CHAPTER 2

BASIC PLANNING DATA AND WATER DEMAND FORECASTING

2.1 EXISTING SERVICE AREA

The existing water system serves a combination of residential, commercial, industrial, and public users. The boundary of the Existing Service Area is shown on Figure 1-2. The Existing Service Area includes and area of approximately 1,290 acres, of which 1,100 acres are within the City Limits and 190 acres are outside the City Limits. Figure 3-1 and Map A, included in the back pocket of this Plan, show the existing Toppenish water system, including the general location of water mains, valves, fire hydrants, wells, and reservoirs.

The Toppenish City Limits include an area of approximately 1,300 acres. Existing land use within the City is presented in Table 2-1.

TABLE 2-1 EXISTING LAND USE WITHIN TOPPENISH CITY LIMITS*

Land Use Category	Total Acreage	Percent of Total
Agricultural / Mineral Lands	189	14.1%
Churches and Civic Organizations	11	0.8%
Commercial: Retail and Services	105	7.8%
Communications / Utilities	199	14.8%
Hotel / Motel	4	0.3%
Native American Trust or Tribal Lands	9	0.7%
Hospital	5	0.4%
Local & Federal Government	67	5.0%
Manufacturing / Industrial	54	4.0%
Parking	3	0.2%
Parks, Recreational, & Cultural Facilities	61	4.5%
Railroad / Transportation	37	2.8%
Residential: Single Family	325	24.2%
Residential: 2 to 4 Units	10	0.7%
Residential: 5 or more Units	23	1.7%
Residential: Mobile Home Park	1	0.1%
Residential: Other	4	0.3%
Schools / Educational Services	124	9.2%
Streets & Rights-of-Way	4	0.3%
Vacant	108	8.1%
TOTAL	1,343	100.0%

* Source: City of Toppenish 2008 Comprehensive Plan Update.

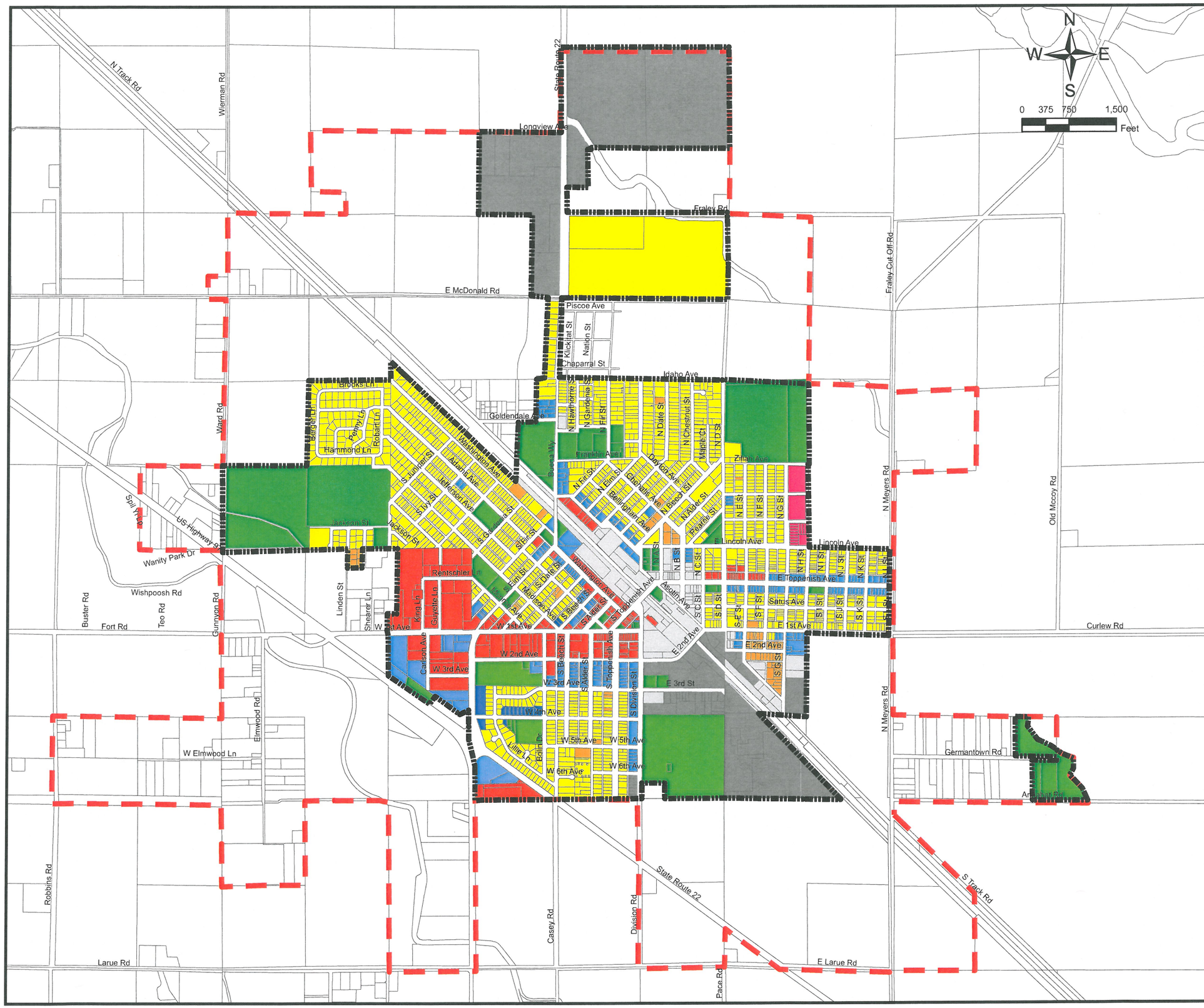
Residential areas are the largest land use total within the City, comprising approximately 363 acres, 27.0% of the land within the City Limits. Existing zoning within the City is presented in Table 2-2 and is shown on Figure 2-1, Existing Zoning Map.

TABLE 2-2 EXISTING ZONING WITHIN TOPPENISH CITY LIMITS*		
Land Use Category	Total Acreage	Percent of Total
R-1: Residential (one and two family dwellings)	401	29.9%
R-2: Residential (multiple family dwellings & apartments)	16	1.2%
PD: Planned Development	8	0.6%
B-1: Local Business	62	4.6%
B-2: General Business	85	6.3%
B-3: Professional Office District	5	0.4%
M-1: Light Industrial	53	3.9%
M-2: Heavy Industrial	223	16.6%
SP: Public / Semi-Public	215	16.0%
Areas not classified	275	20.5%
TOTAL	1,343	100.0%
* Source: City of Toppenish Existing Zoning Map.		

CITY OF TOPPENISH

Water System Plan Update

EXISTING ZONING MAP



Legend

- Toppenish City Limits
- Future Service Area/ Service Area (UGA Boundary)
- Local Business (B-1)
- General Business (B-2)
- Professional Office District (B-3)
- Light Industry (M-1)
- Heavy Industry (M-2)
- Planned Development (PD)
- Single/Two Family Residential (R-1)
- Multiple Family Residential (R-2)
- Public/Semi-Public (SP)

Hulbregtse, Louman Associates, Inc.
CIVIL ENGINEERING • LAND SURVEYING • PLANNING
801 North 39th Avenue ♦ Yakima, WA 98902
(509) 966-7000 ♦ FAX (509) 965-3800

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FIGURE 2-1

2.2 FUTURE SERVICE AREA

Figure 2-2 shows the City's Urban Growth Area (UGA) as adopted by the City in its 2008 Comprehensive Plan Update. The UGA represents the projected Future Service Area/Service Area that the City may be able to provide and maintain services.

2.2.1 Future Land Use

The UGA includes an area of approximately 1,700 acres outside the current City Limits. The future land use within the City is presented in Table 2-3, and the future land use within the UGA is presented in Table 2-4. The future land use within both the City and the UGA is shown on Figure 2-2 - Future Land Use Map.

