

CHAPTER 2

BASIC PLANNING DATA

This chapter presents the basic planning data used to estimate Chelan’s future water demands. Water demand projections are used in Chapter 3 to evaluate the adequacy of the City’s existing water system.

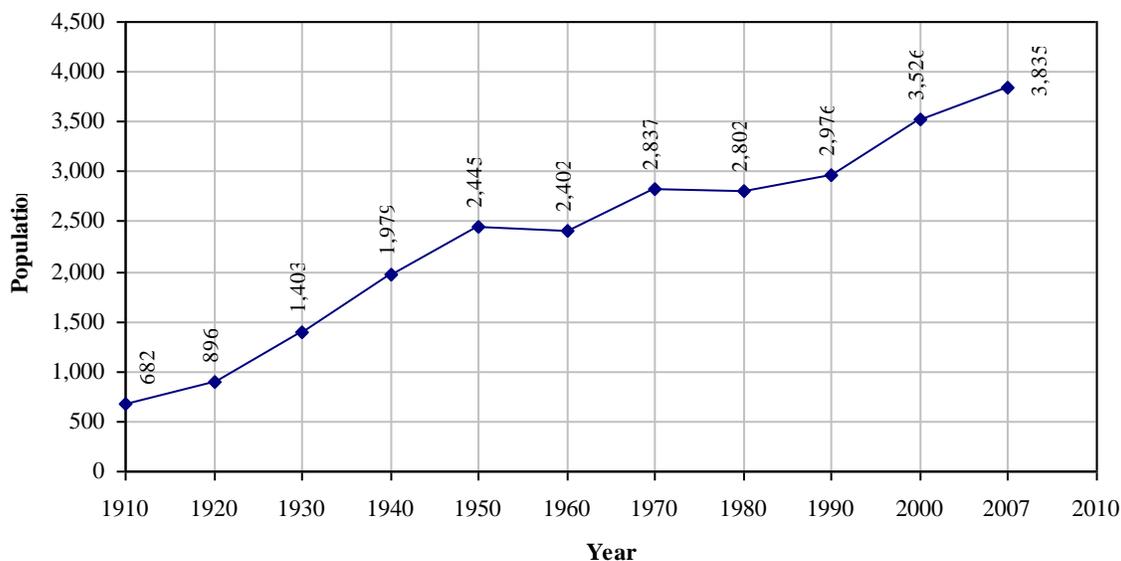
CURRENT PLANNING DATA

This section contains information on existing and historical population, existing service connections, water usage, and equivalent residential units (ERUs).

POPULATION

The population of the City of Chelan has grown steadily since its incorporation in 1902. The City experienced its greatest growth between 1910 and 1950, when the population increased at an annual rate of 3.24 percent. Growth slowed to an annual rate of 0.49 percent from 1950 to 1990, and experienced an average annual growth rate of 1.71% from 1990 to 2000. Based on the Washington State Office of Financial Management (OFM) population estimate for 2007 of 3,835 residents, the population of the City has increased at an annual growth rate of 1.21 percent from 2000 to 2007. Figure 2-1 provides historical population trends for the City between 1910 and 2007.

FIGURE 2-1
City of Chelan Historical Population⁽¹⁾



(1) 1910-2000 Source: Washington State Office of Financial Management, from U.S. Census Data.
2001-2007 Source: Washington State Office of Financial Management estimate.

SERVICE CONNECTIONS

The total number of City water service connections for 2007 is summarized in Table 2-1. For this report, the City classifies its service connections by residential (single-family and multi-family), commercial, schools, municipal, and purveyors. The commercial designation consists of motels, restaurants, business, churches, and institutions such as hospitals and clinics. The municipal designation encompasses the parks, the City golf course clubhouse, and City facilities. Irrigation for the City golf course is provided by a separate non-potable system that withdraws surface water from Lake Chelan.

TABLE 2-1
2007 City Water Service Connections⁽¹⁾

Customer Classification	Number of Connections	Percent of Total Connections
Single-Family Residential	1,477	78.7%
Multi-Family Residential	159	8.5%
Commercial	192	10.2%
Schools	7	0.4%
Municipal	40	2.1%
Purveyors ⁽²⁾	2	0.1%
Total	1,877	100%

(1) 2007 water service connections from City records.

