

APPENDIX 2
ADDITIONAL NEEDS ASSESSMENT

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APPENDIX 2

ADDITIONAL NEEDS ASSESSMENT

Prior to completion of the final report for the second phase of study, additional water districts showed an interest in participating in the study. A third phase of the study was proposed that would include Sallisaw, Sequoyah County RWSG & SWMD #7, Muldrow, and Roland. This Phase III study would provide conceptual level designs and cost estimates for the newly expanded wholesale water treatment and conveyance system.

A needs assessment was conducted for each of the four new participating water districts to provide accurate quantities for conceptual designs of the proposed water treatment and conveyance system. This needs assessment is identical to the needs assessment provided in both the Phase I and Phase II reports and includes an updated version of each table included in the needs assessments in those reports.

WATER INDUSTRY PROFILE

Phase I of this study established a water industry profile for the Lake Tenkiller area, and Phase II updated the profile to include the Tahlequah Public Works Authority. Table 2-1 is a revised list of the 27 participating water systems, including Sallisaw, Sequoyah County RWSG & SWMD #7, Muldrow, and Roland. The profile is critical to establishing a baseline from which to project future water needs. The water systems within the study area were evaluated in terms of present and future water supply demands, water treatment facilities, water supply distribution systems, storage capacity, and cost of water to consumers.

Table 2-1. Water Systems/Districts Within Study Area

Burnt Cabin	Muskogee County RWD #7
Cherokee County Rural Water District (RWD) #1	Paradise Hills, Inc.
Cherokee County RWD #2 (Keys)	Sequoyah County Water Association
Cherokee County RWD #3	Sequoyah County RWSG & SWMD #7
Cherokee County RWD #7	Stick Ross Mountain Water Company
Cherokee County RWD #8	Summit Water
Cherokee County RWD #13 (Cookson)	Tahlequah Public Works
City of Sallisaw	Lake Region Electric Development
East Central Oklahoma Water Authority	Tenkiller Aqua Park
Fin and Feather Water Association	Tenkiller State Park
Lake Tenkiller Harbor	Town of Gore
Lost City RWD	Town of Muldrow
Muskogee County RWD #4	Town of Roland
	Town of Vian

Note: Tenkiller Water Company was purchased by Lake Region Electric Coop and is now known as Lake Region Electric Development (LRED).

PRESENT AND FUTURE WATER SUPPLY DEMANDS

Establishing present and future water supply demands is an important first step in evaluating future needs. Identifying present water system capacities is important in determining whether current demands are being satisfied by existing water systems. This information is also necessary to establish the baseline for water demand projections. Table 2-2 presents revised figures for average and peak daily water usage for the participating water systems. The information used in the study dates to 1995, the latest year with complete water use data.

Table 2-2. Present Demand

Name of District/Water System	Average Daily Usage (1,000 gallons/day)	Peak Daily Usage (1,000 gallons/day)
Burnt Cabin	30	50
Cherokee County RWD #1	70	85
Cherokee County RWD #2	80	40
Cherokee County RWD #3	175	250
Cherokee County RWD #7	100	150
Cherokee County RWD #8	100	NA
Cherokee County RWD #13	70	140
City of Sallisaw	575	1,075
East Central Oklahoma Water Authority	190	250
Fin and Feather Water Association	35	45
Lake Tenkiller Harbor	30	100
Lost City RWD	200	350
Muskogee County RWD #4	69	69
Muskogee County RWD #7	134	200
Paradise Hills, Inc.	22	105
Sequoyah County Water Association	1,385	1,600
Sequoyah County RWSG & SWMD #7	480	725
Stick Ross Mountain Water Company	200	275
Summit Water	67	NA
Tahlequah Public Works	641	1,115
LRED (total)	55*	250*
Tenkiller Aqua Park	10	37
Tenkiller State Park	18*	120
Town of Gore	271	332
Town of Muldrow	500	640
Town of Roland	275	300
Town of Vian	180	180
TOTAL	5,962	8,483

* Figures are from the Lake Tenkiller Development Coalition's 1995 report, entitled "Analysis of Water Systems Surrounding Lake Tenkiller."

To plan for future water infrastructure needs, projections of future needs were developed. A 50-year period from 2000 to 2050 was evaluated. A 50-year time frame is the typical life of infrastructure items such as water treatment plants and distribution systems.

Table 2-3 displays actual and projected water demand for the water supply systems in this study for the years 1995 through 2050. The projections utilized baseline water use information collected in 1996. To project water demand, the base year figures were applied to the rate of projected change estimated for Cherokee and Sequoyah counties by the OWRB for 1990 to 2050¹. The OWRB decennial rate of change for 1990 to 2000 for each county was prorated and applied to 1995 average annual use figures to obtain the projected year 2000 demand. The same method was applied to each subsequent year listed in the table. The method provided a projected average daily use, by decade, for each system. Overall, the total amount of water demand in the area will grow from approximately 6.0 million gallons per day in 1995 to about 8.4 million gallons per day in 2050.

The projected figures for future years listed in Table 2-3 were developed in coordination with the water districts. Each water district was provided the projected data and given an opportunity to comment on how well the straight-line calculations represented their view of future growth. One big concern was the availability of local infrastructure to support growth. The general view held by water district managers is that the type of growth shown in the table may not occur if infrastructure, such as readily available water supply, is not developed. Any growth demand in the area, like that projected by the OWRB, would be in areas where water supply infrastructure is accessible.

