

## CHAPTER 2

### BASIC PLANNING DATA

This chapter includes basic planning data that is essential for the assessment of the City's water demands. This chapter also includes information regarding historical growth. Population projections have been previously established in the City of Milton 2002 Comprehensive Plan. This information was used as a reference for the population forecasts in this plan. The information presented in this chapter was used to evaluate the condition of the existing system and determine future needs based on foreseeable demographic trends through the year 2029.

#### EXISTING POPULATION, SERVICES, AND WATER DEMAND

##### RESIDENTIAL POPULATION

Residential population of the City must be determined using billing data, since the retail service area differs from City limits. In 2008, the City had 2,427 single-family residences and 865 multi-family residential dwelling units within the RSA. Based on an average household size of 2.39 people, as established in the 2000 Census, the RSA average population is 7,868 in 2008.

Multi-family residential dwelling unit data within the City limits is not available for years prior to 2008. An average of 9.5 dwelling units per connection has been applied to 2003 through 2007 in-city multi-family data, which is based on 2008 data of 841 dwelling units with 88 connections within the City limits. Outside of the City limits there are 24 multi-family dwelling units with 6 connections.

Table 2-1 summarizes estimated population for the years 2003 through 2008.

**TABLE 2-1**

##### **Historic Retail Service Area Population**

<b>Year</b>	<b>Population</b>
2003	6,999
2004	7,253
2005	7,362
2006	7,616
2007	7,880
2008	7,868

Billing data shows that the population declined from 2007 to 2008. Residential connections outside of the City limits dropped from an average of 456 to 446 connections which likely contributes to this decline.

### **TOTAL SERVICE CONNECTIONS**

As shown in Table 2-2, the City's average number of active service connections is 2,684 as of 2008.

**TABLE 2-2**

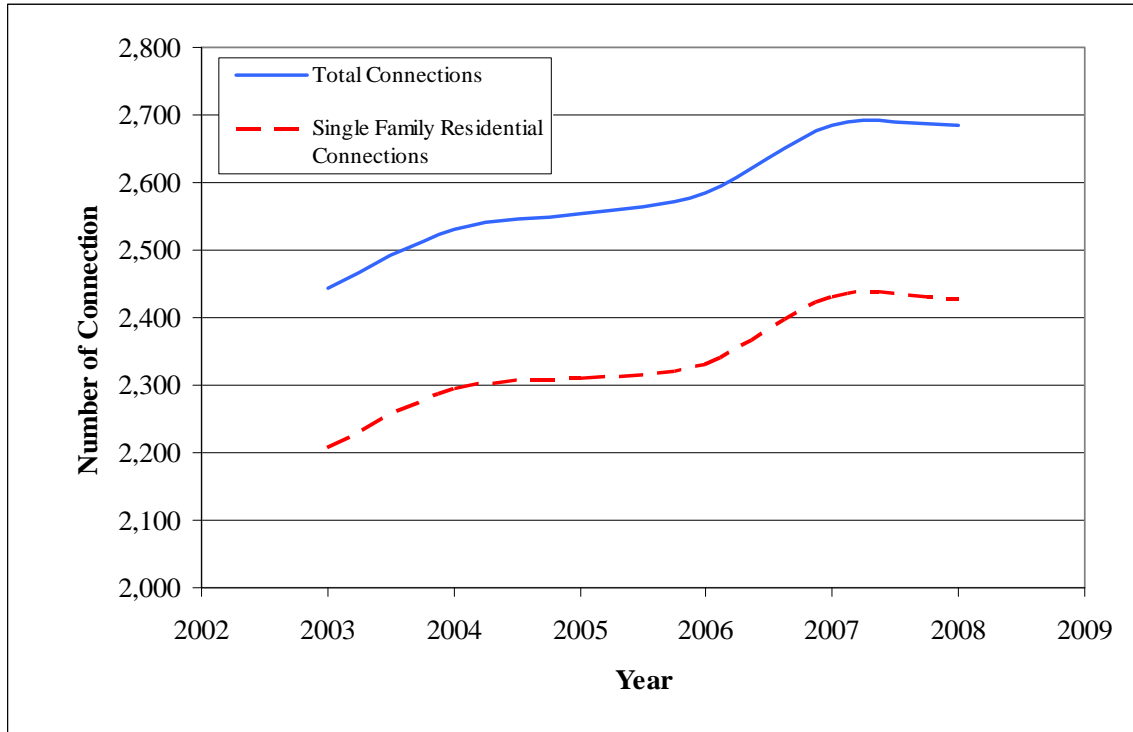
#### **2008 Service Connections**

<b>Customer Classification</b>	<b>Number of Service Connections</b>
Church	12
City	13
Commercial Apartments	88
Commercial	83
Out of City Apartments	6
Out of City Commercial	24
Out of City Residential	446
Single-Family Residential	1,981
Irrigation	24
Schools	7
<b>Total</b>	<b>2,684</b>

Figure 2-1 shows the trend in total connections and single family residential connections both inside and outside of the City limits for the period from 2003 to 2008. Single family connections have accounted for the majority of the growth within the system.