(2) Chelan River Isenhart Water District domestic water system acquired by City in January 2008.

HISTORICAL WATER USE

Since December 1998, the City has pumped water from Lake Chelan through its raw water pump station through a 36" pipe to the City's raw water reservoir located at the City's Water Treatment Plant (WTP). Water quantity is measured prior to entering the raw water reservoir. Recycled backwash water is metered before it re-enters the treatment stream ahead of the source flow meter, requiring net water production to be calculated by subtracting recycled backwash water from source water metering. Treated water is then stored in one of three reservoirs (Treatment Plant East, West, and South), from which point it is conveyed through the City's water distribution system to service area customers. All connections within the water service area are metered. Meters are read once per month by water department personnel, except during the winter months of November through February.

AVERAGE DAY DEMAND (ADD)

Water production from the City's WTP for water years 2004 through 2007 is shown in Table 2-2. Water years shown in this table and throughout this Plan run from October of the previous year through September of the given year in order to properly evaluate production and consumption since the City only reads its water meters March through

October. Water production numbers shown in this table have been increased by 7% to reflect production metering errors. Metering errors were discovered in 2008 at the City’s raw water meter located at the WTP. The City conducted a volumetric analysis to compare actual flow rates through the meter with meter readings at various flow rates through the WTP. It was discovered that the raw water meter readings were an average 7% lower than the actual flow rates tested. The City is working to permanently address this issue to obtain more accurate metering in the future.

Annual production, or demand, is commonly reduced to a daily value, and is referred to as the average daily demand (ADD). ADD is determined by dividing the total annual production by 365 days in the year.

Although the City’s water demands have generally increased because of a growing population, per capita water demand has steadily declined, in part because of the City’s efforts to repair water system leaks, and in part because of the City’s water conservation efforts.

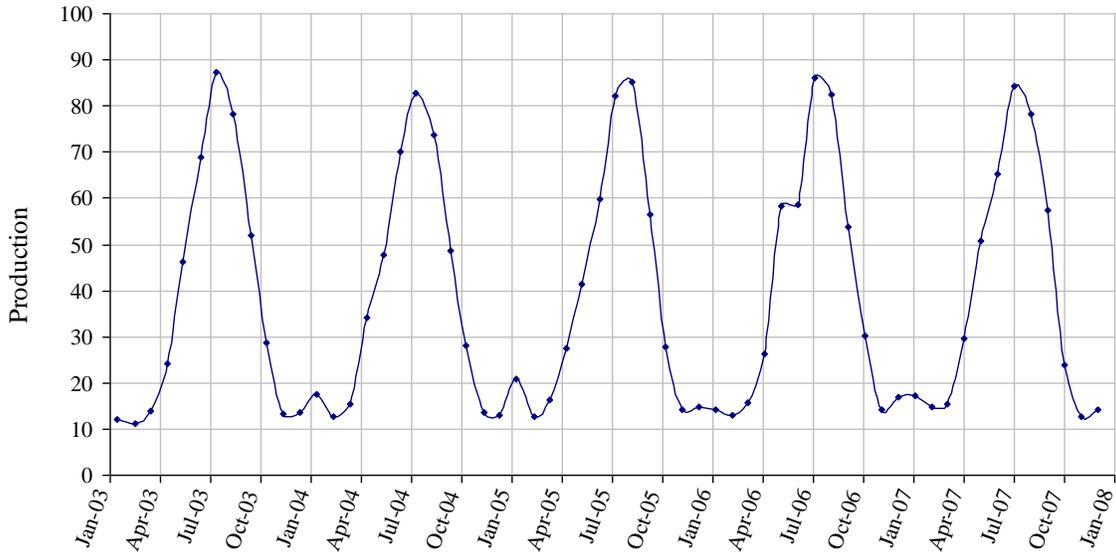
**TABLE 2-2
2004-2007 Average Daily Demand (ADD)**