¹ Though part of the study area includes rural areas within Muskogee County, the water supply projections reflect only the OWRB trends for Sequoyah and Cherokee counties. The OWRB projections for Muskogee reflect growth in the entire county, including users within and adjacent to the city of Muskogee. The city of Muskogee, the largest city in the county, provides water to several large industrial users, as well as to urban residential users. Historic trends of water demand in the rural portions of Muskogee County are more similar to the adjacent, less-urbanized counties than to the urban portions of that county.

**Table 2-3. Actual and Projected Water Demand By Water System/District
(1,000 gallons/day)**

Water System/District	Year						
	1995	2000	2010	2020	2030	2040	2050
Burnt Cabin	30	32	36	37	38	40	42
Cherokee County RWD #1	70	75	84	87	89	94	99
Cherokee County RWD #2	80	86	95	99	102	107	113
Cherokee County RWD #3	175	189	209	217	223	235	247
Cherokee County RWD #7	100	108	119	124	128	134	141
Cherokee County RWD #8	100	108	119	124	128	134	141
Cherokee County RWD #13	70	75	84	87	89	94	99
City of Sallisaw	575	619	686	712	735	772	810
East Central Oklahoma Water	190	205	227	235	242	255	268
Fin and Feather Water Assoc.	35	38	42	43	45	47	49
Lake Tenkiller Harbor	30	32	36	37	38	40	42
Lost City RWD	200	215	239	248	255	269	282
Muskogee County RWD #4	69	74	82	85	88	93	97
Muskogee County RWD #7	134	144	160	166	171	180	189
Paradise Hills, Inc.	22	24	26	27	28	30	31
Sequoyah County Water Assoc.	1,385	1,492	1,653	1,714	1,768	1,859	1,951
Sequoyah County #7	480	517	573	594	613	644	676
Stick Ross Mountain Water Co.	200	215	239	248	255	269	282
Summit Water	67	72	80	83	86	90	94
Tahlequah Public Works	541	653	722	760	792	841	900
LRED	55	59	66	68	70	74	77
Tenkiller Aqua Park	10	11	12	12	13	13	14
Tenkiller State Park	18	19	21	22	23	24	25
Gore Public Water	271	292	323	335	346	364	382
Muldrow	500	539	597	619	639	672	705
Roland Utility Authority	275	296	328	340	351	369	387
Vian Public Water	180	194	215	223	230	242	254
TOTAL	5,962	6,383	7,073	7,346	7,585	7,985	8,397

Note: The 1995 figures are from the Lake Tenkiller Development Coalition's 1995 report entitled, "Analysis of Water Systems Surrounding Lake Tenkiller." The projected figures are based on 1995 average annual use times the rate of growth projected by the OWRB's "State Water Issues and Updated Water Use Projections, 1995"; Cherokee and Sequoyah Counties.

WATER TREATMENT FACILITIES

Identifying the current physical condition, age, and capacity of water treatment facilities for each water district is important to identify water systems that may have no need for expansion as well as those systems that will be unable to support future growth or demand.

Treatment plant type, source of water, water rights on Lake Tenkiller, age, state of repair, and capacity were obtained to develop a baseline condition. This information is presented in Table 2-4. A total of 8 of the 27 water systems do not have treatment plants and purchase treated water from other systems. The age of the treatment facilities varies throughout the area, with some older plants built in the 1950's and newer plants built in the 1980's and 1990's. According to the water system managers, most plants were in good repair and all were operating within water quality standards established by the State. Many of the treatment plants were built with capacities well above what was originally required. Some older treatment plants, however, are operating at their maximum capacities and have no expansion capability without upgrading.

As the public demand for safe drinking water is more accurately defined, State and Federal water quality standards will increase. Such an increase will result in upgrading existing water treatment facilities. To minimize the impact on the retail customer, water suppliers will have to find the most economical means to finance those upgrades.

Table 2-4. Existing Treatment Facilities

Name of Water System	Type	Source of Supply	Water Rights on Lake Tenkiller	Age	State of Repair	Capacity
Burnt Cabin	Sand Filter	Lake Tenkiller	90 acre-feet	1985	Good	More than adequate
Cherokee County RWD #1	Bermuda Filter	Ranger Creek	0 acre-feet	1965	Fair, plant is old	Adequate 115,000 gallons/day
Cherokee County RWD #2	Rapid Sand Filter	Lake Tenkiller	129 acre-feet	1968, expanded in 1977 and 1988	Fair	Running close to capacity 144,000 gallons/day
Cherokee County RWD #3	NA	Vance Spring and Tahlequah Public Works	0 acre-feet	NA	NA	Spring capacity 220,000 gallons/day
Cherokee County RWD #7	NA	Tahlequah Public Works	0 acre-feet	NA	NA	Capacity of system is limited by Tahlequah Public Works
Cherokee County RWD #8	NA	Tahlequah Public Works	0 acre-feet	NA	NA	Capacity of system is limited by Tahlequah Public Works
Cherokee County RWD #13	Multimedia Filter	Lake Tenkiller	272 acre-feet	1967, upgraded over the years	Good	Adequate 170,000 gallons/day
City of Sallisaw	Separate coagulation/floculation and settling basins	Brushy Lake	0 acre-feet	1960, upgraded in 1971 1981, upgraded in 1998	Good Good	1.2 mgd and 1.5 mgd with a peak capacity of 4.3 mgd
East Central Oklahoma Water Authority	Upflow Plant	Lake Tenkiller	1,422 acre-feet	System started in 1964; exact age of plant is not known	Good	More than adequate
Fin and Feather Water Association	Filter	Lake Tenkiller	11 acre-feet	1992	Good	Adequate
Lake Tenkiller Harbor	Rapid Sand Filter	Lake Tenkiller	140 acre-feet	1980	Good	More than adequate 172,800 gallons/day
Lost City RWD	Multimedia Filter	Clear Creek Double Springs Tahlequah Public Works	0 acre-feet	1993	Good	More than adequate 1.0 million gallons/day