**FIGURE 2-1**

**Total Connections 2003-2008**



**WATER PRODUCTION**

Water production data is collected from source meters located at each well. The meters are read on a daily basis.

From 2003 to 2008, the average daily metered production for the City’s wells has ranged from 793,859 gallons per day (gpd) in 2008 to nearly 999,952 gpd in 2003. Production is determined as the amount of water flowing through the source meters at the City’s wells.

Table 2-3 shows the City’s yearly production history since 2003. Accurate individual well production data is not available prior to 2005.

**TABLE 2-3**

**Metered Water Production 2003-2008**

Year	Well No. 3 (MG)	Well No. 5 (MG)	Well No. 7 (MG)	Well No. 10 (MG)	Well No. 12 (MG)	Corridor Wells (MG) <sup>(1)</sup>	Total (MG)	Average Day (gallons)
2003	NA	NA	NA	NA	NA	NA	365.0	999,952
2004	NA	NA	NA	NA	NA	NA	318.8	871,007
2005	57.0	36.5	-	123.5	95.9	NA	308.4	844,954
2006	55.2	34.0	-	122.6	106.5	NA	318.3	871,960
2007	54.7	29.9	-	114.0	108.4	NA	307.0	841,169
2008	39.4	24.8	-	86.2	87.0	53.2	290.6	793,859

(1) SCADA system experienced errors during 2008 so production is calculated from pump run time data and average flow.

Table 2-4 shows monthly production per source for the year 2008. Monthly data from the Corridor Wells is unavailable due to SCADA errors. The absence of this data limits the analysis of how the wells are used in respect to each other as demand changes throughout the year.

**TABLE 2-4**

**2008 Monthly Water Production by Source (MG)**

2008	Well #3	Well #5	Well #10	Well #12
January	2.62	1.91	5.71	5.53
February	2.39	1.61	5.33	5.31
March	2.77	1.99	6.82	6.08
April	0.28	1.84	7.58	6.50
May	4.22	1.44	8.48	9.81
June	2.39	2.10	8.93	7.57
July	4.38	3.55	11.50	9.33
August	4.96	3.05	11.90	9.76
September	4.30	2.16	0.00	8.80
October	4.47	2.02	5.20	5.46
November	3.33	1.43	6.66	5.22
December	3.30	1.70	8.05	7.61
<b>Total</b>	<b>39.43</b>	<b>24.81</b>	<b>86.16</b>	<b>86.97</b>

The City's historic water production per capita is shown in Table 2-5. The average number from 2004 through 2008 will be used as an estimate to project future water production requirements throughout the 20-year planning horizon.

**TABLE 2-5**

**Historic Water Production Per Capita**

<b>Year</b>	<b>Estimated Service Area Population</b>	<b>Average Daily Production (gpd)</b>	<b>Estimated Per Capita Production (gpcd)</b>
2003	6,999	999,952	143
2004	7,253	871,007	120
2005	7,362	844,954	115
2006	7,616	871,960	114
2007	7,880	841,169	107
2008	7,868	793,859	101
<b>Average</b>			<b>117</b>

Per capita production saw a significant decrease between 2003 and 2004. Since then it has continually decreased at a lesser rate. The average per capita production since 2003 is 117 gpcd.

**CONSUMPTION HISTORY**

Meter data for the City is collected monthly. The City’s water consumption for the period 2003 to 2008 is based on existing customer meter data and is presented in Table 2-6.

**TABLE 2-6**

**Annual Consumption by Customer Class (Gallons per day)**

<b>Customer Class</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>
Church	8,398	8,698	8,712	10,820	13,036	8,443
City	4,500	3,474	725	2,092	2,150	2,230
Commercial	73,181	74,330	82,143	79,386	81,817	88,223
Apartments	106,107	123,596	104,064	99,343	96,586	86,786
Out-of-City Apartments	6,461	7,122	10,749	8,117	8,857	7,717
Out-of-City Commercial	29,014	26,989	23,776	18,905	16,763	16,646
Out-of-City Residential	129,056	118,687	107,025	111,792	124,971	113,058
Residential	458,512	446,121	409,265	425,081	415,808	397,364
Irrigation	47,522	48,687	35,508	39,990	50,331	34,157
Schools	6,531	5,352	5,105	5,605	7,187	5,449
Non-revenue water	0	0	0	0	0	630
<b>TOTAL</b>	<b>869,283</b>	<b>863,057</b>	<b>787,072</b>	<b>801,133</b>	<b>817,507</b>	<b>760,702</b>

Table 2-7 represents the percentage use of each customer class from 2003-2008.

