

## San Francisco Public Utilities Commission

### **Wholesale Customer Water Demand Projections Technical Report**

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**URS**



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Numbers	Wholesale Customer
C1	Alameda County Water District
C2	Brisbane, City of
C3	Burlingame, City of
C4	California Water Service Company, Bear Gulch District
C5	California Water Service Company, Mid Peninsula District
C6	California Water Service Company, South San Francisco District
C7	Coastside County Water District
C8	Daly City, City of
C9	East Palo Alto, City of
C10	Estero Municipal Improvement District/Foster City
C11	Guadalupe Valley Municipal Improvement District

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C12	Hayward, City of
C13	Hillsborough, Town of
C14	Los Trancos County Water District
C15	Menlo Park, City of
C16	Mid-Peninsula Water District
C17	Millbrae, City of
C18	Milpitas, City of
C19	Mountain View, City of
C20	North Coast County Water District
C21	Palo Alto, City of
C22	Purissima Hills Water District
C23	Redwood City, City of
C24	San Bruno, City of
C25	San Jose, City of (portion of north San Jose)
C26	Santa Clara, City of
C27	Skyline County Water District
C28	Stanford University
C29	Sunnyvale, City of
C30	Westborough Water District

Appendix D Summary of SFPUC Wholesale Customer Recycled Water Information

ABAG	Association of Bay Area Governments
AWWARF	American Water Works Association Research Foundation
BAWSCA	Bay Area Water Supply and Conservation Agency
BAWUA	Bay Area Water Users Association
CII	Commercial, Industrial, Institutional
CUWCC	California Urban Water Conservation Council
CWS	California Water Service (Company)
DSS	Demand Site Management Least-Cost Planning Decision Support System (model)
gpcd/gped	gallon(s) per capita/employee per day
gpd	gallon(s) per day
gpm	gallon(s) per minute
MGD	million gallons per day
MID	Municipal Improvement District
psi	pound(s) per square inch
SFPUC	San Francisco Public Utilities Commission
UWMP	Urban Water Management Plan
WMP	Water Master Plan

<b>Account</b>	Used by water suppliers to bill for water use measured by a water meter for retail customers; one account per meter.
<b>Average gal/day/acct</b>	The amount of water in gallons that is used per day per account and averaged over a period of time (year, month, etc.).
<b>Base year</b>	The starting year for the water demand analysis; the year used to establish initial conditions. The base year for this study is 2001.
<b>Census 2000</b>	Data provided by the United States Census Bureau. Census 2000 data (U.S. Census Bureau 2002) were used as a resource to obtain population, household sizes, dwelling units by building type, and age of structures for each individual city and unincorporated areas serviced by the water agencies (wholesale customers).
<b>Consumption by customer class</b>	Annual amount of water used and billed by each customer class or category (Single-Family Residential, Multi-Family Residential, Commercial, Industrial, etc.)
<b>Customer-billing category</b>	A designation used by water agencies to categorize groups of water users in a billing system. Common customer-billing categories include Single-Family Residential, Multi-Family Residential, Commercial, and Industrial.
<b>Customer class</b>	Customer-billing category specific to the types of retail customer (Single-Family Residential, Multi-Family Residential, Commercial, Industrial, etc.)
<b>DSS model</b>	Demand Side Management Least-Cost Planning Decision Support System (DSS) model; an end-use model used to develop water demand projections for this study. The end-use model approach uses growth in number of accounts and a complete breakdown of water uses by customer-billing category (“end uses”) to forecast water demands.
<b>End use</b>	The ultimate use of the water; can be a fixture, appliance, or other category of water use within an account.
<b>Fixture</b>	Any plumbing device in homes or businesses using water such as toilets, showers, or faucets.
<b>Indoor water use</b>	The amount of water used indoors in an account for uses such as toilets, laundry, showers, faucets, dishwashers, etc.
<b>Multi-Family Residential</b>	Residential customer class including more than one dwelling unit on a single meter, such as condominiums or apartment buildings.
<b>Outdoor water use</b>	The amount of water used outdoors in an account for uses such as irrigation and car washing.
<b>Per-capita use</b>	Water use per person.
<b>Recycled water</b>	Treated water available for nonpotable reuse.
<b>Single-Family Residential</b>	Residential customer class including single-family dwelling units.

<b>Unaccounted-For-water (UFW)</b>	The mathematical difference between amount of water produced in a system and water billed to customers (water consumed). This water is often referred to as “lost” water and includes water delivery system leaks and water not billed or tracked in the system (i.e., water used for flushing water system pipelines, fire fighting).
<b>Water consumed</b>	Water billed to retail customers in a wholesale customer service area.
<b>Water demand projections</b>	Estimates of water demands for the future based on applying a projection (or growth forecast) to an established base-year value.
<b>Water produced</b>	Water produced is the total of water consumed plus UFW. This includes water purchased from others (such as SFPUC), groundwater, or other sources.
<b>Water purchased</b>	Same as water produced for agencies with a single source of water, such as those who buy all their water from SFPUC.
<b>Wholesale customer</b>	Water agency purchasing water from SFPUC for distribution to retail customers in their service area.



### INTRODUCTION

In Fall 2002, the San Francisco Public Utilities Commission (SFPUC), in conjunction with its 28 wholesale customers, embarked on a comprehensive water demand projections study to assess 2030 water demand in the SFPUC's wholesale customers' service area. The Bay Area Water Supply and Conservation Agency (BAWSCA)<sup>1</sup> had an active role throughout this project in coordinating the efforts of the customers with the SFPUC and its consultant team to ensure overall project integrity. This report documents the methodology used in the study and the resulting 2030 water demand projections.

In addition to this study, the SFPUC conducted a water demand forecast study for the City and County of San Francisco's retail customer base. The SFPUC also investigated the potential for water conservation savings and recycled water potential in the wholesale and retail service areas in conjunction with the water demand forecasts. The results of these studies are documented in the following reports<sup>2</sup>:

- *SFPUC Wholesale Customer Water Conservation Potential* (URS 2004)
- *SFPUC Wholesale Customer Recycled Water Potential* (RMC 2004)
- *City and County of San Francisco Retail Water Demands and Conservation Potential* (SFPUC 2004)

### WATER DEMAND STUDY METHODOLOGY

To determine future demand, the SFPUC employed an "end-use" model, the Demand Side Management Least-Cost Planning Decision Support System (DSS) model (Maddaus 2003). The DSS model arrives at future water demand projections through two steps: (1) establishing base-year water demand at the end-use level and (2) forecasting future water demand based on future demands of existing water service accounts, future growth in the number of water service accounts, and future demands in the new accounts. Establishing the base-year water demand at the end-use level is accomplished by breaking down total water use by water service account to specific end uses such as toilets, faucets, and irrigation. Forecasting future water demand is accomplished by determining the growth in the number of water service accounts in a wholesale customer service area based on population and employment forecasts and applying end water use to those accounts. The DSS model also incorporates the effects of the plumbing code on plumbing fixtures such as toilets, showerheads, and washing machines. A DSS model was developed for each individual wholesale customer to forecast 2030 demand in each wholesale customer service area.

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<sup>1</sup> BAWSCA was created on May 27, 2003, to represent the interests of 26 cities and water districts, and two private utilities, in Alameda, Santa Clara, and San Mateo counties that purchase water on a wholesale basis from the San Francisco regional water system. BAWSCA is the only entity having the authority to directly represent the needs of the cities, water districts, and private utilities (wholesale customers) that depend on the regional water system (BAWSCA website).

<sup>2</sup> The SFPUC is currently updating its retail Recycled Water Master Plan, scheduled to be completed in 2005. This Plan Update will address recycled water potential within the SFPUC's retail customer service area. The *City and County of San Francisco Retail Water Demands and Conservation Potential* (SFPUC 2004) includes retail water conservation potential.

## 2030 WATER DEMAND PROJECTIONS

The DSS model forecasts for 2030 water demand are identified in Table ES-1 for each individual wholesale customer. The 2030 water demand projections represent total water demand for each wholesale customer and do not reflect the amount of water the wholesale customers may expect to purchase from the SFPUC in 2030. The SFPUC wholesale customer purchase estimates are documented in the *SFPUC Wholesale Customer Water Purchase Estimates* (SFPUC 2004) technical memorandum. In 2001-2002, the SFPUC wholesale customers collectively purchased two-thirds of their water supply needs from the SFPUC regional water system, approximately 170 million gallons per day (BAWUA 2002). Their remaining demands were met through a combination of local surface water, groundwater, recycled water, water conservation and other supply sources such as the State Water Project and supplies delivered from Santa Clara Valley Water District.

**Table ES-1  
Demand Projections by SFPUC Wholesale Customer**

Wholesale Customer	Base Year 2001 (MGD)	Demand Projections (MGD)						Demand Increase from 2001	
		2005	2010	2015	2020	2025	2030	MGD	Percent
Alameda County Water District	51.1	53.2	54.5	55.5	56.6	57.9	59.3	8.20	16%
Brisbane, City of	0.44	0.50	0.58	0.67	0.76	0.84	0.93	0.49	111%
Burlingame, City of	4.8	4.8	4.8	4.8	4.9	4.9	4.9	0.12	3%
CWS - Bear Gulch District	13.4	13.5	13.6	13.6	13.7	13.7	13.9	0.48	4%
CWS - Mid Peninsula District	17.2	17.5	17.7	17.7	17.8	18.0	18.1	0.94	5%
CWS - South San Francisco District	8.9	9.0	9.1	9.2	9.5	9.6	9.9	1.00	11%
Coastside County Water District	2.6	2.7	2.9	3.0	3.1	3.1	3.2	0.63	25%
Daly City, City of	8.7	8.7	9.3	9.3	9.2	9.2	9.1	0.44	5%
East Palo Alto, City of	2.5	2.6	2.8	3.5	4.3	4.6	4.8	2.30	92%
Esteros MID/Foster City	5.8	6.0	6.2	6.3	6.5	6.7	6.8	0.98	17%
Guadalupe Valley MID	0.32	0.39	0.47	0.56	0.64	0.72	0.81	0.49	153%
Hayward, City of	19.3	20.8	22.2	23.3	25.0	26.8	28.7	9.40	49%
Hillsborough, Town of	3.7	3.7	3.8	3.8	3.9	3.9	3.9	0.20	5%
Los Trancos County Water District	0.11	0.11	0.12	0.13	0.14	0.14	0.14	0.03	32%
Menlo Park, City of	4.1	4.1	4.3	4.4	4.5	4.6	4.7	0.61	15%
Mid-Peninsula Water District	3.7	3.7	3.6	3.7	3.7	3.7	3.8	0.15	4%
Millbrae, City of	3.1	3.3	3.3	3.3	3.3	3.3	3.3	0.17	5%
Milpitas, City of	12.0	13.0	14.2	15.3	16.1	16.9	17.7	5.74	48%
Mountain View, City of	13.3	13.4	13.8	14.1	14.4	14.6	14.8	1.53	12%
North Coast County Water District	3.6	3.7	3.7	3.7	3.7	3.7	3.8	0.17	5%
Palo Alto, City of	14.2	14.5	14.5	14.6	14.7	14.7	14.7	0.49	3%
Purissima Hills Water District	2.2	2.4	2.6	2.8	2.9	3.1	3.3	1.12	51%
Redwood City, City of	11.9	12.1	12.7	13.0	13.2	13.3	13.4	1.54	13%
San Bruno, City of	4.4	4.2	4.3	4.3	4.4	4.4	4.5	0.07	2%
San Jose, City of (portion of north San Jose)	5.2	5.4	5.7	6.0	6.1	6.3	6.5	1.31	25%
Santa Clara, City of	25.8	28.0	29.7	30.9	31.9	32.9	33.9	8.10	31%
Skyline County Water District	0.17	0.19	0.21	0.26	0.31	0.31	0.31	0.14	82%
Stanford University	3.9	4.3	4.7	5.1	5.7	6.2	6.8	2.94	76%
Sunnyvale, City of	24.8	25.0	25.3	25.6	25.9	26.3	26.8	1.99	8%
Westborough Water District	0.99	1.00	0.95	0.93	0.91	0.89	0.88	-0.11	-11%
<b>Total</b>	<b>272</b>	<b>282</b>	<b>292</b>	<b>299</b>	<b>308</b>	<b>315</b>	<b>324</b>	<b>52</b>	<b>19%</b>

CWS - California Water Service  
MGD - million gallons per day  
MID - Municipal Improvement District

Source: DSS models

**Section 1**  
**Introduction**

## 1.1 PURPOSE OF STUDY

This report documents the methodology and results of a comprehensive water demand study conducted under the direction of the San Francisco Public Utilities Commission (SFPUC) in conjunction with its 28 wholesale customers. The Bay Area Water Supply and Conservation Agency (BAWSCA)<sup>3</sup> had an active role throughout this project in coordinating the efforts of the wholesale customers with the SFPUC and its consultant team to ensure overall project integrity. The study uses an end-use demand model, called the Demand Side Management Least-Cost Planning Decision Support System (DSS) model (Maddaus 2003), to project total water demand out to 2030 for the SFPUC wholesale customer service area. A DSS model was prepared for each individual wholesale customer and the results provide a forecast of total water demand for each wholesale customer. The DSS model was also used to determine conservation potential in the individual wholesale customer service areas. The results of the conservation potential study are documented in the *SFPUC Wholesale Customer Water Conservation Potential* (URS 2004).

It is important to note that the results of this study provide **total** water demand for the SFPUC's wholesale customers and do not represent the amount of water estimated to be purchased by the wholesale customers in 2030. In 2001-2002, the SFPUC wholesale customers collectively purchased two-thirds of their total water supply from the SFPUC regional water system (BAWUA 2002)<sup>4</sup>. Their remaining demands were met through a combination of groundwater, recycled water, water conservation, and other sources of supplies such as the State Water Project and supplies delivered from Santa Clara Valley Water District. Following this demand study, the SFPUC requested the individual wholesale customers provide the SFPUC with 2030 purchase estimates to be used in planning studies. A technical memorandum, *SFPUC Wholesale Customer Water Purchase Estimates* (SFPUC 2004), presents these purchase estimates.

The SFPUC has prepared an additional study, *City and County of San Francisco Retail Water Demands and Conservation Potential* (SFPUC 2004), which documents the SFPUC's projected future water demand and conservation potential of its retail service area.

The retail and wholesale demand studies were prepared in an effort to comprehensively assess future demands on the SFPUC regional water system. The SFPUC is currently implementing a capital improvement program to improve the reliability of the SFPUC system and reduce its risk of failure. This program includes several projects to repair and replace existing transmission and storage facilities of the regional water system. These facilities are critical to supplying water to the SFPUC's retail and wholesale customer service area. Understanding the future demands on the regional water system is an important aspect of improving the system's reliability.