Water Year	Population⁽¹⁾	Total Annual Production (gal)⁽²⁾	Per Cap. Production (gpcd)⁽³⁾	ADD (gpd)⁽⁴⁾
2004	3,645	496,884,000	372	1,357,600
2005	3,680	494,824,000	368	1,355,700
2006	3,755	498,578,000	364	1,366,000
2007	3,835	507,773,000	363	1,391,200
		2004-2007 Average	365	1,371,000

- (1) From Figure 2-1.
- (2) Total Annual Production from City production records, corrected for estimated 7% meter error, and rounded to nearest 1,000 gallons.
- (3) Per Capita Production = (Total Annual Production)/(Population); gpcd = gallons per capita per day.
- (4) Average Daily Demand = (Total Annual Production)/(Total days per year), rounded to nearest 100 gpd.

As required by the Washington State Department of Health’s (DOH) Water Use Efficiency Rule, monthly distribution of the City’s water demands is shown on Figure 2-2. Typical of most eastern Washington communities without separate irrigation, demands increase significantly in the summer as the result of lawn irrigation.

FIGURE 2-2
2003-2007 Monthly Water Production⁽¹⁾



(1) Raw production numbers from City, unadjusted for meter error.

MAXIMUM DAY DEMAND

The maximum quantity produced in a 24-hour period is called the maximum day demand (MDD). The MDD is usually derived from the previous three to five years of production records. MDD values presented in Table 2-3 are based on data collected by the City over the last four years. The data show that while the ADD has increased slightly and MDD has declined slightly since 2004, the MDD/ADD ratio has remained fairly constant. Consequently, the four-year average MDD/ADD ratio of 2.6 will be used for projecting the MDD beyond 2007.

TABLE 2-3
2004-2007 Maximum Day Demand (MDD)

Water Year	ADD ⁽¹⁾ (gpd)	MDD ⁽²⁾		MDD/ADD Ratio
		(gpd)	(gpm)	
2004	1,357,600	3,696,000	2,567	2.7
2005	1,355,700	3,505,000	2,434	2.6
2006	1,366,000	3,451,000	2,397	2.5
2007	1,391,200	3,669,000	2,548	2.6
Average MDD/ADD (2004-2007)				2.6

(1) From Table 2-2.

(2) From City production records, adjusted for 7% meter error, and rounded to nearest 1,000 gallons.

PEAK HOUR DEMAND

The maximum amount of water produced in a one-hour period, usually during the maximum day, is the peak hour demand (PHD). PHD calculations normally require

reservoir water surface elevations and metered production data. Because the City does not keep records of reservoir levels, it is not possible to directly calculate PHD values.

In the absence of information to calculate PHD, the DOH’s 2001 Water System Design Manual (WSDM) provides a means to estimate the PHD through the use of the following equation (Equation 5-3 from the WSDM):

$$PHD = \left(\frac{MDD}{1440} \right) \times [(C)(N) + F] + 18$$

Where PHD is in gpm, MDD in gpd/ERU, N is the number of ERUs, and C and F are coefficients based on the number of ERUs. Using Equation 5-3, for 2007, with MDD = 3,669,000 gpd, C = 1.6, N = 2,775 ERUs (from Table 2-10), and F = 225, PHD = 4,301 gpm and the ratio of PHD to MDD is approximately 1.7.

The City’s 2001 Water System Plan addressed the use of the WSDM equation, and determined that the City of Chelan would be better served with a more conservative estimate of peak usage. Therefore, in an effort to remain consistent with previous planning efforts, a PHD/MDD ratio of 2.0 will be used for projecting future water needs. Table 2-4 shows the estimated PHD for 2004 through 2007 using a PHD/MDD peaking factor of 2.0.

**TABLE 2-4
Peak Hour Demand**

Water Year	Population⁽¹⁾	MDD⁽²⁾ (gpd)	MDD⁽²⁾ (gpm)	PHD⁽³⁾ (gpm)
2004	3,645	3,696,000	2,567	5,133
2005	3,680	3,505,000	2,434	4,868
2006	3,755	3,451,000	2,397	4,793
2007	3,835	3,669,000	2,548	5,096

- (1) From Figure 2-1.
- (2) From Table 2-3.
- (3) PHD/MDD = 2.0.