**TABLE 2-7**

**2003-2008 Annual Consumption by Customer Class as a Percentage of Total**

<b>Customer Class</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>
Church	1.0%	1.0%	1.1%	1.4%	1.6%	1.1%
City	0.5%	0.4%	0.1%	0.3%	0.3%	0.3%
Commercial	8.4%	8.6%	10.4%	9.9%	10.0%	11.6%
Apartments	12.2%	14.3%	13.2%	12.4%	11.8%	11.4%
Out-of-City Apartments	0.7%	0.8%	1.4%	1.0%	1.1%	1.0%
Out-of-City Commercial	3.3%	3.1%	3.0%	2.4%	2.1%	2.2%
Out-of-City Residential	14.8%	13.8%	13.6%	14.0%	15.3%	14.9%
Residential	52.7%	51.7%	52.0%	53.1%	50.9%	52.2%
Irrigation	5.5%	5.6%	4.5%	5.0%	6.2%	4.5%
Schools	0.8%	0.6%	0.6%	0.7%	0.9%	0.7%
Non-revenue water	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%
<b>TOTAL</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

Seasonal variation in water use has also been examined. In 2008, summer usage accounted for approximately 35 percent of annual usage, and each other season accounted for between 20 to 22 percent. Table 2-8 summarizes seasonal usage by customer class for the year 2008.

**TABLE 2-8**

**Seasonal Variation by Customer Class for 2008**

<b>Class</b>	<b>Winter Usage (Jan-Mar, gal)</b>	<b>Spring Usage (Apr-June, gal)</b>	<b>Summer Usage (July-Sept, gal)</b>	<b>Fall Usage (Oct-Dec, gal)</b>
Church	962,676	447,304	1,021,020	658,988
City	144,364	96,492	397,188	178,024
Commercial	7,874,196	7,616,884	7,985,648	8,812,936
Apartments	8,071,668	6,979,588	9,556,448	7,156,116
Out-of-City Apartments	832,524	738,276	702,372	551,276
Out-of-City Commercial	1,451,868	1,219,240	1,751,068	1,670,284
Out-of-City Residential	8,607,984	9,146,544	15,493,324	8,131,508
Residential	32,118,372	32,289,664	52,392,912	28,634,188
Schools	480,216	587,180	287,232	639,540
Irrigation	267,036	2,316,556	8,417,244	1,500,488
<b>Total</b>	<b>60,810,904</b>	<b>61,437,728</b>	<b>98,004,456</b>	<b>57,933,348</b>

Irrigation and City use experience the largest fluctuation during summer months. For irrigation, 67 percent of annual use occurs during summer months, and nearly 50 percent of annual City use occurs during the summer.

**DISTRIBUTION SYSTEM LEAKAGE**

Distribution system leakage (DSL) is defined as the difference between metered source production and metered and other estimated authorized consumption. DSL includes any water loss due to leaks or unauthorized uses such as illegal service connections, accounting errors, inaccurate source and customer meters, and water leaving the system for unmetered usage. Unmetered uses typically include flushing of mains and fire flows.

Table 2-9 shows calculations of distribution system leakage for 2003 to 2008.

**TABLE 2-9**

**Calculated Distribution System Leakage**

Year	Metered Production (MG)	Authorized Consumption (MG)	Distribution System Leakage		
			MG	%	3-Year Rolling Average
2003	365.0	317.3	47.7	13.1%	11.4%
2004	318.8	315.9	2.9	0.9%	9.1%
2005	308.4	287.3	21.1	6.9%	6.9%
2006	318.3	292.4	25.9	8.1%	5.3%
2007	307.0	298.4	8.6	2.8%	5.9%
2008	290.6	278.4	12.1	4.2%	5.0%

The City has an acceptable rate of distribution system leakage, and currently meets DOH requirements of less than 10 percent, which will be further explained in Chapter 5.

**EQUIVALENT RESIDENTIAL UNITS**

An Equivalent Residential Unit (ERU) is a means to express water use by non-residential customers. One ERU is equivalent to water usage by one single-family residence. An ERU is calculated by dividing the total volume of water utilized in the single-family customer class by the total number of single-family residential connections. This number defines the average single-family residential water use. This figure does not include DSL. The volume of water used by other customer classes can then be divided by this number to determine the equivalent residential units utilized by the other customer classes. The average single-family residential water use, for connections both within and outside the City limits, in 2008 is 210 gpd. Table 2-10 summarizes the annual ERU value since 2003.

**TABLE 2-10**

**Equivalent Residential Units for 2003-2008**

<b>Year</b>	<b>Single-Family Residential Connections</b>	<b>Single-Family Residential Consumption (gpd)</b>	<b>ERU Value (gpd/ERU)</b>
2003	2,207	587,567	266
2004	2,294	564,807	246
2005	2,311	516,290	223
2006	2,331	536,873	230
2007	2,432	540,779	222
2008	2,427	510,422	210
<b>Average</b>			<b>233</b>

Similar to the trends in per capita production since 2003, the ERU value dropped significantly in 2004. The average ERU value since 2003 is 233 gpd.

Table 2-11 provides the number of water service connections by customer class, the average daily consumption for each class, the equivalent residential units, and the average ERUs per connection for the year 2008, based on the annual ERU value of 210 gpd/ERU.

**TABLE 2-11**

**Equivalent Residential Units for 2008**

<b>Customer Class</b>	<b>Number of Connections</b>	<b>Average Daily Consumption Demand (gal)</b>	<b>Total ERUs</b>	<b>Average ERUs per connection</b>
Church	12	8,443	40	3.3
City	13	2,230	11	0.8
Commercial	88	88,223	419	4.8
Apartments	83	86,786	413	5.0
Out-of-City Apartments	6	7,717	37	6.1
Out-of-City Commercial	24	16,646	79	3.3
Out-of-City Residential	446	113,058	538	1.2
Residential	1,981	397,364	1,889	1.0
Irrigation	24	34,157	162	6.8
Schools	7	5,449	26	3.7
Non-Revenue	NA	630	3	NA
DSL	NA	33,158	158	NA
<b>Total</b>	<b>2,684</b>	<b>793,859</b>	<b>3,775</b>	<b>1.4</b>



Table 2-12 summarizes the top ten highest users for the year 2007. These users represent 7 percent of total consumption, yet only 0.4 percent of connections.

**TABLE 2-12**

**Top Ten Highest Users for 2008**

<b>Customer Type</b>	<b>Average Consumption (gpd)</b>	<b>Number of ERUs <sup>(1)</sup></b>
Gary Dunham	17,712	84
Commercial – Village Concepts	6,365	30
Commercial – Safeway	5,800	28
Commercial – Milton Associates #1-8	5,213	25
Commercial – Surprise Lake Maytag Laundry	4,949	24
Commercial – Albertson’s	3,896	19
Milton Associates #17-24	3,492	17
McDonald’s	3,111	15
Joseph Landholm	2,926	14
Milton Shell and Food Court	2,176	10
<b>Total Ten Highest Users</b>	<b>55,641</b>	<b>265</b>
<b>Total System</b>	<b>760,702</b>	<b>3,617</b>

(1) Based on the 2008 ERU value of 210 gpd/ERU.

**PEAKING FACTORS**

In order to estimate future peak day and peak hour demands for the City, peaking factors were calculated from historical production data.

**PEAK DAY FACTOR**

The peak day production for the City of Milton’s sources since 2003 is shown in Table 2-13. The City has an average ratio of peak day production to average day production of 2.20.

**TABLE 2-13**

**Peak Day Production**

<b>Year</b>	<b>Average Day Demand (gpd)</b>	<b>Peak Day Demand (gpd)</b>	<b>Peaking Factor</b>
2003	999,952	2,080,000	2.08
2004	871,007	2,167,000	2.49
2005	844,954	1,831,800	2.17
2006	871,960	2,097,572	2.41
2007	841,169	1,764,333	2.10
2008	793,859	1,568,124	1.98
<b>Average</b>			<b>2.20</b>

**PEAK HOUR FACTOR**

The City’s highest annual daily demand for 2003 to 2008, occurring in 2004, was used as the basis for the determination of this peaking factor. Based on the Department of Health’s (DOH) guidelines for peak hour, the City has a **peak hour factor of 1.65**. This is based on the guidelines set forth in DOH’s Water System Design Manual Equation 5.3.