Table 2-4 (Continued)

Name of Water System	Type	Source of Supply	Water Rights on Lake Tenkiller	Age	State of Repair	Capacity
Muskogee County RWD #4	NA	City of Fort Gibson	0 acre-feet	NA	NA	NA
Muskogee County RWD #7	NA	City of Fort Gibson	0 acre-feet	NA	NA	NA
Paradise Hills, Inc.	Rapid Sand Filter	Lake Tenkiller	31 acre-feet	1991	Good	Adequate water plant 400,000 gallons/day Supply line 150,000 gallons/ day
Sequoyah County Water Association	Rapid Sand Filter	Lake Tenkiller Lee Creek	3,000 acre-feet	NA	Good	Adequate
Sequoyah County RWSG & SWMD #7	NA	City of Fort Smith	0 acre-feet	NA	NA	NA
Stick Ross Mountain Water Company	NA	Tahlequah Public Works, Well	3,000 acre-feet	NA	NA	Well 115,000 gallons/day
Summit Water	Filter	Lake Tenkiller	21 acre-feet	NA	Good	Unknown
Tahlequah Public Works	Rapid Sand Filter	Illinois River	0 acre-feet	1947, expanded in 1963, 1976, and 1990	Good	9,000,000 gallons/day
LRED	NA	NA	399 acre-feet	NA	NA	NA
Tenkiller Aqua Park	Sand Filter	Lake Tenkiller	21 acre-feet	1992	Good	More than adequate
Tenkiller State Park	Sand Filter	Lake Tenkiller Sequoyah County	0 acre-feet	1955	Fair	Treatment plant 40,000 gallons/day. Plant is small and Sequoyah County must supplement supply.
Town of Gore	Sand Filter	Lake Tenkiller	560 acre-feet	1992	Good	More than adequate
Town of Muldrow	Rapid Sand Filter	Muldrow Lake	0 acre-feet	1960's	Good	800,000 gallons/day
Town of Roland	Sand Filter	Roland Lake	0 acre-feet	1999	Excellent	800,000 gallons/day
Town of Vian	NA	Sequoyah County	0 acre-feet	NA	NA	NA

Note: "NA" indicates information was not available.

WATER SUPPLY DISTRIBUTION SYSTEMS

The proposed wholesale water treatment and conveyance system does not include a new distribution system for any of the 27 water districts. Each participating water district would use their existing distribution system to supply their customers. The Lake Tenkiller Wholesale Water Treatment and Conveyance System would be linked to existing distribution systems of participating water districts. The water districts would be responsible for maintaining their existing distribution system and for billing customers.

The water distribution systems of the 27 water districts were examined for age, state of repair, type of system, and number of meters. See Table 2-5. Detailed information was not available for every water system. Overall, the distribution systems were reported to be in good shape by the water district managers. Several systems may require an upgrade in line sizes before additional customers could be added. The upgrades would be the responsibility of the individual water systems.

Table 2-5. Existing Distribution Systems

Name of Water System	Approximate Age/ State of Repair	Type of System	Number of Meters	General Description of System
Burnt Cabin	NA/Good	PVC and Galvanized Lines	Master: 1 Residential: 39 Commercial: 2 Industrial: 0	The system is small serving 30 residents, several recreational vehicle hookups, and a marina.
Cherokee County RWD #1	1965/Good	PVC and Galvanized Lines	Master: 1 Residential: 255 Commercial: 1 (school) Industrial: 0	The distribution system is small. The largest line in the system is 6-inch which limits the capacity and the number of customers.
Cherokee County RWD #2	1968, expanded in 1977 and 1988/ Fair to Good	PVC and Galvanized Lines	Master: 6 Residential: 400 Commercial: 25 Industrial: 0	The system is in fair to good shape mainly serving rural customers. The system was originally built in 1968 and has been expanded over the years.
Cherokee County RWD #3	NA/Good	Mostly PVC with some Galvanized Lines	Master: 4 Residential: 600 Commercial: 2 Industrial: 0 (an additional 20 customers are not metered)	This system is described as being in excellent shape. The system is separated into two systems; one is supplied by Tahlequah Public Works, while the other is supplied by both Tahlequah Public Works and Vance Springs.
Cherokee County RWD #7	NA/Good	NA	Master: 1 Residential: 285 Commercial: 0 Industrial: 0	The system purchases water from Tahlequah Public Works. The distribution system is described as being in good shape. Expansion of the distribution system has been limited due to the limited amount of water supplied from Tahlequah Public Works.
Cherokee County RWD #8	10 years/Good	Mostly PVC with some Galvanized Lines	Master: 1 Residential: 229 Commercial: 0 Industrial: 0	The system purchases water from Tahlequah Public Works.
Cherokee County RWD #13	1967, upgraded over the years/Good	PVC and Galvanized Lines	Master: 5 Residential: 500 Commercial: 15 Industrial: 0	The system was built in 1967 and has been upgraded through the years
City of Sallisaw	NA	NA	Master: 4 Residential: 2640 Commercial: 470 Industrial: 5	In addition to serving the City of Sallisaw, this system provides water for Sequoyah County RWD #3 and Sequoyah County RWD #4.
East Central Oklahoma Water Authority	1964, upgraded over the years/Fair-Good	NA	Master: 1 Residential: 690 Commercial: 35 Industrial: 0	The distribution system is in fair condition and includes both a rural and a city distribution system.

