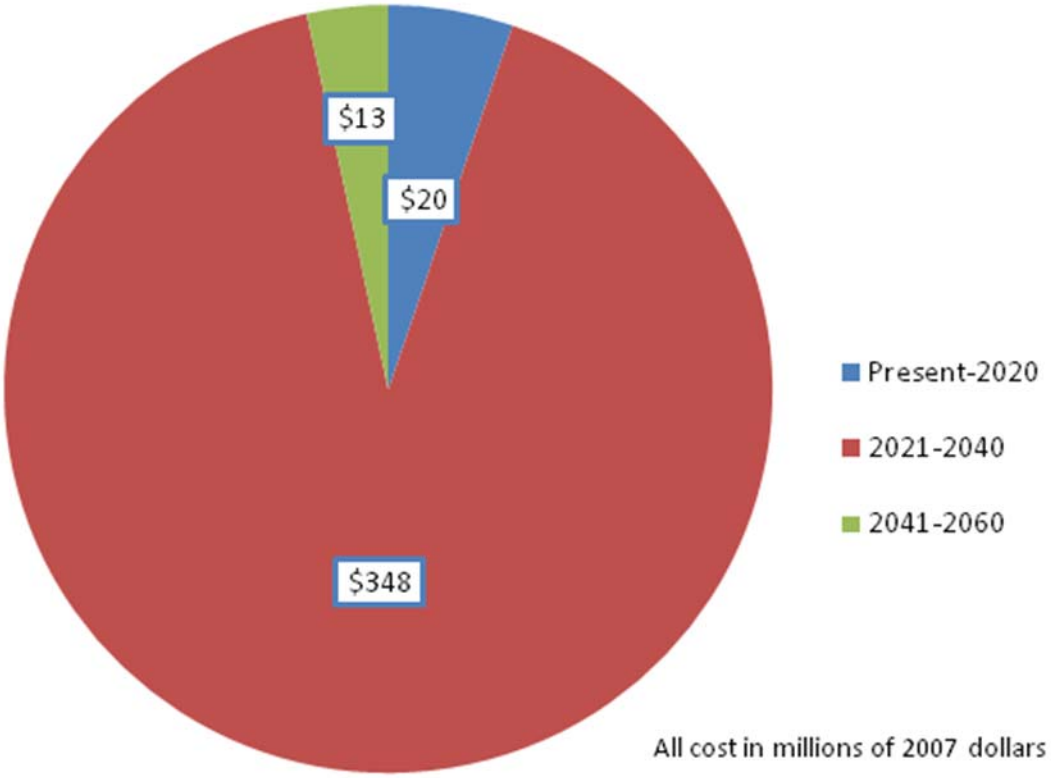

Figure 5-2. Blue Boggy Region – Small Water Providers Costs Over Time

5.3 Blue Boggy – Regional Major Reservoir Projects

There are three major reservoirs in the Blue Boggy region. Table 5-6 identifies the reservoirs and project size. No reservoir rehabilitation projects occur within the OCWP planning period.

Table 5-6. Blue Boggy Region – Major Reservoir Rehabilitation Projects

Reservoir Name	Storage Considered for Rehabilitation [A] (AF)	Project Year
Atoka Reservoir	123,500	2080
Coalgate Reservoir	3,466	2080
McGee Creek Reservoir	109,800	2080

[A] The amount of storage for rehabilitation is based on the municipal water supply storage. If unknown, the full normal pool storage was used. Reservoirs with no designated municipal water supply storage were included in the study but show zero in the rehabilitation column

5.4 Blue Boggy – Regional Cost Summary

This section presents the Blue Boggy regional drinking water infrastructure costs over the next 50 years. Table 5-7 identifies costs by provider size and project year. Distribution and transmission projects make up the majority of the infrastructure costs, nearly 74 percent, of drinking water infrastructure costs in the region. Water treatment projects are distant second making up nearly 23 percent. Small providers have the largest overall drinking water infrastructure costs. The largest infrastructure costs occur in the 2021 – 2040 period.

Table 5-7 Blue Boggy Region – Drinking Water Infrastructure Cost Summary

Category [A, C]	Potential Funding Source [B]	Present - 2020 Infrastructure Need (millions of 2007 dollars)	2021-2040 Infrastructure Need (millions of 2007 dollars)	2041-2060 Infrastructure Need (millions of 2007 dollars)	Total Period Infrastructure Need (millions of 2007 dollars)
Small	DWSRF Eligible	$17	$342	$8	$367
	Non-DWSRF Eligible	$3	$5	$5	$13
Small Subtotal		$20	$347	$13	$380
Medium	DWSRF Eligible	$77	$15	$26	$118
	Non-DWSRF Eligible	$0	$0	$0	$0
Medium Subtotal		$77	$15	$26	$118
Large	DWSRF Eligible	$0	$0	$0	$0
	Non-DWSRF Eligible	$0	$0	$0	$0
Large Subtotal		$0	$0	$0	$0
Reservoir	DWSRF Eligible	$0	$0	$0	$0
	Non-DWSRF Eligible	$0	$0	$0	$0
Reservoir Subtotal		$0	$0	$0	$0
Total		$97	$362	$39	$498

[A] See Table 5-1 for more information on provider size. The "reservoir" category includes all regional reservoir rehabilitation project; however, no rehabilitation projects occur within the OCWP planning range.

[B] This study assumes that distribution projects for new growth and all reservoir projects are non-DWSRF eligible. All other projects were assumed to be DWSRF eligible.

[C] Small differences in values may result from rounding.

Section 6
Central Regional Infrastructure Costs

This section provides some general information about the Central region, identifies water providers selected for modeling and their project lists, and provides a cost summary for this region.

6.1 Central –Regional Description

The Central Watershed Planning Region is a 10,142-square-mile area including all or portions of Woods, Woodward, Major, Alfalfa, Garfield, Dewey, Blaine, Kingfisher, Logan, Canadian, Oklahoma, Lincoln, Creek, Okmulgee, Grady, Cleveland, Pottawatomie, Seminole, Okfuskee, Garvin, Pontotoc, Caddo, McClain, and Hughes Counties. There are 118 OCWP providers in this region. OCWP providers are those included in the 2008 OCWP survey and for which water demand projections were created. Table 6-1 shows the number of Central water providers by stratum.

Table 6-1. Central Region – Number of OCWP Providers by Stratum

Provider Size	Population [A]	Surface Water [B]	Groundwater [C]	Total
Large	>100,000	2	0	2
Medium	3,301 – 100,000	11	26	37
Small	<3,300	4	75	79
Total		**17**	**101**	**118**

[A] Population classification was based on 2060 projection (see *Water Demand Forecast Report* for more details on projections).

[B] Systems were classified as surface water if they have at least one source that is surface water or groundwater under the direct influence of surface water.

[C] Systems were classified as groundwater if they do not meet surface water definition or if their primary source of water is purchased from another provider.

6.2 Central – Developing Project Lists

Eight providers were used for cost modeling. The following sections discuss the project lists for each of these providers.

6.2.1 Central – Large Water Providers

The Central region has two large surface water OCWP providers. Both providers were used for cost modeling. Information about each of these providers is shown in Table 6-2.

Table 6-2. Central Region – Large OCWP Providers

SWDIS Identifier	Provider Name	County	Source Water Type [A]	Did they participate in 2007 DWINS?	Did they participate in 2008 OCWP survey?	Projected 2060 Population [B]	Were they selected for cost modeling?
OK1020801	Norman	Cleveland	SW	Yes	Yes	113,160	Yes
OK1020902	Oklahoma City***	Oklahoma	SW	Yes*	Yes	673,025	Yes

[A] SW – Surface Water, GW – Groundwater, P – Purchased Water, GU – Groundwater Under Direct Influence of Surface Water. Systems are classified as surface water if they have at least one source that is surface water or groundwater under the direct influence of surface water (SW and GW designations). Systems are classified as groundwater if they do not meet surface water definition or if their primary source of water is purchased from another provider (GW, SWP, and GWP designations).

[B] Population based on 2060 projection (see Water Demand Forecast Report for more details on projections).

6.2.1.1 Surface Water Providers

The City of Norman and Oklahoma City participated in the 2007 DWINS and the 2008 OCWP survey. Edmond PWA-Arcadia was used to supplement the distribution information for Norman. Using the methodology described in Section 2.2, a project list was created for each of these providers

Source Water Projects – Norman

The 2007 DWINS identified several well abandonment and replacement projects. Using the project list worksheet, two surface water intake rehabilitation projects for Lake Thunderbird was included in the OCWP study. Additionally, the OCWP study included Norman's portion of projects associated with bringing Atoka Reservoir water to the Central region.

Treatment Projects – Norman

A 14-mgd conventional WTP rehabilitation project was identified in the 2007 DWINS. Using the project list worksheet, an expansion and rehabilitation to 16.28-mgd WTP in 2060 was included in the OCWP study.

Storage Projects – Norman

Approximately 6.5 MG finished water rehabilitation projects were identified in the 2007 DWINS. No other projects were identified using the project list worksheet.

Distribution and Transmission Projects – Norman

Rehabilitation of raw water transmission lines were identified in the 2007 DWINS. Additionally, the OCWP study included Norman's portion of projects associated with bringing Atoka Reservoir water to the Central region.

Many distribution projects were identified in the 2007 DWINS and project list worksheet. Projects included rehabilitation and replacement of existing pipelines, installation of new pipelines to accommodate anticipated growth, replacement of water meters, replacement of valves, and replacement of backflow preventers.

Other Projects – Norman

The 2007 DWINS identified a control replacement project. Additionally, the debt service associated with Norman's portion of projects associated with bringing Atoka Reservoir water to the Central region was included in this infrastructure category.

Source Water Projects – Oklahoma City

The 2007 DWINS identified 24 raw water pump replacement projects. Using the project list worksheet, one surface water intake rehabilitation project was included in the OCWP study. Additionally, the OCWP study included Oklahoma City's portion of projects associated with bringing Atoka Reservoir water to the Central region.

Treatment Projects – Oklahoma City

A 150-mgd and 124-mgd WTP rehabilitation projects were identified in the 2007 DWINS. Using the project list worksheet, rehabilitation of 274-mgd WTP in 2060 was included in the OCWP study.

Storage Projects – Oklahoma City

Approximately 55 MG finished water rehabilitation projects were identified in the 2007 DWINS. No other projects were identified using the project list worksheet.

Distribution and Transmission Projects – Oklahoma City

Rehabilitation of raw water transmission lines were identified using the project list worksheet and the 2007 DWINS. Additionally, the OCWP study included Oklahoma City's portion of projects associated with bringing Atoka Reservoir water to the Central region.

Many distribution projects were identified in the 2007 DWINS and project list worksheet. Projects included rehabilitation and replacement of existing pipelines, installation of new pipelines to accommodate anticipated growth, replacement of water meters, and rehabilitation of booster pump stations.

Other Projects – Oklahoma City

The debt service associated with Oklahoma City's portion of projects associated with bringing Atoka Reservoir water to the Central region was included in this infrastructure category.

6.2.1.2 Groundwater Providers

There were no large groundwater providers in this region.

6.2.1.3 Summary

Table 6-3 presents the drinking water cost through 2060 of the Central large provider stratum by infrastructure type. Figure 6-1 illustrates the drinking water costs over time.

Table 6-3. Central Region – Large Water Provider Costs by Infrastructure Type

Period [A]	Distribution and Transmission (millions of 2007 dollars)	Treatment (millions of 2007 dollars)	Storage (millions of 2007 dollars)	Source (millions of 2007 dollars)	Other (millions of 2007 dollars)	Total Infrastructure Need (millions of 2007 dollars)
Present-2020	$821	$93	$16	$192	$39	$1,161
2021-2040	$412	$0	$0	$5	$0	$417
2041-2060	$938	$224	$0	$0	$0	$1,162
Total	$2,171	$317	$16	$197	$39	$2,740

[A] Small differences in values may result from rounding.

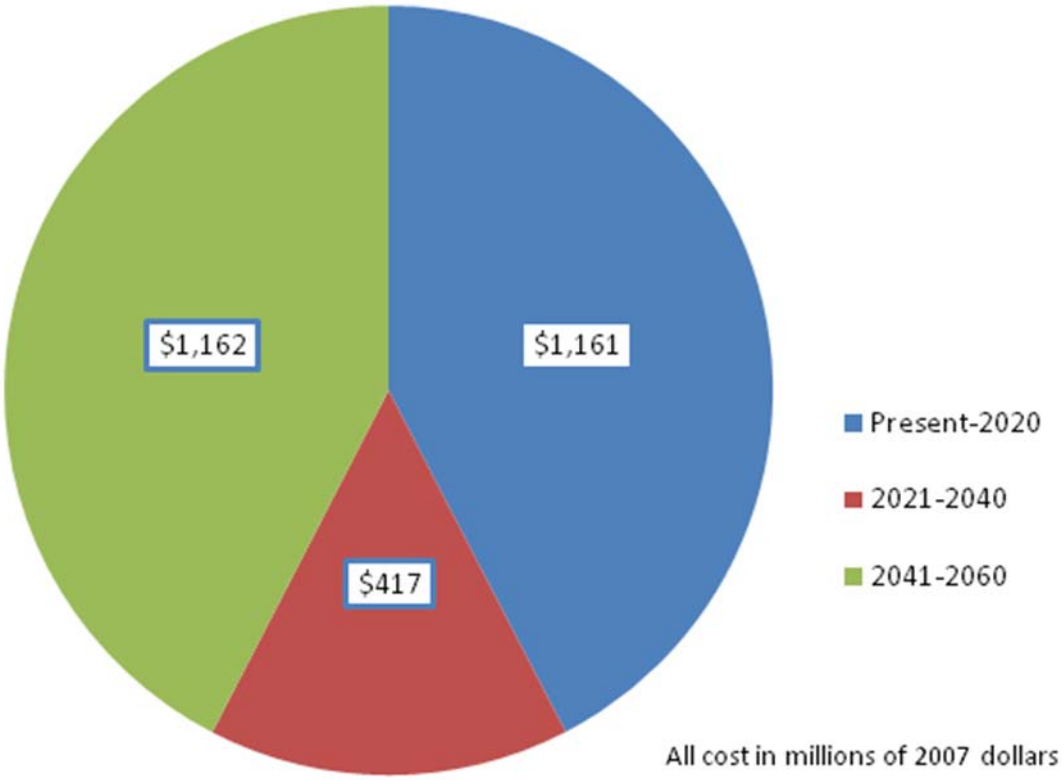

Figure 6-1. Central Region – Large Water Providers Costs Over Time

6.2.2 Central – Medium Water Providers

The Central region has 37 medium OCWP water providers. Information about each of these providers is shown in Table 6-4.

Table 6-4. Central Region – Medium OCWP Providers

SWDIS Identifier	Provider Name	County	Source Water Type [A]	Did they participate in 2007 DWINS?	Did they participate in 2008 OCWP survey?	Projected 2060 Population [B]	Were they selected for cost modeling?
OK1020504	Shawnee	Pottawatomie	SW	No	Yes	40,299	No
OK1020506	Tecumseh Utility Authority	Pottawatomie	SW	No	No	8,196	No
OK1020702	Chandler	Lincoln	SW	No	No	4,105	No
OK1020705	Stroud PWA	Lincoln	SW	No	No	3,983	No
OK1020706	Okemah Utilities Authority	Okfuskee	SW	No	Yes	6,901	Yes
OK1020723	Edmond PWA - Arcadia	Oklahoma	SW	Yes	Yes	91,287	Dist. Only
OK1020805	Del City	Oklahoma	SW	Yes	Yes	26,357	No
OK1020806	Midwest City	Oklahoma	SW	Yes	Yes	65,699	Yes
OK1020903	Guthrie	Logan	SW	No	Yes	16,190	No
OK2000602	Watonga	Blaine	GW	No	Yes	7,074	No
OK2000902	El Reno	Canadian	GU	Yes	Yes	25,709	No
OK2000909	Piedmont	Canadian	SWP	No	Yes	8,706	No
OK2000910	Yukon	Canadian	GW	No	Yes	29,561	No
OK2000922	Mustang	Canadian	GW	No	Yes	24,306	No
OK2001411	Noble	Cleveland	GW	No	Yes	7,076	No
OK2001412	Moore	Cleveland	GW	Yes	Yes	64,453	No
OK2001910	Bristow Mun Auth*	Creek	GW	No	Yes	5,920	No
OK2002608	Tuttle	Grady	GW	No	Yes	6,592	No
OK2003702	Kingfisher	Kingfisher	GW	No	Yes	7,535	No
OK2003704	Hennessey	Kingfisher	GW	No	No	3,405	No
OK2004105	Lincoln Co RW & Sewer Dist 4	Lincoln	GW	No	Yes	3,631	No
OK2004207	Logan Co RWD #1	Logan	GW	Yes	Yes	7,404	Yes
OK2004701	Purcell	McClain	GW	No	Yes	15,236	No
OK2004704	Newcastle	McClain	GW	No	Yes	11,515	Dist. Only
OK2005501	Nichols Hills	Oklahoma	GW	Yes	Yes	4,781	No
OK2005504	Deer Creek Rural Water Corp	Oklahoma	GW	No	Yes	5,362	No
OK2005506	Harrah	Oklahoma	GW	No	Yes	5,660	No
OK2005509	Spencer	Oklahoma	GW	Yes	Yes	3,691	No
OK2005510	Choctaw	Oklahoma	GW	No	Yes	4,556	No
OK2005519	Bethany	Oklahoma	GU	Yes	Yes	25,017	No
OK2006201	Ada	Pontotoc	GW	Yes	Yes	29,737	Yes
OK2006215	Pontotoc Co RWD # 8	Pontotoc	GW	No	Yes	4,141	No
OK2006301	Mcloud	Pottawatomie	GW	No	Yes	3,371	No

Table 6-4 Central Region – Medium OCWP Providers, continued

SWDIS Identifier	Provider Name	County	Source Water Type [A]	Did they participate in 2007 DWINS?	Did they participate in 2008 OCWP survey?	Projected 2060 Population [B]	Were they selected for cost modeling?
OK2006362	Pott Co RWD #2 (Tri County)	Pottawatomie	GW	No	Yes	4,703	No
OK2006701	Bowlegs Lima Water	Seminole	GW	No	Yes	3,449	No
OK3004710	Blanchard	McClain	SWP	No	Yes	6,824	No
OK3006215	Pontotoc Co RWD # 7	Pontotoc	GWP	No	Yes	5,176	No

[A] SW – Surface Water, GW – Groundwater, P – Purchased Water, GU – Groundwater Under Direct Influence of Surface Water. Systems are classified as surface water if they have at least one source that is surface water or groundwater under the direct influence of surface water (SW and GW designations). Systems are classified as groundwater if they do not meet surface water definition or if their primary source of water is purchased from another provider (GW, SWP, and GWP designations).

[B] Population based on 2060 projection (see Water Demand Forecast Report for more details on projections).

6.2.2.1 Surface Water Providers

There are 11 medium surface water providers in the Central region. To represent the average provider, two medium surface water providers were selected. Midwest City participated in the 2007 DWINS and 2008 OCWP survey. Okemah Utilities Authority participated in the 2008 OCWP survey. Using the methodology described in Section 2.2, a project list was created for each of these providers.

Source Water Projects – Midwest City

The 2007 DWINS identified several well abandonment and replacement projects. Using the project list worksheet, four surface water intake rehabilitation projects for Lake Thunderbird were included in the OCWP study. Additionally, the OCWP study included Midwest City's portion of projects associated with bringing Atoka Reservoir water to the Central region.

Treatment Projects – Midwest City

A 13-mgd WTP rehabilitation project was identified in the 2007 DWINS. The 2007 DWINS also identified several chlorination treatment projects. Using the project list worksheet, rehabilitation of 13-mgd WTP in 2060 also was included in the OCWP study.

Storage Projects – Midwest City

Rehabilitation projects totaling 10.7 MG of finished water storage were identified in the 2007 DWINS and were included in the OCWP study.

Distribution and Transmission Projects – Midwest City

Rehabilitation of a 13.0-mgd raw water transmission line was identified using the project list worksheet. Additionally, the OCWP study included Midwest City's portion of projects associated with bringing Atoka Reservoir water to the Central region.

Many distribution projects were identified in the project list worksheet and the 2007 DWINS. Projects included rehabilitation and replacement of existing pipelines and

installation of new pipelines to accommodate anticipated growth. Additionally, the 2007 DWINS identified some booster pump, flushing hydrants, and water meter replacement projects.

Other Projects – Midwest City
The debt service associated with Midwest City's portion of projects associated with bringing Atoka Reservoir water to the Central region was included in this infrastructure category.

Source Water Projects – Okemah Utilities Authority
Using the project list worksheet, one surface water intake rehabilitation project for Okemah Lake was included in the OCWP study.

Treatment Projects – Okemah Utilities Authority
Using the project list worksheet, rehabilitation of 2.2-mgd WTP in 2020 and 2060 were included in the OCWP study.

Storage Projects – Okemah Utilities Authority
Using the project list worksheet, rehabilitation of 0.22 MG of finished water storage tank was included in the OCWP study.

Distribution and Transmission Projects – Okemah Utilities Authority
Rehabilitation of a 2.5-mgd raw water transmission lines was identified using the project list worksheet.

Many distribution projects were identified in the project list worksheet. Projects included rehabilitation and replacement of existing pipelines and installation of new pipelines to accommodate anticipated growth.

Other Projects – Okemah Utilities Authority
No projects were identified in this infrastructure category.

6.2.2.2 Groundwater Providers

Twenty-six medium providers are grouped in this category; three of these primarily purchase water. Logan County Rural Water District (RWD) #1 and the City of Ada were selected for cost modeling to represent the average Central region medium groundwater provider. Both of these providers participated in the 2007 DWINS and 2008 OCWP.

Source Water Projects – Logan County RWD #1
The 2007 DWINS identified several well rehabilitation projects.

Treatment Projects – Logan County RWD #1
Groundwater treatment rehabilitation projects with a total capacity of 1.4 mgd were identified in the 2020 and 2060 periods.

Storage Projects – Logan County RWD #1

The 2007 DWINS identified four finished water storage rehabilitation projects, for capacity of 1.0 mgd, were identified using the project list worksheet.

Distribution and Transmission Projects – Logan County RWD #1

Rehabilitation of a 1.48-mgd raw water transmission line was identified using the project list worksheet.

Many distribution projects were identified in the project list worksheet and the 2007 DWINS. Projects included rehabilitation and replacement of existing pipelines and installation of new pipelines to accommodate anticipated growth. In addition, the 2007 DWINS identified a water meter replacement project.

Other Projects – Logan County RWD #1

No projects were identified in this infrastructure category.

Source Water Projects – Ada

The 2007 DWINS identified several well rehabilitation projects.

Treatment Projects – Ada

The 2007 DWINS identified chlorination and fluoridation treatment projects with a capacity of 11.0 mgd. Using the project list, a 12.0 mgd groundwater treatment project was included in the 2060 period.

Storage Projects – Ada

The 2007 DWINS identified three finished water storage rehabilitation projects, for capacity of 2.0 mgd, were identified using the project list worksheet.

Distribution and Transmission Projects – Ada

Rehabilitation of a 12.0 mgd raw water transmission line was identified using the project list worksheet.

Many distribution projects were identified in the project list worksheet and the 2007 DWINS. Projects included rehabilitation and replacement of existing pipelines and installation of new pipelines to accommodate anticipated growth. The project list worksheet also identified finished water pump rehabilitation. In addition, the 2007 DWINS identified lead service line replacement and water meter replacement project.

Other Projects – Ada

No projects were identified in this infrastructure category.

6.2.2.3 Summary

Table 6-5 presents the drinking water cost through 2060 of the Central medium provider stratum by infrastructure type. Figure 6-2 illustrates the drinking water costs over time.

Table 6-5. Central Region – Medium Water Providers Costs by Infrastructure Type

Period [A]	Distribution and Transmission (millions of 2007 dollars)	Treatment (millions of 2007 dollars)	Storage (millions of 2007 dollars)	Source (millions of 2007 dollars)	Other (millions of 2007 dollars)	Total Infrastructure Need (millions of 2007 dollars)
Present-2020	$536	$182	$52	$65	$4	$839
2021-2040	$447	$0	$0	$0	$0	$447
2041-2060	$962	$171	$0	$0	$0	$1,133
Total	$1,945	$353	$52	$65	$4	$2,419

[A] Small differences in values may result from rounding.

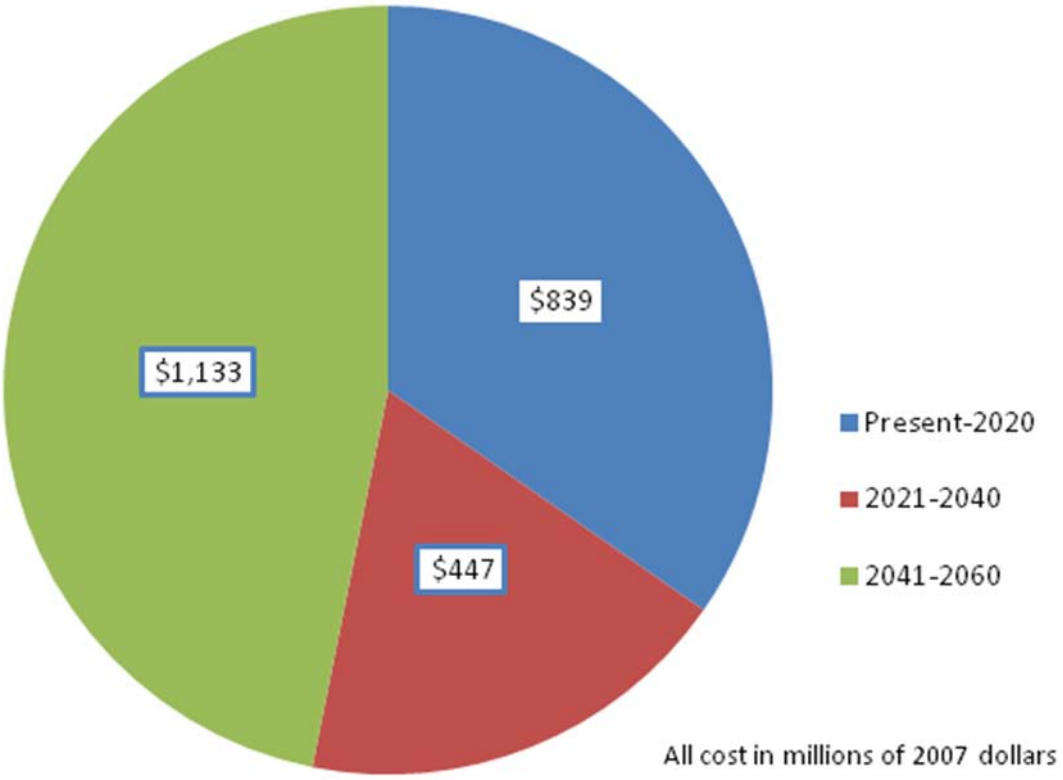

Figure 6-2. Central Region – Medium Water Providers Costs Over Time

6.2.3 Central – Small Water Providers

The Central region has 79 small OCWP water providers. Information about each of these providers is shown in Table 6-6.

Table 6-6. Central Region – Small OCWP Providers

SWDIS Identifier	Provider Name	County	Source Water Type [A]	Did they participate in 2007 DWINS?	Did they participate in 2008 OCWP survey?	Projected 2060 Population [B]	Were they selected for cost modeling?
OK1020508	Wetumka	Hughes	SW	No	No	2,434	No
OK1020703	Lincoln Co RWD #1	Lincoln	SW	No	Yes	578	Yes
OK1020724	Wellston	Lincoln	SW	No	No	1,192	No
OK1020807	Pottawatomie County RWD #3	Pottawatomie	SW	No	No	753	No
OK2000203	Goltry	Alfalfa	GW	No	No	278	No
OK2000206	Aline	Alfalfa	GW	No	Yes	225	No
OK2000207	Carmen	Alfalfa	GW	No	Yes	431	No
OK2000210	Helena	Alfalfa	GW	No	No	447	No
OK2000606	North Blaine Water	Blaine	GW	No	Yes	1,301	No
OK2000607	Canton	Blaine	GW	No	Yes	978	No
OK2000608	Geary	Blaine	GW	No	Yes	1,900	No
OK2000610	Hitchcock Dev	Blaine	GW	No	Yes	306	No
OK2000611	Longdale	Blaine	GW	No	Yes	378	No
OK2000612	Okeene	Blaine	GW	No	Yes	1,866	No
OK2000904	Calumet	Canadian	GW	No	Yes	758	No
OK2000908	Canadian Co RWD # 1	Canadian	GW	No	No	913	No
OK2000930	Canadian Co RWD # 4	Canadian	GW	No	Yes	1,370	No
OK2001409	Lexington	Cleveland	GW	No	Yes	2,573	No
OK2001903	Depew	Creek	GW	No	Yes	738	No
OK2002417	Lahoma PWA	Garfield	GW	No	Yes	652	No
OK2002503	Stratford	Garvin	GW	No	Yes	1,627	No
OK2002610	Minco	Grady	GW	No	Yes	2,221	No
OK2003201	Calvin	Hughes	GW	No	Yes	503	No
OK2003701	Loyal	Kingfisher	GW	No	Yes	147	No
OK2003703	Okarche	Kingfisher	GW	No	Yes	1,838	No
OK2003705	Dover Public Works Trust Auth	Kingfisher	GW	No	Yes	670	No
OK2003715	Okarche RWD	Kingfisher	GW	No	Yes	894	No
OK2003722	Kingfisher Co RWD #3	Kingfisher	GW	No	Yes	221	No
OK2004101	Prague	Lincoln	GW	No	Yes	3,107	No
OK2004104	Carney	Lincoln	GW	No	No	942	No
OK2004204	Crescent	Logan	GW	No	Yes	2,280	No
OK2004205	Rock Creek	Logan	GW	No	Yes	228	No
OK2004206	Logan Co RWD #2	Logan	GW	No	Yes	1,865	No

Table 6-6. Central Region – Small OCWP Providers, continued

SWDIS Identifier	Provider Name	County	Source Water Type [A]	Did they participate in 2007 DWINS?	Did they participate in 2008 OCWP survey?	Projected 2060 Population [B]	Were they selected for cost modeling?
OK2004253	Cimarron City	Logan	GW	No	Yes	77	No
OK2004254	Meridian Water Supply	Logan	GW	No	No	90	No
OK2004401	Meno	Major	GW	No	Yes	212	No
OK2004402	Cleo Springs	Major	GW	No	Yes	336	No
OK2004403	Ames	Major	GW	No	Yes	209	No
OK2004404	Fairview	Major	GW	No	No	2,860	No
OK2004405	Ringwood	Major	GW	No	Yes	524	No
OK2004407	Major County RWD #1	Major	GW	No	Yes	989	Yes
OK2004703	Washington	McClain	GW	No	Yes	987	No
OK2004707	Goldsby Water Auth Trust	McClain	GW	No	Yes	3,183	No
OK2005401	Paden	Okfuskee	GW	No	Yes	708	No
OK2005402	Okfuskee Co RWD # 1 (Boley)	Okfuskee	GW	No	Yes	471	No
OK2005503	Luther	Oklahoma	GW	No	Yes	745	No
OK2005507	Jones	Oklahoma	GW	No	Yes	1,984	No
OK2006205	Francis	Pontotoc	GW	No	Yes	203	No
OK2006302	Maud	Pottawatomie	GW	No	No	1,535	No
OK2006304	St Louis RWD	Pottawatomie	GW	No	Yes	271	No
OK2006363	Brooksville	Pottawatomie	GW	No	No	124	No
OK2006704	Konawa PWA	Seminole	GW	No	Yes	1,708	No
OK2006705	Sasakwa PWA	Seminole	GW	No	No	170	No
OK2006708	Sasakwa RWD	Seminole	GW	No	Yes	326	No
OK3000606	Greenfield PWA	Blaine	GWP	No	No	134	No
OK3000901	Heaston RW Corp	Canadian	GWP	No	Yes	211	No
OK3000903	Canadian Co Water Authority	Canadian	SWP	No	Yes	2,206	No
OK3000909	Union City	Canadian	GWP	No	Yes	1,053	No
OK3001921	Slick	Creek	GWP	Yes	No	202	No
OK3002401	Drummond	Garfield	GWP	No	Yes	487	No
OK3003201	Hughes Co RWD #1	Hughes	SWP	No	Yes	1,822	No
OK3003703	Cashion	Kingfisher	GWP	No	Yes	1,058	No
OK3003704	Kingfisher Co RWD #4	Kingfisher	GWP	No	No	107	No
OK3004102	Lincoln Co RWD #2	Lincoln	SWP	No	No	578	No
OK3004104	Davenport Utility Auth	Lincoln	SWP	No	Yes	1,275	No

Table 6-6. Central Region – Small OCWP Providers, continued

SWDIS Identifier	Provider Name	County	Source Water Type [A]	Did they participate in 2007 DWINS?	Did they participate in 2008 OCWP survey?	Projected 2060 Population [B]	Were they selected for cost modeling?
OK3004107	Lincoln Co RWD #3	Lincoln	SWP	No	No	830	No
OK3004108	Meeker Public Works Authority	Lincoln	SWP	No	Yes	1,467	No
OK3004109	Kendrick Municipal Authority	Lincoln	SWP	No	Yes	503	No
OK3004708	Cole	McClain	GWP	No	No	891	No
OK3004709	Dibble	McClain	SWP	No	Yes	595	No
OK3005401	Okfuskee Co RWD # 3	Okfuskee	SWP	No	Yes	2,063	No
OK3005402	Okfuskee Co RWD # 2	Okfuskee	SWP	No	Yes	2,508	No
OK3006204	Pontotoc Co RWD # 3	Pontotoc	GWP	No	No	1,631	No
OK3006205	Pontotoc Co RWD # 1 (Homer)	Pontotoc	GWP	No	No	525	No
OK3006303	Pottawatomie Co Development	Pottawatomie	SWP	No	Yes	1,613	No
OK3006310	Wanette	Pottawatomie	SWP	No	No	540	No
OK3006311	Asher Util Dev Auth	Pottawatomie	SWP	No	Yes	505	No
OK3006703	Seminole Co RW&SWMD #3	Seminole	SWP	No	No	391	No
OK3007607	Dacoma PWA	Woods	GWP	No	Yes	139	No

[A] SW – Surface Water, GW – Groundwater, P – Purchased Water, GU – Groundwater Under Direct Influence of Surface Water. Systems are classified as surface water if they have at least one source that is surface water or groundwater under the direct influence of surface water (SW and GW designations). Systems are classified as groundwater if they do not meet surface water definition or if their primary source of water is purchased from another provider (GW, SWP, and GWP designations).

[B] Population based on 2060 projection (see Water Demand Forecast Report for more details on projections).

6.2.3.1 Surface Water Providers

There are four small surface water providers in the Central region. Lincoln County RWD #1 participated in the 2008 OCWP survey. Using the methodology described in Section 2.2, a project list was created.

Source Water Projects

Using the project list worksheet, two surface water intake projects, one new and one rehabilitation, for Sparks Lake was included in the OCWP study.

Treatment Projects

Using the project list worksheet, a 0.14 mgd WTP rehabilitation project in 2040 was included in the OCWP study.

Storage Projects
Using the project list worksheet, rehabilitation of 0.028 MG of finished water storage tank was included in the OCWP study.

Distribution and Transmission Projects
A 0.15-mgd rehabilitation of a raw water transmission line was identified using the project list worksheet.

Many distribution projects were identified in the project list worksheet. Projects included rehabilitation and replacement of existing pipelines and installation of new pipelines to accommodate anticipated growth.

Other Projects
No projects were identified in this infrastructure category.

6.2.3.2 Groundwater Providers

There are 75 small providers in this category; 25 of these primarily purchase water. Major County RWD #1 was selected for cost modeling. Major County RWD #1 participated in the 2008 OCWP survey. Using the methodology described in Section 2.2, a project list was created.

Source Water Projects
Using the project list worksheet, a well rehabilitation project for 0.14 mgd was included in the OCWP study.

Treatment Projects
Using the project list worksheet, a 0.14 mgd groundwater chemical treatment was included in the OCWP study in the 2020 and 2060 periods. Information on Major County RWD #1 existing treatment technology was unknown.

Storage Projects
Using the project list worksheet, rehabilitation of 0.014 MG of finished water storage tank was included in the OCWP study.

Distribution and Transmission Projects
Rehabilitation of one raw water transmission line with a capacity of 0.14 mgd was identified using the project list worksheet.

Many distribution projects were identified in the project list worksheet. Projects included rehabilitation and replacement of existing pipelines and installation of new pipelines to accommodate anticipated growth. In addition, a 0.14 mgd pumping project was included in the OCWP study.

Other Projects
No projects were identified in this infrastructure category.

6.2.3.3 Summary

Table 6-7 presents the drinking water cost through 2060 of the Central small provider stratum by infrastructure type. Figure 6-3 illustrates the drinking water costs over time.

Table 6-7. Central Region – Small Water Providers Costs by Infrastructure Type

Period [A]	Distribution and Transmission (millions of 2007 dollars)	Treatment (millions of 2007 dollars)	Storage (millions of 2007 dollars)	Source (millions of 2007 dollars)	Other (millions of 2007 dollars)	Total Infrastructure Need (millions of 2007 dollars)
Present-2020	$648	$15	$3	$2	$0	$668
2021-2040	$67	$3	$0	$0	$0	$70
2041-2060	$5,705	$15	$0	$0	$0	$5,720
Total	$6,420	$33	$3	$2	$0	$6,458

[A] Small differences in values may result from rounding.

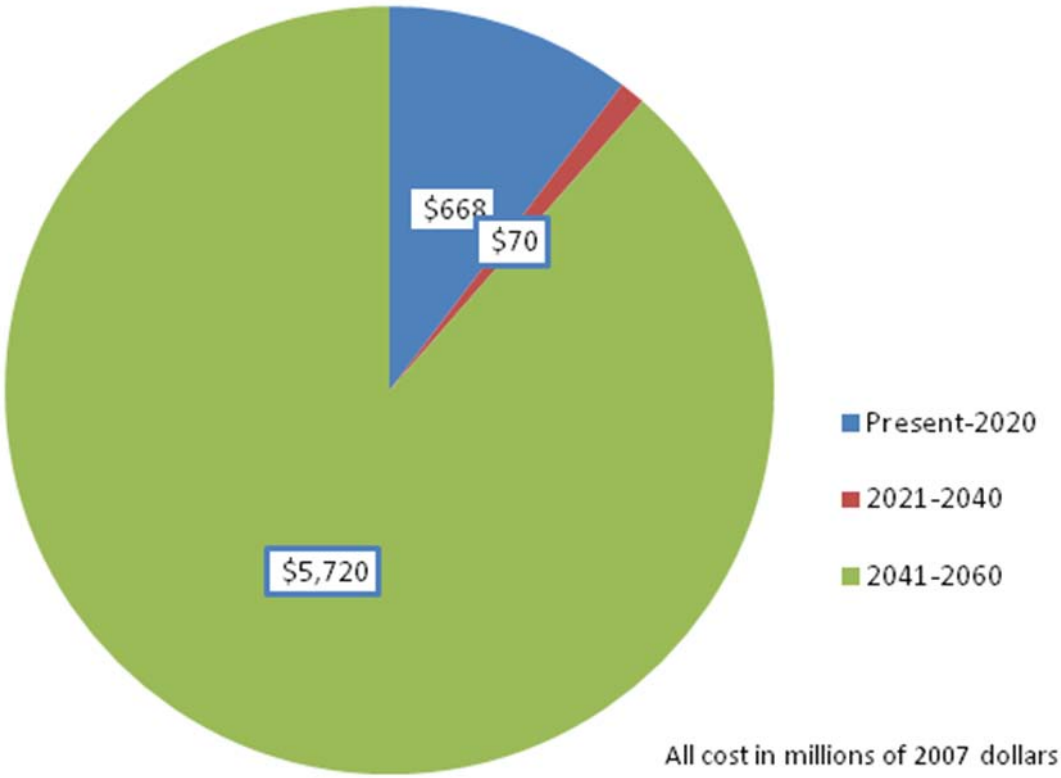

Figure 6-3. Central Region – Small Water Providers Costs Over Time

6.3 Central – Regional Major Reservoir Projects

There are 22 major reservoirs in the Central region. Table 6-8 identifies the reservoirs and project size. Figure 6-4 illustrates project cost over time.