This demand study report is a companion document to other technical memoranda and reports documenting ranges for potential water conservation and recycled water in the wholesale and

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<sup>3</sup> BAWSCA was created on May 27, 2003, to represent the interests of 26 cities and water districts, and two private utilities, in Alameda, Santa Clara, and San Mateo counties that purchase water on a wholesale basis from the San Francisco regional water system. BAWSCA is the only entity having the authority to directly represent the needs of the cities, water districts, and private utilities (wholesale customers) that depend on the regional water system (BAWSCA website).

<sup>4</sup> 2001 was chosen for the base year for water demand forecasting because it shows less of an effect of economic recession and was a relatively "normal" water year. Section 3.2 of this report discusses the selection of the base year in more detail.

retail service areas, and documenting future SFPUC purchase estimates<sup>5</sup>:

- *SFPUC Wholesale Customer Water Conservation Potential* (URS 2004)
- *SFPUC Wholesale Customer Recycled Water Potential* (RMC 2004)
- *SFPUC Wholesale Customer Water Purchase Estimates* (SFPUC 2004)

The above documents were also prepared in conjunction with SFPUC’s wholesale customers and with coordination from BAWSCA.

**1.2 OVERVIEW OF SFPUC AND WHOLESALE CUSTOMERS**

The SFPUC is a department of the City and County of San Francisco (City) that provides water, wastewater services, and municipal power to the City. Under a contractual agreement, 28 wholesale water agencies (wholesale customers) in Alameda, San Mateo, and Santa Clara counties purchase water supplies from the SFPUC. The 28 wholesale customers comprise BAWSCA. Table 1-1 provides a list of the 28 wholesale customers that purchase water from San Francisco. About 32 percent of the SFPUC’s water supply is served to retail customers in the City; the remaining 68 percent is served to wholesale customers and large retail customers outside the City.<sup>6</sup> In all, nearly 2.4 million people rely entirely or in part on water supplied by the SFPUC system to meet their daily water demands.

**Table 1-1  
SFPUC Wholesale Customers**

<b>Alameda County</b>	
Alameda County Water District	City of Hayward
<b>San Mateo County</b>	
City of Brisbane	Town of Hillsborough
City of Burlingame	Los Trancos County Water District
CWS - Bear Gulch District	City of Menlo Park
CWS - Mid Peninsula District	Mid-Peninsula Water District
CWS - South San Francisco District	City of Millbrae
Coastside County Water District	North Coast County Water District
City of Daly City	City of Redwood City
City of East Palo Alto	City of San Bruno
Estero MID/Foster City	Skyline County Water District
Guadalupe Valley MID	Westborough Water District
<b>Santa Clara County</b>	
City of Milpitas	City of San Jose (portion of north San Jose)
City of Mountain View	City of Santa Clara
City of Palo Alto	Stanford University
Purissima Hills Water District	City of Sunnyvale

CWS - California Water Service  
MID – Municipal Improvement District

Source: SFPUC

<sup>5</sup> The SFPUC is currently updating its retail Recycled Water Master Plan, scheduled to be completed in 2005. This Plan Update will address recycled water potential within the SFPUC’s retail customer service area. Water conservation potential in the SFPUC retail service area is included in the *City and County of San Francisco Retail Water Demands and Conservation Potential* (SFPUC 2004).

<sup>6</sup> The larger retail customers receive water from direct connections to SFPUC’s regional transmission mains and are the end users of the water located outside the City’s geographical boundaries, such as the San Francisco County Jail, San Francisco International Airport, and Lawrence Livermore Laboratories.

The 2001-2002 BAWUA Annual Survey reported that the SFPUC wholesale customers collectively purchased approximately 170 million gallons per day (MGD) from the SFPUC (BAWUA 2002). As previously mentioned, their remaining demands were met through other supply sources. Table 1-2 provides a percentage breakdown of supplies used by wholesale customers to meet demands in their service areas in 2001-2002. Demands met through water conservation are not portrayed in the table because they were not quantified in the BAWUA Annual Survey (BAWUA 2002).

**Table 1-2  
SFPUC Wholesale Customer Source of Supply (2001–2002)<sup>1</sup>**

Wholesale Customer	SFPUC Supply	Ground-water Supply	Local Surface Water Supply	Other Sources of Supply <sup>2</sup>	Recycled Water Supply
<b>Alameda County</b>					
Alameda County Water District	24.3%	32.9%	4.4%	38.3%	
City of Hayward	100.0%				
<b>San Mateo County</b>					
City of Brisbane	100.0%				
City of Burlingame	100.0%				
CWS - Bear Gulch District	90.6%		9.4%		
CWS - Mid Peninsula District	100.0%				
CWS - South San Francisco District	88.9%	11.1%			
Coastside County Water District	70.3%	11.0%	18.7%		
City of Daly City	63.6%	36.4%			
City of East Palo Alto	100.0%				
Estero MID/Foster City	100.0%				
Guadalupe Valley MID	100.0%				
Town of Hillsborough	100.0%				
Los Trancos County Water District	100.0%				
City of Menlo Park	96.0%			4.0%	
Mid-Peninsula Water District	100.0%				
City of Millbrae	100.0%				
North Coast County Water District	100.0%				
City of Redwood City	100.0%				0.1%
City of San Bruno	64.4%	35.6%			
Skyline County Water District	100.0%				
Westborough Water District	100.0%				
<b>Santa Clara County</b>					
City of Milpitas	59.3%			35.0%	5.7%
City of Mountain View	89.4%	1.3%		9.2%	
City of Palo Alto	99.4%				0.6%
Purissima Hills Water District	100.0%				
City of San Jose (portion of north San Jose)	96.0%				4.0%
City of Santa Clara	16.2%	61.6%		15.8%	6.4%
Stanford University	68.0%	13.6%	18.5%		
City of Sunnyvale	43.6%	4.9%		46.7%	5.0%

<sup>1</sup>Due to rounding, total supply may not add to exactly 100%

Source: BAWUA Annual Survey (BAWUA 2002)

<sup>2</sup>Other sources include the State Water Project and supplies delivered from Santa Clara Valley Water District

CWS - California Water Service (Company)

MID - Municipal Improvement District

### **1.3 GENERAL CHARACTERISTICS OF THE WHOLESALE CUSTOMER SERVICE AREA**

Figure 1-1 illustrates the location of the 28 wholesale customers. In general, the wholesale customers are located throughout the Bay Area's different microclimates with some serving cool coastal areas and others in the warmer inland areas. The wholesale customer service areas vary dramatically in size and character. For example, Los Trancos County Water District encompasses 4.5 square miles and serves approximately 270 residential accounts, while Alameda County Water District encompasses approximately 103 square miles serving 77,000 residential, commercial, industrial, and institutional accounts. Appendix A provides a brief description of each wholesale customer that purchases water from the SFPUC and participated in this study. The following sections of this report provide more detailed information on their water use.

### **1.4 FORMAT OF THIS REPORT**

This report consists of the following four main sections:

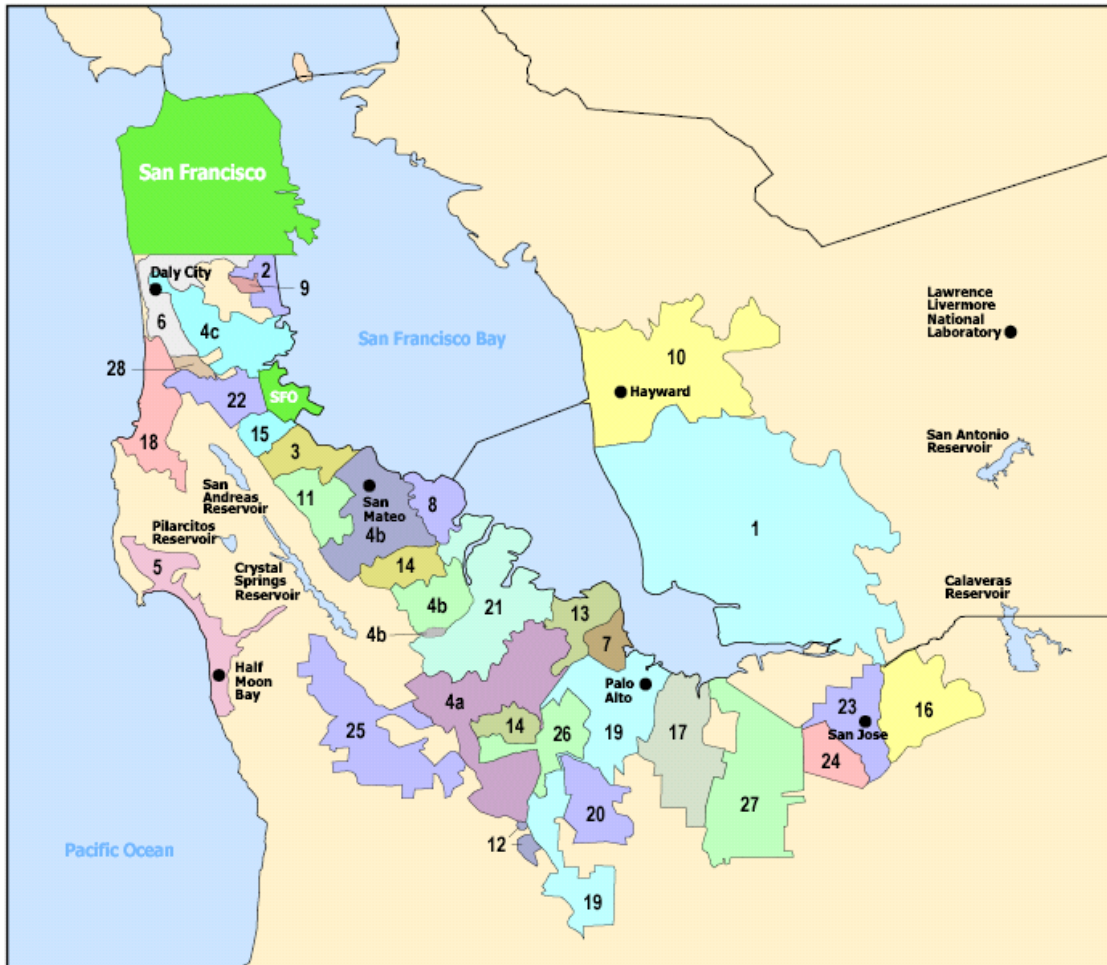
- Approach to Developing Water Demand Projections
- Establishing Base-Year Conditions
- Water Demand Forecasting
- Water Demand Projections

The first section, **Approach to Developing Water Demand Projections**, provides a description of the DSS model used to develop the water demand forecasts. The section introduces the model, its general characteristics, and how it works. The section defines the two primary steps to developing water demand projections (1) establishing base-year conditions and (2) developing water demand forecasts from those base-year conditions.

The second section, **Establishing Base-Year Conditions**, describes the process for establishing base-year conditions for each individual wholesale customer. This section also provides detailed information on the existing water demands for each wholesale customer.

The third section, **Water Demand Forecasting**, explains how the water demand forecasts were developed from the base-year conditions using the DSS model.

The last section, **Water Demand Projections**, provides the actual water demand projections for the SFPUC wholesale customer service area out to the year 2030. The results provided in this section reflect the total demand of each wholesale customer out to 2030, not the amount of water estimated to be purchased from the SFPUC in 2030. The amount of water estimated to be purchased from the SFPUC in 2030 is documented in a technical memorandum, *SFPUC Wholesale Customer Water Purchase Estimates* (SFPUC 2004). This section also describes the wholesale customer concurrence process associated with the DSS water demand projections.



#	SFPUC Wholesale Customer
1	Alameda County Water District
2	Brisbane, City of
3	Burlingame, City of
4a	CWS – Bear Gulch District
4b	CWS – Mid Peninsula District
4c	CWS – South San Francisco District
5	Coastside County Water District
6	Daly City, City of
7	East Palo Alto, City of
8	Estero MID/Foster City
9	Guadalupe Valley MID
10	Hayward, City of
11	Hillsborough, Town of
12	Los Trancos County Water District
13	Menlo Park, City of
14	Mid-Peninsula Water District
15	Millbrae, City of
16	Milpitas, City of
17	Mountain View, City of
18	North Coast County Water District
19	Palo Alto, City of
20	Purissima Hills Water District
21	Redwood City, City of
22	San Bruno, City of
23	San Jose, City of (portion of north San Jose)
24	Santa Clara, City of
25	Skyline County Water District
26	Stanford University
27	Sunnyvale, City of
28	Westborough Water District

**Figure 1-1 SFPUC Wholesale Customer Service Area**

*Map courtesy of BAWSCA website*

CWS - California Water Service (Company)  
MID - Municipal Improvement District



**Section 2**  
**Approach to Developing Water Demand Projections**

## 2.1 INTRODUCTION

Several approaches for forecasting water demands were considered. The most common type is a “per-capita” model that assumes future growth in water demand is equal to growth in population served. A constant per-capita demand (expressed in gallons per person per day) is normally used to make this type of forecast. A second type is a “land use” model that assumes growth in water demand is equal to the increase in developed acres. The forecast is based on the water use expressed as gallons per acre per day. The DSS model approach is different from these approaches because it uses growth in number of accounts and a complete breakdown of water uses by account type (“end uses”) to forecast water demands. It is an “end-use” model. The DSS model is similar to other end-use models such as IWR-Main, developed by California Department of Water Resources, and the end-use model the SFPUC has used for over a decade to forecast water demand in its retail service area. The end-use model was selected for this SFPUC study because it allows a more accurate representation of changing conditions such as the future impact of plumbing and appliance codes on demand and additional planned conservation. Using an end-use model allows more consideration of the effects of targeted conservation measures than is possible with a per-capita or land use demand model. An end-use model also prevents double counting of savings from multiple conservation measures run at the same time and targeted at the same end use, such as residential landscape irrigation. Because the SFPUC was interested in incorporating the effects of existing plumbing codes and current water conservation efforts being implemented in the wholesale service area, the DSS model was considered the most appropriate tool for developing water demand projections in the wholesale service area.<sup>7</sup>

Thirty-year total water demand projections were developed for each wholesale customer<sup>8</sup> using the DSS model. The following sections describe the DSS model, how it was customized for the SFPUC study, and the basic modeling process for a typical SFPUC wholesale customer.

## 2.2 GENERAL DESCRIPTION OF DSS MODEL

The DSS model is an end-use model for which water usage is broken down from the total water production (water demand in the service area) to specific water end uses such as toilets, faucets, or irrigation. For example, an end-use model will break down the water use in an individual home by each water using fixture in the home, incorporate how much water is being used by each fixture, and how many times the fixture is being used per day in the home. The end-use approach allows for detailed criteria to be considered when estimating future demands, such as the effects of natural fixture replacement, plumbing codes, and conservation efforts. While this approach sounds difficult, the reality is that an end-use model relies on the basic fact that all of the water use can be accounted for: it either flows through an indoor fixture (toilet, sink, shower, etc.) or it is used outdoors (irrigation, etc.).

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<sup>7</sup> The SFPUC retail service area water demand model is also an end-use model that incorporates the effects of current conservation efforts and the impact of plumbing codes on water demand.