Table 2-5 (Continued)

Name of Water System	Approximate Age/ State of Repair	Type of System	Number of Meters	General Description of System
Fin and Feather Water Association	NA/Good	NA	Master: 1 Residential: 0 Commercial: 0 Industrial: 0	The distribution system is very small and is in good condition. The system supplies water to a resort area, small trailer park, and a few houses.
Lake Tenkiller Harbor	1980/Good	PVC	Master: 1 Residential: 256 Commercial: 1 Industrial: 0	The system serves a resort/retirement type area that serves approximately 256 customers. The system was installed in 1980.
Lost City RWD	20 years/Good	Mostly PVC with some Galvanized Lines	Master: 3 Residential: 977 Commercial: 0 Industrial: 0	The distribution system is approximately 20 years old and is mostly PVC. The system is in good shape. The system uses two springs and Tahlequah Public Works as its water source.
Muskogee County RWD #4	1957/Good	NA	Master: 2 Residential: 270 Commercial: 0 Industrial: 0	The system was installed in 1957 and only serves rural customers. The system purchases water from the city of Fort Gibson.
Muskogee County RWD #7	NA/Good	NA	Master: 1 Residential: 510 Commercial: 0 Industrial: 0	The system only serves rural customers. The system purchases water from the city of Fort Gibson.
Paradise Hills, Inc.	10 years/Good	Mostly PVC (90%) with some Galvanized Lines	Master: 1 Residential: 1 Commercial: 0 Industrial: 0	The distribution system was installed within the last ten years and is in good shape.
Sequoyah County Water Association	NA/Good	NA	Master: 7 Residential: 3753 Commercial: 2 Industrial: 13	This distribution system is the largest in the Tenkiller area in terms of quantity of water used and service area.
Sequoyah County RWSG & SWMD #7	1969 with extensions in 1980 and 1995	NA	Master: 0 Residential: 1481 Commercial: 84 Industrial: 0	Rural Water District #7 purchases their water from the City of Fort Smith and distributes it from Moffett to Gans.
Stick Ross Mountain Water Company	NA/Good	PVC	Master: 3 Residential: 820 Commercial: 1 (school) Industrial: 0	The system is described as being in good shape, with all lines being PVC. The system uses one well and the city of Tahlequah as its water source.

Table 2-5 (Continued)

Name of Water System	Approximate Age/ State of Repair	Type of System	Number of Meters	General Description of System
Summit Water	NA/Good	NA	Master: 1 Residential: 62 Commercial: 5 Industrial: 0	The system is a small family-owned water system that is in good shape. The system serves approximately 100-150 people.
Tahlequah Public Works	Pre 1947 Fair/Good 1947-1980 Good 1980-1997 Excellent	PVC and Galvanized Lines	Master: 10 Residential: 4701 Commercial: 742 Industrial: 0 Other: 100	This system began operation in 1919 and currently serves approximately 12,000 people.
LRED	NA	NA	Master: Residential: Commercial: Industrial:	Information has not been received from the water system.
Tenkiller Aqua Park	NA/Fair	Galvanized Lines	Master: 0 Residential: 0 Commercial: 0 Industrial: 0	The system is small, serving a small resort type trailer park.
Tenkiller State Park	1955, updated in 1990/Fair	PVC	Master: 2 Residential: 0 Commercial: 1 (marina) Industrial: 0	Originally installed in 1955, this system was updated to PVC in 1990 and is separated into two systems. The north system is supplied by the Sequoyah County Water Association (SCWA). The south system is supplemented by the SCWA during peak demands.
Town of Gore	NA/Fair	PVC and Galvanized Lines	Master: 4 Residential: 523 Commercial: 66 Industrial: 0	The distribution system is made up of both PVC and older galvanized lines. The distribution system is said to be in fair condition, with the older line needing to be updated.
Town of Muldrow	NA	NA	Master: 0 Residential: 1006 Commercial: 70 Industrial: 1	This system serves approximately 3500 residents.
Town of Roland	NA	NA	Master: 23 Residential: 974 Commercial: 33 Industrial: 0	Until recently the Town of Roland purchased its water from Sequoyah County RWD #7.
Town of Vian	NA	NA	Master: 2 Residential: 690 Commercial: 50 Industrial: 0	The town of Vian purchases water from the Sequoyah County Water Association.