CONSUMPTION HISTORY

Table 2-5 shows the City’s water consumption history for water years 2004 -2007 by customer class. The commercial customer class includes City classifications for motels, restaurants, small businesses, churches, institutions (i.e. hospitals, clinics, etc.), and large businesses. The municipal customer class includes City classifications for City parks, other parks, City facilities, and the City golf course clubhouse (the golf course has a separate irrigation source and water right from Lake Chelan).

**TABLE 2-5
2004-2007 Water Consumption by Customer Classification⁽¹⁾
(1,000 gallons)**

Water Year	Residential		Comm.	Schools	Muni.	Purveyors	Totals
	SF	MF					
2004	234,885	58,017	82,626	7,130	65,186	10,643	458,487
2005	240,126	51,754	88,797	6,783	53,672	11,644	452,776
2006	231,936	46,540	81,649	7,528	59,105	12,717	439,475
2007	252,114	52,481	78,503	6,494	64,514	19,566	473,672

(1) From City consumption records.

In general, water consumption for all customer classes shown in Table 2-5 is greater from May to October, due to irrigation usage and an increase in tourism, than during the low demand winter months.

Table 2-6 summarizes 2007 City consumption by individual pressure zone as identified in Chapter 1. Currently, the City has fourteen pressure zones. The Lake Hills pressure zone will be added to the City's existing pressure zones once construction of the Lake Hills development and Higgs booster pump station are complete. Completion of these developer-driven projects is expected in 2010.

**TABLE 2-6
2007 Water Consumption by Pressure Zone⁽¹⁾
(1,000 gallons)**

Pressure Zone	Residential		Comm.	Sch.	Mun.	Purveyors	Percent/ Total
	SF	MF					
Main ⁽²⁾	131,091	41,675	76,017	6,494	62,522	19,566	71.2%
High St.	2,917	---	---	---	---	---	0.6%
Hospital	2,493	953	2,486	---	---	---	1.3%
Darnell's	48,769	6,625	---	---	1,734	---	12.1%
Golf Course	12,740	3,228	---	---	258	---	3.4%
GC Terrace	8,794	---	---	---	---	---	1.9%
Orchard View	24,075	---	---	---	---	---	5.1%
Stehekin Way	6,951	---	---	---	---	---	1.5%
Boyd Road	11,455	---	---	---	---	---	2.4%
Pinnacle	2,829	---	---	---	---	---	0.6%
Lake Hills ⁽³⁾	---	---	---	---	---	---	---
Totals	252,114	52,481	78,503	6,494	64,514	19,566	100%
Percent	53%	11%	17%	1%	14%	4%	

(1) From City consumption records.

(2) Main pressure zone includes consumption numbers from South Chelan, Lakeside, Washington St. and Wilmore pressure zones.

(3) Future pressure zones.

The City’s residential consumption, consisting of both single- and multi-family units, is summarized in Table 2-7. The City’s average residential per capita consumption is not excessive, considering that this amount includes water for irrigation.

**TABLE 2-7
2004-2007 Residential Water Consumption**

Water Year	Population⁽¹⁾	Residential Consumption⁽²⁾ (gal/yr)	Average Day Residential Consumption⁽³⁾ (gpd)	Per Capita Residential Consumption⁽⁴⁾ (gpcd)
2004	3,645	292,902,000	800,300	220
2005	3,680	291,880,000	799,700	217
2006	3,755	278,476,000	762,900	203
2007	3,835	304,595,000	834,500	218
Average				214

- (1) From Figure 2-1.
- (2) Residential SF plus Residential MF from Table 2-5.
- (3) Values rounded to nearest 100 gpd.
- (4) Per Capita Residential Consumption = (Average Day Residential Consumption)/ (Population).