<sup>8</sup> For modeling purposes, this study refers to 30 SFPUC Wholesale Customers; one customer, California Water Service Company, was evaluated as three districts. One additional SFPUC wholesale customer, Cordilleras Mutual Water Users Association, did not participate in this study because they are a finite group (18 single-family homes) with minimal usage (4600 gpd).

To forecast water demands using the DSS model, customer-billing data are obtained from the water agency (wholesale customer) being modeled. These data are organized into customer-billing categories and individual accounts. The billing data are reconciled with available demographic data to characterize the water usage for each customer-billing category in terms of number of users per account.

The customer-billing data are further analyzed to approximate the split of indoor and outdoor water usage in each customer-billing category. The indoor/outdoor water usage is further divided into typical end uses for each customer-billing category. Published data on average per-capita water uses and average per-capita end uses are combined with the number of water users to calibrate the volume of water allocated to specific end uses in each customer-billing category.

Once this calibration is complete, a growth rate for each customer-billing category based on population or employment growth is used to forecast the expected increase in water accounts and water usage for that customer-billing category. Concurrently, high-efficiency fixture replacement parameters are used to adjust the end-use water usage per account type and refine the yearly water demand projections. The resulting projections by customer-billing category are summed to develop total water demand projections. A more detailed discussion of each of these steps is presented in the following sections.

### **2.3 KEY INPUTS & OUTPUTS IN THE MODELING PROCESS**

In general, two steps are involved in the DSS modeling process to arrive at water demand projections: establishing base-year conditions and forecasting future water demand. Figure 2-1 presents the two steps, differentiated by the dashed line, as a detailed schematic of the key inputs and outputs. Above the dashed line, the figure illustrates the process for establishing the base-year conditions and calibrating the model to a particular wholesale customer service area for the selected base year. Below the dashed line, the figure illustrates the process for forecasting future water demands, including the impacts of fixture replacement<sup>9</sup> due to plumbing codes and standards already in place. Each of the items in the schematic is introduced briefly below. Sections 3 and 4 of this report provide further explanations of how each of these are used in the model and their importance to the overall process.

The SFPUC worked closely with the wholesale customers to accurately establish base-year conditions and forecast future water demands.

#### **STEP 1 – ESTABLISHING BASE-YEAR CONDITIONS**

- **Customer-Billing Data** – Customer-billing data indicate how much water is sold to retail users in each wholesale customer service area. Customer-billing data are provided by customer-billing category by the wholesale customers; typical categories are shown in Figure 2-1.

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<sup>9</sup> Fixture replacement refers to replacing high volume water-using fixtures such as toilets and showerheads with lower volume water-using fixtures.

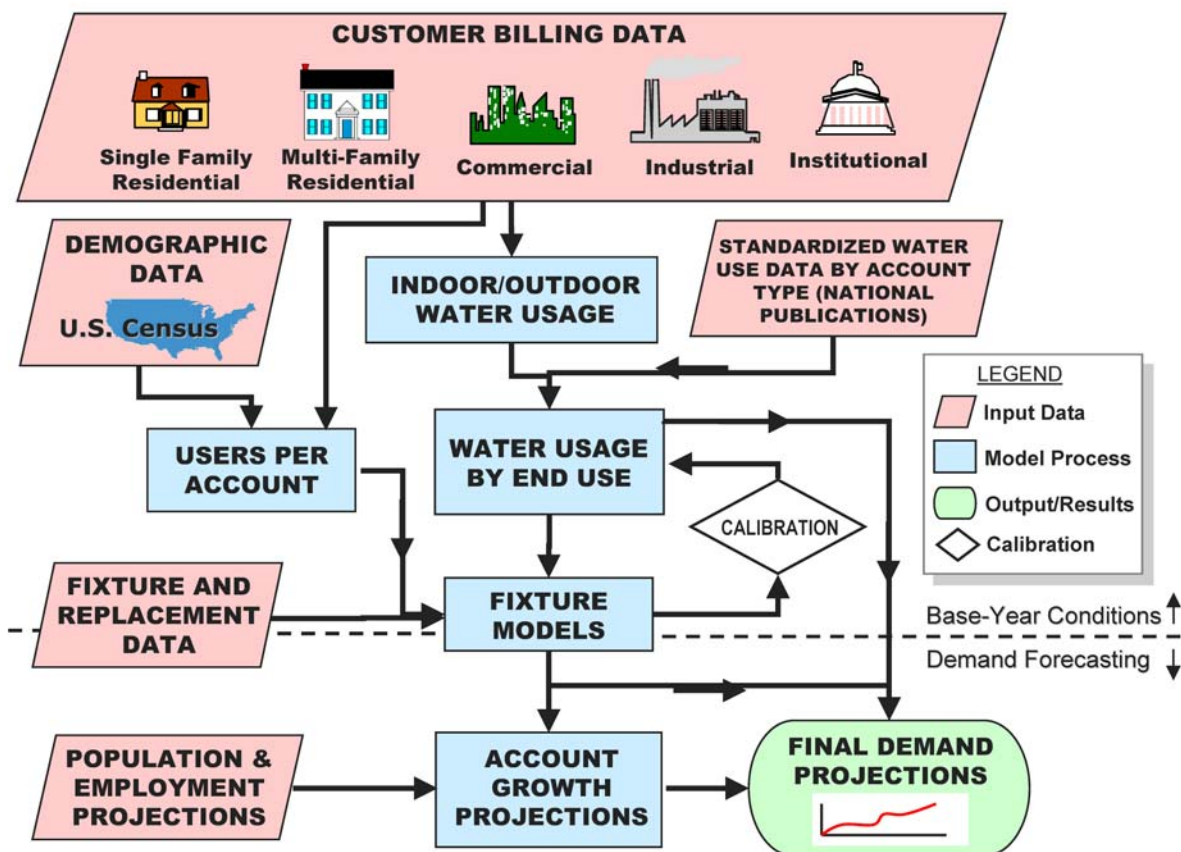


Figure 2-1 Schematic of DSS Model as Applied to SFPUC Wholesale Customers

- Demographic Data** – Published demographic data, such as housing, employment, and population estimates, provide information on wholesale customer service area population, jobs, and number of dwelling units by housing type (single-family or multifamily). Sources for this data include Association of Bay Area Governments (ABAG) Projections 2002 (ABAG 2002) and Census 2000 (U.S. Census Bureau 2002).
- Standardized Water Use Data by Account Type** – Nationally published information provides a reference for establishing normal ranges for customer-billing categories and end uses. The principal sources used for this study include publications on residential and commercial end uses from the American Water Works Association Research Foundation (AWWARF).
- Fixture and Replacement Data** – Data on water-using fixtures and replacement rates provide information on the type of fixtures being used in homes and businesses throughout the wholesale customer service area. Sources of fixture replacement data include Census 2000 (U.S. Census Bureau 2002), AWWARF, Alameda County Water District, California Urban Water Conservation Council (CUWCC), and East Bay Municipal Utility District.
- Indoor/Outdoor Use** – Water use is separated by indoor and outdoor use in the model. This is important for identifying how much water is used inside and outside the home, particularly because of the seasonality of outdoor use. This is accomplished by analyzing customer-billing data provided by wholesale customers.

- **Users Per Account** – Existing population and employment data are used to establish the typical number of people using water under each account type for the base year. The sources for this information include ABAG, California Department of Finance, and Census 2000 (U.S. Census Bureau 2002).
- **Water Usage By End Use** – The DSS model breaks water usage into end uses. Examples of typical end uses are water used in a single-family home to flush toilets or irrigate the garden. Recent studies, such as AWWARF’s Residential End Uses of Water (Mayer et al. 1999), provide detailed end-use data.
- **Fixture Models** –Fixture models are used in the DSS model for modeling the base-year water-using fixture conditions (number of high-volume and lower-volume fixtures) and to forecast fixture improvements and replacements over time. The fixture models forecast water usage using a yearly fixture estimate which averages the fixture conditions in the existing base-year accounts and the new accounts. As fixture improvements and replacements are made each year, the estimate changes accordingly. The source for information used to build fixture models include Bay Area studies and AWWARF as listed above under fixture and replacement data.

### ***CALIBRATION OF WATER USE DATA***

As indicated in Figure 2-1, a water use data calibration process occurs during the development of base-year conditions. The calibration step verifies that the service area population is as close to the actual number of people living in the service area as possible and the per-capita and per-employee water uses are truly representative of the service area. The calibration process also makes adjustments to end uses and fixture models to account for all indoor water use and is further described in Section 3.4 of this report. This calibration is done for every customer-billing category, where applicable. Once the model is calibrated it is ready for forecasting.

### ***STEP 2 – WATER DEMAND FORECASTING***

- **Population and Employment Forecasts** –Population and employment forecasts are developed to establish future account growth (growth in the number of accounts) in the DSS model. Details on published forecast information and how it was used in the DSS model are given in Section 4.2 of this report.
- **Account Growth Projections** – In addition to forecasting future water use and accounts, the DSS model uses projected growth in the number of accounts to estimate future water demands. Section 4.2 of this report discusses how growth in number of accounts is ascertained.
- **Final Demand Projections** – Water demand projections are the result of applying the two DSS model steps: establishing base-year conditions and water demand forecasting. Final demand projections are provided for the base year 2001, and in 5-year increments from 2005 to 2030 in MGD.

**Section 3**  
**Establishing Base – Year Conditions**

### **3.1 INTRODUCTION**

This section describes the development of base-year conditions for the typical SFPUC wholesale customer in the DSS Model as depicted in the portion of Figure 2-1 above the dashed line. The section explains how available demographic data, customer-billing data, and water use studies were used to establish base-year conditions for the DSS model and characterize the water use for each wholesale customer service area; and how these data were reconciled to estimate the average number of users per account.

Appendix B includes a summary of customer-specific adjustments made in establishing base-year conditions and demand forecasting.

### **3.2 SELECTION OF BASE YEAR**

The base year for this study is 2001. The base year serves as the starting year for the water demand analysis and is used to establish initial conditions of water usage. The year 2001 was selected over 2002 and 2003 for this study for three reasons:

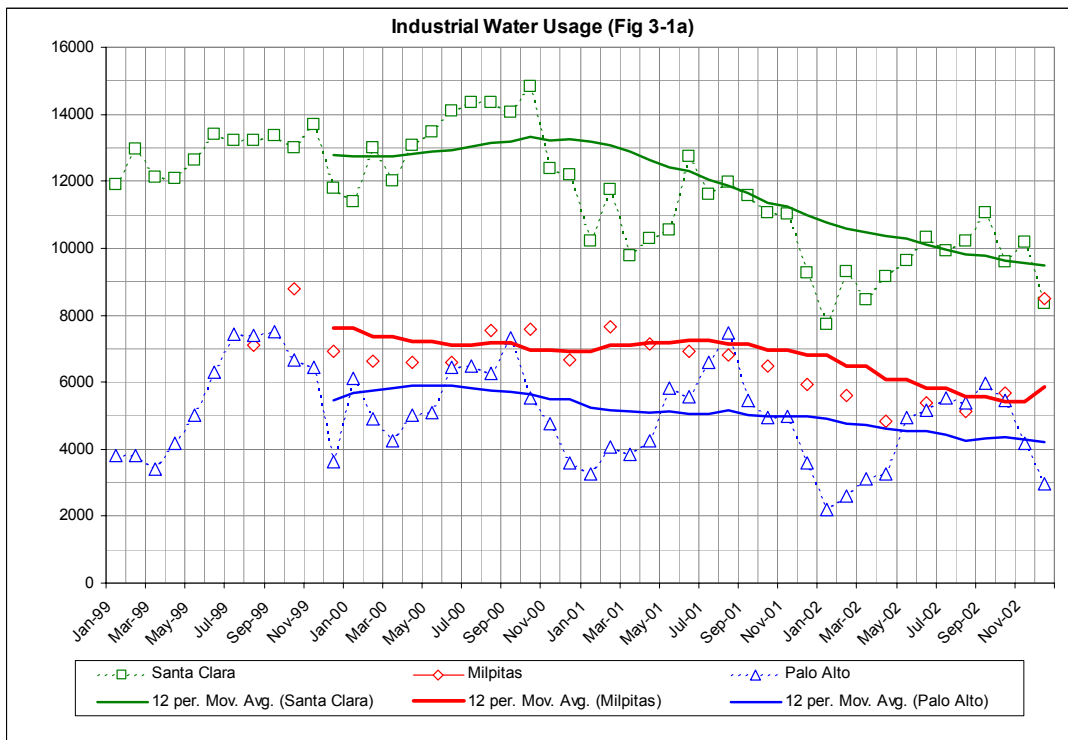
- 2001 shows less of an effect of the economic recession. The year 2002 shows a dip in water demand in many areas due to reduction in economic activity. This kind of reduction is cyclical and demand generally rebounds in better economic times.
- 2001 had relatively “normal” climatic conditions (i.e., it was neither a drought nor an excessively wet year).
- Records for 2003 were incomplete at the time of the analysis, which was started in mid-2003.

Figures 3-1a, 3-1b, and 3-1c show the water consumption for several SFPUC wholesale customers from 1999 to 2002 that demonstrates the general trend of a dip in the year 2002. Industrial, commercial, and multi-family water use was affected by the recession, particularly in Silicon Valley. This dip was most likely due to a loss of jobs, exporting manufacturing overseas, and reduced business, followed by the loss of workers who lived in apartments and moved out of the area leaving abnormally high vacancy rates. Customer-billing data from 1999 to 2002 indicate that single-family water use was not affected by the recession.

The bold lines in Figures 3-1a, 3-1b and 3-1c indicate a 12-month moving average of the water use for each wholesale customer graphed. Looking at the 12-month moving average, Figure 3-1a shows that industrial use in Milpitas, Palo Alto, and Santa Clara started to decline in 2000, with accelerated decline in 2001, and continued to decline through 2002. Reviewing the 12-month moving average for commercial use in Milpitas and Palo Alto Figure 3-1b shows a nearly 10 percent decline in 2002 relative to 2001. Figure 3-1c shows similar declines in multi-family water use during this period in Hayward and Milpitas.

