

Viejas Hotel Project TEIR

Appendix E

Viejas Indian Reservation Water and Wastewater Master Plan

Prepared by Brown & Caldwell Engineers

July 2, 2001

VIEJAS INDIAN RESERVATION

WATER AND WASTEWATER MASTER PLAN

Final Report

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CONFIDENTIAL



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CHAPTER 2

WATER SUPPLY MASTER PLAN

This Water Supply Master Plan looks at system demand through build-out, including all development plans within that horizon, and compares the water requirements with the available sources of supply for the reservation. An analysis of the adequacy of that supply is made, and recommendations for alternative sources of supply are presented to overcome identified deficits. A brief determination of production capacity adequacy is made, but no analysis of distribution system hydraulics or storage is included.

Water Demand

The Viejas Indian Reservation consists of residential, institutional, and commercial properties, which use potable water for drinking, washing, bathing, culinary, waste removal, and irrigation. In the future, water consumption on the reservation will increase due to anticipated growth and redevelopment of residential and institutional service areas, and implementation of significant commercial development plans.

Average Day Demand. Existing and future average water demands were estimated using site-specific water consumption and well production data, water consumption data obtained from water purveyors located in San Diego County, and typical industry standards for water consumption. Demands were estimated for the current year (2001) and for the 5-year (2006) and 10-year (2011) planning horizons. Residential, institutional, and commercial build-out is projected to occur by 2011.

Residential and Institutional Demand – 2001. Currently, the residential property on the reservation consists of approximately 140 single-family homes, in which approximately 500 people reside. Also, the MaTarAwa RV Park provides approximately 86 RV hook-up locations for both permanent and transient residents. The institutional property consists of tribal administrative offices, with approximately 50 employees, a school, a fire station, and a sports park.

Although owned by the Viejas Indian Reservation, the Alpine Springs Resort mobile home park is located outside of the reservation boundary. The utilities that serve this facility are not operated and maintained by the Viejas Tribal Government Department of Public Works (Viejas DPW). It is within the jurisdiction of the County of San Diego. However, since it exerts a demand on the aquifer, the Alpine Springs Resort was included in this water demand analysis.

The sole source of potable water for the Viejas Indian Reservation is groundwater, which is extracted from production wells located on the reservation. The Viejas DPW provided monthly well production data for the period August 2000 through January 2001, shown in Table 2-1. During that period, the system was operated such that all of the demand from the residential and institutional properties (except Alpine Springs, which has its own wells) was met from six production wells (well numbers 1, 2, 2B, 5, 5A, and 6).

Table 2-1. Monthly Production Data from Viejas Wells

Month	Production Period, days	Volume of Water Produced, gallons	
		Residential/ Institutional Properties (Wells 1, 2, 2B, 5, 5A, 6)	Commercial Property (Wells 1A, 2A)
August 2000	31	2,135,800	6,668,400
September 2000	29	1,818,800	6,374,200
October 2000	30	1,305,000	4,936,400
November 2000	29	862,300	4,321,600
December 2000	29	589,700	4,100,600
January 2001	30	1,191,100*	3,472,400

* A large volume of water was used to place newly constructed storage tanks in service, causing the consumption this month to be artificially high. A consumption of 500,000 gallons will be used for the month of January in the 2001 demand projection (see Figure 2-1).

It should be noted that production in January 2001 was higher than normal. A significant amount of water was used to put new distribution storage tanks into service. Since January is generally considered one of the lowest demand months of the year, a demand of 500,000 gallons rather than the 1,191,000 gallons pumped is used for this analysis. With this adjustment, the average water production from Viejas wells for the period was about 41,500 gallons per day (gpd).

Figure 2-1 illustrates a projected monthly demand curve for 2001 based on the 6-month historical record of production. It shows the magnitude of increased demand from winter to summer, which is primarily due to increased irrigation and general water use during hotter months. It is also partially due to an increased population using reservation facilities during the summer.