$$\text{Peak Hour Demand (PHD)} = (\text{MDD}/1440) \{ (C) * (N) + F \} + 18$$

- MDD = Maximum Day Demand (gpd/ERU) (MDD = 613)
- C = Coefficient associated with Ranges of ERUs (C = 1.6)
- N = Number of ERUs (N = 3,484)
- F = Factor associated with Ranges of ERUs (F = 225)

**POPULATION PROJECTIONS**

In the 2002 City of Milton Comprehensive Plan, population projections for the 20-year planning horizon were estimated for the City’s retail service area based on a population growth of 3 percent per year over the 20-year period from the base population of approximately 8,000 people in the year 2000 and a population of 14,872 in 2021 for the retail service area. However, based on conversations with the City, population growth is expected to be significantly lower in the next several years as a result of the economy. To account for this, a growth rate of 1 percent is applied to the year 2009, 2 percent for 2010-2011, and 3 percent from 2012 and thereafter. Additionally, the 2008 service area population, as calculated from billing records, is slightly less than the 2000 estimate of 8,000. Table 2-14 shows the projected growth for the City of Milton water service area through the year 2029 using a projected growth of 1 percent in 2009, 2 percent in 2010 and 2011, and 3.0 percent per year over the rest of the 20-year planning period, with a base population of 7,868 people in 2008.

The build-out population for the retail service area has been calculated using data obtained from the City’s planning department and land acreage and zoning requirements. The planning department estimates a build-out population of 8,180 people for the City limits, consistent with Pierce and King County Growth Management Act projections, and 10,594 for the UGA. The Retail Service Area differs from both of these designations. To determine the build-out population of the RSA, population estimates have been calculated for the areas of the RSA not within the UGA and for areas of the UGA not within the RSA. The areas within the RSA but not within the UGA are the portions of the service area within the City of Edgewood, four parcels near the western boundary of the RSA in unincorporated Pierce County, and three parcels north of South 376<sup>th</sup> Street in the City of Federal Way. Build-out populations for these areas have been added to the UGA build-out population. The areas within the UGA that are not within the RSA are 426 parcels in unincorporated King County and the City near the northeastern boundary of the City, and 79 parcels in unincorporated Pierce County to the west of the City limits. Build-out populations for these areas have been subtracted from the UGA build-out populations since they are not within the RSA. Build-out populations have been calculated based on zoning designations and acreage and assumes the redevelopment of underutilized lots. Zoning for these areas are shown in Figure 1-4 and described in Chapter 1. These calculations result in a build-out population of 12,371 for the RSA.

**TABLE 2-14**

**Projected Population for Water Service Area**

<b>Year</b>	<b>2008</b>	<b>2009</b>	<b>2015</b>	<b>2029</b>	<b>Build-out</b>
Population	7,868	7,947	9,305	14,075	12,371

Projections for 2029 exceed the build-out population, meaning that build-out will occur before the end of the 20-year planning period. With the growth rates described above, build-out is projected to occur in 2025.

**WATER PRODUCTION PROJECTIONS**

Production numbers have been used as a basis for demand projections in the future since it better represents total water drawn from the wells. The demand forecast will be used to analyze source capacity.

As shown in Table 2-5, the average day per capita production demand for 2003 through 2008 was 116 gpcd. In order to project water demands, this value is used with the projected service area population growth. Table 2-15 shows the projected average day and peak day production demand through the year 2029, along with the projected number of ERUs. Peak day and peak hour demands have been calculated by applying peaking factors of 2.20 and 1.66 to the average day and peak day demands, respectively.

**TABLE 2-15**

**Projected Demands Through 2029**

<b>Year</b>	<b>Projected Service Area Population</b>	<b>Projected Average Day Production (gpd)</b>	<b>Projected Peak Day Production (gpd)</b>	<b>Projected Peak Hour Production (gpm)</b>	<b>Projected ERUs<sup>(1)</sup></b>
2009	7,947	926,917	2,041,431	2,341	3,776
2010	8,105	945,455	2,082,259	2,388	3,851
2011	8,268	964,364	2,123,904	2,435	3,928
2012	8,516	993,295	2,187,622	2,508	4,046
2013	8,771	1,023,094	2,253,250	2,584	4,167
2014	9,034	1,053,787	2,320,848	2,661	4,292
2015	9,305	1,085,400	2,390,473	2,741	4,421
Build-out <sup>(2)</sup>	12,371	1,442,967	3,177,973	3,644	5,878
2029	12,371	1,442,967	3,177,973	3,644	5,878

(1) ERU = 233 gallons per day per single-family residence based on 2003-2008 data. Projected ERUs based on average day production less 5 percent DSL.

(2) Build-out is projected to occur in 2025.