QUAY COUNTY
40 Year Water Plan

Prepared For;
Ute Reservoir Regional Water Commission

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Executive Summary

The City of Tucumcari, Village of Logan, Village of San Jon, Village of House and Quay County joined together to form the Ute Reservoir Regional Water Board to address water issues including participation in the Eastern New Mexico Regional Water System. The Ute Reservoir Regional Water Board decided to prepare a 40 year Water plan for the county pursuant to the requirements of Section 72-1-9, NMSA allowing Municipalities and Counties to prepare water development plans.

Quay County

Quay County is located in East Central New Mexico between Union and Curry Counties, just east of the Texas border (Figure ES-2). Formerly parts of Guadalupe, San Miguel, and Union Counties, New Mexico; Quay County was created in 1903. The county covers an approximately 2,883-square-mile area. Elevations range from near 3700 feet in the in the eastern region to over 5100 feet at the Caprock. Quay County falls almost entirely within the Canadian River Basin although the Southern part of the County is within the Pecos River Basin. The county includes four incorporated areas: Tucumcari, San Jon, Logan, and House. The population of Quay County is currently about 10,150.

Figure ES-1. Quay County Map (circa 1950)

Most of the land in the county is privately owned. Historically, tourism and agriculture have been the primary industries. Significant livestock grazing and agriculture take place throughout the county and the primary water use in the region is irrigated agriculture.

Water Rights

All diversions or withdrawals of surface water and groundwater within declared groundwater basins require the user to have a water right from the State of New Mexico, as administered by the Office of the State Engineer. The stream systems within the county have not been adjudicated.

Municipal Water Rights in Quay County	
City of Tucumcari	4720
Village of Logan	1007.8
Village of San Jon	163.6
Village of House	250
Quay County Government	0
Total Municipal Water Rights	6141.4

Groundwater rights in New Mexico are administered through the declaration of

groundwater basins that require a permit for groundwater withdrawals. Quay County encompasses parts of two declared underground water basins: the Northern three-fourths of the county lies within the Tucumcari Basin; the southwestern portion of the county lies within the Fort Sumner Groundwater Basin. Groundwater in the Southeastern and far Northeastern parts of the county are currently undeclared; therefore a permit is not required to withdraw groundwater in that area.

Water Supply

Quay County currently meets more than 84 percent of its water supply needs with surface water. Most of Quay County is drained by the Canadian River and its tributaries (Figure ES-3), and most of the surface water supply in Quay County is associated with this major drainage. The Canadian River originates in southern Colorado and flows south to the Conchas Reservoir. Canadian River Water from the reservoir flows Southeasterly through the county and into Ute lake Reservoir. Ute Creek is a major Tributary of the Canadian River that merges with the river at the Ute Lake Reservoir. The Southwestern area of the county is drained by the Pecos River which originates in Northern NM and flows southerly through NM to Texas.

The overall surface water quality in Quay County is good, although both Conchas and Ute Reservoirs have been listed as impaired, primarily due to stream bottom deposits, turbidity, and plant nutrients. The presence of these constituents does not necessarily mean the source is unacceptable for irrigation or municipal use. However, the vulnerability of the surface water supply to further degradation indicates that water quality protection should be a priority in Quay County and for the Eastern NM Regional Water Authority (ENMRWA).

All of the public and domestic water used within the county is supplied from groundwater sources. The largest and most viable sources of groundwater within Quay County are the Entrada Sandstone and the Ogallala Formation. Groundwater quality in many parts of the county is poor, due to naturally high levels of total dissolved solids, and is unusable without treatment. There is a number of leaking underground storage tanks listed within the county. There does not appear to be contamination of groundwater sources used for municipal or domestic uses from the recorded underground storage tank sites. The groundwater sources supplying the incorporated communities within Quay County appear to be adequate to meet the demands of the communities through the life of this plan. However, the communities should initiate hydrological investigations to verify the adequacy of the groundwater to meet future demands.

House is the only municipality currently using water from the Ogallala Aquifer. Quay County draws its water supply from groundwater sources most notably the High plains and Entrada Aquifer which are NOT part of the Ogallala. Quay's supply is not depleting and is a long term groundwater source.

Water Demand

The communities and Quay County generally do not face a shortage of water for residential and industrial uses based on current and projected demand. Participation in the Eastern New Mexico Regional Water System is an option to supplement/replace current groundwater supplies but is more realistically a vehicle for economic growth and development. The communities and Quay County have decided not to participate in the ENMRWS. However, all of the communities and Quay County will exercise their options

to pay for the reservation and reserve Ute Reservoir water for future development. The City of Tucumcari and Quay County have leased a portion or in the case of Quay County all of its reservation to a new subdivision development, Ute Lake Ranch.

The Village of San Jon has constructed a water line to tie into the Village of Logan water system which is capable of supplying both communities through the life of the 40 year plan. The communities of Quay County support the ENMRWS for the benefits to neighboring Curry and Roosevelt counties and for potential economic development.

The communities of Quay County along with the County will be pursuing development of Water Conservation Ordinance(s) which will rely primarily on voluntary conservation and public education efforts.

The most pressing need within the county is the maintenance and upgrading of local water and sewer infrastructure to assure that the community systems are operating efficiently, cost effectively and will be able to meet the demands of the community through the 40 year life of the plan. The City of Tucumcari in particular needs to upgrade significant portions of its water and sewer systems since portions of its systems dates back to the 1940s and some even into the 1920s. The City has received funding to begin upgrades of both systems but much more work is necessary. The City of Tucumcari as part of its sewer system upgrade is planning to reuse the reclaimed waste water to irrigate the landscape at the public golf course, cemetery and sporting complex. The Village of Logan is planning to extend sewer service to the westernmost portion of the village along the north shore of Ute Reservoir. The village may consider reuse of the effluent if it is economically viable. The Village of San Jon upon completion of the water line project to Logan will begin to plan for the replacement of Asphaltic Concrete water delivery lines and the upgrade of its waste water treatment plant.

Water

Tucumcari has completed design and construction work for the new water tank and pump station. The City has completed sanitary sewer upgrades in roadways throughout the City and the treatment plant is being upgraded and should be completed late 2011.
San Jon has completed the water transmission line to share water from Logan. San Jon has been working to get more customers off of well water due to poor mineral quality of the ground water. The Town is also installing and replacing additional water lines in town to overcome silica blockages.

Wastewater
Logan has completed the sanitary sewer system upgrades to the western part of the Village along the north shore of Ute Lake. Logan has completed upgrades to the waste treatment lagoons.
San Jon has re-lined lagoon #1 of the wastewater treatment plant and are in the process of re-ling lagoons 2 and 3.

1 Introduction

The local Governmental Entities within Quay county joined together to form the Ute Reservoir Regional Water Board which has decided to develop a Quay County Water Plan. Section 72-1-9 NMSA; provides that municipalities, counties, state universities, member-owned community water systems, special water users' associations and public utilities supplying water to municipalities or counties shall be allowed to prepare water development plans for planning periods not to exceed 40 years.

1.1 General Description of the County

Quay County is located in eastern New Mexico between Union Counties and Curry Counties and is just east of the Texas border (Figure 3-1). The total area of Quay County is approximately 2883 square miles. Elevations range from over 3600 feet above mean sea level (msl) in the Eastern part of the county to about 4600 feet in the Caprock area as well as in the western and Northern reaches of the county. Piedmont plains, and mesas are common geomorphic features in areas of the County. Vegetation in the county is grasslands of the plains. Natural resources in the area include wind, water and natural gas.

Demographics

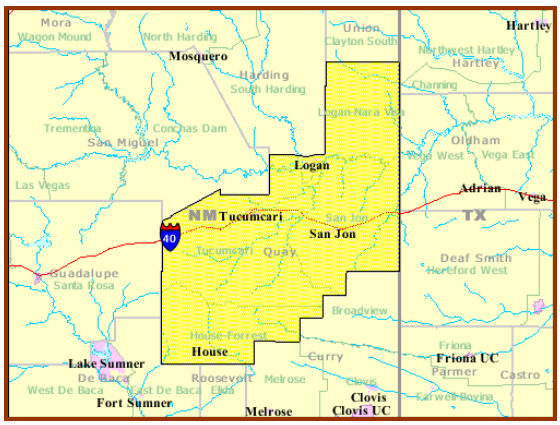
The county includes four incorporated areas: Tucumcari, San Jon, Logan, and House.

Current Population Trends and Projections

Table 2a compares year 2000 and 2010 population data for the County and communities in the County. Over the last 10 years, population declined by -11% in the County. Population losses are estimated from -2.9% in San Jon up to -10.5% in Tucumcari, with an overall rate of decline of -11% for the County as a whole.

However, sizeable seasonal population fluctuations occur throughout the year due to recreation in the Logan/Ute Lake area. In addition, there is a predicted population increase in small communities nationwide due to the attraction of small, safe schools.

Figure 1-1. Quay County



Updated Table 2a: Estimated Population Change, 2000 to 2010

	2000 US Census Population Count[1]	***2010 US Census Population Count[2]***	***Rate of Change (%)[3]***
Quay County	*10,155*	*9,041*	*-11%*
House	*72*	*68*	*-5.6%*
Logan	*1,094*	*1,042*	*-4.8%*
San Jon	*306*	*216*	*-2.9%*
Tucumcari	*5,989*	*5,363*	*-10.5%*
Unincorporated	*2,694*	*2,357*	*-12.5%*

1. 2000 U.S. Census. Sources: U.S. Census Bureau & March, 2005 Quay County Regional Comprehensive Plan
2. 2010 Census Redistricting Data (Public Law 94-171) Summary File, Tables P1 and H1, Source: U.S. Census Bureau, Release Date: March 2011
3. Estimated rate of change. Source: Phelps Engineering and Development Services. March 2011.

Population in the County is projected to experience a slight decline, according to population projections from the University of New Mexico, changing from 10,232 in 2010 to 10, 145 in 2035, a decline of .85%. These figures show Quay County population staying close to steady because of the different methodology used by the University as well as the fact that the projections were made in 2007 (released in August of 2008) prior to the onset of the recession in New Mexico. A new set of projections will be performed by the University in 2011. Table 2b shows the 2008 projections.

Table 2b: Population Projections[4]

	2005	***2010***	***2015***	***2020***	***2025***	***2030***	***2035***
Quay County	*10,106*	*10, 232*	*10,311*	*10,344*	*10,284*	*10,199*	*10,145*
New Mexico	*1,969,292*	*2,162,331*	*2,356,236*	*2,540,145*	*2,707,757*	*2,864,796*	*3,018,289*

4. New Mexico County Population Projections July 1, 2005 to July 1, 2035 Bureau of Business and Economic Research (BBER) University of New Mexico, Released August 2008.

Dairies have located in Curry County and inquires concerning locating within Quay County near House have been made due to the availability of water and the semi-arid climate. The House Co-operative anticipating economic development has built a new building to accommodate business expansion and potential growth.

1.2 Climate

The recorded average temperature in Quay County for through 2002 was fairly consistent, ranging between 55° F and 60° F. Average temperatures increased slightly over the period of record. Precipitation also varies across the county, influenced by location and somewhat by elevation. Weather systems may enter the county from the west (Pacific), northeast (Arctic air masses from the plains), and southwest (Gulf of Mexico), and systems from each point of origin

bring unique sets of temperatures and moisture to the county. Average precipitation, including both snowmelt and rainfall, ranges from about 14 to 19 inches.

A number of climate data collection stations are located in Quay County. Table 1-2 lists the periods of record for the active weather stations in Quay County.

Table 1-2. Climate Station Periods of Record

Station Name	Record Start Date	Avg. Max. Temp. (°F)	Avg. Mean Temp. (°F)	Avg. Min. Temp. (°F)	Avg. Total Snowfall (in.)	Avg. Precip. (in.)
Newkirk	9/ 1/1940	73.2	57.6	42.0	16.8	14.64
McCarty Ranch	11/1/1983	69.6	55.4	41.3	18.8	17.08
Tucumcari 4 NE	12/16/1904	73.2	58.4	43.5	16.0	15.96
San Jon	1/1/1914	73.5	58.5	43.5	16.2	16.68
Ragland 3 SSW	2/1/1935	70.3	55.5	40.7	19.6	17.74

Source: Western Regional Climate Center

1.3 Surface and Ground Water

Quay County lies almost entirely within the Canadian River Basin, which is part of the larger Arkansas-White-Red River Basin. Surface water availability varies year to year, depending on the amount of precipitation in the River Basin. Surface Water from the Canadian River Basin is stored at two reservoirs, Conchas Reservoir in San Miguel County and Ute reservoir in Quay County.

1.4.1 Conchas and Ute Reservoirs

Table 1-3. CONCHAS RESERVOIR STORAGE

DRAINAGE AREA = 7,409 SQ MI

CREST	VOLUME AC-FT	AREA ACRES	ELEV FEET	OUTLET FLOW
TOP OF DAM	721,939	17,580	4,235	0
MAXIMUM POOL	671,179	16,033	4,228.60	9,800
FLOOD CONTROL SPILLWAY	513903	13,626	4218	9910
IRRIGATION SPILLWAY	315,735	9,615	4,201	9,800
PERMANENT POOL	61,532	2,694	4,155	8200
ZERO STORAGE	0	0	4,071	0
CONDUIT INVERT	2	0	4,060	0

Source: US Army Corps Of Engineers

Table 1-4 UTE RESERVOIR NEAR LOGAN

Conchas Dam, constructed by the Corps of Engineers on the Canadian River, is a concrete gravity section flanked by embankment wings. The dam has a structural height of 235 feet, a crest length of 6,230 feet, and a volume of 836,000 cubic yards of concrete and 887,000 cubic yards of earth. The main spillway is an overflow section 300 feet long in the main section of the dam. An emergency spillway, located on the north dike, is 3,000 feet long and is 17 feet higher than the main spillway. The irrigation outlet works is a circular pressure tunnel leading to the gate chamber, then into two steel penstocks in a horseshoe tunnel. The reservoir has a capacity of 528,951 acre-feet, of which 252,334 acre-feet are conservation storage. The Monthly Storage of Conchas Reservoir is shown in Figure 5-14. The data shows that since 1991 that the Reservoir was storing well over 200,000 acre-feet until mid 2001 when the storage dropped significantly to below 100,000 acre-feet. This reduction in storage is the result of the reduced stream flow in the Canadian Basin due to the drought conditions. The Arch Hurley Irrigation District received minimal irrigation flow in 2002 and none in 2003 or in 2004.

DRAINAGE AREA ≈ 11,140 SQ MI		
	VOLUME IN AC-FT	ELEV IN FEET
SPILLWAY CREST	244,957	3788.86
MAXIMUM POOL	200,000	3783.3
PROPOSED MINIMUM POOL	≈ 109,000	3765
ORIGINAL SPILLWAY	≈ 85,000	3760
CURRENT MINIMUM POOL	≈ 35,000	3741.6
INACTIVE POOL	8941	≈ 3725
Source: OSE		

Table 1-5 Tucumcari Project
Arch Hurley Conservancy District

Storage Dams - Constructed by	1

Ute Reservoir was constructed to be a source of water for municipal and industrial purposes. Ute Reservoir was developed as a multiple purpose project and a permanent pool was established which provided for a reasonable amount of sport fishing and water recreation. The ISC entered into an agreement with the State Game Commission on August 20th, 1962. The N.M. Department of Game and Fish agreed to deposit funds each year with the ISC for the operation and maintenance of the Ute Dam. The ISC agreed to provide a minimum pool at Ute Reservoir for fisheries and recreation. Specifically, the ISC agreed to maintain water in Ute Reservoir at or above 3741.6 feet elevation, providing a water surface area of approximately 2,350 acres and an initial storage of 50,000 acre-feet of water.

In 1964, under an agreement among New Mexico Parks and Recreation Commission, the ISC, and the New Mexico Game Commission, the Parks and Recreation Commission assumed responsibility for the surface of the reservoir for all non-fishing recreation purposes.

1.4.2 Tucumcari Project

USACE	
Canals	110.0 mi
Tunnels	5.8 mi
Siphons	4.2 mi
Laterals	171 mi
Pumping Plants	1
Drains	75 mi
Acre Feet available at Crest	278559
Source: Bureau of Reclamation	

Conchas Reservoir initiated under the Emergency Relief Act of 1935, was authorized by the Congress in the Flood Control Act of June 22, 1936, and was completed in 1940 by the Corps of Engineers. The Bureau of Reclamation and the Corps of Engineers, each under the authority of its separate department, set up a cooperative plan to regulate the reservoir storage capacity to best serve the requirements of irrigation and flood control. The reservoir through the irrigation works provides surface water to Arch Hurley Conservancy District for irrigation of farm land within Quay County. The water is conveyed via the Conchas Canal and its branch, the Hudson Canal. The canals deliver the water to the 171-mile distribution system which serves the project. The annual release of water for irrigation purposes is dependent on the inflow into the reservoir from precipitation within the drainage basin.

The Ute Reservoir Regional Water Board is currently working with Brookfield Residential (formerly Carma Developers) out of Denver, Colorado to access their water rights from Ute Reservoir thru an Interim Intake Structure- URWC Intake #1. Tucumcari leased 500 acre-feet to Carma and as part of the agreement the developer would design the intake structure and provide the design of two bores and future connections for Tucumcari and Quays to access the water.

1.4.2.1

City of Tucumcari
UTE RESERVOIR WATER USE ALTERNATIVES
JULY 8, 2010

Background

The City of Tucumcari has reserved an allocation of 6000 acre-feet of water annually from the Ute Reservoir. Subtracting the water previously contracted to Ute Lake Ranch, the City has remaining 2,250 acre-feet (minimum) available annually for other uses.

The City relies on groundwater for municipal supply and has rights to 4300 acre-feet of groundwater per year, which is more than adequate to meet the current and future demands of its customers.

The City of Tucumcari desires to determine the best use of its available water allocation from Ute Reservoir.

Approach

The approach used for this study was to first develop a wide-ranging array of alternatives. Second, a set of criteria were established to compare the alternatives. Finally, the alternatives were scored relative to the criteria – a higher score means that the alternative meets the criteria better than a lower score.

Alternatives

Thirteen alternatives were developed based on knowledge of other water supply projects in the region, interviews with stakeholders within and outside of the City and County. Each alternative includes three common components: diversion, conveyance, and storage. Some alternatives require a treatment component, while others do not.

Criteria

The criteria that were used to score the thirteen alternatives are as follows:

- Capital Costs
- Reliability and Operability (O&M Costs)
- Engineering Feasibility and Constructability
- Public Acceptability
- Funding Potential
- Environmental/Sustainability
- Return on Investment

For each alternative, the criteria were assigned a score from 1 to 10. The final score is the sum of scores from individual criteria. The alternatives, criteria and scores are shown on the accompanying table.

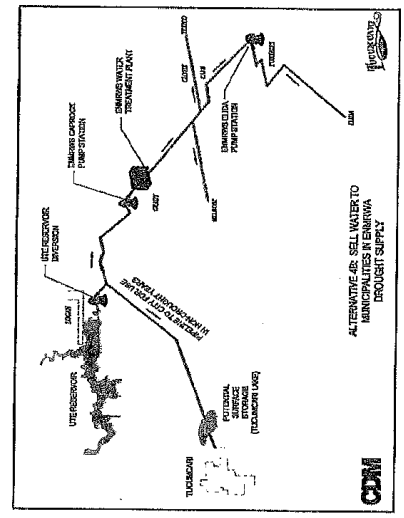
Alternatives Recommended for Further Analysis

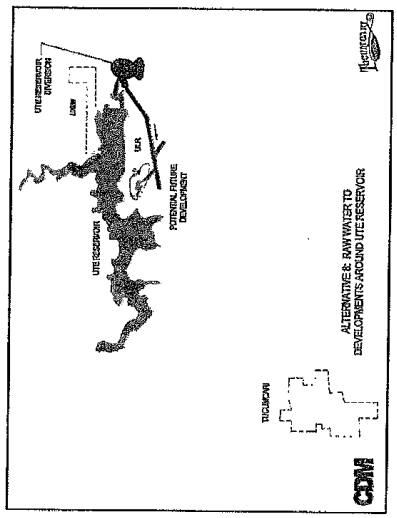
The four highest scoring alternatives are listed below and shown schematically on the back of this sheet:

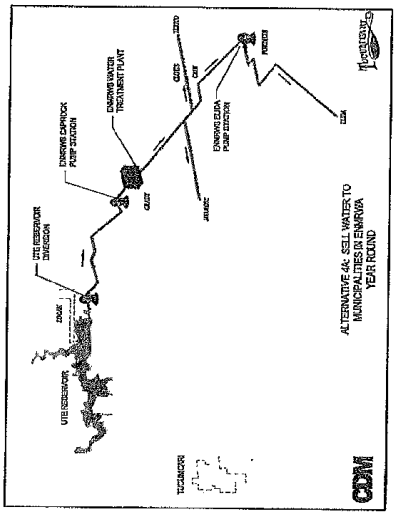
- Sell to Other Municipalities in the ENMRWA – Year Round
- Sell to Other Municipalities in the ENMRWA – Drought Conditions
- Raw Water Supply – Industrial Direct Use
- Raw Water to Developments around Ute Reservoir

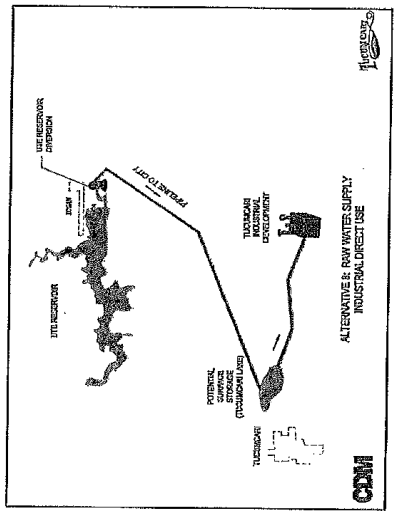
The four highest scoring alternatives will be further defined and analyzed in a Preliminary Engineering Report.

City of Tucumcari
UTE RESERVOIR WATER USE ALTERNATIVES
JULY 8, 2010









Alternatives

Alternative	Use Option	Storage Option	Diversion and Conveyance Options	Treatment Option
1: Augment Arch Hurley Canals	Irrigation	Aquifer storage in non-irrigation season	▪ Lake intake structure with screening system (not a ENMRWA facility) ▪ Pump station – 10.5 MGD approximate capacity (pumps sized to deliver 2,250 acre-feet over a 7-month period, operating 8 hours a day) ▪ Conveyance system – approximately 15 miles of pipeline/lined canals, siphons	No treatment required
2: Sale to Individual Property Owners	Irrigation	Aquifer Storage in non-irrigation season	▪ Lake intake structure with screening system (not a ENMRWA facility) ▪ Pump station – 10.5 MGD approximate capacity (pumps sized to deliver 2,250 acre-feet over a 7-month period, operating 8 hours a day) ▪ Conveyance system – approximately 15 miles of pipeline/lined canals, siphons ▪ New distribution and drainage system including laterals and sub laterals ▪ Connections to existing irrigation systems, where feasible	No treatment required
3: Municipal Supply – Direct Use, Indirect Use and New Industrial Customers	Municipal Supply	Surface storage Aquifer storage and recovery	▪ Lake Intake and screening system ▪ Raw water pump station ▪ Finished water pump station ▪ Pipelines ▪ Booster pumps	Water Treatment Plant
4 Sell to Municipalities in the ENMRWA – Year Round, Drought Conditions	Bulk Water Sale	No storage required Aquifer storage when not needed for drought	ENMWRA diversion and conveyance system	Treatment at ENMRWA facility
5: Sell raw water to Municipalities outside the ENMRWA	Bulk Water Sale	No storage required	▪ Lake intake structure with screening system ▪ Pump station – capacity TBD ▪ Conveyance system - > 100 miles	No treatment required

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Alternatives

Alternative	Use Option	Storage Option	Diversion and Conveyance Options	Treatment Option
6: **Raw Water Supply – Industrial Direct Use, Industrial Indirect Use**	Economic Development	Surface storage Aquifer storage and recovery	▪ Lake intake structure with screening system ▪ Pump station ▪ Conveyance system – pipelines, mileage TBD	No treatment required for infiltration/treatment required for injection
7: **Regional Water System – Direct Use**	Municipal Supply	Surface storage	▪ Lake Intake and screening system ▪ Raw water pump station ▪ Water treatment plant ▪ Finished water pump station ▪ Pipelines ▪ Booster pumps	Treatment at a regional plant to serve communities within Quay County
8: **Raw water to Developments around Ute Reservoir**	Water Supply	No storage required	▪ Lake Intake and screening system ▪ Raw water pump station ▪ Pipelines ▪ Booster pumps	Raw water deliveries; no treatment required
9: **No Action**	None	No storage required	No conveyance required	No treatment required

Alternative Scores

Criteria:	Capital Costs	Reliability & Operability (O&M Costs)	Engineering Feasibility & Constructability	Public Acceptability	Funding Potential	Environmental/ Sustainability	Return on Investment	Total
1: Augment Arch Hurley Canals	4	4	7	3	5	6	2	31
2: Sale to Individual Property Owners	3	3	7	4	5	6	4	32
3A: Municipal Supply - Direct Use	1	2	4	4	2	5	2	20
3B: Municipal Supply – Indirect Use	1	1	3	3	2	5	1	16
3C: Municipal Use - New industrial customers	1	3	7	6	3	3	3	26
4A: Sell to Municipalities in the ENMRWA – Year Round	10	9	10	5	8	8	10	60
4B: Sell to Municipalities in the ENMRWA – Drought Conditions	10	9	10	5	8	8	8	58
5: Sell raw water to Municipalities outside the ENMRWA	2	2	5	3	2	2	2	18
6A: Raw Water Supply – Industrial Direct Use	5	6	9	8	5	6	8	47
6B: Raw Water Supply – Industrial Indirect Use	1	2	4	4	2	5	8	26
7: Regional Water System – Direct Use	1	1	5	4	6	5	3	25
8: Raw Water to Developments around Ute Reservoir	8	9	9	8	3	6	8	51
9: No Action	10	5	10	2	0	5	0	32

For additional information or a more indepth review please see the following report:

CDM

City of Tucumcari

UTE RESERVOIR WATER USE ALTERNATIVES

Tucumcari, New Mexico

June 11, 2010

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1.4.3 UTE WATER COMMISSION

The Ute Water commission (UWC) was formed by Joint Powers Agreement for the purpose of contracting with the ISC for purchase of Ute Reservoir water. Participating agencies making up

the UWC include the communities of Clovis, Elida, Grady, Logan, Melrose, Portales, San Jon, Texico, and Tucumcari; and the counties of Curry, Roosevelt, and Quay.

A 1994 study by the New Mexico Interstate Streams Commission (ISC) estimated the ***annual yield*** to be 24,000 acre-feet per year in all but extreme drought years. The 24,000 acre-feet estimated yield has been reserved by the following Communities and Counties as listed in Table 1-7.

Table 1-6 Annual Reservation of Ute Reservoir Water

Community	Acre-Feet Reserved
Logan	400
San Jon	150
Tucumcari	6,000
Quay Co.	1,000
Quay Co. Totals	7,550
Clovis	12,292
Texico	250
Grady	75
Melrose	250
Curry Co.	100
Curry County Totals	12,967

1.4.3.1 ENMRWA

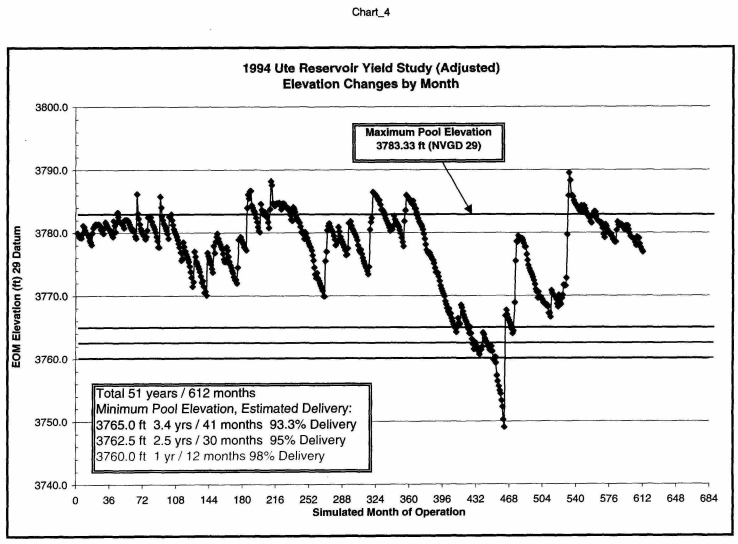
The Eastern NM Regional Water Association was formed subsequent to the UWC for the purpose of advanced planning, design, construction and operation of facilities to take raw water from Ute Reservoir and deliver treated water to the member communities (Eastern NM Regional Water System [ENMRWS]). The surface water available from Ute Reservoir which based on historical data that will be available to provide the 24,000 acre-feet annually for municipal and Industrial uses is shown in Figure 1-8.

The Village of Logan requested that the ENMRWA establish a minimum pool at elevation 3765 for the purpose of maintaining a quality pool for recreation and fishing purposes. ENMRWA voted to approve this request to petition the ISC to change the minimum pool elevation to 3765. The Village derives significant economic benefit from Ute Reservoir through recreation and seasonal residential activities. The reservoir has also attracted retired individuals to live near the lake for the fishing and recreational activities available.

Figure 1-8 shows that 93% of the time over 50 years Ute Reservoir will deliver the full 24,000 acre-feet with the minimum pool established at elevation 3765.00. This information was developed by the ISC.

Portales	**3,333**
Elida	**50**
Roosevelt Co.	**100**
Roosevelt Co. Totals	**3,483**
Total UWC	**24,000**

Figure 1-2. Ute Reservoir Yield



Source; Douglas Murray, OSE

As shown in Table 1-7 the communities and Quay County have reserved 7,550 acre-feet of the 24,000 acre-feet available annually from Ute Reservoir. All of the Quay County members of the ENMRWA have decided not to continue as participating members of the ENMRWS and pursue development of their reservations separately from ENMRWS.

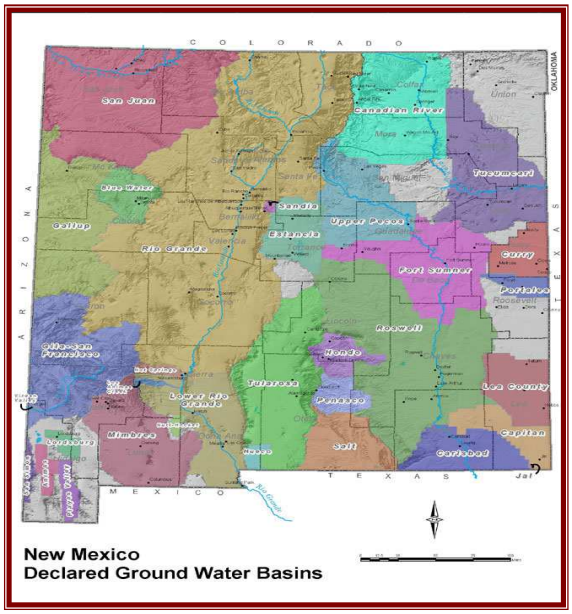
1.5. Groundwater Supply

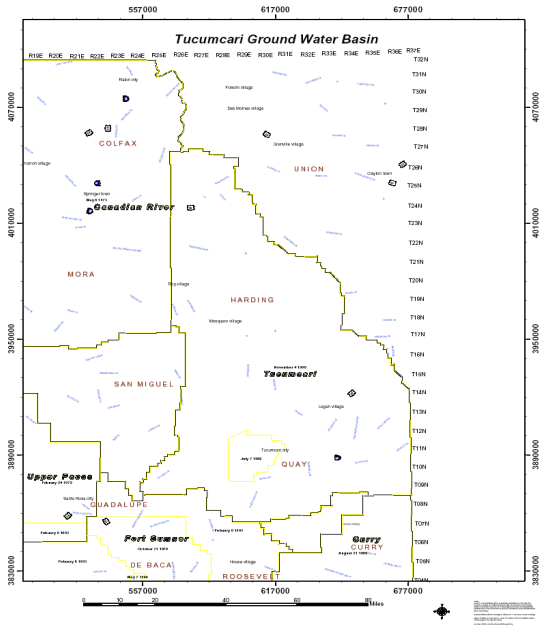
Though much of the water supply needs of the Quay County are met through surface water resources, groundwater is an important resource that is used to meet 6% of the overall demands of the County as well as ***100% of municipal water production*.**

There are Four declared groundwater basins in Quay County. They are the Tucumcari Basin, Fort Sumner Basin, Clayton (new 9/23/2005), and Curry(extended 9/23/2005).

Figure 1-3. Declared Groundwater Basins

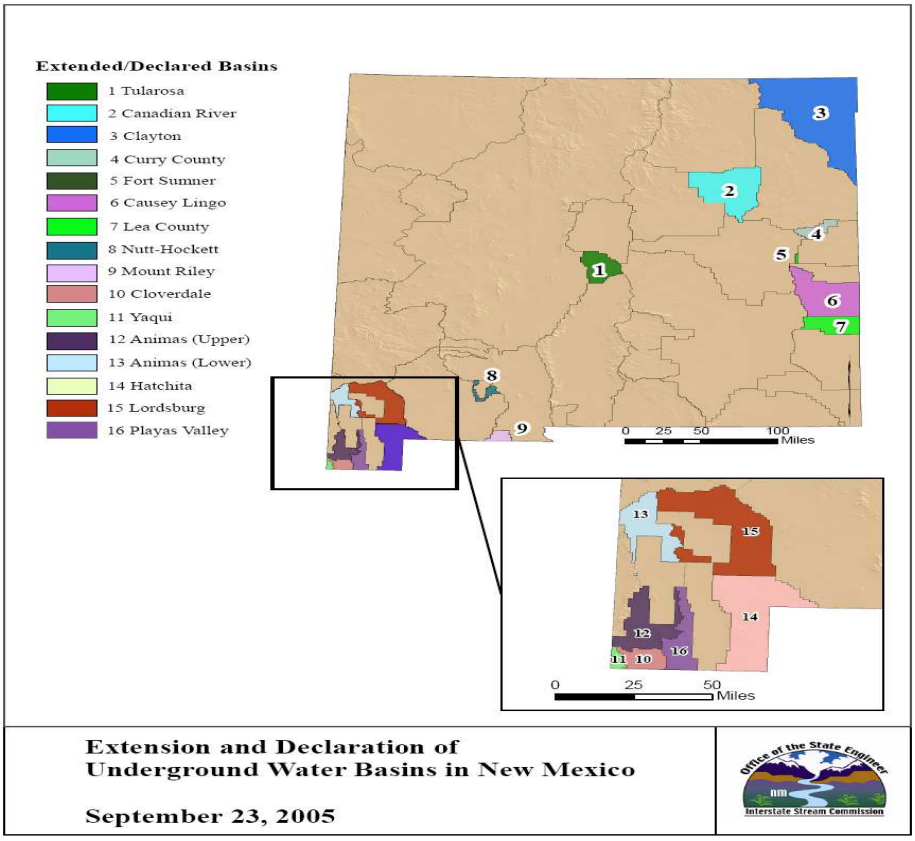
Figure 1-4. Tucumcari Basin





Source: OSE

Figure 1-5. Declared Groundwater Basins 9/23/2005



1.5.1. Hydrogeologic Framework

The occurrence of groundwater in is controlled by varying hydro geologic conditions, dependent upon localized geologic structures, stratigraphy, and geologic formation lithologies. Surface Geology of the county is illustrated in Figure 1-11. Sedimentary rock types present include shale, mudstone, siltstone, fine- to coarse-grained sandstone, conglomerate, dolomite, limestone, and anhydrite. At the surface, these sequences are intermittently capped with unconsolidated alluvial, pediment, and terrace deposits of Quaternary age.

1.5.2. Primary Water Bearing Formations

The major geologic formations that occur in Quay County.

- Quaternary-age alluvium, pediment, and terrace deposits
- Tertiary age Ogallala
- Cretaceous age Sandstones
- Jurassic age Entrada Sandstone
- Mesozoic and Paleozoic sandstones and siltstones

1.6. Overview of Historical Water Use in the County

Based on OSE water use categories, irrigated agriculture has historically been and continues to be by far the largest water use in Quay County, accounting for around 80 percent of total withdrawals in 1995 and 2000. The second largest water use is reservoir evaporation, which was 18 percent of total withdrawals in 1995 and 2000. The remaining uses of water in the county are public and domestic water supply (around 1.2 percent of total withdrawals) and livestock, and commercial applications (a combined 0.4 percent of withdrawals). A comparison of water use records for 1975 and 2000 shows little overall change in the proportionate uses of water in the Quay County area (Sorensen, 1977; Wilson, 2002); however, the overall amount of water withdrawn in the county decreased by approximately 33,000 acre-feet, from around 183,317acre-feet in 1975 to approximately 150,638 acre-feet in 2000.

Figure 1-5. Total Withdrawals by Category in Quay County

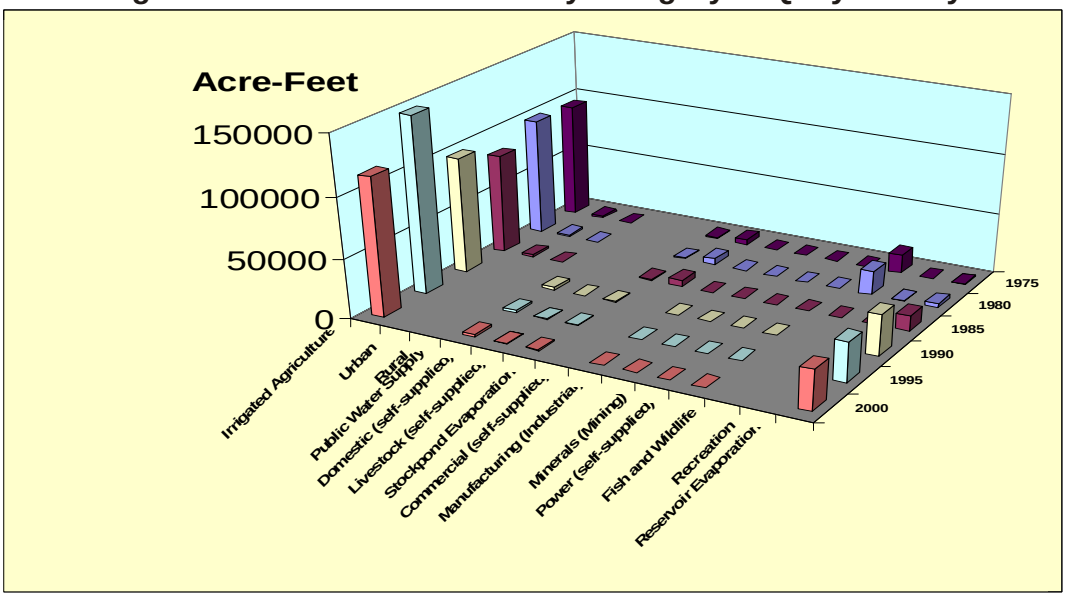
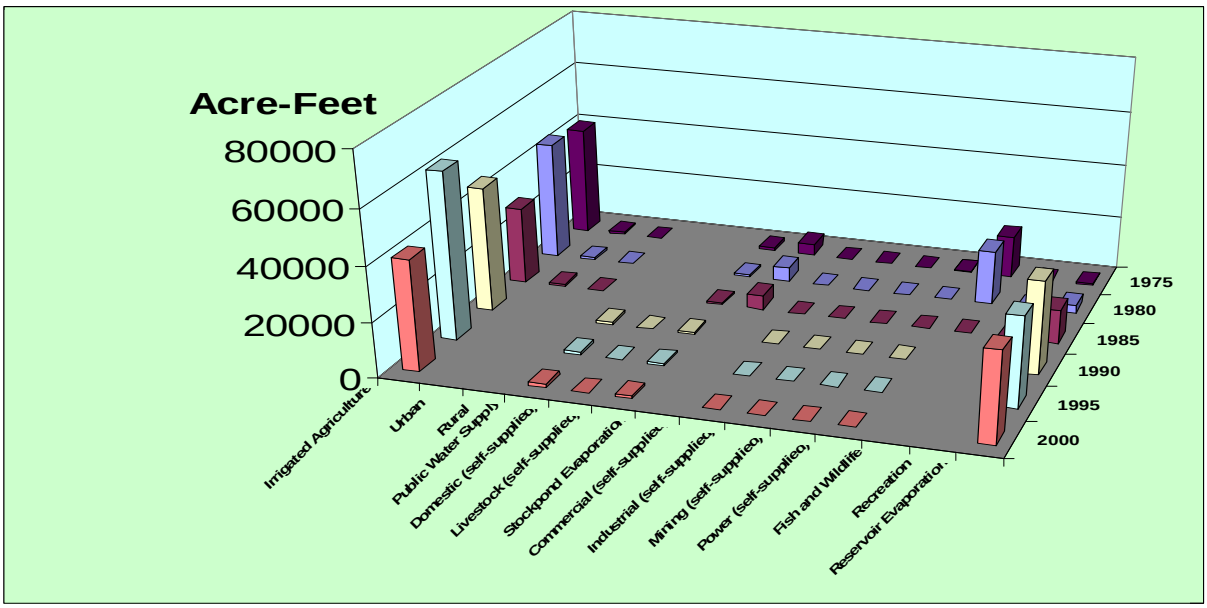


Figure 1-12 shows the total amount of water depleted, or consumptively used, in each category, that is, the amount of withdrawal minus any return flow.