TABLE 2-3 FUTURE LAND USE WITHIN TOPPENISH CITY LIMITS*

Land Use Category	Total Acreage	Percent of Total
Commercial	143	10.6%
Industrial / Manufacturing	278	20.7%
Public	124	9.2%
Recreation / Open Space	58	4.3%
Residential	456	34.0%
Transitional	1	0.1%
Tribal	9	0.7%
Un-classified	274	20.4%
TOTAL	1,343	100.0%

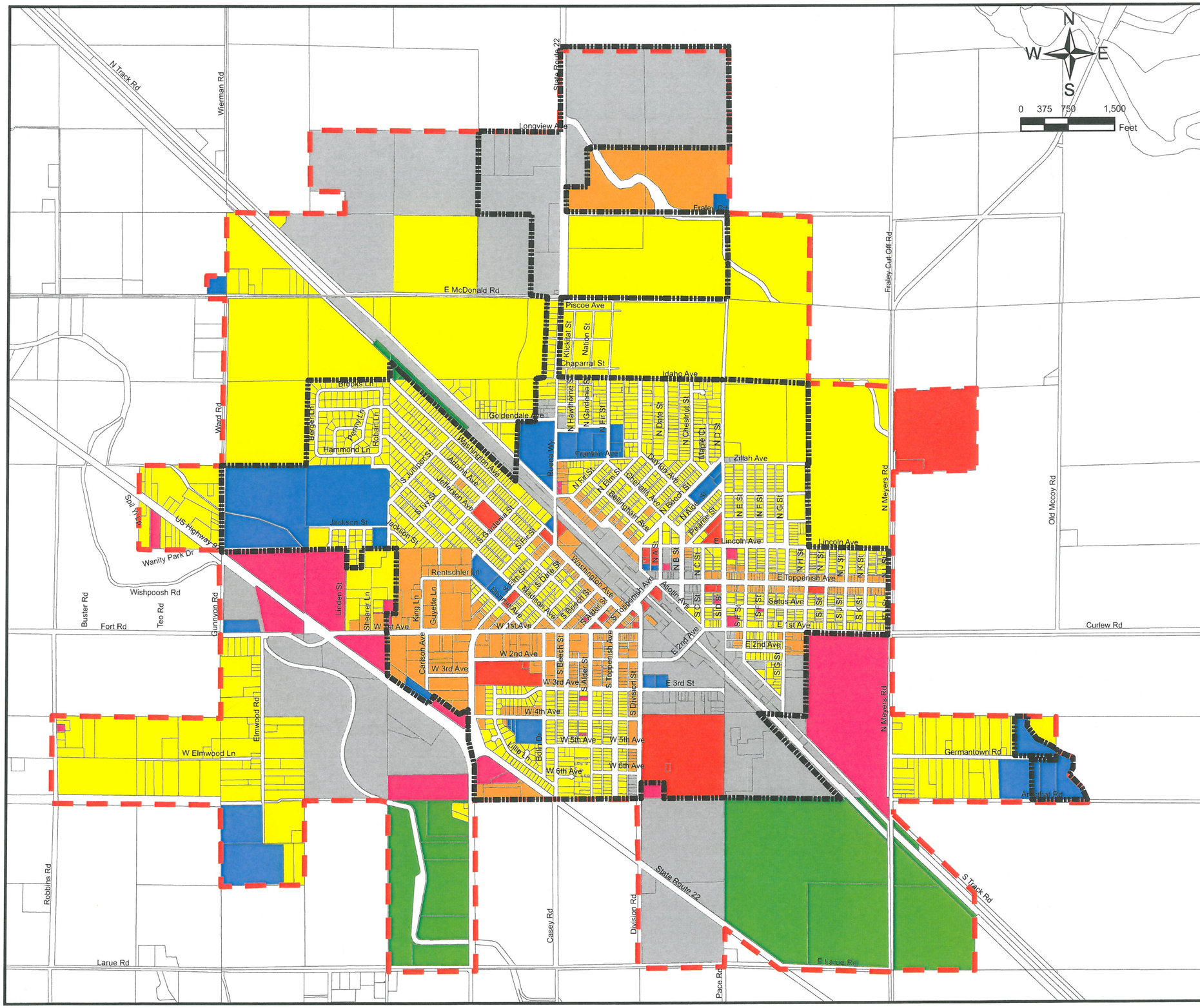
* Source: City of Toppenish Future Land Use Map.

TABLE 2-4 FUTURE LAND USE WITHIN TOPPENISH'S URBAN GROWTH AREA*

Land Use Category	Total Acreage	Percent of Total
Commercial	51	3.0%
Industrial / Manufacturing	357	21.0%
Public	38	2.2%
Recreation / Open Space	38	2.2%
Residential	731	43.0%
Transitional	263	15.4%
Tribal	136	8.0%
Un-classified	89	5.2%
TOTAL	1,703	100.0%

* Source: City of Toppenish Future Land Use Map.

Approximately 274 acres within the City Limits and 89 acres within the UGA have no future land use designation (e.g. streets, highways, right of ways, irrigation canals, etc.). As shown in Tables 2-3 and 2-4, residential areas are the largest future land use, comprising approximately 34.0% of the land within the City Limits and 43.0% of the land within the UGA.



CITY OF TOPPENISH

Water System Plan Update

FUTURE LAND USE MAP

Legend

- Toppenish City Limits
- Future Service Area/ Service Area (UGA Boundary)
- Commercial
- Industrial/Manufacturing
- Public
- Recreational/Open Space
- Residential
- Transitional
- Tribal

Hulbregtse, Louman Associates, Inc.
CIVIL ENGINEERING • LAND SURVEYING • PLANNING
801 North 30th Avenue ♦ Yakima, WA 98902
(509) 966-7020 ♦ FAX (509) 965-3800

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FIGURE 2-2

2.3 POPULATION

2.3.1 Current Population

According to the U.S. Census Bureau, the 2000 population of the City of Toppenish was 8,946, an increase of 1,527 people since 1990. Toppenish's growth rate for the period 1990-2000 was approximately 1.89% per year (20.6% for the ten-year period). Population increases for the thirty-year period 1970-2000 averaged 15.9% per decade. Population trends in the City of Toppenish, Yakima County, and the State of Washington for the period 1910 through 2000 are presented in Table 2-5.

TABLE 2-5 POPULATION TRENDS*

Year	City of Toppenish		Yakima County		State of Washington	
	Population	Percent Change	Population	Percent Change	Population	Percent Change
1910	1,598		41,709		1,141,990	
1920	3,120	95.2%	63,710	52.7%	1,356,621	18.8%
1930	2,774	-11.1%	77,402	21.5%	1,563,396	15.2%
1940	3,683	32.8%	99,019	27.9%	1,736,191	11.1%
1950	5,265	43.0%	135,723	37.1%	2,378,963	37.0%
1960	5,667	7.6%	145,112	6.9%	2,853,214	19.9%
1970	5,744	1.4%	145,212	0.1%	3,413,244	19.6%
1980	6,517	13.5%	172,508	18.8%	4,132,353	21.1%
1990	7,419	13.8%	188,823	9.5%	4,866,692	17.8%
2000	8,946	20.6%	222,581	17.9%	5,894,121	21.1%

* Source: U.S. Census Bureau

Every year, the Washington Office of Financial Management (OFM) develops population estimates for the state, each county, and each city. OFM population estimates for Toppenish, Yakima County, and for the State of Washington for the period 2001 through 2009 are presented in Table 2-6.

TABLE 2-6 OFM POPULATION ESTIMATES*						
Year	City of Toppenish		Yakima County		State of Washington	
	Population	% Change	Population	% Change	Population	% Change
2001	8,975	0.3%	224,500	0.9%	5,974,910	1.4%
2002	8,975	0.0%	225,000	0.2%	6,041,710	1.1%
2003	8,940	-0.4%	226,000	0.4%	6,098,300	0.9%
2004	9,000	0.7%	227,500	0.7%	6,167,800	1.1%
2005	9,000	0.0%	229,300	0.8%	6,256,400	1.4%
2006	9,015	0.2%	231,800	1.1%	6,375,600	1.9%
2007	9,105	1.0%	234,200	1.0%	6,488,000	1.8%
2008	9,140	0.4%	235,900	0.7%	6,587,600	1.5%
2009	9,090	-0.5%	238,400	1.1%	6,668,200	1.2%
* Source: Washington State Office of Financial Management (OFM)						

2.3.2 Future Population

As part of the City's 2008 GMA Comprehensive Plan Update, population projections were made for the years 2005, 2010, 2015, 2020, and 2025. A "High" population estimate was made based upon an annual growth rate of 1.4%, a "Medium" population estimate was made based upon an annual growth rate of 0.9%, and a "Low" population estimate was made based upon an annual growth rate of 0.4%. The City's "Low", "Medium", and "High" population estimates for the years 2010, 2015, 2020, and 2025 are presented in Table 2-7.