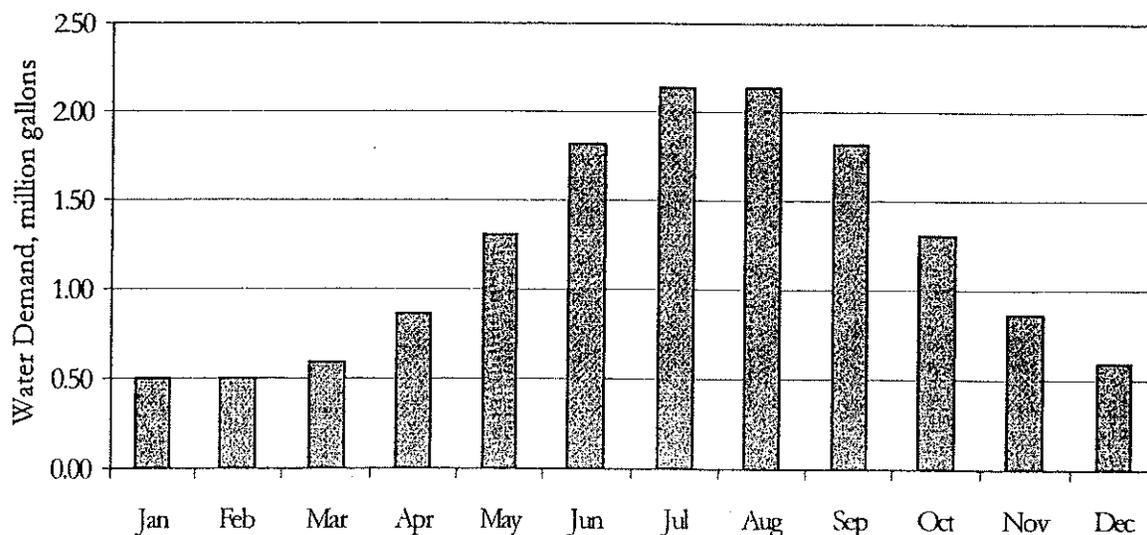


Figure 2-1. Projected Monthly Demand - Residential and Institutional, 2001

As shown in Table 2-2, the various water-using components of the residential and institutional properties were identified and estimated water demands were assigned to each. According to industry standards, the average water consumption rate for each person in a household is 150 gallons per capita per day (gpcd). This rate includes using potable water for drinking, washing, bathing, culinary, waste removal, and irrigation. For the reservation, data shows that the average water consumption rate for the single-family homes has been considerably less than the industry standard because landscape irrigation is not widely performed in these areas and the homes themselves are simpler, with fewer water using fixtures. An even smaller per unit water demand for the RV parks has been exhibited. The populations of the single-family homes and MaTarAwa RV Park were assumed to be 500 and 100, respectively. The existing water demand for the Alpine Springs Resort is taken as 50 percent greater than the MaTarAwa RV Park, based on a population comparison.

Table 2-2. Average Day Demand for Residential and Institutional Facilities

Water Using Component	Average Day Demand, gpd		
	2001	2006	2011
Residential			
Single-Family Homes	28,500	82,500	90,000
Ma-Tar-Awa RV Park	5,000	9,700	9,700
Alpine Springs Resort	7,500	12,600	--
New RV Park	--	--	33,800
New RV Park Rec. Center	--	--	1,000
Subtotal:	41,000	104,800	134,500
Institutional			
Administrative	1,000	1,200	1,200
Landscape Irrigation	7,000	33,300	33,300
Recreational Center	--	3,000	3,000
Subtotal:	8,000	37,500	37,500
Total gpd	49,000	142,300	172,000
Total afy	56	159	193

Irrigation of the sports park and other common areas in the administrative portion of the reservation accounts for the majority of the water used by the institutional property. It was assumed that the administrative offices consume approximately 1,000 gpd, based on an industry standard of 15 gpcd for a typical office, plus additional usage from the school, fire station and other institutional facilities on-site.

As shown in Table 2-2, for the residential and institutional properties, including the Alpine Springs Resort, the estimated average day demand in 2001 is approximately 49,000 gpd.

Residential and Institutional Demand – 2006 and 2011. Expansion of the existing residential and institutional properties on the reservation is expected to occur over the next ten years. The Viejas DPW estimates that the population on the reservation will increase by 20 percent over this period. In addition to the construction of new homes on undeveloped lots, redevelopment of existing homes are expected due to the healthy economy established on the reservation from the success of the commercial enterprises. The new and redeveloped houses are expected to be larger, with more water using fixtures and greater areas of landscaping to maintain. Also by 2011, a new RV center with approximately 250 to 300 new RV spaces may be constructed to replace the existing Alpine Springs Resort.