Figure 1-6. Total Depletions by Category in Quay County



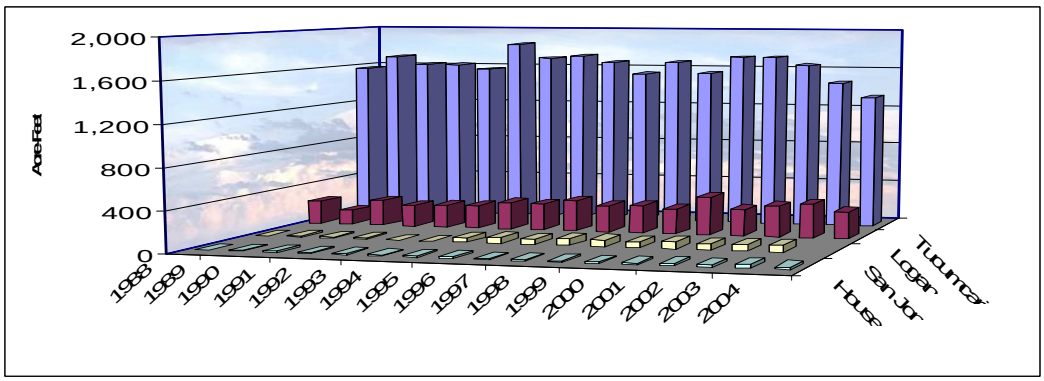
1.6.1 Irrigated Agriculture

Irrigated agriculture is the largest water use in Quay County. Wilson and Lucero (1997) define irrigated agriculture as including all diversions of water for the irrigation of crops grown on farms, ranches, and wildlife refuges. In the Quay County, irrigated agriculture relies primarily on surface water supplies (Table Appendix I). Agricultural demand for both withdrawals and consumptive use are not directly measured, but are instead estimated based on a model of crop water needs. Agricultural consumptive (depletion) use and withdrawal estimates reported by the OSE (Sorenson, 1976, 1981; Wilson, 1986, 1992; Wilson and Lucero, 1997, 2003) are summarized in Table in Appendix I.

1.6.2 Municipal Water Production

A summary of water production by county municipalities only is presented in Figure 1-19.

Figure 1-7. Municipal Water Production



2. Public Participation

The Quay County water planning process attempted to maximize public participation, and all public involvement activities have been documented.

2.1. Public Involvement in the Planning Process

Involvement of all key stakeholders is a critical objective for successful water planning, and a concentrated effort was made to involve local stakeholders from the beginning of the planning effort. Hence, the first step in the Quay regional water planning efforts was to hold a public meeting for the purpose of establishing a steering committee comprised of local stakeholders that would guide the planning efforts. All meetings of the Ute Reservoir Regional Water Board were advertised and the public was encouraged to attend.

The steering committee is comprised of representatives from each member of the Ute Reservoir Regional Water Board. Appendix B contains Public Information Materials.

2.2. Public Meetings

Public meetings were held during the second week of February 2004 to obtain input from the public on viable alternatives to be considered within the 40 Year Water Plan to address water demand and planning. The meetings were held at the following locations;

- Quay County – February 9, 2004 at 2:00 pm at County Courthouse in Commission Room
- City of Tucumcari – February 9, 2004 at 5:00pm in City Council Chambers at City Hall
- Village of Logan – February 10, 2004 at 4:30pm at the Logan Civic Center
- Village of San Jon – February 10, 2004 at 7:00pm at Village Hall (Community Center)
- Village of House – February 11, 2004 at 5:00pm at Village Hall

2.3. Communication with the Public

Press releases announcing the public meetings were issued to newspapers (*Quay County Sun*) and to KTNM/KQAY radio in Tucumcari. In addition the Project Manager and representatives of the Ute Reservoir Regional Water Board provided information to the public during the Feb. 8, 2004 morning show on KTNM.

2.4. Public Welfare

The steering committee developed a regional vision and goals for regional water planning:

- Healthy environment
- Conserve and recycle
- Quality recreation
- Adequate water availability
- Respect for private property rights
- Healthy communities and regional economy
- Protect water rights within the county
- Planned growth
- Regional cooperation
- Resource management
- Provide accurate data
- Educate the public

2.5. Public Review

The Draft 40 Year Water Plan was made available for Public review from 7/15/2004 through 8/15/2004 by viewing at or obtaining a copy from their local Ute Reservoir Regional Water Board Member office. The draft was also placed on the City of Tucumcari Web Site at;

http://www.cityoftucumcari.com/Quay_Water_Plan.pdf

The public review was advertised in the Quay County Sun. In addition, the notice of Public Review was broadcast by the Local Radio Station numerous times daily throughout the review period. A copy of the notice of Public Hearing is included in Appendix B.

The Draft 40 Year Water Plan was also transmitted to the Office of the State Engineer, Water Planning and Communication Bureau, and to the ENMRWA Project Manager for review and comments.

The Plan was finalized after receiving all comments from all interested parties.

3. Legal and Water Rights Issues

In addition to hydrologic constraints, legal issues may also limit the use of the existing and future water supplies. This section identifies potential legal issues.

3.1. Relevant Water Laws

New Mexico water laws affecting Quay County are found in the New Mexico Constitution, New Mexico Statutes Annotated (NMSA), and the case law interpreting and applying the existing law. OSE regulations governing groundwater and surface water and OSE policy for administering various groundwater basins throughout the state also affect water planning and use. New Mexico water law and administrative code is available through the State of New Mexico Web Site, *www.state.nm.us*.

Federal laws that affect water management in Quay County include the Clean Water Act, Safe Drinking Water Act, National Pollution Discharge Elimination System, and the Endangered Species Act. State and federal laws must be reviewed as individual alternatives and projects are implemented to identify project-specific legal issues.

3.2. Federal and State Legal Issues

Federal and state legal and water rights issues must be identified and addressed as the communities pursue the objectives of the *Plan.* Legal issues relating to water resource management in Quay County are discussed further in this section.

3.2.1. Federal Endangered Species Act: Arkansas Shiner in the Canadian Riv*er*

There are a number of species listed as Threatened or Endangered that have been identified within Quay County. The New Mexico Department of Game and Fish Biota Information System of New Mexico (BISON-M) is available through the State of New Mexico web site, *www.state.nm.us*. The Fish and Wildlife Service (FWS) have identified the Canadian River as the habitat for the Arkansas River shiner (ARS) under the federal Endangered Species Act. The habitat of concern is located downstream of Ute Lake in Quay County. In its 1998 federal register notice listing the species as threatened, the FWS stated that “aggregations of Arkansas River shiners in the reach between Ute Reservoir and Lake Meredith are stable and not declining.” The notice states that construction of the Conchas Reservoir in 1938 ultimately led to the extirpation of upstream population (Vol. 63, Fed. Reg. 64791).

The ENMRWA and ISC are studying the impact of the Arkansas River Shiner on the ENMRWS. The study is ongoing but preliminary information indicates that the habitat appears in good condition with plenty of suitable low velocity habitat for the ARS (ISC report to ENMRWA, Feb. 18,2004). The ISC study also suggests that the current leakage from Ute Reservoir of 3-4 cfs will need to be maintained.

3.2.2. Canadian River Compact

The Canadian River Compact between the states of New Mexico, Oklahoma and Texas was signed by representatives of the three states and a representative of the United States in December 1950. The compact subsequently was ratified by the respective state legislatures and approved by the Congress in 1952. The Canadian River Compact came about as a result of plans to construct Lake Meredith on the Canadian River near Sanford, Texas. At the time, New

Mexico was concerned that construction of the large project could affect the future use of Canadian River water in this state. The Canadian River Compact is essentially a storage allocation compact that limits the amount of conservation storage that can be operated on the Canadian River and its tributaries in New Mexico and Texas, and imposes certain limitations on the operation of such storage facilities. Conservation storage is defined by the compact as: "...that portion of the capacity of reservoirs available for the storage of water for subsequent release for domestic, municipal, irrigation and industrial uses, or any of them, and it excludes any portion of the capacity of reservoirs allocated solely to flood control, power production and sediment control, or any of them." The compact allows New Mexico: 1) free and unrestricted use of all waters originating in the drainage basin of the Canadian River above Conchas Dam; 2) free and unrestricted use of all waters originating in the drainage basin of the Canadian River in New Mexico below Conchas Dam, provided that the amount of conservation storage in New Mexico available for impounding these waters which originate in the drainage basin of the Canadian River below Conchas Dam shall be limited to 200,000 acre-feet; and 3) the right of New Mexico to provide conservation storage in the drainage basin of the North Canadian River shall be limited to such water that at the time may be unappropriated under the laws of New Mexico and Oklahoma.

The States of Oklahoma and Texas filed a lawsuit alleging that New Mexico was storing more water in Ute Reservoir than allowed by the Compact. The U.S. Supreme Court ruled for Oklahoma and Texas and a stipulated Judgement was granted. The stipulated Judgement allows that no more than 200,000 acre-feet may be impounded below Conchas reservoir. This Judgement limits the storage of Ute Reservoir to the 200,000 acre-feet decreed.

As Quay County is located entirely below Conchas Dam, use of the Canadian River in the county is governed by the Compact and stipulated Judgement. Water management and planning decisions in Quay County must be evaluated for compliance with the Canadian River Compact.

3.2.3. Water Quality Standards

Federal and state laws require that water quality meet specific standards. The Federal Clean Water Act and New Mexico surface water quality standards passed under that Act require permits for any discharges to “waters of the United States.” These permits are based on water quality requirements and may place limitations on discharges to surface water. Additionally, the Act requires that water quality in streams and lakes also meet state standards. States are required to report water quality to the U.S. Environmental Protection Agency (EPA) and conduct total maximum daily load (TMDL) activities for surface waters not meeting standards. As a result of a TMDL, discharge permit limitations can be made stricter, and efforts to improve the watershed implemented.

State law controls discharges to groundwater through the New Mexico Water Quality Act. One goal of the Act is to prevent discharges to groundwater that would impair water quality. The NMED requires groundwater discharge plans for almost all types of activities that can impact groundwater quality. The Safe Drinking Water Act sets the standards for water that is used as a drinking water supply. It also creates programs, such as wellhead protection and sole source aquifer designation, to protect drinking water aquifers. The current or potential use of Quay County's groundwater resources requires that groundwater be protected from contamination as much as possible. Groundwater contamination has already occurred in some areas of Quay County from both point sources and non-point sources.

Point sources are a major cause of groundwater pollution in Quay County, with leaking

underground storage tanks (USTs) one of the most significant of these. As of December 2000, NMED had reported 39 leaking UST cases in Quay County (Table 3-1). The majority of these groundwater contamination cases are due to oil, gasoline, diesel, and petroleum constituents such as benzene, toluene, ethyl benzene, and xylenes. The bulk of the sites are concentrated around municipal and industrial areas such as Tucumcari, Logan, San Jon and House.

Table 3-1. Leaking Underground Storage Tank Sites in Quay County

GWPA_RANK	NAME	PHYSICAL_ADDRESS	CITY	RPT_DATE
	ENMR	N HWY 54	LOGAN	5-Jun-91
194	BRYANTS CONOCO	STATE RD 39	SAN JON	14-Feb-91
214	DRIVERS TRAVEL	I 40 AND HWY 469 EXIT 356	SAN JON	29-Dec-00
66	HALLS WELL	NM 66 E OF TOWN	SAN JON	9-Sep-91
149	BAR F 11	701 E MAIN ST	TUCUMCARI	15-Nov-89
547	BAR F 13	401 W TUCUMCARI BLVD	TUCUMCARI	15-Nov-89
36	BEACON STATION 654	I 40 EXIT 321 PALOMAS INTERC	TUCUMCARI	20-Nov-92
146	CHEVRON 75762	E HWY 66	TUCUMCARI	9-Nov-84
130	CIRCLE K 839	601 E TUCUMCARI	TUCUMCARI	12-Jul-89
	CONCHAS NORTH DOCK 9	809 E MAIN	TUCUMCARI	22-Jan-99
	CONSERVANCY DISTRICT	705 W CAMPBELL ST	TUCUMCARI	11-May-90
	CONWAY OIL BULK PLAN	412 RAILROAD AVENUE	TUCUMCARI	9-Apr-93
401	CONWAY OIL BULK PLNT	412 RAILROAD AVENUE	TUCUMCARI	20-Sep-95
269	DAN C TRIGG MEM	301 E MIEL DE LUNA AVE	TUCUMCARI	18-Dec-92
	DAVIDS CONOCO	801 E MAIN	TUCUMCARI	25-Feb-00
	FIRE STATION	123 N ADAMS ST	TUCUMCARI	10-May-91
141	HOLIDAY CONOCO	I 40 AND TUCUMCARI BLVD E	TUCUMCARI	25-Nov-92
	K & C TEXACO	902 W TUCUMCARI BLVD	TUCUMCARI	13-Jun-94
	K-MART STATION	1819 E TUCUMCARI BLVD	TUCUMCARI	18-Jun-92
	KMART EXXON 2	1819 E TUCUMCARI BLVD	TUCUMCARI	16-Nov-99
671	MARTINEZ PLUMBING	1019 E MAIN	TUCUMCARI	24-Oct-91
490	NMSHTD TUCUMCARI	US HWY 54 MILE POST 305	TUCUMCARI	10-Jun-91
	QUAY COUNTY BUTANE	E TUCUMCARI BLVD	TUCUMCARI	2-Nov-93
689	RAMADA EXXON	1124 W TUCUMCARI BLVD	TUCUMCARI	10-Jul-92
761	RIGDON TEXACO	123 E TUCUMCARI BLVD	TUCUMCARI	28-Oct-93
	SECOND ST EXXON STAT	101 E TUCUMCARI BLVD	TUCUMCARI	12-Sep-96
	STUCKEY'S	I 40	TUCUMCARI	16-Jun-89
	STUCKEYS 112 A	I 40	TUCUMCARI	27-Sep-01
	SW PUBLIC SERV	301 W RAILROAD AVE	TUCUMCARI	29-Aug-89
793	TOWN & CTRY FOOD 148	201 E TUCUMCARI BLVD	TUCUMCARI	8-May-92
	TRANSCON	701 ELEVENTH ST	TUCUMCARI	10-May-91
752	TUCUMCARI CHEVRON	300 W TUCUMCARI BLVD	TUCUMCARI	11-May-98
126	TUCUMCARI CITY OF	202 N MONROE	TUCUMCARI	10-May-91
87	TUCUMCARI MUNI	6253 QUAY RD	TUCUMCARI	12-Jun-92
579	TUCUMCARI TRUCK	EXIT 329 I 40	TUCUMCARI	5-Jun-91
	UPS TUCUMCARI	524 TUCUMCARI ST	TUCUMCARI	6-Sep-91
361	WHITING BROS TUCUMCA	E TUCUMCARI BLVD	TUCUMCARI	11-Jul-89
222	WORLEY MILLS	702 W CAMBELL	TUCUMCARI	23-Jan-90
468	YOCUMS TEXACO	1823 E TUCUMCARI BLVD	TUCUMCARI	15-Mar-95

Source: NMED

3.2.3.1. Drinking Water Standards

EPA sets standards that, when combined with protecting ground water and surface water, are critical to ensuring safe drinking water. EPA works with its regional offices, states, tribes and its many partners to protect public health through implementing the Safe Drinking Water Act. The National Drinking Water Standards are listed on the EPA website, *http://www.epa.gov/safewater/mcl.html*. The NMED Drinking Water Bureau's upholds the Federal Safe Drinking Water Act and provides technical assistance, system oversight and community outreach about safe drinking water, *www.nmed.state.nm.us*.

Table 3-2 Community Water Systems

Water System Name	Principal County Served	Population Served	Primary Water Source Type	System Status	Date Closed	Water System ID
HOUSE WATER SYSTEM	QUAY	69	Ground water	Active		NM3510220
LOGAN WATER SYSTEM	QUAY	960	Ground water	Active		NM3526920
SAN JON WATER SUPPLY	QUAY	287	Ground water	Active		NM3527920
TUCUMCARI WATER SYSTEM	QUAY	7150	Ground water	Active		NM3528020
HILL'S VILLAGE WATER SYSTEM	QUAY	102	Purchased ground water from City of Tucumcari	Closed		NM3510120
LIBERTY MDWCA	QUAY	225	Purchased ground water from City of Tucumcari	Closed		NM3510020
RAD WATER USERS COOP.	QUAY	470	Purchased ground water from City of Tucumcari	Closed		NM3564420

SOURCE: EPA

3.2.3.2. National Secondary Drinking Water Standards

National Secondary Drinking Water Standards are non-enforceable guidelines regulating contaminants that may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effects (such as taste, odor, or color) in drinking water. EPA recommends secondary standards to water systems but does not require systems to comply. However, states may choose to adopt them as enforceable standards. The National Secondary Drinking Water Standards are also available from the EPA website listed in 3.2.3.1.

3.2.4. Existing Surface Water Quality

As discussed previously, Quay County is mostly drained by the Canadian River and its tributaries. Water quality is generally good; however, both the Conchas and Ute Reservoirs within the Canadian Basin have been listed on the New Mexico 303(d) list (NMED). This list is prepared by NMED to comply with Section 303(d) of the federal Clean Water Act, which requires each state to identify surface waters within its boundaries that are not meeting or not expected to meet water quality standards.

3.2.4.1. Potential sources of Contamination

Sources of contamination are considered point sources if they originate from a single location or non-point sources if they originate over a more widespread or unspecified location. Potential point source discharges must comply with the Clean Water Act and the New Mexico Water Quality Standards by obtaining a permit to discharge. These permits are referred to as National Pollutant Discharge Elimination System (NPDES) permits. A summary of NPDES permitted discharges is included in Table 3-4 (NMED, 2001b). The permit issued to the City of Tucumcari is for discharge of effluent from the Sewage Treatment Facility.

Table 3-3. Quay County Municipal and Industrial NPDES Permittees

NMED DISTRICT IV Chaves, Curry, De Baca, Eddy, Guadalupe, Lea, Lincoln, Quay and Roosevelt Counties:

Permit No:	Municipalities:	Status:	County:
NM0020711	Tucumcari	Major	Quay

Table 3-4 NMED Discharge Permits within Quay County

Discharge Permit Number	Nearest Municipality	Status	Facility Name	Waste Type	Treatment	Discharge	Gpd	Approved	Expires
1054	LOGAN	A	LAKE MEREDITH SALINITY CONTR	DOE/DOD	NONE	NJECTION WELI	034000	16-Dec-98	16-Dec-03
1125	NARA VISA	A	STULL TRAILER WASH	VEHICLE/EQUIP. WASH	LAGOON	LAND APPLICATION	3600	24-Mar-97	24-Mar-02
535	SAN JON	A	SAN JON (VILLAGE OF) - WWTP	MUNICIPALITY	CONSTRUCTED WETLANDS	EVAPORATION LAGOON	33000	31-Aug-95	31-Aug-00
1017	TUCUMCARI	A	QUAIL HILL FARM	SLUDGE DISPOSAL FACILITY	OTHER	LAND APPLICATION	47	4-Sep-00	4-Sep-05
19	TUCUMCARI	D	BREEN RANCH	MUNICIPALITY	WWTP	LAND APPLICATION	2678		
1258	TUCUMCARI	P	TUCUMCARI MOUNTAIN CHEESE FACTORY	CHEESE, MILK OR FOOD PROC	NONE	LAND APPLICATION	11430		
442	TUCUMCARI	T	SIXTY SIX PACKING COMPANY	MEAT PACKING	LAGOON	LAND APPLICATION	20250	22-Jul-87	22-Jul-92

Non-point sources of pollutants are a major concern for surface water in Quay County. Among the most prevalent of these sources are the effects of historical grazing practices. Additional probable sources of pollutants or threats to surface waters are agriculture, resource extraction, recreation, hydro-modification, road runoff, silvicultural activities, road construction, building sites, and septic tanks. Specific pollutants or threats to surface water quality resulting from these non-point sources are turbidity, stream bottom deposits, nutrients, metals, pathogens, total phosphorus, temperature extremes, total ammonia, problems with pH, habitat alteration, and overall watershed condition (NMED, 2003b).

3.3. Water Rights Administration

Assessment of the available water supply includes not only determining what groundwater and surface water resources exist in the planning area, but also ascertaining how much of that water has been appropriated to other users, making it unavailable for use by the planning region.

The OSE has the authority to delineate groundwater basins that require a permit for groundwater withdrawals, referred to as "declared underground water basins." In order to withdraw water from these declared basins, a user must have applied water to beneficial use prior to the basin declaration, thus creating a pre-basin water right, or the user must obtain a water permit from the OSE that specifies (1) how much water a user can withdraw within any given year, (2) the location and type of well that will be used to withdraw the water, and (3) the use to which the water will be put. Diversion of water from New Mexico's surface waters also requires obtaining a water right from the OSE. Surface water appropriations follow the same standards as groundwater rights.

3.3.1. Surface Water Adjudications and Administration

Water rights adjudication is a lawsuit that determines the right to use the waters of any stream system (NMSA 72-4-17). New Mexico courts have interpreted the intent of the legislature in creating this provision by stating "it was evident design of the legislature by this act to have adjudicated and settled by judicial decree, all water rights in state and to have determined the amount of water to which each water user was entitled so that the distribution of water could be facilitated and unappropriated water be determined in order that it might be utilized" *(Snow v. Abalos,* 18 NM 681, 1914). Adjudications are beneficial for regional water planning because they clearly establish the priority dates, water duty (the amount of water allowed to be diverted for each acre of land irrigated), and amounts of water rights available in the planning area.

In Quay County, the major streams have not been adjudicated, which means that stream-related water rights in the region have not been finalized and decreed. Streams that are not yet adjudicated can be considered fully appropriated. Thus even though the Canadian River in Quay County has not been adjudicated, it is considered fully appropriated.

3.3.2. Groundwater Administration

The New Mexico Water Code was not made applicable to groundwater until 1931 and then only in declared groundwater basins. After an underground basin is declared by the State Engineer, no lawful appropriation can occur without a State Engineer issued permit. Appropriations and transfers of water rights within an area not within a declared groundwater basin are accomplished without State Engineer involvement.

Domestic well permits have been granted automatically by the OSE under NMSA 72-12-1 and thus have not been subject either to evaluation of potential impairment or to protest or permit conditions. Applicants simply file a permit with the OSE and are then entitled by statute to use up to 3 ac-ft/yr.

4. CITY OF TUCUMCARI

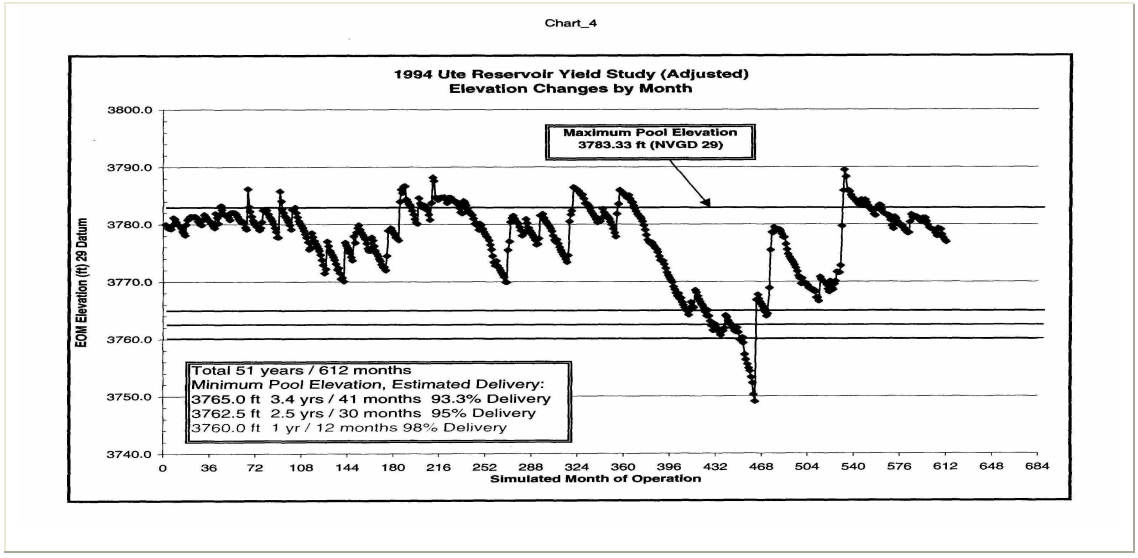
4.1. Surface Water Resources

The City of Tucumcari has not used surface water to supply its municipal water system. The city has used surface water from the Conchas Canal in past years to irrigate the Municipal Golf Course. The golf course uses an average of 9.65 million gallons or 29.6 acre-feet per year. Due to the lack of Irrigation water through the Conchas canal from 2002-2004, the city has placed an irrigation well in service to provide water specifically to the golf course.

The city through its long range plans has intended to use surface water to meet its annual water needs. The city has been a participating member of the Ute Water Commission. The Ute Water commission (UWC) was formed by Joint Powers Agreement for the purpose of contracting with the ISC for purchase of Ute Reservoir water. Participating agencies making up the UWC include the communities of Clovis, Elida, Grady, Logan, Melrose, Portales, San Jon, Texico, and Tucumcari; and the counties of Curry, Roosevelt, and Quay. The participating communities and counties have the option of maintaining their reservation by paying the annual $25.00 per acre-foot raw water cost and the $5.60 per acre-foot operation and maintenance fee for Ute Reservoir to the ISC. The City will exercise its option to maintain its reservation by paying the annual costs to ISC. The City of Tucumcari has already increased GRT to pay this annualized amount.

The ENMRWA was formed subsequent to the UWC for the purpose of advanced planning, design, construction and operation of facilities to distribute treated water from Ute Reservoir to the member communities. A 1994 study by the New Mexico Interstate Streams Commission (ISC) estimated the ***annual yield*** from Ute Reservoir to be 24,000 acre-feet per year in all but extreme drought years. The surface water available from Ute Reservoir which based on historical data that will be available to provide the 24,000 acre-feet annually for municipal and Industrial uses is shown in Figure 4-1.

Figure 4-1. Ute Reservoir Yield



Source; Douglas Murray, OSE

The City of Tucumcari has decided not to participate in the ENMRWS and has leased 3750 acre–feet per year of its reservation to Ute Lake Ranches which is developing a subdivision adjacent to the South Shore of Ute Lake. The City is retaining 2250 acre-feet of its reservation for its use.

4.2. Groundwater

The City of Tucumcari has relied on groundwater as the source of its municipal water supply. The City of Tucumcari currently has 22 wells. The 2 wells in the Hoover Well Field and the 11 wells in the metro well field pump water from the Entrada Sandstone formation. The remaining 10 wells in the Town Field pump water from Alluvium deposits.

OSE Technical Report No. 30, Trauger and Bushman, 1964, estimated that the Entrada formation contained approximately 2.6 million acre-feet of water. The report theorized that at 10% recovery that 260,000 acre-feet would be available. The estimated life expectancy of the Entrada Sandstone ground-water reservoir at 1250 acre-feet annual withdrawal was several hundred years.

The alluvium aquifer underlying Tucumcari (Town Well Field) was nearly depleted by ground-water pumping from 1900-1945, Trauger and Bushman. In 1946, the Tucumcari Project began delivery of water to The Arch Hurley Conservancy District. The water delivery to the irrigation project via unlined canals led to the recharge of the alluvium. By 1953 water elevation in some wells in town were higher than when they were drilled, Trauger and Bushman, 1964.

Table 4-1. Tucumcari Municipal Water Wells

WELL DESCRIPTION	OSE PERMIT NUMBER	USE	Acre-Feet	DEPTH	CAPACITY (as listed on Permit)
Well # 1	TU 00017	MUN	160	390	160
Well # 2	TU 00016	MUN	155	330	182
Well #3	TU 00035	MUN	125	305	110
Well # 4	TU 00031	MUN	97	332	140
Well # 5	TU 00030	MUN	194	370	115
Well # 6	TU 00029	MUN	145	385	160
Well # 7	TU 00027	MUN	155	390	170
Well # 8	TU 00028	MUN	155	330	185
Well # 10	TU 00033	MUN	194	315	260
Well #11	TU 00025	MUN	300	360	
Well # 12	TU 00024	MUN	300	305	410
Well # 13	TU 00020	MUN	402	300	405
Well #14	TU 00021	MUN	300		
Well # 15	TU 00034	MUN	145	262	160
Well # 16	TU 00018	MUN	291	326	265
Well # 17	TU 00019	MUN	291	336	315
Well # 18	TU 00026	MUN	436	179	500
Well # 19	TU 00022	DEC	388	331	400
Well # 20	TU 00023	MUN	155	380	
Golf Course	TU 01257	IRR	32		
Well # 4 (old)	TU 00032	MUN	300		
Well # 6 (old)	TU 00010	DOM	0	320	200
Total Acre-Feet Declared by Tucumcari			4720		
SOURCE:OFFICE OF THE STATE ENGINEER					

The input component of the groundwater budget is recharge. Groundwater recharge in Quay County is likely from infiltration of stream flow from the channels that carry runoff to the adjacent basin and from infiltration from the Tucumcari Project system of canals and laterals that carry irrigation water from the Conchas Reservoir to the project. Detailed groundwater monitoring and modeling would be required to fully evaluate sustainable yields for local resource areas.

The City of Tucumcari draws its water from the Entrada Sandstone aquifer west of Tucumcari and the alluvial aquifer under the town site. The Entrada Aquifer recharge was estimated to be 700 acre-feet per year or about 10% of precipitation (Trauger and Bushman, 1964). This recharge does not include recharge from canal flow near the Tucumcari Hoover Well Field. The alluvium under Tucumcari is estimated to recharge at a rate of approximately 450 acre-feet annually from precipitation and 2000 acre-feet annually from irrigation caused recharge by irrigation and canal flow (Trauger and Bushman, 1964).

4.3. Water Demand

The City of Tucumcari annual water production is currently about 1634 acre-feet per year or 532.5 million gallons. This is the average production over the last 20 years. Table 4-2 shows the annual production values over the last 20 years. The average sales over the 20 years have been 435.2 million gallons or 1336 acre-feet. Of this, approximately 48% was sold to residential accounts, 42% was sold to commercial accounts, and the remaining 8% was sold to water cooperatives. The average daily production approaches 1.4 million gallons per day. The daily production during the June to August summer months peaks at about 2.75 million gallons per day.

Table 4-3. Municipal Water Production in acre-feet, 1985-2004

2004	2003	2002	2001	2000
1,322.21	1,465.21	1,646.54	1,603.50	1,725.40
1999	**1998**	**1997**	**1996**	**1995**
1,552.83	1,665.89	1,543.13	1,654.31	1,726.14
1994	**1993**	**1992**	**1991**	**1990**
1,698.66	1,840.42	1,575.29	1,619.20	1,619.93
1989	**1988**	**1987**	**1986**	**1985**
1,696.77	1,565.79	1,584.17	1,714.28	1,865.30

Table 4-4 Water Sales (Acre-Feet)

	Commercial	Residential	Total
2004	568.84	639.52	1208.36
2003	644.71	679.10	1323.81
2002	621.51	716.04	1337.55
2001	684.80	779.22	1464.03
2000	715.50	777.70	1493.20
1999	559.60	680.03	1239.63
1998	630.82	727.63	1358.44
1997	544.92	706.51	1251.43
1996	612.80	712.82	1325.63

Note; Information on sales before 1996 not available.

The major water users of the Tucumcari system are the City of Tucumcari, Tucumcari Public Schools, Tucumcari Housing Authority and the Water Cooperatives. There are a number of commercial ventures that use between 1000-10000 gallons per day including many of the lodging establishments.

Table 4-5 Water Sales to Cooperatives 1984 -2004 (Acre Feet)				
	Liberty	RAD	Tucam	Total
2004	32.82	66.62	22.91	122.34
2003	29.14	67.73	22.05	118.92
2002	30.99	69.06	21.98	122.03
2001	30.91	66.07	20.91	117.89
2000	30.40	73.60	24.96	128.96
1999	28.54	64.57	23.36	116.48
1998	36.87	59.08	20.38	116.33
1997	29.13	58.84	17.96	105.94
1996	29.14	56.92	30.62	116.69
1995	31.67	58.15	30.94	120.76
1994	27.43	61.23	35.86	124.52
1993	27.19	72.32	36.08	135.58
1992	25.30	55.29	33.12	113.71
1991	31.64	70.93	43.56	146.13
1990	37.49	58.88	24.35	120.72
1989	29.37	54.84	22.86	107.08
1988	24.23	58.31	25.44	107.98
1987	28.14	49.92	35.75	113.81
1986	24.68	52.05	24.47	101.20
1985	28.94	77.16	25.13	131.23

TABLE 4-6 MAJOR WATER USERS GALLONS PER DAY			
	2004	2003	2002
Tucumcari Public Schools	67240	72541	57186
City of Tucumcari	69077	97118	93075
Liberty Water Cooperative	27652	25063	31613
RAD Water Cooperative	78064	90350	89025
Hills Village Water Cooperative	8254	11902	11014
Tucumcari Housing Authority	20870	21322	22998

TABLE 4-7 WELL YIELDS 2001-2004 (gpm)												
	2004			2003			2002			2001		
Well #	Avg.	Min	Max	Avg.	Min	Max	Avg.	Min	Max	Avg.	Min	Max
2	105.2	153.0	164.8	156.7	153.6	163.9	131.8	116.6	165.3	159.4	151.2	164.3
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	114.7	85.9	124.1	116.4	114.3	119.0	113.4	110.5	115.9	113.6	112.4	115.0
4(old)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	272.0	260.9	280.7	95.1	282.5	288.6	0.0	0.0	0.0	245.7	276.9	284.4
6	121.7	120.1	125.6	122.3	119.9	126.2	123.5	121.3	125.0	128.7	124.7	131.8
6(old)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	154.8	146.2	161.8	157.2	149.7	164.8	161.0	157.6	163.0	163.2	159.8	166.1
8	84.3	68.0	92.0	92.7	78.0	117.0	113.2	88.0	140.0	143.6	95.2	159.7
10	266.9	250.0	289.0	288.2	148.3	395.4	247.2	291.5	306.6	52.2	74.7	88.4
11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	504.5	400.0	551.9	522.2	452.0	550.0	534.1	512.0	550.0	560.9	529.5	701.7
13	318.2	274.7	366.9	358.4	303.0	435.0	309.7	303.1	425.0	331.9	214.1	355.2
14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	0.0	0.0	0.0	88.1	86.3	166.4	189.6	174.5	198.6	194.1	145.0	200.9
16	181.8	157.4	204.9	195.5	171.5	222.9	209.2	187.3	231.4	208.2	153.9	247.3
17	317.0	280.6	345.1	332.6	316.6	352.5	301.4	228.0	368.3	0.0	0.0	0.0
18	369.4	241.8	502.9	306.8	101.7	469.0	472.3	363.0	545.3	537.1	515.6	556.6
19	412.1	300.0	452.9	425.4	409.0	450.0	428.9	403.0	450.0	449.2	440.0	450.0

TABLE 4-7 WELL YIELDS 2001-2004 (gpm)												
	2004			2003			2002			2001		
20	121.5	100.0	138.0	155.5	120.0	187.0	154.9	157.8	177.4	171.7	165.0	186.9
Golf Course	new well: information not available											
Note: measurement of 0 indicates that well was not in production that year.												

The well yields and static levels do not show a marked decline in any of the wells except for # 18 which is offset by increases in the static levels of other wells. The city is monitoring this information on a monthly basis and will continue to do so. At this time, there does not appear to be any indication that the aquifers are being depleted. Some of the information does not seem to be consistent such as for Well #17, but with continued monitoring the City will be able to determine the accuracy and validity of its measurements.

Table 4-8 Static Well Levels 2002-2004 (distance below ground level)									
	2004			2003			2002		
Well #	Avg.	Min	Max	Avg.	Min	Max	Avg.	Min	Max
1	39	32	41	53	32	67	60	60	60
2	8	8	8	8	8	8	8	8	8
3	0	0	0	0	0	0	0	0	0
4	153	143	157	134	122	147	127	121	131
4(old)	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0
6	167	150	172	163	148	175	152	148	153
6(old)	0	0	0	0	0	0	0	0	0
7	160	150	181	166	158	181	0	0	0
8	0	0	0	0	0	0	0	0	0
10	155	155	155	154	147	155	151	138	203
11	0	0	0	0	0	0	0	0	0
12	78	58	115	94	57	152	89	71	150
13	78	57	112	103	56	191	113	96	184
14	0	0	0	0	0	0	0	0	0
15	103	103	103	106	103	122	113	111	117
16	78	60	110	60	49	68	63	49	77
17	70	54	94	110	55	241	200	141	236
18	107	88	122	67	63	72	66	47	74
19	67	56	76	53	43	70	75	43	87
20	83	61	113	68	54	83	52	26	112
Golf Course	new well: information not available								
Note: Measurement of 0 indicates that static levels not checked and/or well was not in production									

4.3.1. Projected Populations

Table 4-9 Projected Population: 2000 to 2040							
2000	2005	2010	2015	2020	2025	2030	2040
Declining Population							
5989	5965	5915	5832	5696	5510	5300	5089
Slow Growth							

5,989	6049	6109	6170	6232	6294	6357	6421
Medium Growth							
5,989	6288	6603	6933	7280	7644	8026	8427
Fast Growth							
5,989	6588	7247	7971	8768	9645	10610	11671

City of Tucumcari Comprehensive Plan, Consensus Planning - 2004

The City of Tucumcari Comprehensive Plan has been approved and was used for the Declining(BBER Estimates), Low (1% per 5yrs), Medium (5% per 5yrs) and Fast Growth (10% per 5yrs) analysis. The City of Tucumcari is located at the crossroads of two major East – West routes of National Significance, Interstate 40 and US 54. The traffic volumes on the routes have continued to grow significantly. The transient population that travels through Tucumcari is served through its hospitality and traveler services establishments are represented in the water production values stated previously. The transportation related industries within the City of Tucumcari have served the travelers on US66/Interstate 40 and US 54 since the 1920's and its service related businesses are well established. There is not a seasonal change in population except that the flow of traffic on the Highway system may vary due to vacation and holiday
travel demands.