TABLE 2-7 GMA PLAN POPULATION ESTIMATES			
Year	Low Population Projections	Medium Population Projections	High Population Projections
2010	8,865	9,543	10,273
2015	9,243	10,219	11,249
2020	9,528	10,828	12,181
2025	9,761	11,410	13,113

Toppenish's 2008 GMA Comprehensive Plan Update used the "High" growth rate to estimate the City's future housing needs (2008 Comprehensive Plan Update, Policy 1.6). To be consistent with the 2008 Comprehensive Plan Update, the "High" growth rate values were used to calculate the City's projected future population for the years 2015, 2019, and 2029 as shown in Table 2-8.

TABLE 2-8 CITY POPULATION PROJECTIONS		
Year	Future Population	Increase from 2009 OFM Estimate
2015	11,249	2,159
2019	11,995	2,905
2029	13,857	4,767

The 2008 Comprehensive Plan Update also provides population projection within the City of Toppenish's UGA for the years 2006, 2015 and 2025. From these values, the projected future UGA population was calculated for years 2019 and 2029 as shown in Table 2-9 below.

TABLE 2-9 UGA POPULATION PROJECTIONS

Year	Future Population within City Limits	Future UGA Population
2015	11,249	744
2019	11,995	759
2029	13,857	798

It can be seen in Table 2-9 that the population growth rate within the UGA is lower than within the City limits. As discussed previously, the projected population within the City Limits is based upon adoption of a "high" growth rate in the 2008 Comprehensive Plan. Also, the 2008 Plan assumes that as the population increases, lands within the UGA will be annexed into the City to provide adequate space to accommodate the projected population and housing unit increases.

The 2000 Census provides a population density of 3.88 persons per household for the City of Toppenish. Using the 2009 average number of outside-residential service connections and the population density of 3.88 persons per household, it was determined that approximately 268 persons within the UGA were served by the Toppenish water system in 2009. This is equivalent to about 38% of the calculated 2009 UGA population of 697 persons.

The majority of the outside-residential services and UGA population served by Toppenish water system is for Yakama Nation housing. Future increases in Yakama Nation housing and outside-residential services are unknown; therefore, the same growth rate was used for the projection of all residential service user categories.

2.4 CURRENT WATER CONSUMPTION AND PRODUCTION

Current and historical metered water consumption and production data records are the preferred method for determining demand trends and establishing a basis for forecasting future demand. All water system sources and services in the City of Toppenish are metered. Production meters are typically read daily and consumption meters are read monthly.

2.4.1 Current Water Consumption

Currently, water consumption data is maintained by a computer database at Toppenish City Hall. Services are divided into the following user categories:

1. Residential Inside City
2. Residential Outside City
3. Duplex
4. Apartments
5. Restaurants and Taverns
6. Hotel and Motel
7. Grocery
8. Laundry
9. Gas Stations
10. Car Washes
11. Other Commercial
12. Industrial
13. Churches
14. Schools
15. Government
16. Irrigation
17. Large Industrial (AB Foods)

The number of metered water services by user category for the period 2003 through 2009 is presented in Table 2-10. As can be seen in Table 2-10, the number of government services increased dramatically, beginning in 2007, while the number of irrigation services decreased dramatically. Beginning in 2007 the City updated their billing software. At this time, some services were reclassified and the City began to bill government services monthly rather than quarterly. Together, these changes have resulted in a revised number of government and irrigation services in the past few years.

Also in Table 2-10, it can be seen that the number of school services has continued to rise since 2007. This rise in school services is due to the recent construction of a new school; also, some schools, prior to 2008, had multiple meters that were billed as one service but now are considered separate services with the recent change in billing software.

TABLE 2-10 AVERAGE METERED WATER SYSTEM SERVICES BY USER CATEGORY 2003 – 2009

User Type	2003	2004	2005	2006	2007	2008	2009	Ave.
Residential Inside City	1,766	1,770	1,766	1,766	1,767	1,778	1,774	1,770
Residential Outside City	88	84	86	88	80	69	69	81
Duplex	41	42	42	43	41	41	42	42
Apartments	46	46	44	43	47	47	47	46
Restaurants & Taverns	15	15	14	14	14	13	13	14
Hotel and Motel	3	3	3	3	3	2	2	3
Grocery	5	5	5	5	4	3	3	4
Laundry	2	2	2	2	2	2	2	2
Gas Stations	9	9	10	10	10	10	10	10
Car Washes	3	3	3	3	2	2	2	3
Other Commercial	159	163	162	162	163	166	167	163
Industrial	5	5	5	4	4	4	4	4
Churches	21	21	20	20	21	21	21	21
Schools	17	17	18	17	18	20	24	19
Government	3	3	3	3	17	26	35	13
Irrigation	37	34	35	33	29	13	13	28
Lg. Industrial (AB Foods)	1	1	1	1	1	1	1	1
TOTAL	2,221	2,223	2,219	2,217	2,223	2,218	2,229	2,224

The annual volume of water consumed (in million gallons per year) by user category for the period 2003 through 2009 is presented in Table 2-11. It can be seen in Table 2-11 that the industrial consumption has steadily declined since 2006. This decline in consumption may be attributable to changes in processing types and volumes by Del Monte Fruit (one of the City's major industrial users). Also, annual government consumption has dramatically increased from 2007 to present, which is again likely due to the reclassification of services and change in billing cycles that began in 2007.

Also, the annual consumption of the City's one large industrial service (AB Foods) varies from no consumption in 2005 to a high of 24.959 million gallons in 2006. These significant variations are due to infrequent and unplanned water demands that are a result of past problems with AB Food's own source of supply. This large demand significantly influences the forecast of future water demand for the City. Future water demand is discussed later in Section 2.5 of this Chapter.

TABLE 2-11 WATER CONSUMPTION BY USER CATEGORY 2003 – 2009 (values are in million gallons per year)								
User Type	2003	2004	2005	2006	2007	2008	2009	Ave.
Residential Inside City	342.291	318.089	315.293	305.043	311.856	309.828	302.550	314.993
Residential Outside City	17.575	16.727	15.170	14.500	12.952	11.837	12.059	14.403
Duplex	13.496	13.381	12.412	12.064	12.662	10.104	10.407	12.075
Apartments	30.982	29.616	29.713	27.552	28.968	31.129	30.206	29.738
Restaurants & Taverns	8.872	9.227	8.257	8.504	7.617	7.565	7.753	8.256
Hotel and Motel	1.598	1.630	1.673	1.981	1.724	1.822	1.928	1.765
Grocery	3.491	2.844	3.859	4.194	4.345	5.043	6.352	4.304
Laundry	4.560	4.668	4.859	4.705	4.257	4.817	4.830	4.671
Gas Stations	0.712	0.935	1.530	2.024	1.410	1.251	1.097	1.280
Car Washes	2.959	3.550	3.286	2.734	1.586	1.729	1.662	2.501
Other Commercial	36.828	34.873	32.877	34.377	36.208	34.359	32.961	34.640
Industrial	35.847	27.706	28.202	23.686	19.025	16.515	13.455	23.491
Churches	2.950	3.311	2.766	3.280	3.214	3.667	3.586	3.253
Schools	23.479	24.690	22.266	23.357	17.635	9.878	19.285	20.084
Government	0.512	0.403	0.618	0.550	16.730	37.790	36.272	13.268
Irrigation	16.576	20.687	21.047	19.495	23.874	19.296	22.447	20.489
Lg. Industrial (AB Foods)	7.912	0.064	0.000	24.959	19.830	0.497	0.075	7.620
TOTAL	550.640	512.401	503.828	513.005	523.893	507.127	506.925	516.831

The average day water consumption per service by user category (in gallons per service per day) for the period 2003 through 2009 is presented in Table 2-12. It can be seen from Table 2-12 that the hotel and motel demand per service per day has increased since 2007, but there has not been a noticeable change in total annual demand. The increase is likely due to the decrease in the number of services from three to two. Grocery demand per service per day has also significantly increased since 2007, but unlike the hotel and motel services, there has also been a significant increase in the total annual demand. It is unknown why this increase has occurred, but it could potentially be due to the recent repair of some significant leaks that went unrepaired for long periods of time.

Industrial demand per service per day has decreased significantly in the last few years. This decline is directly correlated to the decline in the annual industrial demand discussed earlier, since the number of services has not changed in the last few years. Also, the school demand per service per day has decreased since 2007, but the annual demand has not changed as significantly. This reduction in demand per service per day is related to the increase in the number of school services, as described earlier and shown in Table 2-10.