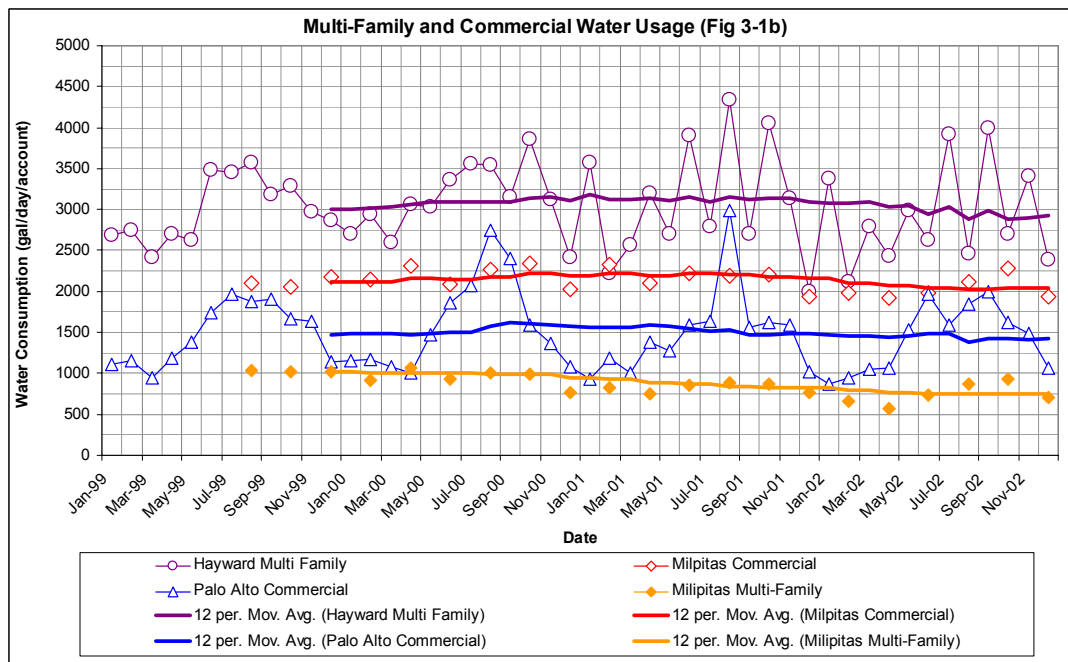
### **3.3 WATER USE DATA**

As discussed in the modeling approach, the DSS models were set up and calibrated using a method that combines billing data, demographic data, and water use studies to establish the base-year model conditions for each wholesale customer service area. This section describes the steps to get from total water production to end uses.



**Figure 3-1a** Water Consumption of Selected SFPUC Wholesale Customers in Years Prior to Base Year (Industrial Accounts)

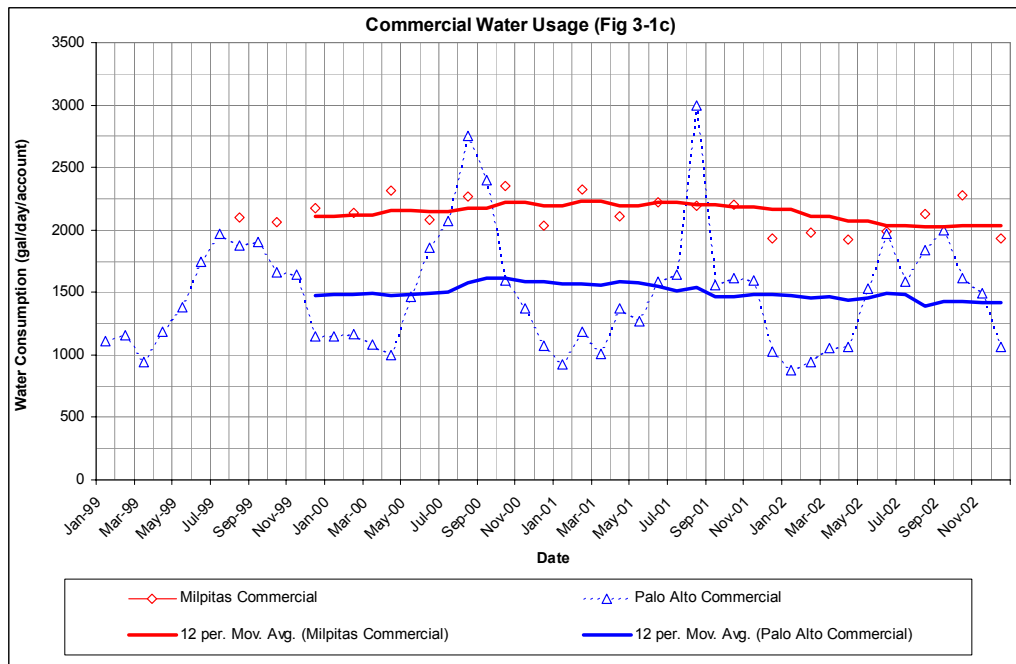
Source: Wholesale Customer Billing Data



**Figure 3-1b** Water Consumption of Selected SFPUC Wholesale Customers in Years Prior to Base Year (Multi-Family Accounts)

Source: Wholesale Customer Billing Data





Source: Wholesale Customer Billing Data

**Figure 3-1c Water Consumption of Selected SFPUC Wholesale Customers in Years Prior to Base Year (Commercial Accounts)**

**3.3.1 Determining Total Water Production**

Total water production is the total water consumed plus unaccounted-for-water (UFW) as defined in the following subsections. Total water production can include water purchased from the SFPUC, purchased from another agency and produced by some other means for use by the wholesale customer (i.e., groundwater obtained from local wells). Each wholesale customer has a different mix of supplies to meet customer demand (see Table 1-2). Recycled water use was included in total water production values where information was available from the wholesale customer. Section 4.4 discusses how recycled water was incorporated into this study.

**Total Water Consumption**

Total water consumption is the total amount of water billed to retail customers in a wholesale customer service area. To determine the total water consumption, data from 2001 billing records were compiled for each of the wholesale customers. These billing records were for potable water only; recycled water was considered separately as discussed in Section 4.4 of this report. Each wholesale customer provided customer-billing categories that were specific to their service area. Most of the categories were similar among all agencies and included:

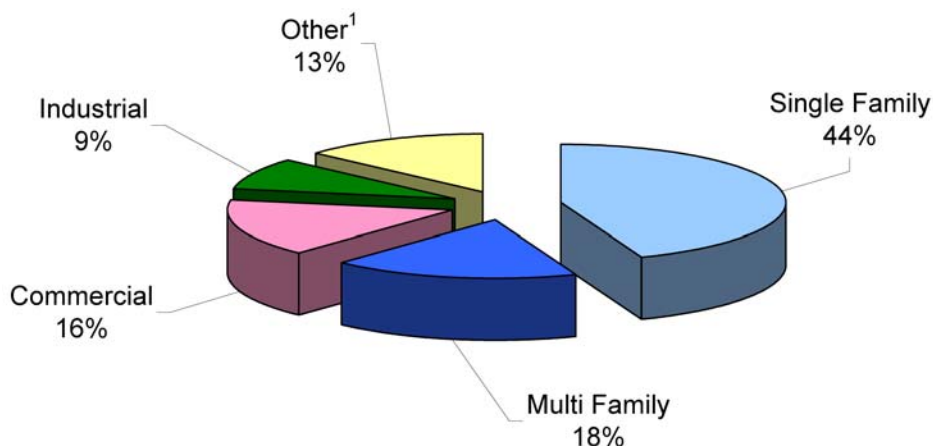
- Single-Family Residential
- Multi-Family Residential
- Commercial or Business
- Industrial
- Institutional
- Irrigation



The first two categories typically comprise most residential water use, while the latter four categories typically comprise most non-residential water use.<sup>10</sup>

The total water consumed was calculated by summing the total water billed by customer-billing category for each wholesale customer.

Figure 3-2 shows the 2001 average water use of SFPUC wholesale customers by typical customer-billing category.



*Source: Wholesale Customer Billing Records*

<sup>1</sup>“Other” category includes miscellaneous uses, institutional uses, municipal uses, irrigation/landscape use where these water uses are separately metered.

**Figure 3-2 Breakdown of SFPUC Wholesale Customer Water Consumption by Customer Category (2001 Base Year)**

### ***Unaccounted-for-Water***

Unaccounted-for-water (UFW) is defined as the mathematical difference between the amount of water produced in a system and the water billed to customers (i.e., water actually consumed). This water is often referred to as “lost” water and includes water delivery system leaks and water not billed or tracked in the system (i.e., water used for flushing water system pipelines, fire fighting). It is necessary to estimate UFW to achieve an accurate account of the total water produced for each wholesale customer and how much is consumed by the various accounts served by the wholesale customer.

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<sup>10</sup> In some cases a wholesale customer had customer-billing categories unique to their service area. For these circumstances, inquiries were made to determine typical uses of water billed to these unique categories so that those accounts could be categorized in one of the typical categories shown above. Appendix B contains information specific to each wholesale customer on particular assumptions or modifications made unique to their model.

For this study, the 5-year average UFW was calculated for each wholesale customer. The two published sources of UFW estimates available are wholesale customer Urban Water Management Plans (UWMPs) and the BAWUA Annual Survey (BAWUA 2002).

UWMPs are required by the State of California Urban Water Management Planning Act. The Act requires water agencies serving more than 3,000 accounts to prepare and adopt an UWMP

**STANDARDIZED WATER  
USE DATA BY ACCOUNT  
TYPE (NATIONAL  
PUBLICATIONS)**

every five years. UWMPs provide information on existing and future water demand and supplies. The BAWUA Annual Survey is a report prepared by the Bay Area Water Users Association (now BAWSCA) that documents the results of an annual survey of its members regarding current and future demand and other key agency-wide information.

Information reported in the BAWUA Annual Survey is not independently verified by BAWUA. The information is reported as received from customer water use surveys and summarized in the BAWUA Annual Survey Report.

Estimates for UFW reported in UWMPs varied between 1 percent and 11 percent. However, UFW estimates were omitted from many plans and provided as ranges in others. More complete data were provided in the BAWUA Annual Survey (BAWUA 2002). The average UFW reported by wholesale customers in the BAWUA Annual Survey was 5.5 percent and the median was 5.7 percent.

These UFW estimates are low by national standards. An American Water Works Association report (AWWA 1996) concluded that the average UFW for systems in the United States is close to 15 percent. A 1982 study of state water agencies for the California Department of Water Resources estimated the average UFW in California to be 9.3 percent (DWR 1982).

It is reasonable to assume that UFW will increase as pipes and other infrastructure components age. The American Water Works Association has in the past stated that a well-run water system should be able to maintain UFW below 10 percent. A minimum value for UFW of 7 percent was used in this study as a conservative estimate for future demands. This value allows water losses to increase a small amount (less than 2 percent), which is appropriate for an aging system that will be 30 years older at the end of the study period. For each wholesale customer the 5-year average UFW reported in the BAWUA Annual Survey was compared with the 7 percent minimum (BAWUA 2002). If the 5-year average was greater than 7 percent, then that value was used. Otherwise 7 percent was assumed.

The assumed percentage of UFW was added to the total water consumed, obtained from billing data, to obtain the total water produced. Table 3-1 lists the total water consumed, the assumed UFW, and the resulting total water production for each wholesale customer. Figure 3-3 illustrates the breakdown of the total water produced for each wholesale customer into residential water consumed, non-residential water consumed and UFW.

**Table 3-1  
SFPUC Wholesale Customer Water Production (2001 Base Year)**

Wholesale Customer	2001 Water Consumed (MGD)	2001 UFW		2001 Total Water Produced (MGD)
		% of Water Consumed	MGD	
Alameda County Water District	47.4	7.8%	3.70	51.1
Brisbane, City of	0.41	7.0%	0.03	0.44
Burlingame, City of	4.5	7.0%	0.31	4.8
CWS - Bear Gulch District	12.5	7.0%	0.88	13.4
CWS - Mid Peninsula District	16.0	7.0%	1.12	17.2
CWS - South San Francisco District	8.3	7.0%	0.58	8.9
Coastside County Water District	2.4	7.0%	0.17	2.6
Daly City, City of	8.1	7.0%	0.57	8.7
East Palo Alto, City of	2.3	7.0%	0.16	2.5
Estero MID/Foster City	5.4	7.0%	0.38	5.8
Guadalupe Valley MID	0.30	7.0%	0.02	0.32
Hayward, City of	17.7	9.0% <sup>1</sup>	1.59	19.3
Hillsborough, Town of	3.5	7.0%	0.24	3.7
Los Trancos County Water District	0.10	7.0%	0.01	0.11
Menlo Park, City of	3.8	7.0%	0.27	4.1
Mid-Peninsula Water District	3.4	7.0%	0.24	3.7
Millbrae, City of	2.9	7.0%	0.20	3.1
Milpitas, City of	11.2	7.0%	0.78	12.0
Mountain View, City of	12.4	7.0%	0.87	13.3
North Coast County Water District	3.4	7.0%	0.24	3.6
Palo Alto, City of	13.3	7.0%	0.93	14.2
Purissima Hills Water District	2.0	7.0%	0.14	2.2
Redwood City, City of	11.1	7.0%	0.78	11.9
San Bruno, City of	3.9	14.0% <sup>2</sup>	0.54	4.4
San Jose, City of (portion of north San Jose)	4.9	7.0%	0.34	5.2
Santa Clara, City of	24.1	7.0%	1.69	25.8
Skyline County Water District	0.16	8.0%	0.01	0.17
Stanford University	3.6	7.0%	0.25	3.9
Sunnyvale, City of	22.9	8.3%	1.90	24.8
Westborough Water District	0.93	7.0%	0.07	0.99
<b>Total</b>	<b>253</b>	<b>7.5%</b>	<b>19</b>	<b>272.0</b>

Source: DSS Input Sheets

<sup>1</sup> The 5-year average for UFW in the Hayward water system was 7.2 percent. A 9% UFW is used in this study because UFW includes water used for hydrant flushing and other maintenance purposes. Many agencies categorize these uses as “other”, however, Hayward does not and because these types of uses are difficult to anticipate, Hayward has adjusted its UFW to 9% consistent with their 2001 UWMP.

<sup>2</sup> The City of San Bruno’s historical UFW reflects a number of unmetered connections that have since been discovered and a system that requires repairs. Over the past few years, the City of San Bruno has been aggressive in discovering and acting upon unmetered connections and has put into place a capital program to address water lost through leaks. Since FY00-01, the City of San Bruno’s UFW has declined. Water demand projections developed in this study reflect the trend in decreasing UFW over time.

Amounts above have been rounded.