The low growth scenario comes from the UNM Bureau of Business and Economic Research (BBER) statewide projections for future population growth, which indicate that the Quay County population will remain static. The slow to high growth scenario are based on evaluation of the local economic base, job trends, and potential development, comments from the regional water planning steering committee, and alternative projections (reflecting conditions that could occur if economic development activities are successful) by the City. These growth projections indicate that demand for domestic and municipal water supply in Quay County could significantly increase in the future.

Specifically, in Quay County, the high growth projections assume that the local economy is reinvigorated. Potential future job growth could come from increasing development of water-oriented recreation at Ute Lake and Conchas Lake State Parks, revitalization of the City of Tucumcari, wind farm expansion, development of the Tucumcari Industrial Park, Trailiner Building, or Worley Mills acre park, expansion of the Tucumcari Mountain Cheese Factory, attraction of ancillary industries related to cheese or dairy, attraction of shipping enterprises, construction of a proposed railway truck terminal, expansion of the ethanol plant, and development of the North American Wind Research and Training Center (NAWRTC) at Mesalands Community College.

4.3.2. Projected Water Demand

Table 4-10 Projected Water Diversion (acre-feet)								
	2000	2005	2010	2015	2020	2025	2030	2040
Census Estimates								
221gpcd	1615	1609	1596	1575	1541	1495	1443	1390
199gpcd	1454	1448	1437	1419	1388	1347	1300	1253
Low Growth								
221gpcd	1615	1630	1645	1660	1675	1691	1707	1723
199gpcd	1454	1467	1480	1494	1508	1522	1536	1550
Medium Growth								

221gpcd	**1615**	**1689**	**1768**	**1850**	**1937**	**2028**	**2123**	**2224**
199gpcd	**1454**	**1520**	**1590**	**1664**	**1741**	**1823**	**1908**	**1997**
Fast Growth								
221gpcd	**1615**	**1764**	**1929**	**2110**	**2309**	**2528**	**2769**	**3034**
199gpcd	**1454**	**1587**	**1734**	**1895**	**2073**	**2269**	**2484**	**2720**

In order to translate the population projections into future water demand, the average water use rate in gallons per capita per day (gpcd) was determined. The water sales to the cooperatives have been very consistent over the past ten years with an average annual sale of 38,656,770 gallons. Removing the cooperative sales from the total production results in an average gpcd of 221. This gpcd amount is high compared with other communities and may be reduced through conservation measures.
A ten percent reduction is equal to a gpcd of 199. The per capita production rate was then multiplied by the projected population Table 4-3 to estimate the range of future projected water demand (diversions) with and without conservation measures being taken, Table 4-4.

The City of Tucumcari has the opportunity to use the sustainable water resource from the Ute Reservoir to attract new industry and jobs to the region. Projected future demand was determined with various scenarios ranging from no-growth to aggressive economic development and as presented in Table 4-4.

4.4. Water Conservation Plan

An important aspect of water planning is water conservation, which allows the efficient use of existing resources. Water conservation may be defined as any beneficial reduction in water use or water losses (American Public Works Association, 1981; Prasifka, 1988). Senate Bill 554 was passed and signed into law during the 2003 regular session of the NM Legislature. Senate Bill 554 requires Municipalities Counties and other covered entities to adopt water conservation and drought management plans. This bill requires the covered entities (those who produce and supply over 500 acre-feet annually) to develop, adopt and submit to the state engineer by December 31, 2005 a comprehensive water conservation plan, including a drought management plan. The City of Tucumcari would be considered a covered entity.
Water conservation ordinances are the obvious choice for water conservation activities. The primary topics covered by conservation ordinances include:

- Prohibiting outdoor water waste (fugitive water) and/or requiring low-water landscapes.
- Changing water rate structures to encourage conservation and reduce water use by residential, industrial, commercial, and institutional customers.

Senate Bill 554 requires the covered entity to consider, and incorporate into its plan if appropriate, at least the following:

(a) water-efficient fixtures and appliances, including toilets, urinals, showerheads and faucets;
(b) low-water-use landscaping and efficient irrigation;
(c) water-efficient commercial and industrial water-use processes;
(d) water reuses systems for both potable and nonpotable water;
(e) distribution system leak repair;
(f) dissemination of information regarding water-use efficiency measures, including public education programs and demonstrations of water-saving techniques;

(g) water rate structures designed to encourage water-use efficiency and reuse in a fiscally responsible manner; and
(h) incentives to implement water-use efficiency techniques, including rebates to customers or others, to encourage the installation of water-use efficiency and reuse measures.

After December 31, 2005, Senate Bill 554 requires that neither the water trust board nor the New Mexico finance authority shall accept an application from a covered entity for financial assistance in the construction of any water diversion, storage, conveyance, water treatment or wastewater treatment facility unless the covered entity includes a copy of its water conservation plan.

4.4.1. Water Conservation Ordinance

The City adopted an ordinance to implement water conservation (see Appendix H). The ordinance addresses water waste, and many of the issues relating to water conservation. Water waste may be defined as the indiscriminate, unreasonable, or excessive running or dissipation of potable water; and non-essential water use may be defined as the indiscriminate, or excessive dissipation of potable water which is unproductive, or does not reasonably sustain economic benefits or life forms, where there is a shortage of potable water (Monterey Peninsula Water Management District, 1988). The City of Rio Rancho defines Water Waste in their ordinance as;

> *Water Waste. Water waste is the non-beneficial use of water that is supplied by any water supply system within the municipality. Non-beneficial uses of water include, but are not restricted to, the following:*
>
> 1. *Landscape water applied in such a manner, rate, or quantity that it regularly overflows the landscaped area being watered and runs onto or seeps into adjacent property or public right-of-way.*
> 2. *Landscape water that leaves a sprinkler, sprinkler system, or other application device in such a manner or direction as to spray onto adjacent property or public right-of-way.*
> 3. *Washing down of vehicles or hard surfaces such as parking lots, aprons, pads, driveways, or other surfaced areas when water is applied without shut-off hose nozzles in an excessive quantity to flow from that surface onto adjacent property or the public right-of-way.*
> 4. Fugitive water which is water that has escaped from one property onto adjacent property or the public right-of-way not including storm water runoff.

The Water Conservation Ordinances will provide for implementation and enforcement by the city.

4.4.2. Conservation through Rate Structuring

Table 4-11 Tucumcari Water Rates

	Inside City Limits		Outside City Limits		Cooperatives		
	Res.	Comm.	Res.	Comm.	RAD	Hills Village	Liberty
0-3000 min.	$12.60	$16.00	$18.90	$24.00	$1.86	$1.86	$1.62
3001 +	$2.44	$2.44	$3.66	$3.66	$1.86	$1.86	$1.62
50,001+	$2.66	$2.66	$3.99	$3.99	$1.86	$1.86	$1.62
Tucumcari Sewer Rates	0-3000 min.	$4.64					
	3001 +	$1.69					

The City of Tucumcari recently adopted the following ascending rate schedule after reviewing their rate structure to determine its adequacy to provide adequate revenue to cover operational and administrative costs. A good practice is to evaluate rates annually and never less than once each two years. This practice will not only help the municipality avoid unpopular large rate increases, but will also provide for a more responsible operation by providing sufficient revenue to maintain and manage the facility. The City will perform system audits in conjunction or prior to the rate analysis to assure that the systems are efficient and that the costs incurred and rate structure adopted are necessary to provide the users with the expected level of service at the most economical cost.

As the community adopts water conservation ordinances adjustment of water and sewer rates may be necessary. The City may look at adopting a more aggressive inverted block rate structure for their water rates so that the cost of the water increases with usage. Keeping the residential and industrial rates separate will be necessary to promote economic development. In addition, based on the community's involvement and wholesale cost of water from Ute Reservoir; the community will need to address the rate pricing of the water delivered from Ute Reservoir through the system.

4.4.3. Water System Management

Over the past nine calendar years the efficiency of the Tucumcari water delivery system has averaged 84.82% efficient.

Generally a water system should have an efficiency of greater than 90%. The efficiency rate less than 90% indicates that the city needs to implement water management measures. The unaccounted for water may be related to:

- Errors
  - Meter inaccuracy
  - Human (meter reading, accounting inaccuracies)
- Loss
  - Unauthorized unmetered users
  - Leaks
  - Tank overflow
- Authorized, unmetered uses
  - Firefighting
  - Street cleaning

Table 4-12 Water Efficiency (Acre-Feet)

	Production	Sales	Difference	% Efficiency
2004	1,322.21	1208.36	113.85	91.39%
2003	1,465.21	1323.81	141.40	90.35%
2002	1,646.54	1337.55	308.99	81.23%
2001	1,603.50	1464.03	139.47	91.30%
2000	1,725.40	1493.2	232.20	86.54%
1999	1,552.83	1239.63	313.20	79.83%
1998	1,665.89	1358.44	307.45	81.54%
1997	1,543.13	1251.43	291.70	81.10%
1996	1,654.31	1325.63	328.68	80.13%
			Avg.	84.82%

- Water main flushing
- Construction water
- Parks

The city will routinely perform a system audit which involves identifying all sources of system inefficiency, water loss, revenue loss, and initiate plans to reduce waste and improve system efficiency, after a series of tests and calculations, designed to balance the water supplied to a system, with the water legitimately used. The audit will include;

- Review of distribution system and maps
- Collecting source and service meter records for the review period
- Water produced and calculating how much water entered and left the system during the review period
- Meter water sales
- Estimated and unmetered water uses
- Testing meters for accuracy
- Estimating the volume and cost of unaccounted-for water
- Review of existing monitoring procedures
- Estimated system losses
- Review of existing pertinent projects in execution
- Analyzing the data and developing an action plan

The benefits to the city of performing a water audit will include;

- Water loss reduction and consequent cost reduction (electrical energy, chemical products, etc.)
- Increased income with the detection of consumers that are not being billed or are being billed incorrectly
- Improved knowledge of the operating system
- Optimization of supply sources thus postponing investment in new units
- Improved public relationship
- Reduction of risks to private properties
- Reduction in illegal connections

The City has initiated a program to replace meters within the city with touch-read meters. This program will improve efficiency by replacing the older possibly inaccurate meters and should improve meter reading accuracy and the overall accounting of water sales. The city will also inventory and develop a plan to replace water hydrants for fire protection.

4.4.4. Metering

Metering is a very fundamental tool of water system management and conservation.
The ordinance adopted will require the installation and regular reading of meters at all water sources, including import or export points, customer service connections, and public landscape sites. All water provided free of charge for public use or general community use should also be metered and read at regular intervals to allow the utility to more accurately account for water use.

4.5. Water Budget

For planning for future needs the available water supply must satisfy the projected demands plus a factor of safety to address unanticipated demands. The major water supply for the City of Tucumcari currently is from groundwater. The City does have 6000 Acre-feet reserved within

Ute Reservoir which as determined by the ISC there is a 93% probability over 50 year time frame that the maximum reservation may be taken by the City.

4.5.1. Supply versus Demand

The City of Tucumcari is supplied by groundwater pumped from the Entrada Sandstone and from an alluvial aquifer. Wells completed in the Entrada Sandstone can yield up to 600 gpm (Kilmer, 1987). Groundwater in the Entrada Sandstone has transmissivities ranging from 630 to 5,560 gpd/ft, specific capacities ranging from 0.5 to 5 gpm/ft of drawdown, specific conductance ranging from 540 to 3,190 µS/cm, and storage coefficients ranging from 0.0002 to 0.144 (Kilmer, 1987). Total groundwater rights are 4,720 acre-feet per year, and the City has an additional 6,000 acre-feet per year reserved in Ute Reservoir. Average production for the City was 1,634 acre-feet per year over the last 20 years. Approximately 55 percent of groundwater pumped is from the Entrada Sandstone, by two wells in the Hoover and 11 wells in the Metro well fields. The remaining 45 percent is supplied from an alluvial aquifer, by 10 wells in the Town well field. The maximum amount of water pumped in one year since 1985 was 1,865.30 acre-feet. The maximum projected demand for the City of Tucumcari is 11,671 acre-feet per year by 2040.

Table 4 – 13, Change in Water Levels, 2002-2004
City of Tucumcari Wells

	Average Static Well Level [a] (distance below ground surface)			Change in Water Level [b]
Well	2002	2003	2004	
1	60	53	39	+
2	8	8	8	0
3	---	---	---	0
4	127	134	153	–
4 (old)	---	---	---	0
5	---	---	---	0
6	152	163	167	–
6 (old)	---	---	---	0
7	---	166	160	+
8	---	---	---	0
10	151	154	155	–
11	---	---	---	0
12	89	94	78	+/–
13	113	103	78	+
14	---	---	---	0
15	113	106	103	+
16	63	60	78	+

In a 1964 OSE publication, Trauger and Bushman estimated that the Entrada Sandstone aquifer held 2.6 million acre-feet of water. They estimated that with 10 percent recovery, 260,000 acre-feet of water was available, and that with an average annual withdrawal of 1,250 acre-feet, this aquifer would last several hundred years. Trauger and Bushman (1964) estimated that 10 percent of precipitation contributed to recharge of the Entrada Sandstone aquifer; however, research compiled for the Northeast New Mexico Regional Water Plan estimates that only 1 to 5 percent of precipitation recharges groundwater.

17	200	110	70	+
18	66	67	107	–
19	75	53	67	+/–
20	52	68	83	–

[a] --- = Levels were not checked and/or well was not in production

[b] + = Rise in average static water level
– = Decline in average static water level

0 = No change in average static water level

+/– = Both rise and fall in static water level

Using these research values DBS&A estimated recharge using the Maxey-Eakin method. This method assumes that a direct relationship exists between annual precipitation and annual recharge; that is, the higher the annual precipitation, the higher the annual recharge. This hypothesis was supported by basin water balance studies (Maxey and Eakin, 1949) indicating that higher-elevation, wetter groundwater basins exhibit higher annual discharge rates (in the absence of significant groundwater pumping, discharge from a basin should be roughly equal to recharge) than lower-elevation, drier basins. The results of the Maxey-Eakin analysis indicate that 2.2 percent of precipitation recharges groundwater in Quay County, for a total of approximately 49,110 acre-feet of recharge per year, county-wide.

The alluvial aquifer is recharged by irrigation and canals from the Arch Hurley Conservancy District, using surface water from Conchas Reservoir. Trauger and Bushman (1964) estimated that recharge to the alluvial aquifer from the Conchas Canal was 2,050 acre-feet per year. The Tucumcari Project began in 1946, and despite having previously been drawn down, water levels in some of the wells in the Town well field had higher water levels in 1953 than when originally drilled (Trauger and Bushman, 1964).

Table 2 summarizes average static water levels for City of Tucumcari wells in 2002, 2003, and 2004. Five of these wells show a decline in average static water level between 2002 and 2004, six show an increase, two have fluctuated up and down, one has not changed, and seven lack static well level data. Information was not available for the new golf course well.

For comparison, change in depth to water has been tabulated for those USGS monitoring wells within 4 miles of Tucumcari. City of Tucumcari water supply wells are completed in either the Entrada Sandstone or alluvial aquifers; however, data for all the USGS monitoring wells within 4 miles of Tucumcari, including those completed in other aquifers, are summarized in Table 3.

Table 4 – 14, Change in Water Levels in USGS Monitoring Wells Near Tucumcari

		Change in Water Level		
Aquifer	Well ID	Amount [a] (feet)	Period of Record	
			Dates	No. of Years
Entrada Sandstone	350543103501401	+0.86	1988-1998	10
	350605103481701	+1.56	1988-2003	15
	351040103433602	+116.46 +43.31 [b]	1952-1963 1952-2005	11 53
	351041103442201	+13	1983-2003	20
Alluvium	350916103380401	+4.34	1948-2003	55
	351126103423201	+3.60	1985-1998	13
	351231103421001	+1.51	1983-1998	15
Chinle Formation	351041103461901	–1.00	1952-1998	46
	351246103374801	–0.37	1983-2003	20
	351332103413501	–0.50	1988-1998	10
Morrison Formation	350950103481701	+5.01	1988-1998	10
	351158103455201	+2.20	1988-1998	10

Source: Data available at http://nwis.waterdata.usgs.gov/nm/nwis/gwlevels, accessed November 11, 2005.

[a] Positive numbers signify a rise in water levels. Negative numbers signify a drop in water levels.

[b] Water level rose 116.46 feet between 1952 and 1963 and has declined since then. Although the level is declining, in 2005 it was still 43.31 feet higher than the level in 1952.

Water levels in the wells completed in the Entrada Sandstone and the alluvial aquifer, the aquifers that the City of Tucumcari draws its water supply from, have not declined, but have slightly increased. Thus the USGS monitoring well data suggest that historical pumping of these aquifers has not negatively impacted them. The three monitoring wells completed in the Chinle Formation show declines on the order of less than a foot, while the two wells completed in the Morrison Formation have seen rises in water level of 2.20 and 5.01 feet in 10 years. The City of Tucumcari production well and USGS monitoring well level data suggest that groundwater supplies surrounding the City of Tucumcari are adequate to meet projected demand over the next 40 years.

4.5.2. Water Supply Needs

The estimated water demand even with the Fast Growth scenario estimates that the demand for water will be 3034afy at 221 gpcd and 2720afy at 199 gpcd (conservation rate). The City is in an enviable position that it can meet its projected municipal demand with its existing groundwater supply or can decide to develop the Ute Reservoir supply and not only provide for the estimated future demand but can aggressively market its resource for commercial developments.

4.6. Water Supply Alternatives

4.6.1. Ute Reservoir Reservation

The city has entered into a lease agreement for 3750acre-feet which provides the remaining 2250 acre-feet for the use of the City of Tucumcari. The 2250 acre-feet is sufficient to meet the projected demand for all but the fast growth scenarios. Aggressive economic development could result in the need for both groundwater and the surface water to be blended into the City's distribution system.
The lease agreement provides that the city the ULR will allow Tucumcari to use its diversion works and infrastructure, whether it is a well field or a surface pump station at the reservoir, to divert its 2,250 acre-feet of water. Tucumcari shall not be required to contribute to the cost of developing the initial infrastructure, whether well field or surface pumping station. Tucumcari will, however, be required to pay the lesser of either (1) all direct operation and maintenance costs attributable to only that amount of water being diverted and/or treated on behalf of Tucumcari or (2) at a rate determined by the average cost of water treatment taken from the costs incurred by three New Mexico communities comparable in size to the City of Tucumcari times the quantity of water treated. All pipelines and storage facilities needed to supply water to Tucumcari and areas outside of Ute Lake Ranch shall be the responsibility of Tucumcari. The ULR also will permit and grant to Tucumcari at no additional cost all required, appropriate and necessary easements for the placement of its infrastructure.

4.6.2. Wastewater Reuse

The City of Tucumcari is currently contracted with the engineering firm, Souder-Miller, to evaluate and design an upgrade to their centralized wastewater treatment system. The city will continue to operate and maintain the centralized system. The city is including potential to reuse waste-water into the upgrade of the plant.

Wastewater reclamation and reuse is being practiced successfully in several locations in the western United States as a means of increasing or supplementing the available supply of water and preserving potable water for drinking water uses. The degree of treatment and the standards to be met depend upon the end use of the reclaimed water. Wastewater reuse is an environmentally and socially responsible way to increase local water supplies.

The City of Tucumcari treats and releases an average of 2 acre-feet per day which is discharged into the Pajarito Creek under a discharge permit. The potential annual reuse would equal approximately 730 acre-feet which is approximately 45% of the average annual water production by the city. The current City of Tucumcari NPDES permit provides for treatment that will meet the requirements of Class 1B for all parameters Except for Fecal Coliforms Bacteria. The Fecal Coliforms Bacteria Requirements if minimally met would classify the effluent as Class 3 waste water. The city would need to treat the effluent to reduce the Fecal Coliforms Bacteria from a permitted level of 500 organisms per 100 ml to a 30 day average of no more than100 organisms per 100 ml to meet Class 1B requirements.

4.6.3. Wellhead Protection

The City has initiated a wellhead protection program (WHPP) which is a planning and management approach to protect groundwater supply systems from contamination. By identifying and managing potential sources of contamination than can affect water supply wells, the City can do a better job of protecting public water supplies. The Wellhead Protection (WHPP) Program is a pollution prevention and management program used to protect underground based sources of drinking water. The Safe Drinking Water Act defines a wellhead protection area as "the surface and subsurface area surrounding a water well or well field

supplying a public water system, through which contaminants are reasonably likely to move toward and reach such water well or well field." The primary components of a wellhead protection program are:

1) Identify roles and duties of government and public water supply agencies;
2) Delineate the wellhead protection area (WHPA) for each wellhead;
3) Identify potential sources of contamination within each WHPA;
4) Develop management methods for wellhead protection, including education and regulatory approaches;
5) Develop contingency plans for public water supply systems;
6) Provide for proper siting of new wells to minimize potential contamination; and
7) Provide for public education and participation.

The Source Water Protection area is the land around each supply well or surface water intake where spills, leaks, accidents or other forms of contamination may have a direct impact on the drinking water supply. The size of this area depends on soil type, site geology, groundwater flow rate, and on the drainage area and land use in the watershed. The susceptibility of drinking water sources to contamination is based on the number and proximity of potential threats to the water supply and an evaluation of any sanitary defects at the wellhead, intake structures, or other components of the water system.

4.6.4. Municipal Water Supply Infrastructure and Management

The City of Tucumcari will over the life of the plan need to upgrade and replace water and sewer infrastructure. The existing infrastructure of Tucumcari that includes portions already significantly past their design life expectancies.

The City of Tucumcari Water distribution system is composed of various materials (PVC, AC, Copper and Cast Iron). The city storage system consists of seven storage tanks with the capacity to store approximately 5,000,000 gallons of water. The city's storage tanks are shown in Table 4-14.

The city has begun to upgrade its distribution system with the identification and replacement of older lines. The city needs to continue to replace the older infrastructure on a systematic basis. The replacements to date were planned based on repairs made and the need to coordinate with street renovation projects. The city has a general map of its distribution system but the mapping is incomplete as to exact location and type of line, age, location of all valves and age, and location of all service lines with associated meters. The city plans to update its mapping and use the GIS/GPS computer based systems currently owned by the City. The mapping system is available but accurate base data is not available nor was it being gathered systematically. The

Table 4-15, City of Tucumcari Water Storage			
Storage Tank	**Storage *(gal)***	**Tank Type**	**Installation Date**
Hoover	**165,000**	**(Concrete)**	**?**
Metro	**220,000**	**(Steel)**	**1938**
Center St.	**1,000,000**	**(Steel)**	**1959**
11th St.	**2,000,000**	**(Steel)**	**1967**
11th St.	**589,000**	**(Concrete)**	**?**
La Joya	**1,000,000**	**(Steel)**	**1964**
Westridge	**110,000**	**(Steel)**	**1987**
Totals	**5,084,000**		

City will prioritize the gathering of basic information during every service call made such as, location of line, service line, meter, valve, location of break and type of repair and the development of a comprehensive relational database for use with the GIS Software. The city is establishing a policy to install isolation valves during emergency repairs to facilitate shutoffs in the future; many of the repairs made currently are under "hot " conditions with water service on due to the inability to shut down the line. The city also will identify where additional isolation valves are necessary and budget for the emplacement of the valves at the rate of five to ten per year. This would allow the city to develop a grid distribution system where small areas may be shut down while maintaining service to the majority of the system to facilitate repairs. The grid system would also facilitate systems upgrades grid by grid.

The central storage tank at Center St handles all of the water pumped and delivered to the City. All of the water flows through this tank and its pumps which are of 1920's vintage. The recent addition of the new tank and replacement of the pump station which was funded through a $500,000 CDBG grant awarded in March 2004. This additional tank is a continuing step in the necessary replacement of the City's infrastructure. The concrete tanks of unknown age need to be scheduled for replacement as soon as possible. The Storage capacity is adequate for now and the future except that additional storage may be necessary if the aggressive growth pattern emerges as planned by the city.

4.6.5. Water Quality

The municipal water supply has continuously met all U.S. Environmental Protection Agency (EPA) and state drinking water health standards. The city vigilantly safeguards its water supplies and has never violated a maximum contaminant level or any other water quality standard. Water Quality is an important factor in developing water supply alternatives.

The water reserved within Ute Reservoir will need treatment to meet drinking water standards before it can be used. The conceptual report by Smith Engineering, 2003, on the ENMRWS has extensive information concerning the exiting water quality of Ute Reservoir and the needed treatments to meet standards. The Water Lease Agreement between the City and Ute Lake Ranch provides that the City will take its remaining reservation of water from Ute Lake through the diversion and treatment infrastructure developed by Ute Lake Ranch by paying a proportional share of the development and operational costs. Therefore, the treatment of the Ute Lake water to meet acceptable drinking standards will be the shared responsibility of both the City and Ute Lake Ranch.

4.7. Water Development Plan

4.7.1. Water Conservation Program

The success of conservation programs varies depending upon the starting point. The City of Tucumcari has a per-person water consumption (gpcd) of 221. The per capita water use is a representation of water use based on the amount of municipal water that has historically been pumped or diverted divided by population and includes system losses and water used for public facilities. The City of Tucumcari will strive to reduce the gpcd by 10% to 199 at least by 2010 and wi8ll evaluate and update goal every five years.

4.7.1.1. Plan

The plan consists of the following activities:

- Adopted Water Conservation Ordinance by December 31,2005
- Public Education ongoing through life of plan
- Outdoor Water Use
- City Government Leadership
- Metering
- Record-Keeping and water audits
- Leak detection
- Voluntary Water Conservation Measures

4.7.1.2. Public education

Public education will include the following: Develop, print and disseminate educational materials on Xeriscape, efficient use of water in the home, and the scarcity of the resource. These materials will be disseminated to new customers at the utility, through flyers sent with the Utility bill, in hotels, advertisements in the newspaper and in public places such as City Hall and the library.

4.7.1.3. Outdoor Water Use

Irrigation with reclaimed wastewater is being evaluated and funding pursued for use at the golf course, city parks, sports fields, and cemetery.

4.7.1.4. City Government Leadership

City government leadership is important because the City is one of the highest water users. City departments and facilities will lead by implementing water efficiency measures. Parks and Recreation will initiate measures to use water more efficiently and will develop a management plan by March 1, 2006.

4.7.1.5. Metering

Metering is an important part of the conservation program. Meters have not been installed at all water sources, import or export points, customer service connections, and municipal landscape irrigation sites, including self-supplied athletic fields, golf course and parks. The City will install meters at all locations by the July 1, 2006. In addition, the city will implement a meter replacement program.

4.7.1.6. Record Keeping and Water Audits

Record-keeping and water audits will be performed as part of the program. The program will benchmark historical usage and track ongoing consumption patterns through the billing system. The program will include monitoring and evaluation, tracking consumption by class, and adapting the program as necessary. Audits and retrofits (installation of more efficient plumbing) will initially focus on the commercial sector.

4.7.1.7. Leak Detection

A regular program of preventative maintenance, leak detection and repair is already underway.

4.7.1.8. Voluntary Water Conservation Measures

- Landscape or lawn watering should be limited in such a manner so as to reduce overall water usage by at least 10%.
- Landscape or lawn watering with automated sprinkler systems between the hours of 10:00 a.m. to 6:00 p.m. is discouraged. Landscape or lawn watering with manual sprinkler systems between the hours of 12:00 noon to 4:00 p.m. is discouraged.
- Watering early in the morning is recommended to avoid excess evaporation and discourage fungus growth, and lawns should be aerated to improve absorption and reduce runoff. Lawn watering should be done only when the lawn needs watering.
- Sprinkler system should be shut off when it is raining.
- Fugitive water which overflows the landscaped area being watered and leaves the property is discouraged.
- Landscape and lawn watering should be stopped when winds are strong enough to cause the water to leave the area being watered.
- Mulch should be placed around all existing plants, trees, shrubs, or flower gardens to hold moisture in the soil.
- Washing of hard surfaces, such as parking lots, driveways or sidewalks, is discouraged.
- Indoor and outdoor leaks should be repaired immediately upon discovery.
- Restaurants should be encouraged to provide water to customers only upon request.
- Hotels, motels and other lodging facilities are requested to promote water conservation by encouraging guests to minimize use of towels and not changing bed linens for multi-night stays.
- Use of fire hydrants should be limited to firefighting use and use of fire hydrants for other purposes discouraged unless metered.
- Car washing at self-serve car washes is encouraged and businesses that wash vehicles are encouraged to use high-pressure wash systems.
- Water users are encouraged to replace old plumbing fixtures with low flow fixtures, such as low flow showerheads, faucets and toilets, or retrofit existing fixtures with low flow devices, such as toilet tank dams, water-filled plastic jugs, or a brick.
- Water users are encouraged to take shorter showers; not to let the water run continuously while brushing teeth or shaving; and to flush only when necessary.
- Appliances which use water, such as dishwashers and clothes washers, should be run only with full loads.
- Evaporative coolers should be run only when needed and have a thermostat to control their operation.
- Hot water heaters should be insulated; the temperature set appropriately; and partially drained once per year.
- Outdoor open burning which requires water to be available for extinguishment is discouraged.

- Treated water bulk sales contracts shall be encouraged to be reduced or diminished by 10%.

4.7.2. Ute Lake Reservoir Development

The City is beginning to plan on developing a trunk line to tie into the ULR dependent on facility location as determined by ULR. This will provide the city with 2250 acre-feet per year which can be used in lieu of groundwater to preserve groundwater resources for future demand or used for aggressive economic development.

4.7.3. Water Supply Infrastructure Improvements and Management

The city has begun to upgrade its distribution system with the identification and replacement of older lines. The city will continue to replace the older infrastructure on a systematic basis.

The city plans to update its mapping and use the GIS/GPS computer based systems currently owned by the City. The mapping system is available but accurate base data is not available nor was it being gathered systematically. The City will prioritize the gathering of basic information during every service call made such as, location of line, service line, meter, valve, location of break and type of repair and the development of a comprehensive relational database for use with the GIS Software.

The city is establishing a policy to install isolation valves during emergency repairs to facilitate shutoffs in the future; many of the repairs made currently are under “hot“ conditions with water service on due to the inability to shut down the line. The city also will identify where additional isolation valves are necessary and budget for the emplacement of the valves at the rate of five to ten per year.

The concrete tanks of unknown age will be scheduled for replacement as soon as possible. The Storage capacity is adequate for now and the future except that additional storage may be necessary if the aggressive growth pattern emerges as planned by the city.

4.7.4. Wastewater Reuse (Souder, Miller and Associates)

The City of Tucumcari is implementing improvements to the Wastewater treatment facility that would include the installation of a treated effluent pump station and a wastewater reuse line from the water reclamation facility to the sports fields and the municipal golf course. The reuse line would carry reclaimed water to be used for irrigation of these facilities and help mitigate concerns of future water shortages and drought conditions. The approximate location of the facilities and the proposed line location are shown on the enclosed figures in the Appendix. By utilizing the wastewater effluent from the facility, the City of Tucumcari would have approximately 226 million gallons or 694 acre-feet of reuse water available for irrigation purposes on an annual basis.

In general, the flow requirements through the transmission line from the waste water treatment facility to the Golf Course and the Sports Fields would be similar to that observed during average flow conditions at the facility. The average flow conditions are 0.62 MGD or 430 gpm. The elevation of the Water Reclamation Facility is 4,050 feet above mean sea level while the golf course is approximately 4130 feet above mean sea level. For a velocity of 2.5 feet per second, a 12” diameter PVC pipe would be used as the transmission line over the

approximately 7.5 mile length noted on the figures in the Appendix. The pressure loss through this transmission line is 43 feet of head (19 psi). Using a safety factor of 1.5, the required flow rate for the reuse line would be 645 gpm with an estimated total dynamic head of 123 feet (54 psi). A 30 HP pump should be sufficient to meet these conditions

Table 4-16, Tucumcari Reuse Estimate

Item	Quantity	Unit Cost	Cost
Transmission Line (12" PVC C900 including fittings, restraints and appurtenances)	7.5 Miles	$63,360	$475,200
Booster Station (including three 30 HP pumps, building, HVAC, electrical and other appurtenances)	LS	$125,000	$125,000
1-1/2" Combination Vacuum / Air Relief Valves	8	$600	$4,800
12" Gate Valves (spaced every half mile)	15	$2,500	$50,000
Misc. Mechanical / Piping	LS	$20,000	$20,000
Altitude Valve	1	$10,000	$10,000
100,000 Gallon Storage Tank	1	$75,000	$75,000
Contingency (10%)			$76,000
CONSTRUCTION TOTAL			$836,000
Design (8%)			$66,800
Construction Inspection (6%)			$50,160
PROFESSIONAL SERVICES TOTAL			$116,960
TOTAL PROJECT COST			$952,960
Note: NMGRT not included in estimated project costs			
Souder, Miller and Associates			

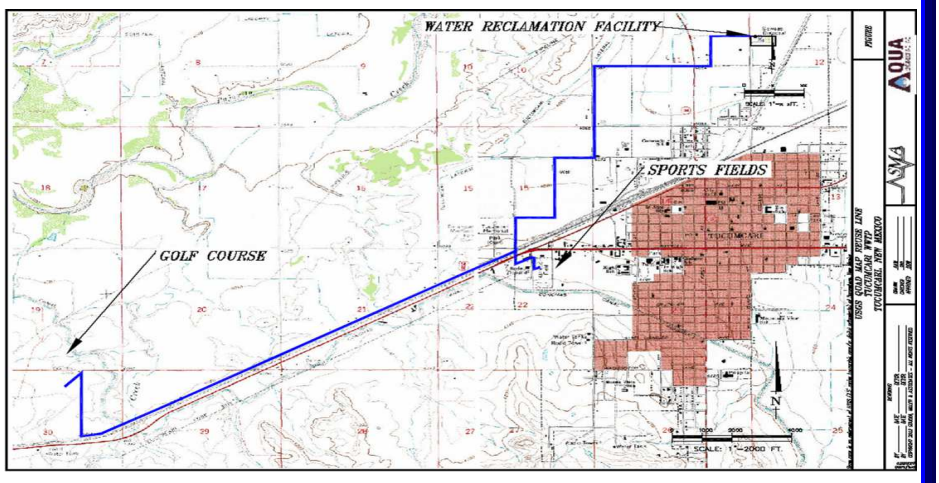


Figure 4-2. Tucumcari Reuse Pipeline Schematic (SM&A)

4.7.5. Water Rights Transfers

The purpose of this alternative is to pursue water rights transfers that would enable the City to continue to meet demands or mitigate drought related shortages. Identifying water rights for sale, lease, or to option before the water is needed is an alternative that merits serious consideration. Addressing water rights transfers now facilitates planning and enables quick responses to water issues resulting from drought conditions. In addition, priority water rights may be established in case other entities (private or public) begin to purchase or lease water rights to supplement their water supply.

Table 8-13 lists the wells and corresponding water rights listed in Quay County in the Waters Database that could present the communities with the opportunity to transfer water rights for municipal purposes. The City of Tucumcari is in Township 11N Range 30E

Table 4-17, Non-Domestic/Municipal Wells

DB File Nbr	Use	Diversion	Owner	Well Number	Tws	Rng	Sec
TU 00111	IRR	60	ALVIN LEM CHESHER	TU 00111	11N	30E	22
TU 00191	IRR	45	L. C. STRAWN	TU 00191	12N	30E	32
TU 00725	IRR	120	BOBBY D. WHITE	TU 00725	11N	30E	24

4.7.6. Appropriate and Reserve Groundwater

Appropriating available groundwater resources would increase the supply available to the city and protect water supplies from appropriation by neighboring cities, counties, regions or states. New Mexico law allows for certain types of water providers and local governmental entities to appropriate water for future use as part of the long-term planning process. A municipality, county or other qualifying applicant may reserve water rights for up to 40 years without putting them to beneficial use if a 40-year water plan that demonstrates a future need for the water has been completed (NMSA 72-1-9).

Certain eligible entities such as Tucumcari may wish to pursue individual applications, especially since it is located near groundwater supplies with the potential to be appropriated and developed. The ability and willingness to develop groundwater supplies will be determined by the quality and amounts of groundwater available.
An applicant has previously filed an application numbered TU-1385 with the State Engineer for Permit To Appropriate the Underground Waters of the State of New Mexico within the Tucumcari Underground Water Basin in Quay County by drilling a well in the Southwest ¼ Northwest ¼ Southwest ¼ of Section 11, Township 11 North, Range 30 East, New Mexico Principal Meridian, 100 feet deep with a 10-inch casing to be located on land owned by the applicant, for the appropriation of 160 acre-feet per annum for irrigation purposes on 70-acres of land. The new well will be physically located approximately 1-mile northwest of Tucumcari City Hall and 0.5 mile west of Highway 104. This application is an example of the feasibility of appropriating underground waters for the City of Tucumcari. The continuation of drought conditions and the lack of irrigation water from Conchas Reservoir may cause more farmers within AHCD to apply to appropriate underground waters within AHCD and in close proximity to the City of Tucumcari. Therefore, the city must be aggressive in protecting the water resource and municipal supply.

The city at least must be vigilant of new applications to appropriate groundwater from the Entrada and Alluvium aquifers that the city relies on for its current water supply and protest applications such to assure that the appropriation will not impair the city's existing water rights.

4.8. Summary for City of Tucumcari

The City of Tucumcari will continue to rely on groundwater for the foreseeable future through the life of the plan. The City has leased 3750 acre-feet of its 6000 acre-feet per year reservation from Ute Lake to Ute Lake Ranches. The lease agreement provides that ULR will allow Tucumcari to use its diversion works and infrastructure, whether it is a well field or a surface pump station at the reservoir, to divert its 2,250 acre-feet of water. Tucumcari shall not be required to contribute to the cost of developing the initial infrastructure, whether well field or surface pumping station. Tucumcari will, however, be required to pay the lesser of either (1) all direct operation and maintenance costs attributable to only that amount of water being diverted and/or treated on behalf of Tucumcari or (2) at a rate determined by the average cost of water treatment taken from the costs incurred by three New Mexico communities comparable in size to the City of Tucumcari times the quantity of water treated. This will provide water for an aggressive economic development plan being developed by the City.

The City will implement a conservation plan and has begun the process of adopting a conservation ordinance. The goal of the city is to reduce its production by 10% based on the gallons produced per day per capita. The Conservation ordinance and plan addresses phased implementation of water conservation measures based on drought conditions.

The city's most pressing need is to upgrade its infrastructure and its water management system to reduce unaccounted water losses and improve efficiency of its system to at least 90% but will strive for 93% plus. This effort will take significant funding and will not be accomplished immediately. The City's infrastructure plan will address over the next ten years to replace all existing infrastructure over 30 years old. The city will develop during 2006 a water management plan including metering all connections and performing a water system audit biannually.

The City will budget and initiate by 2015 a comprehensive hydrological study of its aquifers in order to determine and validate the supply and its long-term availability, more than 100 years. The study will also be used to determine the availability of unappropriated water that the city may apply with OSE to divert to Municipal and Industrial use.

4.9. Implementation Plan

Table 4-17 shows the implementation plan for the City of Tucumcari initiatives.

