

## CHAPTER 2

### BASIC PLANNING DATA AND WATER DEMAND FORECASTING

#### 2.0 OBJECTIVE

The objective of this chapter is to collect basic planning data and project future water demands.

#### 2.1 CURRENT POPULATION AND SERVICE CONNECTIONS

Service population and connection data for the City of Oroville are summarized in Table 2-1.

**TABLE 2-1**  
**2001 SERVICE POPULATION AND CONNECTIONS**

	POPULATION <sup>1</sup>	RESIDENTIAL CONNECTIONS	COMMERCIAL/INDUSTRIAL CONNECTIONS
City	1,670	673	147
North End Water Users	609 <sup>2</sup>	257	12
Eastlake	123 <sup>2</sup>	52	2
<b>TOTALS</b>	<b>2,402</b>	<b>982</b>	<b>161</b>

<sup>1</sup> 2001 Population Trends for Washington State, Office of Financial Management

<sup>2</sup> Estimate based on 2.37 persons per household (OFM Data)

#### 2.2 HISTORICAL WATER USAGE

The City's wellfield, consisting of Wells 1, 2 and 3, is the primary source. During the summer, Well 4 is utilized in addition to the wellfield. Table 2-2 summarizes historical source output.

**TABLE 2-2**  
**OROVILLE HISTORICAL SOURCE OUTPUT<sup>1</sup>**

Year	Well No. 1 Mgal	Well No. 2 Mgal	Well No. 3 Mgal	Well No. 4 Mgal	Total Mgal
1998	0	0	46.7	73.6	120
1999	33.2	27.2	59.6	80.9	201
2000	15.9	98.1	30.9	81.9	257
2001	0	35.7	120.0	86.3	242

<sup>1</sup> Readings represent November 1 through October 31 period.

### 2.3 EQUIVALENT RESIDENTIAL UNITS (ERU'S)

Oroville records indicate the single family residential water usage during 2001 was 128 million gallons. Using the 982 single family connections, an ERU value of 360 gpd is derived. This value is consistent with other eastern Washington systems indicating Oroville demands are not excessive.

Within the system, there is a distinct difference in usage between the North End/Eastlake and City customers. Single-family residential usage in the North End and Eastlake was 23.7 million gallons for 309 single-family connections. This usage gives an ERU of 210 gpd. The difference can be attributed to the availability of a separate irrigation source.

<u>Area</u>	<u>ERU</u>
North End Water Users and Eastlake	210 gpd.
City Limits	422 gpd.
Combined	360 gpd.
 <b><u>Total ERU Count for 2001</u></b>	
City Residential	791
Commercial	310
North End & Eastlake Residential	180
Commercial	<u>13</u>
Total ERU's	1,294

These ERU values are consistent with usage in eastern Washington indicating that Oroville demands are not excessive. For projecting system demands, the combined ERU of 360 gpd will be used. The North End ERU will be used to evaluate the North End system separately in Chapter 3.

### 2.4 PROJECTED LAND USE

The City of Oroville Comprehensive Land Use Plan was adopted in October 1995. Figure 2-1 shows current land use designations. The following excerpts from the plan provide summaries.

**Existing Land Use** - Oroville is situated between the Okanogan and Similkameen Rivers with the exception of the northwest portion of the city, which lies to the north of where the Similkameen enters the valley. Lake Osoyoos is located to the immediate north of Oroville. The United States portion of the Okanogan River flows to the south from Lake Osoyoos. Unincorporated agricultural land is found on the south border of the city. Bordered on three sides by bodies of water and having a generally flat topography, portions of Oroville are considered to be in the floodplain.

Figure 2-1

The Cascade and Columbia Railroad tracks, part of which is abandoned, separate the city in North and South sections. The major transportation corridor, State Route (SR) 97, further separates the city into quarters as the highway generally runs North and South.

Within the city, industrial uses are located along the railroad tracks, widening the division between the north and south sections. This linear industrial area continues beyond the city boundary to the southeast where two small sawmills are located near the Okanogan River.

In the central portion of the city, along SR 97 (North Main Street), is the central business district of Oroville. Service and other commercial uses have developed along SR 97 to the north and south of the central business district and from the commercial corridor, which extends beyond the city limits in both directions.