STORAGE CAPACITY

The 27 water districts were also examined for water storage capacity. Water storage capacity is the volume of water that is available for immediate use. The storage capacity of each water district is important in determining whether existing water storage meets existing and future water storage capacity needs. Storage capacity will also be an important factor in the feasibility and design of a new wholesale water treatment and conveyance system as the proposed system would use existing water storage capabilities when possible to help lower the cost of the new system. Adequate storage capacity is also required to ensure proper water supply for emergencies and to provide water at peak demands. Storage capacities of the 27 water systems varied from approximately 4.75 million gallons for the largest system (Sallisaw) to several systems that have no water storage capacity. Table 2-6 lists the storage capacity of the 27 water systems. Total raw water storage is approximately 178,432,235 gallons. Total treated water storage is approximately 14,929,925 gallons.

COST OF WATER TO CONSUMER

One purpose of the proposed wholesale water treatment and conveyance system is to provide reliable water supply to surrounding communities at an affordable, uniform rate. Current water prices in the study area vary widely. The method of rate computation also varies. Several water systems charge a flat monthly rate; others charge based on the amount of water used. Table 2-7 lists the current cost of water to the consumer for each of the 27 water systems.

ANALYSIS OF EXISTING SYSTEMS AND DETERMINATION OF NEEDS

To establish need for the proposed wholesale water treatment and conveyance system, the water industry profile developed in the previous section must be analyzed with respect to demand, treatment facilities, storage capacity, and cost. Most of the analysis relies on the projected water needs for the region presented earlier.

Table 2-6. Water Storage Capacity

Name of Water System	Raw Water Storage (gallons)	Treated Water Storage (gallons)
Burnt Cabin	0	50,000* - stand pipe
Cherokee County RWD #1	0	30,000 - water tower 40,000 - water tower
Cherokee County RWD #2	0	30,000 - clearwell 120,000 - stand pipe 100,000 - stand pipe
Cherokee County RWD #3	0	120,000 - stand pipe 37,000 - stand pipe
Cherokee County RWD #7	0	Two 45,000 - stand pipes
Cherokee County RWD #8	0	120,000 - total storage in stand pipes
Cherokee County RWD #13	135,000	125,000 - total storage in 3 stand pipes
City of Sallisaw	12,000,000 at treatment plant	2,000,000 – treatment plant 2,000,000 – N. Fruit Farm Road 750,000 – Taylor Drive Street
East Central Oklahoma Water Authority	0	30,000 – clearwell 100,000 – tank 30,000 – tank
Fin and Feather Water Assoc.	25,000 – tank	25,000 – tank
Lake Tenkiller Harbor	0	40,000 – clearwell
Lost City RWD	0	425,000 - total storage in stand pipes
Muskogee County RWD #4	0	0
Muskogee County RWD #7	0	Three 80,000 - stand pipes
Paradise Hills, Inc.	0	84,000 – tank
Sequoyah County Water Association	257,235	1,409,925 - total in 14 tanks
Sequoyah County RSWG & SWMD #7	0	200,000 – stand pipe 100,000 – tank 100,000 – tank 100,000 – tank
Stick Ross Mountain Water Company	0	150,000 – stand pipe 37,000 - stand pipe 53,000 - stand pipe
Summit Water	0	50,000
Tahlequah Public Works	166,000,000	4,000,000 in four 1-million gallon storage reservoirs
LRED	0	400,000
Tenkiller Aqua Park	0	Two 37,000 - tanks
Tenkiller State Park	15,000 – clearwell	30,000 - tower (needs to be replaced)
Town of Gore	0	60,000 - clearwell 80,000 - stand pipe 50,000 - stand pipe
Town of Muldrow	Muldrow Lake Muldrow Pond	1,200,000
Town of Roland	Roland Lake	1,200,000
Town of Vian	0	150,000 - tower 100,000 - tower