Table 4-17. Implementation Plan

Fall 2005	**Adopted Conservation/Drought Ordinance**
2006	**Implement Conservation/Drought Plan**
2007-2046	**Promote Public Awareness of and continue with conservation program with biannual reevaluations and modifications to program**
2006-2046	**Plan for and pursue funding for systemic replacement and upgrades to Water production and distribution system**
2006-2010	**Develop Wastewater reuse for irrigation of parks and Cemetery.**
2006-2046	**Develop and maintain Water Management Plan and perform System Audits biannually. Improve efficiency to 91% plus by end of 2008.**
2006-2015	**Complete a Hydrological study of Tucumcari Aquifers**

Table 4-17. Implementation Plan	
Fall 2005	**Adopted Conservation/Drought Ordinance**
2006-2046	**Development of Ute Lake Reservation for Economic Development with Ute Lake Ranches**

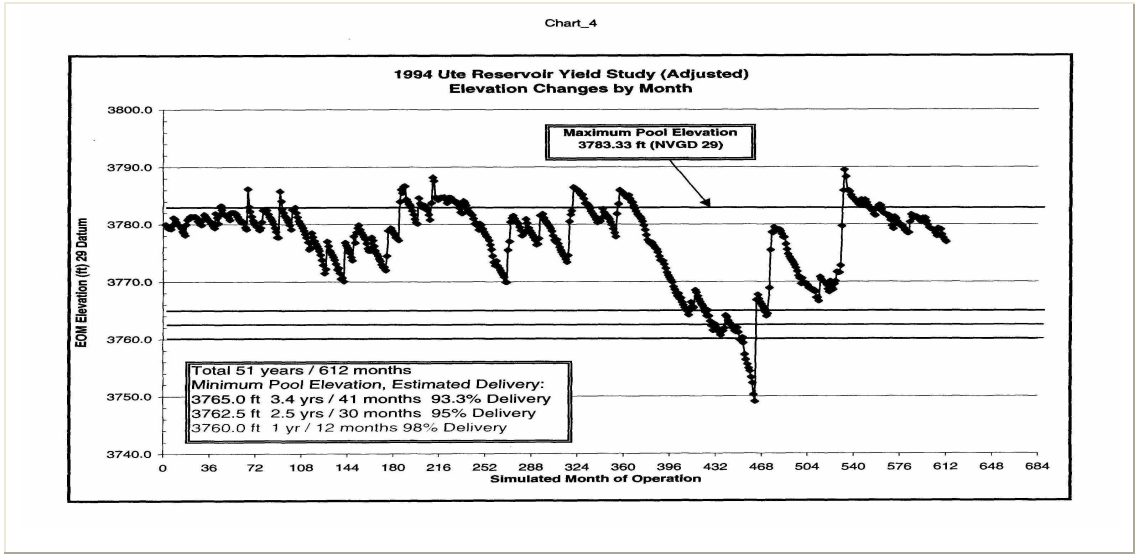
5. VILLAGE OF LOGAN

5.1. Surface Water Resources

The Village of Logan has not used surface water to supply its municipal water system. The village through its long range plans has intended to use surface water to meet its annual water needs. The village has been a participating member of the Ute Water Commission. The Ute Water commission (UWC) was formed by Joint Powers Agreement for the purpose of contracting with the ISC for purchase of Ute Reservoir water. Participating agencies making up the UWC include the communities of Clovis, Elida, Grady, Logan, Melrose, Portales, San Jon, Texico, and Tucumcari; and the counties of Curry, Roosevelt, and Quay. The participating communities and counties have the option of maintaining their reservation by paying the annual $25.00 per acre-foot raw water cost and the $5.60 per acre-foot operation and maintenance fee for Ute Reservoir to the ISC. The Village will exercise its option to maintain its reservation by paying the annual costs to ISC. The Village of Logan has already budgeted to pay for this annualized amount.

The ENMRWA was formed subsequent to the UWC for the purpose of advanced planning, design, construction and operation of facilities to distribute treated water from Ute Reservoir to the member communities. A 1994 study by the New Mexico Interstate Streams Commission (ISC) estimated the ***annual yield*** from Ute Reservoir to be 24,000 acre-feet per year in all but extreme drought years. The surface water available from Ute Reservoir which based on historical data that will be available to provide the 24,000 acre-feet annually for municipal and Industrial uses is shown in Figure 5-1.

Figure 5-1. Ute Reservoir Yield



Source; Douglas Murray, OSE

The Village of Logan has decided not to participate in the ENMRWA and ENMRWS. The village will maintain its reservation by exercising its option to pay for the reservation but will defer development of the water for use by the village until demand increases.

5.2. Ground Water Resources

The Village of Logan is served by 8 wells in around Logan. *Berkstresser, et al, 1966,(ENMRWS Conceptual Report, Smith Engineering,2003) identified the water bearing formation on the north side of Ute Reservoir as the Santa Rosa Sandstone, with a total thickness of about 400 ft. Subsequent investigations have assigned the upper 140 ft. ± to the Chinle Formation (Trujillo Sandstone). Very little hydrologic data is available concerning the hydraulic conductivity of the Santa Rosa Sandstone. Berkstresser, 1966, reports a Chicago, Rock Island, and Pacific Railroad well near Logan, New Mexico (T13N, R13E, Sec. 11.3.2.2) having a specific capacity of 0.57 gpm/ft at 50 gpm. NMSEO, 2002, reports four irrigation wells on the north side of Ute Reservoir having declared water rights ranging from 1.3 AF/yr to 223 AF/yr.* The well with a right of 223 afy was owned by O.O. and Jr. Osborn, but the water rights have been purchased and transferred to the Village of Logan. *It is located in T13N, R33E, Sec. 8.2.2.4. The well is reported to be 404 ft deep. It probably penetrates all of Berkstresser's Santa Rosa Sandstone" (ENMRWS Conceptual Report, Smith Engineeering,2003).*

Table 5- 1 VILLAGE OF LOGAN MUNICIPAL WATER SUPPLY WELLS

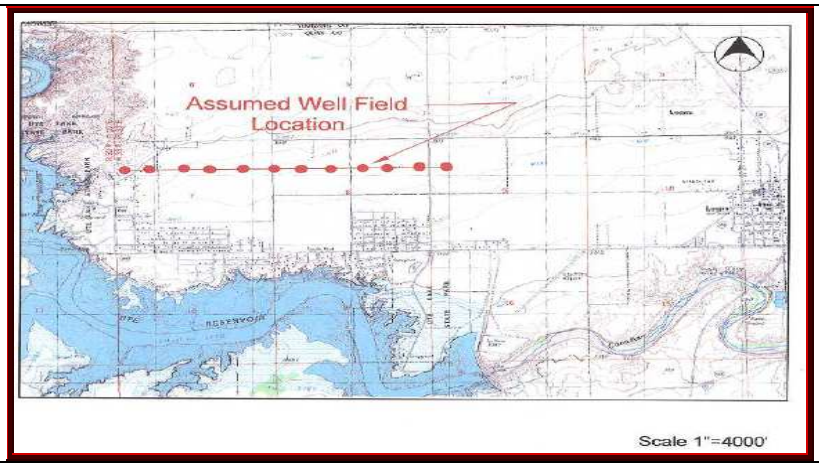
WELL DESCRIPTION	OSE PERMIT NUMBER	USE	Acre-Feet	DEPTH	CAPACITY (as listed or Permit)
Well # 1	TU01329	MUN	119	335	200
Well # 2)	TU01328	MUN	46	254	90
Well # 3	TU01326	MUN	29.8	315	100
Well # 4	TU01327	MUN	65	205	50
Well # 5	TU01325	MUN	125	290	250
Well # 6	TU01331	MUN	150	340	270
Well #7	TU01330	MUN	250	290	200
Well # 8	TU01179	IRR	223	315	100
Total Acre-Feet Declared by Logan			1007.8		
SOURCE:OFFICE OF THE STATE ENGINEER					

The Village of Logan 's water supply is drawn from an older alluvium deposit overlying Chinle and Redondo formations. The transmissivity is approximately 3000gpd/ft (Smith Engineering, Data Collection Report for ENMRWS, 1999). The Village of Logan well field is adjacent to Ute Reservoir and with the high transmissivity of the alluvium and the connection to the Reservoir suggests a natural recharge of the aquifer from Ute Reservoir. *If a 2 mile long line of wells were drilled at a location about 1 mile north of Ute Reservoir as shown on FIGURE 7-3, the capacity of the Santa Rosa Sandstone to convey water to those wells can be estimated using Darcy's Law, with the following assumption:*

- *there would be sufficient number of wells in the line to achieve an average drawdown along the line of 2/3 of the saturated thickness.*

Solving Darcy's Law yields a maximum well field capacity of 785 AF/YR (Smith Engineering,2003). This would provide an additional 785 acre-feet per year to the Village of Logan if appropriated.

Figure 5-2 Assumed Logan Well Field Location (Smith Engineering, 2003)



5.3. Water Demand

The Village of Logan annual water demand is currently about 291.06 acre-feet per year or 94.8 million gallons per year. This is the average annual production over the last 20 years. Table 5-2 shows the annual production values over the last 10 years.

Table 5-2, Municipal Water Production in acre-feet, 1995 - 2004

2004	2003	2002	2001	2000
265.38	333.60	305.64	262.03	377.13
1999	**1998**	**1997**	**1996**	**1995**
247.66	276.37	264.32	305.87	266.29
1994	**1993**	**1992**	**1991**	**1990**
268.12	231.33	225.25	214.10	256.57
1989	**1988**	**1987**	**1986**	**1985**
147.09	234.56	212.80	209.90	201.90

The average annual billings have been 79.2 million gallons or 243 acre-feet. The records of water sales by the village are not complete and there are only complete records of sales available for the past three years. The average daily use approaches 0.23 million gallons per day. The daily use during the June to August Summer months peaks at about 0.39 million gallons per day. The Village began to sell water to the Village of San Jon in July 2004 and will be the primary source of municipal water for the Village of San Jon. The highest annual production by the Village of San Jon prior to July 2004 was 66.5 acre-feet. Adding this to the highest annual production by the Village of Logan in 2000 is equal to 443.63. The Village does not monitor the well levels or

TABLE 5-3, MAJOR WATER USERS GALLONS PER MONTH

	2004	2003	2002
Village of San Jon	924,000		
Logan Municipal Schools	295500	395000	360000
Ute Lake State Park	219500	257000	218000
Autumn Blessings Retirement Home	123250	173000	112100

well yields on a regular basis. The infrequent inspections of the well levels does not show any decline in the levels.

5.3.1. Projected Populations

The Village of Logan has not prepared a Comprehensive plan. The projections for the City of Tucumcari comprehensive plan as approved were used for the Low, (1% per 5yrs) Medium (5% per 5yrs) and Fast Growth (10% per 5yrs)analysis. The Village of San Jon has also completed a Comprehensive Plan and its growth rates are 5%, 10% and 20% for the slow, medium, and fast growth scenarios respectively. The City of Tucumcari growth rates were used to provide a more conservative estimate of the anticipated growth of the Village. Of the three communities the Village of Logan has experienced continued growth over the past 10 years.

Table 5-4 Projected Population: 2000 to 2040

2000	2005	2010	2015	2020	2025	2030	2040
Census Estimates							
1094	1090	1081	1065	1041	1007	968	930
Slow Growth							
1,094	1105	1116	1127	1138	1150	1161	1173
Medium Growth							
1,094	1149	1206	1266	1330	1396	1466	1539
Fast Growth							
1,094	1203	1324	1456	1602	1762	1938	2132

City of Tucumcari Comprehensive Plan, Consensus Planning-2004

The Village of Logan has a major east –west route that goes through it, US 54. The transient population that travels through the Village is served through its hospitality and traveler services establishments are represented in the water production values stated previously. The transportation related industries within the Village have served the travelers on US 54 since Village Incorporation and its service related businesses are well established.

The low growth scenario comes from the UNM Bureau of Business and Economic Research (BBER) statewide projections for future population growth, which indicate that the Quay County population will remain static. The high growth scenario is based on evaluation of the local economic base, job trends, and potential development, comments from the regional water planning steering committee, and alternative projections (reflecting conditions that could occur if economic development activities are successful) by local governments. These growth projections indicate that demand for domestic and municipal water supply in Quay County could significantly increase in the future.

Specifically, in Quay County, the high growth projections assume that the local economy is reinvigorated. Potential future job growth could come from increasing development of water-oriented recreation at Ute Lake and Conchas Lake State Parks, revitalization of the City of Tucumcari, wind farm expansion, development of the Tucumcari Industrial Park, Trailiner Building, or Worley Mills acre park, expansion of the Tucumcari Mountain Cheese Factory, attraction of ancillary industries related to cheese or dairy, attraction of shipping enterprises, construction of a proposed railway truck terminal, expansion of the ethanol plant, and development of the North American Wind Research and Training Center (NAWRTC) at Mesalands Community College.

5.3.2. Projected Water Demand

In order to translate the population projections into future water use, the average water use rate in gallons per capita per day (gpcd) was determined. The average gpcd is 257. This gpcd amount is high compared with other communities and may be reduced through conservation measures. The Village of Logan is a recreational destination and the census numbers do not include part time or vacationing residents, Table 5-5. A ten percent reduction is equal to a gpcd of 232. The per capita use rate was then multiplied by the projected population Table 5-4 to estimate a range of future projected water demands with and without conservation measures being taken, Table 5-6. Table 5-7 shows the number of meters connected to the Village water system over the past ten years. This information shows that the Village of Logan has shown sustained growth over the past ten years.

Table 5-5, Visitors to Ute Lake State Park

Year	Number of Visitors
1993	229,007
1994	205,886
1995	273,283
1996	268,102
1997	215,422
1998	181,859
1999	177,039
2000	273,311
2001	165,000
2002**	401,000

** Traffic Counter added

Source: Village of Logan

Table 5-6, Projected Water Use (acre-feet)

	2000	2005	2010	2015	2020	2025	2030	2040
Census Estimates								
257gpcd	315	314	311	307	300	290	279	268
232gpcd	284	283	281	277	271	262	252	242
Low Growth								
257gpcd	315	318	321	324	328	331	334	338
232gpcd	284	287	290	293	296	299	302	305
Medium Growth								
257gpcd	315	331	347	364	383	402	422	443
232gpcd	284	299	313	329	346	363	381	400
Fast Growth								
257gpcd	315	346	381	419	461	507	558	614
232gpcd	284	313	344	378	416	458	504	554

Table 5-7, Number of Logan Water Meter Connections

2004	2003	2002	2001	2000
839	819	822	821	794
1999	1998	1997	1996	1995
776	768	758	706	685

The Village of Logan has the opportunity to use the sustainable water resource from the Ute Reservoir to attract new industry and jobs to the region. Projected future demand was determined with various scenarios ranging from no-growth to aggressive economic development as presented in Table 5-6.

5.4. Water Conservation Plan

An important aspect of water planning is water conservation, which allows the efficient use of existing resources. Water conservation may be defined as any beneficial reduction in water use or water losses (American Public Works Association, 1981; Prasifka, 1988). Senate Bill 554 was passed and signed into law during the 2003 regular session of the NM Legislature. Senate Bill 554 requires Municipalities Counties and other covered entities to adopt water conservation and drought management plans. This bill requires the covered entities (those who produce and supply over 500 acre-feet annually) to develop, adopt and submit to the state engineer by December 31, 2005 a comprehensive water conservation plan, including a drought management plan. The Village of Logan would not be considered a covered entity at present even with the addition of selling water to the Village of San Jon. However the Village is intending to adopt a Water Conservation Plan through a Water Conservation Ordinance.

5.4.1. Water Conservation Ordinance

The Village will be adopting an ordinance to implement a Water Conservation Plan(see Appendix H, City of Tucumcari Ordinance). The ordinance will address water rates, water waste, and many of the issues relating to water conservation. Water waste may be defined as the indiscriminate, unreasonable, or excessive running or dissipation of potable water; and non-essential water use may be defined as the indiscriminate, or excessive dissipation of potable water which is unproductive, or does not reasonably sustain economic benefits or life forms, where there is a shortage of potable water (Monterey Peninsula Water Management District, 1988). The City of Rio Rancho defines Water Waste in their ordinance as;

> *Water Waste. Water waste is the non-beneficial use of water that is supplied by any water supply system within the municipality. Non-beneficial uses of water include, but are not restricted to, the following:*
>
> 5. *Landscape water applied in such a manner, rate, or quantity that it regularly overflows the landscaped area being watered and runs onto or seeps into adjacent property or public right-of-way.*
> 6. *Landscape water that leaves a sprinkler, sprinkler system, or other application device in such a manner or direction as to spray onto adjacent property or public right-of-way.*
> 7. *Washing down of vehicles or hard surfaces such as parking lots, aprons, pads, driveways, or other surfaced areas when water is applied without shut-off hose nozzles in an excessive quantity to flow from that surface onto adjacent property or the public right-of-way.*
> 8. Fugitive water which is water that has escaped from one property onto adjacent property or the public right-of-way not including storm water runoff.

The Water Conservation Ordinances will provide for implementation and enforcement by the Village.

5.4.2. Conservation through Rate Structuring

The community has not adopted a Water Conservation Ordinance and water conservation rate pricing although the ascending rate structures of Logan may be considered conservation pricing. As the community adopts a water conservation ordinance; adjustment of water and sewer rates may be necessary. Keeping the residential and industrial rates separate will be necessary to promote economic development. In addition, based on the community's involvement and wholesale cost of water from Ute Reservoir; the community will need to address the rate pricing of the water delivered from Ute Reservoir through their system.

Table 5-8, Logan Water Rates

Gallons	Meter Size				
0	3/4"	1"	2"	4"	6"
0-4000min.	$14.25	$19.25	$26.25	$55.25	$100.00
4000-10000	$1.25	$1.25	$1.25	$1.25	$1.25
10001-20000	$1.35	$1.35	$1.35	$1.35	$1.35
20001-50000	$1.50	$1.50	$1.50	$1.50	$1.50
50000 +	$2.00	$2.00	$2.00	$2.00	$2.00

Logan Sewer Rates	Residential	Commercial	
	$7.00	Up to 5000 gallons	$7.00
		5001-25000 gallons	$0.50
		25001+	$0.25

5.4.3. Water System Management

The efficiency of the Village of Logan water delivery system has had an efficiency of greater than 90%, See Table 5-8. An efficiency rate less than 90% indicates that the Village needs to implement water management measures. The village manages its system to maintain an efficient system. The village has completed a program to replace meters within the Village with touch-read meters. This program will only improve efficiency by replacing the older possibly inaccurate meters and should improve meter reading accuracy and the overall accounting of water sales

Table 5-9, Water Efficiency (1000 gallons))

Jul/Jun	Production	Total Sales	Difference	% Efficiency
2004/2005	265.38	260.62	4.76	98%
2003/2004	333.60	314.43	19.17	94%
2002/2003	305.64	301.40	4.24	99%
			Avg.	97%

5.4.4. Metering

Metering is a very fundamental tool of water system management and conservation.

The ordinance adopted will maintain the village requirement for the installation and regular reading of meters at all water sources, including import or export points, customer service connections, and public landscape sites. All water provided free of charge for public use or general community use is metered and read at regular intervals to allow the utility to accurately account for water use.

5.5. Water Budget

For planning for future needs the available water supply must satisfy the projected demands plus a factor of safety to address unanticipated demands. The major water supply for the Village of Logan is currently from groundwater. The Village does have 400 Acre-feet reserved within Ute Reservoir which as determined by the ISC there is a 93% probability over 50 year time frame that the maximum reservation may be taken by the village.

5.5.1. Supply versus Demand

The Village's total groundwater rights are 1,007.8 acre-feet per year, and Logan has an additional 400 acre-feet per year reserved in Ute Reservoir. Average production for the Village of Logan was 291.06 acre-feet per year over the last 20 years. The maximum amount of water pumped in one year since 1985 was 377.13 acre-feet. The maximum projected demand for the Village of Logan is 614 acre-feet per year by 2040.

San Jon purchased 16 acre-feet of water from Logan in 2004; this water is delivered through a pipeline.

Water levels are not monitored by the Village of Logan, so water level data are unavailable; however, the Quay County 40-year plan notes that "infrequent inspections of the water levels do not show any decline in the levels." Changes in depth to water for those USGS monitoring wells within 4 miles of Logan are summarized in Table 5-10.

Table 5-10, Change in Water Levels in USGS Monitoring Wells Near Logan

Aquifer	Well ID	Change in Water Level		
		Amount [a] (feet)	Period of Record	
			Dates	No. of Years
Santa Rosa Sandstone	351844103254001	+12.95	1983-1998	15
	352149103264101	–24.46 –1.66 [b]	1967-1978 1967-1998	11 31
	352149103284001	+46.54	1965-1998	33
	352307103274401	–6.38 +5.00 [b]	1967-1978 1967-1998	11 31
Chinle Formation	351654103260701	+0.71	1983-1998	15
	351937103263102	+61.71	1960-1998	38
	352106103202401	+1.5	1988-1918	10

Source: Data available at http://nwis.waterdata.usgs.gov/nm/nwis/gwlevels, accessed November 21, 2005.

[a] Positive numbers signify a rise in water levels. Negative numbers signify a drop in water levels.

[b] Water level fell between 1967 and 1978, but has increased since then.

Village of Logan water supply wells are completed in the Santa Rosa Sandstone, Chinle Formation, or alluvial aquifers, but most of the water supply comes from the Santa Rosa Sandstone. USGS monitoring well data suggest that historical pumping of this aquifer has not caused a negative impact. Based on 1998 data, water levels in three of the four USGS wells completed in the Santa Rosa Sandstone show increases, while the water level in the other well has shown a 1.66-foot decline in 31 years (Table 5-10). The three monitoring wells completed in the Chinle Formation show increases from 0.71 feet in 15 years to 61.71 feet in 38 years. These water level data suggest that groundwater supplies surrounding the Village of Logan are not declining, and are adequate to meet projected demand over the next 40 years.

5.6. Water Supply Alternatives

5.6.1. Ute Reservoir Reservation

The Village has 400 acre-feet per year reserved. The Village is developing long range plans to develop this resource. The village along with the Village of San Jon may discuss with the ISC and OSE the option identified in the ENMRWS conceptual Report (Smith Engineering,2003) that the Village reservations may be taken through additional wells.

5.6.2. Wellhead Protection

The Village has initiated a wellhead protection program (WHPP) which is a planning and management approach to protect groundwater supply systems from contamination. By identifying and managing potential sources of contamination than can affect water supply wells, the Village can do a better job of protecting public water supplies. The Wellhead Protection (WHPP) Program is a pollution prevention and management program used to protect underground based sources of drinking water. The Safe Drinking Water Act defines a wellhead protection area as “the surface and subsurface area surrounding a water well or well field supplying a public water system, through which contaminants are reasonably likely to move toward and reach such water well or well field.” The primary components of a wellhead protection program are:

8) Identify roles and duties of government and public water supply agencies;
9) Delineate the wellhead protection area (WHPA) for each wellhead;
10) Identify potential sources of contamination within each WHPA;
11) Develop management methods for wellhead protection, including education and regulatory approaches;
12) Develop contingency plans for public water supply systems;
13) Provide for proper siting of new wells to minimize potential contamination; and
14) Provide for public education and participation.

The Source Water Protection area is the land around each supply well or surface water intake where spills, leaks, accidents or other forms of contamination may have a direct impact on the drinking water supply. The size of this area depends on soil type, site geology, groundwater flow rate, and on the drainage area and land use in the watershed. The susceptibility of drinking water sources to contamination is based on the number and proximity of potential threats to the water supply and an evaluation of any sanitary defects at the wellhead, intake structures, or other components of the water system.

5.6.3. Municipal Water Supply Infrastructure and Management

The water distribution system is comprised of PVC lines that radiate from the main trunk line. The system is in good condition and the Village is able to maintain the system aggressively. The Village has recently purchased the irrigation well and associated declared water rights from Mr. and Mrs. O.O. Osborn. This well and declared water rights are listed in Tables 4-1 and 6-3. The efficiency of the Village delivery System based on 2003 data is 96.55% which reflects a newer system with all water produced and delivered metered.

Over the life of the plan the system will need continual maintenance and replacement of deficient sections. The Village budgets for personnel, equipment, supplies for line maintenance as well as tank maintenance and meter installations within their annual budget. The village may pursue GIS/GPS mapping of the village with layers for water and sewer systems included to provide a management tool for managing the water and sewer infrastructure.

Table 5-11 Village of Logan Water Storage

Tanks	Capacity	Age
Harding County	167,950	1976
Smith Well	145,041	1976
Goggins Well	290,000	2000
South Shore	50,000	2004
Total	652,991	

The water storage tanks are listed in Table 5-7 which shows storage capacity of over 700 gallons per user (recommended). The growth patterns for Logan show that additional storage may be needed based on the growth scenarios Table 5-7.

The Village of Logan is experiencing growth just outside its municipal boundaries with subdivisions being developed along the South shore of Ute Lake. It is reasonable that the Village will annex the subdivision(s) in the future and will need to upgrade its water distribution sewer systems to service the subdivision(s). A new storage tank holding 50,000 gallons is being installed to serve the new subdivision.

Table 5-12, Village of Logan Future Water Storage Requirements

	2000	2010	2020	2030	2040
Slow Growth	575,400	586,966	598,764	610,799	616,907
Medium Growth	575,400	634,379	699,402	771,091	809,646
Fast Growth	575,400	696,234	842,443	1,019,356	1,121,292

5.6.4. Water Quality

The municipal water supply has continuously met all U.S. Environmental Protection Agency (EPA) and state drinking water health standards. The village vigilantly safeguards its water supplies and has never violated a maximum contaminant level or any other water quality standard. Water Quality is an important factor in developing water supply alternatives.

The water reserved within Ute Reservoir will need treatment to meet drinking water standards before it can be used. The conceptual report by Smith Engineering, 2003, on the ENMRWS has extensive information concerning the exiting water quality of Ute Reservoir and the needed treatments to meet standards. Therefore, the treatment of the Ute Lake water to meet acceptable drinking standards will be the responsibility the Village.

The Village of Logan is evaluating the extension of sewer service to the western limits of the Village. The system being considered are a conventional gravity flow system with lift stations, a Grinder Pump/Low collection system which requires a small pumping facility at each building connected to the sewer service, or a Vacuum Sewer System which requires a vacuum structure constructed at each sewer service. The option receiving most consideration is the Grinder Pump/Low Gravity System since a gravity flow system may not be appropriate due to elevation requirements and stated objections by the ISC to Pump stations adjacent to Ute Lake. A manufacturer of the vacuum system has indicated that the area being considered is not a good candidate for the Vacuum Pump System. The effluent would be transmitted to an enlarged lagoon system capable of handling the seasonal flows. The ENMRWA has approved a measure to include the Logan Sewer Project as a component of the ENMRWS for water quality preservation of Ute Reservoir. The ENMRWA will include the sewer project in its request for Federal and State funding of the ENMRWS.

5.7. Water Development Plan

5.7.1. Water Conservation Program

The success of conservation programs varies depending upon the starting point. The Village of Logan has a per-person water diversion (gpcd) of 257. The per capita water use is a representation of water diversion based on the amount of municipal water that has historically been pumped or diverted divided by population and includes system losses and water used for public facilities. The Village of Logan will strive to reduce the gpcd by 10% to 232.

5.7.1.1. Plan

The plan consists of the following activities:

- Adopt Water Conservation Ordinance by May, 31, 2006
- Public Education
- Metering
- Record-Keeping and water audits
- Leak detection
- Voluntary Water Conservation Measures

5.7.1.2. Public education

Public education will include the following: Develop, print and disseminate educational materials on Xeriscape, efficient use of water in the home, and the scarcity of the resource. These materials will be disseminated to new customers at the utility, through flyers sent with the Utility bill, in hotels, advertisements in the newspaper and in public places such as Village Hall and the community center.

5.7.1.3. Metering

Metering is an important part of the conservation program. Meters have been installed at all water sources, import or export points, customer service connections, and municipal landscape irrigation sites, including self-supplied athletic fields, golf course and parks. In addition, the Village has implemented a meter replacement program.

5.7.1.4. Record Keeping and Water Audits

Record-keeping and water audits will be performed as part of the program. The program will benchmark historical usage and track on-going consumption patterns through the billing system. The program will include monitoring and evaluation, tracking consumption by class, and adapting the program as necessary.

5.7.1.5. Leak Detection

A regular program of preventative maintenance, leak detection and repair is already underway.

5.7.1.6. Voluntary Water Conservation Measures

- Landscape or lawn watering should be limited in such a manner so as to reduce overall water usage by at least 10%.
- Landscape or lawn watering with automated sprinkler systems between the hours of 10:00 a.m. to 6:00 p.m. is discouraged. Landscape or lawn watering with manual sprinkler systems between the hours of 12:00 noon to 4:00 p.m. is discouraged.
- Watering early in the morning is recommended to avoid excess evaporation and discourage fungus growth, and lawns should be aerated to improve absorption and reduce runoff. Lawn watering should be done only when the lawn needs watering.
- Sprinkler system should be shut off when it is raining.
- Fugitive water which overflows the landscaped area being watered and leaves the property is discouraged.
- Landscape and lawn watering should be stopped when winds are strong enough to cause the water to leave the area being watered.
- Mulch should be placed around all existing plants, trees, shrubs, or flower gardens to hold moisture in the soil.
- Washing of hard surfaces, such as parking lots, driveways or sidewalks, is discouraged.
- Indoor and outdoor leaks should be repaired immediately upon discovery.
- Restaurants should be encouraged to provide water to customers only upon request.
- Hotels, motels and other lodging facilities are requested to promote water conservation by encouraging guests to minimize use of towels and not changing bed linens for multi-night stays.

- Use of fire hydrants should be limited to firefighting use and use of fire hydrants for other purposes discouraged unless metered.
- Car washing at self-serve car washes is encouraged and businesses that wash vehicles are encouraged to use high-pressure wash systems.
- Water users are encouraged to replace old plumbing fixtures with low flow fixtures, such as low flow showerheads, faucets and toilets, or retrofit existing fixtures with low flow devices, such as toilet tank dams, water-filled plastic jugs, or a brick.
- Water users are encouraged to take shorter showers; not to let the water run continuously while brushing teeth or shaving; and to flush only when necessary.
- Appliances which use water, such as dishwashers and clothes washers, should be run only with full loads.
- Evaporative coolers should be run only when needed and have a thermostat to control their operation.
- Hot water heaters should be insulated; the temperature set appropriately; and partially drained once per year.
- Outdoor open burning which requires water to be available for extinguishment is discouraged.
- Treated water bulk sales contracts shall be encouraged to be reduced or diminished by 10%.

5.7.2. Ute Lake Reservoir Development

The Village of Logan has decided not to participate in the ENMRWA and ENMRWS. The village will maintain its reservation by exercising its option to pay for the reservation. The Village has 400 acre-feet per year reserved. The Village is developing long range plans to develop this resource. The village along with the Village of San Jon may discuss with the ISC and OSE the option identified in the ENMRWS conceptual Report (Smith Engineering,2003) that the Village reservations may be taken through additional wells.

5.7.3. Water Supply Infrastructure Improvements and Management

Over the life of the plan the system will need continual maintenance and replacement of deficient sections. The Village budgets for personnel, equipment, supplies for line maintenance as well as tank maintenance and meter installations within their annual budget. The village may pursue GIS/GPS mapping of the village with layers for water and sewer systems included to provide a management tool for managing the water and sewer infrastructure. The growth patterns for Logan show that additional storage may be needed to be based on actual growth of the Village.

5.7.4. Water Rights Transfers

The purpose of this alternative is to pursue water rights transfers that would enable the Village to continue to meet demands or mitigate drought related shortages. Identifying water rights for sale, lease, or to option before the water is needed is an alternative that merits serious consideration. Addressing water rights transfers now facilitates planning and enables quick responses to water issues resulting from drought conditions. In addition, priority water rights may be established in case other entities (private or public) begin to purchase or lease water rights to supplement their water supply.

Table 8-13 lists the wells and corresponding water rights listed near the Village of Logan in the Waters Database that could present the community with an opportunity to transfer water rights for municipal purposes. The Village is in Township13N R33E.

Table 5-13, Non-Domestic/Municipal Wells

DB File Nbr	Use	Diversion	Owner	Well Number	Tws	Rng	Sec
TU 00259	IRR	13.6	MAURICE MARCHBANKS	TU 00259	13N	33E	7
TU 01003	IRR	21.54	O.O. AND MILDRED, JR O	TU 01003	13N	33E	8
TU 01271	IRR	150	DANIEL L RUBENTHALER	TU 01271	12N	34E	25
TU 01272	IRR	150	DANIEL L RUBENTHALER	TU 01272	12N	34E	25
TU 01273	IRR	150	DANIEL L RUBENTHALER	TU 01273	12N	34E	25
TU 01274	IRR	150	DANIEL L RUBENTHALER	TU 01274	12N	34E	25
TU 01275	IRR	13	DANIEL L RUBENTHALER	TU 01275	12N	34E	25
TU 01276	IRR	150	DANIEL L RUBENTHALER	TU 01276	12N	34E	25
TU 01277	IRR	150	DANIEL L RUBENTHALER	TU 01277	12N	34E	25

5.7.5. Appropriate and Reserve Groundwater

5.7.6. Desalination

The Lake Meredith Salinity Control Project is capable of producing 250 gpm of salt water (Brine) that if treated can be used for Municipal or Industrial purposes. This would eliminate the injection of the saltwater and result in a source of water. The Villages of Logan and San Jon submitted an application for Financial Assistance from Governor Richardson's water Innovation fund. The application was for the treatment of non potable brine water by using Reverse Osmosis (RO) in conjunction with pre-treatment (slow sand filtration and nano-filtration, a patented process). The intent is to provide potable water to the Villages and some rural residents of Quay County. The reject streams would be routed to solar drying beds for evaporation and harvesting of the deposited minerals. The application as submitted is included in Appendix G in its entirety. The Villages will continue to pursue funding for this project.

5.8. Summary for Village of Logan

The Village of Logan will continue to rely on groundwater for the foreseeable future through the life of the plan. The Village will implement a conservation plan and has begun the process of adopting a conservation ordinance. The goal of the Village is to reduce its production by 10% based on the gallons produced per day per capita. The Conservation ordinance and plan addresses phased implementation of water conservation measures based on drought conditions.

The city's most pressing need is to extend its Sewer system to the western reaches of the Village to eliminate Septic Tank Systems commonly used adjacent to Ute Reservoir. The Village has initiated an engineering analysis of this project and is pursuing funding to construct the additional infrastructure required.

The Village will preserve its reservation of Ute Reservoir water for economic development. The village will exercise its option for its reservation o the water with ISC. The Village will budget and initiate by 2015 a comprehensive hydrological study of its aquifer in order to determine and validate the supply and its long-term availability, more than 100 years. The study will also be used to determine the availability of unappropriated water that the Village may apply with OSE to divert to Municipal and Industrial use. The study will also be used to determine if there is a hydrological connection to Ute Reservoir through which the Village may take its reserved share of water in Ute Reservoir.

5.9. Implementation Plan

Table 5-14 shows the implementation plan for the Village of Logan.

Table 5-14, Implementation Plan

2006 (Winter/Spring)	Adopt Conservation/Drought Ordinance
2006	Implement Conservation/Drought Plan
Early 2006	With the Village of San Jon will discuss formally with OSE Water Rights Division the in-use pipeline from the Logan Water System to San Jon
2007-2046	Promote Public Awareness of and continue with conservation program with biannual reevaluations and modifications to program
2006-2046	Plan for and pursue funding for systemic replacement and upgrades to Water production and distribution system
2006-2010	Develop Sewer System extension to all residents of Village.
2006-2046	Maintain Water Management Plan and perform System Audits biannually. Maintain system efficiency greater than 93%.
2006-2015	Complete a Hydrological study of Logan Aquifer
2006-2046	Develop infrastructure to use Logan's reservation of Ute Reservoir Water for economic development
2006-2025	Continue to pursue funding for Desalination

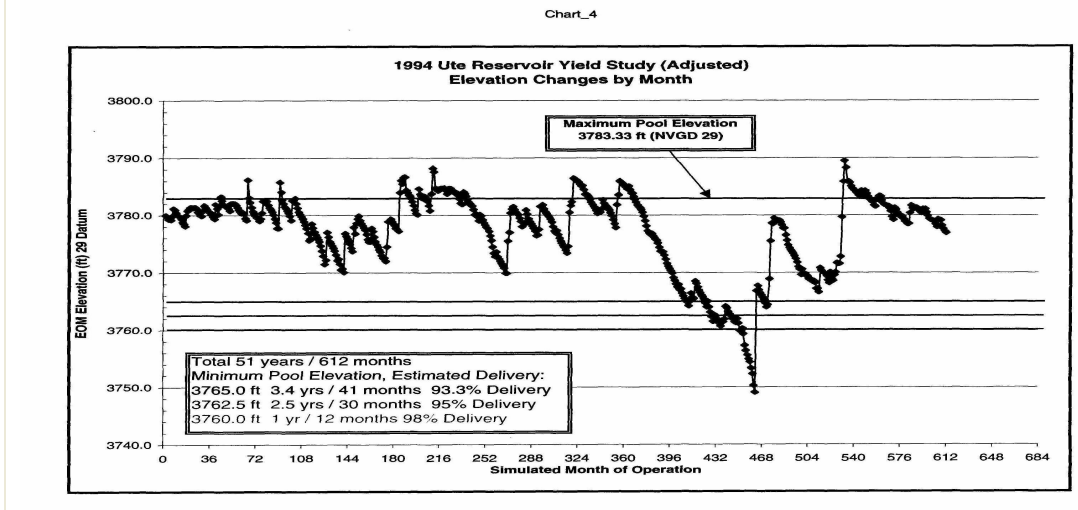
6. VILLAGE OF SAN JON

6.1. Surface Water Resources

The Village of San Jon has not used surface water to supply its municipal water system. The village through its long range plans has intended to use surface water to meet its annual water needs. The village has been a participating member of the Ute Water Commission. The Ute Water commission (UWC) was formed by Joint Powers Agreement for the purpose of contracting with the ISC for purchase of Ute Reservoir water. Participating agencies making up the UWC include the communities of Clovis, Elida, Grady, Logan, Melrose, Portales, San Jon, Texico, and Tucumcari; and the counties of Curry, Roosevelt, and Quay. The participating communities and counties have the option of maintaining their reservation by paying the annual $25.00 per acre-foot raw water cost and the $5.60 per acre-foot operation and maintenance fee for Ute Reservoir to the ISC. The Village will exercise its option to maintain its reservation by paying the annual costs to ISC. The Village of Logan has already budgeted to pay for this annualized amount.

The ENMRWA was formed subsequent to the UWC for the purpose of advanced planning, design, construction and operation of facilities to distribute treated water from Ute Reservoir to the member communities. A 1994 study by the New Mexico Interstate Streams Commission (ISC) estimated the ***annual yield*** from Ute Reservoir to be 24,000 acre-feet per year in all but extreme drought years. The surface water available from Ute Reservoir which based on historical data that will be available to provide the 24,000 acre-feet annually for municipal and Industrial uses is shown in Figure 4-1.

Figure 6-1. Ute Reservoir Yield



Source; Douglas Murray, OSE

The Village of San Jon has decided not to participate in the ENMRWA and ENMRWS. The village will maintain its reservation by exercising its option to pay for the reservation but will defer development of the water for use by the village until demand increases.

6.2. Ground Water Resources

The Village of San Jon well field near Porter draws water from shallow alluvium deposits overlying the Chinle Formation. The transmissivity of the Chinle Formation is approximately 1gpd/ft, relatively impermeable. The Village of San Jon has constructed a 6" pipeline to connect to the Village of Logan Water System.