The City’s average per capita residential consumption of 214 gpd per person for 2004-2007 is generally typical of other eastern Washington water systems without separate irrigation systems. It is worth noting that the WSDM provides Equation 5-1 to estimate the ADD for a typical residential connection.

$$ADD = \left(\frac{8000}{AAR} \right) + 200$$

Where ADD is in gpd per ERU and AAR is the average annual rainfall in inches. The AAR in the Chelan area is about 11 inches per year. This equation produces an estimate of 927 gpd per ERU, or about 370 gpd per person, assuming 2.5 persons per household. The City’s average consumption rate of 214 gpd per person is well below this amount.

DISTRIBUTION SYSTEM LEAKAGE

The Water Efficiency Rule recently adopted by DOH requires that distribution system leakage be maintained at or below 10 percent of total production. Distribution system leakage (DSL) as defined in WAC 246-290-820 (2) is represented by the Water Losses category in Table 2-8.

**TABLE 2-8
“Best Practice” Water Balance⁽¹⁾**

Total Water Produced and Purchased (TP)	Authorized Consumption (AC)	Billed Authorized Consumption	Billed Metered Consumption	Revenue Water
			Billed Unmetered Consumption	
		Unbilled Authorized Consumption	Unbilled Metered Consumption	Non-Revenue Water
			Unbilled Unmetered Consumption	
	Water Losses (DSL) ⁽²⁾	Apparent Losses	Unauthorized Consumption	
			Metering Inaccuracies	
		Real Losses	Pipeline Leakage & Breaks	
			Reservoir Overflows	
Corp to Meter Leaks				

- (1) Source: International Water Association/American Water Works Association. Note that this table, which has been published in papers sponsored by both the International Water Association and the American Water Works Association, does not use the terms “lost” or “unaccounted for” water. These terms are no longer recommended by either association or by DOH because they are felt to be imprecise, and may mean different things to different users.
- (2) Distribution system leakage per WAC 246-290-820 (2). See formula below.

As evident in Table 2-8, distribution system leakage, as currently defined by DOH, includes not only real losses due to pipeline leakage and reservoir overflows, but also apparent losses such as unauthorized consumption (for example, theft from fire hydrants), and meter inaccuracies. The DOH formula for distribution system leakage is given as:

$$DSL = \left[\frac{TP - AC}{TP} \right] * 100$$

Where DSL = percent of distribution system leakage, TP = Total Water Produced and Purchased, and AC = Authorized Consumption. The objective of DOH in not including apparent losses is to focus water utilities on reducing water theft and ensuring that meters are replaced on a scheduled program to minimize meter inaccuracies. The City’s DSL calculations are presented in Table 2-9.

**TABLE 2-9
Distribution System Leakage
(gallons)**

Description	2004	2005	2006	2007
Total Production (TP) ⁽¹⁾	496,884,000	494,824,000	498,578,000	507,773,000
Billed Metered Consumption ⁽²⁾	458,487,000	452,776,000	439,475,000	473,672,000
Billed Unmetered Consumption	NA	NA	NA	NA
Unbilled Metered Consumption	NA	NA	NA	NA
Unbilled Unmetered Consump.	NA	NA	NA	NA
Authorized Consumption (AC) ⁽³⁾	458,487,000	452,776,000	439,475,000	473,672,000
TP – AC	38,397,000	42,048,000	59,103,000	34,101,000
Dist. System Leakage (DSL) ⁽⁴⁾	7.7%	8.5%	11.9%	6.7%
Three-Year Average DSL	---	---	9.4%	9.0%

(1) Production data from Table 2-2.

(2) Consumption data from Table 2-5.

(3) Authorized Consumption = sum of previous four rows.

(4) $DSL = [(TP - AC) / TP] \times 100$

The City has been working diligently to reduce water system losses and, as indicated in Table 2-9, has been successful in doing so over the last several years. To continue to meet DOH’s 10 percent maximum distribution system leakage requirement, the City plans to do the following:

- Continue its ongoing efforts to find and repair leaks.
- Continue to improve on methods to track municipal water consumption.
- Continue to investigate and correct meter inaccuracies throughout its water system.
- The City plans to improve its tracking of authorized consumption, including hydrant flows, dust abatement water, and other unmetered and unbilled water usage.
- The City plans to make metering improvements at its water treatment plant to eliminate source of production inaccuracies.