CWS - California Water Service (Company)

MID - Municipal Improvement District

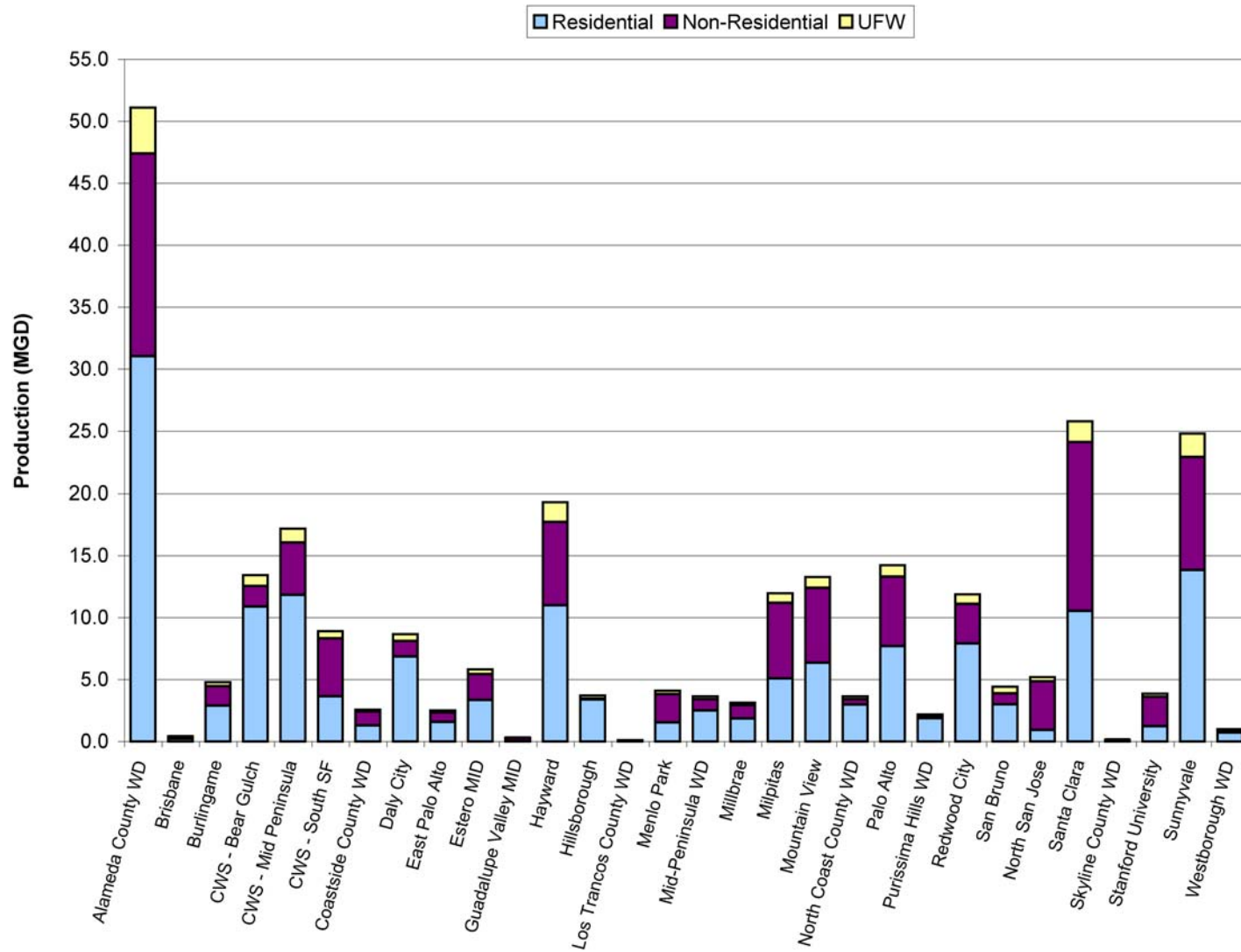


Figure 3-3 Breakdown of SFPUC Wholesale Customer Water Production (2001 Base Year)

Source: DSS Input Sheets

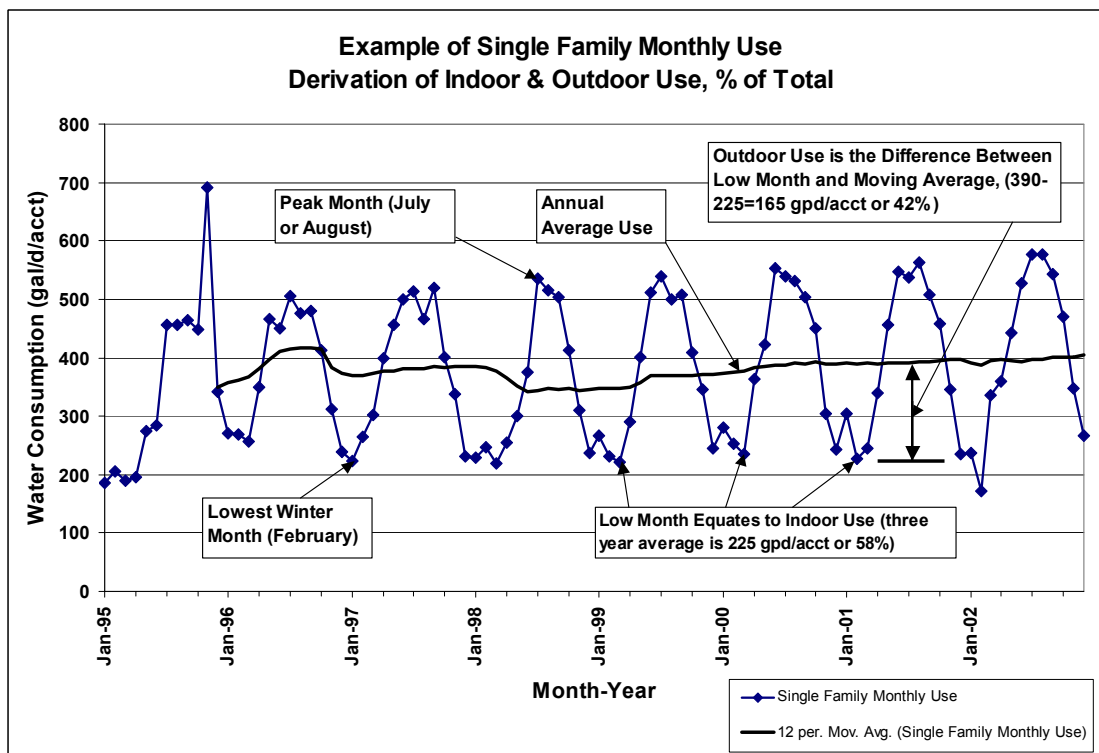
**3.3.2 Separation of Indoor and Outdoor Use**

**INDOOR/OUTDOOR WATER USAGE**

It is necessary to separate indoor and outdoor water usage for each wholesale customer service area to derive both indoor and outdoor uses.

This step separates the water that is used inside buildings (for toilet flushing, bathing, etc.), from that used outdoors or seasonally for irrigation, cooling, etc. The assumption is that the low period in the winter reflects indoor use and all use above this level is outdoor or seasonal use. Separating indoor and outdoor use is also important for identifying end uses of water that may be impacted by plumbing codes and water conservation programs.

To accomplish this, monthly billing data for each customer-billing category, expressed as the average volume of water billed per account per day in that month, were plotted for each individual wholesale customer to examine the temporal variation. On the same plot a trend line was added that represents the 12-month moving average of the water usage for that customer-billing category. Figure 3-4 illustrates how this is performed through an example plot of single-family use.



**Figure 3-4 Example of Billing Data Used to Separate Indoor and Outdoor Use as a Percentage of Total Water Use**

Several years of billing data were plotted to verify that the 2001 base year was representative of typical water usage for that customer-billing category. As shown in Figure 3-4 the monthly water usage per account is typically seasonal with the lowest usage occurring during the wet season when outdoor water use is minimal. For this study, the lowest monthly water use for each customer-billing category per account was assumed to represent the total indoor water usage. For

those wholesale customers that provided bimonthly data, the average of the lowest 2 months was used. The indoor water usage was converted to a percentage and the remaining water usage was assumed to be outdoor use.

Figure 3-5 shows the average water use of SFPUC wholesale customers by indoor/outdoor water usage derived from 2001 customer-billing data as described in Section 3.3.2.

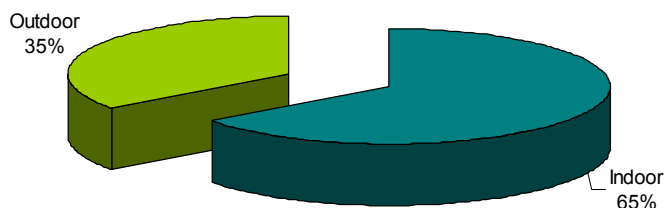


Figure 3-5 Breakdown of SFPUC Wholesale Customer Water Consumption Indoor/Outdoor (2001 Base Year)

Table 3-2 provides a breakdown of the average indoor and outdoor water usage for Single-Family Residential, Multi-Family Residential, and Non-Residential accounts for the 2001 DSS Base Year.

### 3.3.3 Defining End Uses

The indoor and outdoor water usage for each customer-billing category can be further divided into specific end uses for each type of account.

#### WATER USAGE BY END USE

End uses are important to define so that plumbing codes, appliance standards and conservation measures can be accounted for and incorporated accurately. Further, it is necessary to know the amount of water demand due to each end use in the base year, expressed in gallons per day per account, from which future projections can be forecasted.

End uses are established for every customer-billing category. A standard set of end uses was selected for each typical customer-billing category. For Single-Family and Multi-Family Residential accounts the standard end uses were:

- Toilets (indoor)\*
- Clothes Washers (indoor)\*
- Showers (indoor)\*
- Faucets (indoor)
- Baths (indoor)
- Dishwashers (indoor)
- Other Miscellaneous Domestic (indoor)

**Table 3-2  
SFPUC Wholesale Customer Water Use (2001 Base Year)**

	All Category TOTAL (gpcd)				Single-Family Residential (gpcd)				Multi-Family Residential (gpcd)				Non-Residential (gpcd)			
	Total Consumptions	Indoor	Outdoor	% Outdoor	Total Consumptions	Indoor	Outdoor	% Outdoor	Total Consumptions	Indoor	Outdoor	% Outdoor	Total Consumptions	Indoor	Outdoor	% Outdoor
<b>Wholesale Customer</b>																
Alameda County Water District	102	65	37	36%	107	72	35	33%	78	66	12	16%	108	55	53	49%
Brisbane, City of	48	35	13	27%	72	63	9	12%	50	44	6	12%	53	17	37	69%
Burlingame, City of	82	51	31	38%	108	70	38	35%	77	65	12	16%	51	34	17	33%
CWS - Bear Gulch District	121	54	68	56%	169	71	98	58%	73	63	10	14%	39	28	11	29%
CWS - Mid Peninsula District	89	57	33	37%	108	72	37	34%	67	61	7	10%	53	38	15	28%
CWS - South San Francisco District	110	68	42	38%	76	63	13	17%	62	60	2	3%	95	73	22	23%
Coastside County Water District	85	61	24	28%	72	60	12	17%	66	59	7	11%	205	67	138	67%
Daly City, City of	67	52	15	22%	66	56	9	14%	63	55	8	13%	50	37	12	25%
East Palo Alto, City of	74	60	14	19%	71	64	7	10%	56	50	6	10%	235	69	166	71%
Estero MID/Foster City	74	52	22	30%	115	78	37	32%	85	72	14	16%	87	22	65	75%
Guadalupe Valley MID	46	25	21	46%	90	67	22	25%	NA	NA	NA	NA	58	21	38	64%
Hayward, City of	90	56	34	37%	83	61	22	27%	71	54	18	25%	77	54	22	29%
Hillsborough, Town of	292	122	169	58%	292	122	169	58%	NA	NA	NA	NA	33	14	19	58%
Los Trancos County Water District	134	52	82	61%	134	52	82	61%	NA	NA	NA	NA	NA	NA	NA	NA
Menlo Park, City of	189	104	85	45%	141	86	55	39%	79	60	18	23%	227	132	95	42%
Mid-Peninsula Water District	91	55	35	39%	106	64	42	40%	69	62	7	10%	61	42	20	32%
Millbrae, City of	113	71	42	37%	94	64	30	32%	66	58	9	13%	160	98	62	39%
Milpitas, City of	113	68	45	40%	87	62	25	29%	67	61	6	9%	114	76	38	34%
Mountain View, City of	84	53	31	37%	110	72	37	34%	77	64	13	17%	80	39	41	51%
North Coast County Water District	74	54	20	27%	75	57	19	25%	65	55	10	15%	74	40	34	46%
Palo Alto, City of	78	45	33	42%	145	83	62	43%	96	78	18	19%	53	24	29	54%
Purissima Hills Water District	304	86	217	72%	311	85	226	73%	NA	NA	NA	NA	373	97	276	74%
Redwood City, City of	75	48	27	36%	104	68	35	34%	77	60	17	22%	51	25	26	50%
San Bruno, City of	71	53	17	25%	78	66	13	16%	65	55	10	15%	53	32	21	40%
San Jose, City of (portion of north San Jose)	324	185	139	43%	88	72	16	18%	82	69	13	16%	1572	696	876	56%
Santa Clara, City of	118	66	52	44%	125	73	53	42%	80	62	18	23%	98	65	33	33%
Skyline County Water District	116	70	46	40%	118	73	45	38%	NA	NA	NA	NA	83	52	32	38%
Stanford University	62	35	27	44%	NA	NA	NA	NA	39	27	12	31%	NA	NA	NA	NA
Sunnyvale, City of	84	53	32	38%	121	78	44	36%	89	69	20	23%	72	31	41	57%
Westborough Water District	76	63	12	16%	72	66	6	8%	61	54	7	11%	132	53	79	60%
<b>Weighted Average</b>	<b>92</b>	<b>59</b>	<b>33</b>	<b>36%</b>	<b>108</b>	<b>69</b>	<b>39</b>	<b>36%</b>	<b>75</b>	<b>61</b>	<b>14</b>	<b>18%</b>	<b>86</b>	<b>49</b>	<b>37</b>	<b>43%</b>
<b>Median</b>	<b>87</b>	<b>56</b>	<b>33</b>	<b>37%</b>	<b>106</b>	<b>68</b>	<b>35</b>	<b>33%</b>	<b>69</b>	<b>60</b>	<b>10</b>	<b>15%</b>	<b>78</b>	<b>41</b>	<b>35</b>	<b>45%</b>

NA – Not Applicable

Single-family per capita is consumption divided by single-family population.

Multifamily per capita is consumption divided by multifamily population.

Non-residential per employee is consumption divided by employment,

gped - gallons per employee per day

gpcd - gallons per capita per day

CWS - California Water Service (Company)

MID - Municipal Improvement District

Source: DSS Input Sheets



- Internal Leakage (indoor)
- Irrigation and Landscaping (outdoor)
- Pools (outdoor)
- Wash-down of house, sidewalks, etc. (outdoor)
- Car Washing (outdoor)
- External Leakage (outdoor)

The standard end uses for Commercial, Industrial, and Institutional accounts were:

- Toilets (indoor)\*
- Laundry (indoor)
- Showers (indoor)
- Faucets (indoor)
- Urinals (indoor)\*
- Process (indoor)
- Dishwashers (indoor)
- Internal Leakage (indoor)
- Irrigation and Landscaping (outdoor)
- Pools and Fountains (outdoor)
- Wash-down of facilities (outdoor)
- Cooling (outdoor)
- External Leakage (outdoor)

The end uses marked with an asterisk (\*) are those for which Fixture Models were created (see Section 3.4.2).

The total indoor or outdoor water usage for each customer-billing category was divided among the end uses by determining approximate percentages for each end use. Initially, the end-use percentages were assigned based on published data and knowledge of the wholesale customer service area. However, these numbers had to be reconciled with user-specific data such as the average number of users, the average number of uses per day, and the average volume of water per use. Section 3.4.1 describes how the number of users per account was obtained. Section 3.4.2 describes the calibration process that was used in applying the Fixture Models to determine the average volume of water per use.