Table 6-1 MUNICIPAL WATER SUPPLY WELLS

WELL DESCRIPTION	OSE PERMIT NUMBER	USE	Acre-Feet	DEPTH	CAPACITY (as listed on Permit)
Well # 1	TU 01209	MUN	17.7	UNKNOWN	11
Well # 2	TU 01210	MDW	16.1	UNKNOWN	10
Well # 3	TU 01211	MUN	17.7	UNKNOWN	9
Well # 4	TU 01212	MUN	16.1	UNKNOWN	10
Well # 20	TU 01217	MUN	17.7	155	11
Well # 21	TU 01213	MUN	22.6	220	14
Well # 22	TU 01214	MUN	35.5	88	35
Well # 23	TU 01215	MUN	9.2	102	8
Well # 24	TU 01216	MUN	8.0	86	7
Total Acre-Feet Declared by San Jon			160.6		

SOURCE:OFFICE OF THE STATE ENGINEER

6.3. Water Demand

Table 6-2. Municipal Water Demand in acre-feet, 1994-2003

2004	2003	2002	2001	2000
52.87	64.51	60.70	58.75	66.62
1999	**1998**	**1997**	**1996**	**1995**
55.61	64.19	63.77	48.97	58.20

The Village of San Jon annual average water demand is currently about 58.8 acre-feet per year or 19.1 million gallons. This is the average annual usage over the last 10 years, records beyond ten years were not complete and not used. The village did not meter the production from its wells so Table 6-2 reflects average amount pumped through the storage tanks over the 10 years. The average daily use approaches 0.05 million gallons per day. The daily use during the June to August Summer months peaks at about 0.08 million gallons per day. There are no users of the San Jon system that use over 50,000 gallons per day. Table 6-3 shows the major users and the amount used per month in 2004. The Village does not meter the production of its wells. The Village does not have well yield or well level information available. With water being obtained from the Village of Logan the water delivered to the San Jon Trunk Line is being metered and the Village of San Jon will be able to use this as the basis for its Water Management plan.

Table 6-3 Major Users (gallons per month)	
San Jon Public Schools	270,700
Drivers Travel Mart	161,900
Kendrick Oil Co.	132,900
San Jon Motel	88,000
Gerald White	65,870

6.3.1. Projected Populations

The Village of San Jon has prepared a Comprehensive plan (Consensus Planning, 2004). The projections for the Village of San Jon comprehensive plan as approved were used for the Low (5% per 5yrs), Medium (10% per 5yrs) and Fast Growth (20% per 5yrs) analysis. The census estimate for 2000-2040 was estimated for this report using the trend information from the BBER report (August 2002).

The transient population that travels through San Jon is served through its hospitality and traveler services establishments are represented in the water production values stated previously. The transportation related industries within the Village have served the travelers on US66/Interstate 40 since the 1920's and its service related businesses are well established. There is not a seasonal change in population except that the flow of traffic on the Highway system may vary due to vacation and holiday travel demands.

Table 6-4 Projected Population: 2000 to 2040							
2000	2005	2010	2015	2020	2025	2030	2040
Declining Population*							
306	297	288	279	271	263	255	247
Slow Growth**							
306	321	337	354	372	391	410	431
Medium Growth**							
306	337	370	407	448	493	542	596
Fast Growth**							
306	367	441	529	635	761	914	1097
*Source: Village of San Jon Comprehensive Plan, Consensus Planning-2004							

The low growth scenario comes from the UNM Bureau of Business and Economic Research (BBER) statewide projections for future population growth, which indicate that the Quay County population will remain static. The high growth scenario is based on evaluation of the local economic base, job trends, and potential development, comments from the regional water planning steering committee, and alternative projections (reflecting conditions that could occur if economic development activities are successful) by local governments. These growth projections indicate that demand for domestic and municipal water supply in Quay County could significantly increase in the future.

Specifically, in Quay County, the high growth projections assume that the local economy is reinvigorated. Potential future job growth could come from increasing development of water-oriented recreation at Ute Lake and Conchas Lake State Parks, revitalization of the City of Tucumcari, wind farm expansion, development of the Tucumcari Industrial Park, Trailiner Building, or Worley Mills acre park, expansion of the Tucumcari Mountain Cheese Factory, attraction of ancillary industries related to cheese or dairy, attraction of shipping enterprises, construction of a proposed railway truck terminal, expansion of the ethanol plant, and development of the North American Wind Research and Training Center (NAWRTC) at Mesalands Community College.

6.3.2. Projected Water Demand

In order to translate the population projections into future water use, the average water use rate in gallons per capita per day (gpcd) was determined. The average gpcd is 188. This gpcd amount is comparable with other communities and may be reduced through conservation measures. A ten percent reduction is equal to a gpcd of 170. The per capita use rate was then multiplied by the projected population Table 6-4 to estimate a range of future projected water demands with and without conservation measures being taken, Table 6-5.

The Village of San Jon has the opportunity to use the sustainable water resource from the Ute Reservoir to attract new industry and jobs to the region. Projected future demand was determined with various scenarios ranging from no-growth to aggressive economic development as presented in Table 6-5.

Table 6-5 Projected Water Use (acre-feet)

	2000	2005	2010	2015	2020	2025	2030	2040
Declining Population								
188gpcd	64	63	61	59	57	55	54	52
170gpcd	58	63	61	59	57	55	54	52
Low Growth								
188gpcd	64	68	71	75	78	82	86	91
170gpcd	58	61	64	67	71	74	78	82
Medium Growth								
188gpcd	64	71	78	86	94	104	114	126
170gpcd	58	64	70	78	85	94	103	114
Fast Growth								
188gpcd	64	77	93	111	134	160	192	231
170gpcd	58	70	84	101	121	145	174	209

6.4. Water Conservation Plan

An important aspect of water planning is water conservation, which allows the efficient use of existing resources. Water conservation may be defined as any beneficial reduction in water use or water losses (American Public Works Association, 1981; Prasifka, 1988). Senate Bill 554 was passed and signed into law during the 2003 regular session of the NM Legislature. Senate Bill 554 requires Municipalities Counties and other covered entities to adopt water conservation and drought management plans. This bill requires the covered entities (those who produce and supply over 500 acre-feet annually) to develop, adopt and submit to the state engineer by December 31, 2005 a comprehensive water conservation plan, including a drought management plan. The Village of San Jon would is not considered a covered entity at present nor through the life of this plan.

6.4.1. Water Conservation Ordinance

The Village will be adopting an ordinance to implement a Water Conservation Plan (see Appendix H for draft). The ordinance will address water rates, water waste, and many of the issues relating to water conservation. Water waste may be defined as the indiscriminate,

unreasonable, or excessive running or dissipation of potable water; and non-essential water use may be defined as the indiscriminate, or excessive dissipation of potable water which is unproductive, or does not reasonably sustain economic benefits or life forms, where there is a shortage of potable water (Monterey Peninsula Water Management District, 1988). The City of Rio Rancho defines Water Waste in their ordinance as;

> *Water Waste. Water waste is the non-beneficial use of water that is supplied by any water supply system within the municipality. Non-beneficial uses of water include, but are not restricted to, the following:*
>
> 9. *Landscape water applied in such a manner, rate, or quantity that it regularly overflows the landscaped area being watered and runs onto or seeps into adjacent property or public right-of-way.*
> 10. *Landscape water that leaves a sprinkler, sprinkler system, or other application device in such a manner or direction as to spray onto adjacent property or public right-of-way.*
> 11. *Washing down of vehicles or hard surfaces such as parking lots, aprons, pads, driveways, or other surfaced areas when water is applied without shut-off hose nozzles in an excessive quantity to flow from that surface onto adjacent property or the public right-of-way.*
> 12. Fugitive water which is water that has escaped from one property onto adjacent property or the public right-of-way not including storm water runoff.

The Water Conservation Ordinances will provide for implementation and enforcement by the Village.

6.4.2. Conservation through Rate Structuring

The Village of San Jon has an ascending block rate structure with a minimum fee for the first 3000. The Village of San Jon's rates are adequate to cover operational costs and administrative costs for its water and sewer systems. The village routinely reviews its rates structure to determine its adequacy to provide adequate revenue to cover operational and administrative costs. The village monitors system performance to assure that the system is efficient and that the costs incurred and rate structure adopted are necessary to provide the users with the expected level of service at the most economical cost.

Table 6-6 Existing Rates

San Jon Water Rates		San Jon Sewer Rates	
Gallons	**Rates**	**Residential**	**$12.00**
		Commercial	**$14.00 +$2.25/gal**
0-2999 min.	**$11.00**	**Septic Tank Dumping Rate**	**25.00 +$3.00/gal**
3000-12999	**$2.00**		

13000-22999	$2.25
23000-99999	$2.75
100000 +	$3.25

The community has not adopted a Water Conservation Ordinance and water conservation rate pricing although the ascending rate structures may be considered conservation pricing. As the community adopts a water conservation ordinance; adjustment of water and sewer rates may be necessary. Keeping the residential and industrial rates separate will be necessary to promote economic development. In addition, based on the community's involvement and wholesale cost of water from Ute Reservoir; the community will need to address the rate pricing of the water delivered from Ute Reservoir through their system.

6.4.3. Water System Management

The efficiency of the Village of San Jon water delivery system has not been determined. An efficiency rate less than 90% indicates that the Village needs to implement water management measures. The village has not metered all water production and deliveries in the past to determine efficiency. The Village will perform a full system audit to determine how efficient a system it has and what steps need to be taken. Table 6-7 shows an estimated efficiency for 2004 from the information available.

Table 6-7, Unaccounted for Municipal Losses

2004 Well System Production (ac-ft)	2004 Metered (sold) Water (ac-ft)	Loss	
		ac-ft	%
63 *	53	10	16

*** Total produced from San Jon wells (47 acre-feet) plus amount purchased from Logan (16 acre-feet).**

The recommended steps are to perform a system audit which involves identifying all sources of system inefficiency, water loss, revenue loss, and initiate plans to reduce waste and improve system efficiency, after a series of tests and calculations, designed to balance the water supplied to a system, with the water legitimately used. The audit should include;

- Review of distribution system and maps
- Collecting source and service meter records for the review period
- Water produced and calculating how much water entered and left the system during the review period
- Meter water sales
- Estimated and unmetered water uses
- Testing meters for accuracy
- Estimating the volume and cost of unaccounted-for water
- Review of existing monitoring procedures
- Estimated system losses
- Review of existing pertinent projects in execution
- Analyzing the data and developing an action plan

The benefits to the Village of performing a water audit will include;

- Water loss reduction and consequent cost reduction (electrical energy, chemical products, etc.)

- Increased income with the detection of consumers that are not being billed or are being billed incorrectly
- Improved knowledge of the operating system
- Optimization of supply sources thus postponing investment in new units
- Improved public relationship
- Reduction of risks to private properties
- Reduction in illegal connections

6.4.4. Metering

Metering is a very fundamental tool of water system management and conservation. The ordinance adopted will require for the installation and regular reading of meters at all water sources, including import or export points, customer service connections, and public landscape sites. All water provided free of charge for public use or general community use is metered and read at regular intervals to allow the utility to accurately account for water use.

6.5. Water Budget

For planning for future needs the available water supply must satisfy the projected demands plus a factor of safety to address unanticipated demands. The major water supply for the Village of San Jon is currently from groundwater. The Village does have 150 Acre-feet reserved within Ute Reservoir which as determined by the ISC there is a 93% probability over 50 year time frame that the maximum reservation may be taken by the village. The Village of San Jon is currently purchasing all of its water from the Village of Logan, since July 2004.

6.5.1. Supply versus Demand

The Village of San Jon is partially supplied by groundwater pumped from wells near Porter that are completed in alluvial deposits overlying the Chinle Formation. Total groundwater rights are 163.6 acre-feet per year, and San Jon has an additional 150 acre-feet per year reserved in Ute Reservoir. Average production for the Village of San Jon was 58.8 acre-feet per year over the last 10 years (records beyond 10 years were incomplete and were not used in the average). The maximum amount of water pumped in one year since 1985 was 66.44 acre-feet. The maximum projected demand for the Village of San Jon is 231 acre-feet per year by 2040.

In 2004, the Village of San Jon purchased 16 acre-feet of water from the Village of Logan; this water is delivered through a pipeline from Logan to San Jon.

Village of San Jon water supply wells are completed in the alluvial aquifer or the Chinle Formation. Water levels are not monitored by the Village of San Jon, and so water level data for municipal wells are unavailable. Water level data for all USGS monitoring wells within 4 miles of San Jon are summarized in Table 5.

Table 6-8 Change in Water Levels in USGS Monitoring Wells Near San Jon

Aquifer	Well ID	Change in Water Level		
		Amount [a] (feet)	Period of Record	
			Dates	No. of Years
Alluvium	350303103212301	–6.25	1988-2003	15
	350347103173001	–1.43	1988-1998	10
	350808103224701	–2.44	1988-2003	15
	350833103230101	–6.66	1988-2003	15
Chinle Formation	350821103184201	–5.23	1988-1998	10

Source: Data available at http://nwis.waterdata.usgs.gov/nm/nwis/gwlevels, accessed November 21, 2005.

[a] Positive numbers signify a rise in water levels. Negative numbers signify a drop in water levels.

USGS monitoring well water levels show declines in all four wells completed in the alluvial aquifer, as well as in the one well completed in the Chinle Formation. For the alluvial aquifer these declines ranged from 1.43 feet in 10 years to 6.66 feet in 15 years wells in the Chinle Formation declined 5.23 feet in 10 years. These data suggest that historical pumping has impacted water levels in both the alluvial aquifer (the source of supply for the Village of San Jon) and the Chinle Formation.

The Village of San Jon began purchasing water from the Village of Logan in 2004, and during that year purchased 27 percent of the 10-year average production (16 acre-feet). The continued purchase of water from the Village of Logan will reduce the amount of water pumped from the alluvial aquifer, reducing the rate of drawdown and prolonging the aquifer's life. While groundwater levels in the wells surrounding the Village of Logan are declining, the slow rate of decline (at a maximum of less than 6 inches per year) combined with the continued purchase of water from the Village of Logan suggests that the water supply will be adequate to meet projected demand over the next 40 years.

6.6. Water Supply Alternatives

6.6.1. Ute Reservoir Reservation

The Village has 150 acre-feet per year reserved. The Village is developing long range plans to develop this resource. The village in cooperation with the Village of Logan may discuss with the ISC and OSE the option identified in the ENMRWS conceptual Report (Smith Engineering,2003) that the Village of Logan reservations may be taken through additional wells.

6.6.2. Wellhead Protection

The Village has initiated a wellhead protection program (WHPP) which is a planning and management approach to protect groundwater supply systems from contamination. By identifying and managing potential sources of contamination than can affect water supply wells, the Village can do a better job of protecting public water supplies. The Wellhead Protection (WHPP) Program is a pollution prevention and management program used to protect underground based sources of drinking water. The Safe Drinking Water Act defines a wellhead protection area as "the surface and subsurface area surrounding a water well or well field supplying a public water system, through which contaminants are reasonably likely to move toward and reach such water well or well field." The primary components of a wellhead protection program are:

- Identify roles and duties of government and public water supply agencies;
- Delineate the wellhead protection area (WHPA) for each wellhead;
- Identify potential sources of contamination within each WHPA;
- Develop management methods for wellhead protection, including education and regulatory approaches;
- Develop contingency plans for public water supply systems;
- Provide for proper siting of new wells to minimize potential contamination; and
- Provide for public education and participation.

The Source Water Protection area is the land around each supply well or surface water intake where spills, leaks, accidents or other forms of contamination may have a direct impact on the drinking water supply. The size of this area depends on soil type, site geology, groundwater flow rate, and on the drainage area and land use in the watershed. The susceptibility of drinking water sources to contamination is based on the number and proximity of potential threats to the water supply and an evaluation of any sanitary defects at the wellhead, intake structures, or other components of the water system.

6.6.3. Municipal Water Supply Infrastructure and Management

The Village of San Jon has completed a project to construct a six (6) inch main trunk line to tie into the Village of Logan Water System. This provides the Village of San Jon with a new source of municipal water rather than the source that they have historically used. The Village of San Jon has relied on nine wells to supply the village. The capacity of the wells ranged from 7gallons per minute to 35 gallons per minute. The village will maintain its well field for use in case there is an interruption in flow from the Logan Water System.

The project installed a 6" High Density Polyethylene Pipe from the existing 250,000 Gallon storage tank on Quay county Road 67 west along CR 67, north adjacent to CR T, west adjacent to NM 469 including a bridge crossing of Revuelto Creek and crossing of US 54, and west adjacent to old NM 552 to tie into the Logan Village water system. The project includes

Table 6-9, Village of San Jon Water Storage

Tanks	Capacity	Age
Village Tank-Elevated	100,000	1976
5 miles N. on NM469	250,000	1993

Booster Pumps Tank	**75,000**	**1956**
Logan Tank	**250,000**	**2002**
Total	**675,000**	

construction of a surge tank and booster station near the intersection of NM469 and CR T. This project will provide the Village of San Jon with an adequate water supply over the 40 year life of the plan.

The Village water system is comprised of nine wells, a treatment unit with reverse osmosis and liquid chlorinating systems, four storage tanks (Table 8-25), two booster pumps and distribution system. The Storage capacity is adequate for now and the future including an aggressive growth scenario. The village also has the new trunk line which is connected to the Village of Logan Water System and an additional booster station. The distribution system is composed of a mix of PVC, Ductile Iron, Galvanized Steel, and Asbestos Concrete distribution lines and 40% HDPE/60% Copper service lines. Thirty percent (30%) of the distribution lines and sixty percent (60%) of the service lines have been in place for over 25 years. The village will continue upgrading the distribution and service lines initially concentrating on the AC lines.

6.6.4. Water Quality

The municipal water supply has continuously met all U.S. Environmental Protection Agency (EPA) and state drinking water health standards. The village vigilantly safeguards its water supplies and has never violated a maximum contaminant level or any other water quality standard. Water Quality is an important factor in developing water supply alternatives.

The water reserved within Ute Reservoir will need treatment to meet drinking water standards before it can be used. The conceptual report by Smith Engineering, 2003, on the ENMRWS has extensive information concerning the exiting water quality of Ute Reservoir and the needed treatments to meet standards. Therefore, the treatment of the Ute Lake water to meet acceptable drinking standards will be the responsibility the Village.

6.7. Water Development Plan

6.7.1. Water Conservation Program

The success of conservation programs varies depending upon the starting point. The Village of San Jon has a per-person water consumption (gpcd) of 188. The per capita water use is a representation of water use based on the amount of municipal water that has historically been pumped or diverted divided by population and includes system losses and water used for public facilities. The Village of San Jon will strive to reduce the gpcd by 10% to 170 through the life of this plan by means of a voluntary water conservation plan. The Village of San Jon will attempt to reduce consumption through a voluntary program aimed at eliminating water losses.

6.7.1.1. Plan

The plan consists of the following activities:

- Public Education
- Metering
- Record-Keeping and water audits
- Voluntary Water Conservation Measures

6.7.1.2. Public education

Public education will include the following: Develop, print and disseminate educational materials on Xeriscape, efficient use of water in the home, and the scarcity of the resource. These materials will be disseminated to new customers at the utility, through flyers sent with the Utility bill, and in public places such as Village Hall.

6.7.1.3. Metering

Metering is an important part of the conservation program. Meters have not been installed at all water sources, import or export points, customer service connections, and municipal landscape irrigation sites, including self-supplied athletic fields, golf course and parks. The City will install meters at all locations by the July 1, 2006. In addition, the city will implement a meter replacement program.

6.7.1.4. Record Keeping and Water Audits

Record-keeping and water audits will be performed as part of the program. The program will benchmark historical usage and track ongoing consumption patterns through the billing system. The program will include monitoring and evaluation, tracking consumption by class, and adapting the program as necessary.

6.7.1.5. Voluntary Water Conservation Measures

- Landscape or lawn watering should be limited in such a manner so as to reduce overall water usage by at least 10%.
- Landscape or lawn watering with automated sprinkler systems between the hours of 10:00 a.m. to 6:00 p.m. is discouraged. Landscape or lawn watering with manual sprinkler systems between the hours of 12:00 noon to 4:00 p.m. is discouraged.
- Watering early in the morning is recommended to avoid excess evaporation and discourage fungus growth, and lawns should be aerated to improve absorption and reduce runoff. Lawn watering should be done only when the lawn needs watering.
- Sprinkler system should be shut off when it is raining.
- Fugitive water which overflows the landscaped area being watered and leaves the property is discouraged.
- Landscape and lawn watering should be stopped when winds are strong enough to cause the water to leave the area being watered.
- Mulch should be placed around all existing plants, trees, shrubs, or flower gardens to hold moisture in the soil.
- Washing of hard surfaces, such as parking lots, driveways or sidewalks, is discouraged.
- Indoor and outdoor leaks should be repaired immediately upon discovery.
- Restaurants should be encouraged to provide water to customers only upon request.
- Hotels, motels and other lodging facilities are requested to promote water conservation by encouraging guests to minimize use of towels and not changing bed linens for multi-night stays.
- Use of fire hydrants should be limited to firefighting use and use of fire hydrants for other purposes discouraged unless metered.
- Car washing at self-serve car washes is encouraged and businesses that wash vehicles are encouraged to use high-pressure wash systems.

- Water users are encouraged to replace old plumbing fixtures with low flow fixtures, such as low flow showerheads, faucets and toilets, or retrofit existing fixtures with low flow devices, such as toilet tank dams, water-filled plastic jugs, or a brick.
- Water users are encouraged to take shorter showers; not to let the water run continuously while brushing teeth or shaving; and to flush only when necessary.
- Appliances which use water, such as dishwashers and clothes washers, should be run only with full loads.
- Evaporative coolers should be run only when needed and have a thermostat to control their operation.
- Hot water heaters should be insulated; the temperature set appropriately; and partially drained once per year.
- Outdoor open burning which requires water to be available for extinguishment is discouraged.
- Treated water bulk sales contracts shall be encouraged to be reduced or diminished by 10%.

6.7.2. Ute Lake Reservoir Development

The Village of San Jon has decided not to participate in the ENMRWA and ENMRWS. The village will maintain its reservation by exercising its option to pay for the reservation. The Village has 150 acre-feet per year reserved. The Village is developing long range plans to develop this resource. The village along with the Village of Logan may discuss with the ISC and OSE the option identified in the ENMRWS conceptual Report (Smith Engineering,2003) that the Village reservations may be taken through additional wells.

6.7.3. Water Supply Infrastructure Improvements and Management

Thirty percent (30%) of the distribution lines and sixty percent (60%) of the service lines have been in place for over 25 years. The village will continue upgrading the distribution and service lines initially concentrating on the AC lines. Over the life of the plan the system will need continual maintenance and replacement of deficient sections.

The village will install meters to measure all water produced or purchased as well as all service connections including Village connections. The village did not replace meters at production wells recently due to the Logan connection project and the efficiency of the system at this time is indeterminate. The Village needs to perform a Water System Audit to assure that the system is efficient and to determine losses. The Village intends to pursue GIS mapping of the village in 2007 and layers for water and sewer system need to be include to provide a management tool for managing the water and sewer infrastructure.

The Village plans to rebuild the Wastewater treatment plant in 2008. The village also will maintain the village tanks aggressively to assure cleanliness, operability and to prevent corrosion. Tank cleaning and repainting for is scheduled for 2005 (2 tanks) and 2008 (1tank) and approximately every three years dependant on condition and need.

6.7.4. Water Rights Transfers

The purpose of this alternative is to pursue water rights transfers that would enable the Village to continue to meet demands or mitigate drought related shortages. Identifying water rights for sale, lease, or to option before the water is needed is an alternative that merits serious

consideration. Addressing water rights transfers now facilitates planning and enables quick responses to water issues resulting from drought conditions. In addition, priority water rights may be established in case other entities (private or public) begin to purchase or lease water rights to supplement their water supply.

6.7.5. Desalination

The Lake Meredith Salinity Control Project is capable of producing 250 gpm of salt water (Brine) that if treated can be used for Municipal or Industrial purposes. This would eliminate the injection of the saltwater and result in a source of water. The Villages of Logan and San Jon submitted an application for Financial Assistance from Governor Richardson's water Innovation fund. The application was for the treatment of non potable brine water by using Reverse Osmosis (RO) in conjunction with pre-treatment (slow sand filtration and nano filtration, a patented process). The intent is to provide potable water to the Villages and some rural residents of Quay County. The reject streams would be routed to solar drying beds for evaporation and harvesting of the deposited minerals. The application as submitted is included in Appendix G in its entirety. The Villages will continue to pursue funding for this project in cooperation with the Lake Meredith Salinity Control Project.

6.8. Summary for Village of San Jon

The Village of San Jon will continue to rely on groundwater for the foreseeable future through the life of the plan. The Village has connected to the Village of Logan Water System and will continue to obtain the bulk of their water from Logan. The Village will maintain its well field as backup to the Village. The Village will implement a voluntary conservation plan and but does not plan to adopt a conservation ordinance. The goal of the Village is to reduce its production by 10% based on the gallons produced per day per capita.

The Village's most pressing need is to replace its older trunk and distribution lines. The Village also needs to place meters on all water connections. The Village is pursuing funding to construct the additional infrastructure required.

The Village will preserve its reservation of Ute Reservoir water and will exercise its option with the ISC. The Village will work in partnership with the Village of Logan to develop the needed infrastructure to utilize its reservation over the life of this plan. The Village will cooperate with the Village of Logan budget in the Village of Logan's plan to initiate by 2015 a comprehensive hydrological study of its aquifer in order to determine and validate the supply and its long-term availability, more than 100 years. The study will also be used to determine the availability of unappropriated water that the Village of San Jon may apply with the Village of Logan with ISC/OSE to divert to Municipal and Industrial use. The study will also be used to determine if there is a hydrological connection to Ute Reservoir through which the Village may take its reserved share of water in Ute Reservoir.

6.9. Implementation Plan

Table 6-9 shows the implementation plan for the Village of San Jon.

Table 6-10, Implementation Plan	
2006	**Implement Conservation/Drought Plan**
Early 2006	**With the Village of Logan will discuss formally with OSE Water Rights Division the in-use pipeline from the Logan Water System to San Jon**
2007-2046	**Promote Public Awareness of and continue with conservation program with biannual reevaluations and modifications to program**
2006-2046	**Plan for and pursue funding for systemic replacement and upgrades to Water production and distribution system**
2006-2046	**Develop and maintain Water Management Plan and perform System Audits biannually. Improve system efficiency to greater than 91% plus.**
2006-2015	**Participate with the Village of Logan on an Hydrological study of Logan Aquifer**
2006-2046	**Develop infrastructure to use San Jon's reservation of Ute Reservoir Water for economic development**

7. VILLAGE OF HOUSE

7.1. Surface Water Resources

The Village of House does not rely on Surface Water for its municipal supply.

7.2. Ground Water Resources

The Village of House draws its water from the Ogallala formation and the aquifer is approximately 50-100 feet thick. The well yield is approximately 400 gallons per minute. There are two USGS monitoring wells in the vicinity of the Village of House well. The sites are shown in Figure 7-1. The information show that the level in the monitoring wells has not declined due to municipal, domestic and irrigation pumping. The level of the monitoring well near House shows the water level higher in 2004 than in1968 by 0.39 feet. There are 73 wells declared in Township 5N Range 29E, which is the Township where the House well is located. The declared water rights for Township 5N Range 29 E is equal to 4652 acre-feet and the Village of House has 250 acre-feet declared or 5.37% of the water rights within the township.

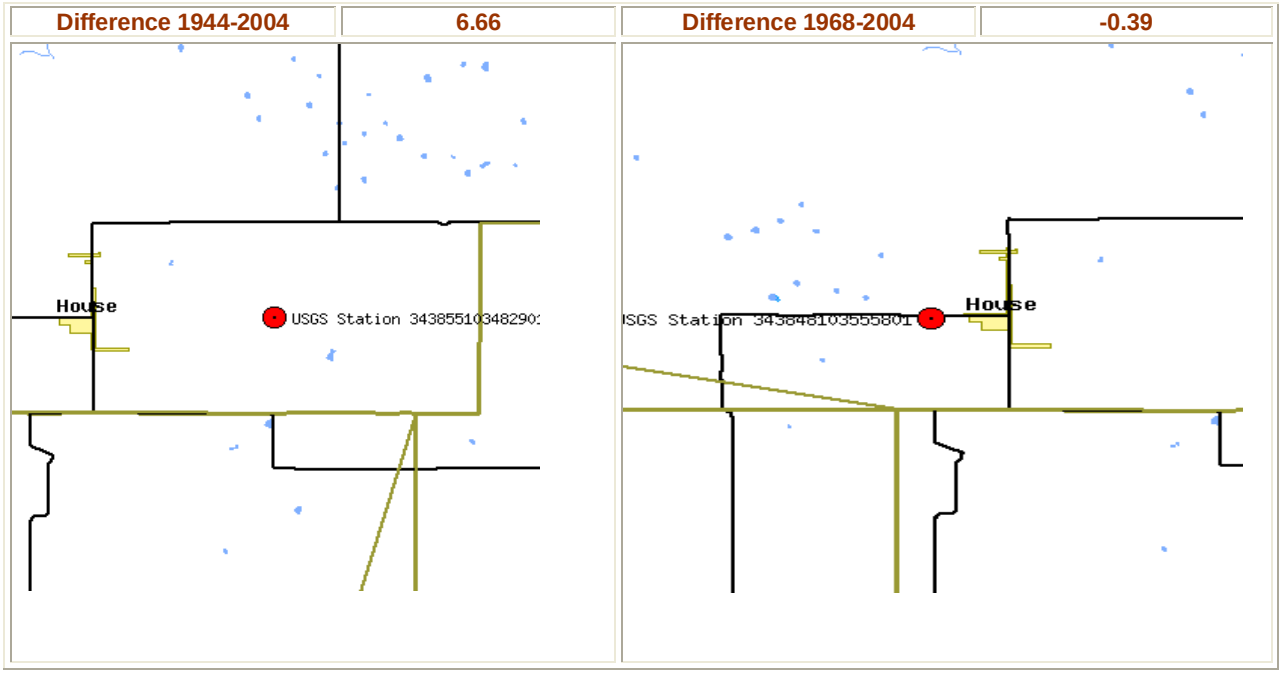
Table 7-1 MUNICIPAL WATER SUPPLY WELLS

WELL DESCRIPTION	OSE PERMIT NUMBER	USE	Acre-Feet	DEPTH	CAPACITY (as listed on Permit)
Well # 1	FS-1129	Mun	250	110	400
Old Well	none				
Fire Dept. Well	none				

SOURCE:OFFICE OF THE STATE ENGINEER

Figure 7-1. USGS Monitoring Wells near House

USGS 343855103482901 05N.30E.18.331311		USGS 343848103555801 05N.28E.23.222232	
Quay County, New Mexico		Quay County, New Mexico	
Latitude 34°38'55", Longitude 103°48'29" NAD27		Latitude 34°38'48", Longitude 103°55'58" NAD27	
Gage datum 4,634.20 feet above sea level NGVD29		Gage datum 4,788.00 feet above sea level NGVD29	
The depth of the well is 78 feet below land surface.		The depth of the well is 93.5 feet below land surface.	
This well is completed in OGALLALA FORMATION (121OGLL)		This well is completed in OGALLALA FORMATION (121OGLL)	
Date	**Water level, feet below land surface**	**Date**	**Water level, feet below land surface**
5/18/1944	39.08	1/26/1968	76.29
Minimum 3/28/1946	34.76	Minimum 12/17/1996	73.59
Average 1944-2004	43.77	Average 1968-2004	74.83
Maximum 9/25/1952	54.46	Maximum 2/18/1972	84.22
1/10/2004	45.74	1/10/2004	75.9



The water rights declared in the Fort Sumner Basin within Quay County is equal to 17091 acre-feet; 854 for Municipal/Domestic and 16237 for irrigation. The OSE reported in the 2000 Water Use Report (Wilson and Lucero) that the total groundwater withdrawal in the Fort Sumner Basin for Public/Domestic Water use was 29.16acre-feet and for irrigated agriculture was 6546 acre-feet. The Village of House diverts only a small percentage of the water pumped within the Quay County portion of the Fort Sumner Basin with the majority of water use for irrigated agriculture. There is a significant difference between the water rights declared and the amount of water withdrawn.

7.3 Water Demand

The Village of House annual average water production over the past 11 years is 17.22 acre-feet per year or 5.6 million gallons per year. The village consumption through the water system has increased as more of the Village residents have moved from domestic wells to the Village system. The daily use during the June to August Summer months peaks at about 0.03 million gallons per day. Table 7-2 shows the amount of water diverted and Table 7-4 shows the amount sold through the House Water System from 1994 to 2004. Prior to 1994 residents were still being connected to the system so the production was markedly less than after 1994.

Table 7-2, Water Production (acre-feet)

	Produced
2004	20.69
2003	37.94
2002	24.2
2001	21.09
2000	13.86
1999	12.96
1998	10.47
1997	10.38
1996	11.15
1995	13.79
1994	12.89

Table 7-3, Major Users (gallons per month)

House Public Schools	78,774
Village Park	57,272

There are no users of the House system that use over 50,000 gallons per day. Table 7-4 shows the major users and the average amount used per month from 2002 to 2004.

Table 7-4, Water Sales (acre-feet)

	Commercial	Residential	Other Sales	Total Sales
2004	7.07	7.83	0	14.89
2003	7.42	8.57	21.71	37.7
2002	6.7	9.1	8.39	24.2
2001	9.86	6.31	5	21.18
2000	4.06	6.49	3.12	13.66
1999	2.61	6.69	3.65	12.96
1998	3.29	5.75	1.43	10.47
1997	3.04	5.03	2.14	10.21
1996	2.96	7.5	0.74	11.2
1995	5.98	6.53	2.15	14.66
1994	6.61	6.18	0.65	13.44

7.3.1. Projected Population

The Village of House has prepared a Comprehensive plan (Consensus Planning, 2004). The projections for the Village of House comprehensive plan as approved were used for the Low (1% per 5yrs), Medium (5% per 5yrs) and Fast Growth (10% per 5yrs) analysis. The census estimate for 2000-2040 was estimated for this report using the trend information from the BBER report (August 2002).

Table 7-5, Projected Population: 2000 to 2040

2000	2005	2010	2015	2020	2025	2030	2040
Declining Population*							
72	69	65	62	58	55	52	47
Slow Growth**							
72	76	79	83	87	92	96	106
Medium Growth**							
72	79	86	95	104	114	124	149
Fast Growth**							
72	83	94	108	122	140	158	205

***Source: Village of House Comprehensive Plan, Consensus Planning-2004**

The low growth scenario comes from the UNM Bureau of Business and Economic Research (BBER) statewide projections for future population growth, which indicate that the Quay County population will remain static. The high growth scenario is based on evaluation of the local economic base, job trends, and potential development, comments from the regional water planning steering committee, and alternative projections (reflecting conditions that could occur if economic development activities are successful) by local governments. These growth projections indicate that demand for domestic and municipal water supply in Quay County could significantly increase in the future.

Specifically, in Quay County, the high growth projections assume that the local economy is reinvigorated. Potential future job growth could come from increasing development of water-oriented recreation at Ute Lake and Conchas Lake State Parks, revitalization of the City of Tucumcari, wind farm expansion, development of the Tucumcari Industrial Park, Trailiner

Building, or Worley Mills acre park, expansion of the Tucumcari Mountain Cheese Factory, attraction of ancillary industries related to cheese or dairy, attraction of shipping enterprises, construction of a proposed railway truck terminal, expansion of the ethanol plant, and development of the North American Wind Research and Training Center (NAWRTC) at Mesalands Community College.

7.3.2. Projected Water Demand

In order to translate the population projections into future water diversion, the average rate of diversion in gallons per capita per day (gpcd) was determined. The average gpcd is 207. This gpcd amount is comparable with other communities and may be reduced through conservation measures. A ten percent reduction is equal to a gpcd of 186. The per capita diversion rate was then multiplied by the projected population Table 7-5 to estimate a range of future projected water demands with and without conservation measures being taken, Table 7-6. Projected future demand was determined with various scenarios ranging from no-growth to aggressive economic development as presented in Table 7-6.

Table 7-6, Projected Water Diversion (acre-feet)

	2000	2005	2010	2015	2020	2025	2030	2040
Declining Population								
207gpcd	17	16	15	14	13	13	12	11
186gpcd	15	14	14	13	12	11	11	10
Low Growth								
207gpcd	17	18	18	19	20	21	22	24
186gpcd	15	16	16	17	18	19	20	22
Medium Growth								
207gpcd	17	18	20	22	24	26	29	35
186gpcd	15	16	18	20	22	24	26	31
Fast Growth								
207gpcd	17	19	22	25	28	32	37	48
186gpcd	15	17	20	23	25	29	33	43

7.4. Water Conservation Plan

An important aspect of water planning is water conservation, which allows the efficient use of existing resources. Water conservation may be defined as any beneficial reduction in water use or water losses (American Public Works Association, 1981; Prasifka, 1988). Senate Bill 554 was passed and signed into law during the 2003 regular session of the NM Legislature. Senate Bill 554 requires Municipalities Counties and other covered entities to adopt water conservation and drought management plans. This bill requires the covered entities (those who produce and supply over 500 acre-feet annually) to develop, adopt and submit to the state engineer by December 31, 2005 a comprehensive water conservation plan, including a drought management plan. The Village House is not considered a covered entity at present or through the life of this plan.

7.4.1. Water Conservation Ordinance

The Village will not be adopting an ordinance to implement a Water Conservation Plan

7.4.2. Water Rates

The existing water and sewer rates are shown in Table 7-5. The Village of House has a flat rate structure with a minimum fee for the first 3000 gallons used per month. The Village of House rates are adequate today to cover operational costs and administrative costs for their water and sewer systems.

Table 7-7, House Water Rates	
Gallons Delivered	**Rates**
0-3000 min.	$16.50
3000+	$1.20

7.4.3. Water System Management

The Village of House has the newest water system of the incorporated communities within Quay County with operations beginning in October of 1988. The Village efficiency of its system is above 95% generally. The Village did have an overflow from its storage tank in 2004 which resulted in a significant loss of water. The efficiency of the system for 2004 shows it to be 72% which is the direct result of the overflow and not representative of the system management. The Village has corrected the problem and will continue to maintain an efficient system.

Table 7-8, Water System Efficiency (acre-feet)				
	Produced	**Sales**	**Difference**	**% Efficient**
2004	20.69	14.89	5.79	72.00%
2003	37.94	37.7	0.24	99.00%
2002	24.2	24.2	0	100.00%
2001	21.09	21.18	-0.09	100.00%
2000	13.86	13.66	0.2	99.00%
1999	12.96	12.96	0	100.00%
1998	10.47	10.47	0	100.00%
1997	10.38	10.21	0.17	98.00%
1996	11.15	11.2	-0.04	100.00%
1995	13.79	14.66	-0.87	100.00%
1994	12.89	13.44	-0.55	100.00%

7.4.4. Metering

Metering is a very fundamental tool of water system management and conservation. The Village has installed and regularly reads meters at all water sources, including import and export points, customer service connections, and public landscape sites. All water provided free of charge for public use or general community use is metered and read at regular intervals to allow the utility to accurately account for water use.

7.5. Water Budget

For planning for future needs the available water supply must satisfy the projected demands plus a factor of safety to address unanticipated demands. The major water supply for the Village of House is currently from groundwater.

7.5.1. Supply versus Demand

The Village of House is supplied solely by groundwater pumped from the Ogallala Aquifer. Groundwater from the Ogallala Formation has transmissivities ranging from 3,000 to 90,500 gpd/ft, specific capacities ranging from 1 to 30 gpm/ft of drawdown, specific conductance ranging from 326 to 820 as/cm, and a storage coefficient averaging 0.1 (Kilmer, 1987). Total groundwater rights are 250 acre-feet per year; House does not have any water reserved in Ute Reservoir. Average production for the Village of House was 17 acre-feet per year over 11 years. Although the water system wells were put into operation in October 1988, pumping data collected prior to 1994 were for only a portion of the system and so were not included in this average. The maximum amount of water pumped in one year since 1985 was 37.94 acre-feet. The maximum projected demand for the Village of House is 48 acre-feet per year by 2040.