EQUIVALENT RESIDENTIAL UNITS

Equivalent residential units (ERUs) are a way to express water use by non-residential customers as an equivalent number of residential customers. The ERUs for each customer class in 2007 are listed in Table 2-10. The average estimated consumption per single-family residential customer for 2007 was 468 gpd/ERU (252,114,000 gallons/365 days per year/1,477 single-family residential connections).

**TABLE 2-10
2007 Equivalent Residential Units**

Classification	Metered Consumption⁽¹⁾ (gal)	Number of Connections⁽²⁾	ERUs⁽³⁾	ERUs / Conn.	Percent of Total ERUs
Residential - SF	252,114,000	1,477	1,477	1	53.2%
Residential - MF	52,481,000	159	307	2	11.1%
Commercial	78,503,000	192	460	2	16.6%
Schools	6,494,000	7	38	5	1.4%
Municipal	64,514,000	40	378	9	13.6%
Purveyors ⁽⁴⁾	19,566,000	2	115	57	4.1%
Total	473,672,000	1,877	2,775	---	100%

- (1) From City billing records.
- (2) Chelan water service connection data provided by City.
- (3) Number of multi-family, commercial, schools, municipal, and purveyors ERUs calculated by dividing 2007 Consumption (Table 2.5) by Average Consumption per ERU of 468 gpd/ERU.
- (4) Chelan River Isenhart Water District domestic water system acquired by City in January 2008.

LARGEST WATER USERS

Peak consumption patterns by large water users are important because a modest increase or decrease in consumption by a larger water user could significantly change the overall demands, as well as revenue, of the system. It is also important for the hydraulic model to identify locations of high demand in the water service area. The City’s largest water users during 2007 and their percentage of total consumption are listed in Table 2-11.

**TABLE 2-11
2007 Largest Water Users**

Customer	2007 Usage (gallons)⁽¹⁾	Percent of Total Consumption
Lakeshore Park	42,502,000	9.0%
Campbells Resort	24,824,000	5.2%
Chelan Ball Fields	7,048,000	1.5%
Chelan Co. PUD (Parks)	6,723,000	1.4%
Lake Chelan Shores	5,817,000	1.2%
Slidewaters, LLC	5,716,000	1.2%
Caravel Motel	5,065,000	1.1%
Spader Bay Condos	4,884,000	1.0%
Chelan School District	4,278,000	0.9%
Chelan Valley Housing	4,050,000	0.9%
Best Western Lakeside	3,684,000	0.8%
Petersons Condos	3,502,000	0.7%
Park Pointe	3,228,000	0.7%
Moses Lake WA FM Group	3,101,000	0.7%

- (1) 2007 water consumption data from City records.

PROJECTED POPULATION AND ERUs

This section contains information on projected population, service connections, water usage, and equivalent residential units (ERUs) for the 6-year and 20-year planning periods.

RESIDENTIAL POPULATION

The population projections for the City of Chelan were taken from the 2002 amendments to the 1998 City of Chelan Comprehensive Land Use Plan and amendments to the 2000 Chelan County Comprehensive Plan, December 2002. The figures in these plan amendments are based the 2000 U.S. Census population count and the “High Series” Office of Financial Management (OFM) population projections for the Chelan County Census Division (Chelan CCD). The Chelan Urban Growth Area (UGA) lies within the Chelan CCD.

The 2000 population count for the Chelan CCD is 6,222. Using the Chelan County “High Series” estimated growth projection of 1.741 percent per year, the projected population for the Chelan CCD in 2025 is 9,579, an increase of 3,357 residents. Of the 6,222 residents within the Chelan CCD in 2000, 4,030 are within the Chelan UGA, with the remaining population of 2,192 being within unincorporated areas, according to the amendments to the 1998 Comprehensive Land Use Plan. According to the amendments to the 2000 Chelan County Comprehensive Plan and the amendments to the 1998 Comprehensive Land Use Plan, the City and County agreed upon a projected population allocation for the Chelan UGA of 2,675 additional residents by 2025, which corresponds to an annual growth rate of 2.057 percent between 2000 and 2025. The rounded annual growth rate of 2.06 percent for the Chelan UGA is therefore used for the estimated annual residential growth rate for the City of Chelan for the 20-year planning period. These planning numbers are consistent with the City’s 2008 General Sewer Plan and 2008 WWTP Engineering Report.