For this analysis, the population of the single-family homes is projected to increase by 20 percent, to 600, by the year 2011. Due to the redevelopment activity, it was assumed that the average water consumption rate would conservatively increase to 150 gpcd, which is an industry standard. Therefore, the average daily demand for single family residences is projected to be 90,000 gpd in 2011.

The unit demand from the RV parks will also increase, but not to the extent of single-family homes since it is assumed that landscape irrigation will not be widely performed in the future. Instead, it was assumed that the average day demand would increase to 75 gpcd. The MaTarAwa RV Park has 86 spaces. At a future average occupancy rate of 75 percent, with two persons per space, the future average population is projected to be 129. This equates to an average water demand of about 9,700 gpd.

Similarly, by 2006, the Alpine Springs Resort, with 112 spaces, will transition to the same 75 gpcd rate, yielding a water demand of 12,600 gpd. As stated previously, there are preliminary plans to replace the existing Alpine Springs Resort with a new RV center by 2011. For this analysis, it was assumed that the new facility would have 300 spaces. At a 75 percent occupancy rate, the average water demand of the new facility is projected to be 33,800 gpd. The proposed pool and recreational center at the new RV park will likely have a water consumption rate of 10 gpd per guest, adding an additional estimated 1,000 gpd to the water demand.

Plans are proceeding to construct a new 18,000 square foot community recreational center with outdoor swimming pools and an expanded sports park consisting of baseball and football/soccer fields, basketball courts, and play grounds. This 20-acre facility is expected to be complete within the next 5 years. A new administrative office facility is also planned in this period to consolidate the existing trailer complex.

It was assumed that the number of employees working in the administrative offices by 2006 will increase by 20 percent and then remain constant for the following years. The proposed recreational center will likely have a water consumption rate of 10 gpd per guest, with an estimated average of 300 guests per day. The planned sports park consists of approximately 500,000 square feet of area requiring irrigation, and will likely require an average irrigation rate of 1,400 gallons per week per 3,000 square feet. This water consumption rate is an industry standard.

Table 2-2 presents the average day demands for 2006 and 2011 used in this analysis for the residential and institutional properties. Including the Alpine Springs Resort, the estimated average day demand in 2006 and 2011 is approximately 142,000 and 172,000 gpd, respectively.

Commercial Demand – 2001. The commercial property consists of the Viejas Casino and Viejas Outlet Center. The casino is a 300,000 square-foot gaming facility with five restaurants, an entertainment showroom, and an employee restaurant. The outlet center is an open-air shopping complex consisting of approximately 60 factory outlet stores, six fast food eateries, a small park, and decorative water fountains. The complex features a water show that is choreographed to music, laser, lights, and pyrotechnics.

The sole source of potable water for the commercial property is groundwater, which historically has been provided from two production wells (1A and 2A) located on the reservation. The Viejas DPW provided monthly well production data for the two wells for the period of August 2000 through January 2001. These data are shown in Table 2-1. This 6-month period was deemed representative of half a normal annual demand cycle, therefore the average production of 167,600 gpd during this period can also be considered the existing average day demand for the commercial facilities. Figure 2-2 illustrates how the commercial water production for this 6-month period projects to an annual water demand cycle.