Water levels are not monitored by the Village of House, and so water level data are unavailable. Data for the one USGS monitoring well within 4 miles of House, which is completed in the Ogallala aquifer, are summarized in Table 7-9. As shown in this table, water levels declined in this well, but only by 2.88 feet in 37 years, or less than 1 inch per year. These data suggest that while historical pumping has had an impact on the water level in the Ogallala aquifer, the rate of decline is sufficiently slow that the water supply will be adequate to meet projected demand over the next 40 years.

Table 7-9, Change in Water Levels in USGS Monitoring Wells Near House

Aquifer	Well ID	Change in Water Level		
		Amount (feet)	Period of Record	
			Dates	No. of Years
Ogallala	343848103555801	–2.88	1968-2005	37

Source: Data available at http://nwis.waterdata.usgs.gov/nm/nwis/gwlevels, accessed November 21, 2005.

[a] Positive numbers signify a rise in water levels. Negative numbers signify a drop in water levels.

7.6. Water Supply Alternatives

7.6.1. Well Head Protection Program

The Village has initiated a wellhead protection program (WHPP) which is a planning and management approach to protect groundwater supply systems from contamination. By identifying and managing potential sources of contamination than can affect water supply wells, the Village can do a better job of protecting public water supplies. The Wellhead Protection (WHPP) Program is a pollution prevention and management program used to protect underground based sources of drinking water. The Safe Drinking Water Act defines a wellhead protection area as “the surface and subsurface area surrounding a water well or well field supplying a public water system, through which contaminants are reasonably likely to move toward and reach such water well or well field.” The primary components of a wellhead protection program are:

- Identify roles and duties of government and public water supply agencies;

- Delineate the wellhead protection area (WHPA) for each wellhead;
- Identify potential sources of contamination within each WHPA;
- Develop management methods for wellhead protection, including education and regulatory approaches;
- Develop contingency plans for public water supply systems;
- Provide for proper siting of new wells to minimize potential contamination; and
- Provide for public education and participation.

The Source Water Protection area is the land around each supply well or surface water intake where spills, leaks, accidents or other forms of contamination may have a direct impact on the drinking water supply. The size of this area depends on soil type, site geology, groundwater flow rate, and on the drainage area and land use in the watershed. The susceptibility of drinking water sources to contamination is based on the number and proximity of potential threats to the water supply and an evaluation of any sanitary defects at the wellhead, intake structures, or other components of the water system.

7.6.2. Municipal Water Supply Infrastructure and Management

The Village of House has the newest water system of the incorporated communities within Quay County with operations beginning in October of 1988. The village is served by one (1) municipal well and a 75,000 gallon storage tank. Over the life of the plan the Village will be upgrading its distribution and service lines dependant on conditions, growth patterns, and funding.

The original town well and the well at the Fire Department site are still in existence and the Village will submit applications for these wells to divert water from the wells and declare water rights associated with the wells. The Village intends to pursue refurbishing the wells to act as backup to the main well and to increase capacity for economic development. The storage tank is adequate for the Village now and the foreseeable future. The Village may add an Additional Storage Tank to serve as a backup when repairs to the existing tank are needed. Additional Storage of 50,000 to 75,000 gallons will be adequate.

The Village is considering the development of a sewer system to replace the existing septic tanks which serve Village residents. The Village will be considering all options including centralized and decentralized treatment facilities.

7.6.3. Water Quality

The municipal water supply has continuously met all U.S. Environmental Protection Agency (EPA) and state drinking water health standards. The village vigilantly safeguards its water supplies and has never violated a maximum contaminant level or any other water quality standard. Water Quality is an important factor in developing water supply alternatives.

7.7. Water Development Plan

7.7.1. Water Conservation Program

The success of conservation programs varies depending upon the starting point. The Village of House has a per-person water diversion (gpcd) of 207. The per capita water use is a representation of water use based on the amount of municipal water that has historically been

pumped or diverted divided by population and includes system losses and water used for public facilities. The Village of House will attempt to reduce diversion through a voluntary program aimed at eliminating water losses.

7.7.1.1. Plan

The plan consists of the following activities:

- Public Education
- Voluntary Water Conservation Measures

7.7.1.2. Public education

Public education will include the following: Develop, print and disseminate educational materials on Xeriscape, efficient use of water in the home, and the scarcity of the resource. These materials will be disseminated to new customers at the utility, through flyers sent with the Utility bill, and in public places such as Village Hall.

7.7.1.3. Voluntary Water Conservation Measures

- Landscape or lawn watering should be limited in such a manner so as to reduce overall water usage by at least 10%.
- Landscape or lawn watering with automated sprinkler systems between the hours of 10:00 a.m. to 6:00 p.m. is discouraged. Landscape or lawn watering with manual sprinkler systems between the hours of 12:00 noon to 4:00 p.m. is discouraged.
- Watering early in the morning is recommended to avoid excess evaporation and discourage fungus growth, and lawns should be aerated to improve absorption and reduce runoff. Lawn watering should be done only when the lawn needs watering.
- Sprinkler system should be shut off when it is raining.
- Landscape and lawn watering should be stopped when winds are strong enough to cause the water to leave the area being watered.
- Mulch should be placed around all existing plants, trees, shrubs, or flower gardens to hold moisture in the soil.
- Indoor and outdoor leaks should be repaired immediately upon discovery.
- Use of fire hydrants should be limited to firefighting use and use of fire hydrants for other purposes discouraged unless metered.
- Water users are encouraged to replace old plumbing fixtures with low flow fixtures, such as low flow showerheads, faucets and toilets, or retrofit existing fixtures with low flow devices, such as toilet tank dams, water-filled plastic jugs, or a brick.
- Water users are encouraged to take shorter showers; not to let the water run continuously while brushing teeth or shaving; and to flush only when necessary.
- Appliances which use water, such as dishwashers and clothes washers, should be run only with full loads.
- Evaporative coolers should be run only when needed and have a thermostat to control their operation.
- Hot water heaters should be insulated; the temperature set appropriately; and partially drained once per year.
- Outdoor open burning which requires water to be available for extinguishment is discouraged.
- Treated water bulk sales contracts shall be encouraged to be reduced or diminished by 10% (based on the same month of the preceding year) or at a percentage which is in the

same ratio or proportion as the supply by the City's own customers is being reduced or diminished, whichever is greater.

7.7.2. Water Supply Infrastructure Improvements and Management

The Village of House has the newest water system of the incorporated communities within Quay County with operations beginning in October of 1988. Over the life of the plan the Village will be upgrading its distribution and service lines dependant on conditions, growth patterns, and funding.

The original town well and the well at the Fire Department site are still in existence and the Village will submit applications for these wells to divert water from the wells and declare water rights associated with the wells. The Village intends to pursue refurbishing the wells to act as backup to the main well and to increase capacity for economic development. The Village may add an Additional Storage Tank to serve as a backup when repairs to the existing tank are needed. Additional Storage of 50,000 to 75,000 gallons will be adequate.

The Village is considering the development of a sewer system to replace the existing septic tanks which serve Village residents. The Village will be considering all options including centralized and decentralized treatment facilities.

7.7.3. Water Rights Transfers

The purpose of this alternative is to pursue water rights transfers that would enable the Village to continue to meet demands or mitigate drought related shortages. Identifying water rights for sale, lease, or to option before the water is needed is an alternative that merits serious consideration. Addressing water rights transfers now facilitates planning and enables quick responses to water issues resulting from drought conditions. In addition, priority water rights may be established in case other entities (private or public) begin to purchase or lease water rights to supplement their water supply.

Table 7-10, Non-Domestic/Municipal Wells within Quay County

DB File Nbr	Use	Diversion	Owner	Well Number	Tws	Rng	Sec
FS 00619	IRR	120	ASA G. PASCHALL	FS 00619	05N	29E	20
FS 00888	IRR	600	GLEN R. FRANKLIN	FS 00888	05N	29E	4
FS 00897	IRR	100	BRUCE RUNYAN	FS 00897	05N	29E	12
FS 00901	IRR	40	BRUCE RUNYAN	FS 00901	05N	29E	23
FS 00903	IRR	100	BRUCE RUNYAN	FS 00903	05N	29E	23
FS 00905	IRR	50	BRUCE RUNYAN	FS 00905	05N	29E	23
FS 00907	IRR	20	BRUCE RUNYAN	FS 00907	05N	29E	25
FS 00910	IRR	20	BRUCE RUNYAN	FS 00910	05N	29E	26
FS 00914	IRR	25	BRUCE RUNYAN	FS 00914	05N	29E	13
FS 00915	IRR	50	BRUCE RUNYAN	FS 00915	05N	29E	13
FS 00916	IRR	50	BRUCE RUNYAN	FS 00916	05N	29E	13
FS 00917	IRR	50	BRUCE RUNYAN	FS 00917	05N	29E	13
FS 00928	IRR	40	BRUCE RUNYAN	FS 00928	06N	29E	5
FS 00989	IRR	350	GENE ROBBERSON	FS 00989	05N	29E	6

Table 7-10, Non-Domestic/Municipal Wells within Quay County							
DB File Nbr	Use	Diversion	Owner	Well Number	Tws	Rng	Sec
				FS 00990	05N	29E	6
				FS 00991	05N	29E	6
				FS 00992	05N	29E	6
FS 01009	IRR	720	MAURICE RUNYAN	FS 01009	05N	29E	5
				FS 01009 S	05N	29E	5
				FS 01009 S-2	05N	29E	6
				FS 01009 S-3	05N	29E	6
				FS 01009 S-4	05N	29E	6
				FS 01009 S-5	05N	29E	6
FS 01094	IRR	264	FOURELL INC.	FS 01094	05N	29E	20
				FS 01094 S	05N	29E	20
				FS 01094 S-2	05N	29E	20
FS 01095	IRR	264	FOURELL INC.	FS 01095	05N	29E	20
				FS 01095 S	05N	29E	20
				FS 01095 S-2	05N	29E	20
FS 01096	IRR	308	FOURELL INC.	FS 01096	05N	29E	20
				FS 01096 S	05N	29E	20
FS 01097	IRR	374	FOURELL INC.	FS 01097	05N	29E	14
				FS 01097 S	05N	29E	15
				FS 01097 S-2	05N	29E	15
				FS 01097 S-3	05N	29E	14
				FS 01097 S-4	05N	29E	14
FS 01098	IRR	264	FOURELL INC.	FS 01098	05N	29E	8
				FS 01098 S	05N	29E	8
				FS 01098 S-2	05N	29E	8
FS 01117	IRR	40	DONNIE R. OR ELVERNA R. SPARKS	FS 01117	05N	29E	27

7.8. Summary for Village of House

The Village of San Jon will continue to rely on groundwater for the foreseeable future through the life of the plan. The Village will implement a voluntary conservation plan and but does not plan to adopt a conservation ordinance. The goal of the Village is to reduce its production by 10% based on the gallons produced per day per capita.

The Village's most pressing need although not critical nor an immediate need is to add an additional storage tank. The Village will plan to initiate by 2015 a comprehensive hydrological study of its aquifer in order to determine and validate the supply and its long-term availability, more than 100 years. The study will also be used to determine the availability of unappropriated water that the Village may apply with the OSE to divert to Municipal and Industrial use.

7.9. Implementation Plan

Table 7-11 shows the implementation plan for the Village of House.

Table 7-11, Implementation Plan	
2006	**Implement Conservation/Drought Plan**
2006 (Winter/Spring)	**Initiate formal proceedings with OSE on existing wells to permit for municipal use.**
2007-2046	**Promote Public Awareness of and continue with conservation program with biannual reevaluations and modifications to program**
2006-2046	**Plan for and pursue funding for systemic replacement and upgrades to Water production and distribution system**
2006-2046	**Maintain Water Management Plan and perform System Audits biannually. Improve system efficiency to greater than 91% plus.**
2006-2015	**Complete a Hydrological study of House Aquifer**

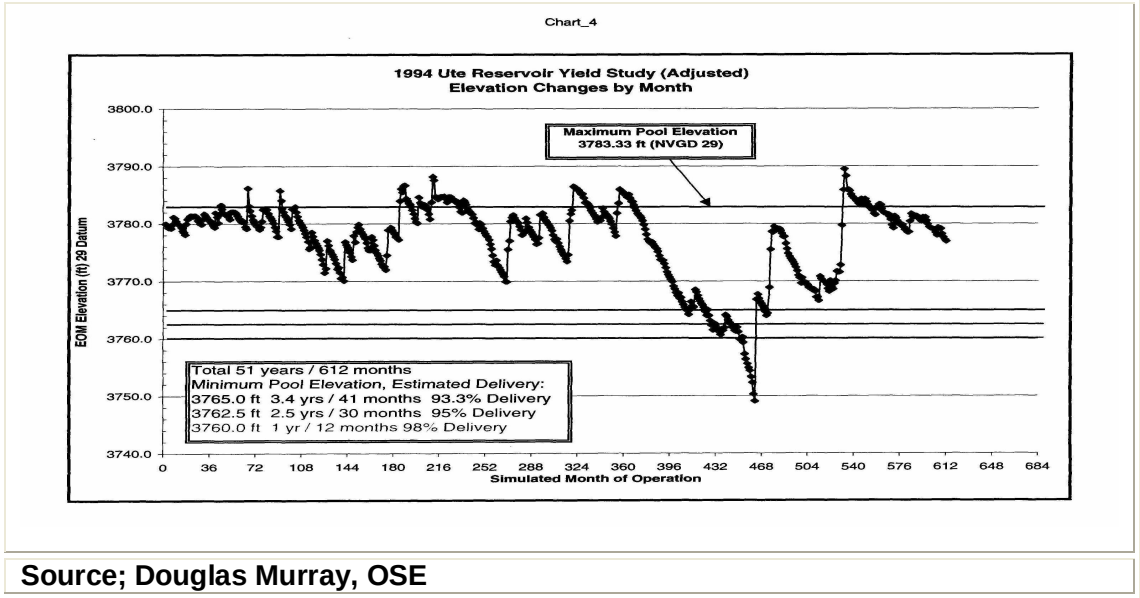
8. QUAY COUNTY

8.1. Surface Water Resources

Quay County does not operate a water system and has not used surface water.
The county has been a participating member of the Ute Water Commission. The Ute Water commission (UWC) was formed by Joint Powers Agreement for the purpose of contracting with the ISC for purchase of Ute Reservoir water. Participating agencies making up the UWC include the communities of Clovis, Elida, Grady, Logan, Melrose, Portales, San Jon, Texico, and Tucumcari; and the counties of Curry, Roosevelt, and Quay. The participating communities and counties have the option of maintaining their reservation by paying the annual $25.00 per acre-foot raw water cost and the $5.60 per acre-foot operation and maintenance fee for Ute Reservoir to the ISC. The County will exercise its option to maintain its reservation by paying the annual costs to ISC.

The ENMRWA was formed subsequent to the UWC for the purpose of advanced planning, design, construction and operation of facilities to distribute treated water from Ute Reservoir to the member communities. A 1994 study by the New Mexico Interstate Streams Commission (ISC) estimated the ***annual yield*** from Ute Reservoir to be 24,000 acre-feet per year in all but extreme drought years. The surface water available from Ute Reservoir which based on historical data that will be available to provide the 24,000 acre-feet annually for municipal and Industrial uses is shown in Figure 4-1.

Figure 8-1. Ute Reservoir Yield



Source; Douglas Murray, OSE

The County has decided not to participate in the ENMRWS and has leased its entire 1000 acre–feet per year reservation to Ute Lake Ranch which is developing a subdivision adjacent to the South Shore of Ute Lake.

8.2. Ground Water Resources

Quay County does not operate a water system and has not used ground water. The county does not intend to develop a water system

8.3. Water Development Plan

Generally, the county population is served by domestic wells and septic systems which will continue for the future. The County is served by five water cooperatives, three near Tucumcari who purchase water from the City, and Forrest and Nara Visa Community Systems. All of the cooperatives will need to provide upgrades to their systems within the life of this plan. Quay County Government assists the cooperatives with funding applications and support for the projects.

The County is maintaining its reservation rights to the water and will exercise its option to purchase their reserved amount by Jan. 31, 2006. The county has agreed to provide Ute Lake Ranch with the right to divert and consume the 1000 acre-feet of water annually from Quay County's Ute Reservoir allocation.

8.4. Supply versus Demand – Unincorporated Areas

Water level trends in all the other USGS monitoring wells within Quay County that had 5 or more data points are summarized in Table 8-1. These data show the following trends for the portions of Quay County not within 4 miles of Tucumcari, Logan, San Jon, or House.

- USGS monitoring wells completed in the Ogallala aquifer show declining water levels in two of seven wells. Overall rates of decline for these two wells range from 1.4 to 4.6 inches per year.
- Wells completed in alluvial aquifers show declining water levels in three of six wells. Overall rates of decline for these three wells range from less than 0.5 to 4.0 inches per year.
- In the Chinle Formation, water levels are declining in three of ten monitoring wells. Rates of decline for these three wells range from approximately 2.2 to 8.3 inches per year.
- In the Morrison Formation, the water level for the one monitoring well sampled is declining at an average rate of 0.6 inch per year.
- In the Dakota Formation, the water level for the one monitoring well sampled is declining at an average rate of 6.5 inches per year.

Table 8-1, Change in Water Levels in Other USGS Monitoring Wells in Quay County

Aquifer	Well ID	Change in water level		
		Amount [a] (feet)	Period of Record	
			Dates	No. of Years
Ogallala	343855103482901	–23.41	1944-2005	61
	344019103463801	+3.39	1977-2002	25
	344318104043501	+5.14 [b]	1955-1997	42
	344952103232501	+9.24 +1.88	1955-1968 1968-2002	13 34
		+11.12	1955-2002	47
	353320103033501	–5.19	1954-1998	44
	353919103135301	+0.53 –0.22	1954-1988 1988-1998	34 10
		+0.31	1954-1998	44
	354234103133501	+1.33	1983-1998	15
Alluvium	344406103555501	–16.89 –2.28	1948-1967 1967-2005	19 38
		–19.17	1948-2005	57
	350013103125301	+0.11 –1.89	1954-1987 1987-1998	33 11
		–1.78	1954-1998	44
	350507103334101	+59.46 +0.09	1948-1988 1988-2003	40 15
		+59.55	1948-2003	55
	350920103024701	–3.89	1983-2003	20
	351344103253901	+2.48 –0.78	1955-1983 1983-1998	28 15
		+1.70	1955-1998	43
	353239103111301	+7.02	1971-2004	33
Chinle Formation	350124103402601	–7.92 [c]	1955-1998	43
	350340103374801	+69.89	1955-2003	48
	350357103441701	–5.47 +16.62	1952-1983 1983-1998	31 15
		+11.15	1952-1998	46

Table 8-1, Change in Water Levels in Other USGS Monitoring Wells in Quay County

Aquifer	Well ID	Change in water level		
		Amount [a] (feet)	Period of Record	
			Dates	No. of Years
	350456103303001	+11.39 –9.91 +7.99	1955-1993 1993-1998 1998-2003	38 5 5
		+9.47	1955-2003	48
	350557103364501	+17.85	1945-1998	53
	350648103111901	+2.36	1954-2003	49
	350930103302801	–13.79	1983-2003	20
	351044103023801	–0.94 –8.36	1983-1998 1998-2003	15 5
		–9.30	1983-2003	20
	351123103182601	+0.52	1983-2003	20
	351244103162701	+14.87 –10.79	1983-1998 1998-2003	15 5
		+4.08	1983-2003	20
Morrison Formation	350517103525901	–2.23	1952-1998	46
Dakota Formation	354238103132301	–20.56 [d]	1967-2005	38

Source: Data available at http://nwis.waterdata.usgs.gov/nm/nwis/gwlevels, accessed November 21, 2005.

[a] Positive numbers signify a rise in water levels. Negative numbers signify a drop in water levels.

[b] Water level declined from 1955 through the mid-1970s, but has increased since then.

[c] Water level fluctuates significantly, with ~20-foot swings every ~5 years.

[d] Water level was relatively stable from 1967 to 1988 and has fluctuated widely since then.

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Engineer's Inc.	Feb. 1998	Logan Infrastructure Plan	Village of Logan PO Box 7 Logan, NM 88426
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Jarnis Environmental Consultants	Dec. 2003	ENMRWS Conceptual Design Peer Review	http://www.enmrwa.com/default.htm Eastern New Mexico Regional Water Authority
Gordon Herkenhoff and Associates, Inc.	July 1967	Tucumcari, NM Water Resources Study and Development Program	City of Tucumcari
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Leedshill-Herkenhoff, Inc.	Jul. 1984	Water Investigation Report For City of Tucumcari "Proposed Water Wells"	City of Tucumcari
Marron and Associates	March 1997	Environmental Assessment for US 54 Railroad Crossing	New Mexico State Highway and Transportation Department

Author	Report Date	Title	Publishing Information
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New Mexico Environment Department		Drinking Water Regulations	http://www.nmenv.state.nm.us/dwb/dwbtop.html Drinking Water Bureau
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New Mexico Environment Department	2001	Major New Mexico municipal and industrial NPDES Permittees.	<http://www.nmenv.state.nm.us/> Surface Water Quality Bureau, Point Source Regulation. March 12, 2001.
New Mexico Environment Department	2001	2000-2002 State of New Mexico 303(d) list for assessed streams and river reaches.	<http://www.nmenv.state.nm.us/> Surface Water Quality Bureau, TMDL Development. March 9, 2001.
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Smith Engineering Co.	Nov. 1999	Data Collection Summary Report for ENMRWS	http://www.enmrwa.com/default.htm Eastern New Mexico Regional Water Authority
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Author	Report Date	Title	Publishing Information
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Wilson Brian C. and A.A. Lucero	Sep. 1997	Water use by Categories in New Mexico Counties and River Basins, and Irrigated Acreage in 1995	Technical Report 49, New Mexico State Engineer Office, Santa Fe, New Mexico
Wilson Brian C. and A.A. Lucero	Sep. 1998	Water use by Categories in New Mexico Counties and River Basins, and Irrigated Acreage in 2000	Technical Report 51, New Mexico State Engineer Office, Santa Fe, New Mexico
Wilson Brian C. and A.A. Lucero	Feb. 2003	Irrigated Agriculture Water use and Acreage in New Mexico Counties and River Basins, 1993-1995	Technical Report 50, New Mexico State Engineer Office, Santa Fe, New Mexico

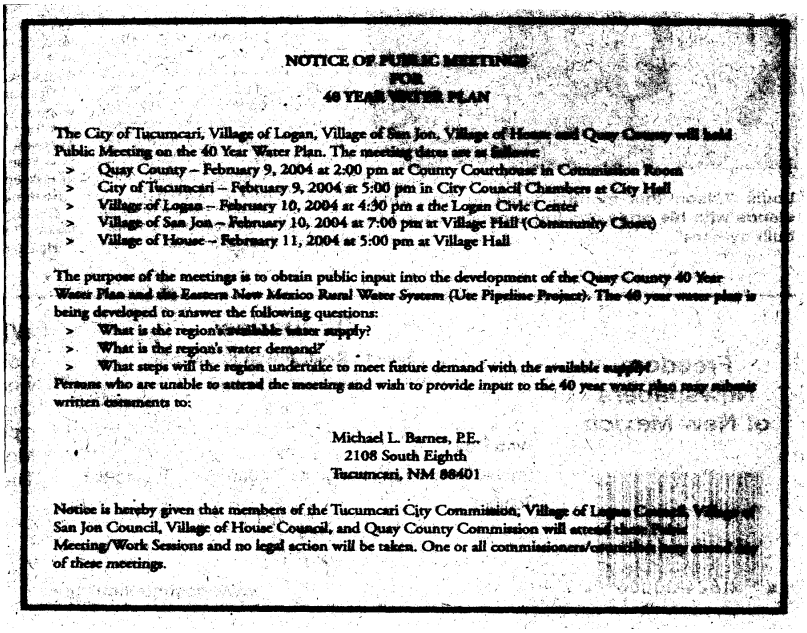
Appendix B - Public Involvement Information

Ute Reservoir Regional Water Board
City of Tucumcari
Village of Logan
Village of San Jon
Village of House
Quay County

Steering Committee

City of Tucumcari	Richard Primrose
Village of Logan	Larry Wallin
Village of San Jon	Bobbye Rose
Village of House	Linda Lavender
Quay County	Paula Chacon/Terry Turner

Scanned Advertisement of Public Meetings from Quay County Sun



NOTICE OF PUBLIC MEETINGS
FOR
40 YEAR WATER PLAN

The City of Tucumcari, Village of Logan, Village of San Jon, Village of House and Quay County will hold Public Meeting on the 40 Year Water Plan. The meeting dates are as follows:

- Quay County – February 9, 2004 at 2:00 pm at County Courthouse in Commission Room
- City of Tucumcari – February 9, 2004 at 5:00 pm in City Council Chambers at City Hall
- Village of Logan – February 10, 2004 at 4:30 pm at the Logan Civic Center
- Village of San Jon – February 10, 2004 at 7:00 pm at Village Hall (Community Closet)
- Village of House – February 11, 2004 at 5:00 pm at Village Hall

The purpose of the meetings is to obtain public input into the development of the Quay County 40 Year Water Plan and the Eastern New Mexico Rural Water System (Ute Pipeline Project). The 40 year water plan is being developed to answer the following questions:

- What is the region's available water supply?
- What is the region's water demand?
- What steps will the region undertake to meet future demand with the available supply?

Persons who are unable to attend the meeting and wish to provide input to the 40 year water plan may submit written comments to:

Michael L. Barnes, P.E.
2108 South Eighth
Tucumcari, NM 88401

Notice is hereby given that members of the Tucumcari City Commission, Village of Logan Council, Village of San Jon Council, Village of House Council, and Quay County Commission will attend these Public Meeting/Work Sessions and no legal action will be taken. One or all commissioners/councilors may attend any of these meetings.

Copies of Sign In Sheets for the Public Meetings

Quay County 40 Year Water Plan
Public Meeting
Sign-In Sheet

2/10/2004 **Village of Logan**

Name	Address
[illegible] Frost	P.O. Box 622 Logan N.M.
[illegible] Walker	Box 355 Logan, N.M. 88426
[illegible]	1501 540 Loop Logan NM "
John R Vigil	700 Vigil St. Logan N.M
Ruby Vigil	" "
David Babb	PO Box 396 Logan NM
Larry Thomas	PO Box 157 Logan, NM 88426
[illegible] Babb	
Apolonio Ramirez	P.O. Box 351, Logan, NM 88426

Quay County 40 Year Water Plan
Public Meeting
Sign-In Sheet

2/10/2004 **Village of Logan**

Name	Address
Joe Geibel	
[illegible]	
Jessie Locke	
Scott Verhines	ENMRWA Albuquerque, NM
George Ervin	Box 206 Logan, NM 88426
Joe & Lee Locke	Box 645 Logan NM 88426
Melvin Kesse	107 Mockingbird Lane NM 88426
R.D. Pierce & Jimmie Pierce	6213 540 Loop, Logan 88426
Johnny Irving	PO Box 333 Logan 88426
Martha Kind	610 Bass Aly Logan 88426
Oscar Peterson	303 Trout Logan 88426
Lynda Jeffers	119 Cain Rd Logan 88426
Wes Cantrell	Box 1248 Tucumcari NM 88401
Judy Westall	123 Yuma Logan 88426
Harold Westall	— —
Mike Kochendorfer	Logan
Dita Holman	PO Box 403 Logan
Lind Cole	PO Box 612 Logan
James Evans	402 Trout
Rose Kelly	
Gloria Geibel	Logan
Elmer Jones	Logan 415 N. 2nd
Alice Jones	Logan " "
Guy Mitchell	Logan
Rosemarie Lowe	"
Michael L. Barnes	2103 So 8th Tucumcari, NM 88401

Quay County 40 Year Water Plan
Public Meeting
Sign-In Sheet

2/10/04 **Village of San Jon**

Name	Address
JOE CLARK	P.O BOX 536 SAN JON
Rodney Stover	519 E Cherry Ave San Jon
Scott Verhines	ENMRWA 4300 San Mateo NE, ABQ, NM.
Larry Martinez	1008 E Wabash Ave San Jon NM.
LINDA BRILL	EPCOG 418 N MAIN, CLOVIS, NM 88101
Dennis Carramenospe)	EPCOG 418 Main, Clovis, NM 88101
Billie J Barrow	Box 145 San Jon NM
Cynthia Lee	PO Box 14 San Jon
JIM LAFFERTY	2610 S. 4th TUCUMCARI
Ben [illegible]	PO BOX 205 SAN JON NM 88434
Lee [illegible]	PO Box 49 SAN JON, NM 88434
Rosalie Rachor	PO Box 37, San Jon
Wade Lane	" "
MICHAEL L. BARNES	208 South 8th TUCUMCARI, NM 88401

Quay County 40 Year Water Plan
Public Meeting
Sign-In Sheet

2/10/04 **Village of San Jon**

Name	Address
JOE CLARK	P.O BOX 536 SAN JON
Rodney Stover	519 E Cherry Ave San Jon
Scott Verhines	ENMRWA 4300 San Mateo NE, ABQ, NM.
Larry Martinez	1008 E Wabash Ave San Jon NM.
LINDA BRILL	EPCOG 418 N MAIN, CLOVIS, NM 88101
Dennis Carramenospe)	EPCOG 418 Main, Clovis, NM 88101
Billie J Barrow	Box 145 San Jon NM
Cynthia Lee	PO Box 14 San Jon
JIM LAFFERTY	2610 S. 4th TUCUMCARI
Ben [illegible]	PO BOX 205 SAN JON NM 88434
Lee [illegible]	PO Box 49 SAN JON, NM 88434
Rosalie Rachor	PO Box 37, San Jon
Wade Lane	" "

Quay County 40 Year Water Plan
Public Meeting
Sign-In Sheet

2/9/2004 **Quay County**

Name	Address
David Foote	4343 QR 63 Tucumcari NM 88401
Bob Morgan	P.O. Box 645 Tucumcari NM 88401
[illegible] Fyatt	Box 1128 Tucumcari N.M. 88401
Alan Bugg	PO Box 1012 Tucumcari NM 88401
maryHelen Follingstad	NMISC P.O. Box 25103, SANTA FE, NM 87504
Scott Verhines	ENMRWA 4300 San Mateo NE B150 ABQ, NM 87110
Terry Turner	1103 Marigold Ln NE Albuquerque NM 87112
Michael Barnes	2108 So 9th Tucumcari, NM 88401
Jessica Laughlin	P.O. Box 744 Tucumcari N.M. 88401
Bruce E Rhodes	6310 Cedar St. Tucumcari, N.M. 88401
Franklin McCasland	3433 Quay Road 58 Tucumcari, NM. 88401

Quay County 40 Year Water Plan
Public Meeting
Sign-In Sheet

2/9/2004 **City of Tucumcari**

Name	Address
Charlie Sandoval	P.O. Box 1188, Tuc., NM 88401
Richard Primrose	P.O. Box 1188 Tuc, NM 8840
Mary Mayfield	812 Main Tuc. NM 88401
Joe Ramirez	P.O. Box 1138 Tucumcari NM 88401
Pat Petrak	PO Box 665 House NM 88121
Calvin Litchfield	Box 947 Tucumcari 88401
Antonio Apodaca	409 N. 3rd City
Clara L. Rey	P.O. Box 1188 Tuc. NM 88401
Nora Powers	P.O. Box 1188 Tuc. NM 88401
Ted Thrasher	Box 1228, Tuc 88401
Virginia Wynn	PO Drawer E Tuc 88401
Michael L. Barnes	2108 So 9th Tuc. 88401
Scott Verhines	ENMRWA 4303 San Mateo NE B150 ABQ 87110

Quay County 40 Year Water Plan
Public Meeting
Sign-In Sheet

2/11/2004 **Village of House**

Name	Address
Floyd Morrow	POBOX 707
Linda Lavender	PO Box 682 House NM 88121
Wilson Sargent	P.O. Box 844 House NM 88121
Ashley Perry	P.O.Box 548 House, NM 88121
Jimmie Gore Jr.	RT 1 Box 55 McAlister NM 88427
Mike Morrow	P.O. Box 694 House N.M. 88121
Tom CARTER	Box 516 Fort Sumner NM 88119
Sherman W Mathis	Box 696 House N.M.
Judy Morrow	Box 674 House NM 88121

Comment Sheets Returned

Quay County 40 Year Water Plan
Comment Sheet

Date: 2/11/04
Name: Village of House
Address: PO Box 682
Organization: Village Council
Phone: 279-7372 Fax: 279-6053 Email: village_house@plateautel.net

Priority	Alternative
4	Prepare a drought plan
	Develop and implement city and county water conservation ordinances
	Implement AHCD agricultural water conservation plan
	Identify water rights transfers or leases that could supply projected demand
1	Appropriate and reserve groundwater for the region
	Participate in ENMRWS Ute Pipeline
	Implement County Water Quality Ordinances
	Adopt land use plans that integrate water planning elements
	Water Conservation
	Agricultural conservation
3	Municipal conservation
	Recycle municipal wastewater
	Watershed Management
	Implement efficiencies in municipal water supply management (e.g., leak detection)
5	Increase water rates
	Xeriscape to conserve (municipal) water
	Reduce losses by lining ditches and encasing delivery systems
	Develop unappropriated groundwater to meet projected demand
	Implement cloud seeding projects
	Upgrade mains
	Require water quality study for all development projects
	Implement point and non-point source projects
	Draft and implement source water and well- head protection plans for key water supplies
2	Construct sewer systems
	Develop and implement city ordinances to control private wells

Comments

Hand in at end of meeting or mail to:
Michael L. Barnes
2108 South Eighth Street
Tucumcari, NM 88401

Additional space for comments on back

Quay County 40 Year Water Plan
Comment Sheet

Date Jan 10 2009

Name James Ebony

Address Box 478

Organization

Phone: 487 3266 | Fax: | Email:

Priority	Alternative
✓	Prepare a drought plan
✓	Develop and implement city and county water conservation ordinances
	Implement AHCD agricultural water conservation plan
	Identify water rights transfers or leases that could supply projected demand
✓	**Appropriate and reserve groundwater for the region**
✓	Participate in ENMRWS Ute Pipeline
	Implement County Water Quality Ordinances
	Adopt land use plans that integrate water planning elements
	Water Conservation
	Agricultural conservation
	Municipal conservation
	Recycle municipal wastewater
	Watershed Management
	Implement efficiencies in municipal water supply management (e.g., leak detection)
	Increase water rates
	Xeriscape to conserve (municipal) water
✓	Reduce losses by lining ditches and encasing delivery systems
	Develop unappropriated groundwater to meet projected demand
	Implement cloud seeding projects
	Upgrade mains
	Require water quality study for all development projects
	Implement point and non-point source projects
	Draft and implement source water and well- head protection plans for key water supplies
	Construct sewer systems
	Develop and implement city ordinances to control private wells

Comments

Hand in at end of meeting or mail to:
Michael L. Barnes
2108 South Eighth Street
Tucumcari, NM 88401

Additional space for comments on back

Quay County 40 Year Water Plan
Comment Sheet

Date: 02-09-04
Name: Marcy Mayfield
Address: 812 E Hester
Organization: City
Phone: 505 461 2998 | Fax: | Email:

Priority	Alternative
	Prepare a drought plan
2 ✓	Develop and implement city and county water conservation ordinances
	Implement AHCD agricultural water conservation plan
	Identify water rights transfers or leases that could supply projected demand
	Appropriate and reserve groundwater for the region
1 ✓	Participate in ENMRWS Ute Pipeline
	Implement County Water Quality Ordinances
	Adopt land use plans that integrate water planning elements
	Water Conservation
	Agricultural conservation
	Municipal conservation
4 ✓	Recycle municipal wastewater
	Watershed Management
	Implement efficiencies in municipal water supply management (e.g., leak detection)
5 ✓	Increase water rates
	Xeriscape to conserve (municipal) water
	Reduce losses by lining ditches and encasing delivery systems
	Develop unappropriated groundwater to meet projected demand
	Implement cloud seeding projects
	Upgrade mains
	Require water quality study for all development projects
	Implement point and non-point source projects
3 ✓	Draft and implement source water and well- head protection plans for key water supplies
	Construct sewer systems
	Develop and implement city ordinances to control private wells

Comments

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Tucumcari, NM 88401

Additional space for comments on back

Quay County 40 Year Water Plan
Comment Sheet

Date	2-9-04		
Name	Patricia A PeTrak		
Address	P O Box 665, House NM 88121		
Organization	City Tucumcari - LABORATORY		
Phone: 461-4372	Fax: 461-4372	Email: lab@cityoftucumcari.com	

Priority	Alternative
	Prepare a drought plan
	Develop and implement city and county water conservation ordinances
	Implement AHCD agricultural water conservation plan
	Identify water rights transfers or leases that could supply projected demand
3	Appropriate and reserve groundwater for the region
	Participate in ENMRWS Ute Pipeline
	Implement County Water Quality Ordinances
	Adopt land use plans that integrate water planning elements
	Water Conservation
4	Agricultural conservation
	Municipal conservation
1	Recycle municipal wastewater
	Watershed Management
	Implement efficiencies in municipal water supply management (e.g., leak detection)
	Increase water rates
	Xeriscape to conserve (municipal) water
5	Reduce losses by lining ditches and encasing delivery systems
	Develop unappropriated groundwater to meet projected demand
	Implement cloud seeding projects
	Upgrade mains
2	Require water quality study for all development projects
	Implement point and non-point source projects
	Draft and implement source water and well- head protection plans for key water supplies
	Construct sewer systems
	Develop and implement city ordinances to control private wells

Comments

I would like to see copies of the water chemistry from the Lake study.

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2108 South Eighth Street
Tucumcari, NM 88401

Additional space for comments on back

Quay County 40 Year Water Plan
Comment Sheet

Date

Name Tom Anderson

Address

Organization

Talked to Mr Anderson 2/12 & received this info over Phone. MTB

Phone: 461-1584 Fax: Email:

Priority	Alternative
	Prepare a drought plan
	Develop and implement city and county water conservation ordinances
	Implement AHCD agricultural water conservation plan
✓	Identify water rights transfers or leases that could supply projected demand
(1) ✓	**Appropriate and reserve groundwater for the region**
	Participate in ENMRWS Ute Pipeline
	Implement County Water Quality Ordinances
	Adopt land use plans that integrate water planning elements
	Water Conservation
	Agricultural conservation
	Municipal conservation
	Recycle municipal wastewater
	Watershed Management
	Implement efficiencies in municipal water supply management (e.g., leak detection)
✓	Increase water rates Adjust Water Rates to obtain Conservation.
	Xeriscape to conserve (municipal) water
	Reduce losses by lining ditches and encasing delivery systems
	Develop unappropriated groundwater to meet projected demand
	Implement cloud seeding projects
	Upgrade mains
	Require water quality study for all development projects
	Implement point and non-point source projects
	Draft and implement source water and well- head protection plans for key water supplies
	Construct sewer systems
	Develop and implement city ordinances to control private wells
✓	Reduce Evaporation - Layer to Reduce Evaporation of RESERVOIR.

Comments

- ENMRWS - Important Project
- Age of Projects → → → → → 100 year life of RESERVOIR & Conserv.