Comparing the 2000 Chelan UGA population (4,030) and the 2000 City of Chelan population (3,526) shows that approximately 500 people reside outside the Chelan City limits but within its UGA boundary. Therefore, population projections from 2007 using the anticipated growth rate of 2.06% will include the 2007 City population (3,835) and an additional 500 for a total 2007 Chelan UGA population of 4,335, as shown in Table 2-13.

COMMERCIAL POPULATION

According to the City of Chelan’s 2000 Wastewater Facility Plan, commercial growth within the City is expected to occur at an annual rate of 2.42 percent between 1997 and 2017, as available commercially zoned property is built out within the Chelan UGA. After 2017, it is assumed that commercial development will continue, possibly as a result of rezoning other areas of the community to accommodate commercial services for an expanding population. Therefore, an annual growth rate of 2.42 percent is used for

estimated commercial growth during the 20-year planning period. These planning numbers are consistent with the City’s 2008 General Sewer Plan and 2008 WWTP Engineering Report.

MUNICIPAL

The City currently does not expect any additional water consumption for municipal facilities, including parks, during the 20-year planning period.

SCHOOLS

The annual residential growth rate of 2.06 percent is used for estimated school growth during the 20-year planning period.

PROPOSED DEVELOPMENTS

Table 2-12 contains projected ERU growth with the City’s UGA over the course of the planning period from proposed developments and developments currently under construction.

**TABLE 2-12
Proposed Developments**

Development	Pressure Zone	ERUs	
		2013	2027
Legacy Ridge	Darnells	---	99
Cotter Orchards	Darnells	---	58
M.C. Orchard	Darnells	---	67
Lochlea	Darnells	---	61
Granite Ridge	Darnells	50	--
Lake Hills Phase 1	Lake Hills ⁽¹⁾	85	--
Lake Hills Phase 2	Lake Hills ⁽¹⁾	---	200
Holiday Hills	Main	---	108
Daybreak	⁽¹⁾	511	340
Tuscan Village	⁽¹⁾	944	---
Totals		1,590	933

(1) These developments are expected to plan and construct new pressure zones.

PROJECTED ERUS

Table 2-13 summarizes the City’s projected population and ERU growth for the planning period. Projected residential and commercial growth is calculated using projected growth rates of 2.06% and 2.42% respectively over the planning period.

**TABLE 2-13
Projected ERUs**

Year	Pop. ⁽¹⁾	Residential		Comm. (3)	School (2)	Muni. (4)	Purvey. (5)	New Devel. (6)	Total (7)
		SF ⁽²⁾	MF ⁽²⁾						
2007	4,335	1,477	307	460	38	378	83	0	2,744
2008	4,424	1,507	314	471	39	378	118	0	2,827
2009	4,515	1,538	320	482	40	378	152	993	3,904
2010	4,608	1,570	327	494	40	378	186	1,058	4,054
2011	4,703	1,603	334	506	41	378	220	1,178	4,260
2012	4,800	1,636	340	518	42	378	254	1,315	4,483
2013	4,899	1,669	347	531	43	378	289	1,590	4,848
2027	6,518	2,221	462	742	57	378	1,016	2,523	7,399

- (1) 2007 population from Figure 2-1 plus additional 500 for population outside the Chelan corporate limits but within the Chelan UGA. 2008-2027 population based on 2.06% annual growth rate.
- (2) 2007 Residential ERUs from Table 2-10. 2008-2027 Residential and School ERUs based on 2.06% annual growth rate.
- (3) 2007 Commercial ERUs from Table 2-10. 2008-2027 Commercial ERUs based on 2.42% annual growth rate.
- (4) Municipal ERUs assumed to be constant during the planning period.
- (5) Purveyors Residential and Commercial ERUs derived from Table 2.3 in the Chelan River and Isenhart Irrigation Districts 2007 Comprehensive Water System Plan and adjusted for the Districts' lower projected consumption of 250 gpd/ERU.
- (6) Proposed developments from Table 2-12.
- (7) Total = Subtotal plus anticipated development ERUs projected to occur during the planning period (Table 2-13).