Since 2007, increases in the number of services, annual demand, and demand per service per day for the government user category have occurred and are all due to the recent reclassifications and changes in billing. Irrigation consumption per service per day has also increased significantly since 2007. As stated earlier and shown in Tables 2-10 and 2-11, the number of irrigation services decreased, but the total annual irrigation consumption has remained about the same. The increase in irrigation consumption per service per day is likely due to the reclassification of many irrigation services to government services in 2007, resulting in fewer irrigation services with higher daily consumption per service.

TABLE 2-12 WATER CONSUMPTION BY USER CATEGORY 2003 – 2009
(values are in gallons per service per day)

User Type	2003	2004	2005	2006	2007	2008	2009	Ave.
Residential Inside City	531	491	489	473	484	476	467	487
Residential Outside City	547	544	483	451	444	469	479	488
Duplex	902	870	810	769	846	673	679	793
Apartments	1,845	1,759	1,850	1,755	1,689	1,810	1,758	1,781
Restaurants & Taverns	1,620	1,681	1,616	1,664	1,491	1,590	1,634	1,614
Hotel and Motel	1,460	1,484	1,528	1,809	1,575	2,490	2,641	1,855
Grocery	1,913	1,554	2,115	2,296	2,976	4,593	5,801	3,035
Laundry	6,246	6,377	6,657	6,446	5,831	6,581	6,616	6,393
Gas Stations	217	284	419	555	386	342	300	358
Car Washes	2,702	3,234	3,000	2,497	2,173	2,362	2,277	2,606
Other Commercial	635	585	556	581	609	566	541	582
Industrial	19,642	15,140	15,453	16,223	13,031	11,280	9,216	14,284
Churches	385	431	379	449	419	477	468	430
Schools	3,784	3,968	3,389	3,764	2,684	1,350	2,201	3,020
Government	467	367	565	502	2,696	3,971	2,839	1,630
Irrigation	1,227	1,662	1,648	1,619	2,255	4,056	4,731	2,457
Lg. Industrial (AB Foods)	263,745	2,144	0	162,071	165,252	8,142	206	85,937

2.4.2 Seasonal Water Consumption

Water consumption in the City of Toppenish varies throughout the year due to irrigation use and/or peak industrial processing times. Services within the City of Toppenish do not have separate irrigation systems, so domestic water is used for irrigation. Figure 2-3 shows the seasonal change in residential-inside-city consumption per service from 2003 through 2009. From this figure it can be seen that the peak demand occurs around the summer months of July and August, when irrigation use is more prevalent.

FIGURE 2-3
RESIDENTIAL INSIDE CITY SEASONAL CONSUMPTION

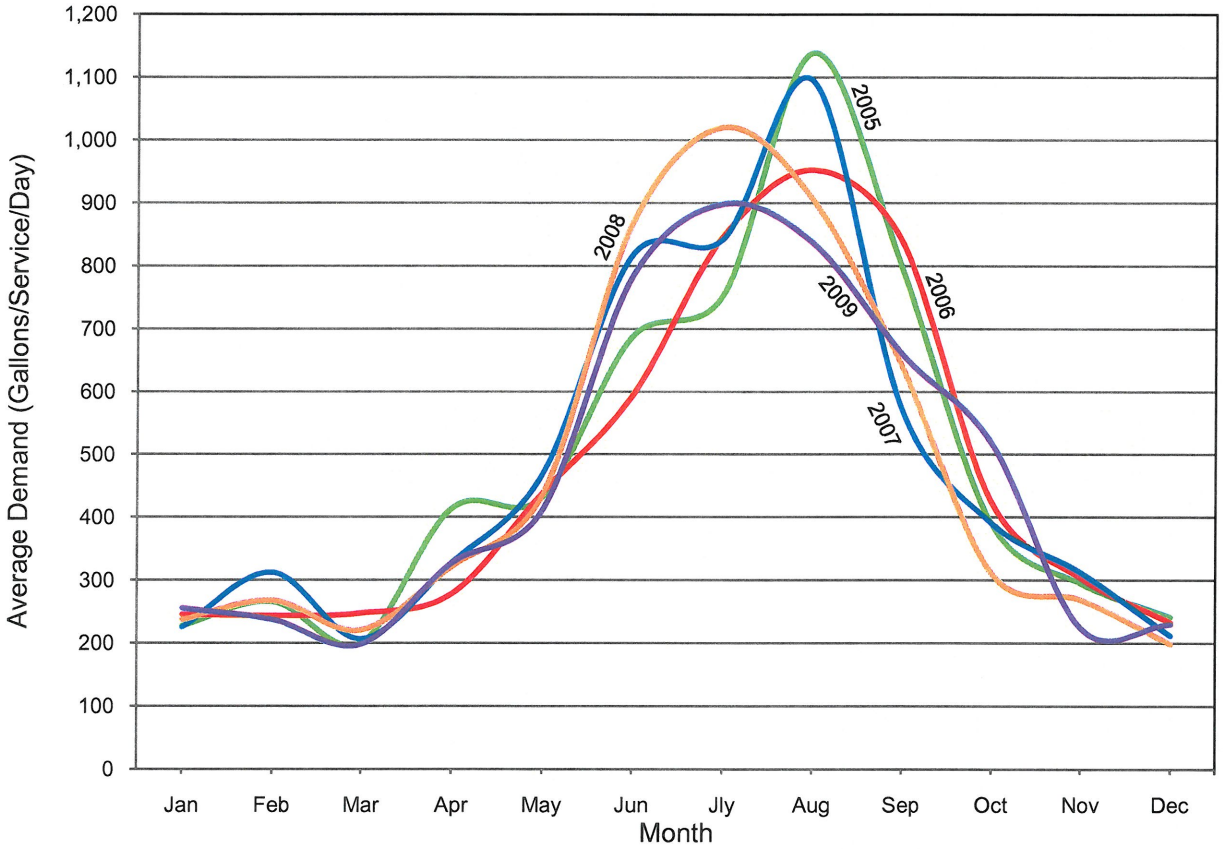
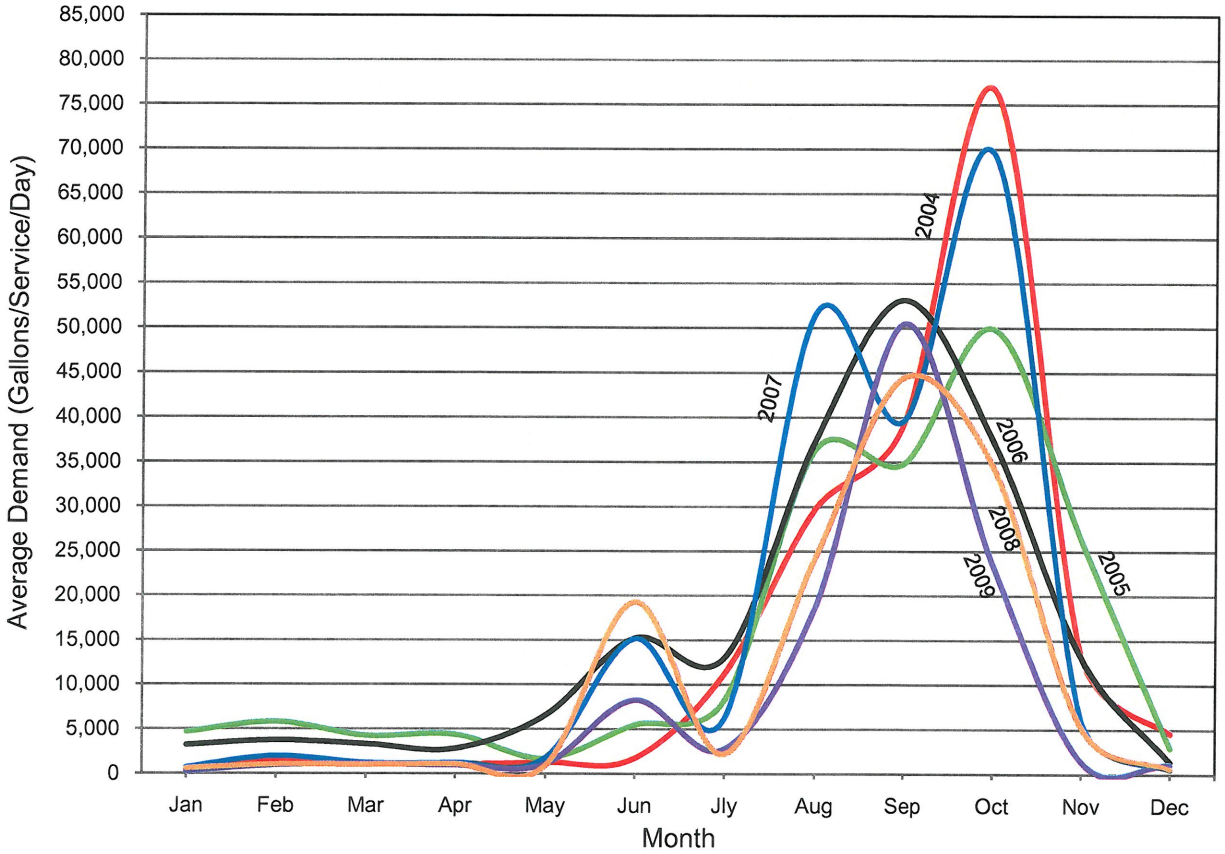