Table 6-8. Central Region – Major Reservoir Rehabilitation Projects

Reservoir Name	Storage Considered for Rehabilitation [A] (AF)	Project Year
Bell Cow Lake	15,613	2080
Chandler Lake	2,778	2060
Guthrie Lake	3,875	2020
Holdenville Lake	11,000	2040
Lake Arcadia	23,090	2080
Lake El Reno	709	2080
Lake Hefner	75,000	2060
Lake Konawa	23,000	2080
Lake Overholser	17,000	2020
Lake Thunderbird	105,900	2080
Lake Wetumka	1,839	2040
Liberty Lake	2,740	2060
Meeker Lake	0	2080
Okemah Lake	10,391	2020
Prague City Lake	2,415	2080
Purcell Lake	2,600	2040
Shawnee Reservoir 1	34,000	2040
Shawnee Reservoir 2	34,000	2060
Stanley Draper Lake	100,000	2080
Stroud Lake	8,800	2080
Tecumseh Lake	1,118	2040
Wes Watkins Reservoir	14,065	2080

[A] The amount of storage for rehabilitation is based on the municipal water supply storage. If unknown, the full normal pool storage was used. Reservoirs with no designated municipal water supply storage were included in the study but show zero in the rehabilitation column

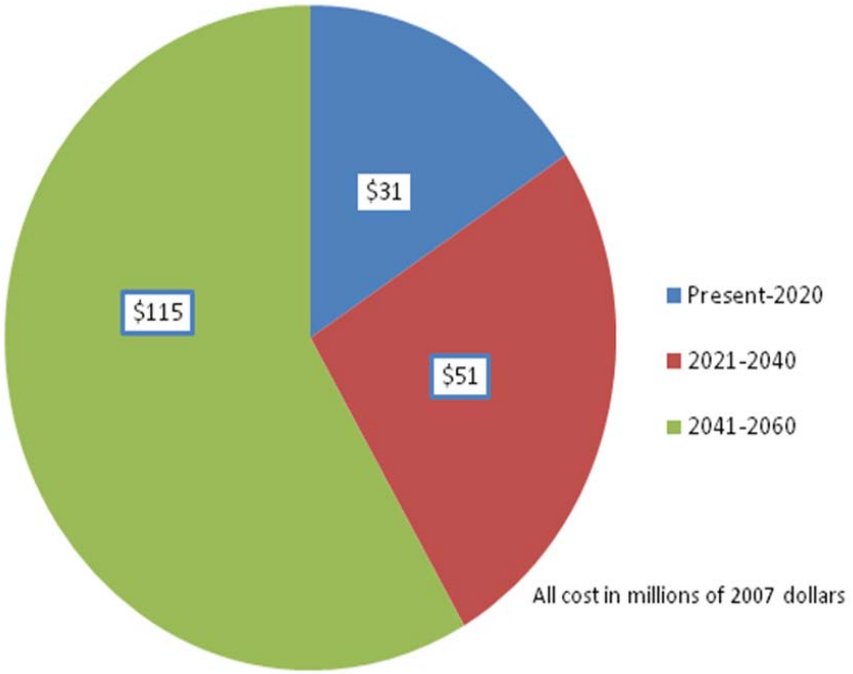

Figure 6-4. Central Region – Major Reservoir Rehabilitation Costs Over Time

6.4 Central – Regional Cost Summary

This section presents the Central regional drinking water infrastructure costs over the next 50 years. Table 6-9 identifies costs by provider size and project year. Distribution and transmission projects make up the majority of the infrastructure costs, over 89 percent, of drinking water infrastructure costs in the region. Treatment and source water projects are distant second and third places respectively. Small providers have the largest overall drinking water infrastructure costs. The largest infrastructure costs occur in the 2041-2060 period.

Table 6-9 Central Region – Drinking Water Infrastructure Cost Summary

Category [A, C]	Potential Funding Source [B]	Present - 2020 Infrastructure Need (millions of 2007 dollars)	2021-2040 Infrastructure Need (millions of 2007 dollars)	2041-2060 Infrastructure Need (millions of 2007 dollars)	Total Period Infrastructure Need (millions of 2007 dollars)
Small	DWSRF Eligible	$644.08	$34.04	$5,682.75	$6,360.87
	Non-DWSRF Eligible	$24.00	$36.75	$36.75	$97.50
Small Subtotal		$668.08	$70.79	$5,719.50	$6,458.37
Medium	DWSRF Eligible	$829.24	$438.22	$1,124.59	$2,392.05
	Non-DWSRF Eligible	$9.92	$8.94	$8.94	$27.79
Medium Subtotal		$839.16	$447.16	$1,133.53	$2,419.84
Large	DWSRF Eligible	$1,117.19	$408.91	$1,153.92	$2,680.02
	Non-DWSRF Eligible	$43.73	$7.91	$7.91	$59.55
Large Subtotal		$1,160.92	$416.82	$1,161.83	$2,739.57
Reservoir	DWSRF Eligible	$0.00	$0.00	$0.00	$0.00
	Non-DWSRF Eligible	$31.27	$50.56	$114.52	$196.35
Reservoir Subtotal		$31.27	$50.56	$114.52	$196.35
Total		**$2,699.43**	**$985.33**	**$8,129.38**	**$11,814.13**

[A] See Table 6-1 for more information on provider size. The "reservoir" category includes all regional reservoir rehabilitation projects.
[B] This study assumes that distribution projects for new growth and all reservoir projects are non-DWSRF eligible. All other projects were assumed to be DWSRF eligible.
[C] Small differences in values may result from rounding.

Section 7
Eufaula Regional Infrastructure Costs

This section provides some general information about the Eufaula region, identifies water providers selected for modeling and their project lists, and provides a cost summary for this region.

7.1 Eufaula – Regional Description

The Eufaula Watershed Planning Region is a 3,223-square-mile area including all or portions of Okfuskee, Seminole, Hughes, McIntosh, Haskell, Latimer, Okmulgee, Pittsburg, Pottawatomie, and Muskogee Counties. There are 53 OCWP providers in this region. OCWP providers are those included in the 2008 OCWP survey and for which water demand projections were created. Table 7-1 shows the number of Eufaula water providers by stratum.

Table 7-1. Eufaula Region – Number of OCWP Providers by Stratum

Provider Size	Population [A]	Surface Water [B]	Groundwater [C]	Total
Large	>100,000	0	0	0
Medium	3,301 – 100,000	9	4	13
Small	<3,300	10	30	40
Total		**19**	**34**	**53**

[A] Population classification was based on 2060 projection (see *Water Demand Forecast Report* for more details on projections).

[B] Systems were classified as surface water if they have at least one source that is surface water or groundwater under the direct influence of surface water.

[C] Systems were classified as groundwater if they do not meet surface water definition or if their primary source of water is purchased from another provider.

7.2 Eufaula – Developing Project Lists

Six providers were used for cost modeling. The following sections discuss the project lists for each of these providers.

7.2.1 Eufaula – Large Water Providers

The Lower Washita region has no large OCWP providers.

7.2.2 Eufaula – Medium Water Providers

The Eufaula region has 13 medium OCWP water providers. Information about each of these providers is shown in Table 7-2.

Table 7-2. Eufaula Region – Medium OCWP Providers

SWDIS Identifier	Provider Name	County	Source Water Type [A]	Did they participate in 2007 DWINS?	Did they participate in 2008 OCWP survey?	Projected 2060 Population [B]	Were they selected for cost modeling?
OK1020510	Wewoka Water Works	Seminole	SW	No	Yes	4,134	No
OK1020514	Eufaula PWA	McIntosh	SW	Yes	No	7,678	No
OK1020529	McIntosh Co RWD # 8 (Texanna)	McIntosh	SW	No	Yes	6,877	No
OK1020609	McAlester PWA	Pittsburg	SW	Yes	Yes	22,342	Yes
OK1020623	Longtown RW&S District #1 Pittsburg Co	Pittsburg	SW	No	Yes	6,403	No
OK1020708	Okmulgee	Okmulgee	SW	Yes	Yes	17,831	No
OK1020709	Henryetta	Okmulgee	SW	No	No	11,093	No
OK1020710	Muskogee Co RWD # 3	Muskogee	SW	No	Yes	3,461	Yes
OK1020803	Holdenville	Hughes	SW	No	Yes	8,024	No
OK2004913	McIntosh Co RWD # 6 (Vivian)	McIntosh	GW	No	Yes	3,773	Dist. Only
OK2006720	Seminole	Seminole	GW	No	Yes	7,887	Yes
OK3005604	Okmulgee Co RWD # 2 (Preston)	Okmulgee	SWP	No	Yes	4,162	No
OK3006112	Adamson Rural Water District # 8	Pittsburg	SWP	No	Yes	6,278	No

[A] SW – Surface Water, GW – Groundwater, P – Purchased Water, GU – Groundwater Under Direct Influence of Surface Water. Systems are classified as surface water if they have at least one source that is surface water or groundwater under the direct influence of surface water (SW and GW designations). Systems are classified as groundwater if they do not meet surface water definition or if their primary source of water is purchased from another provider (GW, SWP, and GWP designations).

[B] Population based on 2060 projection (see Water Demand Forecast Report for more details on projections).

7.2.2.1 Surface Water Providers

There are nine medium surface water providers in the Eufaula region. To represent the average provider, two medium surface water providers were selected. McAlester PWA participated in the 2007 DWINS and 2008 OCWP survey. Muskogee County RWD #3 participated in the 2008 OCWP survey. Using the methodology described in Section 2.2, a project list was created for each of these providers.

Source Water Projects – McAlester PWA

Using the project list worksheet, four surface water intake rehabilitation projects for Lake McAlester, Lake Talawanda No. 1 and No. 2, and Lake Eufaula were included in the OCWP study.

Treatment Projects – McAlester PWA

A 12-mgd WTP rehabilitation project was identified in the 2007 DWINS. Using the project list worksheet, rehabilitation of a 12-mgd WTP in 2060 also was included in the OCWP study.

Storage Projects – McAlester PWA

Rehabilitation projects totaling 4.2 MG of finished water storage were identified in the 2007 DWINS and were included in the OCWP study.

Distribution and Transmission Projects – McAlester PWA

Rehabilitation of four raw water transmission lines, with a total capacity of 13.57 mgd, was identified using the project list worksheet.

Many distribution projects were identified in the project list worksheet and the 2007 DWINS. Projects included rehabilitation and replacement of existing pipelines and installation of new pipelines to accommodate anticipated growth. Additionally, the 2007 DWINS identified some booster pump and water meter replacement projects.

Other Projects – McAlester PWA

No projects were identified in this infrastructure category.

Source Water Projects – Muskogee County RWD #3

Using the project list worksheet, two surface water intake rehabilitation projects for Eufaula Lake were included in the OCWP study.

Treatment Projects – Muskogee County RWD #3

Using the project list worksheet, rehabilitation of 1.65-mgd WTP in 2040 was included in the OCWP study.

Storage Projects – Muskogee County RWD #3

Using the project list worksheet, rehabilitation of 0.17 MG of finished water storage tank was included in the OCWP study.

Distribution and Transmission Projects – Muskogee County RWD #3

A combination of new and rehabilitation of raw water transmission lines, with a total capacity of 1.65 mgd was identified using the project list worksheet.

Many distribution projects were identified in the project list worksheet. Projects included rehabilitation and replacement of existing pipelines and installation of new pipelines to accommodate anticipated growth.

Other Projects – Muskogee County RWD #3

No projects were identified in this infrastructure category.

7.2.2.2 Groundwater Providers

Four medium providers are grouped in this category; two of these primarily purchase water. The City of Seminole was selected for cost modeling. Seminole participated in the 2008 OCWP. McIntosh County RWD #6 (Vivian) was used to supplement the distribution information for Seminole.

Source Water Projects

One well rehabilitation project, for capacity of 0.99 mgd, was identified using the project list worksheet.

Treatment Projects

Groundwater treatment rehabilitation projects, for capacity of 0.99 mgd, were identified in the 2020 and 2060 periods using the project list worksheet.

Storage Projects

One finished water storage rehabilitation project, for capacity of 0.099 mgd, was identified using the project list worksheet.

Distribution and Transmission Projects

Rehabilitation of one raw water transmission line with a capacity of 0.99 mgd was identified using the project list worksheet.

Many distribution projects were identified in the project list worksheet. Projects included rehabilitation and replacement of existing pipelines and installation of new pipelines to accommodate anticipated growth. In addition, pumping project totaling 0.99 mgd was identified in the project list worksheet for inclusion in the OCWP study.

Other Projects

No projects were identified in this infrastructure category.

7.2.2.3 Summary

Table 7-3 presents the drinking water cost through 2060 of the Eufaula medium provider stratum by infrastructure type. Figure 7-1 illustrates the drinking water costs over time.

Table 7-3. Eufaula Region – Medium Water Providers Costs by Infrastructure Type

Period [A]	Distribution and Transmission (millions of 2007 dollars)	Treatment (millions of 2007 dollars)	Storage (millions of 2007 dollars)	Source (millions of 2007 dollars)	Other (millions of 2007 dollars)	Total Infrastructure Need (millions of 2007 dollars)
Present-2020	$242	$88	$8	$18	$0	$356
2021-2040	$305	$20	$1	$2	$0	$328
2041-2060	$109	$88	$0	$0	$0	$197
Total	$656	$196	$9	$20	$0	$881

[A] Small differences in values may result from rounding.

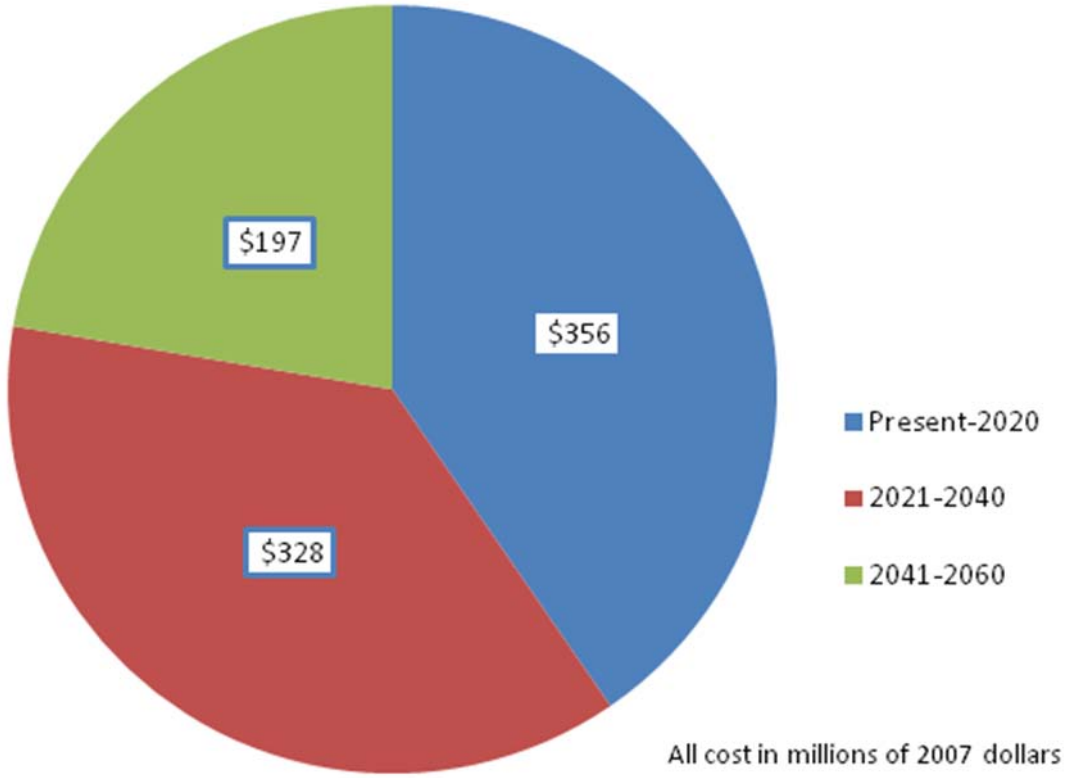

Figure 7-1. Eufaula Region – Medium Water Providers Costs Over Time

7.2.3 Eufaula – Small Water Providers

The Eufaula region has 40 small OCWP water providers. Information about each of these providers is shown in Table 7-4.

Table 7-4. Eufaula Region – Small OCWP Providers

SWDIS Identifier	Provider Name	County	Source Water Type [A]	Did they participate in 2007 DWINS?	Did they participate in 2008 OCWP survey?	Projected 2060 Population [B]	Were they selected for cost modeling?
OK1010414	Hughes Co RWD #2	Hughes	SW	No	No	1,814	No
OK1020511	Dustin	Hughes	SW	No	Yes	844	No
OK1020512	Weleetka	Okfuskee	SW	No	No	1,263	No
OK1020603	Pittsburg Co PWA (Crowder)	Pittsburg	SW	No	Yes	2,779	No
OK1020604	Pittsburg	Pittsburg	SW	No	No	345	No
OK1020606	Krebs Utility Authority	Pittsburg	SW	No	Yes	2,659	Yes
OK1020612	Pittsburg Co RWD # 4 (Canadian	Pittsburg	SW	No	Yes	222	No
OK1020616	Pittsburg Co Water Authority	Pittsburg	SW	No	No	33	No

Table 7-4. Eufaula Region – Small OCWP Providers, continued

SWDIS Identifier	Provider Name	County	Source Water Type [A]	Did they participate in 2007 DWINS?	Did they participate in 2008 OCWP survey?	Projected 2060 Population [B]	Were they selected for cost modeling?
OK1020625	Pittsburg Co RWD #14	Pittsburg	SW	No	No	1,444	No
OK1020707	Beggs	Okmulgee	SW	No	Yes	1,923	No
OK2004902	Hanna PWA	McIntosh	GW	No	Yes	868	Yes
OK2004919	McIntosh Co RWD #12 (Shell Creek)	McIntosh	GW	No	No	309	No
OK2005603	McIntosh Co RWD # 13 (Wells)	Okmulgee	GW	No	Yes	2,024	Yes
OK2005604	Okmulgee Co RWD #5 (Bryant RWD #5)	Okmulgee	GW	No	No	1,027	No
OK3003202	Hughes Co RWD #3	Hughes	SWP	No	No	335	No
OK3003203	Hughes Co RWD #4	Hughes	GWP	No	Yes	1,340	No
OK3003204	Hughes Co RWD #5	Hughes	SWP	No	Yes	1,298	No
OK3004903	McIntosh Co RWD # 3 (Victor)	McIntosh	SWP	No	Yes	2,707	No
OK3004906	McIntosh Co RWD #4 (Hitchita)	McIntosh	SWP	No	No	715	No
OK3005602	Okmulgee Co RWD # 4	Okmulgee	SWP	No	Yes	2,793	No
OK3005603	Kusa RWD #3	Okmulgee	SWP	No	Yes	315	No
OK1010414	Hughes Co RWD #2	Hughes	SW	No	No	1,814	No
OK3005605	Okmulgee Co RWD #1	Okmulgee	SWP	No	Yes	2,477	No
OK3005606	Okmulgee Co RWD #20	Okmulgee	SWP	No	Yes	3,129	No
OK3005607	Okmulgee Co RWD #21	Okmulgee	SWP	No	No	685	No
OK3005608	Okmulgee Co RWD #7 (Nuyaka)	Okmulgee	SWP	No	Yes	1,342	No
OK3005610	Morris	Okmulgee	SWP	No	No	1,968	No
OK3005613	Dewar	Okmulgee	SWP	No	Yes	1,307	No
OK3006101	Hartshorne	Pittsburg	SWP	No	Yes	2,946	No
OK3006102	Pittsburg Co RW&SD #15	Pittsburg	SWP	No	No	176	No
OK3006104	Savanna	Pittsburg	SWP	No	No	922	No
OK3006106	Pittsburg Co RWD #16	Pittsburg	SWP	No	No	1,004	No
OK3006107	Pittsburg Co RWD # 9 McAlester	Pittsburg	SWP	No	Yes	628	No

Table 7-4. Eufaula Region – Small OCWP Providers, continued

SWDIS Identifier	Provider Name	County	Source Water Type [A]	Did they participate in 2007 DWINS?	Did they participate in 2008 OCWP survey?	Projected 2060 Population [B]	Were they selected for cost modeling?
OK3006108	Pittsburg Co RWD # 7 (Haywood)	Pittsburg	SWP	No	No	2,386	No
OK3006109	Pittsburg Co RWD # 6 (Alderson	Pittsburg	SWP	No	No	375	No
OK3006110	Indianola RWD # 18	Pittsburg	SWP	No	No	2,474	No
OK3006111	Haileyville	Pittsburg	SWP	No	Yes	1,124	No
OK3006115	Pittsburg Co RWD # 5	Pittsburg	SWP	No	Yes	2,040	No
OK3006701	Seminole Co RWD #2	Seminole	SWP	No	No	365	No
OK3006702	Seminole Co RWD # 1	Seminole	SWP	No	No	449	No
OK3006704	Seminole Co RWD # 5	Seminole	SWP	No	No	228	No

[A] SW – Surface Water, GW – Groundwater, P – Purchased Water, GU – Groundwater Under Direct Influence of Surface Water. Systems are classified as surface water if they have at least one source that is surface water or groundwater under the direct influence of surface water (SW and GW designations). Systems are classified as groundwater if they do not meet surface water definition or if their primary source of water is purchased from another provider (GW, SWP, and GWP designations).

[B] Population based on 2060 projection (see Water Demand Forecast Report for more details on projections).

7.2.3.1 Surface Water Providers

There are 10 small surface water providers in the Eufaula region. Krebs Utility Authority participated in the 2008 OCWP survey. Using the methodology described in Section 2.2, a project list was created.

Source Water Projects

Using the project list worksheet, two surface water intake rehabilitation projects for Kreb City Lake and Lake Eufaula were included in the OCWP study.

Treatment Projects

Using the project list worksheet, a new 0.5-mgd WTP project in 2040 and two 0.27-mgd WTP rehabilitation projects in 2020 and 2060 were included in the OCWP study.

Storage Projects

Using the project list worksheet, rehabilitation of 0.077 MG of finished water storage tank was included in the OCWP study.

Distribution and Transmission Projects

A new 0.5 mgd and rehabilitation of two raw water transmission lines with a capacity of 0.5 mgd were identified using the project list worksheet.

Many distribution projects were identified in the project list worksheet. Projects included rehabilitation and replacement of existing pipelines and installation of new pipelines to accommodate anticipated growth.

Other Projects

No projects were identified in this infrastructure category.

7.2.3.2 Groundwater Providers

There are 30 small providers in this category; 26 of these primarily purchase water. Hanna PWA and McIntosh County RWD #13 (Wells) were selected for cost modeling to represent the average Eufaula small groundwater provider. Both Hanna PWA and McIntosh County RWD #13 participated in the 2008 OCWP survey. Using the methodology described in Section 2.2, a project list was created.

Source Water Projects – Hanna PWA

Using the project list worksheet, a well rehabilitation project for 0.07 mgd was included in the OCWP study.

Treatment Projects – Hanna PWA

Using the project list worksheet, a 0.07-mgd groundwater chemical treatment was included in the OCWP study. Information on Hanna PWA's existing treatment technology was unknown.

Storage Projects – Hanna PWA

Using the project list worksheet, rehabilitation of 0.007 MG of finished water storage tank was included in the OCWP study.

Distribution and Transmission Projects – Hanna PWA

Rehabilitation of one raw water transmission line with a capacity of 0.07 mgd was identified using the project list worksheet.

Many distribution projects were identified in the project list worksheet. Projects included rehabilitation and replacement of existing pipelines and installation of new pipelines to accommodate anticipated growth. In addition, a 0.07-mgd pumping project was included in the OCWP study.

Other Projects – Hanna PWA

No projects were identified in this infrastructure category.

Source Water Projects – McIntosh County RWD #13 (Wells)

Using the project list worksheet, a well rehabilitation project for 0.16 mgd was included in the OCWP study. The project date was based on the average age of McIntosh County's existing wells.

Treatment Projects – McIntosh County RWD #13 (Wells)
Using the project list worksheet, a 0.302-mgd chlorination only treatment was included in the OCWP study.

Storage Projects – McIntosh County RWD #13 (Wells)
Using the project list worksheet, rehabilitation of 0.03 MG of finished water storage tank was included in the OCWP study.

Distribution and Transmission Projects – McIntosh County RWD #13 (Wells)
Rehabilitation of one raw water transmission line with a capacity of 0.302 mgd was identified using the project list worksheet.

Many distribution projects were identified in the project list worksheet. Projects included rehabilitation and replacement of existing pipelines and installation of new pipelines to accommodate anticipated growth. In addition, a 0.302-mgd pumping project was included in the OCWP study.

Other Projects – McIntosh County RWD #13 (Wells)
No projects were identified in this infrastructure category.

7.2.3.3 Summary

Table 7-5 presents the drinking water cost through 2060 of the Eufaula small provider stratum by infrastructure type. Figure 7-2 illustrates the drinking water costs over time.

Table 7-5. Eufaula Region – Small Water Providers Costs by Infrastructure Type

Period [A]	Distribution and Transmission (millions of 2007 dollars)	Treatment (millions of 2007 dollars)	Storage (millions of 2007 dollars)	Source (millions of 2007 dollars)	Other (millions of 2007 dollars)	Total Infrastructure Need (millions of 2007 dollars)
Present-2020	$154	$13	$1	$7	$0	$175
2021-2040	$1,181	$19	$1	$0	$0	$1,201
2041-2060	$819	$15	$0	$0	$0	$834
Total	$2,154	$47	$2	$7	$0	$2,210

[A] Small differences in values may result from rounding.

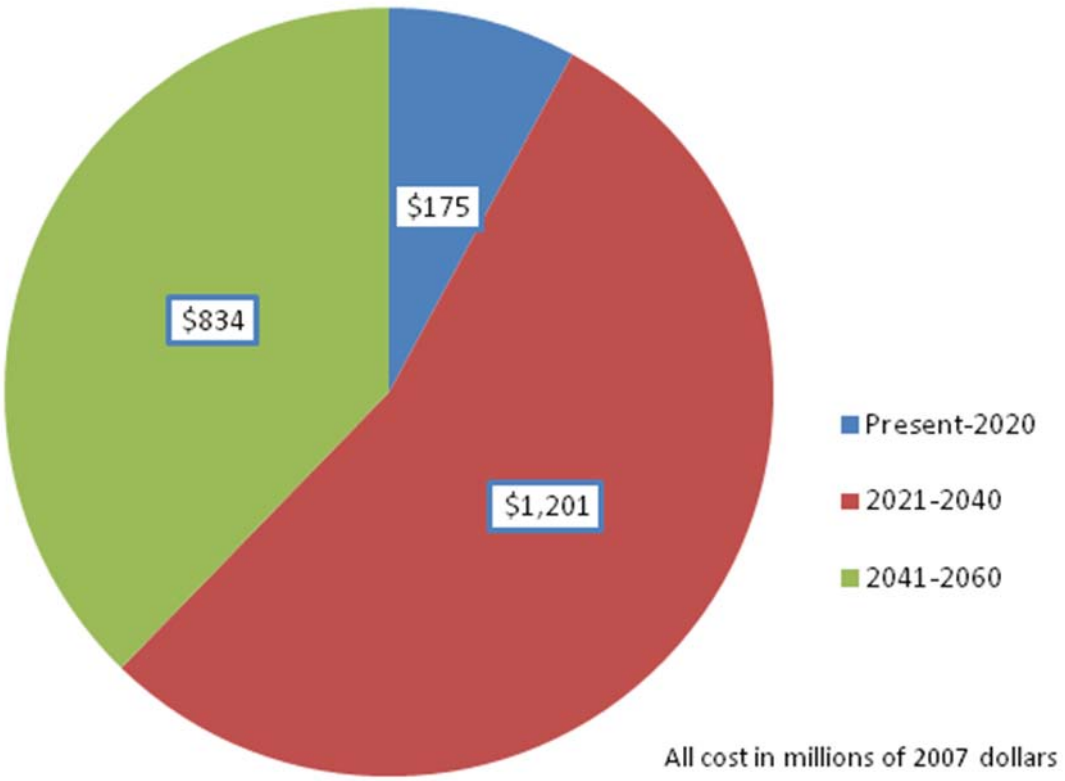

Figure 7-2. Eufaula Region – Small Water Providers Costs Over Time

7.3 Eufaula – Regional Major Reservoir Projects

There are 11 major reservoirs in the Eufaula region. Table 7-6 identifies the reservoirs and project size. Figure 7-3 illustrates project cost over time.

Table 7-6. Eufaula Region – Major Reservoir Rehabilitation Projects

Reservoir Name	Storage Considered for Rehabilitation [A] (AF)	Project Year
Carter Lake	990	2060
Dripping Springs Lake	16,200	2080
Eufaula Lake	56,000	2080
Lake Henryetta	6,660	2040
Lake McAlester	16,900	2040
Okmulgee lake	14,170	2040
Talawanda no 2, lake	2,750	2040
Weleetka Lake	385	2040
Wewoka Lake	3,301	2040

[A] The amount of storage for rehabilitation is based on the municipal water supply storage. If unknown, the full normal pool storage was used. Reservoirs with no designated municipal water supply storage were included in the study but show zero in the rehabilitation column

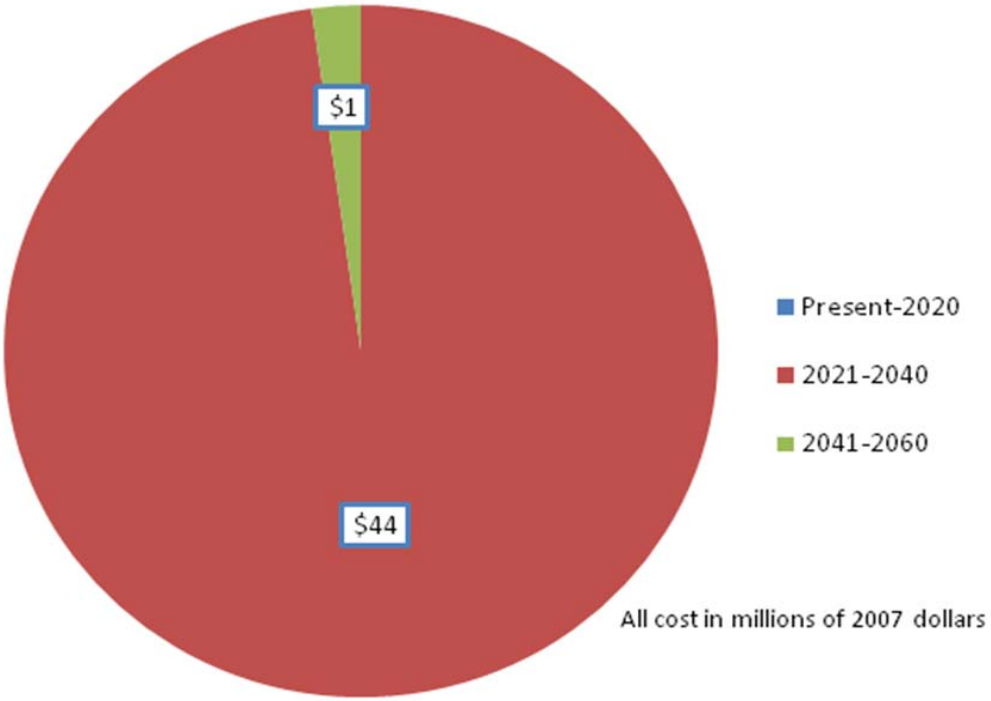

Figure 7-3. Eufaula Region – Major Reservoir Rehabilitation Costs Over Time

7.4 Eufaula – Regional Cost Summary

This section presents the Eufaula regional drinking water infrastructure costs over the next 50 years. Table 7-7 identifies costs by provider size, project year, and infrastructure type. Distribution and transmission projects make up the majority of the infrastructure costs, nearly 90 percent, of drinking water infrastructure costs in the region. Small providers have the largest overall drinking water infrastructure costs. The largest infrastructure costs occur in the 2021-2040 period.

Table 7-7 Eufaula Region – Drinking Water Infrastructure Cost Summary

Category [A, C]	Potential Funding Source [B]	Present - 2020 Infrastructure Need (millions of 2007 dollars)	2021-2040 Infrastructure Need (millions of 2007 dollars)	2041-2060 Infrastructure Need (millions of 2007 dollars)	Total Period Infrastructure Need (millions of 2007 dollars)
Small	DWSRF Eligible	$169	$1,193	$826	$2,188
	Non-DWSRF Eligible	$6	$9	$9	$24
Small Subtotal		$175	$1,202	$835	$2,212
Medium	DWSRF Eligible	$355	$325	$195	$875
	Non-DWSRF Eligible	$2	$3	$3	$8
Medium Subtotal		$357	$328	$198	$883
Large	DWSRF Eligible	$0	$0	$0	$0
	Non-DWSRF Eligible	$0	$0	$0	$0
Large Subtotal		$0	$0	$0	$0
Reservoir	DWSRF Eligible	$0	$0	$0	$0
	Non-DWSRF Eligible	$0	$44	$1	$45
Reservoir Subtotal		$0	$44	$1	$45
Total		$532	$1,574	$1,034	$3,140

[A] See Table 7-1 for more information on provider size. The "reservoir" category includes all regional reservoir rehabilitation projects.
[B] This study assumes that distribution projects for new growth and all reservoir projects are non-DWSRF eligible. All other projects were assumed to be DWSRF eligible.
[C] Small differences in values may result from rounding.

Section 8
Grand Regional Infrastructure Costs

This section provides some general information about the Grand region, identifies water providers selected for modeling and their project lists, and provides a cost summary for this region.

8.1 Grand –Regional Description

The Grand Watershed Planning Region is a 2,964-square-mile area including all or portions of Craig, Ottawa, Rogers, Mayes, Delaware, Wagoner, Muskogee, and Cherokee Counties. There are 64 OCWP providers in this region. OCWP providers are those included in the 2008 OCWP survey and for which water demand projections were created. Table 8-1 shows the number of Grand water providers by stratum.

Table 8-1. Grand Region – Number of OCWP Providers by Stratum

Provider Size	Population [A]	Surface Water [B]	Groundwater [C]	Total
Large	>100,000	0	0	0
Medium	3,301 – 100,000	12	8	20
Small	<3,300	9	35	44
Total		**21**	**43**	**64**

[A] Population classification was based on 2060 projection (see *Water Demand Forecast Report* for more details on projections).

[B] Systems were classified as surface water if they have at least one source that is surface water or groundwater under the direct influence of surface water.

[C] Systems were classified as groundwater if they do not meet surface water definition or if their primary source of water is purchased from another provider.

8.2 Grand – Developing Project Lists

Four providers were used for cost modeling. The following sections discuss the project lists for each of these providers.

8.2.1 Grand – Large Water Providers

The Grand region has no large OCWP providers.

8.2.2 Grand – Medium Water Providers

The Grand region has 20 medium OCWP water providers. Information about each of these providers is shown in Table 8-2.

Table 8-2. Grand Region – Medium OCWP Providers

SWDIS Identifier	Provider Name	County	Source Water Type [A]	Did they participate in 2007 DWINS?	Did they participate in 2008 OCWP survey?	Projected 2060 Population [B]	Were they selected for cost modeling?
OK1021504	Chelsea Economic Dev. Auth.	Rogers	SW	No	Yes	3,991	No
OK1021602	Oklahoma Ordnance Works Authority	Mayes	SW	Yes	Yes	5,855	No
OK1021611	Vinita PWA	Craig	SW	No	Yes	17,977	No
OK1021612	Ketchum PWA	Craig	SW	No	No	6,195	No
OK1021614	Grove Municipal Services Auth.	Delaware	SW	Yes	Yes	20,429	No
OK1021640	Mayes Co RWD # 3	Mayes	SW	No	Yes	4,635	No
OK1021666	Mayes Co RWD # 6	Mayes	SW	No	Yes	6,459	No
OK1021674	Jay	Delaware	SW	No	Yes	4,601	No
OK1021678	Mayes Co RWD # 9	Mayes	SW	No	Yes	3,399	No
OK1221630	Peggs Water Company	Cherokee	SW	No	Yes	3,513	No
OK1221637	Cherokee Co RWD #11	Cherokee	SW	Yes	Yes	6,095	Yes
OK1221638	Ketchum PWA Delaware Co System	Delaware	SW	No	Yes	3,725	No
OK2002166	Bernice	Delaware	GW	No	Yes	4,594	Yes
OK2005810	Commerce	Ottawa	GW	No	Yes	5,023	No
OK2005813	Miami	Ottawa	GW	Yes	Yes	18,858	No
OK3001802	Craig Co RWD #2	Craig	SWP	No	Yes	6,361	No
OK3004608	Mayes Co RWD # 2	Mayes	SWP	No	No	11,589	No
OK3004611	Pryor	Mayes	SWP	Yes	Yes	13,441	No
OK3004616	Mayes Co RWD # 5	Mayes	SWP	No	Yes	5,022	No
OK3004617	Pryor West RWD #4	Mayes	SWP	No	Yes	6,334	No

[A] SW – Surface Water, GW – Groundwater, P – Purchased Water, GU – Groundwater Under Direct Influence of Surface Water. Systems are classified as surface water if they have at least one source that is surface water or groundwater under the direct influence of surface water (SW and GW designations). Systems are classified as groundwater if they do not meet surface water definition or if their primary source of water is purchased from another provider (GW, SWP, and GWP designations).

[B] Population based on 2060 projection (see Water Demand Forecast Report for more details on projections).

8.2.2.1 Surface Water Providers

There are 12 medium surface water providers in the Grand region. The Cherokee County Rural Water District #11 was selected for modeling. Bernice participated in the 2008 OCWP survey. Using the methodology described in Section 2.2, a project list was created.

Source Water Projects

Using the project list worksheet, one surface water intake rehabilitation project for Double Spring Creek was included in the OCWP study.

Treatment Projects

A 1.0-mgd WTP rehabilitation project and laboratory equipment project were identified in the 2007 DWINS. Using the project list worksheet, rehabilitation of a 1.0-mgd WTP in 2060 was included in the OCWP study.

Storage Projects

Rehabilitation projects totaling 1.01 MG of finished water storage were identified in the 2007 DWINS and were included in the OCWP study.

Distribution and Transmission Projects

Rehabilitation of a raw water transmission line, with a capacity of 1.01 mgd, was identified using the project list worksheet.

Many distribution projects were identified in the project list worksheet and the 2007 DWINS. Projects included rehabilitation and replacement of existing pipelines and installation of new pipelines to accommodate anticipated growth. Additionally, the 2007 DWINS identified some booster pump, air release, blow-off hydrants, and water meter replacement projects.

Other Projects

The 2007 DWINS identified telemetry controls, emergency power, and security projects that were included in the OCWP study under this infrastructure category.

8.2.2.2 Groundwater Providers

Eight medium providers are grouped in this category; five of these primarily purchase water. The City of Bernice was selected for cost modeling. Bernice participated in the 2008 OCWP.

Source Water Projects

One well rehabilitation project, for capacity of 0.13 mgd, was identified using the project list worksheet. Additional, new wells and well houses with a capacity of 0.98 mgd also were included in the OCWP study.

Treatment Projects

Groundwater treatment rehabilitation projects, for capacity of 0.99 mgd, were identified in the 2020 and 2060 periods using the project list worksheet.

Storage Projects

One finished water storage rehabilitation project, for capacity of 1.11 mgd, was identified using the project list worksheet.

Distribution and Transmission Projects

A combination of rehabilitation and new raw water transmission lines with a capacity of 1.11 mgd were identified using the project list worksheet.

Many distribution projects were identified in the project list worksheet. Projects included rehabilitation and replacement of existing pipelines and installation of new pipelines to accommodate anticipated growth. In addition, pumping project totaling 1.11 mgd was identified in the project list worksheet for inclusion in the OCWP study.

Other Projects

No projects were identified in this infrastructure category.

8.2.2.3 Summary

Table 8-3 presents the drinking water cost through 2060 of the Grand medium provider stratum by infrastructure type. Figure 8-1 illustrates the drinking water costs over time.

Table 8-3. Grand Region – Medium Water Providers Costs by Infrastructure Type

Period [A]	Distribution and Transmission (millions of 2007 dollars)	Treatment (millions of 2007 dollars)	Storage (millions of 2007 dollars)	Source (millions of 2007 dollars)	Other (millions of 2007 dollars)	Total Infrastructure Need (millions of 2007 dollars)
Present-2020	$182	$37	$9	$8	$1	$237
2021-2040	$558	$3	$1	$0	$0	$562
2041-2060	$341	$37	$0	$6	$0	$384
Total	$1,081	$77	$10	$14	$1	$1,183

[A] Small differences in values may result from rounding.

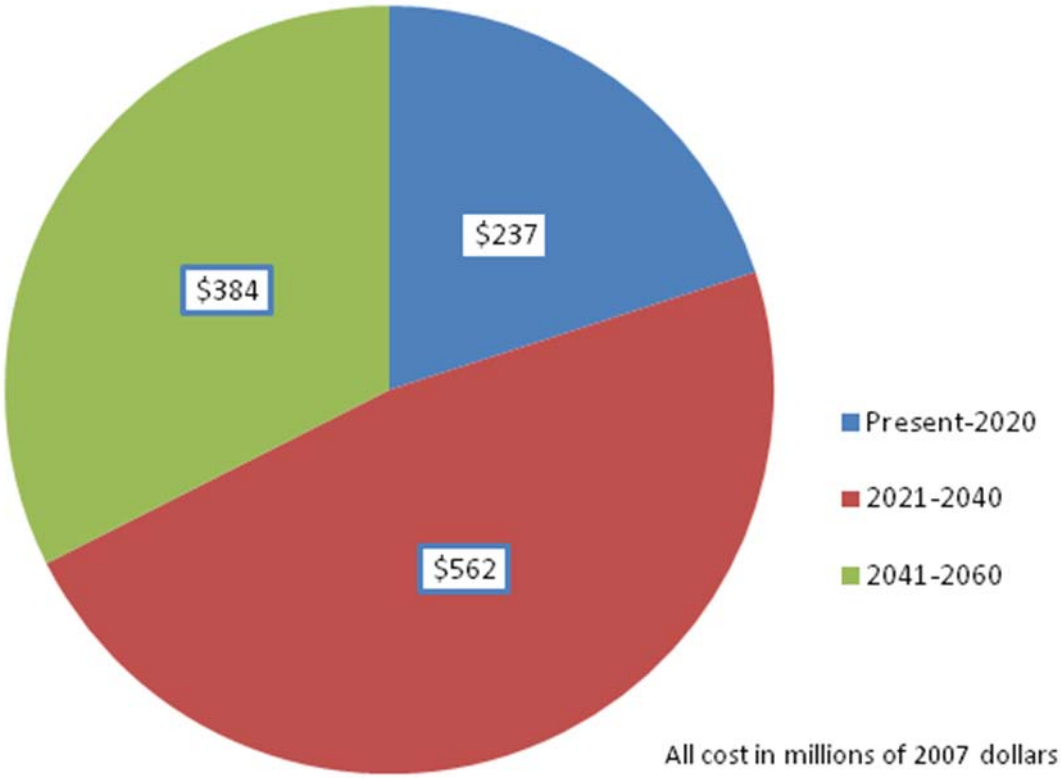

Figure 8-1. Grand Region – Medium Water Providers Costs Over Time

8.2.3 Grand – Small Water Providers

The Grand region has 44 small OCWP water providers. Information about each of these providers is shown in Table 8-4.