Table 2-14 summarizes the ADD, MDD, and PHD projections for the next 20 years based upon proposed growth rates, **excluding** proposed development growth shown in Table 2-12. These projections will be used in the water system analysis presented in Chapter 3 to identify system deficiencies based upon projected growth rates **without** proposed developments.

Table 2-15 summarizes the ADD, MDD, and PHD projections for the next 20 years based upon proposed growth rates, **including** proposed development growth shown in Table 2-12. These projections will be used in the water system analysis presented in Chapter 3 to identify system deficiencies based upon projection growth rates **with** proposed developments. The average ADD from Table 2-2 was used as the starting point for the projections shown in Tables 2-14 and 2-15.

**TABLE 2-14
Projected ADD, MDD and PHD (Excluding Proposed Developments)**

Year	Pop.⁽¹⁾	ERUs⁽¹⁾	ADD⁽²⁾ (gpd)	Annual Prod.⁽³⁾ (af/yr)	MDD⁽⁴⁾ (gpd)	MDD (gpm)	PHD⁽⁵⁾ (gpm)
2007	4,335	2,744	1,371,000	1,536	3,565,000	2,476	4,951
2008	4,424	2,827	1,412,000	1,582	3,671,000	2,549	5,099
2009	4,515	2,911	1,454,000	1,629	3,780,000	2,625	5,250
2010	4,608	2,996	1,497,000	1,677	3,892,000	2,703	5,406
2011	4,703	3,082	1,540,000	1,725	4,004,000	2,781	5,561
2012	4,800	3,168	1,583,000	1,773	4,116,000	2,858	5,717
2013	4,899	3,258	1,628,000	1,823	4,233,000	2,940	5,879
2027	6,518	4,876	2,436,000	2,728	6,334,000	4,399	8,797

- (1) Population and ERUs from Table 2-13.
- (2) Average ADD for 2004-2006 from Table 2-2 used for 2007 ADD; ADD for remaining years assumed to grow at same rate as ERU growth.
- (3) Annual Production = ADD * 365 days/43,560 cf/ac/7.481 gal/cf.
- (4) MDD/ADD = 2.6 (Table 2-3).
- (5) PHD/MDD = 2.0 (see discussion this Chapter).

**TABLE 2-15
Projected ADD, MDD and PHD (Including Proposed Developments)**

Year	Pop.⁽¹⁾	ERUs⁽¹⁾	ADD⁽²⁾ (gpd)	Annual Prod.⁽³⁾ (af/yr)	MDD⁽⁴⁾ (gpd)	MDD (gpm)	PHD⁽⁵⁾ (gpm)
2007	4,335	2,744	1,371,000	1,536	3,565,000	2,476	4,951
2008	4,424	2,827	1,412,000	1,582	3,671,000	2,549	5,099
2009	4,515	3,904	1,951,000	2,185	5,073,000	3,523	7,046
2010	4,608	4,054	2,025,000	2,268	5,265,000	3,656	7,313
2011	4,703	4,260	2,128,000	2,384	5,533,000	3,842	7,685
2012	4,800	4,483	2,240,000	2,509	5,824,000	4,044	8,089
2013	4,899	4,848	2,422,000	2,713	6,297,000	4,373	8,746
2027	6,518	7,399	3,697,000	4,141	9,612,000	6,675	13,350

- (1) Population and ERUs from Table 2-13.
- (2) Average ADD for 2004-2006 from Table 2-2 used for 2007 ADD; ADD for remaining years assumed to grow at same rate as ERU growth.
- (3) Annual Production = ADD * 365 days/43,560 cf/ac/7.481 gal/cf.
- (4) MDD/ADD = 2.6 (Table 2-3).
- (5) PHD/MDD = 2.0 (see discussion this Chapter).