Figure 2-4 shows the fluctuation in demand from the industrial users (not including AB Foods). The peak months of water consumption occur in September and October, which corresponds with processing times for late summer/early fall harvest times. In the winter months, industrial demand is below 10% of the peak demand.

FIGURE 2-4
INDUSTRIAL SEASONAL CONSUMPTION



2.4.3 Maximum and Peak Consumption

Between the years 2003 and 2009, year 2003 was the largest annual consumption on record, as a total of 550.640 million gallons (MG) was consumed. The maximum month of water consumption in the same time period was experienced in August 2006 when 100.547 MG of water was consumed. However, 20.627 MG of the August 2006 consumption was due to an unusually high demand by AB Foods. When consumption by AB Foods is excluded, August 2006 is no longer the peak month of consumption. Therefore, due to the inconsistencies in AB Foods demand, the existing and future annual and peak demands from AB Foods have been evaluated separately in Section 2.4.4 and peak demands for other service categories are calculated with demand from AB Foods excluded.

The peak month of consumption, excluding demand from AB Foods occurs in August 2007 when 98.581 MG of water was consumed, but due to the update in the City's billing software and the reclassification of some service categories in 2007, the resulting peak demand calculated from August 2007 or other previous high months of demand, result in inaccurate peak consumption values for some service categories. Therefore, to provide a more accurate representation of peak demand for future demand calculations, the highest month of consumption in the last two years of 78.648 MG (excluding AB Foods consumption), which occurred in July, 2009, is presented in Table 2-13.

TABLE 2-13 MAXIMUM MONTH WATER CONSUMPTION, JULY 2009*				
	Maximum Month Consumption (million gallons)	Average Day Consumption (gallons)	Maximum Month Consumption per Service (gallons)	Average Day Consumption per Service (gallons)
Residential Inside City Services (1,778 each)	49.538	1,598,000	27,862	899
Residential Outside City Services (68 each)	1.777	57,323	26,132	843
Duplex Services (42 each)	1.532	49,419	36,476	1,177
Apartments Services (47 each)	3.871	124,871	82,362	2,657
Restaurants & Taverns Services (13 each)	0.853	27,516	65,615	2,117
Hotel & Motel Services (2 each)	0.191	6,161	95,500	3,081
Grocery Services (3 each)	0.577	18,613	192,333	6,204
Laundry Services (2 each)	0.430	13,871	215,000	6,935
Gas Station Services (10 each)	0.158	5,097	15,800	510
Car Wash Services (2 each)	0.154	4,968	77,000	2,484
Other Commercial Services (165 each)	4.098	132,194	24,836	801
Industrial Services (4 each)	0.346	11,161	86,500	2,790
Church Services (21 each)	0.635	20,484	30,238	975
School Services (23 each)	3.060	98,710	133,043	4,292
Government Services (46 each)	6.779	218,677	147,370	4,754
Irrigation Services (19 each)	4.649	149,968	244,684	7,893
TOTAL SERVICES (2,245 each)	78.648	2,537,032	35,033	1,130

* Excludes water consumption by AB Foods

The maximum day of water production experienced in July 2009 was on July 29, when 6,224,112 gallons were pumped into the system. Utilizing the same percentage breakdown of demand per user category as generated for the maximum month analysis in Table 2-13, maximum day demand (MDD) is calculated as shown in Table 2-14. The average distribution system leakage (DSL) percentage for 2007 was subtracted from the maximum day of water production to calculate MDD for each user category. Consumption from AB Foods was not subtracted from the maximum day because it was insignificant (1,503 gallons), compared to all other demands in July 2009.

Peak hour demand (PHD), also shown in Table 2-14, has been calculated by multiplying the maximum day demand by a factor of 2 and dividing by 1,440 minutes per day. Using the maximum day of water production in the maximum month of consumption to calculate the MDD and PHD for projection of future system demand will account for the highest possible demand on the system, based upon available historical data.

TABLE 2-14 MAXIMUM DAY AND PEAK HOUR WATER CONSUMPTION, JULY 29, 2009*				
	Maximum Day Consumption (gallons)	Maximum Day Consumption per Service (gallons)	Peak Hour Demand (GPM)	Peak Hour Demand per Service (GPM)
Residential Inside City Services (1,778 each)	3,224,667	1,814	4,479	2.5
Residential Outside City Services (68 each)	115,697	1,701	161	2.4
Duplex Services (42 each)	99,827	2,377	139	3.3
Apartments Services (47 each)	251,871	5,359	350	7.4
Restaurant & Tavern Services (13 each)	55,289	4,253	77	5.9
Hotel & Motel Services (2 each)	12,286	6,143	17	8.5
Grocery Services (3 each)	37,371	12,457	52	17.3
Laundry Services (2 each)	28,156	14,078	39	19.5
Gas Station Services (10 each)	10,239	1,024	14	1.4
Car Washes Services (2 each)	10,239	5,120	14	7.0
Other Commercial Services (165 each)	266,717	1,616	370	2.2
Industrial Services (4 each)	22,525	5,631	31	7.8
Church Services (21 each)	41,467	1,975	58	2.8
School Services (23 each)	199,142	8,658	277	12.0
Government Services (46 each)	441,286	9,593	613	13.3
Irrigation Services (19 each)	302,553	15,924	420	22.1
TOTAL SERVICES (2,245 each)	5,119,332	2,280	7,111	3.2

* 6,224,112 gallons production less 17.75% DSL (2009 average DSL) to arrive at a maximum daily consumption of 5,119,332 gallons.

2.4.4 Large Industrial (AB Foods) Water Consumption

As previously discussed, annual water consumption by AB Foods during the six-year period displayed a wide range of values. The significant variations were due to infrequent and unplanned water demands. Usually lasting for only a few months, large water use events (greater than 1.0 MG) occurred during three of the seven years between 2003 through 2009. A separate summary of water demand by AB Foods is important in estimating future system demand. The annual water consumption values for AB Foods from 2003 through 2009 are shown in Table 2-15. The average day demand (ADD), taking into account the time period in which this demand is served (1 to 2 months), is also shown in Table 2-15.

TABLE 2-15 ANNUAL LARGE INDUSTRIAL (AB FOODS) WATER CONSUMPTION 2003 – 2009								
	2003	2004	2005	2006	2007	2008	2009	Average
Annual Demand (gallons)	7,912,344	64,328	0	24,958,950	19,830,228	496,672	75,263	7,619,541
No. of Months Served	1	1	0	5	4	2	12	4
ADD (gallons)	263,745	2,144	0	162,071	165,252	8,142	206	85,937

The maximum month of water consumption by AB Foods was experienced in August 2006 when 20.627 MG of water was used. The maximum month and average day water consumption for August 2006 is as shown in Table 2-16. Also shown in Table 2-16 is the calculated maximum day demand (MDD) and peak hour demand (PHD) for AB Foods. Similar to the approach used to calculate maximum day and peak hour consumption for other user categories, the maximum day of water production during the maximum month of consumption was used to calculate MDD and PHD.

The maximum day of water production experienced in August 2006 was on the 11th, when 3,217,000 gallons were produced. Applying a loss factor of 19.48% (the average DSL in 2006), results in a daily consumption value of 2,590,328 gallons. Consumption by AB Foods averaged 20.5% of all water consumed in August 2006. Therefore, when this factor is applied to the daily consumption value of 2,590,328 gallons, the resulting AB Foods MDD is equal to 531,017 gallons, as shown in Table 2-16. Peak hour demand (PHD), also shown in Table 2-16, has been calculated by multiplying the maximum day demand by a factor of 2 and dividing by 1,440 minutes per day.