Table 8-4. Grand Region – Small OCWP Providers

SWDIS Identifier	Provider Name	County	Source Water Type [A]	Did they participate in 2007 DWINS?	Did they participate in 2008 OCWP survey?	Projected 2060 Population [B]	Were they selected for cost modeling?
OK1021603	Salina PWA	Mayes	SW	No	No	2,192	No
OK1021604	Langley	Mayes	SW	No	Yes	717	Yes
OK1021613	Adair	Mayes	SW	No	No	1,086	No
OK1021620	Hulbert PWA	Cherokee	SW	Yes	No	2,358	No
OK1021668	Locust Grove	Mayes	SW	No	Yes	2,469	No
OK1021696	Afton PWA	Ottawa	SW	No	Yes	1,916	No
OK1021711	Cherokee Co RWD # 2 (Keys)	Cherokee	SW	No	No	2,719	No
OK1021733	Cherokee Co RWD # 9	Cherokee	SW	Yes	No	274	No
OK1221615	Delaware Co RWD # 3	Delaware	SW	No	No	1,212	No

Table 8-4. Grand Region – Small OCWP Providers, continued

SWDIS Identifier	Provider Name	County	Source Water Type [A]	Did they participate in 2007 DWINS?	Did they participate in 2008 OCWP survey?	Projected 2060 Population [B]	Were they selected for cost modeling?
OK2000145	Adair Co RWS & SWMD #6	Adair	GW	No	No	52	No
OK2001801	Welch PWA	Craig	GW	No	Yes	2,005	Yes
OK2001802	Blue Jacket PWA	Craig	GW	No	Yes	447	No
OK2001807	Craig Co RWS & SWMD #3	Craig	GW	No	No	826	No
OK2002135	Kansas PWA	Delaware	GW	No	Yes	1,273	No
OK2002157	Colcord PWA	Delaware	GW	No	No	1,517	No
OK2002159	Oaks Water Works Inc	Delaware	GW	No	No	753	No
OK2005801	Ottawa Co RWD # 4	Ottawa	GW	No	No	897	No
OK2005804	Ottawa Co RWD # 2	Ottawa	GW	No	No	963	No
OK2005805	Ottawa Co RWD # 1	Ottawa	GW	No	No	630	No
OK2005806	Ottawa Co RWD # 3	Ottawa	GW	No	Yes	219	No
OK2005807	Cardin Water Service	Ottawa	GW	No	No	357	No
OK2005809	Fairland	Ottawa	GW	No	No	1,409	No
OK2005811	Quapaw	Ottawa	GW	No	Yes	1,371	No
OK2005812	Picher PWA	Ottawa	GW	No	Yes	2,267	No
OK2005840	Ottawa Co RWD #5	Ottawa	GW	No	No	1,032	No
OK2005859	Ottawa Co RWD #6	Ottawa	GW	No	No	552	No
OK2005860	Ottawa Co RWD #7	Ottawa	GW	No	No	688	No
OK3001801	Craig Co RWD #1	Craig	SWP	No	Yes	507	No
OK3001803	Craig Co RWD #4	Craig	SWP	No	No	148	No
OK3001804	Ironside Water District Inc	Craig	SWP	No	No	483	No
OK3001805	Big Cabin PWA	Craig	SWP	No	Yes	497	No
OK3001806	North Vinita Water Coop Inc	Craig	SWP	No	No	222	No
OK3002109	West Siloam Springs	Delaware	SWP	No	No	1,625	No
OK3002134	Delaware Co RWD # 1	Delaware	SWP	No	No	167	No

Table 8-4. Grand Region – Small OCWP Providers, continued

SWDIS Identifier	Provider Name	County	Source Water Type [A]	Did they participate in 2007 DWINS?	Did they participate in 2008 OCWP survey?	Projected 2060 Population [B]	Were they selected for cost modeling?
OK3002137	Delaware RWSG&SW MD #6	Delaware	SWP	No	No	802	No
OK3002138	Delaware Co RWD # 7	Delaware	SWP	No	No	743	No
OK3002144	Delaware Co RWD #9	Delaware	SWP	No	Yes	1,560	No
OK3004609	Pryor East RWD #1	Mayes	SWP	No	No	193	No
OK3004610	Highway 69 Water District	Mayes	SWP	No	Yes	155	No
OK3004615	Chouteau	Mayes	SWP	No	Yes	2,981	No
OK3004627	Mayes Co RWD # 7	Mayes	SWP	No	No	657	No
OK3004637	Mayes Co RWD # 8	Mayes	SWP	No	No	695	No
OK3005801	North Miami	Ottawa	GWP	No	No	599	No
OK6002158	Delaware Co RWD #10	Delaware	GW	No	Yes	2,599	No
OK1021603	Salina PWA	Mayes	SW	No	No	2,192	No

[A] SW – Surface Water, GW – Groundwater, P – Purchased Water, GU – Groundwater Under Direct Influence of Surface Water. Systems are classified as surface water if they have at least one source that is surface water or groundwater under the direct influence of surface water (SW and GW designations). Systems are classified as groundwater if they do not meet surface water definition or if their primary source of water is purchased from another provider (GW, SWP, and GWP designations).

[B] Population based on 2060 projection (see Water Demand Forecast Report for more details on projections).

8.2.3.1 Surface Water Providers

There are nine small surface water providers in the Grand region. The City of Langley participated in the 2008 OCWP survey. Using the methodology described in Section 2.2, a project list was created.

Source Water Projects

Using the project list worksheet, one surface water intake rehabilitation projects was included in the OCWP study.

Treatment Projects

Using the project list worksheet, a new 0.10-mgd WTP rehabilitation projects in 2040 was included in the OCWP study.

Storage Projects

Using the project list worksheet, rehabilitation of 0.01 MG of finished water storage tank was included in the OCWP study.

Distribution and Transmission Projects

Rehabilitation of a 0.10-mgd raw water transmission line was identified using the project list worksheet.

Many distribution projects were identified in the project list worksheet. Projects included rehabilitation and replacement of existing pipelines and installation of new pipelines to accommodate anticipated growth.

Other Projects

No projects were identified in this infrastructure category.

8.2.3.2 Groundwater Providers

There are 35 small providers in this category; 16 of these primarily purchase water. Welch PWA was selected for cost modeling. Welch PWA participated in the 2008 OCWP survey. Using the methodology described in Section 2.2, a project list was created.

Source Water Projects

One well rehabilitation project, for capacity of 0.07 mgd, was identified using the project list worksheet. Additional, new wells and well houses with a capacity of 0.10 mgd also were included in the OCWP study.

Treatment Projects

Using the project list worksheet, rehabilitation of Welch's existing 0.25-mgd direct filtration WTP was included in the OCWP study.

Storage Projects

Using the project list worksheet, rehabilitation of 0.025 MG of finished water storage tank was included in the OCWP study.

Distribution and Transmission Projects

Rehabilitation of one raw water transmission line with a capacity of 0.25 mgd was identified using the project list worksheet.

Many distribution projects were identified in the project list worksheet. Projects included rehabilitation and replacement of existing pipelines and installation of new pipelines to accommodate anticipated growth. In addition, a 0.25-mgd pumping project was included in the OCWP study.

Other Projects

No projects were identified in this infrastructure category.

8.2.3.3 Summary

Table 8-5 presents the drinking water cost through 2060 of the Grand small provider stratum by infrastructure type. Figure 8-2 illustrates the drinking water costs over time.

Table 8-5. Grand Region – Small Water Providers Costs by Infrastructure Type

Period [A]	Distribution and Transmission (millions of 2007 dollars)	Treatment (millions of 2007 dollars)	Storage (millions of 2007 dollars)	Source (millions of 2007 dollars)	Other (millions of 2007 dollars)	Total Infrastructure Need (millions of 2007 dollars)
Present-2020	$277	$0	$0	$0	$0	$277
2021-2040	$400	$45	$2	$3	$0	$450
2041-2060	$101	$0	$0	$7	$0	$108
Total	$778	$45	$2	$10	$0	$835

[A] Small differences in values may result from rounding.

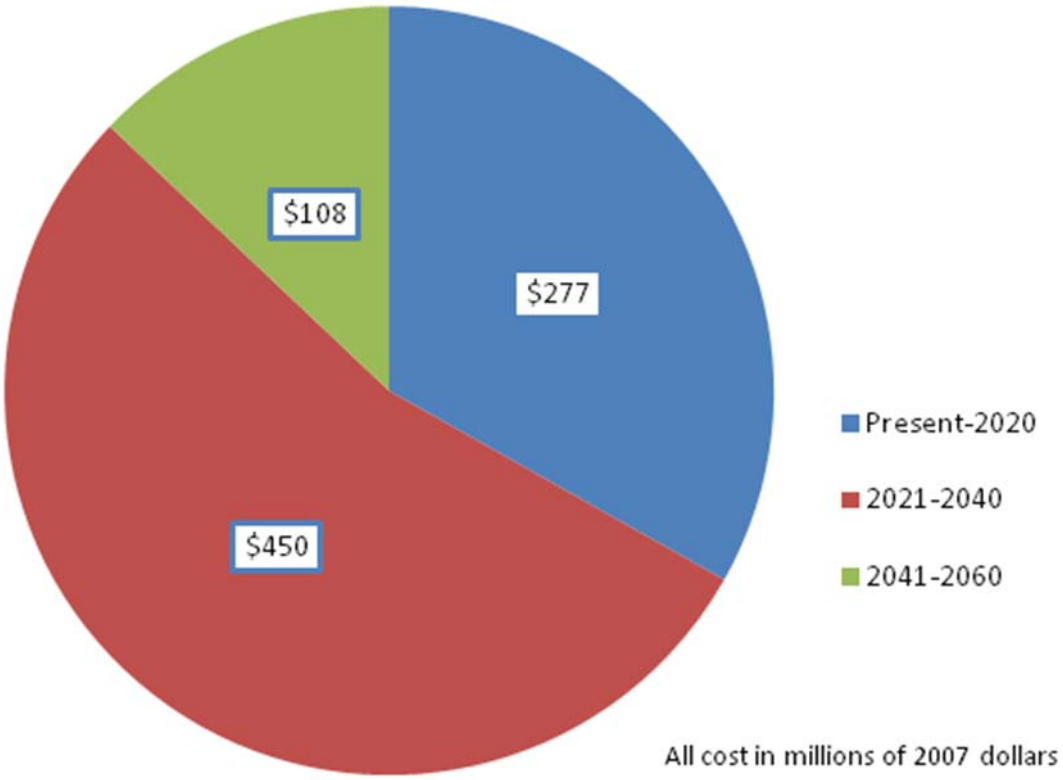

Figure 8-2. Grand Region – Small Water Providers Costs Over Time

8.3 Grand – Regional Major Reservoir Projects

There are seven major reservoirs in the Grand region. Table 8-6 identifies the reservoirs and project size.

Table 8-6. Grand Region – Major Reservoir Rehabilitation Projects

Reservoir Name	Storage Considered for Rehabilitation [A] (AF)	Project Year
Fort Gibson Lake	0	2060
Grand Lake O' The Cherokees	0	2040
Lake Eucha	110,200	2060
Lake Hudson	0	2060
Spavinaw Lake	25,725	2040
W.R. Holway Reservoir	50,372	2080

[A] The amount of storage for rehabilitation is based on the municipal water supply storage. If unknown, the full normal pool storage was used. Reservoirs with no designated municipal water supply storage were included in the study but show zero in the rehabilitation column

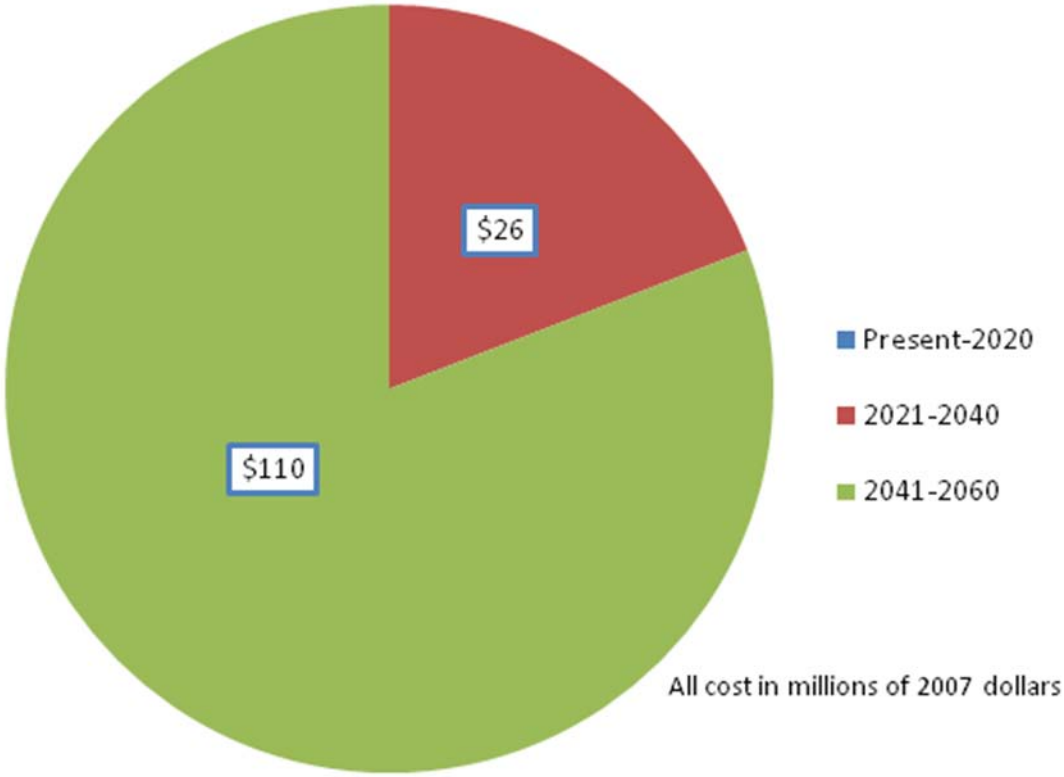

Figure 8-3. Grand Region – Major Reservoir Rehabilitation Costs Over Time

8.4 Grand – Regional Cost Summary

This section presents the Grand regional drinking water infrastructure costs over the next 50 years. Table 8-7 identifies costs by provider size and project year. Source projects and distribution and transmission projects make up the majority of the infrastructure costs, approximately 86 percent, of drinking water infrastructure costs in the region. Medium providers have the largest overall drinking water infrastructure costs. The largest infrastructure costs occur in the 2021-2040 period.

Table 8-7 Grand Region – Drinking Water Infrastructure Cost Summary

Category [A, C]	Potential Funding Source [B]	Present - 2020 Infrastructure Need (millions of 2007 dollars)	2021-2040 Infrastructure Need (millions of 2007 dollars)	2041-2060 Infrastructure Need (millions of 2007 dollars)	Total Period Infrastructure Need (millions of 2007 dollars)
Small	DWSRF Eligible	$277	$450	$109	$836
	Non-DWSRF Eligible	$0	$0	$0	$0
Small Subtotal		$277	$450	$109	$836
Medium	DWSRF Eligible	$234	$557	$378	$1,169
	Non-DWSRF Eligible	$3	$5	$5	$13
Medium Subtotal		$237	$562	$383	$1,182
Large	DWSRF Eligible	$0	$0	$0	$0
	Non-DWSRF Eligible	$0	$0	$0	$0
Large Subtotal		$0	$0	$0	$0
Reservoir	DWSRF Eligible	$0	$0	$0	$0
	Non-DWSRF Eligible	$0	$26	$110	$136
Reservoir Subtotal		$0	$26	$110	$136
Total		$514	$1,038	$602	$2,154

[A] See Table 8-1 for more information on provider size. The "reservoir" category includes all regional reservoir rehabilitation projects.
[B] This study assumes that distribution projects for new growth and all reservoir projects are non-DWSRF eligible. All other projects were assumed to be DWSRF eligible.
[C] Small differences in values may result from rounding.

Section 9
Lower Arkansas Regional Infrastructure Costs

This section provides some general information about the Lower Arkansas region, identifies water providers selected for modeling and their project lists, and provides a cost summary for this region.

9.1 Lower Arkansas – Regional Description

The Lower Arkansas Watershed Planning Region is a 4,657-square-mile area including all or portions of Delaware, Cherokee, Adair, Muskogee, Sequoyah, Pittsburg, Haskell, LeFlore, McIntosh, and Latimer Counties. There are 77 OCWP providers in this region. OCWP providers are those included in the 2008 OCWP survey and for which water demand projections were created. Table 9-1 shows the number of Lower Arkansas water providers by stratum.

Table 9-1. Lower Arkansas Region – Number of OCWP Providers by Stratum

Provider Size	Population [A]	Surface Water [B]	Groundwater [C]	Total
Large	>100,000	0	0	0
Medium	3,301 – 100,000	15	13	28
Small	<3,300	11	39	50
Total		**26**	**52**	**78**

[A] Population classification was based on 2060 projection (see *Water Demand Forecast Report* for more details on projections).

[B] Systems were classified as surface water if they have at least one source that is surface water or groundwater under the direct influence of surface water.

[C] Systems were classified as groundwater if they do not meet surface water definition or if their primary source of water is purchased from another provider.

9.2 Lower Arkansas – Developing Project Lists

Three providers were used for cost modeling. The following sections discuss the project lists for each of these providers.

9.2.1 Lower Arkansas – Large Water Providers

The Lower Arkansas region has no large OCWP providers.

9.2.2 Lower Arkansas – Medium Water Providers

The Lower Arkansas region has 28 medium OCWP water providers. Information about each of these providers is shown in Table 9-2.

Table 9-2. Lower Arkansas Region – Medium OCWP Providers

SWDIS Identifier	Provider Name	County	Source Water Type [A]	Did they participate in 2007 DWINS?	Did they participate in 2008 OCWP survey?	Projected 2060 Population [B]	Were they selected for cost modeling?
OK1020101	Heavener Utility Auth/PSG	Leflore	SW	No	Yes	4,510	No
OK1020103	Wilburton	Latimer	SW	No	Yes	3,971	No
OK1020104	Pvia	Leflore	SW	No	Yes	5,280	No
OK1020205	Stilwell	Adair	SW	No	Yes	6,357	No
OK1020206	Sallisaw	Sequoyah	SW	Yes	Yes	13,089	Yes
OK1020208	Muldrow PWA	Sequoyah	SW	No	No	4,843	No
OK1020210	Sequoyah County Water Assoc	Sequoyah	SW	No	Yes	22,228	No
OK1020212	Roland	Sequoyah	SW	Yes	Yes	4,850	No
OK1020301	Haskell County Water Company	Haskell	SW	No	Yes	10,444	No
OK1020303	Stigler	Haskell	SW	No	Yes	5,208	No
OK1020515	Checotah	McIntosh	SW	No	Yes	6,119	No
OK1021607	Muskogee	Muskogee	SW	No	Yes	41,432	No
OK1021622	Fort Gibson	Muskogee	SW	No	Yes	4,954	No
OK1021701	Tahlequah PWA	Cherokee	SW	Yes	Yes	28,107	No
OK1021721	Cherokee Co RWD #13	Cherokee	SW	No	Yes	4,562	No
OK3000104	Adair Co RWD #1 (Cherry Tree)	Adair	SWP	No	No	3,854	No
OK3000106	Adair Co RWD #3	Adair	SWP	No	Yes	7,323	No
OK3000109	Westville	Adair	SWP	No	Yes	3,477	No
OK3003904	Latimer County RWD #1	Latimer	SWP	No	Yes	4,195	No
OK3004001	Leflore Co RWD # 14	Leflore	SWP	No	No	8,341	No
OK3004005	Spiro East RW	Leflore	SWP	No	Yes	4,975	No
OK3004007	Leflore Co RWD # 2	Leflore	SWP	Yes	Yes	5,005	No
OK3004009	Water Dist Inc	Leflore	SWP	No	Yes	5,700	No
OK3004015	Poteau PWA	Leflore	SWP	No	Yes	11,039	No

Table 9-2. Lower Arkansas Region – Medium OCWP Providers, continued

SWDIS Identifier	Provider Name	County	Source Water Type [A]	Did they participate in 2007 DWINS?	Did they participate in 2008 OCWP survey?	Projected 2060 Population [B]	Were they selected for cost modeling?
OK3005107	Muskogee Co RWD # 5	Muskogee	SWP	No	No	4,597	No
OK3006806	Sequoyah Co RWD #7	Sequoyah	SWP	No	Yes	4,599	No
OK3006815	Sequoyah Co RWD #5	Sequoyah	SWP	No	Yes	3,744	No
OK4001117	Grandview RWD #3	Cherokee	SWP	No	Yes	7,076	No

[A] SW – Surface Water, GW – Groundwater, P – Purchased Water, GU – Groundwater Under Direct Influence of Surface Water. Systems are classified as surface water if they have at least one source that is surface water or groundwater under the direct influence of surface water (SW and GW designations). Systems are classified as groundwater if they do not meet surface water definition or if their primary source of water is purchased from another provider (GW, SWP, and GWP designations).

[B] Population based on 2060 projection (see Water Demand Forecast Report for more details on projections).

9.2.2.1 Surface Water Providers

There are 15 medium surface water providers in the Lower Arkansas region. The City of Sallisaw participated in the 2007 DWINS and 2008 OCWP survey and was selected for cost modeling. Using the methodology described in Section 2.2, a project list was created.

Source Water Projects

Using the project list worksheet, one surface water intake rehabilitation project for Brushy Lake was included in the OCWP study.

Treatment Projects

Rehabilitation projects for the 2.7-mgd WTP in 2020 and 2060 were included in the OCWP study. Additionally, a 3.3-mgd WTP rehabilitation project was included in 2040 period.

Storage Projects

Rehabilitation projects totaling 2.75 MG of finished water storage were identified in the 2007 DWINS and were included in the OCWP study.

Distribution and Transmission Projects

A combination of new and rehabilitation of raw water transmission lines with a total capacity of 6.0 mgd were identified using the project list worksheet.

Many distribution projects were identified in the project list worksheet and the 2007 DWINS. Projects included rehabilitation and replacement of existing pipelines and installation of new pipelines to accommodate anticipated growth. Additionally, the 2007 DWINS identified some flushing hydrants and water meter replacement projects.

Other Projects

No projects were identified in this infrastructure category.

9.2.2.2 Groundwater Providers

There are 13 medium providers grouped in this category because they primarily purchase water. However, since there was not a provider suitable for cost modeling, the Grand region was used to estimate the cost for this stratum.

9.2.2.3 Summary

Table 9-3 presents the drinking water cost through 2060 of the Lower Arkansas medium provider stratum by infrastructure type. Figure 9-1 illustrates the drinking water costs over time.

Table 9-3. Lower Arkansas Region – Medium Water Providers Costs by Infrastructure Type

Period [A]	Distribution and Transmission (millions of 2007 dollars)	Treatment (millions of 2007 dollars)	Storage (millions of 2007 dollars)	Source (millions of 2007 dollars)	Other (millions of 2007 dollars)	Total Infrastructure Need (millions of 2007 dollars)
Present-2020	$220	$104	$14	$19	$0	$357
2021-2040	$282	$125	$2	$0	$0	$409
2041-2060	$492	$104	$0	$9	$0	$605
Total	$994	$333	$16	$28	$0	$1,371

[A] Small differences in values may result from rounding.

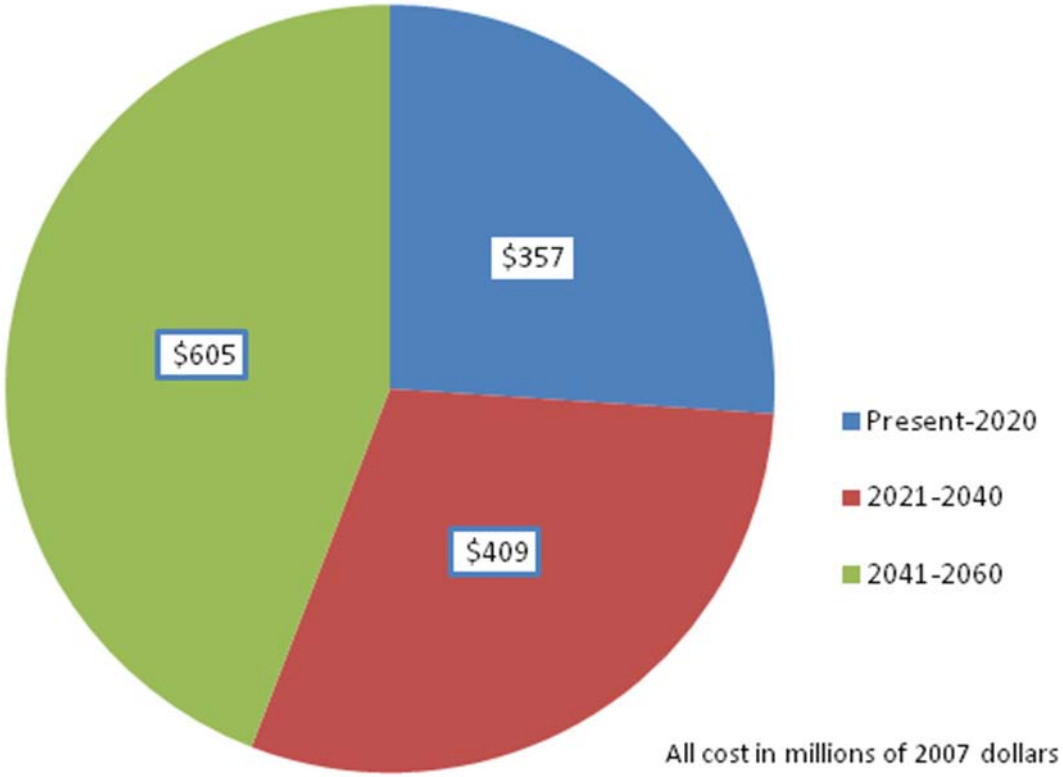

Figure 9-1. Lower Arkansas Region – Medium Water Providers Costs Over Time

9.2.3 Lower Arkansas – Small Water Providers

The Lower Arkansas region has 49 small OCWP water providers. Information about each of these providers is shown in Table 9-4.

Table 9-4. Lower Arkansas Region – Small OCWP Providers

SWDIS Identifier	Provider Name	County	Source Water Type [A]	Did they participate in 2007 DWINS?	Did they participate in 2008 OCWP survey?	Projected 2060 Population [B]	Were they selected for cost modeling?
OK1020105	Red Oak PWA	Latimer	SW	No	No	763	No
OK1020106	Spiro	Leflore	SW	No	Yes	3,132	No
OK1020110	Latimer Co RWD #4	Latimer	SW	No	Yes	684	No
OK1020302	Porum PWA	Muskogee	SW	No	Yes	837	No
OK1020409	Warner	Muskogee	SW	No	Yes	1,661	No
OK1020535	McIntosh Co RWS & SWMD #2 (Onapa)	McIntosh	SW	No	Yes	1,679	Yes
OK1021621	Cherokee Co RWD # 1 (Ft Gibson)	Cherokee	SW	No	No	710	No
OK1021713	East Central Okla Water Auth	Sequoyah	SW	No	No	1,410	No
OK1021763	Burnt Cabin RWD	Cherokee	SW	No	Yes	493	No
OK1021770	Adair Co RWD #5	Adair	SW	No	No	1,301	No
OK1021773	Gore PWA	Sequoyah	SW	No	Yes	2,817	No
OK2001189	Cherokee Co RWD #12	Cherokee	GW	No	Yes	162	No
OK2005104	Braggs Water Works	Muskogee	GW	No	Yes	1,197	Yes
OK3000105	Adair Co RWD #2	Adair	SWP	No	No	1,677	No
OK3000107	Adair Co RWD #4	Adair	SWP	No	No	1,975	No
OK3000108	Watts	Adair	GUP	No	Yes	2,125	No
OK3001118	Cherokee Co RWD # 8 (Briggs)	Cherokee	SWP	No	Yes	730	No
OK3001126	Cherokee Co RWD # 7 (Welling)	Cherokee	SWP	No	No	1,058	No
OK3003101	McCurtain	Haskell	SWP	No	Yes	1,017	No
OK3003112	Keota PWA	Haskell	SWP	No	Yes	917	No

Table 9-4. Lower Arkansas Region – Small OCWP Providers, continued

SWDIS Identifier	Provider Name	County	Source Water Type [A]	Did they participate in 2007 DWINS?	Did they participate in 2008 OCWP survey?	Projected 2060 Population [B]	Were they selected for cost modeling?
OK3003908	Latimer RWD #3	Latimer	SWP	No	Yes	175	No
OK3004003	Leflore Co RWD # 1	Leflore	SWP	No	Yes	2,391	No
OK3004004	Leflore Co RWD # 4	Leflore	SWP	No	Yes	848	No
OK3004006	Leflore Co RWD # 3	Leflore	SWP	No	Yes	174	No
OK3004010	Leflore Co RWD # 5	Leflore	SWP	No	No	2,215	No
OK3004011	Cameron PWA	Leflore	SWP	No	Yes	438	No
OK3004012	Bokoshe PWA	Leflore	SWP	No	No	625	No
OK3004013	Arkoma	Leflore	SWP	No	Yes	3,038	No
OK3004014	Wister	Leflore	SWP	No	Yes	1,391	No
OK3004016	Panama PWA	Leflore	SWP	No	Yes	1,893	No
OK3004040	Consolidated RWD #1 Leflore Co	Leflore	SWP	No	No	2,502	No
OK3004046	Leflore Co RWD # 15	Leflore	SWP	No	Yes	482	No
OK3004048	Leflore Co RWD #17	Leflore	SWP	No	No	598	No
OK3004907	McIntosh Co RWS & SWMD #9	McIntosh	SWP	No	Yes	2,497	No
OK3004916	McIntosh Co RWD #1	McIntosh	SWP	No	No	608	No
OK3004920	McIntosh Co RWD #7	McIntosh	SWP	No	No	353	No
OK3004939	McIntosh Co RWD #5	McIntosh	SWP	No	Yes	2,645	No
OK3005102	Muskogee Co RWD # 2 (Gooseneck)	Muskogee	SWP	No	No	1,154	No
OK3005103	Muskogee Co RWD # 7	Muskogee	SWP	No	No	1,973	No
OK3005104	Muskogee Co RWD # 4	Muskogee	SWP	No	Yes	986	No
OK3005105	Muskogee Co RWD # 6	Muskogee	SWP	No	Yes	1,644	No
OK3005106	Muskogee Co RWD # 1 (Oktaha)	Muskogee	SWP	No	No	444	No
OK3005117	Muskogee Co RWD # 8	Muskogee	SWP	No	Yes	231	No
OK3005119	Muskogee Co RWD # 9	Muskogee	SWP	No	No	346	No

Table 9-4. Lower Arkansas Region – Small OCWP Providers, continued

SWDIS Identifier	Provider Name	County	Source Water Type [A]	Did they participate in 2007 DWINS?	Did they participate in 2008 OCWP survey?	Projected 2060 Population [B]	Were they selected for cost modeling?
OK3006123	Quinton	Pittsburg	SWP	No	Yes	1,349	No
OK3006802	Gans Util Auth	Sequoyah	SWP	No	Yes	977	No
OK3006804	Sequoyah Co RWD #3	Sequoyah	SWP	No	No	1,622	No
OK3006809	Sequoyah Co RWD #4	Sequoyah	SWP	No	No	1,802	No
OK3006812	Vian	Sequoyah	SWP	No	Yes	2,124	No
OK3006820	Lee Creek RWD	Sequoyah	SWP	No	No	390	No

[A] SW – Surface Water, GW – Groundwater, P – Purchased Water, GU – Groundwater Under Direct Influence of Surface Water. Systems are classified as surface water if they have at least one source that is surface water or groundwater under the direct influence of surface water (SW and GW designations). Systems are classified as groundwater if they do not meet surface water definition or if their primary source of water is purchased from another provider (GW, SWP, and GWP designations).

[B] Population based on 2060 projection (see Water Demand Forecast Report for more details on projections).

9.2.3.1 Surface Water Providers

There are 11 small surface water providers in the Lower Arkansas region. McIntosh County RWS & SWMD #2 (Onapa) participated in the 2008 OCWP survey and was selected for cost modeling. Using the methodology described in Section 2.2, a project list was created.

Source Water Projects

Using the project list worksheet, one surface water intake rehabilitation project for Eufaula Lake was included in the OCWP study.

Treatment Projects

Using the project list worksheet, rehabilitation of 1,008-mgd direct filtration WTP was included in the OCWP study during the 2040 period.

Storage Projects

Using the project list worksheet, rehabilitation of finished water storage tank for 0.10 MG was included in the OCWP study.

Distribution and Transmission Projects

A rehabilitation of a 1.152-mgd raw water transmission line was identified using the project list worksheet.

Many distribution projects were identified in the project list worksheet. Projects included rehabilitation and replacement of existing pipelines and installation of new pipelines to accommodate anticipated growth.

Other Projects

No projects were identified in this infrastructure category.

9.2.3.2 Groundwater Providers

There are 38 small providers in this category; 36 of these primarily purchase water. Braggs Water Works was selected for cost modeling. Braggs participated in the 2008 OCWP survey. Using the methodology described in Section 2.2, a project list was created.

Source Water Projects

Using the project list worksheet, a well rehabilitation project for 0.09 mgd was included in the OCWP study. The project date was based on the average age of Braggs' existing wells.

Treatment Projects

Using the project list worksheet, a 0.331-mgd conventional WTP, based on Braggs' existing method of treatment, was included in the OCWP study.

Storage Projects

Using the project list worksheet, rehabilitation of 0.033 MG of finished water storage tank was included in the OCWP study.

Distribution and Transmission Projects

Rehabilitation of one raw water transmission line with a capacity of 0.331 mgd was identified using the project list worksheet.

Many distribution projects were identified in the project list worksheet. Projects included rehabilitation and replacement of existing pipelines and installation of new pipelines to accommodate anticipated growth. In addition, a 0.331-mgd pumping project was included in the OCWP study.

Other Projects

No projects were identified in this infrastructure category.

9.2.3.3 Summary

Table 9-5 presents the drinking water cost through 2060 of the Lower Arkansas small provider stratum by infrastructure type. Figure 9-2 illustrates the drinking water costs over time.

Table 9-5. Lower Arkansas Region – Small Water Providers Costs by Infrastructure Type

Period [A]	Distribution and Transmission (millions of 2007 dollars)	Treatment (millions of 2007 dollars)	Storage (millions of 2007 dollars)	Source (millions of 2007 dollars)	Other (millions of 2007 dollars)	Total Infrastructure Need (millions of 2007 dollars)
Present-2020	$79	$0	$0	$6	$0	$85
2021-2040	$157	$14	$4	$0	$0	$175
2041-2060	$727	$0	$0	$0	$0	$727
Total	$963	$14	$4	$6	$0	$987

[A] Small differences in values may result from rounding.

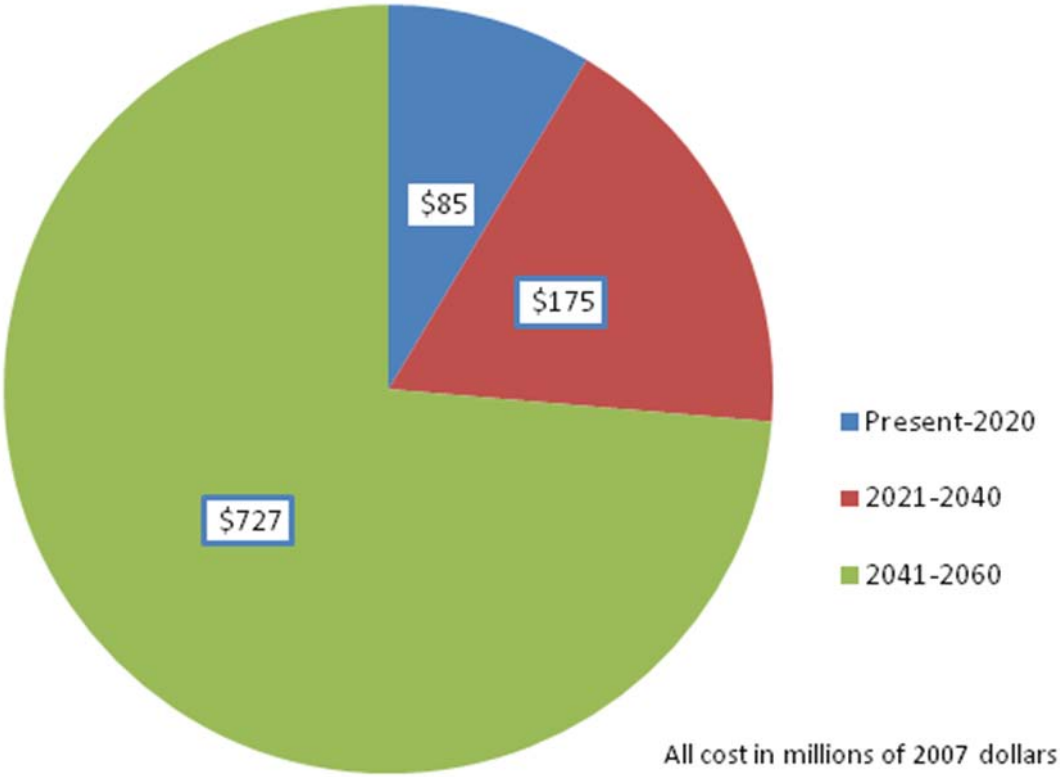

Figure 9-2. Lower Arkansas Region – Small Water Providers Costs Over Time

9.3 Lower Arkansas – Regional Major Reservoir Projects

There are 10 major reservoirs in the Lower Arkansas region. Table 9-6 identifies the reservoirs and project size. Figure 9-3 illustrates project cost over time.

Table 9-6. Lower Arkansas Region – Major Reservoir Rehabilitation Projects

Reservoir Name	Storage Considered for Rehabilitation [A] (AF)	Project Year
Brushy Lake	3,258	2080
John Wells Lake	1,352	2040
Lake Wayne Wallace	1,746	2080
Lloyd Church Lake	3,025	2080
New Spiro Lake	2,160	2060
Robert S Kerr Reservoir	0	2080
Stillwell City Lake	3,110	2080
Tenkiller Ferry Lake	25,400	2060
Webbers Falls Reservoir	0	2080
Wister Lake	14,000	2060

[A] The amount of storage for rehabilitation is based on the municipal water supply storage. If unknown, the full normal pool storage was used. Reservoirs with no designated municipal water supply storage were included in the study but show zero in the rehabilitation column

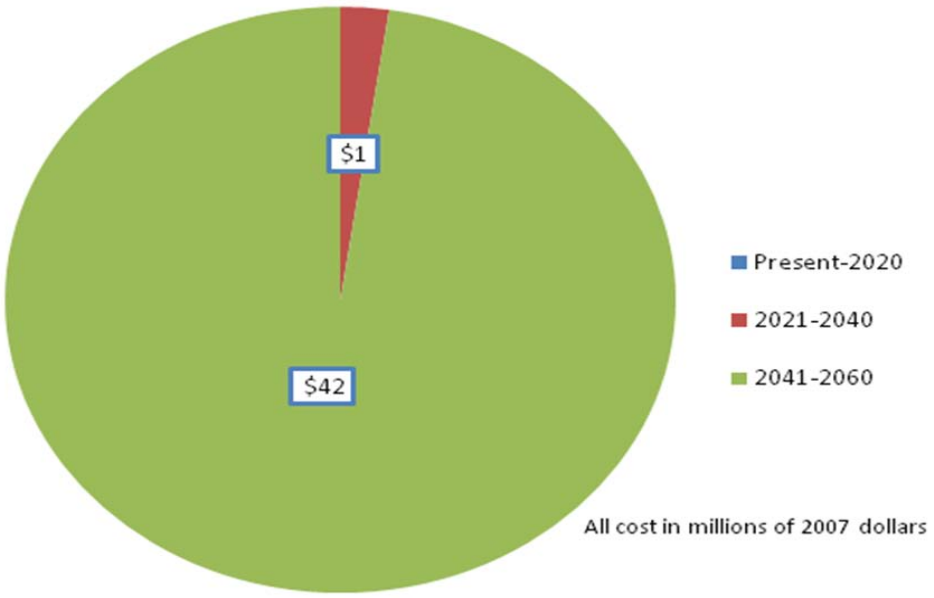

Figure 9-3. Lower Arkansas Region – Major Reservoir Rehabilitation Costs Over Time

9.4 Lower Arkansas – Regional Cost Summary

This section presents the Lower Arkansas regional drinking water infrastructure costs over the next 50 years. Table 9-7 identifies costs by provider size and project year. Distribution and transmission projects make up the majority of the infrastructure costs, nearly 82 percent, of drinking water infrastructure costs in the region. Water treatment projects are distant second making up nearly 15 percent. Medium providers have the largest overall drinking water infrastructure costs. The largest infrastructure costs occur in the 2041-2060 period.

Table 9-7 Lower Arkansas Region – Drinking Water Infrastructure Cost Summary

Category [A, C]	Potential Funding Source [B]	Present - 2020 Infrastructure Need (millions of 2007 dollars)	2021-2040 Infrastructure Need (millions of 2007 dollars)	2041-2060 Infrastructure Need (millions of 2007 dollars)	Total Period Infrastructure Need (millions of 2007 dollars)
Small	DWSRF Eligible	$84	$173	$725	$982
	Non-DWSRF Eligible	$1	$2	$2	$5
Small Subtotal		$85	$175	$727	$987
Medium	DWSRF Eligible	$354	$403	$600	$1,357
	Non-DWSRF Eligible	$3	$5	$5	$13
Medium Subtotal		$357	$408	$605	$1,370
Large	DWSRF Eligible	$0	$0	$0	$0
	Non-DWSRF Eligible	$0	$0	$0	$0
Large Subtotal		$0	$0	$0	$0
Reservoir	DWSRF Eligible	$0	$0	$0	$0
	Non-DWSRF Eligible	$0	$1	$42	$43
Reservoir Subtotal		$0	$1	$42	$43
Total		$442	$584	$1,374	$2,400

[A] See Table 9-1 for more information on provider size. The "reservoir" category includes all regional reservoir rehabilitation projects.