* estimated capacity

Table 2-7. Cost of Water to Consumer

Name of District/ Water System	Residential Rate	Commercial Rate
Burnt Cabin	\$30.00/month flat rate	\$150.00/month 1st 5,000 gallons 5,000 - 10,000 gallons \$3.13/1,000 gallons 10,000-75,000 gallons \$2.35/1,000 gallons
Cherokee County RWD #1	\$10.00/month, 1st 1,000 gallons, then \$3.00/1,000 gallons Unknown flat rate for 20 unmetered customers	Not Available
Cherokee County RWD #2	\$12.50/month, 1st 1,000 gallons, then \$3.00/1,000 gallons	Not Available
Cherokee County RWD #3	\$7.50/month, 1st 1,500 gallons, then \$2.30/1,000 gallons	Not Available
Cherokee County RWD #7	\$12.50/month, 1st 1,000 gallons then 1,000 - 6,000 gallons \$2.50/1,000 gallons over 6,000 gallons, \$3.35/1,000 gallons	Not Available
Cherokee County RWD #8	\$10.00/month, 1st 1,000 gallons 2nd 1,000 gallons, \$1.50/1,000 gallons 3rd 1,000 gallons, \$2.00/1,000 gallons over 5,000 gallons, \$3.00/1,000 gallons	Not Available
Cherokee County RWD #13	\$16.00/month, 1st 2,000 gallons, then \$3.75/1,000 gallons	Not Available
City of Sallisaw	\$1.00/1,000 gallons	Not Available
East Central Oklahoma Water Authority	\$8.00/month, 1st 1,000 gallons 2nd 1,000 gallons, \$2.00/1,000 gallons 3rd 1,000 gallons, \$2.10/1,000 gallons 4th 1,000 gallons, \$2.22/1,000 gallons	Not Available
Fin and Feather Water Assoc.	Unknown flat rate	Unknown flat rate
Lake Tenkiller Harbor	\$21.75/month, 1st 2,000 gallons then \$2.10/1,000 gallons	Not Available
Lost City RWD	\$11.60/month, 1st 1,000 gallons then 1,000 - 7,000 gallons, \$2.70/1,000 gallons over 7,000 gallons, \$4.00/1,000 gallons	Not Available
Muskogee County RWD #4	\$10.00/month, 1st 2,000 gallons then \$2.00/1,000 gallons	Not Available
Muskogee County RWD #7	\$11.00/month, 1st 1,500 gallons then \$2.50/1,000 gallons	Not Available
Paradise Hills, Inc.	\$25.00/month flat rate	Not Available

Table 2-7 (Continued)

Name of District/ Water System	Residential Rate	Commercial Rate
Sequoyah County Water Association	Rural Customers - \$15.00/1st 1,000 gallons Tenkiller State Park - \$7.00/1,000 gallons City of Vian - \$1.20/1,000 gallons	Not Available
Sequoyah County RWSG & SWMD #7	\$7.50/1 st 1,500 gallons \$0.36/1,000 gallons (1,501 – 4,000) \$0.31/1,000 gallons (4,001 – 10,000) \$0.20/1,000 gallons (10,001 – 15,000) \$0.23/1,000 gallons (15,001+)	Not Available
Stick Ross Mountain Water Company	\$8.00/month, 1st 1,000 gallons then 1,000-10,000 gallons, \$2.85/1,000 gallons over 10,000 gallons, \$3.35/1,000 gallons	Not Available
Summit Water	\$18.00/month, 1st 1,000 gallons	Not Available
Tahlequah Public Works	City \$3.50/1st 2,000 gallons then \$1.00/1,000 gallons Rural \$4.60/1st 2,000 gallons then \$1.00/1,000 gallons	Not Available
LRED (total)	\$21.85/1,500 gallons	Not Available
Tenkiller Aqua Park	Cost of water is included in the trailer service fee (water, garbage, and rent - \$135/month)	Not Available
Tenkiller State Park	Not Available (State buys some of its water from Sequoyah County at \$7.00/1,000 gallons)	Not Available
Town of Gore	Local customers - \$6.00/month, 1st 1,000 gallons then \$1.00/1,000 gallons Rural Customers - \$8.00/month, 1st 1,000 gallons, then \$2.50/1,000 gallons	Not Available
Town of Muldrow	\$0.70/1,000 gallons	Not Available
Town of Roland	\$1.25/1,000 gallons	Not Available
Town of Vian	City buys water from Sequoyah County at \$1.20/1,000 gallons	Not Available

DEMAND

The proposed wholesale water treatment and conveyance system will rely on Lake Tenkiller as its sole source of water. Therefore, the ability to meet the demands of the participating districts is directly related to water rights owned and available on the lake. The 27 water districts involved in this study currently own 9,096 acre-feet of water rights for public water supply on Lake Tenkiller. Based on the demand projections developed earlier, a total of 9,405 acre-feet of water will be required in the year 2050. **Combining all the water rights on Lake Tenkiller currently held by the participating districts would not provide enough raw water through the year 2050.** Current demand and water rights are tabulated in Table 2-8. The table also includes a column indicating when individual systems will exceed their water rights on Lake Tenkiller. Of the 27 participating systems, 13 have water rights on the lake. Two of these 13 systems have current demands that exceed their water rights, and one more will exceed its rights by the year 2050. Obtaining additional water rights could be difficult as outstanding requests for water rights have priority.

TREATMENT FACILITIES

A total of 18 of the participating systems have treatment facilities. Table 2-9 lists which systems have existing water treatment plants, the relative ages, maximum capacities, and in what year the projected demand will exceed the plant's existing capacity. The useful lifetime of a water treatment facility is approximately 30-50 years. While all the systems that provided treatment plant capacity information do not exceed their projected average daily demand by 2050, some may not be able to handle extremely high peak capacities. Those systems with treatment plants older than 1970 may be operating close to their limits on peak demand days. Ten systems have constructed treatment facilities since 1980 that should be able to meet peak demands through 2050.