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2108 South Eighth Street
Tucumcari, NM 88401

Additional space for comments on back

Quay County 40 Year Water Plan
Comment Sheet

Date: Feb. 10, 2004 Meeting in Logan
Name: Harold & Judy L. Westall
Address: 123 Yuma St. Logan NM 88426
Organization: Retired
Phone: (505) 487-5034 Fax: — Email: —

Priority	Alternative
2	Prepare a drought plan
1	Develop and implement city and county water conservation ordinances
	Implement AHCD agricultural water conservation plan
11	Identify water rights transfers or leases that could supply projected demand
3	**Appropriate and reserve groundwater for the region**
14	Participate in ENMRWS Ute Pipeline
12	Implement County Water Quality Ordinances
	Adopt land use plans that integrate water planning elements
5	Water Conservation
7	Agricultural conservation
6	Municipal conservation
	Recycle municipal wastewater
	Watershed Management
	Implement efficiencies in municipal water supply management (e.g., leak detection)
13	Increase water rates
	Xeriscape to conserve (municipal) water
	Reduce losses by lining ditches and encasing delivery systems
	Develop unappropriated groundwater to meet projected demand
	Implement cloud seeding projects
8	Upgrade mains
	Require water quality study for all development projects
	Implement point and non-point source projects
9	Draft and implement source water and well- head protection plans for key water supplies
10	Construct sewer systems
	Develop and implement city ordinances to control private wells I think this is out of scope of cities.

Comments

#8 If there is significant loss of water in mains.

#4 Logan should participate in this and when possible use this water and conserve ground water that is available.

#13 Water rates should only be increased to cover production of water & upkeep on system.

No tax payer money should be spent on cloud seeding, if farmers think it would benefit them they should be willing to bear the cost of same.

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Tucumcari, NM 88401

Additional space for comments on back

Quay County 40 Year Water Plan
Comment Sheet

If conditions of the past year, 2003, persist it will require very restrictive water use. State, County, and City officials will be faced with having to make some unpopular choices for conservation of water and will have to keep their constituents informed where possible.

Public Review Notice for Draft 40 Year Water Plan

NOTICE OF PUBLIC REVIEW
QUAY COUNTY 40 YEAR WATER PLAN

The City of Tucumcari, Village of Logan, Village of San Jon, Village of House and Quay County have published the 40 Year Water Plan for Public Review.

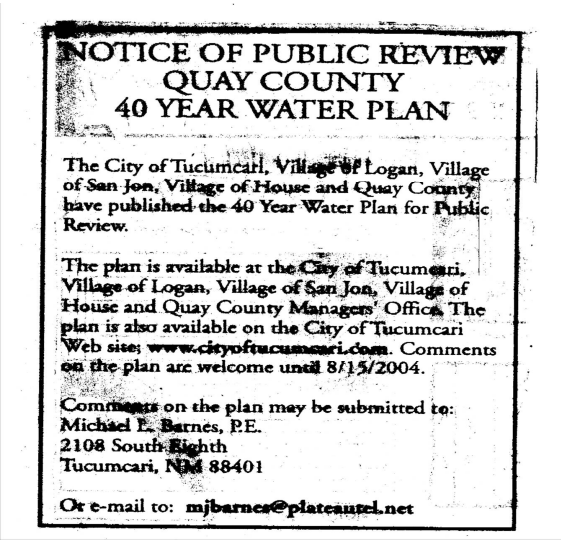
The plan is available at the City of Tucumcari, Village of Logan, Village of San Jon, Village of House and Quay County Managers' Office. The plan is also available on the City of Tucumcari Web site; **www.cityoftucumcari.com**. Comments on the plan are welcome until 8/15/2004.

Comments on the plan may be submitted to:

Michael L. Barnes, P.E.
2108 South Eighth
Tucumcari, NM 88401

Or e-mail to: mjbarnes@plateautel.net

Scanned Copy of Notice from Quay County Sun Newspaper



NOTICE OF PUBLIC REVIEW
QUAY COUNTY
40 YEAR WATER PLAN

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Comments on the plan may be submitted to:
Michael L. Barnes, P.E.
2108 South Eighth
Tucumcari, NM 88401

Or e-mail to: mjbarnes@plateautel.net

Appendix C - General Information

Quay County City Population, 1910-2000										
	2000	1990 r/	1980	1970	1960	1950	1940	1930	1920	1910
Place	(April 1)	(April 1)	(April 1)	(April 1)	(April 1)	(April 1)	(April 1)	(April 1)	(Jan. 1)	(April 15)
House	72	96	117	119	139	na	na	na	na	na
Logan	1,094	804	735	386	320	na	na	na	na	na
San Jon	306	283	341	308	411	362	na	na	na	na
Tucumcari	5,989	6,872	6,765	7,189	8,143	8,419	6,194	4,143	3,117	2,526
Source: U.S. Department of Commerce, Bureau of the Census.										
Table prepared by: Bureau of Business and Economic Research, University of New Mexico.										

Temperature Summaries by Station

	Monthly Averages			Daily Extremes				Monthly Extremes	
	Max.	Min.	Mean	High	Date	Low	Date	Highest Mean	Lowest Mean
	˚F	˚F	˚F	˚F	m/dd/yyyy	˚F	m/dd/yyyy	˚F	˚F
NEWKIRK	73.2	42	57.6	108	6/23/1990	-19	1/23/1990	59.6	56.1
MC CARTY RANCH	69.6	41.3	55.4	107	6/25/1990	-13	1/23/1990	57.4	54
RINESTINE RANCH	72.1	41.1	56.7	106	6/24/1978	-11	2/8/1980	56.8	55.5
OBAR	73.4	41	57.2	109	16/22/1953	-20	2/1/1951	60.1	55.1
UTE DAM	73.2	43.1	58.2	107	6/28/1968	-11	1/5/1971	58.6	57.6
LOGAN	75.1	42.1	58.6	110	8/4/1944	-20	2/1/1951	60	56.9
TUCUMCARI 4 NE	73.2	43.5	58.4	109	6/25/1990	-22	1/13/1963	61.3	55.5
TUCUMCARI FAA AIRPORT	72.7	43.6	58.2	109	6/28/1968	-19	1/13/1963	60	56.8
SAN JON	73.5	43.5	58.5	110	6/24/1990	-33	1/13/1963	61.3	55.9
CAMERON	70.5	40.7	55.6	106	6/29/1957	-21	2/1/1951	58.8	54
RAGLAND 3 SSW	70.3	40.7	55.5	106	6/21/1981	-15	1/13/1963	56.9	53.1

Appendix D City of Tucumcari Water System

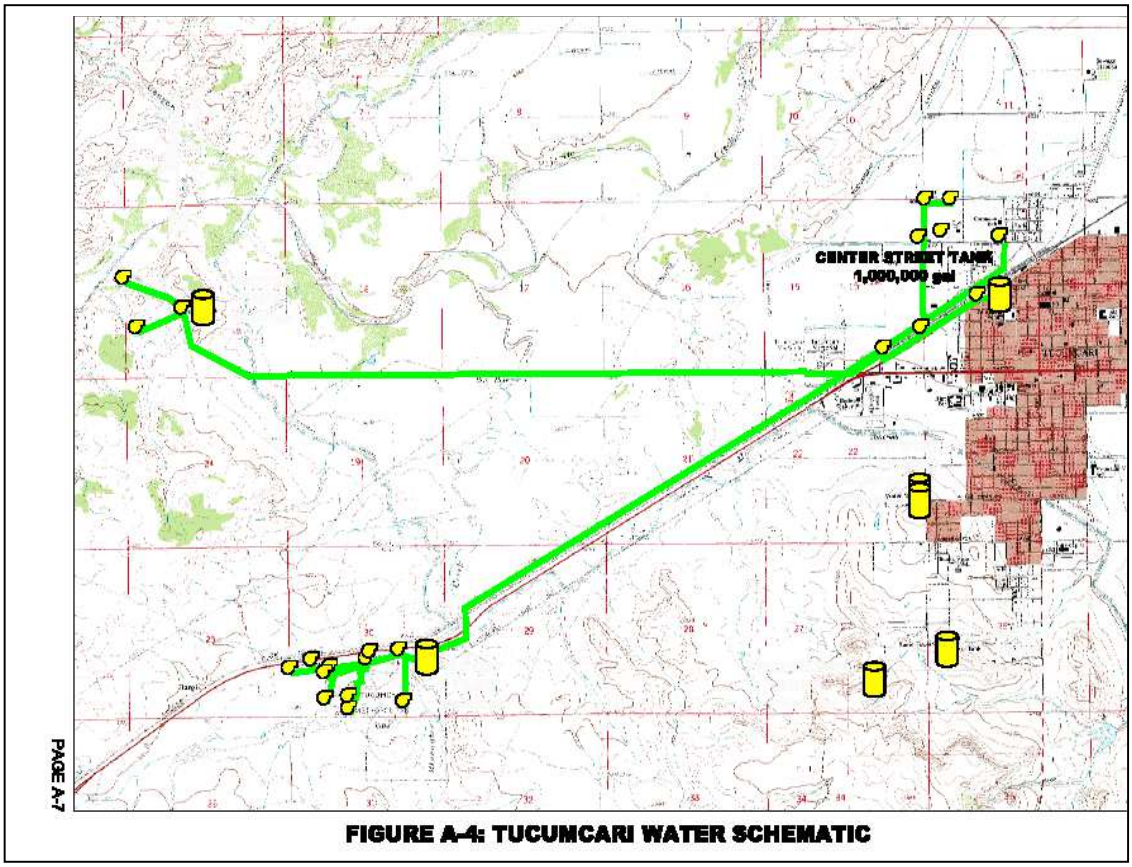


FIGURE A-4: TUCUMCARI WATER SCHEMATIC

Smith Engineering, 2003

City of Tucumcari Production Reports 2000-2004													
	Water Production:	# of Wells Operated:	Operating Hours:	Electrical Power Used:	Booster Station Power Used:	Golf Course:	Power Plant:	RAD Co-op:	Tucam Sub.:	W.P.C.F.:	Cemetery:	Liberty:	Swimming Pool:
Jan-00	30,185,000	11	2,706	51,200	26,790	597,000	1,600	1,116,000	372,000	3,800	26,200	507,200	
Feb-00	28,833,000	14	2,510	52,710	35,300	948,700	1,700	1,383,000	435,000	3,000	36,700	616,300	
Mar-00	33,976,000	14	2,784	54,600	38,430	672,400	1,900	1,359,000	465,000	2,800	235,900	656,900	
Apr-00	39,345,000	12	3,010	54,720	40,010	825,200	100	1,345,000	515,000	3,100	298,100	625,700	36,100
May-00	62,164,000	14	3,945	87,807	56,775	219,000	2,700	2,886,000	982,000	12,400	1,268,000	1,084,000	360,700
Jun-00	62,747,000	14	4,117	88,525	58,412	171,400	183,300	2,674,000	1,020,000	45,200	1,053,000	1,181,000	308,900
Jul-00	66,858,000	14	4,378	94,679	60,310	137,000	1,200	2,255,000	845,000	55,600	1,166,300	892,500	289,700
Aug-00	75,362,000	14	4,758	104,260	80,001	199,900	1,900	3,053,000	1,214,000	71,400	1,956,000	1,186,200	289,700
Sep-00	62,998,000	14	4,163	90,530	57,260	211,700	1,900	2,755,000	870,000	40,000	1,541,600	1,211,400	
Oct-00	37,427,000	15	2,630	55,950	38,780	266,200	2,800	1,777,000	549,000	49,300	133,600	662,900	
Nov-00	32,517,000	15	2,557	47,990	30,011	470,600	1,700	1,674,000	438,000	50,200	300	652,600	168,000
Dec-00	29,811,000	15	2,464	49,900	30,787	318,500	1,200	1,705,000	429,000	59,000	300	627,700	
Jan-01	30,424,000	13	2,552	46,646	28,782	798,000	2,100	1,547,000	312,000	2,000		657,400	
Feb-01	26,426,000	15	2,241	43,444	25,702	420,200	100	1,655,000	358,000	48,800	200	517,200	
Mar-01	31,146,000	15	2,704	51,882	28,500	800,800	1,900	1,112,000	352,000	51,100	600	546,300	
Apr-01	41,217,000	15	3,148	66,010	34,208	1,881,000	300	1,361,000	487,000	2,200	228,700	644,300	
May-01	47,125,000	15	3,423	72,476	39,566	249,800	6,200	1,563,000	574,000	3,200	1,204,000	728,300	376,600
Jun-01	58,694,000	15	3,692	85,491	49,760	140,600	2,700	2,088,000	735,000	3,300	1,398,000	888,500	331,700
Jul-01	72,813,000	15	4,363	99,670	63,863	182,600	20,800	2,984,000	1,105,000	3,900	1,821,900	1,390,400	432,500
Aug-01	59,727,000	14	3,685	76,260	51,565	165,200	14,800	3,288,000	887,000	6,100	1,785,000	1,156,300	256,300
Sep-01	51,245,000	14	3,327	66,296	43,638	141,600	800	1,043,000	694,000	8,400	844,000	940,900	
Oct-01	40,890,000	14	2,963	55,994	35,336	639,900	2,000	1,630,000	472,000	3,500	13,400	783,200	
Nov-01	31,972,000	13	2,804	51,357	28,034	1,008,300	1,000	1,467,000	387,000	1,900	3,700	686,400	
Dec-01	33,274,000	13	2,680	47,271	30,896	798,000	2,100	1,547,000	312,000	2,000		657,400	
Jan-02	30,424,000	13	2,552	46,646	28,782	798,000	2,100	1,547,000	312,000	2,000		657,400	

Feb-02	27,604,000	13	2,214	42,907	25,541	829,000	1,500	1,252,000	411,000	2,800	100	655,300	
Mar-02	34,221,000	15	2,342	44,360	30,161	1,268,000	100	1,556,000	431,000	300	1,600	725,300	
Apr-02	48,549,000	15	3,073	68,699	40,095	1,628,900	1,600	1,968,000	594,000	3,000	773,400	720,700	3,200
May-02	62,041,000	15	3,876	79,447	55,112	247,400	5,800	2,794,000	929,000	3,400	2,237,600	1,159,300	316,000
Jun-02	80,242,000	15	4,735	96,358	62,931	1,185,700	2,700	2,123,000	793,000	4,900	1,145,300	1,018,000	498,700
Jul-02	55,676,000	15	3,771	73,398	44,992	1,786,100	26,200	2,868,000	840,000	3,200	1,054,300	1,139,300	354,700
Aug-02	69,447,000	15	4,455	89,783	58,145	1,920,100	19,700	2,870,000	977,000	2,400	1,500,900	1,308,300	186,700
Sep-02	38,642,000	15	2,773	52,668	34,508	1,010,200	19,000	1,476,000	400,000	3,700	4,600	579,600	
Oct-02	33,955,000	15	2,614	54,821	28,951	926,000	900	1,612,000	472,000	2,500	19,300	710,200	
Nov-02	28,605,000	12	2,126	44,590	27,288	482,500	1,600	1,362,000	452,000	2,500	7,500	612,600	
Dec-02	27,122,000	14	2,016	42,150	26,936	188,600	5,100	1,356,000	452,000	1,800	6,000	576,700	
Jan-03	28,574,000	15	2,148	44,438	27,338	594,100		1,382,000	492,000	2,200	11,800	515,900	
Feb-03	24,480,000	15	2,011	42,128	24,208	469,700	300	1,227,000	447,000	2,600	198,300	405,300	
Mar-03	32,842,000	15	2,434	51,898	30,727	1,087,900	1,500	1,551,000	632,000	2,400	280,900	521,700	
Apr-03	38,152,000	15	2,933	62,943	32,526	1,819,000	100	1,769,000	739,000	2,600	464,900	699,900	6,600
May-03	56,289,000	15	4,211	97,926	51,774	2,259,300	1,800	2,556,000	678,000	3,600	1,668,600	1,039,700	372,100
Jun-03	48,764,000	15	3,809	88,911	42,411	2,008,300	2,700	2,015,000	589,000	11,100	536,000	949,700	264,700
Jul-03	66,431,000	15	4,332	110,055	59,857	2,398,800	1,300	3,070,000	951,000	3,800	1,378,000	1,519,100	352,800
Aug-03	63,816,000	14	3,988	99,241	54,677	1,963,800		2,708,000	770,000	4,400	713,000	1,534,000	182,000
Sep-03	36,060,000	16	2,627	66,529	37,286	6,700	1,400	1,631,000	536,000	7,000	61,000	797,900	0
Oct-03	34,067,000	15	2,375	56,835	31,588	9,000	100	1,525,000	507,000	2,000	8,000	515,000	0
Nov-03	24,223,000	15	1,726	43,647	26,433	3,000	1,500	1,308,000	418,000	2,000		530,000	0
Dec-03	23,742,000	15	1,674	44,759	25,923	10,000	100	1,329,000	425,000	2,000		468,000	0
Jan-04	26,576,000	15	2,034	50,242	28,725	2000	1,000	1,423,000	835,000	1,000	119,500	562000	0
Feb-04	23,426,000	15	1,924	41,731	24,991	2000	0	1,293,000	509,000	18700	57000	340000	0
Mar-04	23,426,000	15	1924	41,731	24,991	17000	2200	1,360,000	513,000	242000	326000	657000	0
Apr-04	31,246,000	15	2,305	48,477	30,366	11,000	0	1,322,000	435,000	192,000	153,000	702000	0
May-04	56,000,000	15	3317	94,675	49,108	88000	3000	3196000	902000	0	1,173,000	1269000	273000
Jun-04	61,908,000	15	3,716	106,529	58,227	73,000	100	3,915,000	951,000	216,000	1,282,000	1,649,000	415,000
Jul-04	53,990,000	15	3,950	95,443	44,859	853,000	16,000	2,030,000	978,000	216,000	1,282,000	1,649,000	415,000
Aug-04	40,747,000	15	3,144	83,377	38,659	74,000	0	1,715,000	569,000	197,000	18,000	889,000	254,000

Sep-04	33,219,000	15	2,297	63,290	35,841	39,000	2,000	1,811,000	589,000	194,000	100	1,061,000	0
Oct-04	27,737,000	13	2,227	51,480	24,677	75,000		1,083,000	425,000	209,000	100	886,000	0
Nov-04	21,331,000	13	1,759	37,660	24,318	69,000	600	1,025,000	340,000	168,000	200	551,000	0
Dec-04	25,387,000	13	2,175	45,360	23,330	101,000	100	1,534,000	419,000	188,00	100	479000	0
Totals	2,526,137,000	863	179,191	3,900,800	2,328,998	38,567,700	378,900	111,829,000	36,521,000	2,264,100	31,497,600	49,553,900	6,744,700
Average	42,102,283	14	2,987	65,013	38,817	642,795	6,315	1,863,817	608,683	37,735	524,960	825,898	112,412

Appendix E Village of Logan Water System

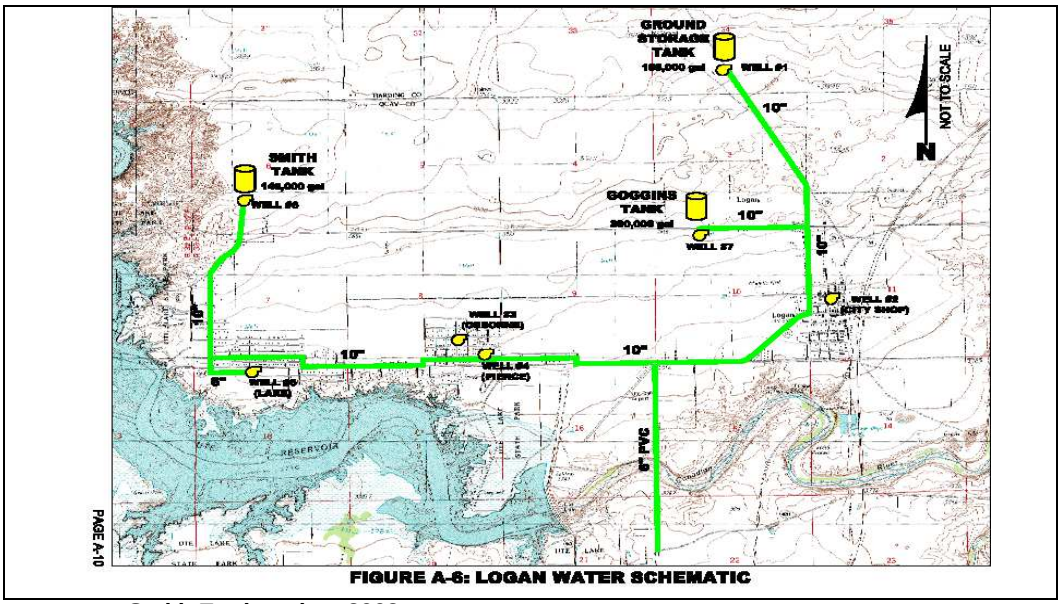


FIGURE A-6: LOGAN WATER SCHEMATIC

Smith Engineering, 2003

VILLAGE OF LOGAN WATER PRODUCTION

2004

Water Well	Jan-04	Feb-04	Mar-04	Apr-03	May-04	Jun-04	Jul-04	Aug-04	Sep-04	Oct-04	Nov-04	Dec-04	Total for 2004	Acre-Feet
1	1608600	512400	1508800	3033000	4475100	2017400	7132200	3187500	4232600	1368400	534700	431100	30,041,800	92.19
2													0	0.00
3													0	0.00
4													0	0.00
5													0	0.00
6	2636600	3528600	3432500	3309800	3302700	3643370	2488430	1726100	3691300	1865800	1261700	891400	31,778,300	97.52
7					2068200	2054200	823000	87900	147100	0	0	0	5,180,400	15.90
8	44000	59000	180000	105000	204000	2566000	1419000	199000	431000	74000	234000	3000	5,518,000	16.93
Osborn								3017900	3477600	2777400	3175300	3575900	16,024,100	49.18
Total	4,289,200	4,100,000	5,121,300	6,447,800	10,050,000	10,280,970	11,862,630	8,218,400	11,979,600	6,085,600	5,205,700	4,901,400	88,542,600	271.73

2003

Water Well	Jan-03	Feb-03	Mar-03	Apr-03	May-03	Jun-03	Jul-03	Aug-03	Sep-03	Oct-03	Nov-03	Dec-03	Total for 2003	Acre-Feet
1	1,053,400	983,400	3,404,500	4,629,900	4,973,700	2,553,600	3,185,600	4,383,000	4,901,000	3,934,400	4,649,300	3,482,000	42,133,800	129.30
2													0	0.00
3													0	0.00
4													0	0.00
5													0	0.00
6	3,316,700	2,836,500	3,058,200	2,264,700	3,136,900	2,835,400	2,788,100	3,189,500	201,800	0	0	0	23,627,800	72.51
7	0	0	88,200	167,300	3,118,300	3,693,900	4,446,000	4,231,200	4,748,200	86,800	0	0	20,579,900	63.16
8	0	0	212,000	406,000	940,000	2,656,000	4,909,000	5,505,000	3,917,000	2,955,000	641,000	221,000	22,362,000	68.63
Total	4,370,100	3,819,900	6,762,900	7,467,900	12,168,900	11,738,900	15,328,700	17,308,700	13,768,000	6,976,200	5,290,300	3,703,000	108,703,500	333.60

2002

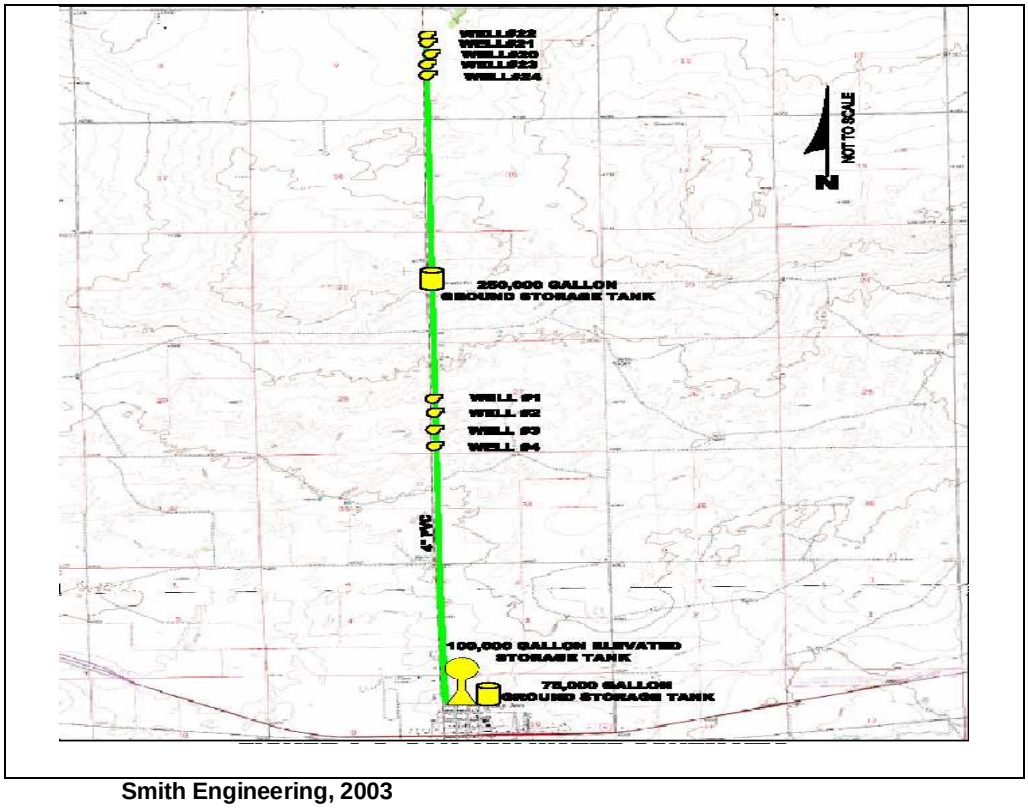
Water Well	Jan-02	Feb-02	Mar-02	Apr-02	May-02	Jun-02	Jul-02	Aug-02	Sep-02	Oct-02	Nov-02	Dec-02	Total for 2002	Acre-Feet
1	807,500	1,179,000	2,378,500	4,293,000	4,715,200	3,369,100	5,819,000	5,163,900	4,434,400	4,653,500	1,085,200	655,200	38,553,500	118.32
2													0	0.00
3	0	220,000	84,000	0	0	0	0	0	0	0	0	0	304,000	0.93
4													0	0.00

VILLAGE OF LOGAN WATER PRODUCTION

5													0	0.00
6	4,123,200	2,570,200	3,532,600	3,582,800	3,377,400	3,369,100	3,577,600	2,954,000	3,201,800	3,322,400	2,763,000	2,847,000	39,221,100	120.36
7	400	0	0	0	0	21,857	2,753,400	2,655,700	988,000	241,000	2,200	0	6,662,557	20.45
8	70,000	425,000	129,500	635,500	3,540,000	3,178,000	3,319,000	1,889,000	1,431,000	0	236,000	0	14,853,000	45.58
Total	5,001,100	4,394,200	6,124,600	8,511,300	11,632,600	9,938,057	15,469,000	12,662,600	10,055,200	8,216,900	4,086,400	3,502,200	99,594,157	305.64
2001														
Water Well	Jan-01	Feb-01	Mar-01	Apr-01	May-01	Jun-01	Jul-01	Aug-01	Sep-01	Oct-01	Nov-01	Dec-01	Total for 2001	Acre-Feet
1	858,500	421,500	637,700	2,299,200	5,258,600	2,848,200	6,283,500	6,132,900	2,393,600	0	0	150,800	27,284,500	83.73
2													0	0.00
3													0	0.00
4													0	0.00
5													0	0.00
6	3,892,800	2,317,900	0	1,627,300	3,904,000	2,603,700	2,982,100	4,632,900	3,862,900	4,720,800	2,845,600	3,302,400	36,692,400	112.60
7	0	0	0	339,000	0	2,199,600	2,997,900	1,898,500	24,000	881,500	129,900	0	8,470,400	25.99
8	0	0	0	201,000	384,000	1,057,000	5,425,000	3,969,000	1,120,900	199,000	474,000	105,000	12,934,900	39.70
Total	4,751,300	2,739,400	637,700	4,466,500	9,546,600	8,708,500	17,688,500	16,633,300	7,401,400	5,801,300	3,449,500	3,558,200	85,382,200	262.03
2000														
Water Well	Jan-00	Feb-00	Mar-00	Apr-00	May-00	Jun-00	Jul-00	Aug-00	Sep-00	Oct-00	Nov-00	Dec-00	Total for 2000	Acre-Feet
1	256,600	894,600	2,329,700	2,502,500	4,574,600	4,951,500	5,795,500	5,509,200	4,288,600	2,154,600	422,200	1,315,300	34,994,900	107.40
2													0	0.00
3	0	0	0	0	0	3,121,000	3,532,000	3,771,900	3,673,100	1,722,800	0	0	15,820,800	48.55
4													0	0.00
5													0	0.00
6	4,147,400	3,171,100	3,076,200	3,281,200	3,618,900	3,711,400	3,980,500	4,104,000	3,938,100	4,352,800	3,409,300	2,721,300	43,512,200	133.53
7	0	0	0	0	4,369,100	1,764,700	3,703,000	1,603,900	2,193,200	1,297,900	61,700	0	14,993,500	46.01
8	0	0	261,000	0	491,000	2,153,000	5,319,000	2,461,000	2,082,000	776,000	0	24,000	13,567,000	41.64
Total	4,404,000	4,065,700	5,666,900	5,783,700	13,053,600	15,701,600	22,330,000	17,450,000	16,175,000	10,304,100	3,893,200	4,060,600	122,888,400	377.13
1999														
Water Well	Jan-99	Feb-99	Mar-99	Apr-99	May-99	Jun-99	Jul-99	Aug-99	Sep-99	Oct-99	Nov-99	Dec-99	Total for 1999	Acre-Feet
1	-200	5,100	425,200	2,185,700	1,896,500	2,365,400	3,175,000	5,075,600	5,880,200	3,307,900	798,700	1,744,400	26,859,500	82.43
2													0	0.00

VILLAGE OF LOGAN WATER PRODUCTION														
3	122,600	0	0	0	0	3,867,900	3,217,300	2,163,200	1,000	0	0	0	9,372,000	28.76
4													0	0.00
5													0	0.00
6	4,725,600	3,043,500	3,596,400	4,175,600	3,021,200	3,680,700	3,648,000	1,527,900	4,043,700	3,685,000	3,797,400	2,160,700	41,105,700	126.15
7	-500	2000	4100	90700	37200	10900	1084800	1,005,300	1,127,700	0	0	0	3,362,200	10.32
8													0	0.00
Total	4,847,500	3,050,600	4,025,700	6,452,000	4,954,900	9,924,900	11,125,100	9,772,000	11,052,600	6,992,900	4,596,100	3,905,100	80,699,400	247.66
1998														
Water Well	Jan-98	Feb-98	Mar-98	Apr-98	May-98	Jun-98	Jul-98	Aug-98	Sep-98	Oct-98	Nov-98	Dec-98	Total for 1998	Acre-Feet
1	500	0	0	391,300	589,900	1,261,900	4,020,500	-319,700	354,400	80,300	-24,100	-1,400	6,353,600	19.50
2													0	0.00
3	3,932,700	3,425,700	3,559,500	3,635,000	3,242,800	3,859,400	3,996,600	3,224,000	3,324,100	3,452,100	3,501,300	2,849,200	42,002,400	128.90
4													0	0.00
5													0	0.00
6	702,100	127,400	61,600	1,828,500	1,627,000	3,443,600	3,565	1,104,200	1,236,600	702,300	285,200	160,400	11,282,465	34.62
7	0	0	0	0	4,666,500	8,216,900	0	6,335,900	6,407,300	4,789,400	2,300	0	30,418,300	93.35
8													0	0.00
Total	4,635,300	3,553,100	3,621,100	5,854,800	10,126,200	16,781,800	8,020,665	10,344,400	11,322,400	9,024,100	3,764,700	3,008,200	90,056,765	276.37

Appendix F Village of San Jon Water System

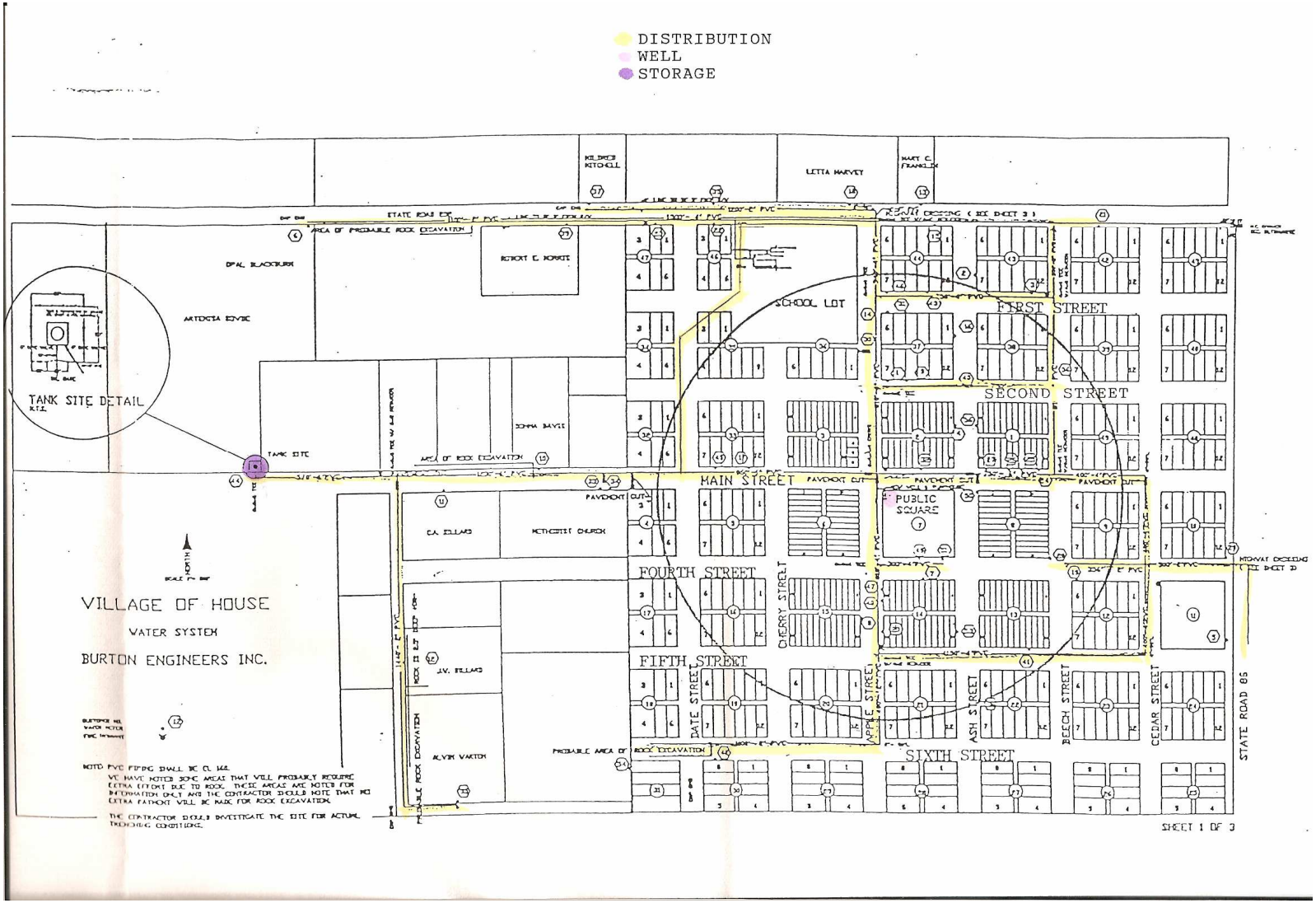


Smith Engineering, 2003

Village of San Jon Water System 2004/2005 (Gallons)

DATE	INSIDE COMMERCIAL	INSIDE RESIDENTIAL	OUTSIDE CUSTOMERS	OUTSIDE RESIDENTIAL	VILLAGE USE	TOTAL USAGE	WATER PURCHASED FROM LOGAN
Jul-04	664,730	904,320	27,260	40,550	111,560	1,748,420	793,000
Aug-04	821,350	762,560	69,480	28,890	5,480	1,687,760	396,000
Sep-04	728,660	1,041,220	65,360	23,720	6,820	1,865,780	392,000
Oct-04	653,680	550,790	6,990	9,750	9,590	1,230,800	1,358,000
Nov-04	409,590	489,330	7,040	10,860	2,550	919,370	1,385,000
Dec-04	529,530	564,960	8,920	9,630	9,200	1,122,240	1,220,000
Jan-05	333,130	497,480	9,010	7,060	33,600	880,280	1,220,000
Feb-05	457,630	533,160	7,240	27,770	3,020	1,028,820	1,180,000
Mar-05	405,600	432,940	6,220	9,930	100	854,790	1,040,000
Apr-05	407,010	525,560	7,520	15,200	900	956,190	1,010,000
May-05	635,110	632,550	9,710	14,050	10,950	1,302,370	1,560,000
Jun-05	605,030	1,001,080	7,010	37,010	57,400	1,707,530	1,770,000
Jul-05	722,050	1,091,590	8,060	49,960	53,240	1,924,900	1,840,000
TOTALS	7,373,100	9,027,540	239,820	284,380	304,410	17,229,250	15,164,000

Appendix G Village of House



	Jan-04	Feb-04	Mar-04	Apr-04	May-04	Jun-04	Jul-04	Aug-04	Sep-04	Oct-04	Nov-04	Dec-04	Total for 2004
Well 1	290,900	508,900	1,136,400	423,500	831,400	825,800	612,500	397,600	766,200	350,300	302,000	295,200	6,740,700
	Jan-03	Feb-03	Mar-03	Apr-03	May-03	Jun-03	Jul-03	Aug-03	Sep-03	Oct-03	Nov-03	Dec-03	Total for 2003
Well 1	299,400	435,800	1,083,000	2,136,500	1,824,000	1,473,200	1,225,400	1,233,200	1,214,700	619,200	327,700	489,200	12,361,300
	Jan-02	Feb-02	Mar-02	Apr-02	May-02	Jun-02	Jul-02	Aug-02	Sep-02	Oct-02	Nov-02	Dec-02	Total for 2002
Well 1	246400	251000	508300	741700	852100	959200	993,300	1,336,300	769,300	603,900	327,100	296,400	7,885,000
	Jan-01	Feb-01	Mar-01	Apr-01	May-01	Jun-01	Jul-01	Aug-01	Sep-01	Oct-01	Nov-01	Dec-01	Total for 2001
Well 1	592,300	249,900	147,800	274,300	617,700	561,500	577,700	780,400	634,200	1,337,500	775,700	321,600	6,870,600
	Jan-00	Feb-00	Mar-00	Apr-00	May-00	Jun-00	Jul-00	Aug-00	Sep-00	Oct-00	Nov-00	Dec-00	Total for 2000
Well 1	158,100	390,700	237,900	236,800	489,500	557,700	353,600	689,600	679,200	380,500	170,400	172,000	4,516,000
	Jan-99	Feb-99	Mar-99	Apr-99	May-99	Jun-99	Jul-99	Aug-99	Sep-99	Oct-99	Nov-99	Dec-99	Total for 1999
Well 1	222,400	167,500	182,900	533,200	295,800	421,400	300,700	489,900	636,800	282,300	541,600	147,200	4,221,700
	Jan-98	Feb-98	Mar-98	Apr-98	May-98	Jun-98	Jul-98	Aug-98	Sep-98	Oct-98	Nov-98	Dec-98	Total for 1998
Well 1	205,700	144,800	191,700	232,900	375,400	412,600	647,000	270,000	363,000	271,700	163,100	135,000	3,412,900
	Jan-97	Feb-97	Mar-97	Apr-97	May-97	Jun-97	Jul-97	Aug-97	Sep-97	Oct-97	Nov-97	Dec-97	Total for 1997
Well 1	222,900	280,300	237,900	253,000	222,400	425,700	536,300	260,900	344,300	240,000	159,100	201,000	3,383,800
	Jan-96	Feb-96	Mar-96	Apr-96	May-96	Jun-96	Jul-96	Aug-96	Sep-96	Oct-96	Nov-96	Dec-96	Total for 1996
Well 1	170,900	222,300	266,500	396,500	583,700	376,100	326,800	364,300	316,900	311,600	143,100	155,600	3,634,300
	Jan-95	Feb-95	Mar-95	Apr-95	May-95	Jun-95	Jul-95	Aug-95	Sep-95	Oct-95	Nov-95	Dec-95	Total for 1995
Well 1	264,600	232,400	315,800	400,600	418,900	472,700	442,100	529,400	449,600	445,880	147,710	374,000	4,493,690

Appendix H Water Conservation Ordinance

ORDINANCE NO. 1012

AN ORDINANCE ADDING CHAPTER 13.06 TO THE TUCUMCARI MUNICIPAL CODE ESTABLISHING GUIDELINES FOR WATER CONSERVATION DURING DROUGHT CONDITIONS.