**STANDARDIZED WATER  
USE DATA BY ACCOUNT  
TYPE (NATIONAL  
PUBLICATIONS)**

The initial percentage assumptions for single-family and multifamily indoor end uses and commercial, industrial and institutional (CII) end uses were based on industry standards and previous experience with CII water audits and are listed in Table 3-3.

**Table 3-3  
End-Use Data - Initial Percentage Assumptions**

End Use	Initial Percentages by Customer-Billing Category				
	Single-Family Residential	Multi-Family Residential	Commercial	Industrial	Institutional
<b>Indoor Usage</b>					
Toilets (indoor)	26.7%	26.7%	25%	23%	20%
Urinals (indoor)	NA	NA	0%	7%	0%
Laundry (indoor)	21.7%	21.7%	8%	5%	10%
Showers (indoor)	16.8%	16.8%	5%	5%	16%
Bath (indoor)	1.7%	1.7%	NA	NA	NA
Faucets (indoor)	15.7%	15.7%	10%	15%	19%
Process (indoor)	NA	NA	34%	30%	5%
Dishwashers (indoor)	1.4%	1.4%	8%	5%	15%
Internal Leakage (indoor)	13.7%	13.7%	10%	10%	15%
Other Domestic (indoor)	2.2%	2.2%	NA	NA	NA
<b>Outdoor Usage</b>					
Irrigation and Landscaping (outdoor)	80%	80%	75%	65%	70%
Pools and Fountains (outdoor)	5%	5%	2%	5%	5%
Wash-down of house/facilities (outdoor)	5%	5%	3%	0%	5%
Car Washing (outdoor)	5%	5%	0%	0%	0%
Cooling (outdoor)	0%	0%	15%	25%	15%
External Leakage (outdoor)	5%	5%	5%	5%	5%

NA – Not Applicable

Sources: AWWARF, Konen (1986), Behling et al. (1992)

### 3.4 CALIBRATING WATER USE DATA

Calibrating water use involves breaking down total water production into end uses and performing the reverse, combining end uses and the average number of persons using them to arrive at total water production. Section 3.3 described the model set-up from total water production into end uses. This section describes how the average number of users per account was determined to perform calibration of those end uses affected by Fixture Models.

#### 3.4.1 Determining Users per Account

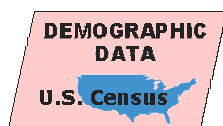
Determining the average number of users per account is important because the water savings from reducing water use in an account by replacing a water-using fixture, such as a toilet, is dependent upon how many persons in a household or employees in a business are using that fixture. For example, in a residential home, water savings from replacing a 3.5 gallons per flush toilet with a 1.6 gallons per flush toilet are 1.9 gallons per flush. Each resident in the home flushes the toilet about 5 times per day (Mayer et al. 1999), so the total water savings is dependent upon the number of people living in the home.

**USERS PER ACCOUNT**

The users per account are derived from both the census and customer-billing data simply by dividing the number of users determined for each type of account in 2001 by the number of those accounts in 2001. Population data are used to establish the number of users by Residential account. Employment data are used to establish the number of users for Non-Residential accounts. The following subsections further explain this process.

### ***Residential Demographics***

Residential demographics are important because it is necessary to establish an average number of water users for individual customer accounts within the wholesale customer service area. This number is useful in determining water use and water savings potential in homes.



In general, demographic data from Census 2000 (U.S. Census Bureau 2002) were reconciled with customer-billing records for the year 2000 to obtain service area population estimates split into multi-family and single-family residences using census data. The multi-family population was based on the average multi-family household size (from Census 2000) multiplied by the average number of dwelling units per account (from Census 2000) multiplied by the number of Multi-Family Residential accounts (billing data). The single-family population was based on the average single-family household size (from Census 2000) multiplied by the number of Single-Family Residential accounts (billing data - assuming one dwelling unit per account).

### ***Determining Dwelling Units per Multi-Family Residential Account***

#### **Step 1: Apportioning of Wholesale Customer Service Areas**

Census 2000 (U.S. Census Bureau 2002) provides dwelling unit numbers for incorporated cities and towns. Most wholesale customer service areas approximately correspond to the boundaries of incorporated cities or towns. In those cases, the census data were used directly to develop estimates of the number of dwelling units. For those service areas comprised of less-than-whole portions of cities or towns, an assumed percentage of each city or town was apportioned to the corresponding service areas. Apportionment of shared cities and towns was based on service area descriptions, maps and estimated populations that were obtained from the wholesale customers. Table 3-4 shows the approximate percentage of each wholesale customer service area that is represented by a certain jurisdictional boundary (city, town or an unincorporated area). ABAG Subregional boundaries, defined in Section 4.2.1, were used to define jurisdictional boundaries.

Dwelling units from Census 2000 (U.S. Census Bureau 2002) are classified by the type of building (or residential housing complex). Table 3-5 lists the residential building types from the census data along with the average number of dwelling units per building for each type.

**Table 3-4**  
**SFPUC Wholesale Customer Service Area Jurisdictional Boundary Blend**

Wholesale Customer	Percentage of Wholesale Customer Service Area in Jurisdictional Boundary (each totals 100% <sup>1</sup> )
Alameda County Water District	65% Fremont 14% Newark 21% Union City
Brisbane, City of	100% Brisbane
Burlingame, City of	98% Burlingame 2% Other Unincorporated San Mateo County
CWS Company - Bear Gulch District	91% Atherton 2% Menlo Park 0.1% Portola Valley 7% Other Unincorporated San Mateo County
CWS Company - Mid-Peninsula District (San Carlos, San Mateo)	77% San Mateo 23% San Carlos
CWS Company - South San Francisco District	91% South San Francisco 2% Colma 0.1% Daly City 7% Other Unincorporated San Mateo County
Coastside County Water District	65% Half Moon Bay 35% Half Moon Bay Unincorporated
Daly City, City of	100% Daly City
Estero MID/Foster City	90% Foster City 10% San Mateo
East Palo Alto, City of	100% East Palo Alto
Guadalupe Valley MID	100% Brisbane <sup>2</sup>
Hayward, City of	100% Hayward
Hillsborough, Town of	100% Hillsborough
Los Trancos County Water District	10% Portola Valley 90% Other Unincorporated Mateo County
Menlo Park, City of	100% Menlo Park
Mid-Peninsula Water District	95% Belmont 4% Other Unincorporated San Mateo County 1% San Carlos
Millbrae, City of	100% Millbrae
Milpitas, City of	100% Milpitas
Mountain View, City of	100% Mountain View
North Coast County Water District	98% Pacifica 2% Other Unincorporated San Mateo County
Palo Alto, City of	100% Palo Alto
Purissima Hills Water District	96.8% Los Altos Hills 3.2% Other Unincorporated Santa Clara County
Redwood City, City of	91% Redwood City 0.1% San Carlos 5.9% Woodside 3.3% Other Unincorporated San Mateo County
San Bruno, City of	98% San Bruno 2% Other Unincorporated San Mateo County
San Jose, City of (portion of north San Jose)	100% San Jose
Santa Clara, City of	100% Santa Clara
Skyline County Water District	63.6% Woodside 36.4% Other Unincorporated San Mateo County
Sunnyvale, City of	100% Sunnyvale
Westborough Water District	100% South San Francisco

<sup>1</sup>Due to rounding, totals may not be exactly 100%.

<sup>2</sup>Guadalupe Valley MID is within the city of Brisbane.

CWS - California Water Service (Company)

MID - Municipal Improvement District

**Table 3-5  
Dwelling Unit by Building Type from Census 2000**

Building Type	Assumed Number of Dwelling Units per Building/Complex
<b>Single-Family</b>	
1-detached	1
1-attached	1
<b>Multifamily</b>	
2-units	2.0
3-4 units	3.5
5 to 9 units	7.0
10-19 units	15
20 or more units	50
Mobile homes	50

*Source: Census 2000 (U.S. Census Bureau 2002)*

The number of dwelling units provided by the census was divided by the assumed number of dwelling units per building to determine the estimated number of buildings (or housing complexes).

**Step 2: Apportioning Dwelling Units to Residential Billing Categories**

The total number of “Single-Family 1-detached” buildings was compared with the number of Single-Family Residential accounts in 2000 (obtained from billing records) to determine if the “Single-Family 1-attached” buildings were represented by billing data. If not all the “Single-Family 1-detached” buildings were represented in the Single-Family Residential accounts, then it was assumed they were grouped with the Multi-Family Residential accounts. This grouping can occur depending on how a wholesale customer categorizes townhouses, condos, etc. Some agencies categorize these types of residences as multifamily while others may categorize them as single-family.

The assumptions for number of dwelling units per building (or residential complex) were adjusted to obtain a reasonable match between the number of buildings and the number of Multi-Family Residential accounts in 2000 (billing records). The final number of multi-family dwelling units was divided by the number of Multi-Family Residential accounts to obtain an average number of dwelling units per account for each wholesale customer. Each value was assumed to remain constant from 2000 to 2001 (base year).

**Determining Average Household Sizes**

Average household sizes are important parameters in developing an end-use model because they provide a link between the customer-billing data (such as the number of Single-Family accounts) and the end-use data (such as the residents use water in the accounts). Therefore, a complex iterative process was used to ensure that the household sizes not only fit known demographic data, but also produce reasonable water use results. The following steps describe the process used in determining the average household sizes for single-family and multi-family residences:

1. Population data from Census 2000 (U.S. Census Bureau 2002) were used to estimate the total population of the service area. As with the dwelling units, some service areas required more specific assumptions to apportion the population from several cities and/or towns.
2. To arrive at the total residential population, the institutionalized population provided in Census 2000 data (U.S. Census Bureau 2002) was subtracted from the total population assuming that these users were served under Institutional accounts instead of Residential accounts. The institutionalized population includes people living in nursing homes, assisted living, jails, college dormitories, etc. The number was usually small.
3. The multi-family household size was estimated using the “renter occupied” household size from the census data.
4. The average multi-family household size from Step #3 was multiplied by the total number of multi-family dwelling units provided in the census data to obtain the initial estimate of the multi-family residential population.
5. The Multi-Family Residential population from Step #4 was subtracted from the total residential population in Step #2 to obtain the Single-Family Residential population.
6. The average single-family household size was calculated by dividing the single-family residential population by the number of single-family dwelling units provided in the census data.
7. The average single-family household sizes from Step #6 were multiplied by the corresponding number of accounts from the 2001 customer-billing data to obtain 2001 single-family residential population.
8. The total service area population was calculated as the sum of the 2001 Single-Family and Multi-Family Residential populations from Steps #4 and #7.

As a check for reasonableness, the total service area population was compared with the estimated service area population from the BAWUA Annual Survey (BAWUA 2002). As a final check for reasonableness, the average per-capita water use for Single- and Multi-Family Residential were checked using the process described below.

### ***Determining Per-Capita Water Use***

Based on the household sizes derived from the census data, the per-capita water uses were also used as a link between the customer-billing data and the census data. The total indoor water use per account was calculated from 2001 customer-billing data as described in Section 3.3.2 for both Single-Family Residential and Multi-Family Residential accounts. These values were divided by the average household sizes from Steps #3 and #6 above to obtain per-capita indoor water use estimates, which were compared to ranges published in Mayer et al. (1999). Steps #3 through #6 above were repeated until the per-capita indoor water usage was within the following ranges.

- Single-Family Residential: 60 to 80 gallons/capita/day
- Multi-Family Residential: 50 to 70 gallons/capita/day

Table 3-6 lists the household sizes for each wholesale customer and the corresponding per-capita indoor water usage for 2001. Also shown are the per-capita indoor usage for Single-Family and Multi-Family Residential accounts. In all cases, multi-family indoor use is lower than single-family indoor use. This is probably because multi-family residences are likely to contain fewer bathrooms and fewer on-site laundry facilities than single-family residences. Residents in single-family and multi-family residences may also have significant differences in income and lifestyle which could result in differences in water use.

### ***Determining Number of Employees***

Determining the number of employees working in the wholesale customer service area is necessary for determining the number of water users that receive and use water in the non-residential billing categories. This number is used to determine the water savings from non-residential fixture replacement programs.

The number of users per Commercial account was determined by estimating the total number of employees and dividing by the number of Commercial accounts provided in the 2001 customer-billing data.

ABAG projections (ABAG 2002) were used to determine the number of employees in the year 2000. ABAG projections for total jobs in each jurisdictional boundary were divided into the same geographic regions as the Census 2000 data (U.S. Census Bureau 2002). Therefore, based on the percentages given in Table 3-4, the resulting 2000 employment numbers were determined and were escalated to 2001 using annual population growth data provided by the California Department of Finance (CDOF 2003). Table 3-7 lists the number of Non-Residential accounts in 2001, the estimated number of employees in the wholesale customer service area in 2001 (2001 Employment) and the resulting average users per Commercial account (employees) for each wholesale customer.

### **3.4.2 Applying Fixture Models to End Uses**

Fixture models are used to capture the impact of increasing efficiencies related to specific fixtures in specific customer-billing categories, such as toilets in the single-family billing category. This is used to provide future water use projections in applicable accounts (existing base-year accounts and new accounts).



**FIXTURE  
MODELS**

Once water usage for specific end uses is separated out, the effects of natural replacement<sup>11</sup> and plumbing codes that require increased fixture efficiency can be applied to that end use. This section describes how these effects were incorporated into each DSS model using fixture models.



**FIXTURE AND  
REPLACEMENT  
DATA**

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<sup>11</sup> Natural replacement of a fixture occurs due to failure, aging or remodeling. Natural replacement means that when an old, inefficient fixture is replaced it is replaced with a high efficient fixture required under current plumbing codes.

**Table 3-6  
Household Sizes and Corresponding Per-Capita Indoor Water Usage (2001)**

Wholesale Customer	Single-Family		Multifamily	
	Household Size	Per-Capita Indoor Usage (gpcd)	Household Size	Per-Capita Indoor Usage (gpcd)
Alameda County Water District	2.91	72	3.60	66
Brisbane, City of	2.45	63	1.80	44
Burlingame, City of	2.99	70	1.70	65
CWS - Bear Gulch District	3.93	71	2.50	63
CWS - Mid Peninsula District	2.92	72	2.21	61
CWS - South San Francisco District	3.06	63	2.70	60
Coastside County Water District	3.14	60	1.70	59
Daly City, City of	3.57	56	3.10	55
East Palo Alto, City of	4.76	64	3.50	50
Estero MID/Foster City	2.57	78	2.70	72
Guadalupe Valley MID	1.16	67	NA	NA
Hayward, City of	3.13	61	2.90	54
Hillsborough, Town of	2.73	122	NA	NA
Los Trancos County Water District	2.87	52	NA	NA
Menlo Park, City of	2.76	86	1.75	60
Mid-Peninsula Water District	2.56	64	2.00	62
Millbrae, City of	2.67	64	2.18	58
Milpitas, City of	3.75	62	2.45	61
Mountain View, City of	2.21	72	2.15	64
North Coast County Water District	2.77	57	2.40	55
Palo Alto, City of	2.34	83	2.03	78
Purissima Hills Water District	2.95	85	2.86	NA
Redwood City, City of	2.74	68	2.38	60
San Bruno, City of	2.70	66	2.64	55
San Jose, City of (portion of north San Jose)	2.63	72	3.90	69
Santa Clara, City of	2.72	73	2.40	62
Skyline County Water District	2.70	73	2.27	NA
Stanford University	8.95	NA	2.13	27
Sunnyvale, City of	2.61	78	2.30	69
Westborough Water District	2.67	67	1.90	55
<b>Overall Average</b>	2.94	69.6	2.65	60.9

gpcd - gallons per capita per day  
 NA - Not Applicable  
 CWS - California Water Service (Company)  
 MID - Municipal Improvement District

Source: DSS Input Sheets



Fixture models are used for two purposes:

- To model the base-year water use, accounting for and reconciling the fixture data to what the current level of efficiency is in the homes and businesses, and
- To forecast the impact of replacing the current inefficient fixtures with more efficient models over time in existing base-year accounts and in new accounts. These replacements result in water savings that are incorporated into the demand projections and are discussed in Section 4 of this report.