[B] This study assumes that distribution projects for new growth and all reservoir projects are non-DWSRF eligible. All other projects were assumed to be DWSRF eligible.

[C] Small differences in values may result from rounding.

Section 10
Lower Washita Regional Infrastructure Costs

This section provides some general information about the Lower Washita region, identifies water providers selected for modeling and their project lists, and provides a cost summary for this region.

10.1 Lower Washita –Regional Description

The Lower Washita Watershed Planning Region is a 6,192-square-mile area including all or portions of Grady, Stephens, Garvin, Murray, Pontotoc, Jefferson, Carter, Love, Johnston, Bryan, Caddo, Canadian, Comanche, McClain, and Marshall Counties. There are 67 OCWP providers in this region. OCWP providers are those included in the 2008 OCWP survey and for which water demand projections were created. Table 10-1 shows the number of Lower Washita water providers by stratum.

Table 10-1. Lower Washita Region – Number of OCWP Providers by Stratum

Provider Size	Population [A]	Surface Water [B]	Groundwater [C]	Total
Large	>100,000	0	0	0
Medium	3,301 – 100,000	12	13	25
Small	<3,300	4	38	42
Total		**16**	**51**	**67**

[A] Population classification was based on 2060 projection (see *Water Demand Forecast Report* for more details on projections).

[B] Systems were classified as surface water if they have at least one source that is surface water or groundwater under the direct influence of surface water.

[C] Systems were classified as groundwater if they do not meet surface water definition or if their primary source of water is purchased from another provider.

10.2 Lower Washita – Developing Project Lists

Five providers were used for cost modeling. The following sections discuss the project lists for each of these providers.

10.2.1 Lower Washita – Large Water Providers

The Lower Washita region has no large OCWP providers.

10.2.2 Lower Washita – Medium Water Providers

The Lower Washita region has 25 medium OCWP water providers. Information about each of these providers is shown in Table 10-2.

Table 10-2. Lower Washita Region – Medium OCWP Providers

SWDIS Identifier	Provider Name	County	Source Water Type [A]	Did they participate in 2007 DWINS?	Did they participate in 2008 OCWP survey?	Projected 2060 Population [B]	Were they selected for cost modeling?
OK1010604	Bryan County RWS & SWMD#2	Bryan	SW	No	Yes	11,856	No
OK1010806	Anadarko WTP	Caddo	SW	No	Yes	8,030	No
OK1010808	Pauls Valley	Garvin	SW	No	Yes	6,828	No
OK1010809	Duncan	Stephens	SW	Yes	Yes	24,070	No
OK1010814	Ardmore	Carter	SW	Yes	Yes	32,340	No
OK1010815	Tishomingo WTP	Johnston	SW	No	Yes	5,351	No
OK1010820	Madill	Marshall	SW	No	Yes	8,149	No
OK1010821	Chickasha	Grady	SW	Yes	Yes	21,031	Yes
OK1010822	Davis	Murray	SW	No	Yes	4,930	No
OK1010830	Southern Okla Water Corp	Carter	SW	No	Yes	15,741	No
OK1010848	Marshall County Water Corp	Marshall	SW	No	Yes	33,191	No
OK1011102	Healdton	Carter	SW	No	Yes	3,758	No
OK2001007	Lone Grove	Carter	GW	No	Yes	5,061	No
OK2002501	Lindsay PWA	Garvin	GW	No	Yes	3,332	No
OK2002633	Grady Co RWD #7 (Ninnekah)	Grady	GW	No	Yes	3,775	No
OK2003511	Johnston Co RWD #3	Johnston	GW	No	Yes	4,421	No
OK2004301	Marietta PWA	Love	GW	No	Yes	9,269	No
OK2004303	Thackerville	Love	GW	No	Yes	13,056	Dist. Only
OK2004501	Kingston PWA	Marshall	GW	No	Yes	3,324	No
OK2004711	McClain Co RWD # 8	McClain	GW	No	Yes	4,349	No
OK2005001	Sulphur	Murray	GW	No	Yes	7,703	No
OK2005012	Murray Co RWD # 1	Murray	GW	Yes	Yes	6,778	Yes
OK2006907	Marlow PWA	Stephens	GW	No	Yes	5,137	Yes
OK2006969	Stephens Co RWD #5	Stephens	GW	No	Yes	3,888	No
OK3002603	Grady Co RWD #6	Grady	SWP	No	Yes	4,427	No

[A] SW – Surface Water, GW – Groundwater, P – Purchased Water, GU – Groundwater Under Direct Influence of Surface Water. Systems are classified as surface water if they have at least one source that is surface water or groundwater under the direct influence of surface water (SW and GW designations). Systems are classified as groundwater if they do not meet surface water definition or if their primary source of water is purchased from another provider (GW, SWP, and GWP designations).

[B] Population based on 2060 projection (see Water Demand Forecast Report for more details on projections).

10.2.2.1 Surface Water Providers

There are 12 medium surface water providers in the Lower Washita region. The City of Chickasha participated in the 2007 DWINS and 2008 OCWP survey and was selected for cost modeling. Using the methodology described in Section 2.2, a project list was created.

Source Water Projects

Using the project list worksheet, one surface water intake rehabilitation project for Fort Cobb Reservoir was included in the OCWP study.

Treatment Projects

A 7-mgd WTP rehabilitation project was identified in the 2007 DWINS. Using the project list worksheet, rehabilitation of 7-mgd WTP in 2060 also was included in the OCWP study.

Storage Projects

Rehabilitation projects totaling 5 MG of finished water storage were identified in the 2007 DWINS and were included in the OCWP study.

Distribution and Transmission Projects

Rehabilitation of one raw water transmission line, with a total capacity of 7.2 mgd, was identified using the project list worksheet.

Many distribution projects were identified in the project list worksheet and the 2007 DWINS. Projects included rehabilitation and replacement of existing pipelines and installation of new pipelines to accommodate anticipated growth. Additionally, the 2007 DWINS identified some booster pump and water meter replacement projects.

Other Projects

No projects were identified in this infrastructure category.

10.2.2.2 Groundwater Providers

Thirteen medium providers are grouped in this category; only one of these primarily purchases water. Murray County RWD #1 and Marlow PWA were selected for cost modeling. Two providers were selected to represent the average Lower Washita medium groundwater provider. Murray County RWD #1 participated in the 2007 DWINS and 2008 OCWP. Marlow PWA participated in the 2008 OCWP.

Source Water Projects – Murray County RWD #1

Two well rehabilitation projects, each for capacity of 0.86 mgd, were identified in the 2007 DWINS. An additional well rehabilitation project, for 0.86 mgd, was identified using the project list worksheet.

Treatment Projects – Murray County RWD #1

Two chlorination treatment rehabilitation projects were identified in the 2007 DWINS. Additional rehabilitation projects for these projects were included in the 2060 period for this OCWP study.

Storage Projects – Murray County RWD #1

As part of the 2007 DWINS, rehabilitation of over 1.6 MG of finished water storage projects were identified and are included in the OCWP study.

Distribution and Transmission Projects – Murray County RWD #1

Rehabilitation of one raw water transmission line with a capacity of 0.89 mgd was identified using the project list worksheet.

Many distribution projects were identified in the project list worksheet. Projects included rehabilitation and replacement of existing pipelines and installation of new pipelines to accommodate anticipated growth. In addition, pumping projects totaling 1.2 mgd were identified in the 2007 DWINS and project list worksheet for inclusion in the OCWP study.

Other Projects – Murray County RWD #1

No projects were identified in this infrastructure category.

Source Water Projects – Marlow PWA

Using the project list worksheet, a well rehabilitation project for 0.76 mgd was included in the OCWP study. The project date was based on the average age of Marlow's existing wells.

Treatment Projects – Marlow PWA

Using the project list worksheet, a 0.76-mgd groundwater gas chlorination treatment was included in the OCWP study. Information on Marlow's existing treatment technology was identified in the 2008 OCWP survey.

Storage Projects – Marlow PWA

Using the project list worksheet, rehabilitation of 0.076 MG of finished water storage tank was included in the OCWP study.

Distribution and Transmission Projects – Marlow PWA

Rehabilitation of one raw water transmission line with a capacity of 0.76 mgd was identified using the project list worksheet.

Many distribution projects were identified in the project list worksheet. Projects included rehabilitation and replacement of existing pipelines and installation of new pipelines to accommodate anticipated growth. In addition, a 0.76-mgd pumping project was included in the OCWP study.

Other Projects – Marlow PWA

No projects were identified in this infrastructure category.

10.2.2.3 Summary

Table 10-3 presents the drinking water cost through 2060 of the Lower Washita medium provider stratum by infrastructure type. Figure 10-1 illustrates the drinking water costs over time.

Table 10-3. Lower Washita Region – Medium Water Providers Costs by Infrastructure Type

Period [A]	Distribution and Transmission (millions of 2007 dollars)	Treatment (millions of 2007 dollars)	Storage (millions of 2007 dollars)	Source (millions of 2007 dollars)	Other (millions of 2007 dollars)	Total Infrastructure Need (millions of 2007 dollars)
Present-2020	$604	$173	$31	$17	$0	$825
2021-2040	$933	$0	$0	$1	$0	$934
2041-2060	$42	$171	$0	$0	$0	$213
Total	$1,579	$344	$31	$18	$0	$1,972

[A] Small differences in values may result from rounding.

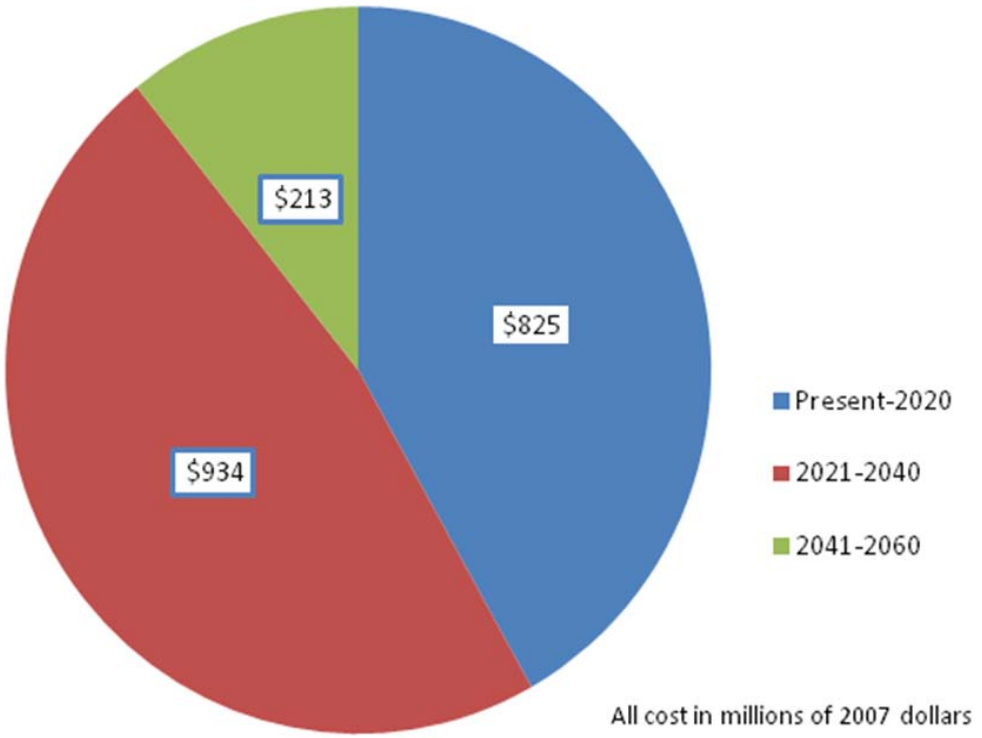

Figure 10-1. Lower Washita Region – Medium Water Providers Costs Over Time

10.2.3 Lower Washita – Small Water Providers

The Lower Washita region has 42 small OCWP water providers. Information about each of these providers is shown in Table 10-4.

Table 10-4. Lower Washita Region – Small OCWP Providers

SWDIS Identifier	Provider Name	County	Source Water Type [A]	Did they participate in 2007 DWINS?	Did they participate in 2008 OCWP survey?	Projected 2060 Population [B]	Were they selected for cost modeling?
OK1010807	Maysville	Garvin	SW	No	Yes	1,456	No
OK1010812	Wynnewood Water & Light	Garvin	SW	No	Yes	2,638	No
OK1010824	Dougherty	Murray	SW	No	Yes	354	Yes
OK1011103	SOWC (Lake Murray)	Carter	SW	No	No	1,968	No
OK2000802	Caddo Co RWD #1 (Lookeba)	Caddo	GW	No	No	231	No
OK2000803	Binger PWA	Caddo	GW	No	Yes	843	No
OK2000811	Gracemont PWA	Caddo	GW	No	Yes	400	No
OK2001001	Wilson Municipal Authority	Carter	GW	No	Yes	2,211	No
OK2001003	Western Carter Co Water Corp	Carter	SWP	No	Yes	1,829	No
OK2002502	Paoli	Garvin	GW	No	Yes	723	No
OK2002511	Garvin Co RWD # 6 (Wells)	Garvin	GW	No	Yes	3,054	No
OK2002514	Garvin Co RWD #2	Garvin	GW	No	Yes	1,879	No
OK2002516	Garvin Co RWD #1	Garvin	GW	No	Yes	1,555	No
OK2002521	Elmore City	Garvin	SWP	No	Yes	846	No
OK2002603	Alex	Grady	GW	No	Yes	837	No
OK2002604	Grady Co RWD #1	Grady	GW	No	Yes	399	No
OK2002605	Grady Co RWD #2	Grady	GW	No	Yes	605	No
OK2002607	Grady Co RWD #3	Grady	GW	No	Yes	106	No
OK2002609	Rush Springs	Grady	GW	No	Yes	1,660	No
OK2003404	Ringling	Jefferson	GW	No	Yes	1,320	Yes
OK2003405	Terral	Jefferson	SWP	No	Yes	428	No
OK2003501	Mill Creek	Johnston	GW	No	Yes	599	No
OK2003504	Ravia	Johnston	GW	No	Yes	784	No

Table 10-4. Lower Washita Region – Small OCWP Providers, continued

SWDIS Identifier	Provider Name	County	Source Water Type [A]	Did they participate in 2007 DWINS?	Did they participate in 2008 OCWP survey?	Projected 2060 Population [B]	Were they selected for cost modeling?
OK2003505	Mannsville Public Works Authority	Johnston	GW	No	Yes	2,070	No
OK2004302	Leon RWD #1 (Love County)	Love	GW	No	No	212	No
OK2004506	Oakview Water Corp	Marshall	GW	No	No	2,213	No
OK2004702	Wayne	McClain	GW	No	Yes	1,420	No
OK2004709	Byars	McClain	GW	No	Yes	528	No
OK2006904	Stephens Co RWD #4 (Loco)	Stephens	GW	No	No	229	No
OK2006906	Stephens Co RWD & SD #1	Stephens	GW	No	No	963	No
OK3000805	Cyril	Caddo	GWP	No	Yes	1,378	No
OK3000806	Cement	Caddo	GWP	No	No	625	No
OK3001004	Ratliff City	Carter	GWP	No	Yes	166	No
OK3002503	Garvin Co RWD #4	Garvin	SWP	No	Yes	1,344	No
OK3002505	Elmore City RW Corp	Garvin	SWP	No	Yes	1,035	No
OK3002515	Garvin Co RWD #6 (SW Purchase)	Garvin	SWP	No	No	1,410	No
OK3002601	Norge Water Co	Grady	SWP	No	Yes	1,165	No
OK3003404	Cornish	Jefferson	GWP	No	No	182	No
OK3004513	Oakland	Marshall	SWP	No	Yes	1,358	No
OK3005002	Buckhorn RWD	Murray	GWP	No	Yes	1,386	No
OK3005004	West Davis RWD	Murray	SWP	No	Yes	1,377	No
OK4002619	Verden	Grady	GW	No	No	876	No

[A] SW – Surface Water, GW – Groundwater, P – Purchased Water, GU – Groundwater Under Direct Influence of Surface Water. Systems are classified as surface water if they have at least one source that is surface water or groundwater under the direct influence of surface water (SW and GW designations). Systems are classified as groundwater if they do not meet surface water definition or if their primary source of water is purchased from another provider (GW, SWP, and GWP designations).

[B] Population based on 2060 projection (see Water Demand Forecast Report for more details on projections).

10.2.3.1 Surface Water Providers

There are four small surface water providers in the Lower Washita region. The City of Dougherty participated in the 2008 OCWP survey and was selected for cost modeling. Using the methodology described in Section 2.2, a project list was created.

Source Water Projects
Using the project list worksheet, one surface water intake rehabilitation project for Lake of the Arbuckles was included in the OCWP study.

Treatment Projects
Using the project list worksheet, a 33-mgd WTP rehabilitation in 2040 was included in the OCWP study.

Storage Projects
Using the project list worksheet, rehabilitation of 3.3 MG of finished water storage tank was included in the OCWP study.

Distribution and Transmission Projects
Rehabilitation of one raw water transmission line with a capacity of 33 mgd was identified using the project list worksheet.

Many distribution projects were identified in the project list worksheet. Projects included rehabilitation and replacement of existing pipelines and installation of new pipelines to accommodate anticipated growth.

Other Projects
No projects were identified in this infrastructure category.

10.2.3.2 Groundwater Providers

There are 38 small providers in this category; 14 of these primarily purchase water. The City of Ringling was selected for cost modeling. Ringling participated in the 2008 OCWP survey. Using the methodology described in Section 2.2, a project list was created.

Source Water Projects
Using the project list worksheet, a well rehabilitation project for 0.14 mgd was included in the OCWP study. The project date was based on the average age of Ringling's existing wells.

Treatment Projects
Using the project list worksheet, a 0.14-mgd groundwater chemical treatment was included in the OCWP study. Information on Ringling's existing treatment technology was unknown.

Storage Projects
Using the project list worksheet, rehabilitation of 0.014 MG of finished water storage tank was included in the OCWP study.

Distribution and Transmission Projects
Rehabilitation of one raw water transmission line with a capacity of 0.14 mgd was identified using the project list worksheet.

Many distribution projects were identified in the project list worksheet. Projects included rehabilitation and replacement of existing pipelines and installation of new pipelines to accommodate anticipated growth. In addition, a 0.14-mgd pumping project was included in the OCWP study.

Other Projects

No projects were identified in this infrastructure category.

10.2.3.3 Summary

Table 10-5 presents the drinking water cost through 2060 of the Lower Washita small provider stratum by infrastructure type. Figure 10-2 illustrates the drinking water costs over time.

Table 10-5. Lower Washita Region – Small Water Providers Costs by Infrastructure Type

Period [A]	Distribution and Transmission (millions of 2007 dollars)	Treatment (millions of 2007 dollars)	Storage (millions of 2007 dollars)	Source (millions of 2007 dollars)	Other (millions of 2007 dollars)	Total Infrastructure Need (millions of 2007 dollars)
Present-2020	$364	$8	$2	$2	$0	$376
2021-2040	$26	$173	$3	$0	$0	$202
2041-2060	$36	$0	$0	$0	$0	$36
Total	$426	$181	$5	$2	$0	$614

[A] Small differences in values may result from rounding.

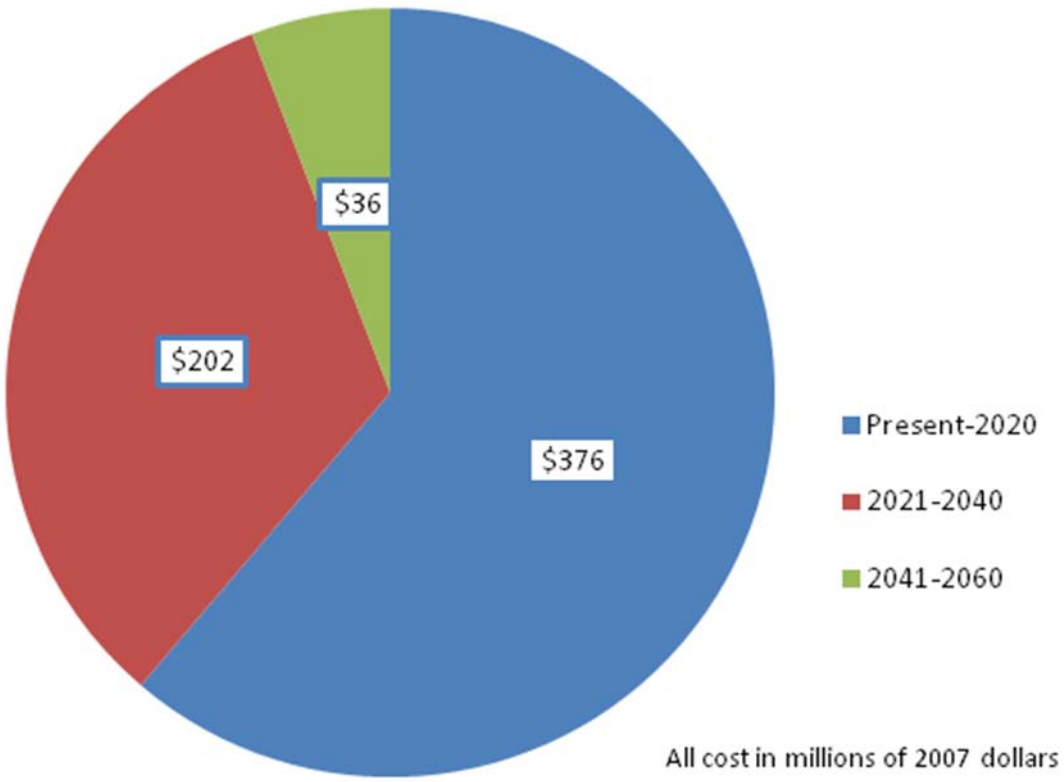

Figure 10-2. Lower Washita Region – Small Water Providers Costs Over Time

10.3 Lower Washita – Regional Major Reservoir Projects

There are 11 major reservoirs in the Lower Washita region. Table 10-6 identifies the reservoirs and project size. Figure 10-3 illustrates project cost over time.

Table 10-6. Lower Washita Region – Major Reservoir Rehabilitation Projects

Reservoir Name	Storage Considered for Rehabilitation [A] (AF)	Project Year
Clear Creek Lake	7,710	2060
Duncan Lake	7,200	2040
Healdton Lake	3,766	2080
Lake Chickasha	41,080	2060
Lake Fuqua	21,100	2080
Lake Humphreys	14,041	2060
Lake of the Arbuckles	62,600	2080
Lake Texoma	150,000	2060
Pauls Valley Lake	8,730	2060
RC Longmire Lake	N/A	2080
Wiley Post Memorial Lake	0	2080

[A] The amount of storage for rehabilitation is based on the municipal water supply storage. If unknown, the full normal pool storage was used. Reservoirs with no designated municipal water supply storage were included in the study but show zero in the rehabilitation column

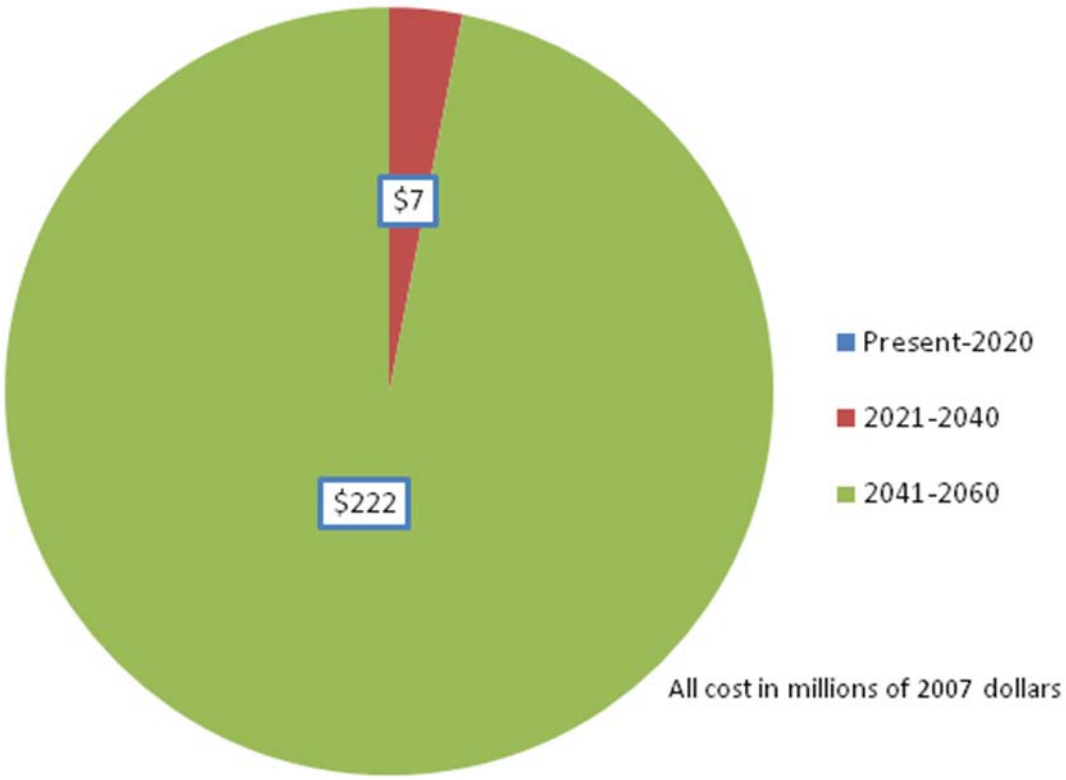

Figure 10-3. Lower Washita Region – Major Reservoir Rehabilitation Costs Over Time

10.4 Lower Washita – Regional Cost Summary

This section presents the Lower Washita regional drinking water infrastructure costs over the next 50 years. Table 10-7 identifies costs by provider size and project year. Distribution and transmission projects make up the majority of the infrastructure costs, over 71 percent, of drinking water infrastructure costs in the region. Water treatment projects make up the second largest infrastructure costs, nearly 19 percent. Medium providers have the largest overall drinking water infrastructure costs. The largest infrastructure costs occur in the Present - 2020 period.

Table 10-7 Lower Washita Region – Drinking Water Infrastructure Cost Summary

Category [A, C]	Potential Funding Source [B]	Present - 2020 Infrastructure Need (millions of 2007 dollars)	2021-2040 Infrastructure Need (millions of 2007 dollars)	2041-2060 Infrastructure Need (millions of 2007 dollars)	Total Period Infrastructure Need (millions of 2007 dollars)
Small	DWSRF Eligible	$375	$202	$36	$613
	Non-DWSRF Eligible	$0	$0	$0	$0
Small Subtotal		$375	$202	$36	$613
Medium	DWSRF Eligible	$818	$924	$203	$1,945
	Non-DWSRF Eligible	$6	$9	$9	$24
Medium Subtotal		$824	$933	$212	$1,969
Large	DWSRF Eligible	$0	$0	$0	$0
	Non-DWSRF Eligible	$0	$0	$0	$0
Large Subtotal		$0	$0	$0	$0
Reservoir	DWSRF Eligible	$0	$0	$0	$0
	Non-DWSRF Eligible	$0	$7	$222	$229
Reservoir Subtotal		$0	$7	$222	$229
Total		$1,199	$1,142	$470	$2,811

[A] See Table 10-1 for more information on provider size. The "reservoir" category includes all regional reservoir rehabilitation projects.
[B] This study assumes that distribution projects for new growth and all reservoir projects are non-DWSRF eligible. All other projects were assumed to be DWSRF eligible.
[C] Small differences in values may result from rounding.

Section 11
Middle Arkansas Regional Infrastructure Costs

This section provides some general information about the Middle Arkansas region, identifies water providers selected for modeling and their project lists, and provides a cost summary for this region.

11.1 Middle Arkansas –Regional Description

The Middle Arkansas Watershed Planning Region is a 5,173-square-mile area including all or portions of Osage, Washington, Nowata, Craig, Tulsa, Rogers, Creek, Okmulgee, Wagoner, Mayes, and Muskogee Counties. There are 95 OCWP providers in this region. OCWP providers are those included in the 2008 OCWP survey and for which water demand projections were created. Table 11-1 shows the number of Middle Arkansas water providers by stratum.

Table 11-1. Middle Arkansas Region – Number of OCWP Providers by Stratum

Provider Size	Population [A]	Surface Water [B]	Groundwater [C]	Total
Large	>100,000	2	0	2
Medium	3,301 – 100,000	19	17	36
Small	<3,300	12	45	57
Total		**33**	**62**	**95**

[A] Population classification was based on 2060 projection (see *Water Demand Forecast Report* for more details on projections).

[B] Systems were classified as surface water if they have at least one source that is surface water or groundwater under the direct influence of surface water.

[C] Systems were classified as groundwater if they do not meet surface water definition or if their primary source of water is purchased from another provider.

11.2 Middle Arkansas – Developing Project Lists

Five providers were used for cost modeling. The following sections discuss the project lists for each of these providers.

11.2.1 Middle Arkansas – Large Water Providers

The Middle Arkansas region has two large surface water OCWP providers. Both providers were used for cost modeling. Table 11-2 presents information about each of these providers.

Table 11-2. Middle Arkansas Region – Large OCWP Providers

SWDIS Identifier	Provider Name	County	Source Water Type [A]	Did they participate in 2007 DWINS?	Did they participate in 2008 OCWP survey?	Projected 2060 Population [B]	Were they selected for cost modeling?
OK1020418	Tulsa	Tulsa	SW	Yes*	Yes	460,795	Yes
OK1021508	Broken Arrow WTP	Tulsa	SW	Yes	Yes	200,800	Yes

[A] SW – Surface Water, GW – Groundwater, P – Purchased Water, GU – Groundwater Under Direct Influence of Surface Water. Systems are classified as surface water if they have at least one source that is surface water or groundwater under the direct influence of surface water (SW and GW designations). Systems are classified as groundwater if they do not meet surface water definition or if their primary source of water is purchased from another provider (GW, SWP, and GWP designations).

[B] Population based on 2060 projection (see Water Demand Forecast Report for more details on projections).

11.2.1.1 Surface Water Providers

The cities of Tulsa and Broken Arrow participated in the 2007 DWINS and the 2008 OCWP survey. Lawton was used to supplement the distribution information for Broken Arrow. Using the methodology described in Section 2.2, a project list was created for each of these providers.

Source Water Projects – Tulsa

Using the project list worksheet, three surface water intake rehabilitation projects for Lake Eucha, Oologah Lake, and Lake Hudson were included in the OCWP study. No source water projects were indentified in the 2007 DWINS.

Treatment Projects – Tulsa

Two WTP projects with a combined capacity of 220 mgd were identified in the 2007 DWINS. Additionally, two chlorination rehabilitation projects were identified in the 2007 DWINS. Using the project list worksheet, rehabilitation of all four of the DWINS projects were identified for additional rehabilitation in the 2060 period. In addition, from the 2001 Tulsa Water System Study, an ozone treatment facilities project was included in the 2040 period.

Storage Projects – Tulsa

Nearly 105 MG finished water rehabilitation projects were identified in the 2007 DWINS. No other projects were identified using the project list worksheet.

Distribution and Transmission Projects – Tulsa

Two new raw water transmission lines were identified in the 2007 DWINS. Additionally, the OCWP study included rehabilitation of the raw water transmission pipeline from Hudson Lake to Mohawk WTP.

Many distribution projects were identified in the 2007 DWINS and project list worksheet. Projects included rehabilitation and replacement of existing pipelines, installation of new pipelines to accommodate anticipated growth, replacement of water meters, replacement of valves, and replacement of backflow preventers. Additionally, over 56 mgd of finished pumping rehabilitation or replacement projects were identified in 2007 DWINS. The OCWP

study also pulled distribution and transmission projects from the 2001 Tulsa Water System Study.

Other Projects – Tulsa

The 2007 DWINS identified a backup power project and security enhancement projects.

Source Water Projects – Broken Arrow

No source water projects were identified in the 2007 DWINS. Using the project list worksheet, one surface water intake rehabilitation project on the Verdigris River was included in the OCWP study.

Treatment Projects – Broken Arrow

A 10-mgd WTP rehabilitation project was identified in the 2007 DWINS. Using the project list worksheet, a new 15-mgd WTP in 2040 and rehabilitation of 10.5 mgd WTP in 2060 were included in the OCWP study.

Storage Projects – Broken Arrow

Approximately nine MG finished water rehabilitation projects were identified in the 2007 DWINS. No other projects were identified using the project list worksheet.

Distribution and Transmission Projects – Broken Arrow

A combination of a new and rehabilitation projects were identified for transporting approximately 25 mgd of raw water.

Many distribution projects were identified in the 2007 DWINS and project list worksheet. Projects included rehabilitation and replacement of existing pipelines, installation of new pipelines to accommodate anticipated growth, replacement of water meters, and valves.

Other Projects – Broken Arrow

No projects were identified in this infrastructure category.

11.2.1.2 Groundwater Providers

There were no large groundwater providers in this region.

11.2.1.3 Summary

Table 11-3 presents the drinking water cost through 2060 of the Middle Arkansas large provider stratum by infrastructure type. Figure 11-1 illustrates the drinking water costs over time.

Table 11-3. Middle Arkansas Region – Large Water Provider Costs by Infrastructure Type

Period [A]	Distribution and Transmission (millions of 2007 dollars)	Treatment (millions of 2007 dollars)	Storage (millions of 2007 dollars)	Source (millions of 2007 dollars)	Other (millions of 2007 dollars)	Total Infrastructure Need (millions of 2007 dollars)
Present-2020	$200	$219	$19	$11	$2	$451
2021-2040	$634	$54	$0	$0	$0	$688
2041-2060	$251	$219	$0	$0	$0	$470
Total	$1,085	$492	$19	$11	$2	$1,609

[A] Small differences in values may result from rounding.

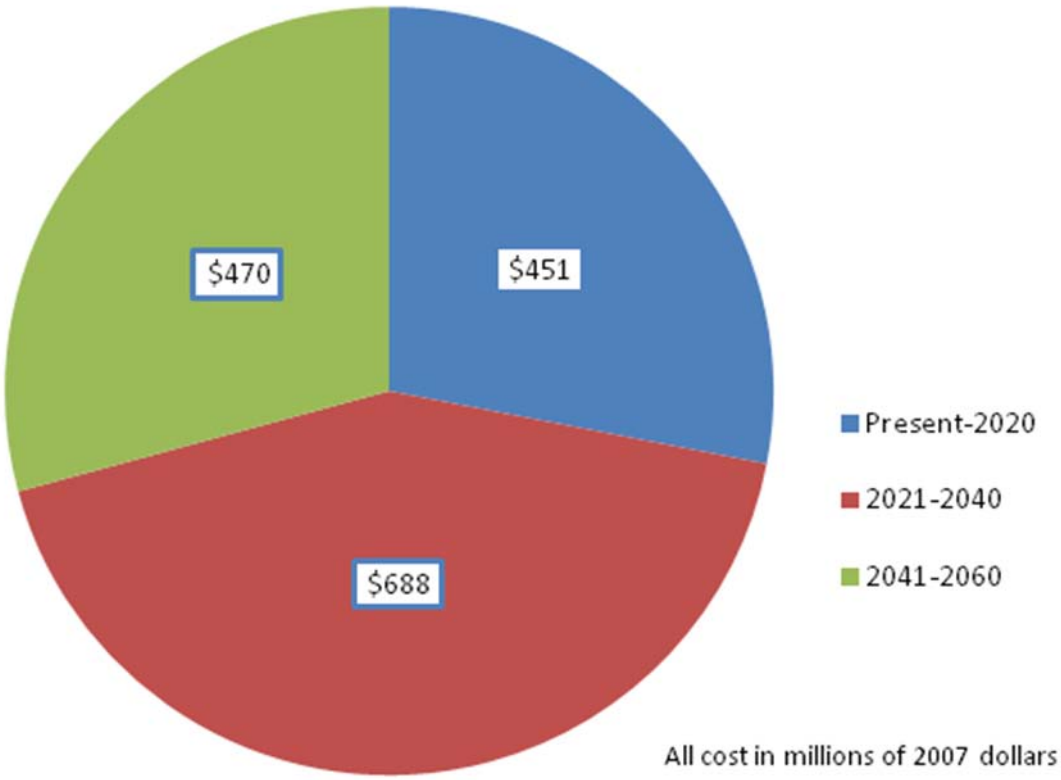

Figure 11-1. Middle Arkansas Region – Large Water Providers Costs Over Time

11.2.2 Middle Arkansas – Medium Water Providers

The Middle Arkansas region has 36 medium OCWP water providers. Information about each of these providers is shown in Table 11-4.

Table 11-4. Middle Arkansas Region – Medium OCWP Providers

SWDIS Identifier	Provider Name	County	Source Water Type [A]	Did they participate in 2007 DWINS?	Did they participate in 2008 OCWP survey?	Projected 2060 Population [B]	Were they selected for cost modeling?
OK1020404	Sapulpa	Creek	SW	No	Yes	25,097	No
OK1020419	Creek Co RWD # 1	Creek	SW	No	Yes	7,756	No
OK1020420	Sand Springs	Tulsa	SW	Yes	Yes	38,872	No
OK1021301	Pawhuska	Osage	SW	No	Yes	4,948	No
OK1021306	Hominy	Osage	SW	No	Yes	3,371	No
OK1021401	Bartlesville	Washington	SW	Yes	Yes	37,585	No
OK1021418	Washington Co RWD #3 (New #1)	Tulsa	SW	Yes	Yes	20,174	No
OK1021503	Nowata	Nowata	SW	No	No	18,060	No
OK1021505	Collinsville	Tulsa	SW	No	Yes	5,614	No
OK1021506	Rogers Co RWD # 4	Rogers	SW	No	Yes	3,979	No
OK1021507	Rogers Co RWD # 5	Rogers	SW	Yes	Yes	16,146	Yes
OK1021509	Coweta	Wagoner	SW	No	Yes	10,968	No
OK1021512	Claremore	Rogers	SW	Yes	Yes	26,234	No
OK1021513	Rogers Co RWD # 3 Lake Plant	Rogers	SW	No	No	6,064	No
OK1021527	Wagoner Co RWD # 9	Wagoner	SW	No	Yes	5,822	No
OK1021528	Wagoner Co RWD # 5	Wagoner	SW	Yes	Yes	11,709	No
OK1021529	Wagoner Co RWD # 4	Wagoner	SW	Yes	Yes	31,293	No
OK1021649	Wagoner	Wagoner	SW	No	Yes	13,054	No
OK1021691	Grand Lake PWA	Delaware	SW	No	No	3,528	No
OK3001902	Creek Co RWD # 2	Creek	SWP	Yes	Yes	14,308	No
OK3001904	Sapulpa Rural Water Company	Creek	SWP	Yes	Yes	8,975	No
OK3001916	Consolidated RWD #3 Creek Co	Creek	SWP	No	No	3,927	No
OK3005611	Okmulgee Co RWD # 6	Okmulgee	SWP	No	Yes	10,573	No
OK3005736	Osage Co RWD #15	Osage	SWP	No	Yes	9,510	No
OK3006603	Rogers Co RWD # 2	Rogers	SWP	No	Yes	4,377	No
OK3006604	Rogers Co RWD # 7	Rogers	SWP	Yes	No	4,456	No
OK3006606	Rogers Co RWD # 8	Rogers	SWP	No	Yes	4,775	No
OK3006629	Catoosa	Rogers	SWP	Yes	Yes	4,884	No

Table 11-4. Middle Arkansas Region – Medium OCWP Providers, continued

SWDIS Identifier	Provider Name	County	Source Water Type [A]	Did they participate in 2007 DWINS?	Did they participate in 2008 OCWP survey?	Projected 2060 Population [B]	Were they selected for cost modeling?
OK3006650	Rogers Co RWD # 3 Cot Sta	Rogers	SWP	No	No	6,567	No
OK3007201	Jenks PWA	Tulsa	SWP	No	Yes	11,465	No
OK3007218	Owasso	Tulsa	SWP	Yes	Yes	28,199	No
OK3007221	Water Improvement District #3	Tulsa	SWP	No	Yes	3,600	No
OK3007223	Glenpool Water	Tulsa	SWP	No	Yes	11,462	No
OK3007243	Bixby PWA	Tulsa	SWP	No	Yes	27,033	No
OK3007306	Porter PWA	Wagoner	SWP	No	Yes	3,657	No
OK3007402	Dewey	Washington	SWP	Yes	Yes	3,555	No

[A] SW – Surface Water, GW – Groundwater, P – Purchased Water, GU – Groundwater Under Direct Influence of Surface Water. Systems are classified as surface water if they have at least one source that is surface water or groundwater under the direct influence of surface water (SW and GW designations). Systems are classified as groundwater if they do not meet surface water definition or if their primary source of water is purchased from another provider (GW, SWP, and GWP designations).

[B] Population based on 2060 projection (see Water Demand Forecast Report for more details on projections).

11.2.2.1 Surface Water Providers

There are 19 medium surface water providers in the Middle Arkansas region. Rogers County RWD #5 was selected for cost modeling. Rogers County participated in the 2007 DWINS and 2008 OCWP survey. Using the methodology described in Section 2.2, a project list was created.

Source Water Projects

No source water projects were identified in the 2007 DWINS. Using the project list worksheet, one surface water intake rehabilitation project on the Verdigris River was included in the OCWP study.

Treatment Projects

A 3-mgd WTP rehabilitation project was identified in the 2007 DWINS. Using the project list worksheet, rehabilitation, and expansion of 6 mgd WTP in 2060 also was included in the OCWP study.