Table 2-8. Water Demand, Availability, and Sources

Name of Water System	Current Average (1,000 gal/day)	Water Rights (1,000 gal/day)	Demand Exceeds	Other Sources of Water
Burnt Cabin	30	80	---	
Cherokee County RWD #1	70			Ranger Creek
Cherokee County RWD #2	80	115	---	
Cherokee County RWD #3	175			Tahlequah, Vance Spring
Cherokee County RWD #7	100			Tahlequah
Cherokee County RWD #8	100			Tahlequah
Cherokee County RWD #13	70	243	---	
City of Sallisaw	575			Brushy Lake
East Central Oklahoma Water Authority	190	1,269	---	Gore
Fin and Feather Water Authority	35	10	Now	
Lake Tenkiller Harbor	30	125	---	
Lost City RWD	200			Tahlequah, Clear Creek, Double Springs
Muskogee County RWD #4	69			Fort Gibson
Muskogee County RWD #7	134			Fort Gibson
Paradise Hills, Inc.	22	28	2030	
Sequoyah County Water Association	1,385	2,678	---	Lee Creek
Sequoyah County RWSG & SWMD #7	480			Fort Smith
Stick Ross Mountain Water Company	200	2,678	---	Tahlequah, Well
Summit Water	67	19	Now	
Tahlequah Public Works	641			Illinois River
LRED	55	356	---	NA
Tenkiller Aqua Park	10	19	---	
Tenkiller State Park	18			Sequoyah County
Town of Gore	271	500	---	
Town of Muldrow	500			Muldrow Lake, Muldrow Pond
Town of Roland	275			Roland Lake
Town of Vian	180			Sequoyah County
NOTE:				
1. "Now" indicates current demand already exceeds water rights.				
2. "---" indicates average daily demand will not exceed water rights by 2050.				
3. "NA" indicates information was not available for this system.				

Table 2-9. Treatment Facilities, Age, and Capacities

Name of Water System	Treatment Plant	Date	Capacity (1,000 gal/day)	Demand Exceeds Capacity When?
Burnt Cabin	Y	1985	NA	NA
Cherokee County RWD #1	Y	1965	115	---
Cherokee County RWD #2	Y	1968	144	---
Cherokee County RWD #3	N			
Cherokee County RWD #7	N			
Cherokee County RWD #8	N			
Cherokee County RWD #13	Y	1967	170	---
City of Sallisaw	Y	1998	2,700	---
East Central Oklahoma Water Auth.	Y	1964	NA	NA
Fin and Feather Water Association	Y	1992	NA	NA
Lake Tenkiller Harbor	Y	1980	172	---
Lost City RWD	Y	1993	1,000	---
Muskogee County RWD #4	N			
Muskogee County RWD #7	N			
Paradise Hills, Inc.	Y	1991	400	---
Sequoyah County Water Association	Y	NA	NA	NA
Sequoyah County RWSG & SWMD #7	N			
Stick Ross Mountain Water Company	N			
Summit Water	Y	NA	NA	NA
Tahlequah Public Works	Y	1990	9,000	---
LRED	NA	NA	NA	NA
Tenkiller Aqua Park	Y	1992	NA	NA
Tenkiller State Park	Y	1955	40	NA
Town of Gore	Y	1992	NA	NA
Town of Muldrow	Y	1960's	800	---
Town of Roland	Y	1999	800	---
Town of Vian	N			
<p>NOTE:</p> <ol style="list-style-type: none"> 1. "Date" is year treatment facility was placed in operation, or latest expansion completed. 2. "NA" indicates information was not available for this system. 3. "---" indicates average daily demand will not exceed treatment capacity by 2050. 				

STORAGE CAPACITY

Treated water storage capacity of each system is compiled in Table 2-10. The table also shows projected demand for the year 2050 and the projected date demand exceeds storage capacity. The Oklahoma Administrative Code requires a minimum storage capacity equal to at least average daily water use. Eight systems currently have inadequate storage capacity for treated water. Six additional systems will exceed their storage capacity by 2050. The remaining 13 systems have more than adequate storage capacity to handle projected demand by 2050.

COST TO CONSUMERS

To get a better idea of the variation of costs throughout the study area, it is helpful to compare costs for an equal amount of water used. A figure of 10,000 gallons was chosen as representative of typical residential use. Table 2-11 shows the resulting costs to residential consumers. Costs varied widely, from \$7.00 for Muldrow to \$46.00 for Cherokee County RWD #13. Average cost was \$27.80. Costs were unavailable for a number of systems.

DETERMINATION OF NEEDS

The assessment of needs is specific to each water district. Providing adequate, dependable, high quality water at a reasonable cost to the consumer is important to every water district. Table 2-12 illustrates whether each water system has an identifiable need and, if so, what criteria the need is based on.

Table 2-10. Treated Water Storage Capacity

Name of Water System	Treated Storage Capacity (1,000 gallons)	Projected Demand in 2050 (1,000 gal/day)	Projected Date Demand Exceeds Capacity
Burnt Cabin	50	42	----
Cherokee County RWD #1	70	99	Now
Cherokee County RWD #2	250	113	----
Cherokee County RWD #3	157	247	Now
Cherokee County RWD #7	90	141	Now
Cherokee County RWD #8	120	141	2010
Cherokee County RWD #13	125	99	----
City of Sallisaw	4,750	3,239	----
East Central Oklahoma Water Authority	160	268	Now
Fin and Feather Water Association	25	49	Now
Lake Tenkiller Harbor	40	42	2040
Lost City RWD	425	282	----
Muskogee County RWD #4	0	97	Now
Muskogee County RWD #7	240	189	----
Paradise Hills, Inc.	84	31	----
Sequoyah County Water Association	1,410	1,951	2000
Sequoyah County RWSG & SWMD #7	500	676	2000
Stick Ross Mountain Water Company	240	282	2010
Summit Water	50	94	Now
Tahlequah Public Works	4,000	3,100	----
LRED	400	77	----
Tenkiller Aqua Park	74	14	----
Tenkiller State Park	30	25	----
Town of Gore	190	382	Now
Town of Muldrow	1,200	705	----
Town of Roland	1,200	387	----
Town of Vian	250	254	2050

NOTE:

1. Treated water storage capacity should at least equal the average daily demand.
2. “----“ indicates demand will not exceed capacity by 2050.
3. “Now” indicates demand already exceeds capacity.