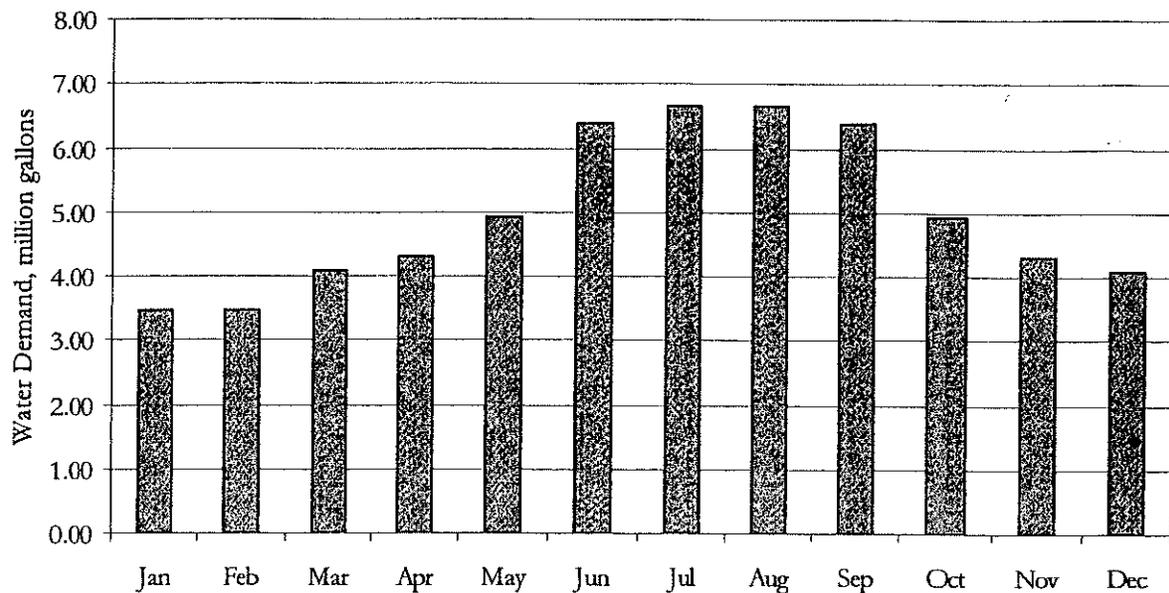


Figure 2-2. Projected Monthly Demand – Commercial, 2001

As shown on Table 2-3, the various water-using components (i.e., restaurants, retail stores, restrooms, landscape irrigation, water features, etc.) of the casino and outlet center were identified and estimated water demands for 2001 were assigned to each. This was an iterative process achieved by balancing actual water consumption data for the casino and outlet center, actual well production data, water consumption data obtained from water purveyors located in San Diego County, and typical industry standards for water consumption. Table 2-4 presents some of the relevant water use values obtained from external sources that aided in subdividing reservation-specific data for 2001.

Table 2-3. Average Day Demand for Commercial Facilities

Water Using Component	Average Day Demand, gpd		
	2001	2006	2011
Existing Casino (300,000 SF)			
Deli and Lounge	6,400		
Chinese Restaurant	7,300		
Diner - 80 seats, open 24 hours	8,200		
Steakhouse/Bar - 100 seats	7,300		
Buffet - 350 seats	15,500		
Entertainment Showroom and Bar	3,600		
Employee Restaurant - 150 seats	7,300		
Restrooms	36,000		
Landscape Irrigation	12,000		
Operation and Maintenance	3,400		
Subtotal:	107,000		
Proposed Casino (300,000 SF)			
Steakhouse - 150 seats	7,300	8,200	
Diner - 200 seats, open 24 hours	8,200	9,820	
Restaurant - 500 seats	14,300	16,070	
Buffet - 500 seats	17,000	18,750	
Bar - 15,000 SF, open 24 hours	5,500	7,300	
Entertainment Showroom and Bar - 15,000 SF	3,600	4,465	
Convention Hall (w/ kitchen) - 30,000 SF	5,500	6,400	
Employee Restaurant - 250 seats	7,300	8,200	
Restrooms - 8,000 SF	48,600	61,200	
Landscape Irrigation	20,400	20,400	
Operation and Maintenance	3,400	5,780	
Subtotal:	167,600	269,110	333,540
Other Commercial			
200,000 SF (w/ some fast food)	18,500	18,500	18,500
Water Show and Decorative Fountains	3,400	5,100	5,100
Landscape Irrigation	38,700	58,050	58,050
Subtotal:	60,600	81,650	81,650
Residential			
300 Rooms		22,320	
100 Rooms			5,570
Pool		4,465	7,145
Subtotal:		26,785	60,715
Additional Facilities			
Gas Station/Car Wash/Mini Mart/Fast Food Complex		7,145	8,040
Retail Store (200,000 SF, i.e., Wal-Mart)			5,500
Cultural Museum			900
Equestrian Park			900
Subtotal:		7,145	15,340
TOTAL COMMERCIAL (without golf course), gpd			
	167,600	269,110	333,540
TOTAL COMMERCIAL (without golf course), afy			
	188	301	374
GOLF COURSE (18 holes)			
Irrigation			446,400
19th-Hole Restaurant/Bar/Restrooms			3,600
100 Timeshare Condominiums			25,000
Subtotal:			475,000
TOTAL COMMERCIAL (with golf course), gpd			
	167,600	269,110	808,540
TOTAL COMMERCIAL (with golf course), afy			
	188	301	906

Table 2-7. Maximum Day Demand Projections, gpd

Demand Category	Maximum Day Demand, gpd		
	2001	2006	2011
Residential	82,000	209,600	269,000
Institutional	16,000	75,000	75,000
Commercial	336,000	518,000	668,000
Golf Course Complex	--		950,000
Total Demand	434,000	822,600	1,962,000

Source of Supply

The sole source of water supply for the Viejas Indian Reservation is groundwater pumped from wells drilled on reservation lands. As shown in Figure 2-3, this is a small, local groundwater basin, formed from percolation of precipitation within the watershed, estimated to be approximately 5,750 acres in area. Runoff in the watershed also forms Viejas Creek, which runs east to west through the valley floor. A natural wetlands, approximately 114 acres in size, exists along Viejas Creek within the reservation boundary.

Groundwater Recharge and Safe Yield. Based on well-understood factors from similar topography and geology in San Diego County, groundwater recharge occurs at a rate of about 0.12 acre-feet/acre/year (personal communication with John Peterson, San Diego County Department of Planning and Land Use, March 2001). The annual recharge rate for the Viejas groundwater basin is estimated to be 690 acre-feet/year (afy). This figure is consistent with estimates in previous studies (GeoSoils, Inc., February 1985).

The unit recharge rate was developed from precipitation data collected over many years. Therefore, the 690 afy should be considered a long-term average recharge rate. There are many years, sometimes consecutively, that little or no precipitation occurs. This creates minimal recharge and may lead to drought conditions. During these years, the amount of water available for extraction from the basin will be less than average. How much less is difficult to quantify without long-term groundwater level monitoring data.

Safe Yield and Aquifer Storage. The amount of water that can be withdrawn from a groundwater basin annually without causing undesirable effects is called the basin safe yield. If extractions exceed the safe yield, particularly for a multi-year period, reduced groundwater levels will result, potentially leading to higher pumping costs, reduced water supply, intrusion of poor water quality, reduced surface stream flow, impacts to riparian habitat, and land subsidence. Understanding and quantifying the relative significance of these potential impacts is key to determining the basin safe yield. Since some of these factors are difficult to quantify without extensive monitoring data, for planning purposes, the safe yield is nominally taken as being equal to the recharge rate for a particular year.

WATERSHED BOUNDARY
(Approximate Area 5750 Acres)

CARTAN F. GRANDE INDIAN RESERVATION

Viejias
Peak of
Mountain

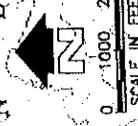
RESERVATION
BOUNDARY

INDIAN RESERVATION
Creek Y
VIEJAS VALLEY

VIEJAS VALLEY WATERSHED

FIGURE 2-3

PROJECT LOCATION	DATE	PROJECT NUMBER
VIEJAS INDIAN RESERVATION WATER AND WASTEWATER MASTER PLAN	JUNE 2001	20877
BROWN AND CALDWELL SAN DIEGO, CALIFORNIA		



It is estimated that reduced recharge will have a substantial impact on groundwater level in the Viejas basin because the total aquifer storage volume is small. The aquifer geology is primarily fractured bedrock, a formation which has minimal pore space by volume. Hargis+Associates, Inc., in a letter report reviewing the previous GeoSoils work (Hargis, 1999), stated that GeoSoils had overestimated the quantity of aquifer storage at 4.43 percent, and suggested that "literature indicates that the porosity of fractured bedrock commonly ranges from 2 percent to less than 0.1 percent." Peterson confirmed that 0.1 percent was a good estimate of the average porosity of bedrock in this area of San Diego County (personal communication with John Peterson, San Diego County Department of Planning and Land Use, March 2001). It is fair to conclude that an aquifer with a relatively small storage volume such as this would be prone to significant draw down in a less than average recharge or drought condition. Lacking sufficient data to support a more definitive quantification, the minimum basin safe yield, corresponding to a moderate drought, is assumed to be 450 afy.

The Viejas Indian Reservation represents most of the developed area within the Viejas Valley watershed. There are other residential and commercial users with private wells that also have rights to the groundwater basin. An allocation of 50 afy is reserved for these non-reservation demands. Therefore, an average safe yield of 640 afy and a minimum safe yield of 400 afy are estimated to be available for use by the Viejas reservation.

Groundwater Management. In association with planning for further development on the reservation, it is important that a program be implemented to effectively manage the limited groundwater resource so it can be sustained and protected for the long term. Presently, none of the groundwater basins in San Diego County have been adjudicated, whereby a watermaster is assigned to manage and enforce court determined allocations of groundwater. Neither has any legislatively-created groundwater management agency been formed. Therefore, an overlying property owner has the right to extract an unquantified amount of groundwater from wells on its property, as long as it can be put to beneficial use.

San Diego County Groundwater Ordinance. In the absence of any judicial or legislative controls, San Diego County is one of at least 12 California counties to develop a local ordinance to manage its groundwater resources. Rather than setting annual pumping allocations, the San Diego County Groundwater Ordinance (Ordinance No. 7994, effective November 1991), seeks to protect its groundwater through a regulatory permit process that restricts development in areas without adequate water supply. Specifically, the ordinance states in Section 67.702 that its purpose is "to ensure that development will not occur in groundwater dependent areas of the County unless adequate groundwater supplies are available to serve both the existing uses within the affected groundwater basin and the proposed uses."

As a sovereign nation, the Viejas Indian Reservation is not subject to state or local laws, regulations, or ordinances. Although the specific provisions of the County ordinance are not enforceable, its principles of groundwater management are valid and applicable to Viejas. It is recommended that a program be implemented on the reservation that serves to fulfill a similar purpose - to protect, preserve and maintain the groundwater resource.

Groundwater Management Program for Viejas. The key to an effective groundwater management program is developing a water balance, which is a comparison of the inflow and outflow in the basin. To maintain a constant groundwater level, these components must balance on

an annual basis. Regular, accurate data collection is necessary to create and refine the water balance enabling decision-making based on reliable information. The California Department of Water Resources publishes guidelines that may be used to help structure an effective groundwater management program.

To quantify the inflow component, records of precipitation and surface water inflow in the basin should be kept, as should quantities of imported water or reclaimed water. As discussed above, reasonably accurate estimates of basin recharge are available for average conditions. But, it is vital to understand how this parameter varies annually and its correlation to groundwater level.

Basin outflow can be determined from metering of production wells, as well as from estimating evapotranspiration and surface water outflow. It is important that annual outflow (composed primarily of consumptive uses) be restricted to that which can be sustained reliably from inflows over the same period of time. Demands should not be created which can't be sustained in low safe yield years unless a reliable source of imported water is available to augment the groundwater supply.

Of key importance is a regular program of groundwater level monitoring. This should be done at both monitoring wells and production wells. The monitoring wells will provide static water levels that indicate whether a surplus or deficit exists in the water balance at any given time. Production well level monitoring will provide pumping water levels that indicate the drawdown of the aquifer due to a particular rate of extraction.

Using these data and information from well driller's logs, the specific yield, or the amount of water available from the aquifer, can be estimated. The specific yield in turn can be used to calculate the amount of water in storage at a given groundwater level and the change in groundwater level that will occur when a specific amount of water is extracted. With experience and guided by the basin monitoring data, effective management of the water balance can be achieved.

Water Balance

Using the projections for demand and safe yield developed in the previous sections, a water balance can be created for the Viejas Indian Reservation. The basic principle of a water balance is that inflow must equal outflow on an annual basis to preserve the groundwater level. That means that when sources of supply are reduced, demand must also be reduced. It is prudent to strive to refill the basin each year, because it is not possible to predict the recharge for the following year.

Inflow. There are three primary components of inflow to the Viejas reservation. The primary component is natural recharge, which is the percolation of precipitation within the watershed. In the previous section this was estimated at an average of 690 acre-feet/year (afy). The minimum natural recharge to the basin from natural sources is assumed to be 450 afy. Allowing for 50 afy for non-reservation use, the average and minimum natural recharge is 640 afy and 400 afy, respectively.

The second component of inflow that must be accounted for is water reuse. As will be discussed in the following chapter, wastewater produced on the reservation will be treated at a reclamation plant and reused to meet non-potable demand. This includes primarily irrigation of landscaping and the proposed golf course, as well as other minor non-potable applications.