Storage Projects

Rehabilitation projects totaling approximately 1.2 MG of finished water storage were identified in the 2007 DWINS and were included in the OCWP study.

Distribution and Transmission Projects

A combination of a new and rehabilitation projects were identified for transporting approximately 6 mgd of raw water.

Many distribution projects were identified in the project list worksheet and the 2007 DWINS. Projects included rehabilitation and replacement of existing pipelines and

installation of new pipelines to accommodate anticipated growth. Additionally, the 2007 DWINS identified some booster pump, flushing hydrants, valves, and water meter replacement projects.

Other Projects

No projects were identified in this infrastructure category.

11.2.2.2 Groundwater Providers

There are 17 medium providers grouped in this category because they primarily purchase water. However, since there was not a provider suitable for cost modeling, the Central region was used to estimate the cost for this stratum.

11.2.2.3 Summary

Table 11-5 presents the drinking water cost through 2060 of the Middle Arkansas medium provider stratum by infrastructure type. Figure 11-2 illustrates the drinking water costs over time.

Table 11-5. Middle Arkansas Region – Medium Water Providers Costs by Infrastructure Type

Period [A]	Distribution and Transmission (millions of 2007 dollars)	Treatment (millions of 2007 dollars)	Storage (millions of 2007 dollars)	Source (millions of 2007 dollars)	Other (millions of 2007 dollars)	Total Infrastructure Need (millions of 2007 dollars)
Present-2020	$599	$158	$34	$39	$0	$830
2021-2040	$252	$0	$0	$0	$0	$252
2041-2060	$2,594	$245	$0	$0	$0	$2,839
Total	$3,445	$403	$34	$39	$0	$3,921

[A] Small differences in values may result from rounding.

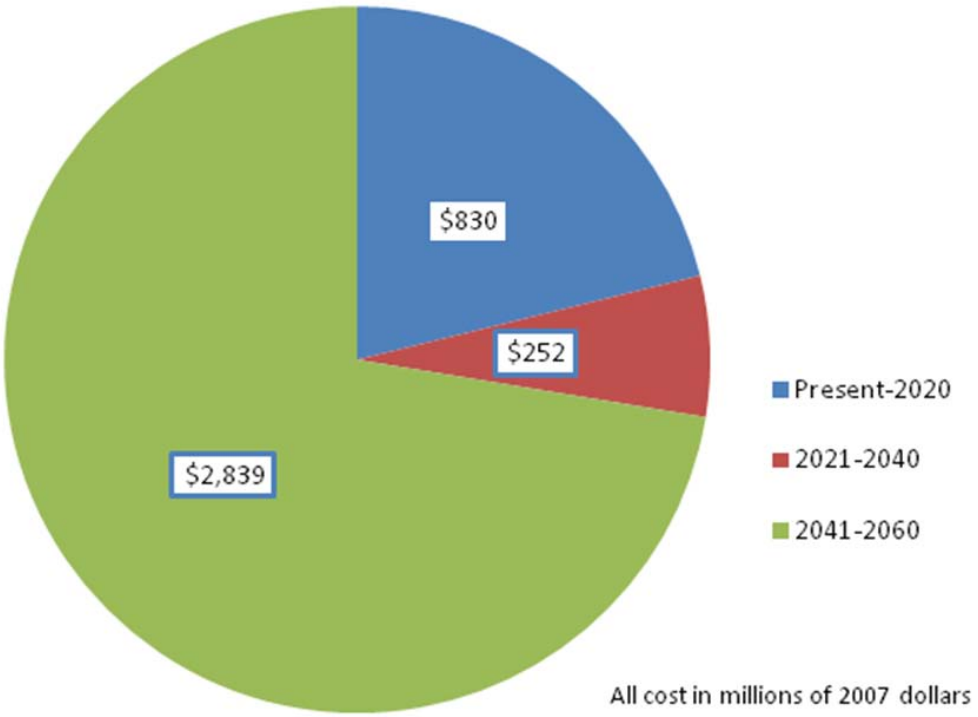

Figure 11-2. Middle Arkansas Region – Medium Water Provider Costs Over Time

11.2.3 Middle Arkansas – Small Water Providers

The Middle Arkansas region has 57 small OCWP water providers. Information about each of these providers is shown in Table 11-6.

Table 11-6. Middle Arkansas Region – Small OCWP Providers

SWDIS Identifier	Provider Name	County	Source Water Type [A]	Did they participate in 2007 DWINS?	Did they participate in 2008 OCWP survey?	Projected 2060 Population [B]	Were they selected for cost modeling?
OK1020405	Creek Co RWD # 7	Creek	SW	Yes	Yes	2,969	No
OK1021304	Barnsdall	Osage	SW	No	Yes	1,716	No
OK1021305	Avant Utilities Auth	Osage	SW	No	Yes	499	No
OK1021313	Skiatook PWA	Osage	SW	No	Yes	3,182	No
OK1021410	Osage Co RWD # 20 (Hulah)	Osage	SW	No	Yes	198	No
OK1021417	Copan PWA	Washington	SW	No	Yes	1,254	Yes
OK1021501	Lenapah	Nowata	SW	No	No	527	No
OK1021502	Delaware	Nowata	SW	No	Yes	809	No
OK1021616	Spavinaw	Mayes	SW	No	No	870	No
OK1021643	Wagoner Co RWD # 2	Wagoner	SW	No	No	3,072	No
OK1021650	Wagoner Co RWD # 1	Wagoner	SW	No	No	614	No

Table 11-6. Middle Arkansas Region – Small OCWP Providers, continued

SWDIS Identifier	Provider Name	County	Source Water Type [A]	Did they participate in 2007 DWINS?	Did they participate in 2008 OCWP survey?	Projected 2060 Population [B]	Were they selected for cost modeling?
OK1221626	Wagoner Co RWD # 7 (New)	Wagoner	SW	No	Yes	1,997	No
OK2005111	Haskell PWA	Muskogee	GW	No	No	69	No
OK2005708	Wynona	Osage	GW	No	No	695	No
OK2005743	Birch Creek RWD	Osage	GW	No	Yes	51	Yes
OK3001920	Creek Co RWD # 4	Creek	SWP	No	No	1,309	No
OK3005118	Taft	Muskogee	SWP	No	Yes	406	No
OK3005127	Boynton PWA	Muskogee	SWP	No	No	313	No
OK3005128	Muskogee Co RWD #10	Muskogee	SWP	No	Yes	316	No
OK3005134	Muskogee Co RWD #14	Muskogee	SWP	No	Yes	69	No
OK3005301	Nowata Co Consolidated RWD #1	Nowata	SWP	No	Yes	2,969	No
OK3005302	Nowata County RWD # 3	Nowata	SWP	No	Yes	496	No
OK3005303	Nowata Co RWD #2	Nowata	SWP	No	Yes	632	No
OK3005304	Nowata Co RW & S Dist #1	Nowata	SWP	No	Yes	902	No
OK3005305	South Coffeyville	Nowata	SWP	No	Yes	795	No
OK3005307	Nowata Co RWD #5	Nowata	SWP	No	Yes	179	No
OK3005308	Nowata Co RWD #6	Nowata	SWP	No	No	812	No
OK3005309	Elm Bend RWD Inc	Nowata	SWP	No	No	1,083	No
OK3005321	Nowata Co RWD #7	Nowata	SWP	No	Yes	2,527	No
OK3005701	Strike-Axe Hwy 60	Osage	SWP	No	No	586	No
OK3005702	Rural Water District #9	Osage	SWP	No	Yes	371	No
OK3005704	Osage Co RWD # 1	Osage	SWP	No	Yes	1,205	No
OK3005721	Osage Co RWD # 5	Osage	SWP	No	Yes	664	No
OK3005739	Strike Axe (Chimney Rock)	Osage	SWP	No	No	358	No
OK3005744	Osage Co RWD #18 (Evergreen)	Osage	SWP	No	Yes	393	No

Table 11-6. Middle Arkansas Region – Small OCWP Providers, continued

SWDIS Identifier	Provider Name	County	Source Water Type [A]	Did they participate in 2007 DWINS?	Did they participate in 2008 OCWP survey?	Projected 2060 Population [B]	Were they selected for cost modeling?
OK3006605	Rogers Co RWD # 9	Rogers	SWP	No	No	1,396	No
OK3006612	Inola Water Works Inc	Rogers	SWP	No	Yes	2,538	No
OK3006628	Rogers Co RWD # 6	Rogers	SWP	No	No	1,592	No
OK3006648	Rogers Co RWD #12	Rogers	SWP	No	Yes	280	No
OK3006652	Rogers Co RWD #15	Rogers	SWP	No	No	59	No
OK3007202	Sperry	Tulsa	SWP	No	Yes	1,228	No
OK3007204	Tulsa Co RWD #1	Tulsa	SWP	No	No	2,046	No
OK3007213	Tulsa Co W Imp Dist #14	Tulsa	SWP	No	Yes	1,577	No
OK3007244	Sand Springs Skyline/81St Area	Tulsa	SWP	No	No	60	No
OK3007305	Red Bird	Wagoner	SWP	No	No	243	No
OK3007308	Wagoner Co RWD # 8	Wagoner	SWP	No	No	2,304	No
OK3007330	Wagoner Co RWD # 6	Wagoner	SWP	No	Yes	1,997	No
OK3007338	Tullahassee Water	Wagoner	SWP	No	No	167	No
OK3007351	Okay PWA	Wagoner	SWP	No	No	910	No
OK3007401	Washington Co RWD #1	Washington	SWP	No	Yes	1,190	No
OK3007403	Washington Co RWD #2	Washington	SWP	No	Yes	2,433	No
OK3007406	Bar-Dew Water Assoc Inc	Washington	SWP	No	Yes	227	No
OK3007407	Le Ann Water	Washington	SWP	No	No	811	No
OK3007408	Ramona	Washington	SWP	No	Yes	1,686	No
OK3007409	Washington Co RWD #5	Washington	SWP	No	Yes	1,081	No
OK3007414	Ochelata Utility Authority	Washington	GWP	No	No	534	No
OK3007415	Washington Co RWD #7	Washington	SWP	No	No	368	No

[A] SW – Surface Water, GW – Groundwater, P – Purchased Water, GU – Groundwater Under Direct Influence of Surface Water. Systems are classified as surface water if they have at least one source that is surface water or groundwater under the direct influence of surface water (SW and GW designations). Systems are classified as groundwater if they do not meet surface water definition or if their primary source of water is purchased from another provider (GW, SWP, and GWP designations).

[B] Population based on 2060 projection (see Water Demand Forecast Report for more details on projections).

11.2.3.1 Surface Water Providers

There are 12 small surface water providers in the Middle Arkansas region. Copan PWA participated in the 2008 OCWP survey and was selected for cost modeling. Using the methodology described in Section 2.2, a project list was created.

Source Water Projects

Using the project list worksheet, a rehabilitation surface water intake for Copan Lake was included in the OCWP study.

Treatment Projects

Using the project list worksheet, a 0.45 mgd WTP rehabilitation project in 2020 and 2060 were included in the OCWP study.

Storage Projects

Using the project list worksheet, rehabilitation of 0.45 MG of finished water storage tank was included in the OCWP study.

Distribution and Transmission Projects

A 0.45 mgd rehabilitation of a raw water transmission line was identified using the project list worksheet.

Many distribution projects were identified in the project list worksheet. Projects included rehabilitation and replacement of existing pipelines and installation of new pipelines to accommodate anticipated growth.

Other Projects

No projects were identified in this infrastructure category.

11.2.3.2 Groundwater Providers

There are 45 small providers in this category; 42 of these primarily purchase water. Birch Creek RWD was selected for cost modeling. Birch Creek RWD participated in the 2008 OCWP survey. Using the methodology described in Section 2.2, a project list was created.

Source Water Projects

Using the project list worksheet, a well rehabilitation project for 0.06 mgd was included in the OCWP study.

Treatment Projects

Using the project list worksheet, a 0.06 mgd groundwater chemical treatment was included in the OCWP study in the 2040 period. Information on Birch Creek RWD existing treatment technology was unknown.

Storage Projects

Using the project list worksheet, rehabilitation of 0.006 MG of finished water storage tank was included in the OCWP study.

Distribution and Transmission Projects

Rehabilitation of one raw water transmission line with a capacity of 0.06 mgd was identified using the project list worksheet.

Many distribution projects were identified in the project list worksheet. Projects included rehabilitation and replacement of existing pipelines and installation of new pipelines to accommodate anticipated growth.

Other Projects

No projects were identified in this infrastructure category.

11.2.3.3 Summary

Table 11-7 presents the drinking water cost through 2060 of the Middle Arkansas small provider stratum by infrastructure type. Figure 11-3 illustrates the drinking water costs over time.

Table 11-7. Middle Arkansas Region – Small Water Providers Costs by Infrastructure Type

Period [A]	Distribution and Transmission (millions of 2007 dollars)	Treatment (millions of 2007 dollars)	Storage (millions of 2007 dollars)	Source (millions of 2007 dollars)	Other (millions of 2007 dollars)	Total Infrastructure Need (millions of 2007 dollars)
Present-2020	$0	$23	$1	$0	$0	$24
2021-2040	$444	$8	$1	$5	$0	$458
2041-2060	$152	$23	$0	$0	$0	$175
Total	$596	$54	$2	$5	$0	$657

[A] Small differences in values may result from rounding.

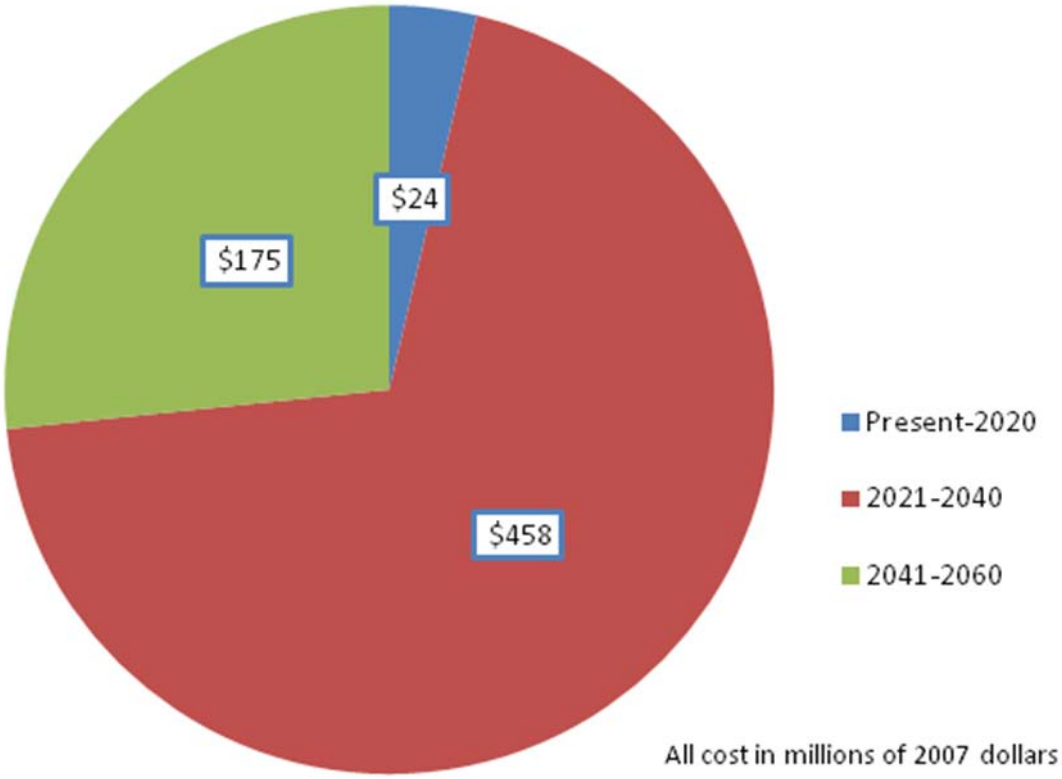

Figure 11-3. Middle Arkansas Region – Small Water Providers Costs Over Time

11.3 Middle Arkansas – Regional Major Reservoir Projects

There are 22 major reservoirs in the Middle Arkansas region. Table 11-8 identifies the reservoirs and project size. Figure 11-4 illustrates project cost over time.

Table 11-8 Middle Arkansas Region – Major Reservoir Rehabilitation Projects

Reservoir Name	Storage Considered for Rehabilitation [A] (AF)	Project Period
Birch Lake	7,600	2080
Bluestem Lake	17,000	2060
Copan Lake	7,500	2080
Heyburn Lake	2,000	2060
Hominy Municipal Lake	5,000	2040
Hulah Lake	19,800	2060
Lake Bixhoma	3,130	2080
Lake Claremore	7,900	2040
Lake Pawhuska	3,600	2040
Lake Sahoma	4,850	2060
Lake Waxhoma	2,000	2060
Lake Yahola	6,445	2060
Oologah Lake	342,600	2080
Shell Lake	9,500	2040
Skiatook Lake	62,900	2080
Taylor Lake	1,877	2060

[A] The amount of storage for rehabilitation is based on the municipal water supply storage. If unknown, the full normal pool storage was used. Reservoirs with no designated municipal water supply storage were included in the study but show zero in the rehabilitation column

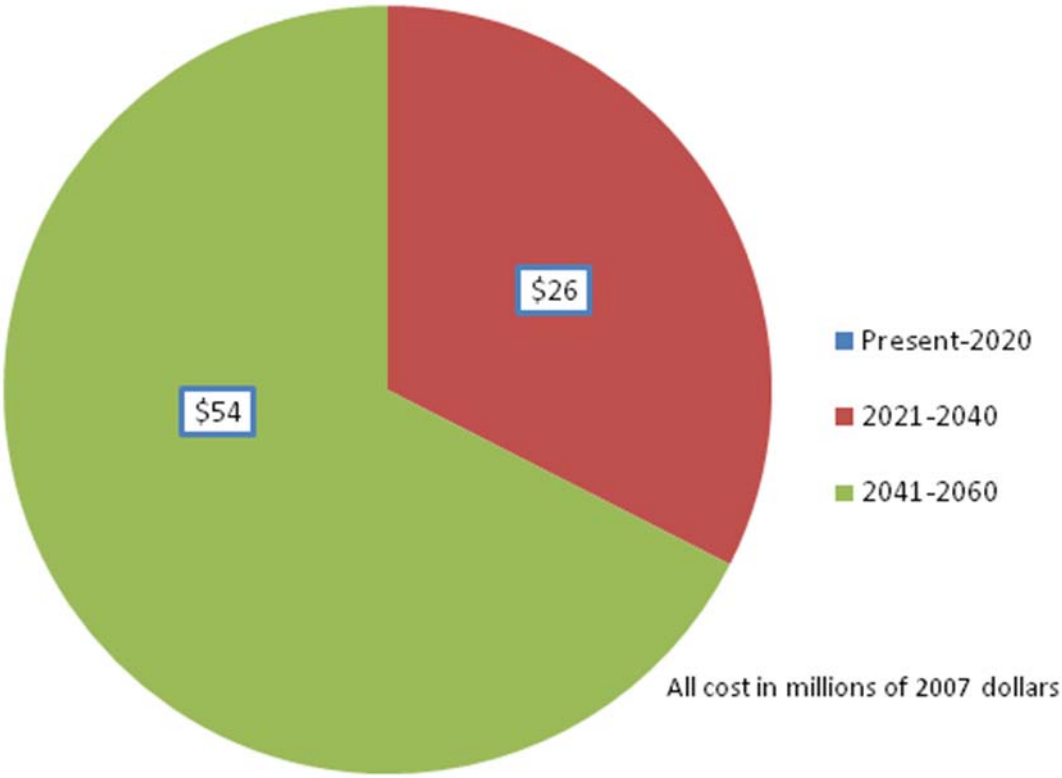

Figure 11-4. Middle Arkansas Region – Major Reservoir Rehabilitation Costs Over Time

11.4 Middle Arkansas – Regional Cost Summary

This section presents the Middle Arkansas regional drinking water infrastructure costs over the next 50 years. Table 11-9 identifies costs by provider size and project year. Distribution and transmission projects make up the majority of the infrastructure costs, approximately 82 percent, of drinking water infrastructure costs in the region. Treatment and source water projects are distant second and third places respectively. Medium providers have the largest overall drinking water infrastructure costs. The largest infrastructure costs occur in the 2041-2060 period.

Table 11-9 Middle Arkansas Region – Drinking Water Infrastructure Cost Summary

Category [A, C]	Potential Funding Source [B]	Present - 2020 Infrastructure Need (millions of 2007 dollars)	2021-2040 Infrastructure Need (millions of 2007 dollars)	2041-2060 Infrastructure Need (millions of 2007 dollars)	Total Period Infrastructure Need (millions of 2007 dollars)
Small	DWSRF Eligible	$24	$458	$175	$657
	Non-DWSRF Eligible	$0	$0	$0	$0
Small Subtotal		$24	$458	$175	$657
Medium	DWSRF Eligible	$816	$233	$2,820	$3,869
	Non-DWSRF Eligible	$13	$19	$19	$51
Medium Subtotal		$829	$252	$2,839	$3,920
Large	DWSRF Eligible	$445	$680	$463	$1,588
	Non-DWSRF Eligible	$6	$7	$7	$20
Large Subtotal		$451	$687	$470	$1,608
Reservoir	DWSRF Eligible	$0	$0	$0	$0
	Non-DWSRF Eligible	$0	$26	$54	$80
Reservoir Subtotal		$0	$26	$54	$80
Total		$1,304	$1,423	$3,538	$6,265

[A] See Table 11-1 for more information on provider size. The "reservoir" category includes all regional reservoir rehabilitation projects.
[B] This study assumes that distribution projects for new growth and all reservoir projects are non-DWSRF eligible. All other projects were assumed to be DWSRF eligible.
[C] Small differences in values may result from rounding.

Section 12
Panhandle Regional Infrastructure Costs

This section provides some general information about the Panhandle region, identifies water providers selected for modeling and their project lists, and provides a cost summary for this region.

12.1 Panhandle –Regional Description

The Panhandle Watershed Planning Region is a 9,426-square-mile area including all or portions of Cimarron, Texas, Beaver, Harper, Woods, Ellis, Woodward, Dewey, Major, and Blaine Counties. There are 32 OCWP providers in this region. OCWP providers are those included in the 2008 OCWP survey and for which water demand projections were created. Table 12-1 shows the number of Panhandle water providers by stratum.

Table 12-1. Panhandle Region – Number of OCWP Providers by Stratum

Provider Size	Population [A]	Surface Water [B]	Groundwater [C]	Total
Large	>100,000	0	0	0
Medium	3,301 – 100,000	0	3	3
Small	<3,300	0	29	29
Total		**0**	**32**	**32**

[A] Population classification was based on 2060 projection (see *Water Demand Forecast Report* for more details on projections).

[B] Systems were classified as surface water if they have at least one source that is surface water or groundwater under the direct influence of surface water.

[C] Systems were classified as groundwater if they do not meet surface water definition or if their primary source of water is purchased from another provider.

12.2 Panhandle – Developing Project Lists

Two providers were used for cost modeling. The following sections discuss the project lists for each of these providers.

12.2.1 Panhandle – Large Water Providers

The Panhandle region has no large OCWP providers.

12.2.2 Panhandle – Medium Water Providers

The Panhandle region has three medium OCWP water providers. Information about each of these providers is shown in Table 12-2.

Table 12-2. Panhandle Region – Medium OCWP Providers

SWDIS Identifier	Provider Name	County	Source Water Type [A]	Did they participate in 2007 DWINS?	Did they participate in 2008 OCWP survey?	Projected 2060 Population [B]	Were they selected for cost modeling?
OK2007003	Guymon	Texas	GW	No	Yes	32,382	Yes
OK2007006	Hooker	Texas	GW	No	Yes	4,326	No
OK2007701	Woodward	Woodward	GW	No	Yes	17,328	No

[A] SW – Surface Water, GW – Groundwater, P – Purchased Water, GU – Groundwater Under Direct Influence of Surface Water. Systems are classified as surface water if they have at least one source that is surface water or groundwater under the direct influence of surface water (SW and GW designations). Systems are classified as groundwater if they do not meet surface water definition or if their primary source of water is purchased from another provider (GW, SWP, and GWP designations).

[B] Population based on 2060 projection (see Water Demand Forecast Report for more details on projections).

12.2.2.1 Surface Water Providers

The Panhandle region has no medium surface water OCWP providers.

12.2.2.2 Groundwater Providers

Three medium providers are grouped in this category. The City of Guymon was selected for cost modeling. Guymon participated in the 2008 OCWP.

Source Water Projects

One well rehabilitation project, for capacity of 8.47 mgd, was identified using the project list worksheet. Additionally, new wells and well houses for a capacity of 7.01 mgd also were included in the OCWP study.

Treatment Projects

Groundwater treatment rehabilitation projects, for capacity of 8.47 mgd and 7.01 mgd, were identified in the 2040 and 2060 periods respectively using the project list worksheet.

Storage Projects

Finished water storage rehabilitation projects, for capacity of 0.85 mgd and 0.70 mgd, were identified using the project list worksheet.

Distribution and Transmission Projects

Rehabilitation of one raw water transmission line with a capacity of 8.47 mgd and a new raw water transmission line with a capacity of 7.01 mgd were identified using the project list worksheet.

Many distribution projects were identified in the project list worksheet. Projects included rehabilitation and replacement of existing pipelines and installation of new pipelines to accommodate anticipated growth. In addition, pumping projects totaling 15.47 mgd were identified in the project list worksheet for inclusion in the OCWP study.

Other Projects

No projects were identified in this infrastructure category.

12.2.2.3 Summary

Table 12-3 presents the drinking water cost through 2060 of the Panhandle medium provider stratum by infrastructure type. Figure 12-1 illustrates the drinking water costs over time.

Table 12-3. Panhandle Region – Medium Water Providers Costs by Infrastructure Type

Period [A]	Distribution and Transmission (millions of 2007 dollars)	Treatment (millions of 2007 dollars)	Storage (millions of 2007 dollars)	Source (millions of 2007 dollars)	Other (millions of 2007 dollars)	Total Infrastructure Need (millions of 2007 dollars)
Present-2020	$49	$0	$0	$0	$0	$49
2021-2040	$57	$2	$1	$9	$0	$69
2041-2060	$60	$2	$1	$6	$0	$69
Total	$166	$4	$2	$15	$0	$187

[A] Small differences in values may result from rounding.

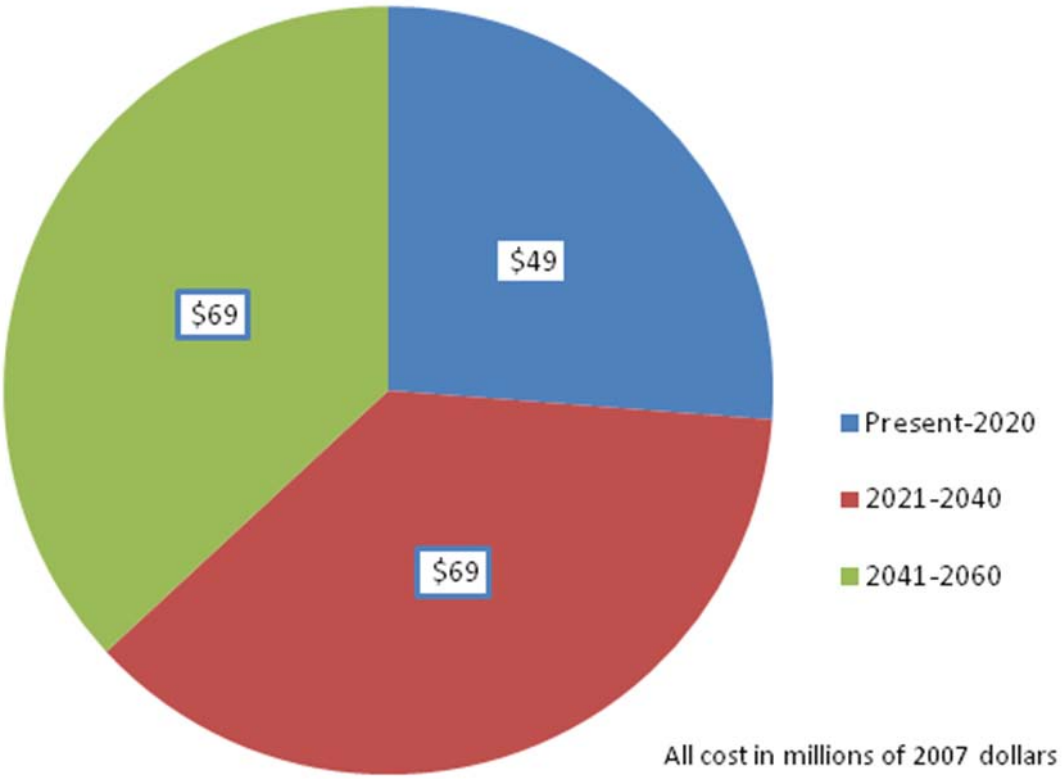

Figure 12-1. Panhandle Region – Medium Water Providers Costs Over Time

12.2.3 Panhandle – Small Water Providers

The Panhandle region has 29 small OCWP water providers. Information about each of these providers is shown in Table 12-4.

Table 12-4. Panhandle Region – Small OCWP Providers

SWDIS Identifier	Provider Name	County	Source Water Type [A]	Did they participate in 2007 DWINS?	Did they participate in 2008 OCWP survey?	Projected 2060 Population [B]	Were they selected for cost modeling?
OK2000402	Beaver Co RWD #1 Turpin	Beaver	GW	No	Yes	519	No
OK2000404	Beaver	Beaver	GW	No	Yes	1,734	No
OK2000405	Beaver Co RWD #2 (Gate)	Beaver	GW	No	No	118	No
OK2000406	Forgan	Beaver	GW	No	Yes	532	No
OK2001302	Keyes Utility Auth.	Cimarron	GW	No	Yes	368	No
OK2001303	Boise City PWA	Cimarron	GW	No	Yes	1,428	No
OK2002205	Seiling	Dewey	GW	Yes	Yes	896	Yes
OK2002301	Gage	Ellis	GW	No	Yes	412	No
OK2002303	Fargo	Ellis	GW	No	Yes	294	No
OK2002304	Shattuck	Ellis	GW	No	Yes	1,194	No
OK2003001	Harper Co Water Corp	Harper	GW	No	Yes	206	No
OK2003002	Laverne	Harper	GW	No	Yes	1,112	No
OK2003003	Buffalo	Harper	GW	No	Yes	1,212	No
OK2007001	Optima	Texas	GW	No	Yes	897	No
OK2007004	Hardesty Utilities	Texas	GW	No	No	547	No
OK2007005	Goodwell	Texas	GW	No	Yes	2,863	No
OK2007009	Texhoma	Texas	GW	No	Yes	2,241	No
OK2007010	Texas County RWD #1	Texas	GW	No	Yes	600	No
OK2007013	Tyrone	Texas	GW	No	Yes	2,112	No
OK2007604	Waynoka	Woods	GW	No	Yes	1,055	No
OK2007706	Woodward Co RWD #1	Woodward	GW	No	Yes	433	No
OK2007707	Dewey Co RWD #3	Woodward	GW	No	Yes	790	No
OK2007708	Quinlan Community RWD #1	Woodward	GW	No	Yes	215	No
OK2007709	Mooreland	Woodward	GW	No	Yes	1,428	No
OK2007710	Woodward Co RWD #2	Woodward	GW	No	No	945	No

Table 12-4. Panhandle Region – Small OCWP Providers, continued

SWDIS Identifier	Provider Name	County	Source Water Type [A]	Did they participate in 2007 DWINS?	Did they participate in 2008 OCWP survey?	Projected 2060 Population [B]	Were they selected for cost modeling?
OK2007741	Sharon Utilities	Woodward	GW	No	Yes	151	No
OK3007601	Freedom	Woods	GWP	No	Yes	291	No
OK3007603	Woods Co RWD #2	Woods	GWP	No	No	44	No
OK3007701	Fort Supply PWA	Woodward	GWP	No	Yes	383	No

[A] SW – Surface Water, GW – Groundwater, P – Purchased Water, GU – Groundwater Under Direct Influence of Surface Water. Systems are classified as surface water if they have at least one source that is surface water or groundwater under the direct influence of surface water (SW and GW designations). Systems are classified as groundwater if they do not meet surface water definition or if their primary source of water is purchased from another provider (GW, SWP, and GWP designations).

[B] Population based on 2060 projection (see Water Demand Forecast Report for more details on projections).

12.2.3.1 Surface Water Providers

The Panhandle region has no small surface water OCWP providers.

12.2.3.2 Groundwater Providers

There are 29 small providers in this category; three of these primarily purchase water. The City of Seiling was selected for cost modeling. Seiling participated in the 2007 DWINS and 2008 OCWP survey. Using the methodology described in Section 2.2, a project list was created.

Source Water Projects

The 2007 DWINS identified rehabilitation of existing wells and new well houses. Projects had a total capacity of 1.27 mgd and were included in the OCWP study.

Treatment Projects

The 2007 DWINS identified rehabilitation of a reverse osmosis WTP with a capacity of 0.576. Using the project list worksheet, an additional rehabilitation of the WTP was included in the OCWP study.

Storage Projects

The 2007 DWINS identified finished water storage tank rehabilitation projects. Projects with a total capacity of 0.325 were included in the OCWP study.

Distribution and Transmission Projects

Rehabilitation of one raw water transmission line with a capacity of 1.38 mgd was identified using the project list worksheet.

Many distribution projects were identified in the project list worksheet and the 2007 DWINS. Projects included rehabilitation and replacement of existing pipelines and installation of new pipelines to accommodate anticipated growth. Additionally, the 2007 DWINS identified pumping, and meter replacement projects.

Other Projects

The 2007 DWINS identified an emergency power project. This project is included in the OCWP study.

12.2.3.3 Summary

Table 12-5 presents the drinking water cost through 2060 of the Panhandle small provider stratum by infrastructure type. Figure 12-2 illustrates the drinking water costs over time.

Table 12-5 Panhandle Region – Small Water Providers Costs by Infrastructure Type

Period [A]	Distribution and Transmission (millions of 2007 dollars)	Treatment (millions of 2007 dollars)	Storage (millions of 2007 dollars)	Source (millions of 2007 dollars)	Other (millions of 2007 dollars)	Total Infrastructure Need (millions of 2007 dollars)
Present-2020	$231	$40	$9	$6	$1	$287
2021-2040	$291	$0	$0	$0	$0	$291
2041-2060	$89	$40	$0	$0	$0	$129
Total	$611	$80	$9	$6	$1	$707

[A] Small differences in values may result from rounding.

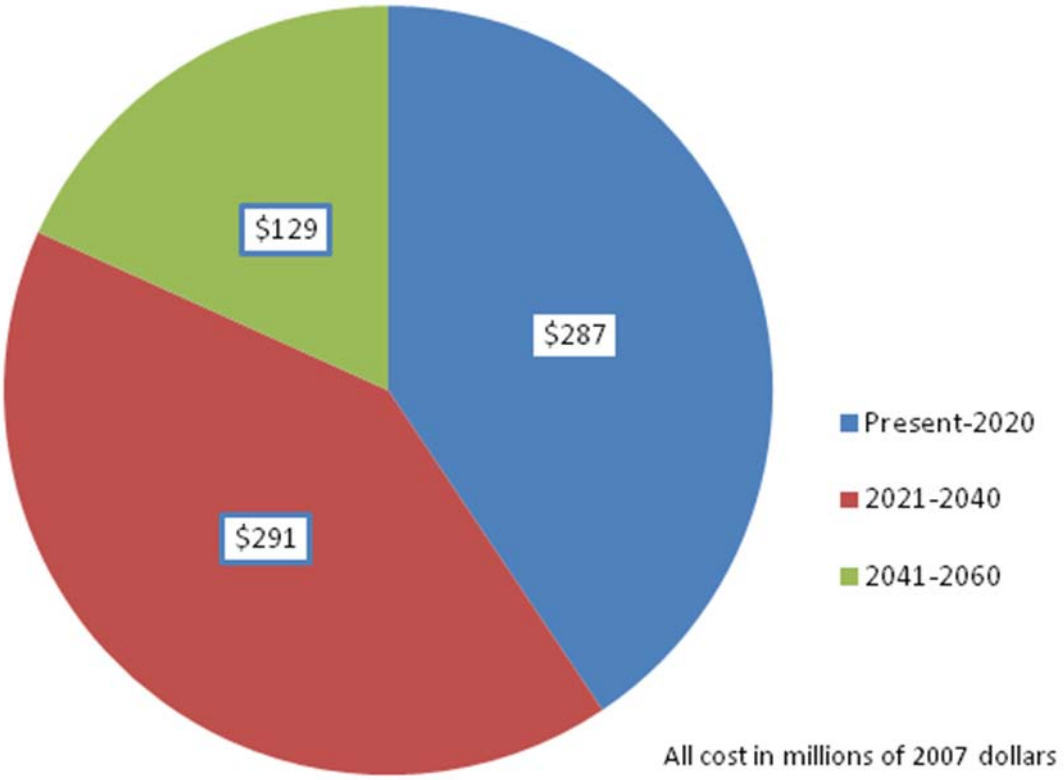

Figure 12-2. Panhandle Region – Small Water Provider Costs Over Time

12.3 Panhandle – Regional Major Reservoir Projects

There are three major reservoirs in the Panhandle region. Table 12-6 identifies the reservoirs and project size. Figure 12-3 illustrates project cost over time.

Table 12-6 Panhandle Region – Major Reservoir Rehabilitation Projects

Reservoir Name	Storage Considered for Rehabilitation [A] (AF)	Project Year
Canton Lake	38,000	2060
Fort Supply Lake	400	2060
Optima Lake	117,650	2080

[A] The amount of storage for rehabilitation is based on the municipal water supply storage. If unknown, the full normal pool storage was used. Reservoirs with no designated municipal water supply storage were included in the study but show zero in the rehabilitation column

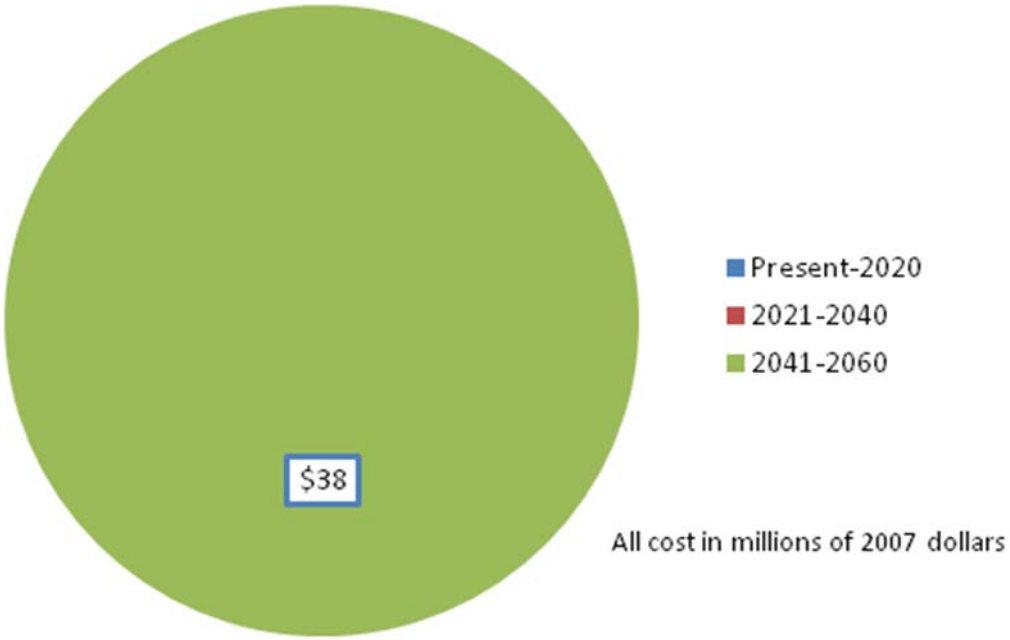

Figure 12-3. Panhandle Region – Major Reservoir Rehabilitation Costs Over Time

12.4 Panhandle – Regional Cost Summary

This section presents the Panhandle regional drinking water infrastructure costs over the next 50 years. Table 12-7 identifies costs by provider size and project year. Distribution and transmission projects make up the majority of the infrastructure costs, over 83 percent, of drinking water infrastructure costs in the region. Small providers have the largest overall drinking water infrastructure costs. The largest infrastructure costs occur in the 2021 – 2040 period.

Table 12-7 Panhandle Region – Drinking Water Infrastructure Cost Summary

Category [A, C]	Potential Funding Source [B]	Present - 2020 Infrastructure Need (millions of 2007 dollars)	2021-2040 Infrastructure Need (millions of 2007 dollars)	2041-2060 Infrastructure Need (millions of 2007 dollars)	Total Period Infrastructure Need (millions of 2007 dollars)
Small	DWSRF Eligible	$288	$291	$129	$708
	Non-DWSRF Eligible	$0	$0	$0	$0
Small Subtotal		$288	$291	$129	$708
Medium	DWSRF Eligible	$48	$68	$68	$184
	Non-DWSRF Eligible	$0	$0	$0	$0
Medium Subtotal		$48	$68	$68	$184
Large	DWSRF Eligible	$0	$0	$0	$0
	Non-DWSRF Eligible	$0	$0	$0	$0
Large Subtotal		$0	$0	$0	$0
Reservoir	DWSRF Eligible	$0	$0	$0	$0
	Non-DWSRF Eligible	$0	$0	$38	$38
Reservoir Subtotal		$0	$0	$38	$38
Total		$336	$359	$235	$930

A See Table 12-1 for more information on provider size. The "reservoir" category includes all regional reservoir rehabilitation projects.

B This study assumes that distribution projects for new growth and all reservoir projects are non-DWSRF eligible. All other projects were assumed to be DWSRF eligible.

C Small differences in values may result from rounding.

Section 13
Southeast Regional Infrastructure Costs

This section provides some general information about the Southeast region, identifies water providers selected for modeling and their project lists, and provides a cost summary for this region.