TABLE 2-16 MAXIMUM MONTH, MAXIMUM DAY AND PEAK HOUR LARGE INDUSTRIAL (AB FOODS) WATER CONSUMPTION			
August 2006 – Maximum Month Consumption (gallons)	August 2006 – Average Day Consumption (gallons)	August 11, 2006 – Maximum Day Consumption (gallons)*	August 11, 2006 – Peak Hour Demand (GPM)
20,627,357	665,399	531,017	738
* 3,217,000 gallons production less 19.48% DSL (2006 average DSL) to arrive at a maximum daily consumption of 2,590,328 gallons. 20.5% of maximum daily consumption is attributable to AB Foods.			

2.4.5 Water Production

Annual water production by source well for the period 2003 through 2009 is presented in Table 2-17. There has been little change in the total annual quantity of water produced by Toppenish's wells in the past seven years.

TABLE 2-17 TOPPENISH ANNUAL WATER PRODUCTION 2003 - 2009 (values are in million gallons)							
Well No.	2003	2004	2005	2006	2007	2008	2009
Well No. 3	154.265	157.764	150.883	169.269	172.185	162.163	162.543
Well No. 5	141.886	136.757	146.887	177.664	181.785	156.174	158.452
Well No. 6	95.852	110.795	106.497	94.708	99.748	91.848	83.361
Well No. 7	56.700	38.842	53.006	0.952	0	18.311	28.470
Well No. 8	167.112	173.650	168.022	194.534	178.035	178.380	183.514
TOTAL	615.815	617.808	625.295	637.127	631.753	606.876	616.340

2.4.6 Distribution System Leakage (DSL)

Table 2-18 shows annual water production, annual metered water consumption, and the difference between production and consumption including the DSL percentage. Water production from Toppenish's source wells for the period 2003 through 2009 totaled 4,351 million gallons. Metered consumption during that same time period totaled 3,618 million gallons. The difference between production and consumption for that period is 733 million gallons, or 16.85% of total water production for the period. However, in 2007 the City began tracking estimated authorized consumption from unmetered uses such as water main flushing, reservoir maintenance, fire department uses, street cleaning, water main breaks and other uses. It can be seen in Table 2-18 that accounting of unmetered uses has decreased the DSL percentage in those years.

TABLE 2-18 TOPPENISH WATER PRODUCTION AND CONSUMPTION 2003 - 2009
(values are in million gallons)

Year	Production	Consumption	Estimated Consumption	DSL	% DSL
2003	615.815	550.640	–	65.175	10.58%
2004	617.808	512.401	–	105.407	17.06%
2005	625.295	503.828	–	121.467	19.43%
2006	637.127	513.005	–	124.122	19.48%
2007	631.753	523.893	0.061	107.799	17.06%
2008	606.876	507.127	2.639	97.110	16.00%
2009	616.340	506.925	5.114	104.301	16.92%
Total	4,351.014	3,617.82	7.814	725.380	16.67%

The City will continue to track the difference between production and consumption and will work towards reducing the volume of DSL through the implementation of supply related water use efficiency measures as well as the completion of recommended distribution system improvements. Water use efficiency measures are discussed in further detail in Chapter 4 of this Plan.

2.4.7 Current Equivalent Residential Units

An Equivalent Residential Unit (ERU) is defined as the amount of water consumed by a typical full-time single-family residence. The actual quantity of water represented by an ERU is related to the type of demand. As discussed previously, maximum day and peak hour demands are calculated from the maximum day of production that occurs in the maximum month of consumption, so the ERU values need to be adjusted accordingly. Within a month of peak demand the peaking factor is not the same for all service categories. Therefore, the ERU values in Table 2-19 are presented as average daily demand (ADD) and peak day demand (MDD and PHD). The ERU information is important in forecasting future water demand.

Year 2003 was the year of greatest total water consumption (550.640 MG), and was also the year of the largest Residential Inside City consumption (531 gallons per service per day). Because of differences in annual ADD values experienced over the different years, Table 2-19 presents the average ADD for the period 2003 through 2009 by user category with the exception of hotel and motel, grocery, industrial, school, government and irrigation user categories. Due to changes in billing software and reclassification of some services, the ADD for these user categories is based upon the two-year average (2008-2009), as discussed in Section 2.4.1.

The peak day demand per service provided in Table 2-19 is based upon the calculated demand for July 29, 2009, which was the peak day of production in the last two years, as discussed in Section 2.4.3 and provided in Table 2-14. Peak water consumption by industrial users occurs between September and October, rather than July, as discussed in Section 2.4.2. Therefore, the peak day consumption per service value for the industrial user category was adjusted to show typical industrial peak day consumption and to account for the possibility of future peak industrial consumption occurring at the same time as other peak demand.

ERU values for the City's large industrial user (AB Foods) are included in Table 2-19 for reference, but future demand, like the historical demand from AB Foods, will be considered separately from the remainder of the system demand.

TABLE 2-19 EQUIVALENT RESIDENTIAL UNIT FACTORS (ERUs)

User Category	ADD		Peak Day (MDD & PHD)	
	GPD/Service	ERUs	GPD/Service[c]	ERUs
Residential, Inside City	487	1.0	1,814	1.0
Residential, Outside City	488	1.0	1,701	0.9
Duplex	793	1.6	2,377	1.3
Apartments	1,781	3.7	5,359	3.0
Restaurants and Taverns	1,614	3.3	4,253	2.3
Hotel and Motel[a]	2,566	5.3	6,143	3.4
Grocery[a]	5,197	10.7	12,457	6.9
Laundry	6,393	13.1	14,078	7.8
Gas Stations	358	0.7	1,024	0.6
Car Washes	2,606	5.4	5,120	2.8
Other Commercial	582	1.2	1,616	0.9
Industrial[a]	10,248	21.0	50,495[d]	27.8
Churches	430	0.9	1,975	1.1
Schools[a]	1,776	3.6	8,658	4.8
Government[a]	3,405	7.0	9,593	5.3
Irrigation[a]	4,394	9.0	15,924	8.8
Large Industrial (AB Foods)	197,023[b]	404.6	531,017[e]	292.8

a. ADD for these user categories represents the most recent two-year (2008-2009) average.
b. ADD for the large industrial (AB Foods) service category represents the average of the three highest years of consumption between 2003 and 2009.
c. Peak Day demand is based upon calculated demand for July 29, 2009 as provided in Table 2-14.
d. Peak Day demand for the Industrial user category has been adjusted to represent the peak month (September) of consumption in 2009 for this user category.
e. Peak Day demand for AB Foods has been adjusted to represent the peak consumption as shown in Table 2-16.

2.5 FORECAST OF FUTURE WATER DEMAND

Water use is contingent upon a number of varying and uncertain factors, which makes forecasting future demand difficult. Of primary importance are the following factors:

1. Population;
2. Type of residential development, i.e., single-family, multi-family, rural, large or small lot;
3. Per capita income;
4. Types of commercial and industrial enterprises;
5. Climate;
6. Irrigation use of water; and
7. Price charged for water and type of rate structure, i.e., the base water quantity and cost for individual service meters.

As discussed previously, the population estimates for the City of Toppenish were derived from the City's 2008 Comprehensive Plan Update, which adopted a "high" population projection as a guide for future growth in the City. To remain consistent with the Comprehensive Plan, the high population projection

values were used to determine a percentage of growth in population and number of services for the 6-year, 10-year, and 20-year projections.

The demographics and climate of Toppenish are not expected to change in the future, so those factors are not expected to significantly impact future water demand for most user categories. However, future demand from AB Foods will have a significant impact on total system demand. The applicability and impact of future demand by AB Foods will be discussed later in this Plan.

Use of domestic water for irrigation purposes, significantly impacts system demand, especially during peak demand periods. Climate changes can enhance these effects, but the area's climate has remained reasonably consistent with historical averages, so irrigation demand is expected to remain about the same. Unlike other communities, the City of Toppenish does not have the ability to access a separate irrigation source of water to relieve this demand on its system.