Table 2-11. Residential User Cost for 10,000 Gallons/Month

Name of Water System	Cost
Burnt Cabin	\$30.00
Cherokee County RWD #1	\$37.00
Cherokee County RWD #2	\$39.50
Cherokee County RWD #3	\$27.05
Cherokee County RWD #7	\$38.40
Cherokee County RWD #8	\$32.50
Cherokee County RWD #13	\$46.00
City of Sallisaw	\$10.00
East Central Oklahoma Water Authority	\$27.64
Fin and Feather Water Association	NA
Lake Tenkiller Harbor	\$38.55
Lost City RWD	\$39.80
Muskogee County RWD #4	\$26.80
Muskogee County RWD #7	\$32.25
Paradise Hills, Inc.	\$25.00
Sequoyah County Water Association	NA
Sequoyah County RWSG & SWMD #7	\$10.26
Stick Ross Mountain Water Company	\$33.65
Summit Water	NA
Tahlequah Public Works	City \$11.50 Rural \$14.20
LRED	NA
Tenkiller Aqua Park	NA
Tenkiller State Park	NA
Town of Gore	\$30.50
Town of Muldrow	\$7.00
Town of Roland	\$12.50
Town of Vian	NA
NOTE: "NA" indicates complete information was unavailable for this system.	

Table 2-12. Assessment of Needs

Name of Water System	Needs						New Plant	Potential for Regionalization		
	Water Rights	Old Treatment Plant	Storage Capacity	Source of Water	Cost	Insufficient Information		Low	Med.	High
Burnt Cabin								X		
Cherokee County RWD #1		X	X		X					X
Cherokee County RWD #2		X			X				X	
Cherokee County RWD #3			X	X					X	
Cherokee County RWD #7			X	X	X					X
Cherokee County RWD #8			X	X					X	
Cherokee County RWD #13		X			X				X	
City of Sallisaw				X			X	X		
East Central Oklahoma Water		X	X	X						X
Fin and Feather Water Assoc.	X		X				X		X	
Lake Tenkiller Harbor			X		X				X	
Lost City RWD				X	X		X		X	
Muskogee County RWD #4			X	X					X	
Muskogee County RWD #7				X				X		
Paradise Hills, Inc.	X						X	X		
Sequoyah County Water Assoc.			X	X		X			X	
Sequoyah County #7			X	X					X	
Stick Ross Mountain Water Co.			X	X					X	
Summit Water	X		X			X			X	
Tahlequah Public Works				X				X		
LRED						X		X		
Tenkiller Aqua Park						X	X	X		
Tenkiller State Park		X		X		X			X	
Town of Gore			X				X	X		
Town of Muldrow		X		X					X	
Town of Roland				X			X	X		
Town of Vian			X	X		X			X	

The criteria examined were water rights, age of treatment plant, treated water storage capacity, water supply sources, and cost to consumers. Water rights for public water supply on Lake Tenkiller were considered since expansion of individual systems that utilize Lake Tenkiller water may soon be limited by lack of currently held public water rights. Age of treatment plant was considered a criterion, as construction of a new facility would be a major cost to any of the participating water districts. Treated water storage capacity was also a factor since construction of new storage facilities would be a major cost to any of the participating systems. Water supply sources were considered since some systems were limited on their expansion due to the supplying system's capacity. Additionally, some systems use multiple sources and could be better served by a single source, if available. Multiple sources also present potential difficulties with meeting water quality standards. Different sources may require varying amounts of treatment. Cost to consumers was considered since many of the water districts expressed their desire for the lowest possible water rates.

Each system was rated for its potential for regionalization as low, medium, or high based on the number of criteria that applied to it. Each criterion was given equal weight in determining potential. Systems showing need on one criterion were rated as low potential; two criteria were rated as medium potential; and three or more criteria were rated as high potential. Six systems had inadequate information and were rated according to available information.

One criterion not examined was expansion of existing distribution systems. While Table 2-12 may not indicate an individual system's need for additional capacity, either in water treatment or water storage, the potential for regionalization shown in Table 2-12 may be greater if distribution system upgrades would allow expansion greater than predicted in Table 2-3.

The analysis revealed that only one water district has no needs based on the selected criteria. A total of three systems have a high potential for the proposed wholesale water treatment and conveyance system based on at least three criteria. The majority of the systems, 15 in total, have a medium potential for regionalization based on two criteria. Of these 15 systems, 4 had insufficient information available. The remaining nine systems have a low potential for regionalization. Four of these have new treatment facilities.

Ultimately, each water district will determine their need for a wholesale water treatment and conveyance system based on available information. Collectively, the group of water districts must decide whether the need for a regional water treatment facility will be supported by their entity.