13.1 Southeast –Regional Description

The Southeast Watershed Planning Region is a 4,437-square-mile area including all or portions of Pittsburg, Latimer, LeFlore, Atoka, Pushmataha, McCurtain, and Choctaw Counties. There are 27 OCWP providers in this region. OCWP providers are those included in the 2008 OCWP survey and for which water demand projections were created. Table 13-1 shows the number of Southeast water providers by stratum.

Table 13-1. Southeast Region – Number of OCWP Providers by Stratum

Provider Size	Population [A]	Surface Water [B]	Groundwater [C]	Total
Large	>100,000	0	0	0
Medium	3,301 – 100,000	6	1	7
Small	<3,300	3	15	18
Total		9	16	25

[A] Population classification was based on 2060 projection (see *Water Demand Forecast Report* for more details on projections).

[B] Systems were classified as surface water if they have at least one source that is surface water or groundwater under the direct influence of surface water.

[C] Systems were classified as groundwater if they do not meet surface water definition or if their primary source of water is purchased from another provider.

13.2 Southeast – Developing Project Lists

Two providers were used for cost modeling. The following sections discuss the project lists for each of these providers.

13.2.1 Southeast – Large Water Providers

The Southeast region has no large OCWP providers.

13.2.2 Southeast – Medium Water Providers

The Southeast region has seven medium OCWP water providers. Information about each of these providers is shown in Table 13-2.

Table 13-2. Southeast Region – Medium OCWP Providers

SWDIS Identifier	Provider Name	County	Source Water Type [A]	Did they participate in 2007 DWINS?	Did they participate in 2008 OCWP survey?	Projected 2060 Population [B]	Were they selected for cost modeling?
OK1010203	Idabel PWA	McCurtain	SW	#N/A	Yes	8,286	No
OK1010207	McCurtain Co RWD #8 (Mt. Fork)	McCurtain	SW	Yes	Yes	6,802	Yes
OK1010214	Broken Bow PWA	McCurtain	SW	Yes	No	17,857	No
OK1010302	Antlers	Pushmataha	SW	No	No	4,510	No
OK1010314	Hugo	Choctaw	SW	No	Yes	6,251	No
OK1010318	Pushmataha Co RWD #3	Pushmataha	SW	No	Yes	7,968	No
OK3004806	McCurtain Co RWD # 1	McCurtain	SWP	No	Yes	4,467	No

[A] SW – Surface Water, GW – Groundwater, P – Purchased Water, GU – Groundwater Under Direct Influence of Surface Water. Systems are classified as surface water if they have at least one source that is surface water or groundwater under the direct influence of surface water (SW and GW designations). Systems are classified as groundwater if they do not meet surface water definition or if their primary source of water is purchased from another provider (GW, SWP, and GWP designations).

[B] Population based on 2060 projection (see Water Demand Forecast Report for more details on projections).

13.2.2.1 Surface Water Providers

There are six medium surface water providers in the Eufaula region. McCurtain County RWD #8 (Mt. Fork) participated in the 2007 DWINS and 2008 OCWP survey and was selected for cost modeling. Using the methodology described in Section 2.2, a project list was created.

Source Water Projects

Using the project list worksheet, two surface water intake rehabilitation projects for Mountain Fork River were included in the OCWP study.

Treatment Projects

A new 2.0 membrane WTP project was identified in the 2007 DWINS. Using the project list worksheet, rehabilitation of the 2.0-mgd membrane WTP in 2060 also was included in the OCWP study.

Storage Projects

Rehabilitation projects totaling 1.1 MG of finished water storage were identified in the 2007 DWINS and were included in the OCWP study.

Distribution and Transmission Projects

A combination of new and rehabilitation of three raw water transmission lines, with a total capacity of 2.0 mgd, were identified using the project list worksheet.

Many distribution projects were identified in the project list worksheet and the 2007 DWINS. Projects included rehabilitation and replacement of existing pipelines and installation of new pipelines to accommodate anticipated growth. Additionally, the 2007 DWINS identified some booster pump and water meter replacement projects.

Other Projects

No projects were identified in this infrastructure category.

13.2.2.2 Groundwater Providers

One medium provider is grouped in this category because it primarily purchases water. However, since it was not a provider suitable for cost modeling, the Eufaula region was used to estimate the cost for this stratum.

13.2.2.3 Summary

Table 13-3 presents the drinking water cost through 2060 of the Southeast medium provider stratum by infrastructure type. Figure 13-1 illustrates the drinking water costs over time.

Table 13-3. Southeast Region – Medium Water Providers Costs by Infrastructure Type

Period [A]	Distribution and Transmission (millions of 2007 dollars)	Treatment (millions of 2007 dollars)	Storage (millions of 2007 dollars)	Source (millions of 2007 dollars)	Other (millions of 2007 dollars)	Total Infrastructure Need (millions of 2007 dollars)
Present-2020	$227	$30	$2	$7	$0	$266
2021-2040	$347	$0	$0	$0	$0	$347
2041-2060	$175	$29	$0	$0	$0	$204
Total	$749	$59	$2	$7	$0	$817

[A] Small differences in values may result from rounding.

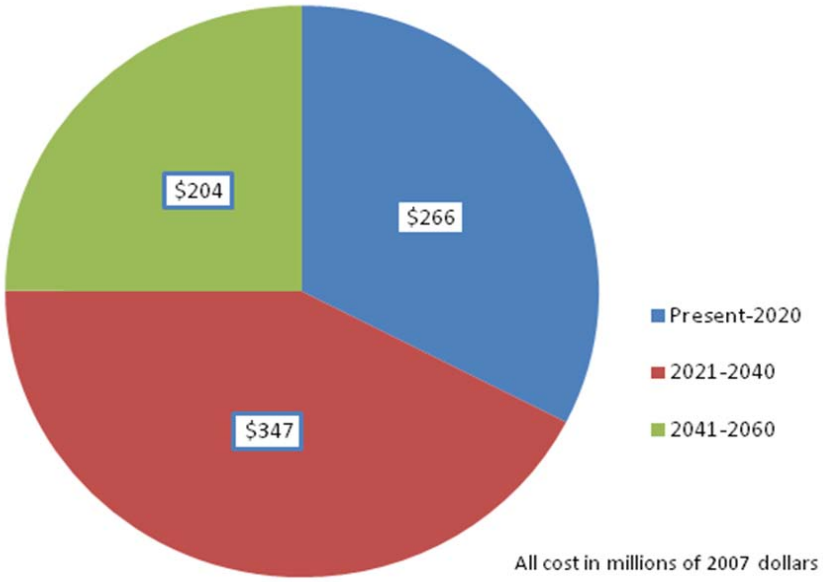

Figure 13-1. Southeast Region – Medium Water Providers Costs Over Time

13.2.3 Southeast – Small Water Providers

The Southeast region has 20 small OCWP water providers. Information about each of these providers is shown in Table 13-4.

Table 13-4. Southeast Region – Small OCWP Providers

SWDIS Identifier	Provider Name	County	Source Water Type [A]	Did they participate in 2007 DWINS?	Did they participate in 2008 OCWP survey?	Projected 2060 Population [B]	Were they selected for cost modeling?
OK1010304	Talihina	Leflore	SW	Yes	Yes	1,808	Yes
OK1010319	Sardis Lake Water Authority	Pushmataha	SW	No	Yes	532	No
OK2001207	Fort Towson	Choctaw	GU	No	Yes	697	No
OK3001203	Choctaw RWD #2	Choctaw	SWP	No	Yes	511	No
OK3001209	Choctaw Co RWSG & SWMD #3	Choctaw	SWP	No	Yes	282	No
OK3003903	Latimer Co RWD #2	Latimer	SWP	No	Yes	1,631	Dist. Only
OK3004801	McCurtain Co RWD #7	McCurtain	SWP	No	Yes	2,174	No
OK3004804	McCurtain Co RWD #5 (Hochatown)	McCurtain	SWP	No	Yes	1,466	No
OK3004809	Garvin	McCurtain	SWP	No	Yes	266	No
OK3004810	Haworth	McCurtain	SWP	No	Yes	447	No
OK3004811	Wright City PWA	McCurtain	SWP	No	Yes	1,134	No
OK3004812	Valliant PWA	McCurtain	SWP	No	Yes	1,138	No
OK3004814	McCurtain Co RWD #2	McCurtain	SWP	No	No	899	No
OK3004820	McCurtain Co RWD #9	McCurtain	SWP	No	Yes	1,190	No
OK3006402	Pushmataha Co RWD #2 (Albion)	Pushmataha	SWP	No	Yes	1,753	No
OK3006403	Pushmataha Co RWD #1	Pushmataha	SWP	No	Yes	2,079	No
OK3006408	Clayton PWA	Pushmataha	SWP	No	No	1,242	No
OK3006410	Pushmataha Co RWD #5 (Nashoba)	Pushmataha	SWP	No	Yes	456	No

[A] SW – Surface Water, GW – Groundwater, P – Purchased Water, GU – Groundwater Under Direct Influence of Surface Water. Systems are classified as surface water if they have at least one source that is surface water or groundwater under the direct influence of surface water (SW and GW designations). Systems are classified as groundwater if they do not meet surface water definition or if their primary source of water is purchased from another provider (GW, SWP, and GWP designations).

[B] Population based on 2060 projection (see Water Demand Forecast Report for more details on projections).

13.2.3.1 Surface Water Providers

There are three small surface water providers in the Southeast region. The City of Talihina participated in the 2007 DWINS and 2008 OCWP survey and was selected for cost modeling. Latimer County RWD #2 was used to supplement the distribution information for Talihina. Using the methodology described in Section 2.2, a project list was created.

Source Water Projects

Using the project list worksheet, two surface water intake rehabilitation projects for Carl Albert Lake were included in the OCWP study.

Treatment Projects

A 0.75-mgd WTP rehabilitation project was identified in the 2007 DWINS. Using the project list worksheet, a new 0.375-mgd WTP project in 2040 and 0.75-mgd WTP rehabilitation project in 2060 were included in the OCWP study.

Storage Projects

Two rehabilitation projects, totaling 1.0 MG, of finished water storage tanks were included in the OCWP study.

Distribution and Transmission Projects

A rehabilitation of a 1.8-mgd raw water transmission line was identified using the project list worksheet.

Many distribution projects were identified in the project list worksheet. Projects included rehabilitation and replacement of existing pipelines and installation of new pipelines to accommodate anticipated growth. Additionally, the 2007 DWINS identified some booster pump and water meter replacement projects.

Other Projects

No projects were identified in this infrastructure category.

13.2.3.2 Groundwater Providers

There are 17 small providers in this category; all of these primarily purchase water. However, since there was not a provider suitable for cost modeling, the Eufaula region was used to estimate the cost for this stratum.

13.2.3.3 Summary

Table 13-5 presents the drinking water cost through 2060 of the Southeast small provider stratum by infrastructure type. Figure 13-2 illustrates the drinking water costs over time.

Table 13-5. Southeast Region – Small Water Providers Costs by Infrastructure Type

Period [A]	Distribution and Transmission (millions of 2007 dollars)	Treatment (millions of 2007 dollars)	Storage (millions of 2007 dollars)	Source (millions of 2007 dollars)	Other (millions of 2007 dollars)	Total Infrastructure Need (millions of 2007 dollars)
Present-2020	$7	$8	$2	$2	$0	$19
2021-2040	$745	$6	$0	$1	$0	$752
2041-2060	$431	$9	$0	$0	$0	$440
Total	$1,183	$23	$2	$3	$0	$1,211

[A] Small differences in values may result from rounding.

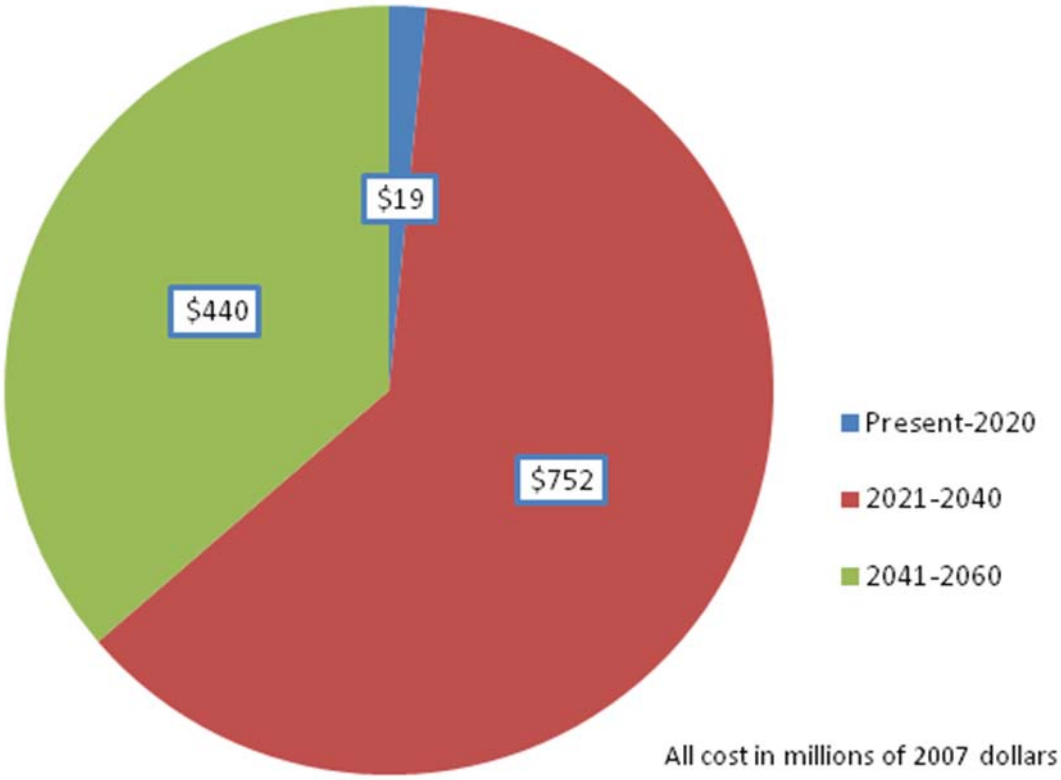

Figure 13-2. Southeast Region – Small Water Providers Costs Over Time

13.3 Southeast – Regional Major Reservoir Projects

There are five major reservoirs in the Southeast region. Table 13-6 identifies the reservoirs and project size. No reservoir rehabilitation projects occur within the OCWP planning period.

Table 13-6. Southeast Region – Major Reservoir Rehabilitation Projects

Reservoir Name	Storage Considered for Rehabilitation [A] (AF)	Project Year
Broken Bow Lake	152,500	2080
Carl Albert Lake	2,739	2080
Hugo Lake	47,600	2080
Pine Creek Lake	49,400	2080
Sardis Lake	297,200	2080

[A] The amount of storage for rehabilitation is based on the municipal water supply storage. If unknown, the full normal pool storage was used. Reservoirs with no designated municipal water supply storage were included in the study but show zero in the rehabilitation column

13.4 Southeast – Regional Cost Summary

This section presents the Southeast regional drinking water infrastructure costs over the next 50 years. Table 13-7 identifies costs by provider size and project year. Distribution and transmission projects make up the majority of the infrastructure costs, approximately 74 percent, of drinking water infrastructure costs in the region. Small providers have the largest overall drinking water infrastructure costs. The largest infrastructure costs occur in the 2021 - 2040 period.

Table 13-7 Southeast Region – Drinking Water Infrastructure Cost Summary

Category [A, C]	Potential Funding Source [B]	Present - 2020 Infrastructure Need (millions of 2007 dollars)	2021-2040 Infrastructure Need (millions of 2007 dollars)	2041-2060 Infrastructure Need (millions of 2007 dollars)	Total Period Infrastructure Need (millions of 2007 dollars)
Small	DWSRF Eligible	$15	$746	$435	$1,196
	Non-DWSRF Eligible	$3	$5	$5	$13
Small Subtotal		$18	$751	$440	$1,209
Medium	DWSRF Eligible	$265	$345	$201	$811
	Non-DWSRF Eligible	$1	$2	$2	$5
Medium Subtotal		$266	$347	$203	$816
Large	DWSRF Eligible	$0	$0	$0	$0
	Non-DWSRF Eligible	$0	$0	$0	$0
Large Subtotal		$0	$0	$0	$0
Reservoir	DWSRF Eligible	$0	$0	$0	$0
	Non-DWSRF Eligible	$0	$0	$0	$0
Reservoir Subtotal		$0	$0	$0	$0
Total		$284	$1,098	$643	$2,025

[A] See Table 13-1 for more information on provider size. The "reservoir" category includes all regional reservoir rehabilitation projects; however no rehabilitation projects occur within the OCWP planning range.
[B] This study assumes that distribution projects for new growth and all reservoir projects are non-DWSRF eligible. All other projects were assumed to be DWSRF eligible.
[C] Small differences in values may result from rounding.

Section 14
Southwest Regional Infrastructure Costs

This section provides some general information about the Southwest region, identifies water providers selected for modeling and their project lists, and provides a cost summary for this region.

14.1 Southwest –Regional Description

The Southwest Watershed Planning Region is a 4,045-square-mile area including all or portions of Roger Mills, Beckham, Washita, Harmon, Greer, Kiowa, Jackson, Tillman, and Comanche Counties. There are 36 OCWP providers in this region. OCWP providers are those included in the 2008 OCWP survey and for which water demand projections were created. Table 14-1 shows the number of Southwest water providers by stratum.

Table 14-1 Southwest Region – Number of OCWP Providers by Stratum

Provider Size	Population [A]	Surface Water [B]	Groundwater [C]	Total
Large	>100,000	0	0	0
Medium	3,301 – 100,000	2	1	3
Small	<3,300	1	32	33
Total		**3**	**33**	**36**

[A] Population classification was based on 2060 projection (see *Water Demand Forecast Report* for more details on projections).

[B] Systems were classified as surface water if they have at least one source that is surface water or groundwater under the direct influence of surface water.

[C] Systems were classified as groundwater if they do not meet surface water definition or if their primary source of water is purchased from another provider.

14.2 Southwest – Developing Project Lists

Four providers were used for cost modeling. The following sections discuss the project lists for each of these providers.

14.2.1 Southwest – Large Water Providers

The Southwest region has no large OCWP providers.

14.2.2 Southwest – Medium Water Providers

The Southwest region has three medium OCWP water providers. Information about each of these providers is shown in Table 14-2.

Table 14-2. Southwest Region – Medium OCWP Providers

SWDIS Identifier	Provider Name	County	Source Water Type [A]	Did they participate in 2007 DWINS?	Did they participate in 2008 OCWP survey?	Projected 2060 Population [B]	Were they selected for cost modeling?
OK1011501	Altus	Jackson	SW	No	Yes	26,409	No
OK1011502	Hobart	Kiowa	SW	No	Yes	4,121	Yes
OK2000501	Elk City	Beckham	GW	No	Yes	18,905	Yes

[A] SW – Surface Water, GW – Groundwater, P – Purchased Water, GU – Groundwater Under Direct Influence of Surface Water. Systems are classified as surface water if they have at least one source that is surface water or groundwater under the direct influence of surface water (SW and GW designations). Systems are classified as groundwater if they do not meet surface water definition or if their primary source of water is purchased from another provider (GW, SWP, and GWP designations).

[B] Population based on 2060 projection (see Water Demand Forecast Report for more details on projections).

14.2.2.1 Surface Water Providers

There are two medium surface water providers in the Southwest region. The City of Hobart participated in the 2008 OCWP survey and was selected for cost modeling. Using the methodology described in Section 2.2, a project list was created.

Source Water Projects

Using the project list worksheet, one surface water intake rehabilitation project for Rocky Lake was included in the OCWP study.

Treatment Projects

Using the project list worksheet, rehabilitation of 2-mgd WTP in 2020 and 2060 was included in the OCWP study.

Storage Projects

Rehabilitation projects totaling 0.2 MG of finished water storage were identified using the project list worksheet.

Distribution and Transmission Projects

Rehabilitation of one raw water transmission line, with a total capacity of 1.15 mgd, was identified using the project list worksheet.

Many distribution projects were identified in the project list worksheet and. Projects included rehabilitation and replacement of existing pipelines and installation of new pipelines to accommodate anticipated growth.

Other Projects

No projects were identified in this infrastructure category.

14.2.2.2 Groundwater Providers

There is only one medium groundwater provider. Elk City participated in the 2008 OCWP.

Source Water Projects

Using the project list worksheet, a well rehabilitation project for 4.4 mgd was included in the OCWP study. The project date was based on the average age of Elk City's existing wells.

Treatment Projects

Using the project list worksheet, a 13.0-mgd groundwater chemical treatment was included in the OCWP study. Information on Elk City's existing treatment technology was not available.

Storage Projects

Using the project list worksheet, rehabilitation of 1.3 MG of finished water storage tank was included in the OCWP study.

Distribution and Transmission Projects

Rehabilitation of one raw water transmission line with a capacity of 13.0 mgd was identified using the project list worksheet.

Many distribution projects were identified in the project list worksheet. Projects included rehabilitation and replacement of existing pipelines and installation of new pipelines to accommodate anticipated growth. In addition, a 13.0-mgd pumping project was included in the OCWP study.

Other Projects

No projects were identified in this infrastructure category.

14.2.2.3 Summary

Table 14-3 presents the drinking water cost through 2060 of the Southwest medium provider stratum by infrastructure type. Figure 14-1 illustrates the drinking water costs over time.

Table 14-3. Southwest Region – Medium Water Providers Costs by Infrastructure Type

Period [A]	Distribution and Transmission (millions of 2007 dollars)	Treatment (millions of 2007 dollars)	Storage (millions of 2007 dollars)	Source (millions of 2007 dollars)	Other (millions of 2007 dollars)	Total Infrastructure Need (millions of 2007 dollars)
Present-2020	$116	$11	$0	$1	$0	$128
2021-2040	$63	$1	$0	$1	$0	$65
2041-2060	$32	$11	$0	$0	$0	$43
Total	$211	$23	$0	$2	$0	$236

[A] Small differences in values may result from rounding.

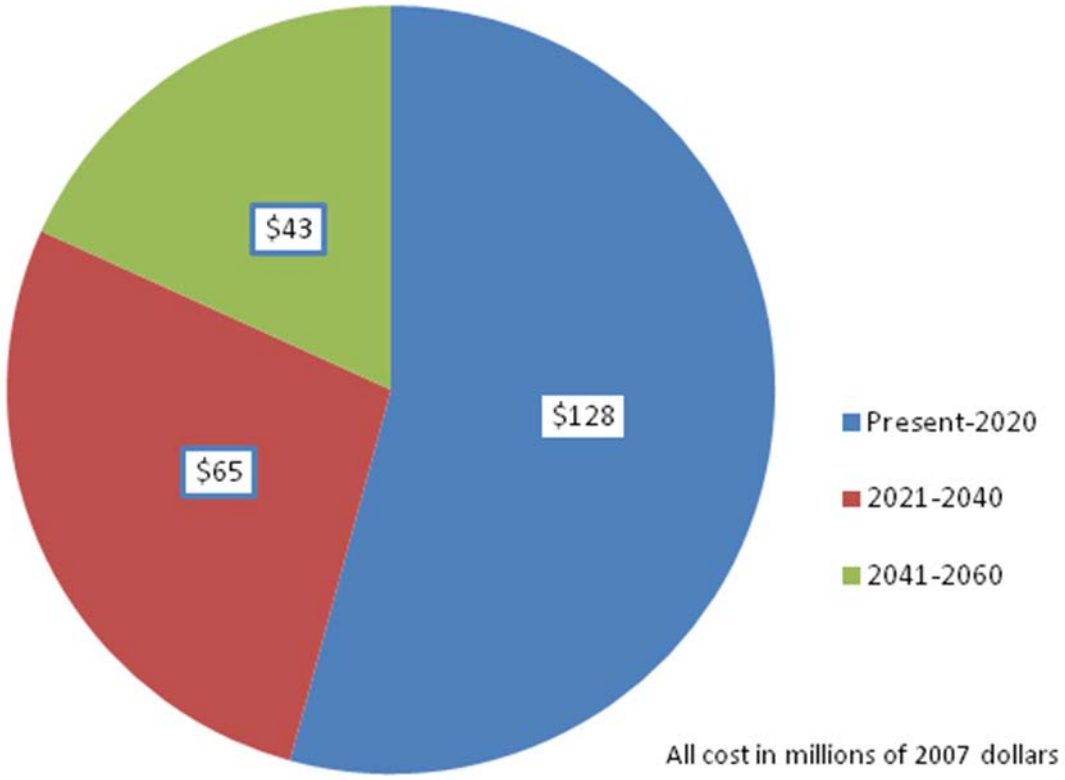

Figure 14-1. Southwest Region – Medium Water Providers Costs Over Time

14.2.3 Southwest – Small Water Providers

The Southwest region has 33 small OCWP water providers. Information about each of these providers is shown in Table 14-4.

Table 14-4. Southwest Region – Small OCWP Providers

SWDIS Identifier	Provider Name	County	Source Water Type [A]	Did they participate in 2007 DWINS?	Did they participate in 2008 OCWP survey?	Projected 2060 Population [B]	Were they selected for cost modeling?
OK1011503	Snyder	Kiowa	SW	No	Yes	1,589	Yes
OK2000502	Erick	Beckham	GW	No	Yes	1,606	Dist. Only
OK2000505	Beckham Co RWD #1	Beckham	GW	No	Yes	2,017	No
OK2000508	Sayre	Beckham	GW	Yes	Yes	1,754	Yes
OK2000510	Beckham Co RWD #2	Beckham	GW	No	Yes	623	No
OK2000547	Beckham Co RWD #3	Beckham	GW	No	Yes	1,513	No
OK2002801	Willow	Greer	GW	No	Yes	124	No
OK2002802	Mangum PWS	Greer	GW	No	Yes	3,057	No
OK2002804	Granite PWS	Greer	GWP	No	Yes	1,004	No
OK2002806	Thirsty Water Corp	Greer	GW	No	No	210	No

Table 14-4. Southwest Region – Small OCWP Providers, continued

SWDIS Identifier	Provider Name	County	Source Water Type [A]	Did they participate in 2007 DWINS?	Did they participate in 2008 OCWP survey?	Projected 2060 Population [B]	Were they selected for cost modeling?
OK2002901	Hollis	Harmon	GW	No	Yes	2,609	No
OK2002902	Harmon Water Corp	Harmon	GW	No	Yes	681	No
OK2003301	Duke Central Vue Water	Jackson	GW	No	No	391	No
OK2003304	Blair PWA	Jackson	GW	No	Yes	1,223	No
OK2003306	Jackson Co Water Corp	Jackson	GW	No	Yes	3,188	No
OK2003802	Roosevelt PWA	Kiowa	GW	No	Yes	290	No
OK2003806	Lone Wolf	Kiowa	GWP	No	Yes	504	No
OK2003880	Quartz Mountain Reg Water Auth	Kiowa	GWP	No	Yes	0	No
OK2007101	Tipton	Tillman	SWP	No	Yes	1,027	No
OK2007507	Dill City	Washita	GW	No	No	601	No
OK3000501	Carter	Beckham	GWP	No	Yes	492	No
OK3002801	Harmon Electric	Greer	GWP	No	No	79	No
OK3002802	Reed Water Corp	Greer	GWP	No	No	184	No
OK3002901	Gould PWA	Harmon	GWP	No	No	232	No
OK3003301	Eldorado	Jackson	SWP	No	Yes	508	No
OK3003302	Headrick	Jackson	GWP	No	Yes	143	No
OK3003304	Martha	Jackson	SWP	No	Yes	249	No
OK3003309	Olustee PWS	Jackson	SWP	No	Yes	799	No
OK3003311	Duke PWA	Jackson	SWP	No	No	522	No
OK3003804	Kiowa Co RWS&SWMD #1	Kiowa	GWP	No	Yes	190	No
OK3003807	Mountain Park, Town Of	Kiowa	SWP	No	Yes	505	No
OK3007501	Rocky	Washita	GWP	No	Yes	117	No
OK3007505	Sentinel PWS	Washita	GWP	No	No	969	No

[A] SW – Surface Water, GW – Groundwater, P – Purchased Water, GU – Groundwater Under Direct Influence of Surface Water. Systems are classified as surface water if they have at least one source that is surface water or groundwater under the direct influence of surface water (SW and GW designations). Systems are classified as groundwater if they do not meet surface water definition or if their primary source of water is purchased from another provider (GW, SWP, and GWP designations).

[B] Population based on 2060 projection (see Water Demand Forecast Report for more details on projections).

14.2.3.1 Surface Water Providers

There is one small surface water provider in the Southwest region. The City of Snyder participated in the 2008 OCWP survey and was selected for cost modeling. Using the methodology described in Section 2.2, a project list was created.

Source Water Projects
Using the project list worksheet, one surface water intake rehabilitation project for Tom Steed Reservoir was included in the OCWP study.

Treatment Projects
Using the project list worksheet, rehabilitation of a 0.21-mgd WTP in 2020 and 2060 were included in the OCWP study.

Storage Projects
Using the project list worksheet, rehabilitation of 0.02 MG of finished water storage tank was included in the OCWP study.

Distribution and Transmission Projects
Rehabilitation of one raw water transmission line with a capacity of 0.21 mgd was identified using the project list worksheet.

Many distribution projects were identified in the project list worksheet. Projects included rehabilitation and replacement of existing pipelines and installation of new pipelines to accommodate anticipated growth.

Other Projects
No projects were identified in this infrastructure category.

14.2.3.2 Groundwater Providers

There are 32 small providers in this category; 17 of these primarily purchase water. The City of Sayre was selected for cost modeling. Sayre participated in the 2007 DWINS and 2008 OCWP survey. Using the methodology described in Section 2.2, a project list was created.

Source Water Projects
The 2007 DWINS identified well rehabilitation projects with a total capacity of nearly 3.7 mgd. No other source infrastructure projects were identified.

Treatment Projects
The 2007 DWINS identified rehabilitation of 3.67-mgd chlorination treatment project. Using the project list worksheet, a 3.6-mgd chlorination treatment was included in the2060 period.

Storage Projects
From the 2007 DWINS, rehabilitation of approximately 2.3 MG of finished water storage tank was included in the OCWP study.

Distribution and Transmission Projects
Rehabilitation of one raw water transmission line with a capacity of 2.52 mgd was identified using the project list worksheet.

Many distribution projects were identified in the project list worksheet and the 2007 DWINS. Projects included rehabilitation and replacement of existing pipelines and installation of new pipelines to accommodate anticipated growth. In addition, pumping projects totaling 1.47-mgd capacity were identified in the 2007 DWINS. Other projects identified are water meter and lead service line replacement.

Other Projects

No projects were identified in this infrastructure category.

14.2.3.3 Summary

Table 14-5 presents the drinking water cost through 2060 of the Southwest small provider stratum by infrastructure type. Figure 14-2 illustrates the drinking water costs over time.

Table 14-5. Southwest Region – Small Water Providers Costs by Infrastructure Type

Period [A]	Distribution and Transmission (millions of 2007 dollars)	Treatment (millions of 2007 dollars)	Storage (millions of 2007 dollars)	Source (millions of 2007 dollars)	Other (millions of 2007 dollars)	Total Infrastructure Need (millions of 2007 dollars)
Present-2020	$195	$28	$42	$6	$0	$271
2021-2040	$483	$0	$0	$0	$0	$483
2041-2060	$136	$1	$0	$0	$0	$137
Total	$814	$29	$42	$6	$0	$891

[A] Small differences in values may result from rounding.

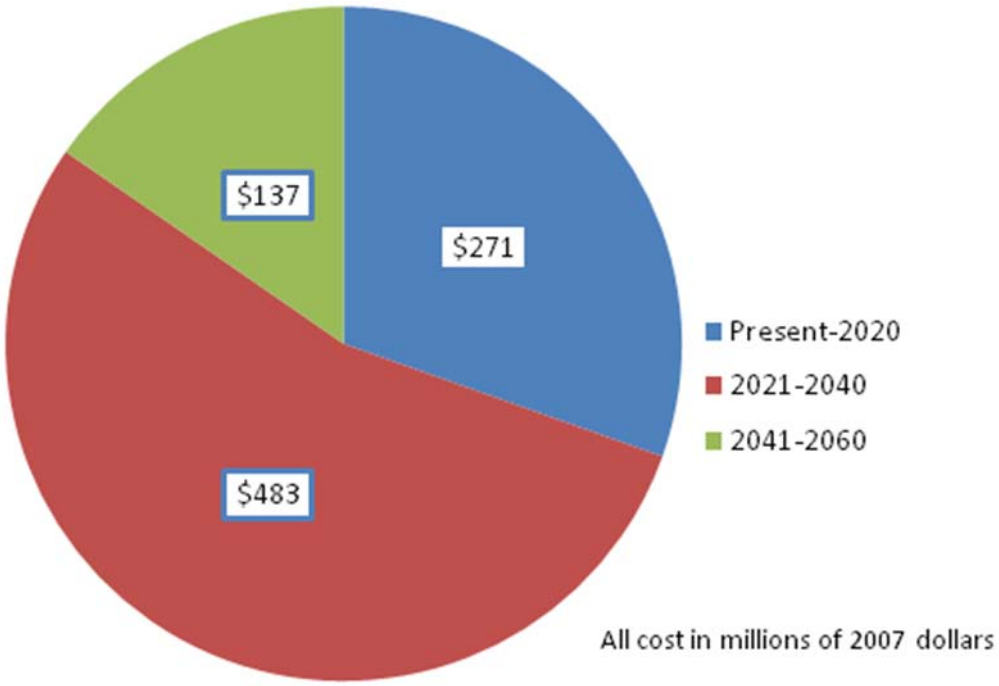

Figure 14-2. Southwest Region – Small Water Providers Costs Over Time

14.3 Southwest – Regional Major Reservoir Projects

There are five major reservoirs in the Southwest region. Table 14-6 identifies the reservoirs and project size. Figure 14-3 illustrates project cost over time.

Table 14-6. Southwest Region – Major Reservoir Rehabilitation Projects

Reservoir Name	Storage Considered for Rehabilitation [A] (AF)	Project Year
Altus City Lake	2,500	2040
Lake Elk City	2,583	2080
Lugert-Altus Reservoir	132,830	2060
Rocky Lake	4,210	2040
Tom Steed Reservoir	88,160	2080

[A] The amount of storage for rehabilitation is based on the municipal water supply storage. If unknown, the full normal pool storage was used. Reservoirs with no designated municipal water supply storage were included in the study but show zero in the rehabilitation column

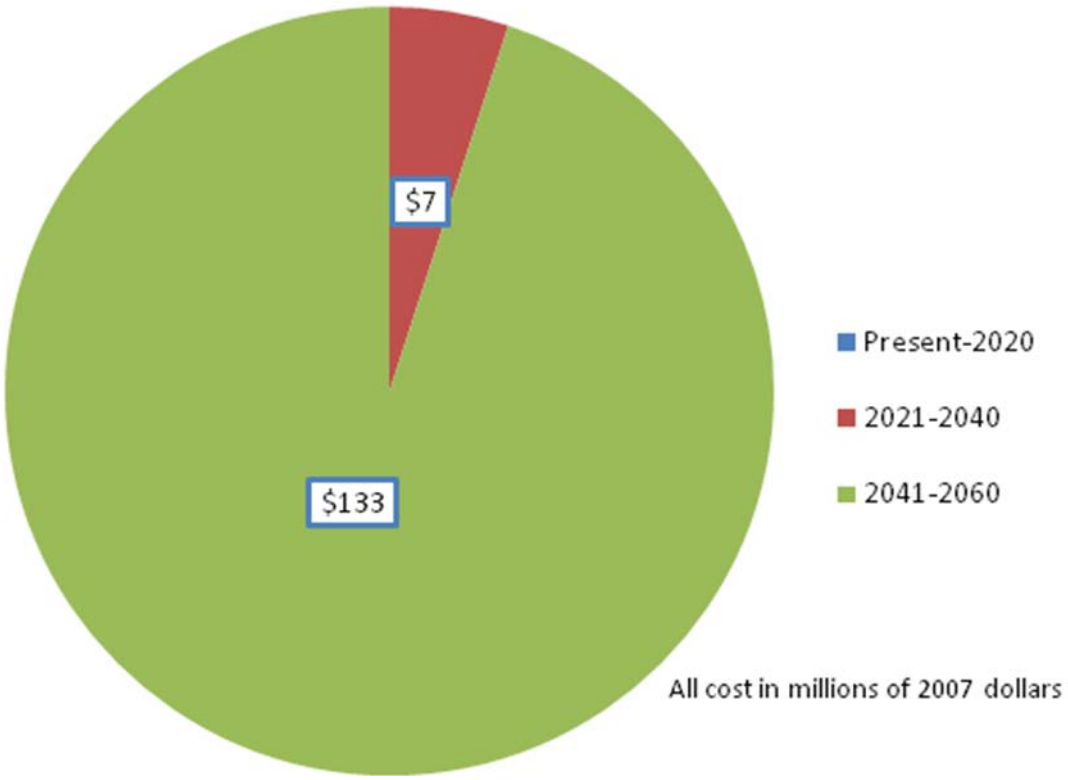

Figure 14-3. Southwest Region – Major Reservoir Rehabilitation Costs Over Time

14.4 Southwest – Regional Cost Summary

This section presents the Southwest regional drinking water infrastructure costs over the next 50 years. Table 14-7 identifies costs by provider size and project year. Distribution and transmission projects make up the majority, approximately 81 percent, of the drinking water infrastructure costs in the region. Source water projects are a distant second, nearly 12 percent of total cost. Small providers have the largest overall drinking water infrastructure costs. The largest infrastructure costs occur in the 2021 – 2040 period.

Table 14-7 Southwest Region – Drinking Water Infrastructure Cost Summary

Category [A, C]	Potential Funding Source [B]	Present - 2020 Infrastructure Need (millions of 2007 dollars)	2021-2040 Infrastructure Need (millions of 2007 dollars)	2041-2060 Infrastructure Need (millions of 2007 dollars)	Total Period Infrastructure Need (millions of 2007 dollars)
Small	DWSRF Eligible	$268	$478	$132	$878
	Non-DWSRF Eligible	$4	$5	$5	$14
Small Subtotal		$272	$483	$137	$892
Medium	DWSRF Eligible	$129	$64	$42	$235
	Non-DWSRF Eligible	$1	$1	$1	$3
Medium Subtotal		$130	$65	$43	$238
Large	DWSRF Eligible	$0	$0	$0	$0
	Non-DWSRF Eligible	$0	$0	$0	$0
Large Subtotal		$0	$0	$0	$0
Reservoir	DWSRF Eligible	$0	$0	$0	$0
	Non-DWSRF Eligible	$0	$7	$133	$140
Reservoir Subtotal		$0	$7	$133	$140
Total		$402	$555	$313	$1,270

[A] See Table 14-1 for more information on provider size. The "reservoir" category includes all regional reservoir rehabilitation projects.
[B] This study assumes that distribution projects for new growth and all reservoir projects are non-DWSRF eligible. All other projects were assumed to be DWSRF eligible.
[C] Small differences in values may result from rounding.

Section 15
Upper Arkansas Regional Infrastructure Costs

This section provides some general information about the Upper Arkansas region, identifies water providers selected for modeling and their project lists, and provides a cost summary for this region.

15.1 Upper Arkansas –Regional Description

The Upper Arkansas Watershed Planning Region is a 7,452-square-mile area including all or portions of Woods, Alfalfa, Grant, Kay, Osage, Garfield, Noble, Pawnee, Kingfisher, Logan, Payne, Creek, Tulsa, and Lincoln Counties. There are 99 OCWP providers in this region. OCWP providers are those included in the 2008 OCWP survey and for which water demand projections were created. Table 15-1 shows the number of Upper Arkansas water providers by stratum.

Table 15-1. Upper Arkansas Region – Number of OCWP Providers by Stratum

Provider Size	Population [A]	Surface Water [B]	Groundwater [C]	Total
Large	>100,000	0	0	0
Medium	3,301 – 100,000	7	8	15
Small	<3,300	7	78	85
Total		14	86	100

[A] Population classification was based on 2060 projection (see *Water Demand Forecast Report* for more details on projections).

[B] Systems were classified as surface water if they have at least one source that is surface water or groundwater under the direct influence of surface water.

[C] Systems were classified as groundwater if they do not meet surface water definition or if their primary source of water is purchased from another provider.

15.2 Upper Arkansas – Developing Project Lists

Five providers were used for cost modeling. The following sections discuss the project lists for each of these providers.

15.2.1 Upper Arkansas – Large Water Providers

The Upper Arkansas region has no large OCWP providers.

15.2.2 Upper Arkansas – Medium Water Providers

The Upper Arkansas region has 14 medium OCWP water providers. Information about each of these providers is shown in Table 15-2.

Table 15-2. Upper Arkansas Region – Medium OCWP Providers

SWDIS Identifier	Provider Name	County	Source Water Type [A]	Did they participate in 2007 DWINS?	Did they participate in 2008 OCWP survey?	Projected 2060 Population [B]	Were they selected for cost modeling?
OK1020909	Mannford	Creek	SW	Yes	No	3,927	No
OK1021101	Blackwell	Kay	SW	Yes	Yes	10,717	Yes
OK1021202	Ponca City Mun Water	Kay	SW	Yes	Yes	30,906	No
OK1021206	Perry Water & Light Dept	Noble	SW	Yes	No	6,166	No
OK1021209	Pawnee	Pawnee	SW	No	Yes	3,522	No
OK1021210	Cleveland North	Pawnee	SW	No	Yes	5,188	No
OK1021220	Stillwater Water Plant	Payne	SW	Yes	Yes	63,914	Yes
OK2001902	Drumright	Creek	GW	No	Yes	3,930	No
OK2001994	Creek Co RWD #5	Creek	GW	Yes	Yes	3,619	Yes
OK2002412	Enid	Garfield	GW	Yes	Yes	53,747	No
OK2003603	Tonkawa	Kay	GW	Yes	No	3,766	No
OK2005931	Pawnee Co RWD #1	Pawnee	GW	No	Yes	5,054	No
OK2006061	Cushing	Payne	GW	No	Yes	11,631	No
OK2007603	Alva	Woods	GW	No	Yes	5,519	No
OK3006030	Payne Co RW Corp #3	Payne	SWP	No	No	4,076	No

[A] SW – Surface Water, GW – Groundwater, P – Purchased Water, GU – Groundwater Under Direct Influence of Surface Water. Systems are classified as surface water if they have at least one source that is surface water or groundwater under the direct influence of surface water (SW and GW designations). Systems are classified as groundwater if they do not meet surface water definition or if their primary source of water is purchased from another provider (GW, SWP, and GWP designations).

[B] Population based on 2060 projection (see Water Demand Forecast Report for more details on projections).

15.2.2.1 Surface Water Providers

There are seven medium surface water providers in the Upper Arkansas region. The City of Stillwater and the City of Blackwell were selected for cost modeling to represent the average medium surface water provider. Both of these providers participated in the 2007 DWINS and 2008 OCWP survey. Using the methodology described in Section 2.2, a project list was created for each of the selected providers.

Source Water Projects – Stillwater

Using the project list worksheet, one surface water intake rehabilitation project for Kaw Lake was included in the OCWP study.

Treatment Projects – Stillwater

The 2007 DWINS identified a 21-mgd WTP rehabilitation project. Using the project list worksheet, rehabilitation of 21-mgd WTP in 2060 was included in the OCWP study.

Storage Projects – Stillwater

Rehabilitation projects totaling 7.25 MG of finished water storage were identified in the 2007 DWINS.

Distribution and Transmission Projects – Stillwater
Rehabilitation of one raw water transmission line was identified in the 2007 DWINS.

Many distribution projects were identified in the project list worksheet and the 2007 DWINS. Projects included rehabilitation and replacement of existing pipelines and installation of new pipelines to accommodate anticipated growth. Additionally, the 2007 DWINS identified a water meter replacement project.

Other Projects – Stillwater
No projects were identified in this infrastructure category.

Source Water Projects – Blackwell
Using the project list worksheet, one surface water intake rehabilitation project for Chikashia River was included in the OCWP study.

Treatment Projects – Blackwell
The 2007 DWINS identified a 3.3-mgd WTP rehabilitation project. Using the project list worksheet, rehabilitation and expansion of 3.5 mgd WTP in 2060 was included in the OCWP study.

Storage Projects – Blackwell
Rehabilitation projects totaling 2.75 MG of finished water storage were identified in the 2007 DWINS.

Distribution and Transmission Projects – Blackwell
Rehabilitation of one 3.2-mgd raw water transmission line was identified using the project list worksheet.

Many distribution projects were identified in the project list worksheet and the 2007 DWINS. Projects included rehabilitation and replacement of existing pipelines and installation of new pipelines to accommodate anticipated growth. Additionally, the 2007 DWINS identified water meter and lead service line replacement projects.

Other Projects – Blackwell
No projects were identified in this infrastructure category.

15.2.2.2 Groundwater Providers

There are eight medium groundwater provider; one of these primarily purchases water. Creek County RWD #5 was selected for cost modeling. This provider participated in the 2007 DWINS and 2008 OCWP.

Source Water Projects
The 2007 DWINS identified well rehabilitation projects totaling 0.5 mgd. Using the project list worksheet, a well rehabilitation project for 0.08 mgd was included in the OCWP study.

Treatment Projects

The 2007 DWINS identified chlorination rehabilitation projects totaling 0.5 mgd. Using the project list worksheet, a 0.5-mgd chlorination rehabilitation project was included in the2060 period.

Storage Projects

Using the project list worksheet and 2007 DWINS, rehabilitation projects for 1.03 MG of finished water storage tanks were included in the OCWP study.

Distribution and Transmission Projects

Rehabilitation of one raw water transmission line with a capacity of 0.5 mgd was identified using the project list worksheet.

Many distribution projects were identified in the project list worksheet and the 2007 DWINS. Projects included rehabilitation and replacement of existing pipelines and installation of new pipelines to accommodate anticipated growth. Additional water meter replacement projects identified in the 2007 DWINS were included in the OCWP study.

Other Projects

An emergency power project was identified in the 2007 DWINS and was included in the OCWP study.

15.2.2.3 Summary

Table 15-3 presents the drinking water cost through 2060 of the Upper Arkansas medium provider stratum by infrastructure type. Figure 15-1 illustrates the drinking water costs over time.

Table 15-3 Upper Arkansas Region – Medium Water Providers Costs by Infrastructure Type

Period [A]	Distribution and Transmission (millions of 2007 dollars)	Treatment (millions of 2007 dollars)	Storage (millions of 2007 dollars)	Source (millions of 2007 dollars)	Other (millions of 2007 dollars)	Total Infrastructure Need (millions of 2007 dollars)
Present-2020	$182	$137	$16	$1	$0	$336
2021-2040	$326	$0	$0	$10	$0	$336
2041-2060	$234	$137	$2	$0	$0	$373
Total	$742	$274	$18	$11	$0	$1,045

[A] Small differences in values may result from rounding.

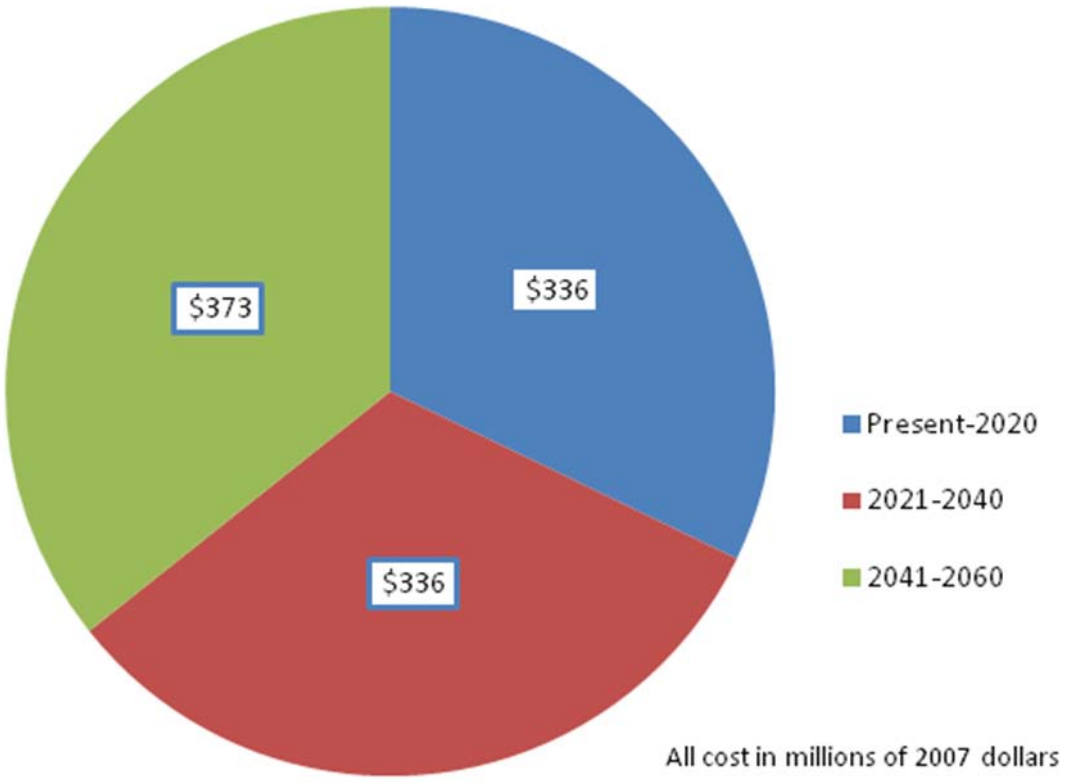

Figure 15-1. Upper Arkansas Region – Medium Water Providers Costs Over Time

15.2.3 Upper Arkansas – Small Water Providers

The Upper Arkansas region has 86 small OCWP water providers. Information about each of these providers is shown in Table 15-4.

Table 15-4. Upper Arkansas Region – Small OCWP Providers

SWDIS Identifier	Provider Name	County	Source Water Type [A]	Did they participate in 2007 DWINS?	Did they participate in 2008 OCWP survey?	Projected 2060 Population [B]	Were they selected for cost modeling?
OK1020911	Langston PWA	Logan	SW	Yes	No	2,717	No
OK1021203	Shidler	Osage	SW	No	No	664	No
OK1021204	Fairfax	Osage	SW	No	Yes	1,951	Yes
OK1021205	Noble Co RWD #1 (Lucien)	Noble	SW	No	Yes	397	No
OK1021221	Lone Chimney Water Association	Pawnee	SW	Yes	Yes	286	No
OK2000201	Alfalfa Co RWS & SWMD #1 North	Alfalfa	GW	No	No	0	No

Table 15-4. Upper Arkansas Region – Small OCWP Providers, continued

SWDIS Identifier	Provider Name	County	Source Water Type [A]	Did they participate in 2007 DWINS?	Did they participate in 2008 OCWP survey?	Projected 2060 Population [B]	Were they selected for cost modeling?
OK2000202	Alfalfa Co RWS & SWMD #1	Alfalfa	GW	No	Yes	1,688	No
OK2000208	Cherokee	Alfalfa	GW	No	Yes	1,689	No
OK2000211	Jet	Alfalfa	GW	No	Yes	268	No
OK2001901	Oilton	Creek	GW	No	No	1,581	No
OK2001907	Creek Co RWD #10	Creek	GW	No	No	31	No
OK2002402	Garfield Co RWD #1 (Krem-Hill)	Garfield	GW	No	Yes	790	No
OK2002410	Waukomis PWA	Garfield	GW	No	Yes	1,467	Yes
OK2002413	Fairmont	Garfield	GW	No	Yes	167	No
OK2002415	Kay Co RWD #6	Garfield	GW	No	No	1,444	No
OK2002416	Garber	Garfield	GW	No	Yes	955	No
OK2002420	Breckinridge PWA	Garfield	GW	No	No	279	No
OK2002444	Garfield Co RWD #5	Garfield	GW	No	Yes	1,474	No
OK2002701	Nash	Grant	GW	No	Yes	208	No
OK2002702	Pond Creek	Grant	GW	No	Yes	970	No
OK2002703	Manchester	Grant	GW	No	No	125	No
OK2002704	Medford	Grant	GW	No	Yes	1,766	No
OK2002705	Lamont	Grant	GU	No	Yes	516	Dist. Only
OK2002706	Wakita	Grant	GW	No	Yes	450	No
OK2002711	Deer Creek	Grant	GW	No	No	157	No
OK2003604	Newkirk	Kay	GW	No	No	2,607	No
OK2003605	Kaw City Water Authority	Kay	GW	No	Yes	421	No
OK2003616	Osage Co RWD #21	Osage	GU	No	No	1,954	No
OK2004103	Tryon	Lincoln	GW	No	No	643	No
OK2004203	Coyle	Logan	GW	No	Yes	530	No
OK2004230	Logan Co RWS & SWMD #3	Logan	GW	No	Yes	2,441	No
OK2005201	Billings PWA	Noble	GW	No	Yes	654	No
OK2005202	Red Rock	Noble	GW	No	No	349	No
OK2005204	Marland	Noble	GW	No	Yes	328	No
OK2005207	Noble Co RWD #3	Noble	GW	No	No	178	No
OK2005701	Osage PWA	Osage	GW	No	Yes	220	No
OK2005703	Prue PWA	Osage	GW	No	Yes	585	No
OK2005901	Ralston	Pawnee	GW	No	No	554	No
OK2005904	Jennings	Pawnee	GW	No	Yes	623	No
OK2005905	Hallett PWA	Pawnee	GW	No	Yes	270	No
OK2005910	Westport Utility Auth Trust	Pawnee	GW	No	No	273	No

Table 15-4. Upper Arkansas Region – Small OCWP Providers, continued

SWDIS Identifier	Provider Name	County	Source Water Type [A]	Did they participate in 2007 DWINS?	Did they participate in 2008 OCWP survey?	Projected 2060 Population [B]	Were they selected for cost modeling?
OK2006011	Payne Co RWD #3	Payne	GW	No	Yes	1,911	No
OK2006012	Perkins	Payne	GW	No	Yes	3,159	No
OK2006013	Ripley PWA	Payne	GW	No	Yes	516	No
OK3000202	Burlington	Alfalfa	GWP	No	Yes	166	No
OK3002403	Kremlin	Garfield	GWP	No	No	803	No
OK3002404	Hillsdale PWA	Garfield	GWP	No	No	121	No
OK3002406	Garfield Co RWD #4	Garfield	GWP	No	Yes	361	No
OK3002408	Garfield Co RWD #7	Garfield	GWP	No	Yes	353	No
OK3002414	Douglas	Garfield	GWP	No	No	32	No
OK3002415	Hunter	Garfield	GWP	No	No	345	No
OK3002418	Salt Fork Water Authority	Garfield	GWP	No	No	28	No
OK3002419	Covington	Garfield	GWP	No	Yes	628	No
OK3002702	Jefferson	Grant	GWP	No	Yes	57	No
OK3002703	R&C Water Corp	Grant	GWP	No	Yes	576	No
OK3002706	SW Water Inc	Grant	GWP	No	Yes	224	No
OK3002707	Grant County RWD #1	Grant	GWP	No	Yes	110	No
OK3003601	Blackwell RW Corp	Kay	SWP	No	Yes	1,054	No
OK3003602	Kay Co RWD #3	Kay	SWP	No	Yes	1,201	No
OK3003603	Kay Co RWD #5 (Dale Water Corp)	Kay	GWP	No	No	875	No
OK3003604	Kay County RWD #2	Kay	SWP	No	No	57	No
OK3003605	Kay Co RWD #1	Kay	SWP	No	Yes	2,018	No
OK3003616	Braman	Kay	SWP	No	Yes	273	No
OK3003618	Kaw Water Inc	Kay	GWP	No	No	102	No
OK3003624	Kay County RWD #4	Kay	GWP	No	No	114	No
OK3004201	Marshall	Logan	GWP	No	No	418	No
OK3004202	Orlando	Logan	GWP	No	Yes	321	No
OK3004203	Mulhall	Logan	GWP	No	Yes	389	No
OK3005201	Noble Co RWD #4	Noble	GWP	No	Yes	299	No
OK3005203	Noble County RWD #2	Noble	SWP	No	Yes	1,778	No
OK3005205	Morrison PWA	Noble	SWP	No	Yes	1,185	No

Table 15-4. Upper Arkansas Region – Small OCWP Providers, continued

SWDIS Identifier	Provider Name	County	Source Water Type [A]	Did they participate in 2007 DWINS?	Did they participate in 2008 OCWP survey?	Projected 2060 Population [B]	Were they selected for cost modeling?
OK3005717	Grayhorse RWD	Osage	SWP	No	No	130	No
OK3005747	Mccord RWD #3	Osage	SWP	No	No	2,344	No
OK3005748	Osage Co RWS & SWD #3 (Braden)	Osage	SWP	No	No	912	No
OK3005752	Burbank	Osage	GWP	No	Yes	208	No
OK3005902	Pawnee Co RWD #5	Pawnee	GWP	No	No	204	No
OK3005911	Pawnee Co RWD #3	Pawnee	SWP	No	No	1,016	No
OK3005913	Pawnee Co RWD #4	Pawnee	SWP	No	Yes	766	No
OK3005921	Pawnee Co RWD #2	Pawnee	SWP	No	Yes	2,804	No
OK3006001	Payne Co RWD #4	Payne	SWP	No	Yes	1,170	No
OK3006003	51 East Corp	Payne	SWP	No	Yes	2,849	No
OK3006039	Yale	Payne	SWP	No	Yes	1,990	No
OK3006040	Glencoe	Payne	SWP	No	Yes	887	No
OK3007602	Woods County RWD #1	Woods	GWP	No	Yes	257	No
OK3007605	Woods County RWD #3	Woods	GWP	No	Yes	378	No

[A] SW – Surface Water, GW – Groundwater, P – Purchased Water, GU – Groundwater Under Direct Influence of Surface Water. Systems are classified as surface water if they have at least one source that is surface water or groundwater under the direct influence of surface water (SW and GW designations). Systems are classified as groundwater if they do not meet surface water definition or if their primary source of water is purchased from another provider (GW, SWP, and GWP designations).

[B] Population based on 2060 projection (see Water Demand Forecast Report for more details on projections).

15.2.3.1 Surface Water Providers

There are seven small surface water providers in the Upper Arkansas region. The City of Fairfax was selected for cost modeling. Fairfax participated in the 2008 OCWP survey. The City of Lamont was used to supplement the distribution information for Fairfax. Using the methodology described in Section 2.2, a project list was created.

Source Water Projects

Using the project list worksheet, one surface water intake rehabilitation projects for Fairfax City Lake was included in the OCWP study.

Treatment Projects

Using the project list worksheet, rehabilitation of a 0.864-mgd WTP in 2040 was included in the OCWP study.

Storage Projects
Using the project list worksheet, rehabilitation of 0.086 MG of finished water storage tank was included in the OCWP study.

Distribution and Transmission Projects
Rehabilitation of one raw water transmission line with a capacity of 0.864 mgd was identified using the project list worksheet.

Many distribution projects were identified in the project list worksheet. Projects included rehabilitation and replacement of existing pipelines and installation of new pipelines to accommodate anticipated growth.

Other Projects
No projects were identified in this infrastructure category.

15.2.3.2 Groundwater Providers

There are 77 small providers in this category; 40 of these primarily purchase water. Waukomis PWA was selected for cost modeling. Waukomis PWA participated in the 2008 OCWP survey. Using the methodology described in Section 2.2, a project list was created.

Source Water Projects
Using the project list worksheet, well rehabilitation project with a capacity of 1.4 mgd was identified.

Treatment Projects
Using the project list worksheet, a 0.15 mgd groundwater chemical treatment was included. Information on Waukomis PWA's existing treatment was not available from the 2008 OCWP survey.

Storage Projects
Using the project list worksheet, rehabilitation of approximately 0.015 MG of finished water storage tank was included in the OCWP study.

Distribution and Transmission Projects
Rehabilitation of one raw water transmission line with a capacity of 0.288 mgd was identified using the project list worksheet.

Many distribution projects were identified in the project list worksheet. Projects included rehabilitation and replacement of existing pipelines and installation of new pipelines to accommodate anticipated growth. In addition, a 0.15 mgd finished pump rehabilitation project was identified.

Other Projects
No projects were identified in this infrastructure category.

15.2.3.3 Summary

Table 15-5 presents the drinking water cost through 2060 of the Upper Arkansas small provider stratum by infrastructure type. Figure 15-2 illustrates the drinking water costs over time.

Table 15-5. Upper Arkansas Region – Small Water Providers Costs by Infrastructure Type

Period [A]	Distribution and Transmission (millions of 2007 dollars)	Treatment (millions of 2007 dollars)	Storage (millions of 2007 dollars)	Source (millions of 2007 dollars)	Other (millions of 2007 dollars)	Total Infrastructure Need (millions of 2007 dollars)
Present-2020	$681	$16	$4	$4	$0	$705
2021-2040	$138	$21	$1	$0	$0	$160
2041-2060	$111	$0	$0	$0	$0	$111
Total	$930	$37	$5	$4	$0	$976

[A] Small differences in values may result from rounding.

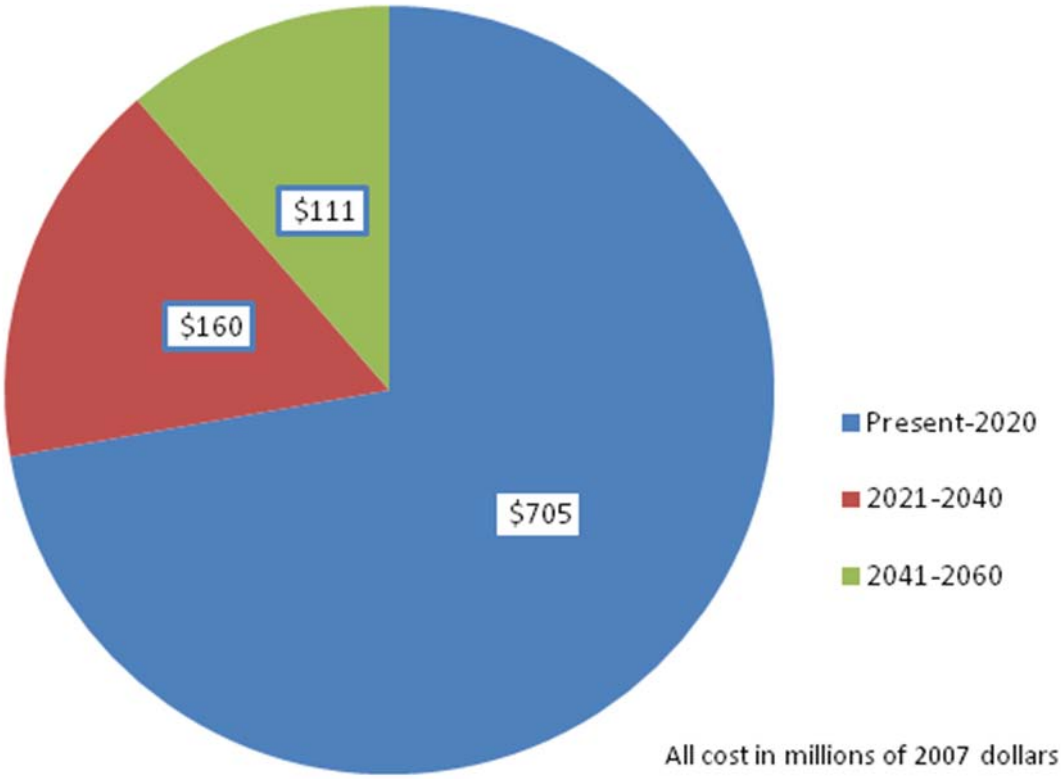

Figure 15-2. Upper Arkansas Region – Small Water Providers Costs Over Time

15.3 Upper Arkansas – Regional Major Reservoir Projects

There are 15 major reservoirs in the Upper Arkansas region. Table 15-6 identifies the reservoirs and project size. Figure 15-3 illustrates project cost over time.

Table 15-6 Upper Arkansas Region – Major Reservoir Rehabilitation Projects

Reservoir Name	Storage Considered for Rehabilitation [A] (AF)	Project Year
Boomer Lake	3,200	2040
Cleveland City Lake	2,200	2040
Cushing Lake	3,304	2060
Fairfax City Lake	1,795	2040
Great Salt Plains Reservoir	0	2060
Kaw Lake	171,200	2080
Keystone Lake	20,000	2080
Lake Blackwell	55,000	2040
Lake McMurtry	13,500	2080
Lake Ponca	15,300	2040
Langston Lake	5,792	2080
Lone Chimney Lake	6,200	2080
Pawnee Lake	3,855	2040
Perry Lake	6,358	2040
Sooner Lake	149,000	2080

[A] The amount of storage for rehabilitation is based on the municipal water supply storage. If unknown, the full normal pool storage was used. Reservoirs with no designated municipal water supply storage were included in the study but show zero in the rehabilitation column

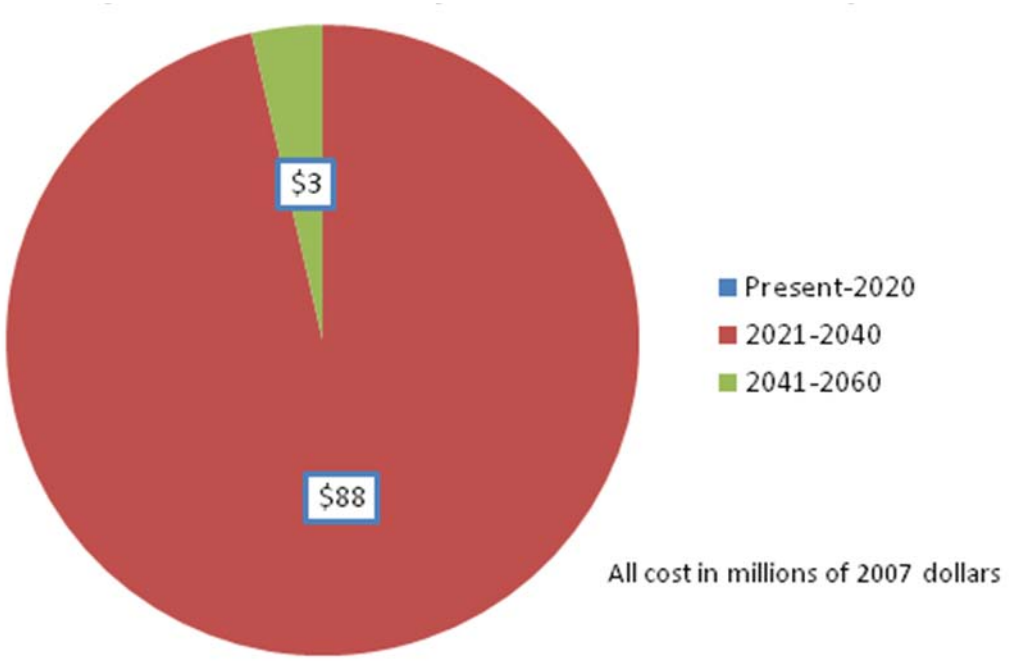

Figure 15-3. Upper Arkansas Region – Major Reservoir Rehabilitation Costs Over Time

15.4 Upper Arkansas – Regional Cost Summary

This section presents the Upper Arkansas regional drinking water infrastructure costs over the next 50 years. Table 15-7 identifies costs by provider size and project year. Distribution and transmission projects make up the majority, approximately 79 percent, of the drinking water infrastructure costs in the region. Medium providers have the largest overall drinking water infrastructure costs. The largest infrastructure costs occur in the Present -2020 period.

Table 15-7 Upper Arkansas Region – Drinking Water Infrastructure Cost Summary

Category [A, C]	Potential Funding Source [B]	Present - 2020 Infrastructure Need (millions of 2007 dollars)	2021-2040 Infrastructure Need (millions of 2007 dollars)	2041-2060 Infrastructure Need (millions of 2007 dollars)	Total Period Infrastructure Need (millions of 2007 dollars)
Small	DWSRF Eligible	$705	$160	$111	$976
	Non-DWSRF Eligible	$0	$0	$0	$0
Small Subtotal		$705	$160	$111	$976
Medium	DWSRF Eligible	$323	$331	$369	$1,023
	Non-DWSRF Eligible	$12	$5	$5	$22
Medium Subtotal		$335	$336	$374	$1,045
Large	DWSRF Eligible	$0	$0	$0	$0
	Non-DWSRF Eligible	$0	$0	$0	$0
Large Subtotal		$0	$0	$0	$0
Reservoir	DWSRF Eligible	$0	$0	$0	$0
	Non-DWSRF Eligible	$0	$88	$3	$91
Reservoir Subtotal		$0	$88	$3	$91
Total		$1,040	$584	$488	$2,112

[A] See Table 15-1 for more information on provider size. The "reservoir" category includes all regional reservoir rehabilitation projects.

[B] This study assumes that distribution projects for new growth and all reservoir projects are non-DWSRF eligible. All other projects were assumed to be DWSRF eligible.

[C] Small differences in values may result from rounding.

Section 16
West Central Regional Infrastructure Costs

This section provides some general information about the West Central region, identifies water providers selected for modeling and their project lists, and provides a cost summary for this region.

16.1 West Central –Regional Description

The West Central Watershed Planning Region is a 5,262-square-mile area including all or portions of Ellis, Woodward, Dewey, Blaine, Canadian, Roger Mills, Custer, Beckham, Washita, Caddo, Kiowa, and Comanche Counties. There are 36 OCWP providers in this region. OCWP providers are those included in the 2008 OCWP survey and for which water demand projections were created. Table 16-1 shows the number of West Central water providers by stratum.

Table 16-1. West Central Region – Number of OCWP Providers by Stratum

Provider Size	Population [A]	Surface Water [B]	Groundwater [C]	Total
Large	>100,000	0	0	0
Medium	3,301 – 100,000	2	2	4
Small	<3,300	2	30	32
Total		**4**	**32**	**36**

[A] Population classification was based on 2060 projection (see *Water Demand Forecast Report* for more details on projections).

[B] Systems were classified as surface water if they have at least one source that is surface water or groundwater under the direct influence of surface water.

[C] Systems were classified as groundwater if they do not meet surface water definition or if their primary source of water is purchased from another provider.

16.2 West Central – Developing Project Lists

Four providers were used for cost modeling. The following sections discuss the project lists for each of these providers.

16.2.1 West Central – Large Water Providers

The West Central region has no large OCWP providers.

16.2.2 West Central – Medium Water Providers

The West Central region has four medium OCWP water providers. Information about each of these providers is shown in Table 16-2.

Table 16-2. West Central Region – Medium OCWP Providers

SWDIS Identifier	Provider Name	County	Source Water Type [A]	Did they participate in 2007 DWINS?	Did they participate in 2008 OCWP survey?	Projected 2060 Population [B]	Were they selected for cost modeling?
OK1010828	Clinton	Custer	SW	Yes	Yes	10,818	Yes
OK1010829	Foss Reservoir MCD	Custer	SW	Yes	No	21,706	No
OK2000816	Caddo Co RWD #3	Caddo	GW	Yes	No	6,378	No
OK2002002	Weatherford	Custer	GW	No	Yes	12,108	Yes

[A] SW – Surface Water, GW – Groundwater, P – Purchased Water, GU – Groundwater Under Direct Influence of Surface Water. Systems are classified as surface water if they have at least one source that is surface water or groundwater under the direct influence of surface water (SW and GW designations). Systems are classified as groundwater if they do not meet surface water definition or if their primary source of water is purchased from another provider (GW, SWP, and GWP designations).

[B] Population based on 2060 projection (see Water Demand Forecast Report for more details on projections).

16.2.2.1 Surface Water Providers

There are two medium surface water providers in the West Central region. The City of Clinton was selected for cost modeling. Clinton participated in the 2007 DWINS and 2008 OCWP survey. Using the methodology described in Section 2.2, a project list was created. The City of New Castle was used to supplement the distribution information available for Clinton.

Source Water Projects

Using the project list worksheet, two surface water intake rehabilitation projects for Clinton Lake and Foss Reservoir were included in the OCWP study. A new surface water intake project also was included to accommodate surface water needs above the existing permitted supply.

Treatment Projects

The 2007 DWINS identified a 3.0-mgd WTP rehabilitation project. Using the project list worksheet, rehabilitation, and expansion to 3.7 mgd WTP in 2060 also was included in the OCWP study.

Storage Projects

Rehabilitation projects totaling 3.2 MG of finished water storage were identified in the 2007 DWINS.

Distribution and Transmission Projects

Rehabilitation of one 3.7-mgd raw water transmission line was identified using the project list worksheet.

Many distribution projects were identified in the project list worksheet and the 2007 DWINS. Projects included rehabilitation and replacement of existing pipelines and installation of new pipelines to accommodate anticipated growth. Additionally, the 2007

DWINS identified finished water pump rehabilitation, water meter replacement, and lead service line replacement projects.

Other Projects

No projects were identified in this infrastructure category.

16.2.2.2 Groundwater Providers

There are two medium groundwater providers. The City of Weatherford was selected for cost modeling. This provider participated in the 2008 OCWP. The City of Thackerville was used to supplement the distribution information available for Weatherford.

Source Water Projects

Using the project list worksheet, well rehabilitation project was identified.

Treatment Projects

Using the project list worksheet, a 3.2-mgd rehabilitation of groundwater chemical treatment projects was included in the 2020 and 2060 period.

Storage Projects

Using the project list worksheet, rehabilitation project for 0.34 MG of finished water storage tank was included in the OCWP study.

Distribution and Transmission Projects

Rehabilitation of one raw water transmission line with a capacity of 3.4 mgd was identified using the project list worksheet.

Many distribution projects were identified in the project list worksheet. Projects included rehabilitation and replacement of existing pipelines and installation of new pipelines to accommodate anticipated growth. Additionally, a 3.4-mgd finished water-pumping project was included in the OCWP study.

Other Projects

No projects were identified in this infrastructure category.

16.2.2.3 Summary

Table 16-3 presents the drinking water cost through 2060 of the West Central medium provider stratum by infrastructure type. Figure 16-1 illustrates the drinking water costs over time.

Table 16-3. West Central Region – Medium Water Providers Costs by Infrastructure Type

Period [A]	Distribution and Transmission (millions of 2007 dollars)	Treatment (millions of 2007 dollars)	Storage (millions of 2007 dollars)	Source (millions of 2007 dollars)	Other (millions of 2007 dollars)	Total Infrastructure Need (millions of 2007 dollars)
Present-2020	$13	$17	$3	$4	$0	$37
2021-2040	$100	$0	$0	$1	$0	$101
2041-2060	$67	$18	$0	$0	$0	$85
Total	$180	$35	$3	$5	$0	$223

[A] Small differences in values may result from rounding.

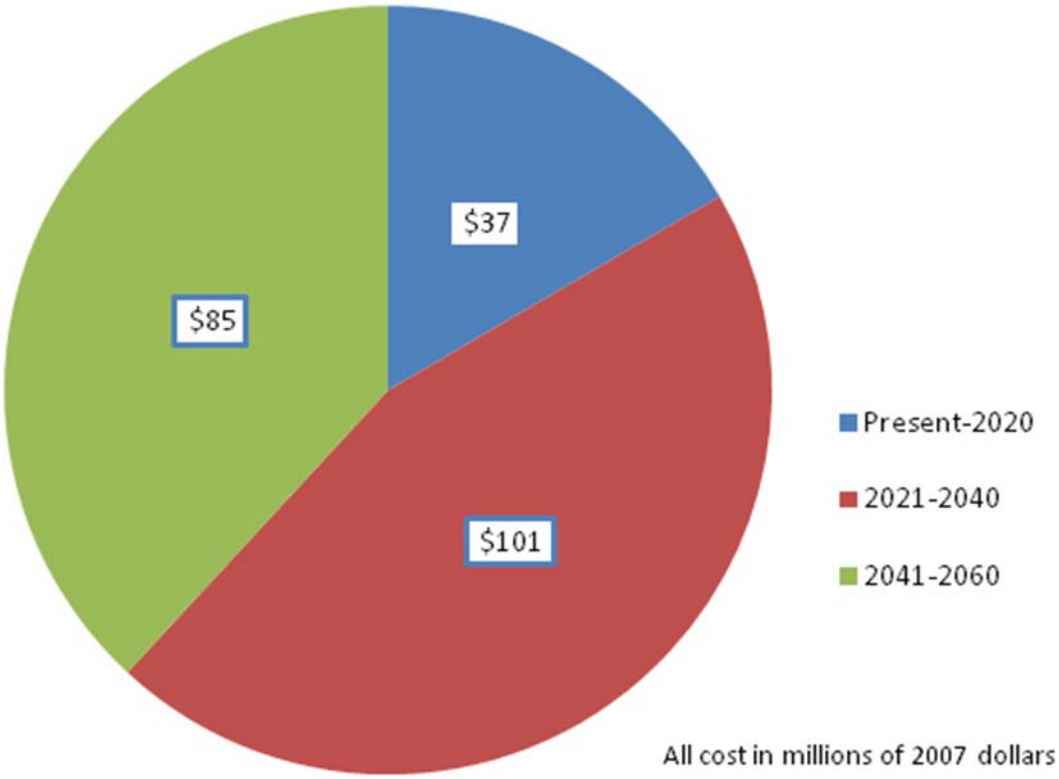

Figure 16-1. West Central Region – Medium Water Providers Costs Over Time

16.2.3 West Central – Small Water Providers

The West Central region has 32 small OCWP water providers. Information about each of these providers is shown in Table 16-4.

Table 16-4. West Central Region – Small OCWP Providers

SWDIS Identifier	Provider Name	County	Source Water Type [A]	Did they participate in 2007 DWINS?	Did they participate in 2008 OCWP survey?	Projected 2060 Population [B]	Were they selected for cost modeling?
OK1010803	Cheyenne	Roger Mills	SW	No	Yes	778	Yes
OK2000804	Bridgeport	Caddo	GW	No	Yes	129	No
OK2000805	Carnegie	Caddo	GW	No	Yes	1,891	No
OK2000808	Eakly Dev Corp	Caddo	GW	No	Yes	325	No
OK2000809	Hinton	Caddo	GW	No	Yes	2,568	No
OK2000810	Fort Cobb	Caddo	GW	No	Yes	782	No
OK2000812	Hydro PWA	Caddo	GW	No	Yes	1,246	No
OK2002001	Thomas	Custer	GW	No	Yes	1,511	No
OK2002009	Custer City PWS	Custer	GW	No	Yes	472	No
OK2002040	Custer County RWD #3	Custer	GW	No	No	1,191	No
OK2002201	Dewey Co RWD #1	Dewey	GW	Yes	No	131	No
OK2002202	Camargo RWD #2	Dewey	GW	Yes	No	150	No
OK2002203	Vici	Dewey	GW	Yes	Yes	762	Yes
OK2002207	Taloga	Dewey	GW	Yes	Yes	202	No
OK2002305	Arnett	Ellis	GW	No	Yes	497	No
OK2003805	Mountain View PWA	Kiowa	GW	No	Yes	925	No
OK2006501	Roger Mills RWS & SWMD #3	Roger Mills	GW	No	No	179	No
OK2006502	Roger Mills RWS & SWMD #1	Roger Mills	GW	No	Yes	300	No
OK2006505	Roger Mills RWD #2 (Red Star)	Roger Mills	GW	No	Yes	800	No
OK2007501	Corn PWA	Washita	GW	No	No	675	No
OK2007502	New Cordell Utility Authority	Washita	SWP	No	No	3,279	No
OK2007503	Canute	Washita	GW	No	Yes	593	No
OK2007505	Burns Flat PWS	Washita	GW	No	Yes	2,827	No
OK2007508	Foss	Washita	GU	No	No	31	No
OK2007511	Washita Co RWD #2	Washita	GW	No	Yes	1,258	No
OK3002001	Butler	Custer	SWP	No	Yes	425	No
OK3002004	Arapaho	Custer	SWP	No	Yes	1,019	No
OK3002011	Frontier Development Auth	Custer	SWP	No	Yes	1,093	No

Table 16-4. West Central Region – Small OCWP Providers, continued

SWDIS Identifier	Provider Name	County	Source Water Type [A]	Did they participate in 2007 DWINS?	Did they participate in 2008 OCWP survey?	Projected 2060 Population [B]	Were they selected for cost modeling?
OK3002201	Leedey	Dewey	GWP	No	Yes	211	No
OK3003801	Gotebo	Kiowa	GWP	No	No	286	No
OK3006503	Hammon	Roger Mills	GWP	No	No	469	No
OK3007504	Bessie	Washita	SWP	No	Yes	215	No

[A] SW – Surface Water, GW – Groundwater, P – Purchased Water, GU – Groundwater Under Direct Influence of Surface Water. Systems are classified as surface water if they have at least one source that is surface water or groundwater under the direct influence of surface water (SW and GW designations). Systems are classified as groundwater if they do not meet surface water definition or if their primary source of water is purchased from another provider (GW, SWP, and GWP designations).

[B] Population based on 2060 projection (see Water Demand Forecast Report for more details on projections).

16.2.3.1 Surface Water Providers

There are two small surface water providers in the West Central region. The City of Cheyenne was selected for cost modeling. Cheyenne participated in the 2008 OCWP survey. Using the methodology described in Section 2.2, a project list was created.

Source Water Projects

Using the project list worksheet, one surface water intake rehabilitation project was included in the OCWP study.

Treatment Projects

Using the project list worksheet, rehabilitation of a 0.504-mgd WTP in 2040 was included in the OCWP study.

Storage Projects

Using the project list worksheet, rehabilitation of 0.05 MG of finished water storage tank was included in the OCWP study.

Distribution and Transmission Projects

Rehabilitation of one raw water transmission line with a capacity of 0.36 mgd was identified using the project list worksheet.

Many distribution projects were identified in the project list worksheet. Projects included rehabilitation and replacement of existing pipelines and installation of new pipelines to accommodate anticipated growth.

Other Projects

No projects were identified in this infrastructure category.

16.2.3.2 Groundwater Providers

There are 30 small providers in this category; eight of these primarily purchase water. The City of Vici was selected for cost modeling. Vici participated in the 2007 DWINS and 2008 OCWP survey. Using the methodology described in Section 2.2, a project list was created.

Source Water Projects

From the 2007 DWINS, well rehabilitation projects with total capacity of 0.96 mgd were identified.

Treatment Projects

From the 2007 DWINS, chlorine equipment replacement projects totaling a capacity of 0.78 mgd were identified. Using the project list worksheet, a 0.78-mgd chlorination rehabilitation project was included in the 2060 period.

Storage Projects

From the 2007 DWINS, rehabilitation of approximately 0.15 MG of finished water storage tank was included in the OCWP study.

Distribution and Transmission Projects

Rehabilitation of one raw water transmission line with a capacity of 0.78 mgd was identified using the project list worksheet.

Many distribution projects were identified in the project list worksheet and 2007 DWINS. Projects included rehabilitation and replacement of existing pipelines and installation of new pipelines to accommodate anticipated growth. In addition, a 0.78 mgd finished pump rehabilitation project was identified. The 2007 DWINS also identified water meter and valve replacement projects.

Other Projects

No projects were identified in this infrastructure category.

16.2.3.3 Summary

Table 16-5 presents the drinking water cost through 2060 of the West Central small provider stratum by infrastructure type. Figure 16-2 illustrates the drinking water costs over time.

Table 16-5. West Central Region – Small Water Providers Costs by Infrastructure Type

Period [A]	Distribution and Transmission (millions of 2007 dollars)	Treatment (millions of 2007 dollars)	Storage (millions of 2007 dollars)	Source (millions of 2007 dollars)	Other (millions of 2007 dollars)	Total Infrastructure Need (millions of 2007 dollars)
Present-2020	$37	$12	$6	$7	$0	$62
2021-2040	$319	$4	$0	$0	$0	$323
2041-2060	$67	$7	$0	$0	$0	$74
Total	$423	$23	$6	$7	$0	$459

[A] Small differences in values may result from rounding.

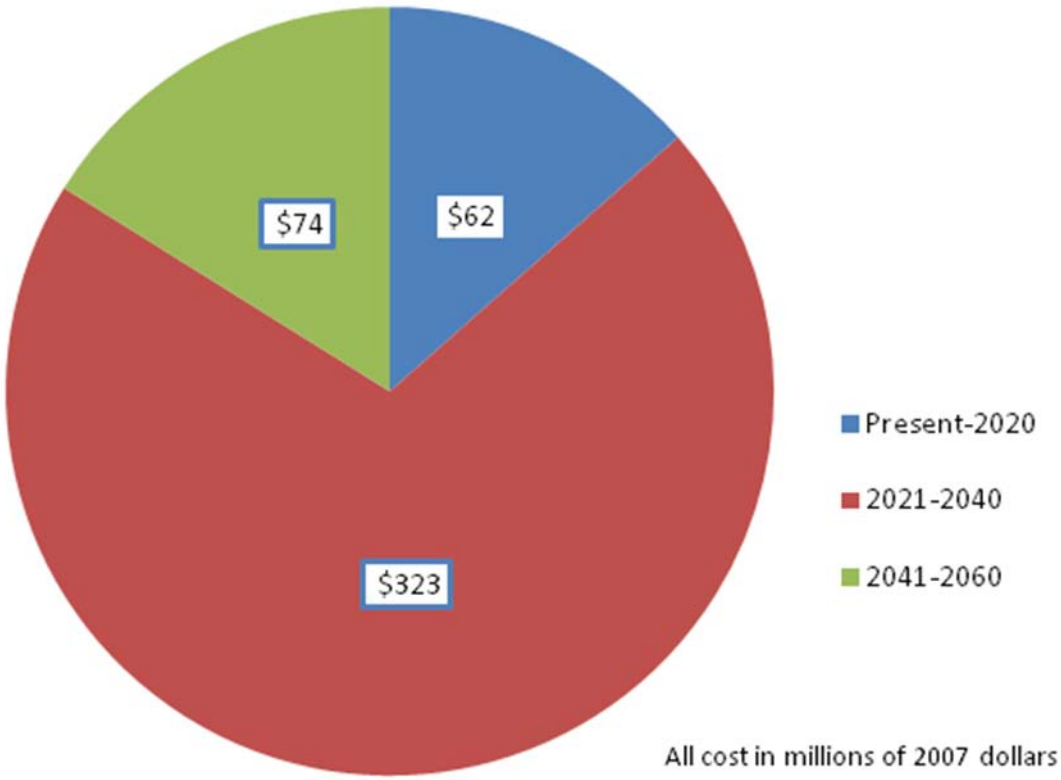

Figure 16-2. West Central Region – Small Water Providers Costs Over Time

16.3 West Central – Regional Major Reservoir Projects

There are six major reservoirs in the West Central region. Table 16-6 identifies the reservoirs and project size. Figure 16-3 illustrates project cost over time.

Table 16-6. West Central Region – Major Reservoir Rehabilitation Projects

Reservoir Name	Storage Considered for Rehabilitation [A] (AF)	Project Year
Clinton Lake	3,980	2040
Crowder Lake	2,094	2060
Dead Indian Lake	977	2060
Fort Cobb Reservoir	78,350	2060
Foss Reservoir	0	2080
Sportsman Lake	5,349	2060

[A] The amount of storage for rehabilitation is based on the municipal water supply storage. If unknown, the full normal pool storage was used. Reservoirs with no designated municipal water supply storage were included in the study but show zero in the rehabilitation column

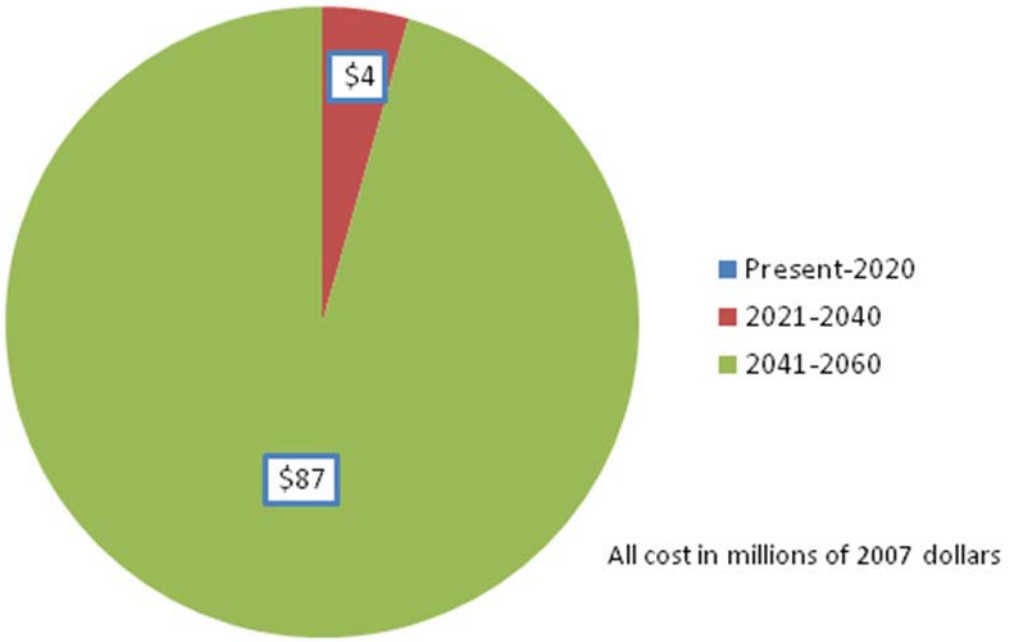

Figure 16-3. West Central Region – Major Reservoir Rehabilitation Costs Over Time

16.4 West Central – Regional Cost Summary

This section presents the West Central regional drinking water infrastructure costs over the next 50 years. Table 16-7 identifies costs by provider size and project year. Distribution and transmission projects make up the majority, over 78 percent, of the drinking water infrastructure costs in the region. Small providers have the largest overall drinking water infrastructure costs. The largest infrastructure costs occur in the 2021 – 2040 period.

Table 16-7 West Central Region – Drinking Water Infrastructure Cost Summary

Category [A, C]	Potential Funding Source [B]	Present - 2020 Infrastructure Need (millions of 2007 dollars)	2021-2040 Infrastructure Need (millions of 2007 dollars)	2041-2060 Infrastructure Need (millions of 2007 dollars)	Total Period Infrastructure Need (millions of 2007 dollars)
Small	DWSRF Eligible	$62	$324	$74	$460
	Non-DWSRF Eligible	$0	$0	$0	$0
Small Subtotal		$62	$324	$74	$460
Medium	DWSRF Eligible	$36	$100	$84	$220
	Non-DWSRF Eligible	$1	$1	$1	$3
Medium Subtotal		$37	$101	$85	$223
Large	DWSRF Eligible	$0	$0	$0	$0
	Non-DWSRF Eligible	$0	$0	$0	$0
Large Subtotal		$0	$0	$0	$0
Reservoir	DWSRF Eligible	$0	$0	$0	$0
	Non-DWSRF Eligible	$0	$4	$87	$91
Reservoir Subtotal		$0	$4	$87	$91
Total		$99	$429	$246	$774

[A] See Table 16-1 for more information on provider size. The "reservoir" category includes all regional reservoir rehabilitation projects.

[B] This study assumes that distribution projects for new growth and all reservoir projects are non-DWSRF eligible. All other projects were assumed to be DWSRF eligible.

[C] Small differences in values may result from rounding.

Appendix A
OCWP Cost Models

Appendix A
OCWP Cost Models

The cost models used in the Oklahoma Comprehensive Water Plan (OCWP) are listed in Table A-1. Reference tables for the cost models are provided in Tables A-2 through A-6. Most of the cost models are based on the U.S. Environmental Protection Authority's (EPA) most recent assessment of the nation's water systems and use the results for allocating the Drinking Water State Revolving Fund.

The most recent EPA survey was completed in 2007. The report *2009 Drinking Water Infrastructure Needs Survey and Assessment: Fourth Report to Congress* presents the methodology utilized by the EPA to determine water needs and results from the survey. When cost estimates were unavailable, EPA utilized cost models to estimate the project costs. The report *2007 Drinking Water Infrastructure Needs Survey and Assessment: Modeling the Cost of Infrastructure* (cost models) documents these cost models. In this OCWP report, the term "2007 DWINS" is used to reference the actual survey and all documentation related specifically to this survey. The 2007 DWINS is the basis for the OCWP cost estimating methodology.

The EPA survey did not take into account new or rehabilitation projects associated with raw surface water storage, or reservoirs, unless this storage was located at the treatment site. The OCWP study included reservoir rehabilitation types of projects. Since data specific to Oklahoma was not available at the time of the task, unit cost of $1,000/AF was applied for rehabilitation projects.

Table A-1. OCWP Cost Models

Name	Category	Possible Components	Parameters Required for Modeling Costs	Formula	R-squared [B]	Indicator Variable	Indicator Variable Values
AA1 Reservoir Rehab [D]	Source	The unit costs include the construction components of the dam, which include outlet works, reservoir clearing, and land acquisition. Estimated costs for environmental mitigation were not addressed as more detailed analyses will need to be completed to assess environmental impacts.	Normal pool storage in acre-feet	=round(D*1000/1000000,2)	n/a	No	
M1 Distribution New	Distribution and Transmission	Should be used for any mains that transport water through a piping grid servicing customers. Components include mains, trenching, bedding, backfill, hydrants, valves, site work, road repair, easements and service leads from the main to the curb stop. It does not include transmission mains.	Pipe diameter in inches and pipe length in feet.	=round(vlookup(d,'Pipeline Costs'!b3:f18,2)*L/1000000,2)*Y	n/a	No	

Table A-1. OCWP Cost Models, continued

Name	Category	Possible Components	Parameters Required for Modeling Costs	Formula	R-squared [B]	Indicator Variable	Indicator Variable Values
M1 Distribution Rehab	Distribution and Transmission	Should be used for any mains that transport water through a piping grid servicing customers. Components include mains, trenching, bedding, backfill, hydrants, valves, site work, road repair, easemetns and service leads from the main to the curb stop. It does not include transmission mains.	Pipe diameter in inches and pipe length in feet.	=round(vlookup(d,'Pipeline Costs'!b3:f18,4)*L/1000000,2)*Y	n/a	No	
M1 Distribution Replace	Distribution and Transmission	Should be used for any mains that transport water through a piping grid servicing customers. Components include mains, trenching, bedding, backfill, hydrants, valves, site work, road repair, easemetns and service leads from the main to the curb stop. It does not include transmission mains.	Pipe diameter in inches and pipe length in feet.	=round(vlookup(d,'Pipeline Costs'!b3:f18,2)*L/1000000,2)*Y	n/a	No	
M2 Lead Service Line Replacement	Distribution and Transmission	Service lines from the curb-stop to the building	Number of service lines.	=round(2985*N/1000000,2)	n/a	No	
M4 Hydrants used for flushing	Distribution and Transmission	Hydrant lead to the transmission of distribution main, drain, hydrant and auciliary valve (not included in another pipe project).	number of hydrants and diameter (in inches)	=round(N*2877/1000000,2)	n/a	No	

Table A-1. OCWP Cost Models, continued

Name	Category	Possible Components	Parameters Required for Modeling Costs	Formula	R-squared [B]	Indicator Variable	Indicator Variable Values
M5, Valves (gate, butterfly, etc.)	Distribution and Transmission	Includes purchase price of the butterfly, ball, air release or other related valve and installation (not included in another pipe project).	Number of valves and diameter (in inches)	=ROUND(VLOOKUP(d,'Valve Costs'!$B$3:$C$11,2)*N/1000000,2)	n/a	No	
M7 Backflow prevention devices/assemblies	Distribution and Transmission	Device or assembly, including installation	Number of assemblies and diamter (in inches)	=ROUND(VLOOKUP(d,'Backflow Costs'!$B$3:$C$11,2)*N/1000000,2)	n/a	No	
M8 Water Meter Replacement	Distribution and Transmission	Individual domestic or industrial units of either manual or remote read methods	Number of meters and diameter in inches.	=ROUND(VLOOKUP(d,'Water Meter Costs'!$B$3:$C$11,2)*N/1000000,2)	n/a	No	
P1 New/Replacement Finished Water Pumps	Distribution and Transmission	Pump and electrical controls	Capacity in MGD	=round(N*exp(11.21758+1.06^2.2)*exp(-.57687*I)*D^.5842/1000000,2)	0.3906	Yes	1 - Rehabilitation, 0 - New/Replacement
P2 New/Replacement Booster or Raw Water Pump Stations	Distribution and Transmission	Should be used for booster or raw water pump stations. Includes clearwell, pumps and building.	Capacity in MGD	=round(exp(13.0485+1.03^2/2)*D^.53231/1000000,2)	0.3978	No	
R1 New/Replacement Well	Source	Siting, drilling and developing a well to completion including installation of a pump and appurtenances such as sample tap, meter, air realease, pressure gauge, shut-off valve, electrical controls and limited discharge piping	Design capacity in MGD	=round(N*exp(13.17975+0.97^2/2)*D^0.56445*exp(0.90327*I)/1000000,2)	0.2637	Yes	1 - Aquifer Storage and Recovery Well, 0 - otherwise

Table A-1. OCWP Cost Models, continued

Name	Category	Possible Components	Parameters Required for Modeling Costs	Formula	R-squared [B]	Indicator Variable	Indicator Variable Values
R1 Rehab Well	Source	Siting, drilling and developing a well to completion including installation of a pump and appurtenances such as sample tap, meter, air realease, pressure gauge, shut-off valve, electrical controls and limited discharge piping	Design capacity in MGD	=round(N*exp(10.96081+1.24^2/2)*D^1.59738/1000000,2)	0.3903	No	
R10 Spring Collector New	Source	Spring box or other collection device, including overflow, meter, sample tap, valves and limited piping connection to a transmission main. Assume gravity flow, does not include pumps.	Design capacity in MGD	=round(N*exp(12.6909+0.94^2/2)*D^0.66705/1000000,2)	0.5880	No	
R10 Spring Collector Rehab	Source	Spring box or other collection device, including overflow, meter, sample tap, valves and limited piping connection to a transmission main. Assume gravity flow, does not include pumps.	Design capacity in MGD	=round(N*exp(12.84973+1.39^2/2)*D^0.32962/1000000,2)	0.1800	No	
R2 New/Replacement or Rehab Well Pump	Source	Pump and electrical controls	Design capacity in MGD	=ROUND(N*EXP(11.21758+1.06^2/2)*EXP(-0.57687*I)*D^(0.5842)/1000000,2)	0.3906	Yes	1 - Rehabilitation, 0 - New/Replacement
R3 New/Replacement or Rehab Well House	Source	Site Work, slab, building structure sized to accommodate on-site disinfection. Projects may include construction of a small building or more elaborate facilities with a chemical feed room with ventilation, etc.	n/a - unit cost assigned	=ROUND(N*19577/1000000,2)	n/a	No	

Table A-1. OCWP Cost Models, continued

Name	Category	Possible Components	Parameters Required for Modeling Costs	Formula	R-squared [B]	Indicator Variable	Indicator Variable Values
R5 Abandon Well	Source	Fill casing with appropriate material, cap well	n/a - unit cost assigned	=round(N*52388/1000000,2)	n/a	No	
R7 New/Replacement Surface Water Intake and Spring collector	Source	Intake structure, piping, valves; does not include pumps or impoundment structures. May include a wet well (small storage tank for raw water to be pumped to the treatment plant).	Design capacity in MGD	=round(exp(12.6909+.94^2/2)*D^0.66705/1000000,2)	0.5880	No	
R7 Rehabilitation Surface Water Intake and Spring collector	Source	Intake structure, piping, valves; does not include pumps or impoundment structures. May include a wet well (small storage tank for raw water to be pumped to the treatment plant).	Design capacity in MGD	=round(exp(12.84973+1.39^2/2)*D^0.32962/1000000,2)	0.1800	No	
R8 Raw Water Pump	Source	Pump and electrical controls	Design capacity in MGD	=round(N*exp(11.21758+1.06^2.2)*exp(-.57687*I)*D^.5842/1000000,2)	0.3906	Yes	1 - Rehabilitation, 0 - New/Replacement
S1 New EWST	Storage	Complete elevated storage facility with appurtenances such as altitude valves and isolation valves.	Volume in MG	=round(N*exp(14.59883+.48^2/2)*D^.65278/1000000,2)	0.5974	No	
S1 Rehab EWST	Storage	Complete elevated storage facility with appurtenances such as altitude valves and isolation valves.	Volume in MG	=round(N*exp(12.86762+.67^2/2)*D^.5033545/1000000,2)	0.2961	No	
S1-S2 Average	Storage			=round(average(N*exp(14.59883+.48^2/2)*D^.65278,exp(14.15178+1.51^2/2)*D^.7743)/1000000,2)	n/a	No	

Table A-1. OCWP Cost Models, continued

Name	Category	Possible Components	Parameters Required for Modeling Costs	Formula	R-squared [B]	Indicator Variable	Indicator Variable Values
S2 New GST	Storage	Complete ground level storage facility with appurtenances such as altitude valves and isolation valves	Volume in MG	=round(exp(14.15178+1.51^2/2)*D^.7743/1000000,2)	0.8305	No	
S2 Rehab GST	Storage	Complete ground level storage facility with appurtenances such as altitude valves and isolation valves	Volume in MG	=round(exp(12.65409+1.01^2/2)*D^.5286/1000000,2)	0.3506	No	
S3 Hydropneumatic Storage [A]	Storage			=round(exp(11.53367+1.51^2/2)*D^0.37516/1000000, 2)	0.1876	No	
T1 chlorination	Treatment	Gas or hypochlorite system with chemical mixing and injection systems, and safety-related components. Does not include gas scrubber.	Design capacity in MGD	=round(exp(11.53367+1.51^2/2)*D^0.37516/1000000, 2)	0.1876	No	
T10 New/Replacement Conventional WTP <1mgd	Treatment	Complete conventional plant with flocculation, sedimentation, filtration, waste handling, and the building. Includes all raw water and finished water pumps, chemicals and mixing, unit processes, clearwell disinfection and process control systems. This code will also be used for systems using contact adsorption clarifier technologies for the flocculation/sedimentation process.	Design capacity in MGD	=round(exp(14.69309+.71^2/2)*D^.498/1000000,2)	0.8148	No	

Table A-1. OCWP Cost Models, continued

Name	Category	Possible Components	Parameters Required for Modeling Costs	Formula	R-squared [B]	Indicator Variable	Indicator Variable Values
T10 New/Replacement Conventional WTP >1mgd	Treatment	Complete conventional plant with flocculation, sedimentation, filtration, waste handling, and the building. Includes all raw water and finished water pumps, chemicals and mixing, unit processes, clearwell disinfection and process control systems. This code will also be used for systems using contact adsorption clarifier technologies for the flocculation/sedimentation process.	Design capacity in MGD	=round(exp(14.69309+.71^2/2)*D^.91438/1000000,2)	0.8148	No	
T10 Rehab/Expansion Conventional WTP	Treatment	Complete conventional plant with flocculation, sedimentation, filtration, waste handling, and the building. Includes all raw water and finished water pumps, chemicals and mixing, unit processes, clearwell disinfection and process control systems. This code will also be used for systems using contact adsorption clarifier technologies for the flocculation/sedimentation process.	Design capacity in MGD	=round(exp(13.6506+1.09^2/2)*D^.72036*exp(1.0099*I)/1000000,2)	0.5781	Yes	1 - Rehabilitation, 0 - Expansion

Table A-1. OCWP Cost Models, continued

Name	Category	Possible Components	Parameters Required for Modeling Costs	Formula	R-squared [B]	Indicator Variable	Indicator Variable Values
T11 Rehab/Expansion Direct or In-line Filter WTP	Treatment	Complete direct or in-line filtration plant, including all raw water and finished water pumps, chemicals and mixing, unit processes, clearwell, disinfection, waste handling and process control systems. This code is also used for pressure filtration systems.	Design capacity in MGD	=round(exp(14.46659+1.25^2/2)*D^0.8104*exp(-1.4608*I)/1000000,2)	0.7913	Yes	1 - Rehabilitation/ Expansion, 0 - New/Replacement
T14, New Membrane Technology for Particulate Removal	Treatment	Complete plant including pre-filtration, membrane filtration equipment, waste-stream handling, all raw water and finished water pumps, disinfection, monitoring equipment and controls. Also may include caustic and other cleaning-chemical feed components.	Design capacity in MGD	=round(exp(15.1106+0.72^2/2)*D^0.8465*exp(-0.362*0)*exp(-0.5446*1)/1000000,2)	0.7268	Yes*	*Indicator variables included in formula
T14, Rehab Membrane Technology for Particulate Removal	Treatment	Complete plant including pre-filtration, membrane filtration equipment, waste-stream handling, all raw water and finished water pumps, disinfection, monitoring equipment and controls. Also may include caustic and other cleaning-chemical feed components.	Design capacity in MGD	=round(exp(15.1106+0.72^2/2)*D^0.8465*exp(-0.362*1)*exp(-0.5446*0)/1000000,2)	0.7268	Yes*	*Indicator variables included in formula
T17 New/Replacement Reverse Osmosis	Treatment	Complete plant including connective piping, filter housing, all raw water and finished water pumps, disinfection, and monitoring equipment	Design capacity in MGD	=round(exp(15.1106+0.72^2/2)*D^0.8465*exp(-0.362*0)*exp(-0.5446*1)/1000000,2)	0.7268	Yes*	*Indicator variables included in formula

Table A-1. OCWP Cost Models, continued

Name	Category	Possible Components	Parameters Required for Modeling Costs	Formula	R-squared [B]	Indicator Variable	Indicator Variable Values
T22 GW Chemical Feed Plant	Treatment	Complete chemical feed treatment including building, disinfection and controls. May also incude corrosion control, fluoridation, sequestration and contact time. Does not include well pumps, contact time, or high service pumps	Design capacity in MGD	=round((exp(11.53367+1.51^2/2)*D^.37516+94123)/1 000000,2)	0.1876	No	
T37 Fluoride Addition	Treatment	Chemical mixing and injection system	Design capacity in MGD	=round(exp(11.53367+1.51^2/2)*D^0.37516/1000000, 2)	0.1876	No	
W2 Computer and Automation Costs	Other	Computer control systems and SCADA control systems. Does not include computer software	Cost must be provided	=round(exp(6.7999+1.4^2/2)*P^0.48453/1000000,2)	0.2775	No	
W3, Pump Controls/Telemetry	Other	Basic telemetry system of telephone-wire based signals or radio signal controls. Does not include SCADA systems (use W2 for SCADA).	Cost must be provided	=round(exp(1.28211+1.47^2/2)*P^0.41043/1000000,2)	0.2113	No	
W4 New/Replacement Emergency Power	Other	Standby power generators including on-site and movable units with assoicated fuel tanks	Kilowatts	=round(exp(8.38957+0.77^2/2)*D^0.47078*D^(2*0.03 159)/1000000,2)	0.6389	No	
X1 New/Replacement Raw Water Transmission	Distribution and Transmission	Should be used for any mains that transport raw water to the treatment plant. Mains trenching, bedding, backfill, site work, easements, typical road repair, control valves, air release valves	Pipe diameter in inches and pipe length in feet.	=round(vlookup(d,'Pipeline Costs'!b3:f18,3)*L/1000000,2)*Y	n/a	No	

Table A-1. OCWP Cost Models, continued

Name	Category	Possible Components	Parameters Required for Modeling Costs	Formula	R-squared [B]	Indicator Variable	Indicator Variable Values
X1 Rehab Raw Water Transmission	Distribution and Transmission	Should be used for any mains that transport raw water to the treatment plant. Mains trenching, bedding, backfill, site work, easements, typical road repair, control valves, air release valves	Pipe diameter in inches and pipe length in feet.	=round(vlookup(d,'Pipeline Costs'!b3:f18,5)*L/1000000,4)*Y	n/a	No	
X2 New/Replacement Finished Water Transmission	Distribution and Transmission	Should be used for any mains that transport finished water from the plant to the distribution grid. Mains, trenching, bedding, backfill, site work, easements, typical road repair, control valves, air release valves	Pipe diameter in inches and pipe length in feet.	=round(vlookup(d,'Pipeline Costs'!b3:f18,3)*L/1000000,3)*Y	n/a	No	
X2 Rehab Finished Water Transmission	Distribution and Transmission	Should be used for any mains that transport finished water from the plant to the distribution grid. Mains, trenching, bedding, backfill, site work, easements, typical road repair, control valves, air release valves	Pipe diameter in inches and pipe length in feet.	=round(vlookup(d,'Pipeline Costs'!b3:f18,3)*L/1000000,5)*Y	n/a	No	

A. According to email correspondence with Druanne Prescott, Cadmus Group, on behalf of the EPA, there was not enough information to create a cost model for hydropneumatic tanks. They evaluated several alternatives and decided that the most representative cost estimated could be obtained using the model for small chemical systems (T1, T2, T3, etc. all share the same cost model equation). This methodology is used here.

B. R-squared (or coefficient of determination) values are provided for each of the EPA cost models. This is an indicator of how well the linear regression model explains the variation in the data with a higher value indicating a better correlation. When all variation is explained by the regression equation, R-squared is equal to one. Generally, new or replacement projects have higher R-squared values than rehabilitation projects reflecting the wide variability inherent to rehabilitation projects.

C. This is not an EPA model. Storage of diverted and delivered supplies capital cost estimates were based upon historic data collected from the Colorado Division of Water Resource Spreadsheet Database of new dams built in Colorado since 1995. The reservoirs analyzed for this study vary in size from 50,000 AF to 500,000 AF. The unit costs include the construction components of the dam, which include outlet works, reservoir clearing, and land acquisition. Estimated costs for environmental mitigation were not addressed as more detailed analyses will need to be completed to assess environmental impacts. Future impacts will likely be very site-specific and vary greatly between all projects. The unit cost is considered conservative and was not escalated as the unit cost accounts for expected economy-of-scale type cost savings in ELA costs as well as dam construction costs.

Table A-1. OCWP Cost Models, continued

Name	Category	Possible Components	Parameters Required for Modeling Costs	Formula	R-squared [B]	Indicator Variable	Indicator Variable Values

D. The 2007 DWINS did not include reservoir costs or cost models. These costs per acre-foot are taken from the Strategies for Colorado's Water Supply Future prepared for the Colorado Water Conservation Board in 2009 since the 2007 DWINS did not include these types of projects. Data specific to Oklahoma was not available at the time of this task.

Variables	Definitions
d	pipe diameter in inches
D	design capacity in MGD or MG based on formula requirements
P	Population served
Y	number of years in which cost occurs
N	number of items (such as number of number of lead service lines to be replaced)
L	pipe length in feet

Table A-2. Pipeline Costs – Used for New, Replacement, Rehabilitation Distribution and Transmission Piping

Diameter	Distribution New/Replacement (cost in 2007 dollars)	Transmission New/Replacement (cost in 2007 dollars)	Distribution Rehab (cost in 2007 dollars)	Transmission Rehab (cost in 2007 dollars)
<6	$107.53	$107.53	$ 73.25	$73.25
6	$107.53	$107.53	$73.25	$73.25
10	$142.83	$95.85	$73.25	$73.25
14	$147.93	$100.95	$73.25	$73.25
16	$191.60	$144.62	$73.25	$73.25
20	$228.42	$181.44	$73.25	$73.25
24	$310.41	$263.43	$73.25	$73.25
30	$312.61	$312.61	$73.25	$73.25
36	$409.32	$409.32	$73.25	$73.25
42	$513.68	$513.68	$73.25	$73.25
60	$513.68	$513.68	$73.25	$73.25
84	$547.09	$547.09	$73.25	$73.25
90	$767.30	$767.30	$73.25	$73.25
96	$859.95	$859.95	$73.25	$73.25
120	$912.07	$912.07	$73.25	$73.25
>120	$1,250.84	$1,250.84	$ 73.25	$73.25

Table A-3. Water Meter Replacement Costs

Diameter	Water Meter Cost (cost in 2007 dollars)
<0.7	$341.00
1	$341.00
1.5	$581.00
2	$984.00
3	$2,772.00
4	$3,261.00
6	$6,706.00
>6	$23,728.00

Table A-4. Calculated Pipeline Diameter when Pipeline Flow Was Known

Flow (mgd)	Flow (cfs)	v (fps)	D (in) calculated	D (in) normalized
<0.25	0	5	3.78	4
0.50	1	5	5.31	5
0.75	1	5	6.52	6
1.00	2	5	7.54	8
2.00	3	5	10.64	10
3.00	5	5	13.04	14
4.00	6	5	15.07	16
5.00	8	5	16.85	16
10.00	15	5	23.82	24
15.00	23	5	29.17	30
20.00	31	5	33.68	36
25.00	39	5	37.66	36
30.00	46	5	41.26	42
35.00	54	5	44.56	42
40.00	62	5	47.64	48
45.00	70	5	50.53	48
50.00	77	5	53.26	54

Table A-4. Calculated Pipeline Diameter when Pipeline Flow Was Known, continued

Flow (mgd)	Flow (cfs)	v (fps)	D (in) calculated	D (in) normalized
55.00	85	5	55.86	54
60.00	93	5	58.34	60
65.00	101	5	60.73	60
70.00	108	5	63.02	66
75.00	116	5	65.23	66
80.00	124	5	67.37	66
85.00	132	5	69.44	72
90.00	139	5	71.46	72
95.00	147	5	73.42	72
100.00	155	5	75.32	78
105.00	162	5	77.18	78
110.00	170	5	79	78
115.00	178	5	80.77	78
120.00	186	5	82.51	84
125.00	193	5	84.21	84
130.00	201	5	85.88	84
135.00	209	5	87.52	90
140.00	217	5	89.12	90
145.00	224	5	90.7	90
150.00	232	5	92.25	90
155.00	240	5	93.78	96
160.00	248	5	95.28	96
165.00	255	5	96.75	96
170.00	263	5	98.21	96
175.00	271	5	99.64	102
180.00	279	5	101.06	102
185.00	286	5	102.45	102
190.00	294	5	103.83	102
195.00	302	5	105.18	108
200.00	309	5	106.52	108
205.00	317	5	107.85	108
210.00	325	5	109.15	108
215.00	333	5	110.44	108
220.00	340	5	111.72	114
225.00	348	5	112.99	114
230.00	356	5	114.23	114
235.00	364	5	115.47	114
240.00	371	5	116.69	114
245.00	379	5	117.9	120
250.00	387	5	119.1	120
255.00	395	5	120.28	120
260.00	402	5	121.46	120
265.00	410	5	122.62	120
270.00	418	5	123.77	120
275.00	425	5	124.91	120
280.00	433	5	126.04	132
285.00	441	5	127.16	132
290.00	449	5	128.27	132

Table A-5. Valve Replacement Costs

Diameter (in)	Valve Costs (cost in 2007 dollars)
<4	$ 2,206.00
6	$ 2,206.00
8	$ 4,100.00
10	$ 4,100.00
12	$ 4,100.00
16	$ 9,449.00
20	$ 15,633.00
>20	$ 28,224.00

Table A-6. Backflow Preventer Replacement Costs

Diameter (in)	Backflow Preventer Costs (cost in 2007 dollars)
<1	$ 803.00
1	$ 839.00
1.5	$ 960.00
2	$ 1,192.00
3	$ 2,044.00
4	$ 2,968.00
6	$ 4,660.00
8	$ 11,222.00
>8	$ 15,688.00

Appendix B
OCWP Project Development Worksheets

Appendix B
OCWP Project Development Worksheets

Examples of the project development worksheets are shown in Figures B-1 and B-2. The worksheet provides a standard method for estimating types of projects needed, project size, and project date. Information developed as part of other OCWP tasks and provided in the 2008 OCWP survey were used to complete this form. The OCWP standard assumptions supplemented the available information.

Project Development Worksheet - Surface Water Providers

SWDIS ID No.	[redacted]						
Provider							
OCWP Region							
2060 Size Classification							
Source Water Type							
Percent SW							
Percent GW							
2007 DWINS Participant?							
			Notes	**Project Year**		**Comments**	**Pipeline Dia. (in)**
Check source water capacity							
	afy	**mgd**					
2060 Demand			based on Provider Lookup Data - from Provider Tables				
Permitted Supply			based on Provider Lookup Data - from Provider Tables				
Shortage/Excess			**If capacity is needed, evaluate type of water source*				
	Lookup	**Age (2007 - ye**	**Name Correction (if applicable)**	**2007 Use AFY (based on OCWP**	**Percent Use**		
Surface Supply 1							
Surface Supply 2							
Surface Supply 3							
Surface Supply 4							
Surface Supply 5							
Surface Supply 6							
Project Size			New/replacement surface water intake			based on question 6.20 from OCWP survey	
Project Size			Rehab surface water intake			based on question 6.20 from OCWP survey	
Project Size							
Check treatment capacity							
		mgd					
Current WTP capacity			based on question 6.2 from OCWP survey				
Known WTP expansions			based on question 6.10 from OCWP survey, manually check DWINS list				
Known new WTP			based on question 6.10 from OCWP survey, manually check DWINS list				
Total							
Shortage/Excess			**If capacity is needed, evaluate using question 6.8 the type of treatment plant*				
		Year Built	**Recent Expansion or Upgrade**				
WTP 1							
WTP 2							
WTP 3							
Project Size			Project identified in DWINS list?				
Project Size			New?				
Project Size			Rehab & Expand?				
Project Size			Finished water storage				
Project Size							
Check raw water transmission capacity							
		mgd					
Current raw water transmission capacity			based on question 6.1 from OCWP survey				
Known expansions			manually check DWINS list			(Not) noted on DWINS	
Total							
Shortage/Excess							
Project Size (mgd)			Rehab transmission			Approximate pipe	
Project Size (mgd)			New transmission			Approximate pipe	
Distribution System Growth/Rehabilitation/Replacement							
	2007	**2060**					
Population			based on Provider Lookup Data - from Provider Tables				
Average growth rate per year							
	From OCWP Question 6.25	**Miles**	**Replacement/Rehab Year**				
Approximate length less than 10 years old			2080				
Approximate length between 10-30 years old			2060				
Approximate length between 30-50 years old			2040				
Approximate length between 50-70 years old			2020				
Approximate length older than 70 years old			2020				
	Miles	**LF**					
Current Length of pipe 6" or smaller in diameter			based on question 6.22 from OCWP survey				
Current Length of pipe greater than 6" and less than 12" in diameter			based on question 6.22 from OCWP survey				

Project Development Worksheet - Surface Water Providers

SWDIS ID No.				
Provider				
Current Length of pipe greater than 12" in diameter			based on question 6.22 from OCWP survey	
Total Length				
Growth Length each year of pipe 6" or smaller in diameter				Plan on annual project of this size
Growth Length each year of pipe greater than 6" and less than 12" in diameter				Plan on annual project of this size
Growth Length each year of pipe greater than 12" in diameter				Plan on annual project of this size
Year	**2080**	**Rehab**	**Replacement**	
Length each year of pipe 6" or smaller in diameter				These projects are outside the scope of this
Length each year of pipe greater than 6" and less than 12" in diameter				These projects are outside the scope of this study
Length each year of pipe greater than 12" in diameter				These projects are outside the scope of this
Total Length				
Year	**2060**	**Rehab**	**Replacement**	
Length each year of pipe 6" or smaller in diameter				
Length each year of pipe greater than 6" and less than 12" in diameter				
Length each year of pipe greater than 12" in diameter				
Total Length				
Year	**2040**	**Rehab**	**Replacement**	
Length each year of pipe 6" or smaller in diameter				
Length each year of pipe greater than 6" and less than 12" in diameter				
Length each year of pipe greater than 12" in diameter				
Total Length				
Year	**2020**	**Rehab**	**Replacement**	
Length each year of pipe 6" or smaller in diameter				
Length each year of pipe greater than 6" and less than 12" in diameter				
Length each year of pipe greater than 12" in diameter				
Total Length				
Check length				
Written Comments in 2008 OCWP - Change worksheet reference				
Type of WTP		6.8*	based on question 6.8 from OCWP survey	
Additional (unplanned) WTP infrastructure improvements needed		6.12*	based on question 6.12 from OCWP survey	
Planned raw water reservoir infrastructure improvements		6.18*	based on question 6.18 from OCWP survey	
Additional raw water reservoir infrastructure improvments		6.19*	based on question 6.19 from OCWP survey	
Planned raw water conveyance infrastructure improvements		6.20.4	based on question 6.20 from OCWP survey	
Additional raw water conveyance infrastructure improvments		6.21*	based on question 6.21 from OCWP survey	
Additional distribution system infrastructure improvements		6.27.4	based on question 6.27 from OCWP survey	

Project Development Worksheet - Groundwater Providers

SWDIS ID No.	[redacted]					
Provider						
OCWP Region						
2060 Size Classification						
Source Water Type						
Percent SW						
Percent GW						
2007 DWINS Participant?						
			Notes	**Project Implementation Year**	**Comments**	**Pipeline Dia. (in)**
Check source water capacity						
2060 Demand			based on Provider Lookup Data - from Provider Tables			
Permitted Supply			based on Provider Lookup Data - from Provider Tables			
Shortage/Excess			**If capacity is needed, evaluate type of water source*			
	Number of Wells (OCWP 5.3, 5.7)	**Avg Age (OCWP 5.4, 5.8)**	**Total Production in 2007 (MG) (OCWP 5.6, 5.10)**	**Percent Use**		
Wells with no treatment						
Wells with treatment						
Project Size					Project included in DWINS?	
Project Size			New groundwater wells			
Project Size			New well house			
Project Size			Rehab existing wells			
Check treatment capacity						
		mgd				
Current WTP capacity			based on question 6.2 from OCWP survey			
Known WTP expansions			based on question 6.10 from OCWP survey, manually check DWINS list			
Known new WTP			based on question 6.10 from OCWP survey, manually check DWINS list			
Total						
Shortage/Excess			**If capacity is needed, evaluate using question 6.8 the type of treatment plant*			
		Year Built	**Recent Expansion or Upgrade**			
WTP 1						
WTP 2						
WTP 3						
Project Size			GW Chemical Feed			
Project Size			Finished Water pumps			
Project Size			Ground level finished water storage			
Check raw water transmission capacity						
		mgd				
Current raw water transmission capacity			based on question 6.1 from OCWP survey			
Known expansions			manually check DWINS list		Not noted on DWINS	
Total						
Shortage/Excess						
Project Size (mgd)			Rehab transmission		Approximate pipe diameter (in)	
Project Size (mgd)			New transmission		Approximate pipe diameter (in)	
Distribution System Growth/Rehabilitation/Replacement						
	2007	**2060**				
Population			based on Provider Lookup Data - from Provider Tables			
Average growth rate per year						
	From OCWP Question 6.25	**Miles**	**Replacement/Rehab Year**			
Approximate length less than 10 years old			2080			
Approximate length between 10-30 years old			2060			
Approximate length between 30-50 years old			2040			
Approximate length between 50-70 years old			2020			
Approximate length older than 70 years old			2020			
	Miles	**LF**				
Current Length of pipe 6" or smaller in diameter			based on question 6.22 from OCWP survey			
Current Length of pipe greater than 6" and less than 12" in diameter			based on question 6.22 from OCWP survey			
Current Length of pipe greater than 12" in diameter			based on question 6.22 from OCWP survey			
Total Length						
Growth Length each year of pipe 6" or smaller in diameter					Plan on annual project of this size	
Growth Length each year of pipe greater than 6" and less than 12" in diameter					Plan on annual project of this size	

Project Development Worksheet - Groundwater Providers

SWDIS ID No.				
Provider				
Growth Length each year of pipe greater than 12" in diameter				Plan on annual project of this size
Year	**2080**	**Rehab**	**Replacement**	
Length each year of pipe 6" or smaller in diameter				These projects are outside the scope of this study
Length each year of pipe greater than 6" and less than 12" in diameter				These projects are outside the scope of this study
Length each year of pipe greater than 12" in diameter				These projects are outside the scope of this study
Total Length				
Year	**2060**	**Rehab**	**Replacement**	
Length each year of pipe 6" or smaller in diameter				
Length each year of pipe greater than 6" and less than 12" in diameter				
Length each year of pipe greater than 12" in diameter				
Total Length				
Year	**2040**	**Rehab**	**Replacement**	
Length each year of pipe 6" or smaller in diameter				
Length each year of pipe greater than 6" and less than 12" in diameter				
Length each year of pipe greater than 12" in diameter				
Total Length				
Year	**2020**	**Rehab**	**Replacement**	
Length each year of pipe 6" or smaller in diameter				
Length each year of pipe greater than 6" and less than 12" in diameter				
Length each year of pipe greater than 12" in diameter				
Total Length				
Check length				

Written Comments in 2008 OCWP - Change worksheet reference		
Type of WTP	6.8*	based on question 6.8 from OCWP survey
Additional (unplanned) WTP infrastructure improvements needed	6.12*	based on question 6.12 from OCWP survey
Planned raw water reservoir infrastructure improvements	6.18*	based on question 6.18 from OCWP survey
Additional raw water reservoir infrastructure improvments	6.19*	based on question 6.19 from OCWP survey
Planned raw water conveyance infrastructure improvements	6.20.4	based on question 6.20 from OCWP survey
Additional raw water conveyance infrastructure improvments	6.21*	based on question 6.21 from OCWP survey
Additional distribution system infrastructure improvements	6.27.4	based on question 6.27 from OCWP survey