2.5.1 Future ERUs and ADD

The future number of water system services and ERUs and the ADD is calculated from population increases provided in Section 2.3.2 and the demand per ERU and user category, provided in Table 2-19. As discussed in Section 2.4.7, the ERU factors for some user categories were adjusted to account for recent changes in the City's billing software and changes in the classification of some service meters. The projected future numbers of services, other than residential services, were also adjusted because it is not expected that other user categories will exhibit the same initial rate of growth projected by the 2008 Comprehensive Plan for the residential service population.

The calculated future number of services, ERUs and projected ADD for years 2015, 2019 and 2029 are presented in Table 2-20, Table 2-21 and Table 2-22, respectively. Demand from AB Foods is not included in these Tables and is discussed separately at the end of this Chapter.

TABLE 2-20 YEAR 2015 ERUs AND ADD

User Category	2015 Services	ERUs/Service	ADD/Service (gallons)	ERUs	Total ADD (gallons)
Residential, Inside City	2,195	1.0	487	2,195	1,068,965
Residential, Outside City	85	1.0	488	85	41,480
Duplex	52	1.6	793	83	41,236
Apartments	58	3.7	1,781	215	103,298
Restaurants and Taverns	15	3.3	1,614	50	24,210
Hotel and Motel	2	5.3	2,566	11	5,132
Grocery	3	10.7	5,197	32	15,591
Laundry	2	13.1	6,393	26	12,786
Gas Stations	11	0.7	358	8	3,938
Car Washes	2	5.4	2,606	11	5,212
Other Commercial	184	1.2	582	221	107,088
Industrial	4	21.0	10,248	84	40,992
Churches	23	0.9	430	21	9,890
Schools	26	3.6	1,776	94	46,176
Government	38	7.0	3,405	266	129,390
Irrigation	14	9.0	4,394	126	61,516
TOTAL	2,714			3,528	1,716,900

TABLE 2-21 YEAR 2019 ERUs AND ADD					
User Category	2019 Services	ERUs/Service	ADD/Service (gallons)	ERUs	Total ADD (gallons)
Residential, Inside City	2,341	1.0	487	2,341	1,140,067
Residential, Outside City	91	1.0	488	91	44,408
Duplex	55	1.6	793	88	43,615
Apartments	62	3.7	1,781	229	110,422
Restaurants and Taverns	16	3.3	1,614	53	25,824
Hotel and Motel	2	5.3	2,566	11	5,132
Grocery	4	10.7	5,197	43	20,788
Laundry	2	13.1	6,393	26	12,786
Gas Stations	12	0.7	358	8	4,296
Car Washes	2	5.4	2,606	11	5,212
Other Commercial	196	1.2	582	235	114,072
Industrial	5	21.0	10,248	105	51,240
Churches	25	0.9	430	23	10,750
Schools	28	3.6	1,776	101	49,728
Government	41	7.0	3,405	287	139,605
Irrigation	15	9.0	4,394	135	65,910
TOTAL	2,897			3,787	1,843,855

TABLE 2-22 YEAR 2029 ERUs AND ADD					
User Category	2029 Services	ERUs/Service	ADD/Service (gallons)	ERUs	Total ADD (gallons)
Residential, Inside City	2,704	1.0	487	2,704	1,316,848
Residential, Outside City	105	1.0	488	105	51,240
Duplex	64	1.6	793	102	50,752
Apartments	72	3.7	1,781	266	128,232
Restaurants and Taverns	19	3.3	1,614	63	30,666
Hotel and Motel	3	5.3	2,566	16	7,698
Grocery	4	10.7	5,197	43	20,788
Laundry	3	13.1	6,393	39	19,179
Gas Stations	13	0.7	358	9	4,654
Car Washes	3	5.4	2,606	16	7,818
Other Commercial	227	1.2	582	272	132,114
Industrial	5	21.0	10,248	105	51,240
Churches	28	0.9	430	25	12,040
Schools	32	3.6	1,776	115	56,832
Government	47	7.0	3,405	329	160,035
Irrigation	18	9.0	4,394	162	79,092
TOTAL	3,347			4,371	2,129,228

2.5.2 Future MDD and PHD

Future MDD and PHD for the system was calculated for the years 2015, 2019 and 2029 using the projected number of services for each user category and demand per service discussed in Section 2.4.7. Calculated future MDD and PHD values for 2015, 2019 and 2029 are presented in Table 2-23, Table 2-24 and Table 2-25, respectively.

TABLE 2-23 YEAR 2015 MDD AND PHD

Type of Service	2015 Services	ERUs/ Service	Total ERUs	MDD/ Service (gallons)	MDD (gallons)	PHD (GPM)	PHD/ Service (GPM)
Residential, Inside City	2,195	1.0	2,195	1,814	3,981,730	5,530	2.5
Residential, Outside City	85	0.9	77	1,701	144,585	201	2.4
Duplex	52	1.3	68	2,377	123,604	172	3.3
Apartments	58	3.0	174	5,359	310,822	432	7.4
Restaurants and Taverns	15	2.3	35	4,253	63,795	89	5.9
Hotel and Motel	2	3.4	7	6,143	12,286	17	8.5
Grocery	3	6.9	21	12,457	37,371	52	17.3
Laundry	2	7.8	16	14,078	28,156	39	19.5
Gas Stations	11	0.6	7	1,024	11,264	16	1.4
Car Washes	2	2.8	6	5,120	10,240	14	7.0
Other Commercial	184	0.9	166	1,616	297,344	413	2.2
Industrial	4	27.8	111	50,495	201,980	281	70.2
Churches	23	1.1	25	1,975	45,425	63	2.7
Schools	26	4.8	125	8,658	225,108	313	12.0
Government	38	5.3	201	9,593	364,534	506	13.3
Irrigation	14	8.8	123	15,924	222,936	310	22.1
TOTAL	2,714		3,357		6,081,180	8,448	

TABLE 2-24 YEAR 2019 MDD AND PHD							
Type of Service	2019 Services	ERUs/ Service	Total ERUs	MDD/ Service (gallons)	MDD (gallons)	PHD (GPM)	PHD/ Service (GPM)
Residential, Inside City	2,341	1.0	2,341	1,814	4,246,574	5,898	2.5
Residential, Outside City	91	0.9	82	1,701	154,791	215	2.4
Duplex	55	1.3	72	2,377	130,735	182	3.3
Apartments	62	3.0	186	5,359	332,258	461	7.4
Restaurants and Taverns	16	2.3	37	4,253	68,048	95	5.9
Hotel and Motel	2	3.4	7	6,143	12,286	17	8.5
Grocery	4	6.9	28	12,457	49,828	69	17.3
Laundry	2	7.8	16	14,078	28,156	39	19.5
Gas Stations	12	0.6	7	1,024	12,288	17	1.4
Car Washes	2	2.8	6	5,120	10,240	14	7.0
Other Commercial	196	0.9	176	1,616	316,736	440	2.2
Industrial	5	27.8	139	50,495	252,475	351	70.2
Churches	25	1.1	23	1,975	49,375	69	2.7
Schools	28	4.8	134	8,658	242,424	337	12.0
Government	41	5.3	217	9,593	393,313	546	13.3
Irrigation	15	8.8	132	15,924	238,860	332	22.1
TOTAL	2,897		3,608		6,538,387	9,082	

TABLE 2-25 YEAR 2029 MDD AND PHD							
Type of Service	2029 Services	ERUs/ Service	Total ERUs	MDD/ Service (gallons)	MDD (gallons)	PHD (GPM)	PHD/ Service (GPM)
Residential, Inside City	2,704	1.0	2,704	1,814	4,905,056	6,813	2.5
Residential, Outside City	105	0.9	95	1,701	178,605	248	2.4
Duplex	64	1.3	83	2,377	152,128	211	3.3
Apartments	72	3.0	216	5,359	385,848	536	7.4
Restaurants and Taverns	19	2.3	44	4,253	80,807	112	5.9
Hotel and Motel	3	3.4	10	6,143	18,429	26	8.7
Grocery	4	6.9	28	12,457	49,828	69	17.3
Laundry	3	7.8	23	14,078	42,234	59	19.7
Gas Stations	13	0.6	8	1,024	13,312	18	1.4
Car Washes	3	2.8	8	5,120	15,360	21	7.0
Other Commercial	227	0.9	204	1,616	366,832	509	2.2
Industrial	5	27.8	139	50,495	252,475	351	70.2
Churches	28	1.1	31	1,975	55,300	77	2.7
Schools	32	4.8	154	8,658	277,056	385	12.0
Government	47	5.3	249	9,593	450,871	626	13.3
Irrigation	18	8.8	158	15,924	286,632	398	22.1
TOTAL	3,347		4,154		7,530,773	10,606	

2.5.3 Future Large Industrial (AB Foods) Demand

Calculated future ADD, MDD and PHD for AB Foods is provided in Table 2-26 below. Again, ADD for AB Foods is based upon the average of the three highest years of consumption between 2003 and 2009. The MDD and PHD were calculated from the maximum day of water production attributable to consumption by AB Foods, as discussed in Section 2.4.4.