For this study, a typical model has up to 8 fixture models. The number of fixture models applied is related to the number of applicable customer-billing categories for each wholesale customer.

**Table 3-7  
SFPUC Wholesale Customer Average User per Non-Residential Account (2001)**

Wholesale Customer	Number of Non-Residential Accounts	2001 DSS (Base Year) Employment	Users per Non-Residential Account
Alameda County Water District	5,263	151,092	28.71
Brisbane, City of	121	3,789	31.31
Burlingame, City of	1,278	31,205	24.42
CWS - Bear Gulch District	1,414	42,899	30.34
CWS - Mid Peninsula District	3,752	79,493	21.19
CWS - South San Francisco District	2,202	49,288	22.38
Coastside County Water District	394	5,402	13.71
Daly City, City of	859	26,941	31.36
East Palo Alto, City of	276	3,289	11.92
Estero MID/Foster City	825	24,318	29.48
Guadalupe Valley MID	44	4,442	100.95
Hayward, City of	3,853	87,473	22.70
Hillsborough, Town of	19	1,216	64.00
Los Trancos County Water District	0	NA <sup>1</sup>	NA <sup>1</sup>
Menlo Park, City of	517	10,053	19.44
Mid-Peninsula Water District	606	14,705	24.27
Millbrae, City of	387	6,664	17.22
Milpitas, City of	1,508	53,566	35.52
Mountain View, City of	2,350	75,629	32.18
North Coast County Water District	423	5,797	13.70
Palo Alto, City of	2,226	105,432	47.36
Purissima Hills Water District	527	420	0.80
Redwood City, City of	1,771	66,389	37.49
San Bruno, City of	821	16,622	20.25
San Jose, City of (portion of north San Jose)	621	2,500	4.03
Santa Clara, City of	3,862	138,163	35.77
Skyline County Water District	10	224	22.40
Stanford University	199	NA <sup>1</sup>	NA <sup>1</sup>
Sunnyvale, City of	4,464	125,476	28.11
Westborough Water District	334	1,610	4.82

*Source: DSS Input Sheet*

<sup>1</sup>Employment numbers and users per Non-Residential account are not applicable for LTCWD and Stanford University. LTCWD only has residential accounts. Users per account or employment numbers were not used to forecast Non-Residential account growth for Stanford University, other parameters such as increase in building square footage increase were used.

NA - Not Applicable

CWS - California Water Service (Company)

MID - Municipal Improvement District

Table 3-8 lists the fixture models that were created in the DSS Model and the corresponding end use to which each was applied.

**Table 3-8  
Fixture Models Included in Water Demand Projections**

<b>Fixture Model</b>	<b>Customer-Billing Category</b>	<b>End Use</b>
Single-Family Toilets	Single-Family	Toilets(Single-Family indoor)
Multi-Family Toilets	Multifamily	Toilets (Multi-Family indoor)
Single-Family Showerheads	Single-Family	Showers (Single-Family indoor)
Multi-Family Showerheads	Multifamily	Showers (Multi-Family indoor)
Single-Family Clothes Washers	Single-Family	Clothes Washers (Single-Family indoor)
Multi-Family Clothes Washers	Multifamily	Clothes Washers (Multi-Family indoor)
Commercial Toilets	Commercial	Toilets (Commercial indoor)
Commercial/Industrial Urinals	Industrial	Urinals (Industrial indoor)

Four sources of fixture replacement data are evaluated for use in this study: data from *BMP Costs and Savings Study* (CUWCC 2000), saturation surveys collected by Alameda County Water District and East Bay Municipal Utility District (CTSI 2001), housing stock information from Census 2000 (U.S. Census Bureau 2002), and feedback from wholesale customers on implementation of water conservation programs in their service areas. Fixture replacement rates were used both to establish base-year fixture conditions and in forecasting future demands using a yearly fixture estimate which averages fixture conditions of those existing base-year accounts and of new accounts. The following sections describe how the base-year conditions were established in the fixture models. Section 4 provides a discussion of how the fixture models were used in demand forecasting.

***Establishing 2001 (Base-Year) Conditions***

Each fixture model was set up to represent the 2001 base-year conditions for the study. First, the existing fixtures were divided into three categories: Old, Intermediate and New. These proportions were based on age of housing data from Census 2000 (U.S. Census Bureau 2002) and assumptions for the relative amount of natural replacement that had occurred prior to the base year. In addition, water conservation programs (i.e., toilet and clothes washer rebate programs and water audits) administered in wholesale customer service areas were considered.

Census 2000 (U.S. Census Bureau 2002) provides a breakdown on the number of homes by the decade during which each home was built. Relative percentages were calculated from these data to determine the approximate percentage of homes that were built prior to 1980, between 1980 and 1990, and between 1990 and 2000. These dates were selected to approximate the change in plumbing codes in California. Table 3-9 presents the different plumbing fixture and appliance standards and the years they went into effect. (Note that newer standards often superseded older standards.)

**Table 3-9  
California Plumbing Fixture and Appliance Standards**

Fixture	Requirement	Regulation	Effective Date
Low flow showerheads	2.75 gpm @ 80 psi	California	1979
High-efficiency showerheads	2.5 gpm in new construction @ 80 psi	California	1992
High-efficiency showerheads	2.5 gpm in replacement @ 80 psi	Federal	1994
Lavatory and Kitchen Faucets	2.2 gpm in new construction @ 60 psi	California	1992
Lavatory and Kitchen Faucets	2.5 gpm in replacement @ 80 psi	Federal	1994
Low flow toilets	3.5 gallons per flush	California	1983
Ultra low flow toilets	1.6 gallons/flush in new residential construction	California	1992
Ultra low flow toilets	1.6 gallons/flush in residential replacement	Federal	1994
Ultra low flow toilets	1.6 gallons/flush in new commercial	California	1992
Ultra low flow toilets	1.6 gallons/flush in commercial replacement	Federal	1997
Urinals	1.0 gallons per flush	California	1992
Washing machines	Energy efficiency standards and possible water efficiency improvements	California	2007

gpm - gallons per minute  
psi - pounds per square inch

In addition to using housing stock information from Census 2000 (U.S. Census Bureau 2002), fixture replacement data received from wholesale customers and in-home fixture saturation survey information collected from Alameda County Water District and East Bay Municipal Utility District were used to approximate percentages of natural replacement of fixtures that occurred prior to 2001. These assumptions are listed in Table 3-10.

**Table 3-10  
Assumptions for Initial Proportions of Fixtures**

End Use (Account Category)	Initial Proportions		
	Old	Intermediate	New
Toilets (Residential)	Remainder (100% minus Intermediate minus New)	Percentage of new homes between 1980 and 1989 plus 5% for natural replacement prior to 2001	Percentage of new homes since 1990 plus 25% for natural replacement prior to 2001
Shower (Residential)	Remainder (100% minus Intermediate minus New)	10%	Percentage of new homes since 1990 plus 50% for natural replacement prior to 2001
Clothes Washers (Residential)	40%	40%	20%
Toilets (Commercial)	Remainder (100% minus Intermediate minus New)	Percentage of new homes (buildings) between 1980 and 1989 plus 5% for natural replacement prior to 2001	Percentage of new homes (buildings) since 1990 plus 30% for natural replacement prior to 2001
Urinals (Commercial/Industrial)	Remainder (100% minus Intermediate minus New)	Percentage of new homes (buildings) between 1980 and 1989 plus 5% for natural replacement prior to 2001	Percentage of new homes (buildings) since 1990 plus 15% for natural replacement prior to 2001

After the initial proportions of fixtures are determined, the average number of uses of the fixtures and the volume of water used by each fixture must be determined. A residential end-use study completed by AWWARF (Mayer et al. 1999) provided ranges of the average number of uses per day for each of the residential fixtures in the fixture models (see Table 3-11). Commercial/industrial toilet and urinal flushes were compiled using information gathered from various studies (Konen 1986, Behling et al. 1992) and previous experience with CII water audits and prorated to a 7-day week. The workforce was assumed to be 50 percent male and 50 percent female to apportion the male urinal flushes to the entire work force.

**Table 3-11  
Range in Average Uses per User per Day**

End Use (Account Category)	Range of Average Uses Per Person or Employee Per Day
Toilets (Residential)	4.5–5.6 flushes
Shower (Residential)	0.6–0.9 shower
Clothes Washers (Residential)	0.3–0.42 loads
Toilets (Commercial)	2.1–2.8 flushes
Urinals (Commercial/Industrial)	0.7–1.1 flushes

Sources: AWWARF, Konen 1986, Behling et al. 1992

Table 3-12 lists the average volume of water used per use of each fixture.

**Table 3-12  
Average Volume per Use**

End Use (Account Category)	Average Gallons Per Use		
	Old	Intermediate	New
Toilets (Residential)	4.5–5.0	3.5	1.8 <sup>1</sup>
Shower (Residential)	20	15.5	12
Clothes Washers (Residential)	43	36.4	26
Toilets (Commercial)	4.5–5.0	3.5	1.8 <sup>1</sup>
Urinals (Commercial/Industrial)	3.0	2.0	1.0

<sup>1</sup>Although new toilets are supposed to flush at 1.6 gallons, practical experience has shown that the average flush is closer to 1.8 gallons. Reasons include water level in tank too high and wrong flapper valve used in replacement.

**3.5 CALIBRATION OF END USES**

In establishing base-year conditions, it is critical that water consumption by end use, reflected in the fixture models and as a percentage of total use (Table 3-3), is consistent with actual water use in a customer-billing account. This consistency is important because natural replacement and conservation measures applied to future demand forecasts will reduce the total amount of water consumed by the affected end use. This section describes the process for ensuring that the end-

use breakdown in customer-billing categories is accurate for the base-year conditions and appropriate for forecasting future water demand.

In Section 3.3, a “top-down” approach to total water use is applied by taking total water consumption by customer-billing category and breaking it down by indoor and outdoor use and then by end use. Initial assumptions regarding the percentage of total water use consumed by each end use were made based on AWWARF’s research on residential, commercial and institutional end uses of water. These initial percentages, presented in Table 3-3, provide a starting point for estimating how water is used in a customer-billing account.

In Section 3.4, total water use in a customer-billing account is considered from a “bottom-up” approach using fixture models. The fixture models look at water use on a plumbing fixture basis, computing total water use in a customer-billing account by the total water use associated with particular end uses.

Both approaches are used as way to provide a checks-and-balance system for ensuring that separating total water use into end uses has been performed accurately. The results of both approaches are compared and adjusted through a calibration process to match one another.

The calibration process generally involves three steps:

- Establishing the initial conditions of the fixture or appliance being modeled (Table 3-10)
- Comparing the fixture model end-use amounts with the initial percentages of water use by end use (Table 3-3)
- Adjusting the frequency of uses per day per user (person or employee in an account) (Table 3-11), or adjusting the initial percentage breakdown of indoor water use by end uses (Table 3-3) until the end use in the fixture model is the same as the end use derived by applying a percentage to the total indoor use

An example of how the actual calibration process occurs follows. The example first reviews how water use by end use is computed in the fixture model then outlines the process of calibration.

The calibration process is performed until the amount of water allocated to each specific end use (expressed in terms of a percentage of the total indoor water use for that category) equals the amount of water derived in the fixture model for that end use. As a rule, the number of uses was not allowed to vary outside the ranges in Table 3-11 and adjustments to the initial proportions in Table 3-3 were minor.

The calibration creates a revised breakdown of water usage by end use. Figures 3-6 and 3-7 show the average breakdown of indoor single-family and multi-family water use for SFPUC wholesale customers for the 2001 base year.

***Fixture Model Water Use Computation***

In the fixture model the amount of water used by an end use is the product of the amount of water used by the fixture per use multiplied by the number of users in the customer-billing account (i.e., persons per household or employees per account) multiplied by the number of uses per day. An example of toilet use computed by a fixture model is shown below:

- Single-Family Residential Toilet Use (sample values in a fixture model)
  - Average users per Single-Family account (household size): 3.0 people per household
  - Average toilet flush volume in service area<sup>12</sup>: 3.5 gallons per flush
  - Average flushes per person per day: 5.0 times per day
  - Volume used to flush toilets:  $3.0 \times 3.5 \times 5.0 = 52.5$  gal/day/household

***Comparing Fixture Model Computations with Indoor and Outdoor Use***

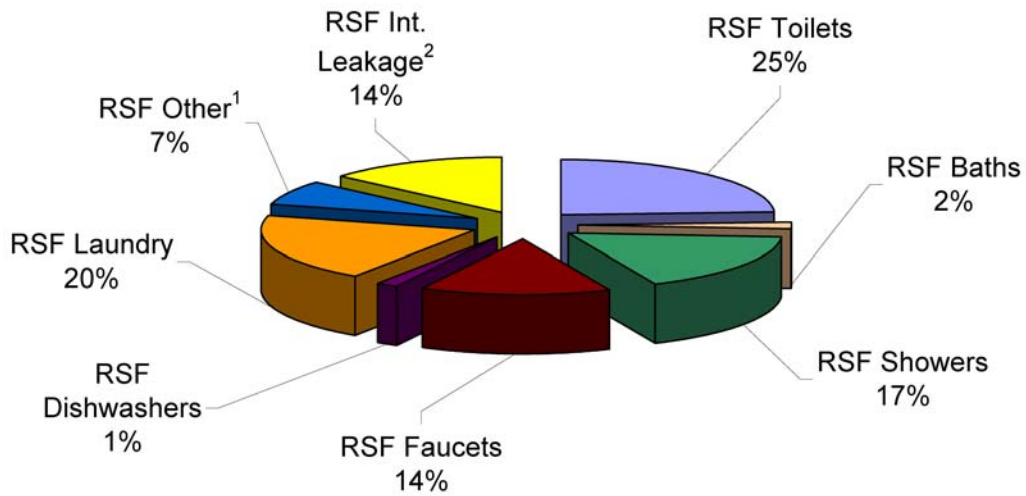
The fixture model computations for each end use by customer-billing category are compared to the percentage of indoor and outdoor water use and by end use for a customer-billing account provided by AWWARF, presented in Table 3-3. Consistent with the fixture model computation provided above, if the single-family indoor use for a particular account is 200 gal/day and the percentage allocated to toilets is 26.7% (Mayer et al. 1999; see Table 3-3), then 53.4 gal/day of the 200 gal/day are used for toilet flushing in the house. Comparing the 53.4 gal/day with the computed value in the fixture model for toilet flushing in that house there is a difference of 1.4 gal/day. Therefore, adjustments need to be performed to either the fixture model or the percentage of water use by end use so that these two numbers match.