WHEREAS, the State of New Mexico has experienced drought conditions and long-term predictions are for unusually dry conditions to continue; and

WHEREAS, the State of New Mexico encourages communities to prepare for long-term drought by adopting water conservation ordinances; and

WHEREAS, the City of Tucumcari does not currently have specific regulations on water conservation;

NOW, THEREFORE, BE IT ORDAINED BY THE GOVERNING BODY OF THE CITY OF TUCUMCARI, NEW MEXICO THAT:

Section 1. Chapter 13.06 is added to the Tucumcari Municipal Code, to read as follows:

WATER CONSERVATION

Section 2. Sections 13.06.010 through 13.06.050 are added to the Tucumcari Municipal Code to read as follows:

13.06.010 - Title; purpose.

This article shall be known as the Water Conservation Ordinance. This article shall both require and encourage all users of water within the city limits to reduce water consumption and waste.

13.06.020 - Water conservation compliance.

No person, firm, corporation, water association, or government facility or operation using water from the City of Tucumcari water system shall make, cause, use or permit the use of water in a manner contrary to provisions of this Chapter. All users of domestic wells and users of irrigation water provided by Arch Hurley Conservancy District within the jurisdiction of the City shall be exempt from the requirements of this Chapter to the extent of such well use provided as authorized by Sections 3-53-1 and 3-53-2 NMSA 1978, and with the exception of Section 13.06.030 on prohibition of water waste.

13.06.030 - Water waste prohibited.

A. No person, firm, corporation, or government facility or operation shall waste, cause or permit to be wasted any water from the City water system. Water waste is defined as the non-beneficial use of water. Non-beneficial use includes but is not restricted to the excessive application of water such that it overflows the landscaped area being watered or other area of water use and runs onto adjacent property or public right-of-way.

B. Restrictions in this Chapter do not apply to water flows resulting from fire fighting, hydrant flushing or fire training activities; water applied to prevent or abate health, safety or accident hazards, or water flows from routine maintenance of the municipal water system or from temporary water system failures or malfunctions. Restrictions on landscape irrigation do not apply to re-use of grey water, effluent (treated wastewater) or nonpotable water.

13.06.040 - Declaration of Water Conservation Levels.

A. The City Manager, upon the recommendation of the Water Department Superintendent, is hereby authorized to declare Water Conservation Levels through public notice. The Conservation Levels shall be initiated based upon the relationship between water demand and municipal safe production and delivery capability.

1. "Safe production capability" is 80% of the total water resources available, based upon well production capacities, booster station capacities, distribution components, storage reserves, aquifer levels, water rights, weather conditions, and historic data.

2. "Total production capability" is 100% of the total water resources available. The Water Department Superintendent shall determine total production capability and update it as water resource conditions change.

B. Declarations by public notice shall be made by public service announcements through electronic media, and shall be published a minimum of one time in a local newspaper(s) of general circulation. The Water Conservation Level declared shall become effective immediately upon the first announcement.

C. The following Water Conservation Levels shall govern the use of water by customers using water from the City water system, as prescribed below:

1. Water Conservation Level I: Voluntary Water Conservation.

(a) Level I shall be initiated when annual precipitation for each of the previous two years is equal to or less than 80% of the long-term annual average. This determination will be based on annual precipitation figures for the period May 1st through April 30th, as measured at the long-term Tucumcari 4 NE gage.

(b) Water users are encouraged to minimize use of water for landscape irrigation, vehicle and pavement washing, construction, and other water consuming activities. Voluntary compliance with Level II restrictions is encouraged.

2. Water Conservation Level II: Water Restrictions. Level II shall be initiated when demand is greater than safe production capability for two (2) consecutive weeks. No person or entity using water from the City's water system shall:

(a) Use water outdoors for landscape watering or refilling of ponds or pools except as provided:

i. Water use is restricted to the following days of the week:

1. Properties with even-numbered addresses are restricted to said uses on Monday, Wednesday, Friday, and Sunday, and

2. Properties with odd-numbered addresses are restricted to said uses on Tuesday, Thursday, Saturday, and Sunday.

ii. Landscape irrigation is restricted to the time period before 10 AM and after 6 PM on the applicable day; however, outdoor irrigation under manual control (e.g. watering from a hose with a shutoff nozzle or from a bucket or watering can) is permissible at any time on the applicable day.

(b) Wash vehicles unless a bucket and hose with a positive cut-off nozzle is used; however these restrictions do not apply to vehicles that must be washed for public health, safety, or welfare, or to commercial car washes.

(c) Wash paved areas such as driveways, sidewalks, parking lots, and tennis courts, except for health or safety.

3. Water Conservation Level III: Water Crisis. Level III shall be initiated when water demand equals or exceeds total production or delivery capability at any time. This level constitutes an emergency situation, and can be declared immediately by the City Manager. At this level, no person or entity using water from the City's water system shall use any water outdoors for any purpose unless required for public health, safety, and welfare.

D. In addition to the restrictions listed above, the City Manager may impose specific restrictions on large water users if deemed necessary to protect the City's water resources and health and safety of its citizens. The City Manager may also consider alternatives to the specified outdoor watering schedules for water users with large turf areas (e.g. half one day, half the next day).

E. The Water Department Superintendent may make recommendations at any time with regard to moratoriums on the extension of water mains, consistent with City policy.

13.06.050 - Penalties and Enforcement.

A. Assessment of fees for violations of the provisions of Chapter 13.06, Sections 13.06.010 through 13.06.040 will be through the City utilities billing department for the responsible party's billing account. Fees and service cutoff may be suspended pending the outcome of an appeal. The schedule for assessment of fees and cutoff of service shall be as follows:

1. Water Conservation Level I: Compliance is voluntary. Warnings will be issued for water waste.

2. Water Conservation Level II:

a) First observed violation: Issuance of notice of violation.
b) Second observed violation: $20 fee.
c) Third observed violation: $50 fee.
d) Fourth observed violation: $100 fee.
e) Fifth observed violation: $100 fee plus cutoff of service.

3. Water Conservation Level III:

a) First observed violation: Issuance of notice of violation.
b) Second observed violation: A fee equal to 25% of the previous month's water bill, but no less than $50 or greater than $500.
c) Third observed violation: A fee equal to 50% of the previous month's water bill, but no less than $100 or greater than $1000.
d) Fourth observed violation: A fee equal to 50% of the previous month's water bill, but no less than $100 or greater than $1000, and cutoff of service.

B. Procedure for assessment of fees: All assessments of fees for violations of the provisions of Chapter 13.06, Sections 13.06.010 through 13.06.040 shall be upon the issuance of a notice of violation. Within five (5) business days of the issuance of a notice of violation, the responsible party shall be sent by certified mail a copy of the notice of violation, along with a statement of the fee to be assessed. The notice to the responsible party also shall include a notice of the party's right to appeal the assessment pursuant to the provisions of subsection (c) hereof. Fees shall be assessed to the responsible party's billing account, listed as a separate line item on the utility bill, and cutoff of service shall be effected on the sixteenth (16th) day following the expiration of the appeal period, the date of issuance of the determination of any appeal, or the date of the City Commission's action upon a review hearing, whichever applicable date is later. The fees must be paid within the normal payment period allowed by the City utility billing system.

C. Appeal of assessment of fees: A responsible party may appeal an assessment of fees or notice of cutoff of service for violations of the provisions of Chapter 13.06, Sections 13.06.010 through 13.06.040 by

delivering to the City Manager, within ten (10) days after the date the notice of violation was mailed, a written notice of appeal of the imposition of the fee or cutoff of service. The notice of appeal shall identify the property and state the grounds of appeal together with all material facts in support thereof. Upon receipt of the notice of appeal, the City Manager shall be provided with copies of the notice of violation appealed from and any documents and photographs supporting the notice of violation. Within seven (7) working days of the date he receives copies of the notice of violation and supporting documents, the City Manager shall issue a written decision on the appeal either upholding the assessment of fees or cutoff of service, modifying the assessment or cutoff, or overruling the assessment or cutoff. Copies of the City Manager's written decision shall be mailed by certified mail to the appealing responsible party, and sent to the City utility billing department, along with a notice of the responsible party's right to request a review hearing before the City Commission pursuant to the provisions of subsection (D) hereof.

D. Review of appeal decision: If a responsible party does not agree with the City Manager's written appeal decision, the party shall, within ten (10) days after the date of mailing of the decision, file with the City Clerk a written request for a hearing before the City Commission. The request for hearing shall identify the property, attach a copy of the City Manager's decision, and state the grounds of appeal to the City Commission together with all material facts in support thereof. The City Clerk shall schedule the hearing for the next regular meeting according to the adopted schedule of the City Commission, providing adequate time to ensure that the public notice requirements can be satisfied, or such later time as is mutually agreed upon by the responsible party and the City Manager. The City Clerk shall send written notice by certified mail to the responsible party of the time and place of the hearing before the City Commission. At the hearing testimony and evidence shall be taken under oath or affirmation, and the responsible party shall have the right to present evidence and ask questions of persons who testify as to the alleged facts upon which the assessment of fee or cutoff of service was based and any other relevant and material facts which may aid the City Commission in determining whether the violation of the provisions of Chapter 13.06, Sections 13.06.010 through 13.06.040 occurred. If, upon such hearing, a majority of those present and voting of the City Commission are of the opinion the City Manager's decision was correct, then said decision shall be affirmed; otherwise the Commission shall have the power to revise the City Manager's decision.

E. Any person who violates the provisions of Chapter 13.06, Sections 13.06.010 through 13.06.040, for which no other penalty is set forth, shall be subject to the general penalty provision of this Code as set forth in Section 13.06.050(A).

F. Authority to enforce the provisions of this Chapter shall be assigned to, but not limited to, all police officers, and code enforcement officers of the City. Other City employees may be assigned enforcement authority as deemed necessary by the City Manager.

PASSED, ADOPTED AND APPROVED this 15th day of December, 2005.

Attest:

Mary Mayfield, Mayor

Jeannette Maddaford, City Clerk

Appendix I

Table 1-1 shows water use in each category for the years 1975, 1980, 1985, 1990, 1995, and 2000 based on the OSE inventories for those years (Sorensen, 1976; Sorensen, 1981; Wilson, 1986; Wilson, 1992; Wilson and Lucero, 1997, Wilson, 2002). Over the years, the OSE has made a few changes in the way that water demand is categorized and reported, including:

- Fish and wildlife and recreation were previously (1975 through 1985) reported as separate categories but are now included in the commercial category.
- Rural, urban, and military uses were separate categories until 1990, when they were replaced with the public water supply and self-supplied domestic categories.
- The OSE stopped reporting stock pond evaporation (which was previously a separate category) after 1985.
- The OSE water use data include only the amount of water that is used by people or is indirectly used through a man-made structure (i.e., reservoir evaporation) and thus does not include natural riparian consumption.

Table1-1. Quay County Water Use, 1975 Through 2000

	Withdrawal		Depletion		Return Flow		Totals		
	Surface Water	Ground Water	Surface Water	Ground Water	Surface Water	Ground Water	Withdrawal	Depletion	Return Flow
1975									
Urban	0	1706	0	768	0	938	1706	768	938
Rural	0	230	0	115	0	115	230	115	115
Public Water Supply									
Domestic (self-supplied)									
Irrigated Agriculture	60740	34860	21570	18450	39170	16410	95600	40020	55580
Livestock (self-supplied)	634	634	634	634	0	0	1268	1268	0
Stock pond Evaporation	4246	0	4246	0	0	0	4246	4246	0
Commercial (self-supplied)	0	0	0	0	0	0	0	0	0
Industrial (self-supplied)	0	43	0	26	0	17	43	26	17
Minerals	0	0	0	0	0	0	0	0	0
Power (self-supplied)	0	17	0	17	0	0	17	17	0
Fish and Wildlife	15300	0	15300	0	0	0	15300	15300	0
Recreation	0	0	0	0	0	0	0	0	0
Reservoir Evaporation	500	0	500	0	0	0	500	500	0
TOTAL:	81420	37490	42250	20010	39170	17480	118910	62260	56650
1980									
Urban	0	1720	0	774	0	946	1720	774	946
Rural	0	305	0	153	0	152	305	153	152
Public Water Supply									
Domestic (self-supplied)									
Irrigated Agriculture	72750	25110	27510	15830	45240	9280	97860	43340	54520
Livestock (self-supplied)	327	338	327	336	0	2	665	663	2
Stock pond Evaporation	5292	0	5292	0	0	0	5292	5292	0
Commercial (self-supplied)	0	0	0	0	0	0	0	0	0

Table1-1. Quay County Water Use, 1975 Through 2000									
	Withdrawal		Depletion		Return Flow		Totals		
	Surface Water	Ground Water	Surface Water	Ground Water	Surface Water	Ground Water	Withdrawal	Depletion	Return Flow
Industrial (self-supplied)	0	0	0	0	0	0	0	0	0
Mining (self-supplied)	0	3	0	1	0	2	3	1	2
Power (self-supplied)	0	0	0	0	0	0	0	0	0
Fish and Wildlife	20000	0	20000	0	0	0	20000	20000	0
Recreation	75	0	69	0	6	0	75	69	6
Reservoir Evaporation	2959	0	2959		0	0	2959	2959	0
TOTAL:	101403	27476	56157	17094	45246	10382	128879	73251	55628
1985									
Urban	0	1807	0	813	0	994	1807	813	994
Rural	0	427	0	214	0	213	427	214	213
Public Water Supply									
Domestic (self-supplied)									
Irrigated Agriculture	68810	14369	19358	8872	49452	5497	83179	28230	54949
Livestock (self-supplied)	333	345	333	343	0	2	678	676	2
Stock pond Evaporation	5292	0	5292	0	0	0	5292	5292	0
Commercial (self-supplied)	0	0	0	0	0	0	0	0	0
Industrial (self-supplied)	0	11	0	6	0	5	11	6	5
Minerals	0	12	0	2	0	10	12	2	10
Power (self-supplied)	0	0	0	0	0	0	0	0	0
Fish and Wildlife	0	0	0	0	0	0	0	0	0
Recreation	98	15	64	15	34	0	113	79	34
Reservoir Evaporation	12381	0	12381	0	0	0	12381	12381	0
TOTAL:	86914	16986	37428	10265	49486	6721	103900	47693	56207
1990									
Urban									

Table1-1. Quay County Water Use, 1975 Through 2000									
	Withdrawal		Depletion		Return Flow		Totals		
	Surface Water	Ground Water	Surface Water	Ground Water	Surface Water	Ground Water	Withdrawal	Depletion	Return Flow
Rural									
Public Water Supply	81	1971	70	968	11	1003	2052	1038	1014
Domestic (self-supplied)	0	155	0	70	0	85	155	70	85
Irrigated Agriculture	78484	18586	31161	14721	47323	3865	97070	45882	51188
Livestock (self-supplied)	68	652	68	650	0	2	720	718	2
Stock pond Evaporation									
Commercial (self-supplied)	0	7	0	3	0	4	7	3	4
Industrial (self-supplied)	0	0	0	0	0	0	0	0	0
Mining (self-supplied)	0	2	0	0	0	2	2	0	2
Power (self-supplied)	0	0	0	0	0	0	0	0	0
Fish and Wildlife									
Recreation									
Reservoir Evaporation	34055	0	34055	0	0	0	34055	34055	0
TOTAL:	112688	21373	65354	16412	47334	4961	134061	81766	52295
1995									
Urban									
Rural									
Public Water Supply	81	2060	70	996	11	1064	2141	1066	1075
Domestic (self-supplied)	0	139	0	63	0	76	139	63	76
Irrigated Agriculture	119333	28023	40077	21387	79256	6636	147356	61464	85892
Livestock (self-supplied)	72	660	72	660	0	0	732	732	0
Stock pond Evaporation									
Commercial (self-supplied)	0	11	0	5	0	6	11	5	6
Industrial (self-supplied)	0	0	0	0	0	0	0	0	0
Mining (self-supplied)	0	0	0	0	0	0	0	0	0

Table1-1. Quay County Water Use, 1975 Through 2000

	Withdrawal		Depletion		Return Flow		Totals		
	Surface Water	Ground Water	Surface Water	Ground Water	Surface Water	Ground Water	Withdrawal	Depletion	Return Flow
Power (self-supplied)	0	0	0	0	0	0	0	0	0
Fish and Wildlife									
Recreation									
Reservoir Evaporation	32938	0	32938	0	0	0	32938	32938	0
TOTAL:	152424	30893	73157	23111	79267	7782	183317	96268	87049
2000									
Urban									
Rural									
Public Water Supply	0.00	2172	0.00	1256	0.00	917	2172	1256	917
Domestic (self-supplied)	0	138	0	138	0	0	138	11	0
Irrigated Agriculture	107954	6546	34912	5523	73042	1023	114500	40435	74065
Livestock (self-supplied)	87	792	87	792	0.00	0.00	878	878	0
Stock pond Evaporation									
Commercial (self-supplied)	0	11	0	11	0	0	11	11	0
Industrial (self-supplied)	0	0	0	0	0	0	0	0	0
Mining (self-supplied)	0	0	0	0	0	0	0	0	0
Power (self-supplied)	0	0	0	0	0	0	0	0	0
Fish and Wildlife									
Recreation									
Reservoir Evaporation	32938	0	32938	0	0	0	32938	32938	0
TOTAL:	140979	9659	67937	7719	73042	1940	150638	75656	74982

SOURCE: OSE
Note; For water years 1985, 1980, and 1975, no return flow was reported by the OSE. The number shown here for these years is the potential return flow, calculated by subtracting the depletion from the withdrawal

The historic diversion, delivery, and efficiency of the Tucumcari Project, Arch Hurley Conservancy District is reflected in Table I-2.

Table I-2 Arch Hurley Conservancy District Water Usage 1946-2003

Year	Water Released (Acre-Feet)	Water Delivered (Acre-Feet)	Delivery Efficiency	Total Acres Irrigated	Average Delivery per Acre (Acre-Feet)	Allocation (inches)
1946	NR	NR	NR	2527		
1947	38,000	11,119	29.26%	4563	2.44	
1948	81,167	22,818	28.11%	16069	1.42	
1949	78,389	27,462	35.03%	22510	1.22	
1950	106,611	45,451	42.63%	31563	1.44	
1951	128,111	61,305	47.85%	33318	1.84	
1952	132,960	67,064	50.44%	33755	1.99	
1953	87,345	42,792	48.99%	35783	1.20	
1954	64,559	39,216	60.74%	29440	1.33	
1955	86,859	50,807	58.49%	33616	1.51	
1956	105,326	58,909	55.93%	33140	1.78	
1957	84,897	47,824	56.33%	33615	1.42	
1958	79,528	36,259	45.59%	33554	1.08	
1959	102,746	51,981	50.59%	33727	1.54	12
1960	62,200	29,041	46.69%	31854	0.91	18
1961	82,998	46,013	55.44%	34398	1.34	24
1962	117,962	68,110	57.74%	34532	1.97	24
1963	113,613	64,187	56.50%	36540	1.76	24
1964	79,166	40,860	51.61%	32668	1.25	13
1965	78,894	42,851	54.31%	33714	1.27	36
1966	105,532	61,939	58.69%	35559	1.74	48
1967	99,131	55,741	56.23%	37588	1.48	36
1968	113,467	63,841	56.26%	37688	1.69	48
1969	80,444	43,244	53.76%	36300	1.19	48
1970	91,402	53,427	58.45%	35283	1.51	36
1971	96,926	56,435	58.22%	34822	1.62	24
1972	69,382	37,567	54.15%	33177	1.13	18
1973	94,863	55,778	58.80%	36353	1.53	36
1974	115,751	69,512	60.05%	35542	1.96	24
1975	60,738	32,052	52.77%	33752	0.95	9
1976	20,780	9,065	43.62%	35086	0.26	1

Table I-2 Arch Hurley Conservancy District Water Usage 1946-2003						
Year	Water Released (Acre-Feet)	Water Delivered (Acre-Feet)	Delivery Efficiency	Total Acres Irrigated	Average Delivery per Acre (Acre-Feet)	Allocation (inches)
1977	38,103	18,532	48.64%	37417	0.50	6.5
1978	51,686	25,950	50.21%	33173	0.78	8
1979	65,547	34,475	52.60%	31628	1.09	18
1980	72,748	41,128	56.53%	32902	1.25	18
1981	47,915	24,922	52.01%	32792	0.76	10
1982	66,275	38,716	58.42%	29704	1.30	18
1983	79,093	47,995	60.68%	20265	2.37	24
1984	75,043	39,750	52.97%	30871	1.29	18
1985	68,810	40,282	58.54%	31198	1.29	24
1986	64,782	36,676	56.61%	28321	1.30	18
1987	71,174	34,291	48.18%	26134	1.31	24
1988	62,487	32,260	51.63%	23683	1.36	24
1989	70,136	38,037	54.23%	32995	1.15	24
1990	78,491	41,965	53.46%	32500	1.29	18
1991	59,818	28,459	47.58%	32235	0.88	18
1992	85,277	53,735	63.01%	30137	1.78	24
1993	93,463	49,647	53.12%	34855	1.42	24
1994	95,261	49,656	52.13%	32817	1.51	24
1995	106,859	55,091	51.55%	32748	1.68	30
1996	95,648	44,754	46.79%	34466	1.30	24
1997	101,531	41,139	40.52%	33377	1.23	18
1998	109,089	67,817	62.17%	32227	2.10	24
1999	95,955	46,127	48.07%	32752	1.41	18
2000	118,244	60,241	50.95%	32302	1.86	24
2001	92,519	44,852	48.48%	30987	1.45	18
2002	15,472	7,205	46.57%	19445	0.37	3
2003	0	0	0.00%	0	0.00	0
Totals	4,641,173	2,436,372	2908.95%	1,771,440	77.83	981
Average	81,424	42,743	51.03%	31,078	1.37	22
Minimum	0	0	0	0	0	0
Maximum	132,960	69,512	63.01%	37,688	2.44	48

Source: AHCD

Appendix J

40 Year Water Plan Resolutions

VILLAGE OF LOGAN
RESOLUTION NO. 392

WHEREAS, Quay County is part of the Northeastern New Mexico Planning Region which is one of 16 planning regions in New Mexico that are in the process of developing a regional water plan;

WHEREAS, the purpose of regional water planning is to protect New Mexico water resources and to ensure that each region is prepared to meet future demands; and

WHEREAS, the local governmental entities within Quay County joined together to form the Ute Reservoir Regional Water Board which has decided to develop a Quay County Water Plan as an important component of the Northeaster Regional Water Plan, and

WHEREAS, the Quay County 40 year water plan serves as a guideline for regional water planning in Quay County and addresses the following items:

1. The region's available water supply
2. The region's water demands
3. The steps the region may undertake to meet future demands with the available supply
4. Alternatives for meeting future demands

WHEREAS, the Village council has the authority to plan water development plans for periods not to exceed 40 years from statute Section 72-1-9 NMSA, 1978, and

WHEREAS, the Village of Logan desires to build flexibility into the document and have the ability to continually address changing conditions that occur in the community, by adopting the plan by Resolution, and

WHEREAS, that the Village of Logan will use the Quay County 40 Year Water Plan, as a guide for decisions concerning the Village's development, growth, funding opportunities and strategies to address the issues impacting Logan; and as a reference for the private section in making informed decisions about the Village. The following principles shall help to guide the community decision-making.

1. Policy decisions shall be based on the short and long term recommendations of this Plan as they relate to water use, economic development, housing, transportation, infrastructure, intergovernmental cooperation and recreation;
2. Planning efforts shall be coordinated between various levels of government, other governmental entities, nonprofit organizations, and the private section, wherever appropriate;
3. The Plan will be integrated with other ongoing planning activities;
4. The Plan is not the final step in good community water planning, other steps will follow:
5. It is not a static document, as the community changes, so should the plan; and
6. Citizens participation will remain an integral part of the of the Comprehensive Plan's implementation and amendment process.

NOW THEREFORE, BE IT RESOLVED THAT THE QUAY COUNTY 40 YEAR WATER PLAN BE ADOPTED BY THE VILLAGE OF LOGAN COUNCIL.

Approved and accepted this 13th day of July, 2004.

Signed
Zaida Babb
Mayor

ATTEST: **Signed**
Angelina Cordova-Jackson
Clerk/Treasurer

City of Tucumcari Resolution

RESOLUTION 2004-30

WHEREAS, Quay County is part of the Northeastern New Mexico Planning Region which is one of 16 planning regions in New Mexico that are in the process of developing a regional water plan; and

WHEREAS, the purpose of regional water planning is to protect New Mexico water resources and to ensure that each region is prepared to meet future demands; and

WHEREAS, the local governmental entities within Quay County joined together to form the Quay Working Group which has decided to develop a Quay County Water Plan as an important component of the Northeastern Regional Water Plan; and

WHEREAS, the Quay County 40 year water plan serves as a guideline for regional water planning in Quay County and addresses the following items:

1. The regions available water supply
2. The regions water demands
3. The steps the region may undertake to meet future demands with the available supply
4. Alternatives for meeting future demands

WHEREAS, the City Commission has the authority to plan water development for periods not to exceed 40 years in accordance with Section 72-1-9 NMSA, 1978; and

WHEREAS, the City of Tucumcari desires to build flexibility into the document and have the ability to continually address changing conditions that occur in the community, by adopting the plan by Resolution; and

WHEREAS, the City of Tucumcari will use the Quay County 40 Year Water Plan, as a guide for decisions concerning the City's development, growth, funding opportunities and strategies to address the issues impacting Tucumcari; and as a reference for the private section in making informed decisions about the City. The following principles shall help to guide the community decision making.

1. Policy decisions shall be based on the short and long term recommendations of this Plan as they relate to water use, economic development, housing, transportation, infrastructure, intergovernmental cooperation and recreation;
2. Planning efforts shall be coordinated between various levels of government, other governmental entities, nonprofit organizations, and the private section, wherever appropriate;
3. The Plan will be integrated with other ongoing planning activities;
4. The Plan is not the final step in good community water planning, other steps will follow;
5. It is not a static document, as the community changes, so should the plan; and
6. Citizen's participation will remain an integral part of the Comprehensive Plans implementation and amendment process.

NOW THEREFORE, BE IT RESOLVED, that the Quay County 40 Year Water Plan be and is hereby adopted by the City Commission of the City of Tucumcari.

PASSED, ADOPTED AND APPROVED this 26th day of August, 2004.

Attest:

Mary Mayfield, Mayor

Rachel Hicklin, City Clerk

Scanned Copy of Signed Resolution by City of Tucumcari

Appendix K
40 Year Water Joint Powers Agreement

QUAY WORKING GROUP
JOINT POWERS AGREEMENT

This Quay Working Group Joint Powers Agreement (this "Agreement") is entered into by and between the City of Tucumcari, a municipal corporation of the State of New Mexico ("Tucumcari"); the Village of Logan, a municipal corporation of the State of New Mexico ("Logan"); the Village of San Jon, a municipal corporation of the State of New Mexico ("San Jon"); the Village of House, a municipal corporation of the State of New Mexico ("House"); and the County of Quay, a political subdivision of the State of New Mexico ("Quay County"), as of the date approved by the New Mexico Secretary of Finance and Administration ("SFA").

WHEREAS, all parties to this Agreement are public agencies as defined by the Joint Powers Agreement Act [NMSA 1978, Section 11-1-1 through 11-1-7 (1961)], and are empowered pursuant to that Act to enter into Agreements to exercise common powers; and

WHEREAS, the parties desire to study the uses of water for their respective and collective entities; and

WHEREAS, the parties desire to study the quality of water; and

WHEREAS, the parties desire to develop a Forty (40) Year Water Plan to ensure that water rights are retained and protected; and

WHEREAS, all participating parties are committed to supporting the Quay Working Group in its efforts.

THEREFORE, in consideration of the foregoing recitals and the covenants and promises contained herein, the parties hereto agree as follows:

1. **Purpose**. The parties to this Agreement have expressed their desire to enter into a joint powers agreement to ensure that the quality of life is maintained in and around Quay County, including the entities of Tucumcari, Logan, San Jon, and House, New Mexico, by the protection of water rights, herein collectively referred to as "Quay Working Group". The purpose of this Agreement is to fulfill the participating entities responsibilities to carry out the mission of the Quay Working Group.

2. **Term**. This Agreement shall become effective upon signature by all parties and the State of New Mexico Secretary of Finance Administration ("SFA") and shall remain in effect until December 31, 2006, unless otherwise amended or terminated by the parties hereto.

   (a) Early Termination. Any party may withdraw from this Agreement upon ninety (90) days written notice to the other parties. By such withdrawal, no party shall negate obligations already incurred prior to the effective date of withdrawal. Withdrawal of a party shall not terminate this Agreement unless a majority of the remaining parties agree to terminate this Agreement. By such early termination

(either with or without the prior withdrawal of a party(ies), no obligation already incurred shall be negated.

(b) Completion of Projects. Upon the exercise of the provision of the preceding paragraph providing for early termination of this Agreement, the parties will begin the process of winding up all activities performed pursuant to this Agreement. The parties will notify the contractor(s) for ongoing project(s) associated with the Forty (40) Year Water Plan to complete the Project(s) in accordance with the terms of the project contract(s). No further projects will be initiated and no ongoing projects will have the time for their performance extended, nor will the scope of work for such projects be modified or expanded, without the express written agreement of the parties, signed by an authorized representative of each party.

(c) Final Accounting for Funds Upon Expiration or Early Termination; Return of Funds. Upon the expiration or early termination of this Agreement and the completion of any projects associated with the development of a Forty (40) Year Water Plan funded pursuant to this Agreement, an accounting of all funds provided by the parties for the performance of this Agreement shall be prepared. Any funds remaining after paying for all expenses related to the performance of this Agreement and projects funded pursuant to it will be returned to the parties in proportion to their contribution of such funds.

3. **Responsibilities of the Parties**.

(a) The Quay Working shall be responsible to meet at an organizational meeting at which time the parties shall adopt By-Laws of the Working Group which establish provisions regarding voting rights, financial commitments, and management responsibilities.

(b) Quay Working Group shall:
(i) oversee the development of a Forty (40) Year Water Plan and advise the parties on the financing of the Plan;
(ii) collaborate and assist in the preparation of budgets and expenditures of the Forty (40) Year Water Plan;
(iii) and collaborate and assist in such other activities as may be deemed prudent.

(c) The Quay Working Group may, subject to and in accordance with the terms of this Agreement, enter into contracts in the name of the "Quay Working Group" hereby established by this Agreement.

(d) The Quay Working Group shall:
(i) endeavor to obtain and/or provide funding (including contributions of funds and in-kind services) for the operations of the Quay Working Group; and

(ii) The Quay Working Group shall seek internal and external funding for a Forty (40) Year Water Plan.

(d) Each entity of the Quay Working Group shall provide information and data related to the Water Plan.

4. **Privileges, Exemptions, and Immunities**. Pursuant to the provisions of the Joint Powers Agreement Act [NMSA 1978, §11-1-1 through 11-1-7 (1961)], all privileges and immunities from liability, exemptions from laws, ordinances, and rules, which apply to the activity of officers, agents, or employees of any signatory public agency when performing their respective functions within the territorial limits of their respective public agencies, shall apply to them to be the same extent while engaged in the performance of any of their functions and duties extraterritorial under the provisions of the Joint Powers Agreement Act. This Agreement does not, in any matter, pre-empt or modify the respective rights and responsibilities of Tucumcari, Logan, San Jon, House, or Quay County. Nothing in this Agreement shall be construed to constitute a waiver of sovereign immunity by any party.

5. **Equal Opportunity Compliance**. The parties to this Agreement agree to abide by all applicable state and federal laws., rules, and regulations pertaining to equal employment opportunity. If a party to this Agreement is found to be not in compliance with these requirements during the term of this Agreement, such party agrees to take appropriate steps to correct such noncompliance.

6. **Third Party Beneficiaries**. This Agreement is not intended to create in the public, or any member thereof, a third party beneficiary claim or to authorize anyone not a party to this Agreement to maintain a suit for wrongful death, bodily and/or personal injury to person, damage to property, and/or any other claim(s) whatsoever.

7. **New Mexico Tort Claims Act**. By entering into this Agreement, each party agrees that it shall be responsible for liability arising from personal injury or damage to property occasioned by its own agents or employees in the performance of this Agreement, subject in all cases to the immunities and limitations of the New Mexico Tort Claims Act NMSA 1978, §41-4-1 through 41-4-29 (1976) and any amendments thereto. This section is intended only to define the liabilities between the parties hereto and is not intended to modify, in any way, the parties' liabilities as governed by common law of the New Mexico Tort Claims Act. The parties and their "public employees," as defined in the New Mexico Tort Claims Act, do not waive sovereign immunity and do not waive any defense or any limitation of liability pursuant to law. No provision in this Agreement modifies and/or waives any provision of the New Mexico Tort Claims Act.

8. **Contractual and Other Liabilities**. Each party shall be liable for its acts or failure to act in accordance with this Agreement.

9. **Accountability of Receipts and Disbursements**. There shall be strict accountability for all receipts and disbursements relating to this Agreement. The parties shall maintain all records and documents related to this Agreement for a minimum of six (6) years after expiration or earlier termination of this Agreement. The parties shall furnish the New Mexico State Auditor, upon demand, all records related to this Agreement and shall allow them the prerogative of inspecting and auditing all records which support or flow from the terms of this Agreement. If upon expiration or earlier termination of this Agreement, any party hereto, the Executive Committee, or the Advisory Committee has excess funds provided by any other party to this Agreement, such excess funds shall be returned to the party of origin.

10. **Dispute Resolution**. Before any party to this Agreement may bring suit in any court concerning any issues relating to this Agreement, such party must first seek in good faith to resolve the issue through negotiation.

11. **Amendment**. This Agreement shall not be altered, modified, or amended except by an instrument in writing and executed by the parties hereto and approved by the SFA. This Agreement may be waived only in writing signed by the party making such waiver. No party's delay or omission in exercising any power or right hereof shall impair or be construed to be a waiver of such right or power. No custom or practice that evolves between the parties shall be construed to lessen one party's right to require the other to perform in strict accordance with the terms of this Agreement. One party's waiver of the other's failure to fully comply with any terms of this Agreement shall not be construed to be a waiver of any subsequent or other failure to comply.

12. **Authority**. Nothing contained in this Agreement shall in anyway be interpreted to limit the ability of each party to exercise their inherent authority, and each party specifically retains the right, in their sole discretion, to reject any advise of proposals of the Advisory Committee or any other party or entity, and to pursue whatever course of action they deem to be in their best interest.

13. **Integration**. This Agreement incorporates all of the agreements and understandings between the parties hereto concerning the subject matter hereof, and all such agreements and understandings have been merged into this written Agreement. No prior agreements or understandings, verbal or otherwise, of the parties or their agents are valid or enforceable unless embodied in this Agreement.

14. **Calculation of Time**. Any time period herein calculated by reference to "days" means calendar days; provided, however, that if the last day for a given act falls on a Saturday, Sunday, or a holiday as observed by the State of New Mexico, the day for such act shall be the first day following that is not a Saturday, Sunday, or such observed holiday.

15. **Interpretation**. The captions and paragraph headings used herein are for descriptive purposes only and do not limit, define, or enlarge the terms of this Agreement. Unless otherwise indicated by the context, use of the singular, plural, or a gender shall include the other, and the use of the words "include" and "including" shall be construed as if "without limitation" or "but not [be] limited to" were annexed thereafter. The Parties were, or had ample opportunity to be, represented by counsel, and this Agreement shall not be interpreted for or against either party based on authorship.

16. **Survival**. Terms of this Agreement that provide for rights, duties, or obligations that expressly or logically extend beyond its expiration or termination, including Contractor's indemnity obligations, shall survive such expiration or termination.

17. **Severability**. If any terms of this Agreement, or their application to any person or circumstance, shall be held illegal, invalid, or unenforceable, the remainder of this Agreement, or the application of such terms to persons or circumstances other than those to which it is held illegal, invalid, or unenforceable, shall not be affected; provided, however, that the remainder of the Agreement is still capable of performance in substantial accordance with the original intent of the parties.

18. **Notice**. Notices and communications required or permitted under this Agreement (including change of address and facsimile or telephone number) shall be in writing and deemed fully given and received:

(a) when hand-delivered to the receiving party's street address,
(b) when sent by facsimile transmission to the receiving party's facsimile number,
(c) one (1) day after deposit with a national overnight courier addressed to the receiving party at the street address, or
(d) five (5) days after deposit in the U.S. mail, postage prepaid, addressed to the receiving party at the mailing address listed below.

City of Tucumcari, New Mexico:
Calvin Litchfield, Mayor
P.O. Box 1188
Tucumcari, NM 88401
Telephone: (505)461-3451
Facsimile: (505)461-2049

Village of Logan, New Mexico:
_____,Title_____
_____
Village of Logan, NM_____
Telephone: (505)_____
Facsimile: (505)_____

Village of San Jon, New Mexico:
_____,Title_____
_____
Village of San Jon, NM_____
Telephone: (505)_____
Facsimile: (505)_____

Village of House, New Mexico:
_____,Title_____
_____
Village of House, NM_____
Telephone: (505)_____
Facsimile: (505)_____

County of Quay, New Mexico
Franklin McCasland,Title: Commissioner
P.O. Box 1246
Tucumcari, New Mexico 88401
Telephone: (505) 461-1865 or (505) 461-2112
Facsimile: (505) 461-6208

This Agreement made and entered into this 4th day of March, 2004 by and between the City of Tucumcari, New Mexico, the Village of Logan, New Mexico, the Village of San Jon, New Mexico, the Village of House, New Mexico and the County of Quay.

CITY OF TUCUMCARI, NEW MEXICO
A Municipal Corporation

By: Calvin L. Litchfield Date: 1/23/04
Calvin Litchfield, Mayor

VILLAGE OF LOGAN, NEW MEXICO
A Municipal Corporation

By: Zaida Babb Date: 1-28-04

VILLAGE OF SAN JON, NEW MEXICO
A Municipal Corporation

By: Joe Cook Date:

VILLAGE OF HOUSE, NEW MEXICO
A Municipal Corporation
By: Sherman W Martin Date: 2/16/04

COUNTY OF QUAY, NEW MEXICO
Political Subdivision of the State of New Mexico

By: Grace E. Madrid Date: January 22, 2004

SECRETARY OF FINANCE AND ADMINISTRATION

By: Danette K Bird Date: JA 3/4/04 3/4/04

ATTEST: