

RECLAMATION

Managing Water in the West

DRAFT

**Feasibility Study for Water Supply System
Economics and Water Demand Analyses Component
FY 2006**

**Santee Sioux Nation
Santee, Nebraska
Village of Niobrara, Nebraska
Great Plains Region**



Mission Statements

The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to Indian Tribes and our commitments to island communities.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

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Acronyms

CBP	U.S. Department of Commerce County Business Patterns
EPA	U.S. Environmental Protection Agency
GED	gallons per employee per day
gpd	gallons per day
gpcd	gallons per capita per day
MR&I	Municipal, Rural and Industrial
Nation	Santee Sioux Nation
Reclamation	Bureau of Reclamation
IHS	Indian Health Service

Introduction

The Bureau of Reclamation (Reclamation), the Santee Sioux Nation (Nation), and the Village of Niobrara are evaluating the water supply needs of the Santee Sioux Reservation and the Village of Niobrara, Nebraska, through the year 2050. A feasibility study is being conducted to determine the most effective method of developing a safe and adequate Municipal, Rural, and Industrial (MR&I) water supply system. This system would meet the collective water supply demands of all residents within the Reservation boundary and in the Village of Niobrara. The study is authorized by Public Law 108-204 Sect. 125. The feasibility study is a detailed investigation to be used as a basis for seeking congressional authorization for constructing the project. Through the feasibility study process, proposed solutions, referred to as reasonable alternatives, are developed to meet the recognized needs, problems, and opportunities. From those alternatives a preferred plan is developed. Information provided in this 2006 study on Water Supply System Economics and Water Demand Analyses will become part of the overall feasibility report and will be used to assist in the selection of the preferred alternative.

Needs Assessment

As part of the planning process, Reclamation and the Nation completed a *Needs Assessment, MR&I Water System, Santee Indian Reservation, Nebraska*, March 2004 (Needs Assessment). The Needs Assessment identifies several reasonable alternatives to meet the future water supply needs of the Nation which were, at the time, estimated to be approximately 500 gallons per minute.

Study Area

Santee Sioux Nation

The Reservation lies in the north-central part of Knox County in northeastern Nebraska. The Reservation border is marked by Lewis and Clark Lake and the Missouri River to the north and the reservation boundaries to the east, west, and south, covering approximately 175 square miles. The resident population is centered in the Village of Santee in the northernmost portion of the Reservation.

The population on the Reservation is expected to increase because of the following:

- The Santee people living on the Reservation want to remain there
- The expected return of Tribal members who are enrolled but not currently living on the Reservation
- The relatively young population of the Reservation who will remain and raise families

- The future economic development proposed for the Reservation

Employment on the Reservation is concentrated in the agricultural, service oriented, and administrative support sectors. Other sources of revenue are tourism, outdoor recreation, and casino gambling. Future economic growth is anticipated for agriculture and service industries as well as recreation and community based enterprises. Potential future development includes a small strip mall, an RV park, casino expansion, a hotel, and a golf course. The Nation would also like to establish light industry on the Reservation. An adequate supply of good quality water is essential for supporting local economic growth and for enhancing the quality of life on the Reservation.

Village of Niobrara

The Village of Niobrara is located in northwestern Knox County in north central Nebraska, at the confluence of the Niobrara and the Missouri River. Niobrara is located approximately 35 miles upstream from Gavins Point Dam on the Missouri River above Yankton, South Dakota. The water, sanitary sewer, and street systems are about 30 years old. The water distribution is almost exclusively cast iron, the sanitary sewer is vitrified clay pipe, and the street surfacing is almost exclusively concrete pavement surfacing. The infrastructure systems are in very good condition.

The existing housing lots within the Village limits are almost all exclusively occupied, thus the number of new housing starts are limited. There is new housing pressure due to the existing recreational opportunities available in the Niobrara vicinity. This is evidenced by increased number of year round and summer housing starts on the south side of Lewis and Clark Lake. Additional housing areas are forecast for development on the south side of the Village.

Current Water Supplies

Reservation water supplies are drawn almost entirely from the Bazile Creek well field near the western boundary of the Reservation. Findings from the U.S. Environmental Protection Agency (EPA) Title 106 Water Quality Management Program indicate that pesticides do not appear to be a problem for the Reservation's domestic groundwater supply. However, nitrate-nitrogen and total coliform bacteria appear to exceed EPA primary drinking water standards in a significant number of wells. Initial findings indicate that the contaminant source is related to septic system effluent or onsite confined animal feeding operations, rather than agricultural non-point source pollution. Poor quality water, which is delivered to the Village of Santee as well as cluster housing projects and rural areas of the Reservation, imposes economic constraints.

The Village of Niobrara utilizes two wells for pumping groundwater, which are both approximately 120 feet deep. The well capacities are both approximately 500 gallons per minute, under 320 feet of dynamic head. The village does not

treat its water, with the exception of adding chlorine. Peak usage is 600,000 to 800,000 gallons per day. Water quality sampling indicates iron, manganese, and total hardness concerns currently exist for this water source.

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Economic Conditions

Demographic and Housing Characteristics

The demographic characteristics of the study area have an important effect on the potential growth of the Reservation population, demand for goods and services now and in the future, the labor supply, and housing demand. These demographic characteristics are summarized in table 1.

Table 1 – Demographic Characteristics of the Santee Reservation Area

	Santee Village	Santee Reservation	Niobrara Village	Knox County	State of Nebraska
Population Characteristics					
Male	45.0%	48.9%	50.9%	49.2%	49.3%
Female	55.0%	51.1%	49.1%	50.8%	50.7%
Median Age (years)	20.6	27.4	49.3	43.0	35.3
American Indian	89.1%	64.1%	10.3%	7.1%	0.9%
Housing Characteristics					
Households/occupied housing units	98	295	184	3,811	666,184
Housing Units	116	368	230	4,773	722,668
Vacant housing units	15.5%	19.8%	20.0%	20.2%	7.8%
Owner-Occupied Units	6	133	131	2,860	449,317
Homeowner Vacany Rates	14.3%	2.2%	3.7%	3.3%	1.8%
Education					
High School Graduate or higher	73.5%	81.1%	88.1%	82.0%	86.6%
B.S. degree or higher	8.1%	9.6%	20.0%	14.4%	23.7%
Residence in 1995					
Same County as 1995	71.8%	80.4%	85.1%	87.3%	78.1%
Same house as 1995	36.3%	55.1%	68.6%	68.8%	54.7%
Housing					
Median value of owner- occupied homes	NA	\$50,600	\$40,900	\$42,100	\$88,000
Median gross monthly rent	\$165	\$179	\$288	\$264	\$491

Source: U.S. Bureau of the Census, Census 2000.

Note: NA = not available

The population characteristics indicate that the Reservation has a young population that has a slightly higher percentage of female population compared to all of Nebraska. This tends to support a relatively high potential population growth rate. The population also has a lower level of educational attainment, potentially limiting current and future employment opportunities for some skilled occupations.

The housing data show that the percentage of households that own their home is very low in the Village of Santee and is relatively low for the Reservation compared to Knox County. The place of residence data indicate that fewer Santee Village and Santee Reservation residents remained in the same county as in 1995 than for Knox County as a whole. Fewer Santee Village residents remained in the same county from 1995 to 2000 than did for Knox County or for all of Nebraska. These statistics show some potential for population growth from migration.

Current Economic Conditions

The current economic conditions in the Santee region are important because a large, diverse, and growing economy will support future growth in economic activity and population. For example, an economy with a significant manufacturing and financial base will have greater potential growth than an economy based entirely on the retail sector. Therefore, future economic growth on the Santee Reservation will be significantly influenced by current economic conditions in the northeastern region of Nebraska. Current economic conditions can be described in a larger regional county setting, in a narrower Reservation setting, or in an even smaller municipal setting. Each of the different levels of aggregation provide information that is useful in evaluating the Reservation economy. Data at the county level can be used as a basis of comparison for evaluating growth at the Reservation or municipal level. There are many economic indicators that can be used to evaluate the economy of the Santee Reservation and the larger surrounding region. These indicators are discussed in detail below.

General Economic Characteristics

The general economic characteristics of the Santee Reservation and surrounding area can be evaluated by looking at the income, poverty rate, unemployment rate, and occupations of the population. Median household income and per capita income are typically used to represent household well-being. Median income represents the income that evenly divides the top one-half of income earners from the bottom one-half. Per capita income is simply the average income of each individual or total income divided by total population. Another frequently used measure of well being is the poverty rate. The poverty rate is the percentage of people that fall below a pre-determined threshold income. The thresholds vary by size of household and number of children under 18 years of age. In 2005 the poverty threshold for a family of four with two children under 18 years of age was \$19,806.

Other measures of overall economic condition include unemployment and the type of occupation as indicated by sector of employment. Clearly high unemployment rates correspond with relatively poor overall economic performance. The type of occupation is an indicator of the importance of different sectors on employment and therefore on income. The economic characteristics of Santee Village, the Santee Reservation, Niobrara Village, Knox County, and the State of Nebraska are presented in table 2.

Table 2 – Economic Characteristics of the Santee Reservation area and Nebraska

Economic Measure	Santee Village	Santee Reservation	Niobrara Village	Knox County	State of Nebraska
Income/Poverty					
Median household income	\$16,250	\$20,938	\$26,000	\$27,564	\$39,250
Per capita Income	\$7,879	\$9,532	\$15,299	\$13,971	\$19,613
Below Poverty, individuals	45.4%	33.1%	13.8%	15.6%	9.7%
Unemployment Rate	20.0%	7.6%	7.5%	3.7%	3.5%
Percentage of Total Employment by Occupation					
Management/professional Services	37.5%	42.5%	46.3%	36.4%	33.0%
Sales and office	17.5%	20.2%	12.8%	16.5%	14.6%
Farming, fishing, forestry	15.0%	19.9%	16.1%	18.3%	26.4%
Construction, extraction, maintenance	NA	1.6%	NA	5.6%	1.6%
Production, transportation, material moving	15.0%	7.4%	10.1%	12.0%	9.3%
Employment by Industry					
Agriculture, forestry, fishing, hunting, mining	NA	20.2%	6.0%	19.8%	5.6%
Construction	2.5%	3.8%	2.0%	6.7%	6.5%
Manufacturing	8.8%	4.1%	8.7%	6.0%	12.2%
Wholesale trade	NA	0.8%	NA	3.9%	3.6%
Retail trade	3.8%	6.0%	20.8%	10.7%	12.1%
Transportation, warehousing, utilities	2.5%	1.6%	1.3%	4.0%	6.1%
Information	3.8%	0.8%	2.0%	1.7%	2.5%
Finance, insurance, real estate	2.5%	3.8%	4.0%	3.8%	7.7%
Professional, scientific, misc. Education, health, social serv.	2.5%	3.8%	NA	2.8%	7.3%
Arts, entertainment, recreation/accomodation, food serv.	33.8%	26.4%	32.2%	26.6%	20.7%
Other services	20.0%	10.4%	7.4%	4.1%	7.3%
Public administration	NA	2.2%	8.7%	5.2%	4.6%
Class of Worker	20.0%	16.1%	6.7%	4.7%	3.9%
Private wage/salary workers	38.8%	46.6%	63.1%	60.1%	77.1%
Government workers	57.5%	36.0%	24.8%	16.5%	13.7%
Self-employed	3.8%	16.3%	12.1%	21.7%	8.7%
Unpaid family workers	NA	1.1%	NA	1.8%	0.5%

Source: U.S. Bureau of the Census, Census 2000.

Note: NA = not available

The data presented in table 2 show that income is relatively low and poverty is relatively high on the Santee Reservation and the Village of Santee. Niobrara has low income compared to all of Nebraska but higher income than the Santee Reservation. The data also show a high percentage of employment of Santee Village residents in education and health, entertainment and accommodation, and public administration positions. Retail trade represented a low percentage of total employment in the Village of Santee and the Reservation compared to Niobrara, Knox County, and the State of Nebraska. Finally, the percentage of those employed by local, state, or federal government is much higher within the Reservation than the other areas.

Historical poverty rates can be used to identify possible poverty trends in the Reservation area compared to other areas. Poverty rate data are available for 1995 to 2003 from the U.S. Department of Commerce. These data are presented in table 3. The data presented in table 3 show that the poverty rate of individuals in the Santee School District has dropped significantly, but that it remains much higher than the rate of Knox County and the Midwest Region.

Table 3 – Historical poverty rates

Year	Santee School District	Knox County, Nebraska	Midwest Region	United States
1995	40.0%	15.5%	11.0%	13.8%
1997	42.1%	15.6%	10.4%	13.3%
1999	35.1%	15.0%	9.8%	11.9%
2000	32.5%	14.2%	9.3%	11.3%
2001	35.8%	14.8%	9.4%	11.7%
2002	32.4%	15.1%	10.3%	12.1%
2003	25.7%	13.7%	10.7%	12.5%

Economic Census and County Business Pattern (CBP) Data

The Economic Census administered by the U.S. Department of Commerce, Bureau of the Census, provides detailed information on business activity, payroll, and employment. The most recent Economic Census data are for 2002. Additional business activity data are available from U.S. Department of Commerce County Business Patterns (CBP, 2006). The CBP data include information on the number of employees, annual payroll, and number of establishments by the size of establishment. The most recent County Business Pattern data are for 2004.

Economic Census and CBP data may not be directly comparable due to differences in how business characteristics are defined and differences in coverage. The Economic Census generally uses respondent reported data while CBP information is based on administrative record data for small establishments. Although efforts are made to resolve significant differences in the data, differences are known to exist. The economic census presents data reported for individual establishments, while CBP data are based primarily on administrative records and data reported from current surveys. In addition, the censuses include

small firms with no paid employees while County Business Pattern data do not. Some large companies report different activities at the same location as separate profit centers. CBP data treat each profit center as a separate establishment. The 2002 Economic Census may combine the profit centers into one establishment. This results in establishment count differences.

Economic Census data are available down to the county level and are available for some larger municipalities and metropolitan areas. Data for 1997 can be compared to the 2002 data to evaluate the dominant economic sectors in Knox County and recent growth/decline in each sector. Economic Census data for 2002 and 1997 are presented in table 4 for Knox County, and the Knox County CBP data are presented in table 5.

Table 4 – Economic Census data for Knox County

Sector	Estab- lishments	Sales/ shipments (\$1,000s)	Annual Payroll (\$1,000s)	Paid Employees
1997 Data				
Wholesale trade	17	NA	NA	NA
Retail trade	73	61,346	4,492	373
Information	NA	NA	NA	NA
Real estate & rental & leasing	4	286	86	12
Professional & technical serv.	14	1,165	207	19
Administrative & support Health Care & social assist.	2	NA	NA	NA
Arts, entertainment & recreat.	12	4,070	1,761	97
Accomodation & food serv.	5	823	110	30
Other services	30	3,440	581	122
	15	2,418	389	29
	9	75,723	2,261	127
	69	68,114	6,062	438
2002 Data				
Wholesale trade	6	NA	278	18
Retail trade	4	647	210	21
Information	16	3,195	614	40
Real estate & rental & leasing	4	NA	NA	NA
Professional & technical serv.	21	13,156	6,058	355
Administrative & support Health Care & social assist.	5	NA	NA	NA
Arts, entertainment & recreat.	34	3,732	588	142
Accomodation & food serv.	14	2,070	485	30
Other services				

Note: NA = not available

Table 5 – Knox County Business Pattern data

North American Industrial Classification System Sector	Number of employees	Annual Payroll (\$1,000s)	Total Establishments	Establishments with 1-19 employees
Forestry, fishing, hunting, agric. support	0-19	NA	2	2
Utilities	0-19	NA	2	2
Construction	108	2,385	37	37
Manufacturing	0-19	NA	4	4
Wholesale trade	138	2,666	9	7
Retail trade	431	6,689	66	63
Transportation and warehousing	52	634	17	17
Information	0-19	NA	3	3
Finance and insurance	141	3,510	20	19
Real estate and rental and leasing	13	257	4	4
Professional, scientific, & tech. services	20-99	NA	15	15
Administrative, support, waste mgmt.	0-19	NA	4	4
Educational services	0-19	NA	1	1
Health care and social assistance	338	6,591	18	15
Health care and social assistance	53	487	5	4
Arts, entertainment, and recreation	103	571	30	30
Arts, entertainment, and recreation	73	735	29	29
Accommodation and food services				
Other Services				

Source: U.S. Department of Commerce. County Business Patterns, 2004. Bureau of the Census, Washington, DC. 2006.

The largest sector in Knox County in terms of the value of products or services sold and employment is the retail trade sector. The largest increase in the value of services produced and employment from 1997 to 2002 was in the health care and social assistance sector. The number of employees and value of services approximately tripled for the health care and social assistance sector over the 5-year period. Significant growth was also observed for the professional and technical services sector. All of the other sectors have remained relatively stable from 1997 to 2002. It is interesting to note that over the same time period the population of Knox County decreased by about 2 percent, but the health care sector grew significantly.

The most recent data shown in table 5 show the importance of retail trade and health care the local economy in terms of both employment and income, employing nearly 800 people combined. Other important sectors include construction, wholesale trade, and finance and insurance.

Building Permits

Another frequently used measure of regional economic growth is the number of building permits issued. Building permits are an indicator of the demand for

housing and commercial space, which results from economic growth and opportunities. From 1980 to 1993 there was an average increase of 3.6 building permits issued each year in Knox County. From 1994 to 2004 the average annual rate of growth of building permits issued fell to 1.9 per year. Assuming the trend in building permits continued into the future, the annual number of new building permits would be projected to be 31 by 2010, 38 by 2020, 42 by 2030, 44 by 2040, 45 by 2050, and 45 again in 2060. The county level permit data supports a very modest level of building growth county wide.

Agricultural Production

Agricultural development has been an important part of the Santee Reservation economy in the past and will continue to be important in the future. A report completed in 1981 (B&E Phase II, 1981) indicated that about 12 percent of the total number of cattle, hogs, sheep, and chickens in Knox County were on the Reservation. This represents a significant percentage of the total livestock in the County and indicates that livestock are a very important part of the Reservation and County economy. The Tribe has a 3,500 acre tribal ranch that supports about 850 head of cattle. The Tribe also has a buffalo herd of about 100 head.

Agriculture is likely to remain an important part of the Reservation economy, as indicated by the desire of the Santee Tribe to acquire neighboring ranching and farming land. The dominant types of agricultural production in Knox County and historical changes in crop acreage and livestock are shown in table 6. Livestock activity appears to have remained fairly stable over the last 25 years as has total non-irrigated crop acreage (although cropping patterns have shifted toward soybean production). Irrigated corn acreage has increased significantly over the last 25 years.

Table 6 – Knox County Agricultural Statistics

Crop	Harvested Acreage or Head							
	1970	1975	1980	1985	1990	1995	2000	2005
Corn - grain								
Irrigated	4,600	10,500	23,400	23,000	28,700	31,600	26,100	30,800
Non-irrigated	99,850	81,300	78,200	91,900	73,800	73,200	82,700	85,300
Corn -silage								
Irrigated	510	900	3,400	3,300	3,800	2,000	1,400	600
Non-irrigated	24,940	26,000	30,500	10,900	13,600	3,600	8,100	6,800
Soybeans								
Irrigated	250	400	4,100	1,300	4,100	9,800	16,600	17,900
Non-irrigated	8,250	8,100	16,300	20,400	25,500	38,600	51,800	50,500
Hay (Dryland)								
Irrigated	97,700	99,200	91,000	77,000	104,000	86,000	87,000	-
Non-irrigated	1,230	3,500	1,800	1,900	1,300	500	-	1,500
Wheat (All)								
Irrigated	121,000	146,000	143,000	120,000	117,000	118,000	136,000	128,000
Non-irrigated								
All Cattle								

(head)	145,000	107,100	155,000	138,000	152,000	143,000	-	-
Hogs & Pigs (head)	1,570	1,460	1,390	1,250	1,170	1,150	1,070	1,010 (2002)
Number of Farms								

Recreation

Recreation represents an important sector of the local Santee and Niobrara economy. Niobrara State Park near Highway 12 provides facilities for camping, fishing, swimming, boating, and hiking. The park has 69 camping pads with electrical hookups, 50 sites without electricity, and 19 cabins. Gavins Point Dam & Powerplant and Lewis and Clark Lake at nearby Yankton, South Dakota provides recreation opportunities to the region. The recreation area is managed by the State of South Dakota. There are about 380 campsites at the park and amenities include picnic shelters, a swimming beach, boat ramps, a marina, and concessions. Other recreation activities include hunting and fishing throughout the area, cultural activities such as Pow Wows and museums, and area parks.

Current Commercial and Industrial Activity on Santee Reservation and in Niobrara

Public and private establishments located on the Santee Reservation and in Niobrara include government services including education, entertainment services, retail activities, and other miscellaneous services. The establishments located on the Reservation and in Niobrara and the number of people employed at each establishment are shown in table 7. Table 7 does not include the tribal ranch, buffalo herd, and crop production discussed in the previous Agricultural Production section.

Table 7 – Establishments and employees on the Santee Reservation and in Niobrara

Establishment/Activity	Employees (full-time equivalent)	Commercial Sector
Santee Reservation		
Tribal Office	40	Government services
School	30	Education services
Ohiya Casino/Restaurant	29	Entertainment/Food
BIA Fire Department	22	Government services
Health Clinic	20	Health/Medical
Housing Authority	18	Housing construction
Land Management/Economic	12	Administrative services
Tribal Head Quarters	10	Government services
Feather Hill Express	7	Retail trade/fuel/misc.
Police Department	7	Government services
Lakeview Resort	6	Recreation
Day Care	5	Education/Health care
Lewis and Clark Store	4	Retail trade/Grocery
Youth Center	3	Government services
Nutrition Center	3	Education/Health care
WIC/Healthy Start	3	Education/Health care
Garage/Repair Shop	3	Retail services
Utility Commission	3	Utilities
Istani Construction	2	Construction
Community Center	1	Government services
Swimming Pool	1 (4 part time)	Recreation
Village of Niobrara		
Niobrara Public Schools	38	Education
Niobrara State Park	28	Recreation
Automobile Dealership	23	Automobile Sales
Ponca Tribe	16	Government services
Small Grocery Store	7	Retail Sales
Farmers and Merchants State Bank	5	Finance
Village of Niobrara	4	Government services
J&K Auto Service	2	Auto Repair services
Hardware Store	2	Retail Sales
Cellular Communications	1	Utility services

It is important to note that the types of commercial establishments that are prominent on the Santee Reservation are related to the administration of services within the reservation (health, education, tribal government) or the provision of services. Government services, education services, entertainment/food, and health/medical services alone account for about three-fourths of total employment on the Reservation. Niobrara has a similar pattern of commercial activity except for a relatively large percentage of employment in more regional services such as the car dealership, recreation, and financial services.

The Ponca Tribe of Nebraska is an important part of the Niobrara economy. As shown in Table 7, the Ponca Tribe has administrative offices in Niobrara. In addition to the Tribal Headquarters, the Ponca Tribe of Nebraska Health and Wellness Center is located in Niobrara and the Ponca Tribal Museum is also located in Niobrara. Together, these establishments provide a significant percentage of total employment in Niobrara.

Future growth in the service based activities that dominate the Reservation and Niobrara would be expected to occur at a rate similar to population, assuming the new population uses establishments on the Reservation. The situation may be somewhat different for the Village of Niobrara, which has several retail sales and financial based activities that potentially extend beyond village boundaries, such as the automobile dealership, recreation, and financial services. In order to determine the potential to attract business beyond the local population, retail market strength needs to be evaluated. This can be done through the use of Pull Factors.

Measuring Retail Sales Market Strength – Pull Factors

A statistic that can be very useful in evaluating the potential for retail and services growth is a Pull Factor. Pull Factors measure the value of sales that are “pulled” from individuals living outside the area of interest. Pull Factors are computed by dividing per capita taxable, non-motor vehicle retail sales by the state average per capita non-motor vehicle retail sales. A Pull Factor of one indicates an area has per capita non-motor vehicle retail sales equal to the state per capita sales. A Pull Factor greater than one indicates an area is drawing retail sales from other areas while a Pull Factor less than one indicates an area is losing retail sales to establishments located outside of the area of interest. A location with a Pull Factor less than one is experiencing a leakage in retail sales and related services.

Pull Factors are available from the Nebraska Public Power District, Economic Development Department (2005). These Pull Factors are available for 16 counties and many municipalities in the Northeast Region of Nebraska. The entire Northeast area has a Pull Factor of 0.75, indicating a loss of 25 percent of retail sales to establishments outside the region. Knox County has a Pull Factor of 0.42, representing a loss of 58 percent of sales outside the County. For comparison Creighton, in Knox County, has a Pull Factor of 1.25, indicating Creighton is the primary retail sales draw in the County. Niobrara has a Pull Factor of 0.96 and Santee has a Pull Factor of 0.46. Six of the 16 Northeast Region counties had Pull Factors lower than Knox County.

It is important to note that the types of commercial establishments that are prominent in the Village of Santee (which is representative of the Reservation) are related to the administration of services within the reservation (health, education, tribal government) or the actual provision of those services. Future growth in these activities, therefore, would reasonably be expected to grow in a similar fashion as population. One exception is the casino, which may attract some revenues from outside the local area. A similar argument could be made for the Village of Niobrara, with exception of three major activities: the State Park, grocery store, and the bank. These three activities potentially extend beyond village boundaries. This may account for the fact that Niobrara has a Pull Factor of nearly 1, while the Santee Pull Factor is a much lower 0.46.

The low Pull Factor for the Village of Santee and Knox County as a whole implies that the rate of commercial growth within the Santee Reservation would likely be less than the rate of population growth because about one-half of the goods and services demanded by the growing population would be satisfied by establishments outside of the County and the Reservation. It is important to note that growth related to the sales of agricultural goods and recreation is excluded from the Pull Factors. Therefore, future economic growth could occur in the agricultural and recreation sectors at a rate greater than for the retail and service sectors.

Public Health, Welfare, and Housing on the Reservation

An outpatient clinic serves the area. The clinic has two examination rooms and laboratory and X-ray facilities. There are four physicians who work half days at the clinic on a rotating basis. A physician's assistant and five nurses (one full-time) staff the clinic. Dental services are also available 4-1/2 days per week, and a pharmacy is located in the clinic. A community tribal center, a K-12 school, a head-start program, a day-care program, and a community college (including a public library) are located in the area.

The Santee Indian Reservation is located in the Indian Health Service (IHS) Aberdeen service area. According to the Indian Health Service (2003), the live birth rate in the Aberdeen service area was slightly more than twice the United States average rate for all races (29.5 births per 1,000 population compared to 14.5 births for the entire United States) and nearly 23 percent more than for all IHS areas combined. Infant mortality in the Aberdeen service area was about 40 percent higher than for all IHS areas and was 71 percent higher than for the entire United States. The IHS data indicate an overall death rate of the population in the Aberdeen Service Area was 105.1 percent higher than for the entire United States and was 41.1 percent higher than for all IHS areas combined.

Unintentional injuries accounted for a much larger percentage of all deaths in the Aberdeen Service Area than for all IHS service areas combined and for the entire United States. The average rate per 100,000 population was 30.1 for the entire United States and 94.7 for all IHS areas. Unintentional injuries accounted for 130.5 deaths per 100,000 population.

Currently, there are 135 occupied tribal housing units on the Reservation. A total of 108 are in the Village of Santee and 27 are located along Highway 12 or 54D. There is a need for more housing on the Reservation for the current and projected future population. Infrastructure is available for approximately 30 more housing units.

Future Economic Growth

The future growth of business and industry on the Santee Reservation cannot be predicted with certainty because of the large number of external factors that could potentially affect economic development. Unlike population projections, future

commercial and industrial growth may not be influenced a great deal by current business patterns. Businesses may move into a region or leave an area for a variety of reasons unrelated to past business location decisions. These reasons may include the availability of tax incentives, transportation linkages, infrastructure, and a labor force.

Transportation links represent an important factor when evaluating the potential for economic growth in an area. The Chief Standing Bear Memorial Bridge connects South Dakota Highway 37 and Nebraska Highway 14. The bridge provides the Santee Reservation with an important link to potential economic markets, allowing access between the Santee Reservation and several South Dakota towns.

However, there are no interstate or 4-lane highways serving the area and the nearest 4-lane major highway is nearly 50 miles away. There are no major motor freight companies with local terminals that serve the Reservation for commercial purposes. The nearest public airport is Creighton Municipal Airport and the nearest commercial airport is located about 100 miles away in Sioux City, Iowa. The Reservation is not served by rail service. All of these factors combine to make the location of a large industrial/manufacturing establishment in the area highly unlikely. Most of the future development will be smaller types of businesses for the local population or specialty goods and services. These goods and services may be related to cultural or other unique characteristics related to the Reservation.

There are several economic development goals that have been indicated by the Santee Tribe (2002), including:

- expansion of the tribe's health service program
- established legal infrastructure including law enforcement and tribal court
- establishment of self-sufficient utilities infrastructures and resources management
- improved education and tribal schools
- expanded recreation and tourism
- increased farming/ranching activities
- possible development of an industrial park.

Future desired commercial expansion on the Reservation includes a motel associated with the Ohiya Casino (60+ rooms), a safety center that will serve police, fire, and the courts, a juvenile detention center, a golf course, and a new

swimming pool (Santee Economic Development, Santee Sioux Tribe of Nebraska, 2006). The motel and golf course represents development aimed primarily at attracting people from outside the reservation, which will bring in new revenues. This development would be added to development associated with increasing demands related to population growth.

Another potential area of growth is recreation/tourism. Recreation in the area is supported by several activities and nearby resources:

- The Annual PowWow and Festival
- Lewis and Clark Lake/Missouri River
- Niobrara River
- Hunting and fishing opportunities on or very near the Reservation
- Scenic Highway 12
- Ashfalls Fossil Bed State Historical Park (about 50 miles south and slightly west of the reservation)
- Fort Randall Dam

The current level of employment represented by recreation is only 3.1 percent of total employment. Assuming the relative percentage of total employment continues until 2050, this would translate into an additional five jobs. This is approximately equal to future growth of an additional Lakeview Resort recreational establishment.

Growth in ranching would be expected in the future. The Santee Tribe has expressed interest in expanding the number of cattle and buffalo. Based on typical carrying capacities for the region, growth of approximately 200-250 head of cattle/buffalo could be supported within the Reservation. The increase in livestock and associated agricultural support activities would translate into approximately five jobs.

As shown in the current distribution of commercial activities and employment on the Reservation, much of the current and anticipated future development in the area is targeted at serving the Reservation population in the areas of community services and improving the standard of living. The current economic data suggest that some level of growth in the basic sectors of education and health care are needed just to bring the current population up to an acceptable level. Once this level is attained, future growth could be tied to projected population growth. Based on the pull factors described above and somewhat limited infrastructure to support any extensive industrial/commercial growth, additional commercial

growth is projected to be at a rate equal to one-half the projected population growth rate. This would translate into an average retail based growth rate of 0.35 percent annually. This represents expansion in retail based economic activity above desired commercial expansion, recreation/tourism growth, and increased agricultural activity described above.

The high level of unemployment indicates that there is a readily available workforce as a percentage of the total population. However, the relatively low level of education, limited work experience, and the small labor pool in absolute terms limits the types and size of establishments that could move onto the Reservation.

The pull-factors discussed in the retail strength section indicates the retail sales of establishments outside of Niobrara provided to the Niobrara population is approximately equal to the retail sales of Niobrara retailers to the population outside of Niobrara. In other words, there is a fairly equal flow of goods and services in to and out of Niobrara. If this pattern continues, future retail sales growth in Niobrara would increase at approximately the same rate as regional population growth. This relationship greatly simplifies projecting future economic development.

Based on the pull-factors for Niobrara, the overall growth of commercial activity in Niobrara is projected to closely mirror regional population growth. As discussed in the following population section, the high estimate of population growth in Niobrara and the regional population growth estimate is 0.21 percent annually. This rate of growth can be used to estimate future Niobrara commercial activity.

It should be emphasized that other potential sources of commercial growth exist that cannot be predicted accurately. Activities associated with the Ponca Tribe, such as Pow Wows and possibly increased Tribal services, could increase in the future. Niobrara State Park is currently an important employer in Niobrara and increased demand for recreational facilities will translate into growth in the recreation sector in the future.

Base Population and Population Projections

The future population of the Santee Reservation depends, in large part, on the level and characteristics of the current population, as well as migration patterns. The 2000 Census estimated the population of the Santee Reservation to be 878 people. Past census estimates have suffered from some level of undercounting of the true population, especially for rural populations and areas with extensive minority populations. These undercounts may be due to simple difficulty in finding more dispersed individuals or because some households may not be willing to disclose the number of people living in their home. Therefore, the population of the Santee Reservation may be under-represented by the 2000 Census.

In an April 2002 U.S. Department of Commerce Memorandum regarding net undercounts for seven race/ethnicity groupings, the net undercount for American Indian and Alaskan Native population for the entire United States was estimated to range from 3.44 percent to 3.66 percent. The range is based on two different sources and methodologies for estimating undercounting. A Pricewaterhouse/Coopers study of undercounting in the 2000 Census estimated an undercount rate of 1.75 percent for all races and ethnicities in the entire United States. The undercount of Native Americans is approximately double that of the entire population. The Pricewaterhouse/Coopers study also estimated a total undercount rate for all of Nebraska at 0.71 percent and the Native American undercount rate at 4.83 percent. Comparing the actual estimated number of undercounted population with the most recent adjusted population estimates results in an estimated undercount rate of 2.58 percent for the Nebraska Native American population.

In a previous study of current and projected population on the Santee Reservation (Bureau of Reclamation, 2004) the 2000 population was estimated to be 1,065 people, which appears to have considerably over-estimated the current population of the Reservation. The previous estimates were based on the assumption that household sizes and the number of Tribal members living on the Reservation were grossly underestimated. Based on the most recent population estimates, this appears to have not been the case.

It has been acknowledged that the Census can undercount the population for a variety of reasons, mostly due to simply missing some houses in sparsely populated areas or not accounting for all people living in a house. Santee Economic Development, Santee Sioux Tribe of Nebraska, estimated a current Reservation population of 906 people. This is approximately 3.2 percent greater than the 2000 Census estimate and is much less than the adjusted base population used in the 2004 Needs Assessment. This is essentially the same rate of undercount as was found for the American Indian population for the entire United States. Therefore, the base population provided by Santee Economic Development is used as the base population for this analysis from which future population projections are estimated.

Population Projections

There are several techniques that can be used to project future population. These techniques can be placed into six basic categories:

1. Application of previously completed projections at larger areas of aggregation to sites or smaller regions of interest.
2. Simple trend analysis of historical rates of growth.

3. Demographic modeling, typically the cohort-component method. The cohort-component method accounts for projected changes in death rates, fertility, and migration for separate age-sex groups.
4. Combined demographic economic models, where the demographic factors are modified by labor supply and demand factors.
5. Population projection scenarios, where different assumptions are used to derive a possible range of future population.
6. Probabilistic techniques where historical data and/or judgments of experts are used to estimate the probability of changes in demographic variables that influence population growth.

Demographic modeling is generally considered superior to the application of previous projections from larger regions and simple trend analysis because modeling can account for differences in population characteristics and changes in the future. The demographic modeling methodology can be further improved if economic factors and probabilities of certain events can be accounted for. In short, the methodology that accounts for the greatest number of factors that influence population growth will most likely produce the most accurate projections. It should be noted however, that any population projection is only as good as the accuracy of the assumed future changes in the factors that affect population growth. For example, if it is assumed that future death rates are going to decrease but future death rates actually increase, then the population projections based on the assumption of lower death rates will be biased upward.

The population projections used in this analysis is the cohort-component method. A variety of sources were used to account for current and future birth rates, death rates, and migration patterns. The population projections are presented in this analysis as a range of future population to allow for variation in future net immigration. A cohort represents a group of individuals who have a specific characteristic (such as age) in common. For example, all males age 19 to 25 represent a cohort. The cohort component method involves separating the population under consideration into cohorts, looking at the demographic components of each cohort, and projecting the population of each cohort for successive time periods into the future.

There are several components involved in the application of the cohort-component method. First, age and sex specific survival rates are applied to each cohort/group. The surviving population of each cohort is then carried forward to the next year. Second, the population of the less than 1-year-old age cohort is projected by applying age-specific birth rates for each age category to the female population of child-bearing age. The projected births are then multiplied by the under 1-year-old survival rate to estimate the total population of under 1-year-olds. The previous year distribution of females and males are assumed to

continue into the future. Last, the net number of individuals immigrating into the area needs to be added (or subtracted if more people move out of the region than new people move in) to the population that is carried forward to the next year. The age and sex distribution of those immigrating into the area are assumed to be the same as the distribution of the current population. Specific assumptions for birth rates, death rates, and net migration are described in more detail below.

Nebraska birth and death rates (rate per 1,000 population) have both declined at a statistically significant rate from 1940 to 2003 (Nebraska Health and Human Services System, 2006), although birth rates have decreased at a faster rate. The estimated annual decrease in birth rates based on a time trend model is a reduction of 0.163 live births per 1,000 population. The estimated annual reduction in death rates for Nebraska over the same period of time was 0.0134 deaths per 1,000 people.

Birth Rate Projections

Birth rates are used in demographic models to project births within specific age groups. The birth rate for an age group, combined with the population of females within that age group, can be used to estimate births during a particular year. Birth rate data are not generally available at the local level. Therefore, state level data are frequently used as a basis for estimating births. There are different measures used to estimate births. The U.S. Bureau of the Census defines women of childbearing age to be 15 to 44 years of age, and overall births for this age group are used to calculate a fertility rate. Birth rate data are available for females aged 10 to 49 years of age. Birth rates are applicable to women within specific age groups.

Both birth rates and fertility rates are used in this analysis to project future population. Fertility rates indicate how many births a woman would have by the end of her reproductive life if, for all of her child bearing years, she were to experience the age-specific birth rates for each given year. Birth rates for an age-specific group represent the number of births during a year to women in a specific age group per 1,000 women. Projections are provided by the U.S. Bureau of the Census for fertility rates but not age-specific birth rates. Therefore, projected changes in future fertility rates are used to estimate future age-specific birth rates.

Current birth rates for the Caucasian population and the Native American population are combined with projections of future fertility rates to estimate current and future births on the Reservation. Future fertility rate projections are available while age specific birth rate projections are not available. Birth rates and fertility rates used in this analysis are shown in tables 8, 9, 10, and 11. The annual rates of change for the middle series of fertility projections were used in this analysis to project future birth rates.

Table 8 – Nebraska fertility and birth rates, Non-Hispanic white

Year	Fertility rate	10-14	15-19	15-17	18-19	20-24	25-29	30-34	35-39	40-44	45-49
	10 to 49 years	years	years	years	years	years	years	years	years	years	years
1990	1,968.5	-	35.3	17.4	59.0	107.5	134.6	83.7	27.8	4.4	-
1995	1,901.5	-	30.1	16.3	51.3	93.6	130.3	89.0	31.9	4.9	-
2000	2,010.5	-	29.6	13.7	53.3	90.5	133.8	104.4	37.0	6.3	-
2001	2,007.5	-	27.5	12.6	49.2	87.9	134.7	105.0	39.7	6.2	0.3
2002	2,015.5	-	25.9	10.5	47.7	89.2	134.8	105.2	40.0	7.4	0.4

Table 9 – Nebraska fertility and birth rates, estimated Native American

Year	Fertility rate	10 to 49	10 to 14	15 to 19	15 to 17	18 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49
	10 to 49 years	years	years	years	years	years	years	years	years	years	years	years
1990	2,410.0	0.8	43.2	21.3	72.2	131.5	164.6	102.3	34.0	5.4	-	-
1995	2,510.0	0.6	39.7	21.5	67.7	123.5	171.9	117.4	42.1	6.5	-	-
2000	2,720.0	0.5	40.0	18.5	72.0	122.3	180.8	141.0	50.0	8.5	-	-
2001	2,740.0	0.4	37.5	17.2	67.1	119.9	183.7	143.2	54.1	8.4	0.4	0.4
2002	2,450.0	0.4	31.5	12.8	58.0	108.5	164.0	128.0	48.7	9.0	0.5	0.5

Table 10 – Projected change in Caucasian fertility rates

Time period	Annual rate of change	Annual rate of change	Annual rate of change
	Low series	Middle series	High series
1999 to 2025	-0.332%	0.295%	0.847%
2026 to 2050	-0.133%	0.036%	0.159%
2051 to 2100	-0.193%	-0.030%	0.072%

Table 11 – Projected change in Native American fertility rates

Time period	Annual rate of change	Annual rate of change	Annual rate of change
	Low series	Middle series	High series
1999 to 2025	-0.836%	0.221%	0.316%
2026 to 2050	-0.226%	0.063%	0.056%
2051 to 2100	-0.258%	-0.092%	0.012%

The total fertility rate for the United States has remained fairly constant from 1989 to 1997. As of 1997, the total fertility rate was 2,032.5 births per 1,000 women. Evaluating the fertility trends of the recent past is useful in establishing the direction of fertility in the short term, but is of limited usefulness in estimating future rates over a long period of time. The middle series fertility rates were calculated using birth registration data from the National Center for Health Statistics and population estimates for 1996 to 1998. Fertility rates by race and Hispanic origin for 1996 and birth registration data by race and Hispanic origin (adjusted for under-registration) for 1997 and 1998 were used.

Death Rate Projections

Significant differences in death rates currently exist between males and females and between race and ethnic groups in the United States. Life expectancy at birth has generally increased throughout the century for males and females. By 1997, life expectancies for males and females had reached 73.6 years and 79.4 years, respectively. The U.S. Bureau of the Census provides population projections to the year 2100 for the entire United States. These projections include a continued increase in life expectancy over time. These projections of increased life expectancy are used in this analysis to account for likely future decreases in deaths. Future life expectancy projections are presented in table 12.

Clearly an increase in life expectancy would have an important impact on future death rates. Death rates are needed to project the number of deaths that would be expected to occur for a particular cohort/group within a given year. In order to project future deaths within each cohort/group, death rates need to be projected into the future. However, age specific death rate projections by sex and ethnicity are not available. Therefore, projections of future life expectancy are used to estimate future survival rates by sex and age. Current death rates by age group, sex, and ethnicity are combined with the future life expectancy projections to estimate future death rates. Current death rates for the United States White and Native American population are presented in table 13.

Table 12 – Projected life expectancy at birth

Population Group	Lowest Series				Middle Series				Highest Series			
	1999	2025	2050	2100	1999	2025	2050	2100	1999	2025	2050	2100
Total Population												
Male	74.0	76.5	79.5	85.0	74.1	77.6	81.2	88.0	74.1	79.1	83.8	92.3
Female	79.7	82.6	84.9	89.3	79.8	83.6	86.7	92.3	79.8	84.6	88.4	95.2
White, Non-Hispanic												
Male	74.7	76.9	79.5	84.8	74.7	77.8	81.1	87.6	74.7	79.2	83.5	91.8
Female	80.1	82.6	84.8	89.0	80.1	83.6	86.4	91.8	80.1	84.5	88.0	94.6
American Indian												
Male	72.8	77.2	80.3	85.6	72.9	78.4	82.2	88.5	73.0	80.1	84.9	92.9
Female	82.0	85.3	87.3	90.6	82.0	86.5	89.2	93.6	82.1	87.7	91.0	96.5

Source: Hollmann, F.W.; T. J. Mulder; and Jeffrey E. Kallan. "Methodology and Assumptions for the Population Projections of the United States: 1999 to 2100." U.S. Bureau of the Census, 2000.

Table 13 – Current deaths per 100,000 population

Age Category	White Male	White Female	Native American Male	Native American Female
All ages	973.9	693.1	797.0	592.1
Under 1 year	658.7	520.7	911.5	676.2
1-4 years	31.5	25.5	57.3	43.0
5-14 years	18.4	13.1	29.3	17.9
15-24 years	108.9	43.2	153.1	61.5
25-34 years	128.8	58.0	185.3	88.7
35-44	237.6	132.9	338.1	196.0
45-54	509.2	287.2	583.6	364.4
55-64	1,102.3	693.7	1,058.3	785.0
65-74	2,707.3	1,780.6	2,237.3	1,710.7
75-84	6,620.6	4,671.6	4,644.0	3,834.3
85 years and over	16,037.9	14,240.6	9,583.8	7,920.2

Source: National Center for Health Statistics. "Health, United States, 2005."

Net Migration

Generally, changes in birth and death rates are slow and somewhat predictable. However, outside influences can cause rapid and significant changes in migration rates with little warning. Therefore, migration is the most difficult demographic component to project with confidence. In addition, there is a general lack of time-series data that report accurate migration patterns by age and sex at a detailed level of analysis. A range of migration assumptions is used to project the future population of the Santee Reservation under three scenarios. Each scenario has the same assumption that net migration of the non-Indian population is zero. The non-Indian portion of the Reservation population has actually decreased over the last 30 years, with the largest portion of the decrease occurring from 1980 to 1990. However, the non-Indian population of the Santee Reservation remained fairly stable from 1990 to 2000, decreasing from 333 to 315 people. The recent stabilization of the non-Indian population was used as a basis for assuming zero net migration of the non-Indian population on the Reservation.

The migration assumptions for the Indian population vary between scenarios, ranging from zero net migration to a 1-percent annual net migration increase. A range of population projections based on the information and assumptions presented above are shown in table 14. The zero net in-migration scenario for the Native American population is likely to understate future movement of Tribal members into the Reservation. Therefore, the 1 percent net immigration scenario is used to estimate future demands. The vast majority of growth is likely to occur in Santee Village, followed by development along Highway 12 and 54D. The distribution of estimated current and 2050 population is shown in figures 1 and 2 (using net in-migration of 1 percent).

Table 14 – Santee Indian Reservation population projections

Year	Net in-migration 1% annually			Zero net in-migration		
	Total Population	Native American	% Native American	Total Population	Native American	% Native American
2010	960	650	67.86%	920	610	66.57%
2015	1,010	700	69.57%	940	635	67.34%
2020	1,070	760	71.21%	965	660	68.15%
2025	1,120	815	72.95%	980	680	69.18%
2030	1,160	865	74.62%	990	690	70.25%
2035	1,190	905	76.00%	990	700	71.09%
2040	1,220	940	76.98%	985	705	71.54%
2045	1,250	970	77.71%	980	710	71.76%
2050	1,280	1,000	78.36%	980	710	71.95%
2055	1,310	1,030	79.01%	980	710	72.18%

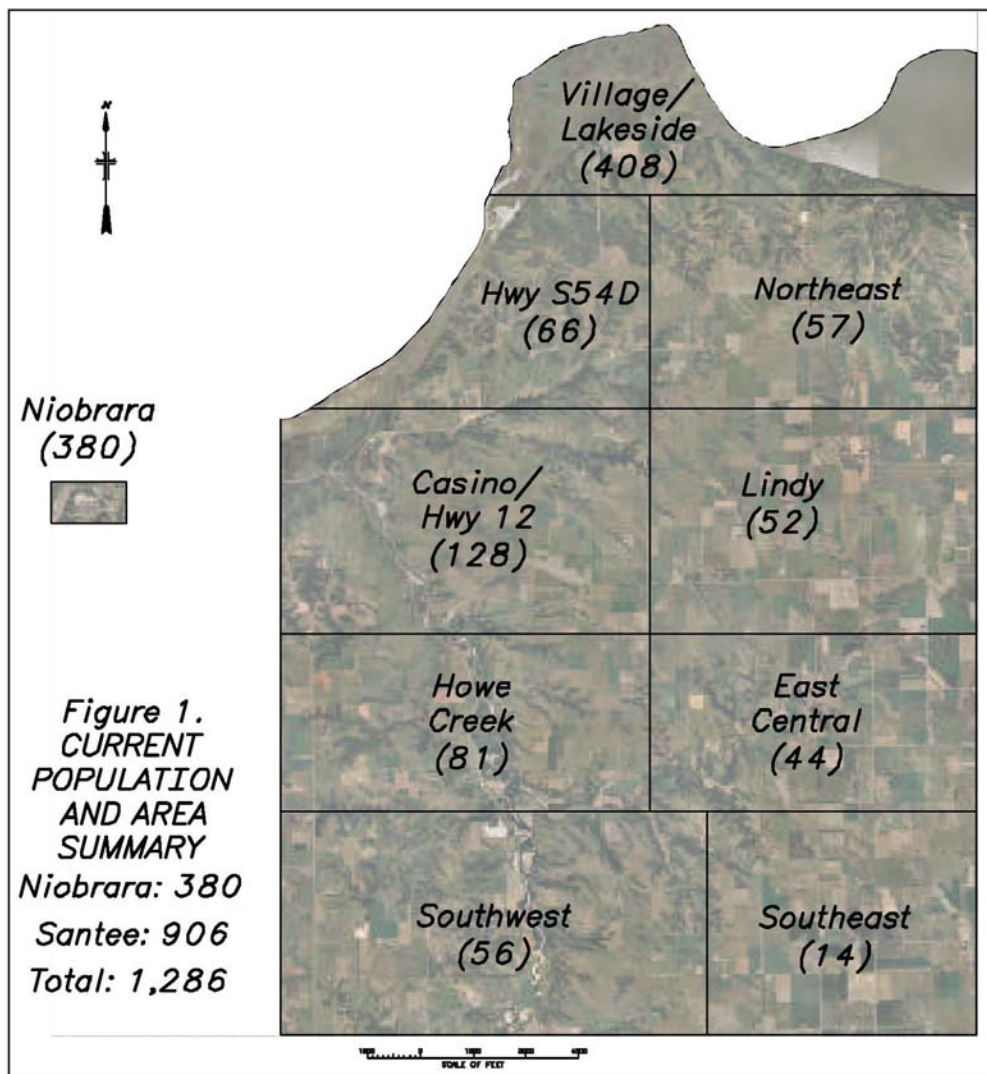
Niobrara Projections

The current population of Niobrara is approximately 380 people. Although the population of Niobrara has historically declined, that decline has recently stabilized. Based on the recent stabilization of the population and potential for moderate economic growth discussed previously, a low growth estimate of the future population of Niobrara would be to maintain the current population of 380 people. The population of Niobrara is projected to change very little over the next 50 years, mostly due to the lack of in-migration that is likely to occur combined with a relatively old population that limits the population added as a result of births. Assuming The Village of Niobrara is likely to grow at a rate that is similar to overall regional growth, a high growth estimate would be equal to regional population projections completed by the U.S. Bureau of the Census. The regional growth rate that represents a high growth rate for Niobrara is equal to an annual growth rate of 0.21 percent. High growth population projections for Niobrara are shown in table 15. The high growth rate estimates still represent a very moderate increase in the Niobrara population.

Table 15 – High growth Niobrara population projections

Year	Population
2010	385
2015	390
2020	395
2025	400
2030	400
2035	405
2040	410
2045	415
2050	420
2055	425

Figure 1. Current population and area summary.



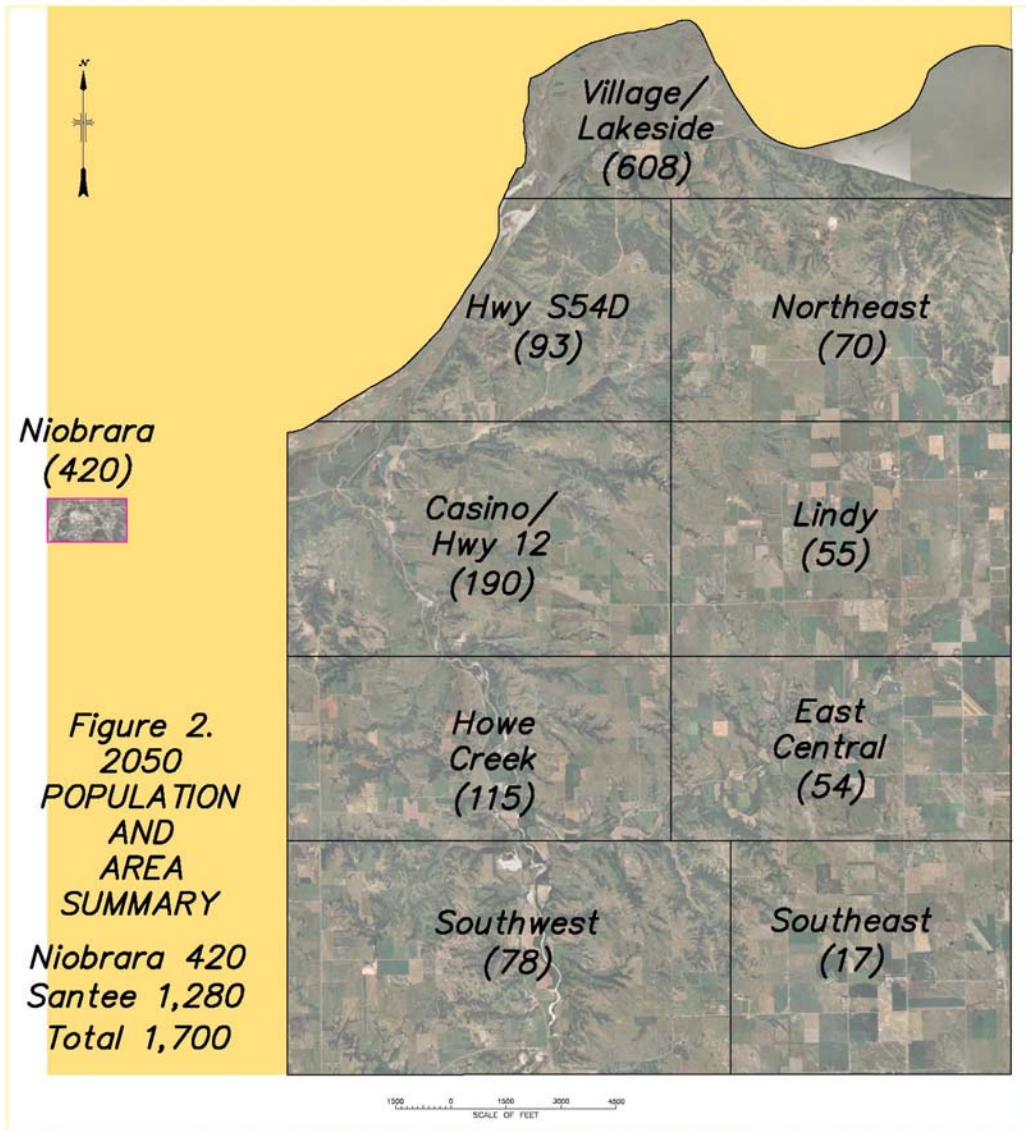


Figure 2. 2050 population and area summary.

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Forecasting Water Needs

Current and Future Water Demands

This section provides current and future water demands for the entire service area including the Santee Sioux Nation and the Village of Niobrara, Nebraska. Current water demands are taken from actual flow reports. Future water demands are based on current water demands, estimated water demands for projected expansions, and current and future population and employment trend data as described in the Economic Conditions portion of this report.

Data for this analysis were limited to monthly quantities thus limiting the ability to calculate appropriate peaking factors necessary for transmission and storage designs. Also, fire protection demands are not included. Maximum day, peak hour, and fire protection demands will be developed as a design activity.

Population

The population estimates for the Santee Nation and Niobrara used in development of current and future water demand are shown in table 16¹.

Table 16 – Santee Nation and Niobrara Population Estimates

Location	2006	2010	2020	2030	2040	2050
Santee Nation	906	960	1070	1160	1220	1280
Niobrara	380	385	395	400	410	420

Current Water Demands

The Santee Sioux Utility Commission provided a single page report titled *Annual Water Usage* which lists 1996–2004 monthly and annual actual water production quantities at the water treatment plant which served residences in the Village and along Highway S54D, Tribal facilities, and commercial establishments. The Highway 12 community was added to the distribution system in 2006. It is assumed existing transmission system leakage is negligible and water demand is equal to production quantities. Data prior to 1997 are incomplete due to the lack of metering at the treatment building; therefore, only the 1998–2004 monthly data are used to determine actual water demand. The Utility Commission also provided a multiple page log for 2004 titled *Water Pump House* which lists flows as measured by the meter in the treatment building main service line. The report and log do not include water demands for the individual communities of Highway 12, Lakeside, Howe Creek, or the non-community residences throughout the Reservation. Table 17 provides the average daily demand, peak month average daily demand as estimated from July data, and typical indoor daily demand as estimated from February data for the period provided. These estimates include both residential and commercial water demands. A comparison of the average and peak month average daily flows represents a peaking factor of 1.3².

¹ These data are found in tables 14 and 15 as well.

² In this instance, peaking factor is a calculated value obtained by comparing average daily demands and peak season average daily demands (in July) when residential outdoor irrigation and increased commercial activity occurs.

Table 17 – Measured Santee Water Deliveries, 1998-2004.

Typical Demands	Population *	Gallons per day (gpd)	Gallons per capita per day (gpcd)
Average daily demand		82,858	172
Peak month average daily demand	482	109,952	228
Typical indoor daily demand		75,604	157

*Note: As described previously in the Economic Conditions section, the population served by the water treatment plant was 482 people (320 in the Village, 66 along Highway S54D, and 96 near the Casino).

The Village of Niobrara provided a memorandum dated March 2, 2006, listing measured monthly water deliveries for 2000-2005. The 2004-2005 data are used to estimate water demand under metered conditions (a metering program was completed in 2003). Table 18 provides the average daily demand, peak month average daily demand, and typical indoor daily demand for 2004-2005. These estimates include both residential and commercial water demand. A comparison of the average and peak month average daily flows represents a peaking factor of 1.8.

Table 18 – Measured Niobrara Water Deliveries, 2000-2005

Typical Demands	Population *	gpd	gpcd
Average daily demand		69,352	183
Peak month average daily demand	380	120,500	317
Typical indoor daily demand		36,268	95

*Note: According to data presented in the Economic Conditions section, the population served in 2006 was 380 people.

Tables 17 and 18 reflect total water deliveries, in gpd, to the residential population and existing commercial and service facilities. As a result, the calculated per capita estimates, in gpcd, are not representative of residential domestic uses. To obtain a per capita estimate for domestic water use, the daily water demands for the commercial facilities must be subtracted from the average daily water demands shown in tables 17 and 18.

Table 19 – Commercial Demands for Santee Nation and Niobrara for 2006

Santee Nation	# Employees	GED	# Livestock	gpd/head	Typical Demand, gpd
Ohiya Casino/Bingo & Café	29	156.2	N/A	N/A	4,530
Feather Hill Express Fuel Plaza	7	117.5	N/A	N/A	823
Lewis & Clark Grocery Store	4	94.2	N/A	N/A	377
Lakeview Resort	6	48.9	N/A	N/A	293
Istani Construction	2	54.2	N/A	N/A	108
Utility Commission	3	51.0	N/A	N/A	153
Garage/Repair Shop	3	54.5	N/A	N/A	164
Community Center (annual Pow Wow)	1	0.0	N/A	N/A	410
Swimming pool (Jun-Aug)	4 FT, 1 PT	0.0	N/A	N/A	2,460
Administrative Offices	40	105.7	N/A	N/A	4,228
Tribal Headquarters	10	105.7	N/A	N/A	1,057
Land Management/Economics	12	57.9	N/A	N/A	695
Housing Authority	18	57.9	N/A	N/A	1,042
Police Department	7	90.6	N/A	N/A	634
BIA Fire Department	22	90.6	N/A	N/A	1,993
Health Clinic	20	90.6	N/A	N/A	1,812
Nutrition Center	3	90.6	N/A	N/A	272
Youth Center	3	36.2	N/A	N/A	109
Santee Public School K-12	30	168.8	N/A	N/A	5,064
Daycare Center	5	119.5	N/A	N/A	598
WIC/Healthy Start	3	90.6	N/A	N/A	272
Cattle	0	44.8	850	12	10,200
Buffalo	0	44.8	100	18	1,800
Santee Nation Typical Commercial Daily Demand					39,093
Niobrara	# Employees	GED	# Livestock	gpd/head	Typical Demand, gpd
Farmers and Merchants State Bank	5	58.9	N/A	N/A	295
Moody Motor, Ford Dealership	23	33.1	N/A	N/A	761
Trustworthy Hardware	2	35.9	N/A	N/A	72
J&K Auto	2	54.5	N/A	N/A	109
Jones Cellular One Communications	1	66.1	N/A	N/A	66
Farniks Grocery Store	7	94.2	N/A	N/A	659
Niobrara State Park	28	0.0	N/A	N/A	0
Village of Niobrara, government	4	105.7	N/A	N/A	423
Niobrara Public Schools	38	168.8	N/A	N/A	6,414
Ponca Tribal Offices	16	105.7	N/A	N/A	1,691
Niobrara Typical Commercial Daily Demand					10,491

FT = full time; PT = part time

Water demands for commercial facilities are based on employment. Using employment estimates described earlier and the appropriate “gallons per employee per day” (GED) coefficients provided by Planning and Management Consultants (1996), estimates of commercial

water uses for present-day conditions were calculated (table 19). Livestock water use is seldom monitored or measured. The estimated use rates for cattle and bison in table 19 were developed for this study from several sources including Hutson, et al (2005).

Table 20 – Estimated Current Residential Per Capita Use (Measured Deliveries Less Commercial Use for Currently-Served Population)

Santee Nation Areas¹	# Residents	Domestic indoor & outdoor use, gpcd	Demand, gpd
Village	320	91 est.	29,072 est.
Lakeside	88	Not measured	Not measured
Highway S54D	66	91 est.	6,000 est.
Casino	96	91 est.	8,693 est.
Highway 12	32	Not measured	Not measured
Howe Creek	81	Not measured	Not measured
Southwest	56	Not measured	Not measured
Northeast	57	Not measured	Not measured
Lindy	52	Not measured	Not measured
East Central	44	Not measured	Not measured
Southeast	14	Not measured	Not measured
Currently-served Population²	482		43,765 est.
Commercial Uses Only (see table 19)			39,093
Santee Nation Average Daily Demand (see table 17)			82,858
Niobrara	# Residents	Domestic indoor & outdoor use, gpcd	Demand, gpd
Residents	380	155 est.	58,861 est.
Commercial Uses Only (see table 19)			10,491
Niobrara Average Daily Demand (see table 18)			69,352

¹ The Santee Nation areas discussed here are shown in Figures 1 and 2.

² The Tribal reports and logs did not include water demands for the individual communities of Highway 12 (which was added to the Village system in 2006), Lakeside, Howe Creek, or the remaining non-community residences throughout the Reservation (non-bolded).

The typical commercial facilities water demands estimated in table 19 can now be subtracted from the average daily demands derived from the actual flow reports shown in tables 17 and 18. Table 20 lists the adjusted domestic per capita use, in gpcd, for the Santee Nation and Niobrara after subtracting the estimated commercial facilities water demands. Table 20 indicates the average daily per capita residential demands (including indoor and outdoor residential uses) for the Santee Nation and Niobrara are 91 and 155 gpcd, respectively.

Using the average daily per capita demands listed in table 20 and the estimated typical commercial facilities demands listed in table 19, the service area-wide demands can be determined for all years within the study period beginning with an estimate of the 2006 service area-wide average daily demands (table 21). For planning purposes, a peaking factor of 2.0 is used to determine peak month average daily demands for the calculated average daily demand.³

³ As noted earlier, peaking factors of 1.3 and 1.8 can be calculated from the monthly water delivery data for Santee Nation and Niobrara, respectively. Increasing the factor to 2.0 adds a measure of safety to the ratio calculated from peak month data and used to estimate peak daily demand. Additional refinement of peak daily demand estimates will be evaluated during the system design study.

Additional system design studies will be conducted to establish the daily peak demand for the Santee and Niobrara system. These future studies will include consideration of fire flow requirements.

For 2006, the estimated per capita residential water use rates of 90.8 gpcd and 154.9 gpcd were applied to Santee and Niobrara populations, respectively. For future demands, a per capita use rate of 155 gpcd was applied to the estimates of future population of the Santee Nation and Niobrara. Applying a single use rate across the projected service area allows planners to conservatively estimate future water use. The 155 gpcd rate is comparable to water use data collected for this study from other nearby communities.

**Table 21 – 2006 Estimated Residential and
Commercial Service Area-Wide Water Demands**

Santee Nation	# Residents	Avg gpcd	# Employees	GED	# Live-stock	gpd/head	Typical Demand, gpd
Village/Lakeside	408.0	90.8	0	0	N/A	N/A	37,046
Hwy S54D	66.0	90.8	0	0	N/A	N/A	5,993
Casino/Hwy 12	128.0	90.8	0	0	N/A	N/A	11,622
Howe Creek	81.0	90.8	0	0	N/A	N/A	7,355
Southwest	56.0	90.8	0	0	N/A	N/A	5,085
Northeast	57.0	90.8	0	0	N/A	N/A	5,176
Lindy	52.0	90.8	0	0	N/A	N/A	4,722
East Central	44.0	90.8	0	0	N/A	N/A	3,995
Southeast	14.0	90.8	0	0	N/A	N/A	1,271
Reservation-wide Population	906.0	90.8	0	0	N/A	N/A	82,265
Ohiya Casino/Bingo & Café	0	0	29	156.2	N/A	N/A	4,530
Feather Hill Express Fuel Plaza	0	0	7	117.5	N/A	N/A	823
Lewis & Clark Grocery Store	0	0	4	94.2	N/A	N/A	377
Lakeview Resort	0	0	6	48.9	N/A	N/A	293
Istani Construction	0	0	2	54.2	N/A	N/A	108
Utility Commission	0	0	3	51.0	N/A	N/A	153
Garage/Repair Shop	0	0	3	54.5	N/A	N/A	164
Community Center (annual Pow Wow)	0	0	1	0.0	N/A	N/A	410
Swimming pool (Jun-Aug)	0	0	4 FT, 1 PT	0.0	N/A	N/A	2,460
Administrative Offices	0	0	40	105.7	N/A	N/A	4,228
Tribal Headquarters	0	0	10	105.7	N/A	N/A	1,057
Land Management/Economics	0	0	12	57.9	N/A	N/A	695
Housing Authority	0	0	18	57.9	N/A	N/A	1,042
Police Department	0	0	7	90.6	N/A	N/A	634
BIA Fire Department	0	0	22	90.6	N/A	N/A	1,993
Health Clinic	0	0	20	90.6	N/A	N/A	1,812
Nutrition Center	0	0	3	90.6	N/A	N/A	272
Youth Center	0	0	3	36.2	N/A	N/A	109
Santee Public	0	0	30	168.8	N/A	N/A	5,064

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Santee Nation	# Residents	Avg gpcd	# Employees	GED	# Live-stock	gpd/head	Typical Demand, gpd
School K-12							
Daycare Center	0	0	5	119.5	N/A	N/A	598
WIC/Healthy Start	0	0	3	90.6	N/A	N/A	272
Cattle	0	0	0	44.8	850	12	10,200
Buffalo	0	0	0	44.8	100	18	1,800
Santee Nation Average Daily Demand							121,357

Niobrara	# Residents	Avg gpcd	# Employees	GED	# Live-stock	gpd/head	Typical Demand, gpd
Residents	380	154.9	0	0	N/A	N/A	58,861
Farmers and Merchants State Bank	0	0	5	58.9	N/A	N/A	295
Moody Motor, Ford Dealership	0	0	23	33.1	N/A	N/A	761
Trustworthy Hardware	0	0	2	35.9	N/A	N/A	72
J&K Auto	0	0	2	54.5	N/A	N/A	109
Jones Cellular One Communications	0	0	1	66.1	N/A	N/A	66
Farniks Grocery Store	0	0	7	94.2	N/A	N/A	659
Niobrara State Park	0	0	28	0.0	N/A	N/A	0
Village of Niobrara, government	0	0	4	105.7	N/A	N/A	423
Niobrara Public Schools	0	0	38	168.8	N/A	N/A	6,414
Ponca Tribal Offices	0	0	16	105.7	N/A	N/A	1,691
Niobrara Average Daily Demand							69,352
Total Service Area-Wide Typical Daily Demand							190,709
Total Service Area-Wide Peak Month Daily Demand (2.0 Peaking Factor)							381,418

Avg = average

Estimate of Future Water Demands

Applying the residential per capita demands (as calculated from 155 gpcd), the employment demands (shown in tables 19 and 21), and the projected service and commercial expansions (discussed in the Economic Conditions portion of this report), future total water demands are projected for 10-year intervals beginning in 2010 through 2050 (table 22). Table 22 summarizes the demand by categories of residential, employment, and livestock for the Santee Nation and Niobrara. Detailed tabulations of estimated future water use by 10-year increments are available in the appendix of this report.

Table 22 – Service Area-Wide Average and Peak Daily Demands for the Years 2010, 2020, 2030, 2040, and 2050 (gallons per day)

User Type	2010	2020	2030	2040	2050
Santee Nation					
Residential ¹	148,797	165,846	179,797	189,102	198,401
Employment ²	27,755	32,164	42,711	44,595	46,511
Livestock	12,000	12,000	13,590	14,834	16,124
Sub-Total	188,551	210,009	236,098	248,532	261,036
Niobrara					
Residential	59,675	61,225	62,000	63,550	65,100
Employment	10,655	10,918	11,114	11,345	11,589
Sub-Total	70,330	72,143	73,114	74,895	76,689
Total Service Area Average Daily Demand	258,881	282,153	309,212	323,427	337,725
Total Service Area Peak Month Daily Demand	517,763	564,305	618,424	646,853	675,451

¹ Residential demands for the Santee Nation include all community and non-community residents.

² The years the commercial expansions listed in the Economic Conditions portion of this report occur are estimated. For example, between 2010 and 2020, the new Safety Center (54 employees) and Juvenile Detention Center (7 employees) are included in the demand forecast.

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Appendix A

Estimated Future Water Use Years 2010, 2020, 2030, 2040, and 2050

Estimated Future Water Use Year 2010

SANTEE RESERVATION	# Residents	AVG gpcd	# FT Employees	GED	# Livestock	gpd/ head	Total Average Demand, gpd
Village/Lakeside	445.9	155.0	0	0	N/A	N/A	69,115
Hwy S54D	68.5	155.0	0	0	N/A	N/A	10,624
Casino/Hwy 12	133.8	155.0	0	0	N/A	N/A	20,733
Howe Creek	84.1	155.0	0	0	N/A	N/A	13,038
Southwest	58.1	155.0	0	0	N/A	N/A	9,001
Northeast	58.2	155.0	0	0	N/A	N/A	9,021
Lindy	52.2	155.0	0	0	N/A	N/A	8,089
East Central	44.9	155.0	0	0	N/A	N/A	6,963
Southeast	14.3	155.0	0	0	N/A	N/A	2,213
Reservation-Wide Population	960.0	155.0	0	0	N/A	N/A	148,797
Ohiya Casino/Bingo & Café	0	0	29	156.2	N/A	N/A	4,530
Feather Hill Express Fuel Plaza	0	0	8	117.5	N/A	N/A	940
Lewis & Clark Grocery Store	0	0	4	94.2	N/A	N/A	377
Lakeview Resort	0	0	6	48.9	N/A	N/A	293
Istani Construction	0	0	2	54.2	N/A	N/A	108
Utility Commission	0	0	3	51.0	N/A	N/A	153
Garage/Repair Shop	0	0	3	54.5	N/A	N/A	164
Community Center (annual Pow Wow)	0	0	1	0.0	N/A	N/A	410
Swimming pool (Jun-Aug)	0	0	4 FT, 1 PT	0.0	N/A	N/A	2,460
Administrative Offices	0	0	41	105.7	N/A	N/A	4,334
Tribal Headquarters	0	0	11	105.7	N/A	N/A	1,163
Land Management/Economics	0	0	13	57.9	N/A	N/A	753
Housing Authority	0	0	19	57.9	N/A	N/A	1,100
Police Department	0	0	7	90.6	N/A	N/A	634
BIA Fire Department	0	0	22	90.6	N/A	N/A	1,993
Health Clinic	0	0	21	90.6	N/A	N/A	1,903
Nutrition Center	0	0	4	90.6	N/A	N/A	362
Youth Center	0	0	4	36.2	N/A	N/A	145
Santee Public School K-12	0	0	30	168.8	N/A	N/A	5,064
Daycare Center	0	0	5	119.5	N/A	N/A	598
WIC/Healthy Start	0	0	3	90.6	N/A	N/A	272
Cattle	0	0	0	44.8	850	12	10,200
Buffalo	0	0	0	44.8	100	18	1,800
SANTEE SIOUX AVERAGE DAILY DEMAND							188,551
NIOBRARA	# Residents	AVG gpcd	# FT Employees	GED	# Livestock	gpd/ head	Total Demand, gpd
Residents	385	155	0	0	N/A	N/A	59,675
Farmers and Merchants State Bank	0	0	6	58.9	N/A	N/A	353
Moody Motor, Ford Dealership	0	0	23	33.1	N/A	N/A	761
Trustworthy Hardware	0	0	2	35.9	N/A	N/A	72
J&K Auto	0	0	2	54.5	N/A	N/A	109
Jones Cellular One Communications	0	0	1	66.1	N/A	N/A	66
Farniks Grocery Store	0	0	7	94.2	N/A	N/A	659
Niobrara State Park	0	0	28	0.0	N/A	N/A	0
Village of Niobrara, government	0	0	5	105.7	N/A	N/A	529
Niobrara Public Schools	0	0	38	168.8	N/A	N/A	6,414
Ponca Tribal Offices	0	0	16	105.7	N/A	N/A	1,691
NIOBRARA AVERAGE DAILY DEMAND							70,330
TOTAL SERVICE AREA-WIDE AVERAGE DAILY DEMAND							258,881
TOTAL SERVICE AREA-WIDE PEAK DAILY DEMAND (2.0)							517,763

Estimated Future Water Use Year 2020

SANTEE RESERVATION	# Residents	AVG gpcd	# FT Employees	GED	# Livestock	gpd/ head	Total Average Demand, gpd
Village/Lakeside	521.9	155.0	0	0	N/A	N/A	80,895
Hwy S54D	73.9	155.0	0	0	N/A	N/A	11,458
Casino/Hwy 12	146.1	155.0	0	0	N/A	N/A	22,641
Howe Creek	90.7	155.0	0	0	N/A	N/A	14,062
Southwest	62.4	155.0	0	0	N/A	N/A	9,680
Northeast	60.7	155.0	0	0	N/A	N/A	9,403
Lindy	52.6	155.0	0	0	N/A	N/A	8,147
East Central	46.8	155.0	0	0	N/A	N/A	7,259
Southeast	14.9	155.0	0	0	N/A	N/A	2,303
Reservation-Wide Population	1070	155.0	0	0	N/A	N/A	165,846
Ohia Casino/Bingo & Café	0	0	29	156.2	N/A	N/A	4,530
Feather Hill Express Fuel Plaza	0	0	8	117.5	N/A	N/A	940
Lewis & Clark Grocery Store	0	0	5	94.2	N/A	N/A	471
Lakeview Resort	0	0	6	48.9	N/A	N/A	293
Istani Construction	0	0	3	54.2	N/A	N/A	163
Utility Commission	0	0	3	51.0	N/A	N/A	153
Garage/Repair Shop	0	0	3	54.5	N/A	N/A	164
Community Center (annual Pow Wow)	0	0	1	0.0	N/A	N/A	410
Swimming pool (Jun-Aug)	0	0	4 FT, 1 PT	0.0	N/A	N/A	2,460
Administrative Offices	0	0	43	105.7	N/A	N/A	4,545
Tribal Headquarters	0	0	13	105.7	N/A	N/A	1,374
Land Management/Economics	0	0	14	57.9	N/A	N/A	811
Housing Authority	0	0	21	57.9	N/A	N/A	1,216
New Safety Center	0	0	54	90.6	N/A	N/A	4,892
New Juvenile Detention Center	0	0	7	90.6	N/A	N/A	634
Health Clinic	0	0	22	90.6	N/A	N/A	1,993
Nutrition Center	0	0	5	90.6	N/A	N/A	453
Youth Center	0	0	5	36.2	N/A	N/A	181
Santee Public School K-12	0	0	32	168.8	N/A	N/A	5,402
Daycare Center	0	0	6	119.5	N/A	N/A	717
WIC/Healthy Start	0	0	4	90.6	N/A	N/A	362
Cattle	0	0	0	44.8	850	12	10,200
Buffalo	0	0	0	44.8	100	18	1,800
SANTEE SIOUX AVERAGE DAILY DEMAND							210,009
NIOBRARA	# Residents	AVG gpcd	# FT Employees	GED	# Livestock	gpd/ head	Total Demand, gpd
Residents	395	155	0	0	N/A	N/A	61,225
Farmers and Merchants State Bank	0	0	6	58.9	N/A	N/A	353
Moody Motor, Ford Dealership	0	0	23	33.1	N/A	N/A	761
Trustworthy Hardware	0	0	2	35.9	N/A	N/A	72
J&K Auto	0	0	2	54.5	N/A	N/A	109
Jones Cellular One Communications	0	0	1	66.1	N/A	N/A	66
Farniks Grocery Store	0	0	8	94.2	N/A	N/A	754
Niobrara State Park	0	0	28	0.0	N/A	N/A	0
Village of Niobrara, government	0	0	5	105.7	N/A	N/A	529
Niobrara Public Schools	0	0	39	168.8	N/A	N/A	6,583
Ponca Tribal Offices	0	0	16	105.7	N/A	N/A	1,691
NIOBRARA AVERAGE DAILY DEMAND							72,143
TOTAL SERVICE AREA-WIDE AVERAGE DAILY DEMAND							282,153
TOTAL SERVICE AREA-WIDE PEAK DAILY DEMAND (2.0)							564,305

Estimated Future Water Use Year 2030

SANTEE RESERVATION	# Residents	AVG gpcd	# FT Employees	GED	# Livestock	gpd/ head	Total Average Demand, gpd
Village/Lakeside	575.3	155.0	0	0	N/A	N/A	89,172
Hwy S54D	79.7	155.0	0	0	N/A	N/A	12,357
Casino/Hwy 12	159.5	155.0	0	0	N/A	N/A	24,724
Howe Creek	97.8	155.0	0	0	N/A	N/A	15,165
Southwest	67.2	155.0	0	0	N/A	N/A	10,409
Northeast	63.2	155.0	0	0	N/A	N/A	9,802
Lindy	52.9	155.0	0	0	N/A	N/A	8,205
East Central	48.8	155.0	0	0	N/A	N/A	7,567
Southeast	15.5	155.0	0	0	N/A	N/A	2,396
Reservation-Wide Population	1160	155.0	0	0	N/A	N/A	179,797
Ohia Casino/Bingo & Café	0	0	29	156.2	N/A	N/A	4,530
New Ohia Motel	0	0	29	230.3	N/A	N/A	6,679
New Golf Course	0	0	6	390.8	N/A	N/A	2,345
Feather Hill Express Fuel Plaza	0	0	8	117.5	N/A	N/A	940
Lewis & Clark Grocery Store	0	0	5	94.2	N/A	N/A	471
Lakeview Resort	0	0	6	48.9	N/A	N/A	293
Istani Construction	0	0	4	54.2	N/A	N/A	217
Utility Commission	0	0	4	51.0	N/A	N/A	204
Garage/Repair Shop	0	0	4	54.5	N/A	N/A	218
Community Center (annual Pow Wow)	0	0	1	0.0	N/A	N/A	410
New Swimming pool (Jun-Aug)	0	0	5 FT, 1 PT	0.0	N/A	N/A	2,460
Administrative Offices	0	0	44	105.7	N/A	N/A	4,651
Tribal Headquarters	0	0	14	105.7	N/A	N/A	1,480
Land Management/Economics	0	0	15	57.9	N/A	N/A	869
Housing Authority	0	0	22	57.9	N/A	N/A	1,274
New Safety Center	0	0	55	90.6	N/A	N/A	4,983
New Juvenile Detention Center	0	0	8	90.6	N/A	N/A	725
Health Clinic	0	0	24	90.6	N/A	N/A	2,174
Nutrition Center	0	0	6	90.6	N/A	N/A	544
Youth Center	0	0	6	36.2	N/A	N/A	217
Santee Public School K-12	0	0	34	168.8	N/A	N/A	5,739
Daycare Center	0	0	7	119.5	N/A	N/A	837
WIC/Healthy Start	0	0	5	90.6	N/A	N/A	453
Cattle	0	0	1	44.8	900	12	10,845
Buffalo	0	0	1	44.8	150	18	2,745
SANTEE SIOUX AVERAGE DAILY DEMAND							236,098
NIOBRARA	# Residents	AVG gpcd	# FT Employees	GED	# Livestock	gpd/ head	Total Demand, gpd
Residents	400	155	0	0	N/A	N/A	62,000
Farmers and Merchants State Bank	0	0	6	58.9	N/A	N/A	353
Moody Motor, Ford Dealership	0	0	23	33.1	N/A	N/A	761
Trustworthy Hardware	0	0	3	35.9	N/A	N/A	108
J&K Auto	0	0	3	54.5	N/A	N/A	164
Jones Cellular One Communications	0	0	1	66.1	N/A	N/A	66
Farniks Grocery Store	0	0	8	94.2	N/A	N/A	754
Niobrara State Park	0	0	28	0.0	N/A	N/A	0
Village of Niobrara, government	0	0	5	105.7	N/A	N/A	529
Niobrara Public Schools	0	0	39	168.8	N/A	N/A	6,583
Ponca Tribal Offices	0	0	17	105.7	N/A	N/A	1,797
NIOBRARA AVERAGE DAILY DEMAND							73,114
TOTAL SERVICE AREA-WIDE AVERAGE DAILY DEMAND							309,212
TOTAL SERVICE AREA-WIDE PEAK DAILY DEMAND (2.0)							618,424

Estimated Future Water Use Year 2040

SANTEE RESERVATION	# Residents	AVG gpcd	# FT Employees	GED	# Livestock	gpd/ head	Total Average Demand, gpd
Village/Lakeside	595.9	155.0	0	0	N/A	N/A	92,365
Hwy S54D	86.0	155.0	0	0	N/A	N/A	13,327
Casino/Hwy 12	174.2	155.0	0	0	N/A	N/A	26,999
Howe Creek	105.5	155.0	0	0	N/A	N/A	16,355
Southwest	72.2	155.0	0	0	N/A	N/A	11,194
Northeast	65.9	155.0	0	0	N/A	N/A	10,218
Lindy	53.3	155.0	0	0	N/A	N/A	8,264
East Central	50.9	155.0	0	0	N/A	N/A	7,888
Southeast	16.1	155.0	0	0	N/A	N/A	2,493
Reservation-Wide Population	1220	155.0	0	0	N/A	N/A	189,102
Ohia Casino/Bingo & Café	0	0	30	156.2	N/A	N/A	4,686
New Ohia Motel	0	0	30	230.3	N/A	N/A	6,909
New Golf Course	0	0	6	390.8	N/A	N/A	2,345
Feather Hill Express Fuel Plaza	0	0	8	117.5	N/A	N/A	940
Lewis & Clark Grocery Store	0	0	5	94.2	N/A	N/A	471
Lakeview Resort	0	0	6	48.9	N/A	N/A	293
Istani Construction	0	0	4	54.2	N/A	N/A	217
Utility Commission	0	0	4	51.0	N/A	N/A	204
Garage/Repair Shop	0	0	4	54.5	N/A	N/A	218
Community Center (annual Pow Wow)	0	0	1	0.0	N/A	N/A	410
New Swimming pool (Jun-Aug)	0	0	5 FT, 1 PT	0.0	N/A	N/A	2,460
Administrative Offices	0	0	46	105.7	N/A	N/A	4,862
Tribal Headquarters	0	0	16	105.7	N/A	N/A	1,691
Land Management/Economics	0	0	16	57.9	N/A	N/A	926
Housing Authority	0	0	23	57.9	N/A	N/A	1,332
New Safety Center	0	0	56	90.6	N/A	N/A	5,074
New Juvenile Detention Center	0	0	9	90.6	N/A	N/A	815
Health Clinic	0	0	25	90.6	N/A	N/A	2,265
Nutrition Center	0	0	7	90.6	N/A	N/A	634
Youth Center	0	0	7	36.2	N/A	N/A	253
Santee Public School K-12	0	0	35	168.8	N/A	N/A	5,908
Daycare Center	0	0	8	119.5	N/A	N/A	956
WIC/Healthy Start	0	0	8	90.6	N/A	N/A	725
Cattle	0	0	1	44.8	925	12	11,145
Buffalo	0	0	2	44.8	200	18	3,690
SANTEE SIOUX AVERAGE DAILY DEMAND							248,532
NIOBRARA	# Residents	AVG gpcd	# FT Employees	GED	# Livestock	gpd/ head	Total Demand, gpd
Residents	410	155	0	0	N/A	N/A	63,550
Farmers and Merchants State Bank	0	0	7	58.9	N/A	N/A	412
Moody Motor, Ford Dealership	0	0	23	33.1	N/A	N/A	761
Trustworthy Hardware	0	0	3	35.9	N/A	N/A	108
J&K Auto	0	0	3	54.5	N/A	N/A	164
Jones Cellular One Communications	0	0	2	66.1	N/A	N/A	132
Farniks Grocery Store	0	0	8	94.2	N/A	N/A	754
Niobrara State Park	0	0	28	0.0	N/A	N/A	0
Village of Niobrara, government	0	0	6	105.7	N/A	N/A	634
Niobrara Public Schools	0	0	39	168.8	N/A	N/A	6,583
Ponca Tribal Offices	0	0	17	105.7	N/A	N/A	1,797
NIOBRARA AVERAGE DAILY DEMAND							74,895
TOTAL SERVICE AREA-WIDE AVERAGE DAILY DEMAND							323,427
TOTAL SERVICE AREA-WIDE PEAK DAILY DEMAND (2.0)							646,853

Estimated Future Water Use Year 2050

SANTEE RESERVATION	# Residents	AVG gpcd	# FT Employees	GED	# Livestock	gpd/ head	Total Average Demand, gpd
Village/Lakeside	613.4	155.0	0	0	N/A	N/A	95,077
Hwy S54D	92.7	155.0	0	0	N/A	N/A	14,373
Casino/Hwy 12	190.2	155.0	0	0	N/A	N/A	29,484
Howe Creek	113.8	155.0	0	0	N/A	N/A	17,639
Southwest	77.7	155.0	0	0	N/A	N/A	12,037
Northeast	68.7	155.0	0	0	N/A	N/A	10,652
Lindy	53.7	155.0	0	0	N/A	N/A	8,323
East Central	53.0	155.0	0	0	N/A	N/A	8,223
Southeast	16.7	155.0	0	0	N/A	N/A	2,593
Reservation-Wide Population	1280	155.0	0	0	N/A	N/A	198,401
Ohia Casino/Bingo & Café	0	0	30	156.2	N/A	N/A	4,686
New Ohia Motel	0	0	30	230.3	N/A	N/A	6,909
New Golf Course	0	0	6	390.8	N/A	N/A	2,345
Feather Hill Express Fuel Plaza	0	0	8	117.5	N/A	N/A	940
Lewis & Clark Grocery Store	0	0	8	94.2	N/A	N/A	754
Lakeview Resort	0	0	6	48.9	N/A	N/A	293
Istani Construction	0	0	4	54.2	N/A	N/A	217
Utility Commission	0	0	4	51.0	N/A	N/A	204
Garage/Repair Shop	0	0	4	54.5	N/A	N/A	218
Community Center (annual Pow Wow)	0	0	1	0.0	N/A	N/A	410
New Swimming pool (Jun-Aug)	0	0	5 FT, 1 PT	0.0	N/A	N/A	2,460
Administrative Offices	0	0	48	105.7	N/A	N/A	5,074
Tribal Headquarters	0	0	18	105.7	N/A	N/A	1,903
Land Management/Economics	0	0	18	57.9	N/A	N/A	1,042
Housing Authority	0	0	24	57.9	N/A	N/A	1,390
New Safety Center	0	0	58	90.6	N/A	N/A	5,255
New Juvenile Detention Center	0	0	10	90.6	N/A	N/A	906
Health Clinic	0	0	26	90.6	N/A	N/A	2,356
Nutrition Center	0	0	8	90.6	N/A	N/A	725
Youth Center	0	0	8	36.2	N/A	N/A	290
Santee Public School K-12	0	0	37	168.8	N/A	N/A	6,246
Daycare Center	0	0	9	119.5	N/A	N/A	1,076
WIC/Healthy Start	0	0	9	90.6	N/A	N/A	815
Cattle	0	0	2	44.8	950	12	11,490
Buffalo	0	0	3	44.8	250	18	4,634
SANTEE SIOUX AVERAGE DAILY DEMAND							261,036
NIOBRARA	# Residents	AVG gpcd	# FT Employees	GED	# Livestock	gpd/ head	Total Demand, gpd
Residents	420	155	0	0	N/A	N/A	65,100
Farmers and Merchants State Bank	0	0	7	58.9	N/A	N/A	412
Moody Motor, Ford Dealership	0	0	24	33.1	N/A	N/A	794
Trustworthy Hardware	0	0	3	35.9	N/A	N/A	108
J&K Auto	0	0	3	54.5	N/A	N/A	164
Jones Cellular One Communications	0	0	2	66.1	N/A	N/A	132
Farniks Grocery Store	0	0	8	94.2	N/A	N/A	754
Niobrara State Park	0	0	28	0.0	N/A	N/A	0
Village of Niobrara, government	0	0	8	105.7	N/A	N/A	846
Niobrara Public Schools	0	0	39	168.8	N/A	N/A	6,583
Ponca Tribal Offices	0	0	17	105.7	N/A	N/A	1,797
NIOBRARA AVERAGE DAILY DEMAND							76,689
TOTAL SERVICE AREA- WIDE AVERAGE DAILY DEMAND							337,725
TOTAL SERVICE AREA-WIDE PEAK DAILY DEMAND (2.0)							675,451