Residential areas are generally located to the east and west of the commercial corridor. Also, residential development is substantial to the north of the city along the shore of Lake Osoyoos. The City of Oroville acquired the North End Water User System in 1989, providing water on the west side of the lake from the northern city Limits to the Canadian border. Wastewater is treated by on-site septic systems. Additionally, Deep Bay Park is located in this area which is owned and operated by the city. The park is an incorporated shoreline area located approximately one mile north of the contiguous city limits. (City of Oroville Comprehensive Plan, 1995)

**Future Land Use** - Population growth in the incorporated area of Oroville has been nearly non-existent over the past several decades while growth is apparent in the outlying fringe areas. The closest and most obvious growth is taking place to the north along the west side of Lake Osoyoos. The city provides water to this area and sanitary sewer is currently perceived by many as an inevitable need in the near future. It is likely residents in the area will look to the city to provide treatment facilities. Furthermore, the City of Oroville experiences the impacts from unincorporated development over which it has little control. At the same time, property valuation to the north is quite high compared to property within the city limits, representing revenue potential that could be used for enhanced planning and infrastructure improvement. For these reasons, annexation of the west shore of Lake Osoyoos as far north as Deep Bay Park offers an option for controlled and planned growth of the community, with the possibility of extending to the border in the future.

A project to deliver water to the city's airport industrial park was completed in 1995. Since growth is inevitable on the east side of Lake Osoyoos, the line was sized to accommodate a demonstrated need for water service enroute to the airport site. The expected need for sanitary sewer on the east side of Lake Osoyoos is likely to cause landowners to look to the city to take part in providing urban services in the future which may lead to future expansion of the city to the east of the lake.

Recent inquiries for annexation have indicated a need for property that is zoned to accommodate affordable housing, which often demands multi-family development. In their research, the Oroville Housing Authority, as well as non-profit and private representatives of the development community, have indicated that there is a lack of available land for such housing. Parcels that are in areas that would be suitable for multi-family housing and are in obvious need of redevelopment usually have structures that are not useful to potential buyers but increase the cost of the property. Additional available lands are located along the west slope of the city and tend to demand higher prices due to view potential and adjacent property value. (City of Oroville Comprehensive Plan, 1995)

## 2.5 PROJECTED POPULATION

Population data from the 2000 census shows the Oroville corporate limits population growing at a rate of 0.9% annually from 1990 to 2000. Growth in Okanogan County during the same period was 1.7%. In comparison to Washington State this is modest growth and reflects the regional economy. Based on construction activity and real estate sales it is apparent that growth has occurred at higher rates in the North End Water Users and Eastlake areas. For planning purposes growth within the corporate limits will be projected at a rate of 1.5% annually. The North End and Eastlake areas will be projected at a rate of 3.0% annually. These projections are conservative with recognition that population data will be updated in the sixth year of the plan. Projections for each area are shown in Table 2-3. Figures 2-2 and 2-3 show the corresponding water demand.

**2.5.1 North End and Eastlake Service Area Capacities** – To accurately assess growth in the North End and Eastlake areas the population projections of Table 2-3 should be compared to land use. Table 2-4 summarizes the potential development in each area based on current zoning. Maximum service population is also derived. As shown, the maximum service population in each area is greater than the projected 20-year population. At the projected growth rates, full buildout of the North End and Eastlake service areas is unlikely within the next 20 years.

**TABLE 2-3**

**OROVILLE SERVICE AREA POPULATION PROJECTIONS**

<b>Year</b>	<b>City Population<sup>1</sup></b>	<b>NEWU/ Eastlake Population<sup>2</sup></b>	<b>Total Population</b>	<b>Residential ERU's<sup>3</sup></b>	<b>Industrial/ Commercial ERU's<sup>4</sup></b>	<b>Public Facilities ERU's<sup>5</sup></b>	<b>Total ERU's</b>
2001	1,670	742	2,412	673	323	123	1,119
2002	1,695	764	2,459	1,038	325	123	1,485
2003	1,720	787	2,507	1,058	326	123	1,507
2004	1,746	810	2,557	1,079	328	123	1,530
2005	1,772	835	2,607	1,100	330	123	1,553
2006	1,799	860	2,659	1,122	331	123	1,576
2007	1,826	886	2,712	1,144	333	123	1,600
2008	1,853	912	2,766	1,167	334	123	1,624
2009	1,881	939	2,821	1,190	336	123	1,649
2010	1,909	968	2,877	1,214	338	123	1,675
2011	1,938	997	2,935	1,238	340	123	1,701
2012	1,967	1,027	2,994	1,263	341	123	1,727
2013	1,997	1,057	3,054	1,289	343	123	1,755
2014	2,027	1,089	3,116	1,315	345	123	1,782
2015	2,057	1,122	3,179	1,341	346	123	1,811
2016	2,088	1,155	3,243	1,368	348	123	1,840
2017	2,119	1,190	3,309	1,396	350	123	1,869
2018	2,151	1,226	3,377	1,425	352	123	1,899
2019	2,183	1,263	3,446	1,454	353	123	1,930
2020	2,216	1,300	3,516	1,484	355	123	1,962
2021	2,249	1,339	3,589	1,514	357	123	1,994
2022	2,283	1,380	3,663	1,545	359	123	2,027
2023	2,317	1,421	3,738	1,577	360	123	2,061