TABLE 2-26 YEAR 2015, 2019 & 2029 LARGE INDUSTRIAL (AB FOODS) ADD, MDD & PHD					
ADD ERUs	ADD (gallons)	Annual Demand (MG)	MDD ERUs	MDD (gallons)	PHD (GPM)
405	197,023	71.9	293	531,017	737.5

Future demand by AB Foods uses peak demands from the past seven years to account for the possibility of unplanned high demands on the system. Currently, use of water by AB Foods is due to failure of their own source, so there is no anticipated season of peak demand. In the future, the City plans to evaluate the feasibility of developing an intertie agreement with AB Foods to establish maximum instantaneous and annual supply capacities that are within the physical capacity of the system. Possible future interties are discussed further in Chapter 4 of this Plan.

2.5.4 Future Demand Summary and ERU/Physical Capacity

Table 2-27 and Table 2-28 summarizes the current and future 6-year, 10-year, and 20-year water demands for the City of Toppenish, both with and without demand from AB Foods (Large Industrial) and compares the future demand to its current and future source capacity and water rights.

TABLE 2-27 CURRENT AND FUTURE WATER RIGHTS, SOURCE CAPACITY, AND WATER DEMAND SUMMARY (WITHOUT LARGE INDUSTRIAL DEMAND)

Year	System Water Demand					Existing Source Capacity[a]		Existing Water Rights[b]		
	# of ERUs	Total Annual Demand	ADD	MDD	PHD	Max. Day Capacity	Pumping Capacity	Water Rights (Q_i)[c]		Water Rights (Q_a)
		MG/Year	MGD	MGD	GPM	MGD	GPM	GPM	MGD	MG/Year
2009	2,965	506.850	1.388	5.119	7,111	5.868	4,075	4,215	6.070	1,042.65
2015	3,528	626.669	1.717	6.081	8,448	6.732	4,675	4,815	6.934	1,042.65
2019	3,787	673.007	1.844	6.538	9,082	8.748	6,075	6,215	8.950	1,042.65
2029	4,371	777.168	2.129	7.531	10,459	8.748	6,075	6,215	8.950	1,042.65

[a] Refer to Chapter 3 for recommended source capacity improvements.
[b] Refer to Chapter 4 for further discussion on existing water right capacity.
[c] Based upon current and projected future Yakama Nation permit quantities for all source wells.

TABLE 2-28 CURRENT AND FUTURE WATER RIGHTS, SOURCE CAPACITY, AND WATER DEMAND SUMMARY (WITH LARGE INDUSTRIAL DEMAND)

Year	System Water Demand					Existing Source Capacity[a]		Existing Water Rights[b]		
	# of ERUs	Total Annual Demand	ADD	MDD	PHD	Max. Day Capacity	Pumping Capacity	Water Rights (Q_i)[c]		Water Rights (Q_a)
		MG/Year	MGD	MGD	GPM	MGD	GPM	GPM	MGD	MG/Year
2009[d]	3,370	506.925	1.585	5.650	7,849	5.868	4,075	4,215	6.070	1,042.65
2015	3,933	698.582	1.914	6.612	9,186	6.732	4,675	4,815	6.934	1,042.65
2019	4,192	744.920	2.014	7.069	9,820	8.748	6,075	6,215	8.950	1,042.65
2029	4,776	849.082	2.326	8.062	11,197	8.748	6,075	6,215	8.950	1,042.65

[a] Refer to Chapter 3 for recommended source capacity improvements.
[b] Refer to Chapter 4 for further discussion on existing water right capacity.
[c] Based upon current and projected future Yakama Nation permit quantities for all source wells.
[d] Includes peak demand from AB Foods although demand from AB Foods was insignificant in 2009.

The system's current and future physical capacity (ERUs), in terms of water rights, source capacity, and storage capacity is summarized in Table 2-29 below. Further information on current water rights, source and reservoir capacities are provided in Chapter 3 and Chapter 4 of this Plan.

The water rights physical capacity in Table 2-29 is based upon comparing the ADD per ERU to the current and/or future total annual (Q_a) water right quantity and the MDD per ERU to the current and/or future total instantaneous (Q_i) water right quantity. Similarly, source physical capacity is based upon comparison of the MDD per ERU to the current and/or future well pump capacity. At a minimum, the total source capacity should be able to replenish depleted fire suppression storage in 72 hours while supplying system MDD in order to eliminate the need for excessive equalizing storage capacity. The water sources should also be able to supply ADD with the largest source of supply out of service.

The storage physical capacity in Table 2-29 is based on two of the primary storage components, equalizing storage (ES) and standby storage (SB). Physical capacity of the City's reservoirs is not based upon operational storage (OS) or fire suppression storage (FSS) because these normally do not change with the number of ERUs. The DOH equations for determining storage physical capacity were simplified, based upon the characteristics of metered and calculated annual and peak demands for the City of Toppenish. Therefore, current and future equalizing and standby storage capacities were calculated from the following equations, where N is the number of ERUs, PHD is the demand per ERU (2.5 gpm, calculated from peak system demand) and Q_s is the total well supply capacity:

$$ES = 150[PHD(N) - Q_s]$$
$$SB = 200(N)$$

Since N is also unknown, the above equations were rearranged and the equation for total storage (TS = OS+ES+SB+FSS) and value of 2.5 gpm for PHD was used to yield the following equation which solves for the existing and/or future ERU capacity (N):

$$N = \frac{TS - OS + 150Q_s}{575}$$

The FSS was excluded in the above equation for total storage because it is nested within standby storage, as discussed in Section 3.4 of the Plan, and becomes a part of the calculated standby storage. The existing available ERU capacity given in Table 2-29 is based upon excluding demand from AB Foods. Future demand from AB Foods may need to be limited to the available ERU capacity until all recommended system improvements are in place. Available ERU capacity in the future is based upon the current number of ERUs, including demand from AB Foods.

TABLE 2-29 SUMMARY OF CURRENT AND FUTURE PHYSICAL CAPACITY (ERUs)

System Component	Current Capacity	Future Capacity[a]	Demand/ ERU	Existing ERU Capacity	Future ERU Capacity[a]	Existing Available ERU Capacity[b]	Future Available ERU Capacity[c]
Water Rights							
Annual (Q_a)	1,042 MG	1,042 MG	0.178 MG	5,854	5,854	2,889	5,854
Instantaneous (Q_i)	4,215 GPM	6,215 GPM	1.26 GPM	3,345	4,933	380	1,968
Source							
(ADD)	1,875 GPM	3,875 GPM	0.37 GPM	5,067	10,472	2,102	7,102
(MDD)	4,075 GPM	6,075 GPM	1.26 GPM	3,234	4,821	269	1,451
Storage (Effective)							
Equalizing	0.534 MG	1.132 MG	Varies	3,054	5,449	89	2,079
Standby	0.611 MG	1.089 MG	200 Gal.	3,054	5,449	89	2,079

[a] Assumes the construction of Well No. 5 (600 GPM) in 2010, a new 1.7 MG reservoir by 2015, and a new 1,400 GPM well by 2019.
[b] Existing available ERU capacity equals existing ERU capacity minus the 2009 number of ERUs (excluding demand from AB Foods).
[c] Future available ERU capacity equals future ERU capacity minus the 2009 number of ERUs (including demand from AB Foods).

It can be seen from Table 2-29 that of the existing system components, reservoir storage is currently the limiting factor in the physical capacity of the City of Toppenish water system. However, with the construction of a new 600 gpm well in 2010 and a new storage reservoir with an effective storage capacity of 1.0 million gallons by 2015, the limiting factor becomes source capacity in order to meet and/or exceed future MDD. This will result in the need for an additional source of supply with a minimum capacity of 1,400 gpm by the year 2019, as described in Chapter 3 of this Plan. Upon completion of the major recommended system improvements, the City of Toppenish will be able to serve the projected future 20-year demand, including peak demand from AB Foods, as shown in Table 2-29.