<sup>1</sup>Annual residential growth - City, 1.5 %

<sup>2</sup>Annual residential growth - NEWU/Eastlake, 3.0 %

<sup>3</sup>Based on OFM Census Data, 2.37 persons per dwelling

<sup>4</sup>Annual industrial/commercial growth, 0.5 %

<sup>5</sup>Based on City records. Assumes no growth.

**TABLE 2-4**

**NORTH END AND EASTLAKE GROWTH ASSESSMENT**

	<b>Zoning</b>	<b>Available Acres</b>	<b>Minimum Lot Size</b>	<b>Maximum Potential Lots</b>	<b>Maximum Potential ERU's</b>
North End Service Area	Agricultural Residential	535	2.0 acres	239	239
	Suburban Residential	302	20,000 sf	631	631
	Commercial	112	5,000 sf	883	795
				North End Potential ERU's	1,665
Eastlake Service Area	Minimum Requirement District	2,329	1.0 acres	2,329	2,329
				<b>Total Potential ERU's</b>	<b>3,994</b>

Note - The potential lot calculations do not take into account land dedicated to public right-of-way.

**2.6 PROJECTED UNACCOUNTABLE WATER**

As shown in Table 3-4, the total source output in 2001 was 242 million gallons. Customer usage, based on City meter readings was 194 million gallons. The 48 million gallon unaccounted difference is 20% of the total source output. It is generally considered that unaccounted usage greater than 10% justifies an investigation. The unaccounted usage may be attributed to leaks, meter inaccuracies, or connections not metered. Records for 2002 show unaccountable water trending downward, however, an investigation of unaccountable water usage is identified as a needed improvement in Chapter 8.

**2.7 WATER DEMAND FORECASTING**

Water demand projections, based on the population and usage data described above, are shown in Figures 2-2 and 2-3. The three demand projections in these figures are defined as follows:

Average Daily Demand (ADD): Total annual volume divided by 365 days per year. Actual usage varies considerably about this average due to seasonal and diurnal patterns. Oroville ADD was based on the ERU usage data of Section 2.3. An example calculation for 2001 is shown below.

$$2001 \text{ Total Annual Volume} = 170 \text{ Mgal}$$

$$2001 \text{ ADD} = \frac{170 \times 10^6 \text{ gal / yr}}{365 \text{ days}} = 465,000 \text{ gpd}$$

Maximum Day Demand (MDD): Highest total volume of water used during a calendar day. When historical data is not available, MDD is typically taken as twice the ADD. An estimate of 2001 MDD is shown below.

$$2001 \text{ MDD} = 2 \times \text{ADD} = (2)(466,000 \text{ gpd}) = 932,000 \text{ gpd}$$

Peak Hour Demand (PHD): Highest flow recorded within one hour. Frequently PHD will occur during the maximum day, but not in all cases. A large industrial user can increase short-term demand to peak hour levels while the overall day's use is still near the average.

Peak hour demand is calculated as a function of MDD when historical hourly data is not available. The DOH Water System Design Manual provides the following method for calculating PHD based on ERU's:

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

Where N = Number of ERU's = 1,119  
C = 1.6  
F = 225

$$2001 \text{ PHD} = \frac{932,000}{1440} [(1.6)(1,119) + 225] + 18 = 1,026 \text{ gpm}$$

The projections shown in Figures 2-2 and 2-3 indicate the City has adequate annual and instantaneous water rights to meet the 20-year projection. Further discussion on water rights is presented in Chapter 4.

### 2.7.1 Influence of Conservation Measures

Chapter 4 describes conservation measure that could be implemented to achieve a reduction in water demand. A goal of 10% reduction in the ERU would extend the City's water right capacity. Figure 2-4 shows the reduction in demand that could be achieved.

Figure 2-2

Figure 2-3

Figure 2-4