***Matching Fixture Model Computations with Initial End-Use Percentages***

The fixture model computations and the end-use percentages can be matched in two ways: either adjust the fixture model components or adjust the initial percentages of end use for total water. In this example, small adjustments can be made to the fixture model to increase the volume used to flush toilets up to 53.4 gal/day or small adjustments can be made to the percentage of water use associated with toilets to reduce its value to 52.5 gal/day. For example, adjusting the fixture model may involve increasing the number of flushes per person per day from 5.0 to 5.086 or decreasing the percentage of indoor use water use allocated to toilets to 26%.

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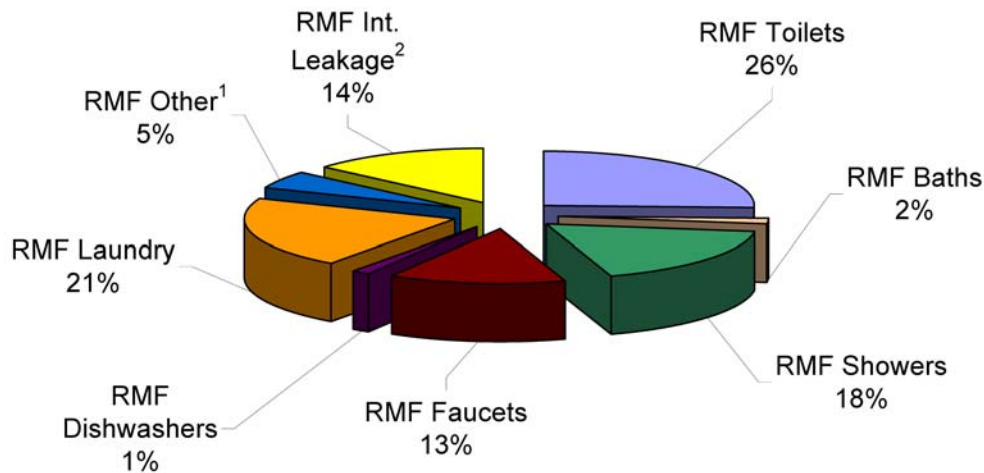
<sup>12</sup> Average toilet flush volume is derived by taking the initial proportions of each type of fixture (Table 3-10) combined with the volume-per-use estimates (Table 3-12) computing a service-area-specific volume-per-use weighted average.



<sup>1</sup>“RSF Other” category water use includes miscellaneous uses not included in one of the other categories, such as cleaning, indoor plant irrigation, etc. in RSF households. (see AWWARF)

<sup>2</sup>“RSF Int. (Internal) Leakage” category water use includes metered water leakage from fixtures and appliances in RSF households. (see AWWARF)

**Figure 3-6 Breakdown of SFPUC Wholesale Customer Area Indoor Single-Family Water Consumption by End Use (2001 Base Year)**



<sup>1</sup>“RMF Other” category water use includes miscellaneous uses not included in one of the other categories, such as cleaning, indoor plant irrigation, etc. in RMF households. (see AWWARF)

<sup>2</sup>“RMF Int. (Internal) Leakage” category water use includes metered water leakage from fixtures and appliances in RMF households. (see AWWARF)

**Figure 3-7 Breakdown of SFPUC Wholesale Customer Area Indoor Multi-Family Water Consumption by End Use (2001 Base Year)**

**3.6 SUMMARY OF ESTABLISHING BASE-YEAR CONDITIONS**

The process for establishing base-year conditions detailed in this section consists of the following basic steps:

- Determining total water production for each wholesale customer by combining total water consumption data with UFW percentages
- Separating base-year indoor and outdoor water use for each wholesale customer by percentages
- Defining end uses for each wholesale customer
- Calibrating the water use data to determine average users per account for each wholesale customer
- Applying fixture models to applicable end uses for each wholesale customer
- Establishing total water usage per day per customer-billing category for each wholesale customer for forecasting

The base-year conditions for customer-billing category water use, population, household size, and employment are recorded on “input sheets” used in the DSS model and provided for each customer in Appendix C. The next section describes the second phase of the DSS model – forecasting demand.



**Section 4**  
**Water Demand Forecasting**

## 4.1 INTRODUCTION

As detailed in Section 3 and represented in the portion of Figure 2-1 above the dashed line, the base-year conditions were established for each wholesale customer using published water use and demographic data, customer-billing data, and the DSS model. The following base-year conditions were calculated based on the model input:

- Average Users per Account
- Per Account Water Use
- Indoor/Outdoor Water Usage
- Fixture Models
- End Uses

This section describes how these factors are used to create water demand forecasts in the DSS model. The DSS model uses account growth (growth in number of accounts) combined with end uses to estimate future water demands for every year for the 30-year planning period, first by end use, then by customer-billing category, and finally by total consumption. The forecasting process includes three steps:

- Determining growth in the number of accounts and increases in watering use in those accounts
- Determining the average yearly rate of natural replacement and plumbing code impacts in the future and incorporating the effects into the fixture models
- Incorporating recycled water where appropriate because recycled water use represents a demand that would otherwise be served by a potable supply

Details on the forecasting process are included in the sections below.

## 4.2 ACCOUNT GROWTH

### ACCOUNT GROWTH PROJECTIONS

Demographic forecasts are used to predict future growth in the number of water accounts. For this study, population and employment projections were

### POPULATION & EMPLOYMENT PROJECTIONS

used to forecast growth in number of accounts.

It was assumed that the average number of users per account remains constant for all account categories, meaning that household sizes don't change nor do number of employees per Non-Residential account<sup>13</sup>. Therefore, the rate of growth for each demographic forecast directly corresponds to the predicted rate of growth for the customer-billing category to which the forecast is applied. In some instances, this assumption proved incorrect based on data gathered. For example, in some service areas it was shown, based

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<sup>13</sup> ABAG (ABAG 2002) indicates relatively constant household sizes for Santa Clara and San Mateo Counties over the forecast period. For San Mateo County, ABAG estimates persons per household in 2000 and 2025 as 2.74 and 2.77, respectively. For Santa Clara County, ABAG estimates persons per household in both 2000 and 2025 as 2.92. The few cities served in Alameda County indicate relatively constant household sizes as well.

on recent trends, that new accounts in particular customer-billing categories were using more water than existing accounts in the same customer-billing category. To address this trend, the new accounts in these categories were incorporated into the DSS model with water use rates consistent with recent customer-billing information. For example, the City of Hayward researched the water being used by recently constructed homes of a similar type in their service area and found it to be 60 percent higher than the current citywide average of that type of account. Therefore, the higher value of water use per home was used to calculate the water use of planned new homes in Hayward. In general, Hayward is experiencing this trend as a result of smaller family homes being replaced with larger family homes with larger landscaped lots.

In most cases, population projections were applied to residential, institutional, and other miscellaneous accounts (such as municipal or public accounts) and employment projections were applied to commercial and industrial accounts. The following sections describe how these demographic forecasts were evaluated.

#### **4.2.1 Use of Population Projections**

Published population projections were used to develop service area growth rates from the year 2001 to the year 2030 for each customer. These growth rates were applied to the 2001 base-year populations to form DSS population projections to the year 2030. Each customer was asked to select a population projection source based on city planning estimates and the latest adopted General Plans to ensure that projections were based on land use plans relevant to the individual wholesale customer service area. Available population projection sources evaluated are identified below.

##### ***Population Projection Sources***

The following sources of population projections were available for SFPUC wholesale customers:

- **ABAG Projections 2002 Report (ABAG 2002)**<sup>14</sup> – ABAG published a report in December 2002 that includes population and employment estimates for each city in the Bay Area. This report provides projections for 2005, 2010, 2015, 2020, and 2025. Jurisdictional city estimates are provided as well as subregional estimates for each ABAG city. Jurisdictional estimates use fixed boundaries to provide a constant frame of reference and do not imply any assumption about how cities will incorporate surrounding areas during the forecast period. Subregional estimates represent the probable ultimate physical boundaries and service area of a local agency. ABAG cities do not necessarily match the service area boundaries for the wholesale customers. Therefore, blends of service areas were formed using percentages of ABAG cities, as described in more detail below and summarized in Table 3-4.
- **Urban Water Management Plans (UWMPs)** – Each agency servicing more than 3,000 accounts is required to submit an UWMP to the Department of Water Resources every 5 years. These plans, most recently published in the year 2000, provide service area population projections. Many of the population projections in these plans were based on ABAG projections for cities in the wholesale customer service area, but other projections were used

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<sup>14</sup> ABAG 2003 was not published at the time this portion of the study was completed.

as well. Year 2000 UWMPs did not have access to the ABAG 2002 report and were based on older ABAG or other projections.

- **Water Agency Water Master Plans (WMPs)** – Some agencies provided a WMP for use in projections, if the WMP was more recent than the latest published UWMP. In some cases the demand projections were presented; however, the population and/or employment forecasts used were not always provided. In some cases the demand projections were based on land use forecasts.
- **Bay Area Water Users Association 2001–2002 Annual Survey (BAWUA 2002)** - Population estimates for wholesale customer service areas are published in the BAWUA Annual Survey each year. Historical population estimates are provided as well as forecasted population estimates for each decade. The *BAWUA 2001–2002 Annual Survey* provides projections out to the year 2030 (BAWUA 2002). BAWUA estimates are provided by the wholesale customer to BAWUA and correspond directly with the wholesale customer service area boundaries. BAWUA does not perform any analysis to verify these projections.
- **Agency Demand or Forecast Studies** - Some agencies provided demand or forecast studies with their own water demand or population projections based on their own evaluations, similar to WMPs. These studies were evaluated as an alternate projection source in the DSS Model.

### ***Development of Yearly Projections to the Year 2030***

Typically, only the BAWUA Annual Survey projected the population to the year 2030 as desired for this study (BAWUA 2002). In addition, none of the population projection sources provided yearly projections, although most provided projections in 5- or 10-year increments. Therefore, the following steps were taken to create yearly projections to 2030 for each of the sources, as necessary:

- The population increase for each 5- or 10-year increment was divided evenly and applied yearly throughout the 5- or 10-year period to form a linear yearly population projection between increments
- For ABAG, the population from 2025–2030 was estimated using the 2020–2025 population growth rate applied to the 2025 estimate and carried forward linearly at that rate to 2030

### ***Population Growth Rates***

Population growth rates were extrapolated from the yearly population projections to 2030 for each source, to utilize the population projections with the DSS 2001 base-year population for each wholesale customer's service area.

To reconcile the ABAG projections with the wholesale customer service areas, it was necessary to create service area blends of ABAG cities, summarized in Table 3-4. A yearly service area population growth rate for the years 2001–2030 was then created for each wholesale customer using the ABAG city's yearly growth rates at those percentages.

***Agency Population Projection Source Selection***

The DSS population projections were tabulated in 5-year increments and graphed for each wholesale customer. Each of these population projections was then applied in the DSS model to create preliminary water demand projections with and without plumbing codes, which were also tabulated, graphed, and submitted to the wholesale customers.

Each wholesale customer was asked to select one of the population projection sources based on the unique characteristics of their service area and consistency with local land use plans and policies. The exception to this is Stanford University. Residential account growth for Stanford University was projected using increase in dwelling units rather than population projections.

Table 4-1 summarizes each wholesale customer's population projection source selection, 2001 base-year population, and corresponding 2030 population derived using the methodology outlined above.

**4.2.2 Use of Employment Projections**

As described above, the DSS model uses growth in number of accounts and end uses to estimate future water demands. For each wholesale customer, the 2001 estimated service area employment (total jobs in service area) was directly related to the number of 2001 commercial and industrial accounts. Growth in those accounts was estimated using an employment growth rate or, in two cases, a total population growth rate. Table 4-1 summarizes 2001 DSS employment and 2030 employment projections for each wholesale customer based on the growth rate from their selected projection source for commercial and industrial accounts. An employment projection was not developed for Los Trancos County Water District (LTCWD) or Stanford University. LTCWD includes only residential accounts. Stanford University used other parameters such as increase in building square footage to forecast growth in Non-Residential accounts.

ABAG was the only published source of employment projections available for the SFPUC wholesale customers. For each wholesale customer, yearly service area employment growth rates were developed for the years 2001 to 2030 using the methodology described in Section 4.2.1 above. ABAG service area blends, summarized in Table 3-4, were used to create the service area specific employment growth rates and projections.

**4.3 PLUMBING CODES AND NATURAL REPLACEMENT RATES**

In the forecasting process of the DSS model, fixture models incorporate the effects of natural replacement and plumbing codes to adjust the end-use water usage over time using a yearly average of fixture conditions for accounts with applicable end uses, including base-year existing accounts and new accounts. Natural replacement of a fixture occurs due to failure, aging, or remodeling. Plumbing codes require that new and replacement fixtures meet specified standards of efficiency. Table 3-9 lists the historical and current plumbing codes.

**Table 4-1  
SFPUC Wholesale Customer Population Projections**

<b>Wholesale Customer</b>	<b>Projection Source Selected for Growth Rates</b>	<b>2001 DSS (Base Year) Population</b>	<b>2030 DSS Population</b>	<b>2001 DSS (Base Year) Employment</b>	<b>2030 DSS Employment</b>
Alameda County Water District	ABAG Sub. Reg. 2002	316,523	379,931	151,092	221,858
Brisbane, City of	City Planning <sup>1</sup>	3,174	4,606	3,789	19,575
Burlingame, City of	ABAG Sub. Reg. 2002	30,154	34,967	31,205	36,160
CWS - Bear Gulch District	BAWUA Survey <sup>2</sup>	66,197	73,719	42,899	47,774
CWS - Mid Peninsula District	ABAG Sub. Reg. 2002	120,856	139,834	79,493	100,568
CWS - South San Francisco District	ABAG Sub. Reg. 2002	49,207	59,584	49,288	62,344
Coastside County Water District	ABAG Sub. Reg. 2002	18,319	24,973	5,402	6,795
Daly City, City of	ABAG Sub. Reg. 2002	106,117	115,651	26,941	33,981
East Palo Alto, City of	ABAG Sub. Reg. 2002	24,395	32,712	3,289	8,673
Estero MID/Foster City	ABAG Sub. Reg. 2002	34,568	40,096	24,318	31,840
Guadalupe Valley MID	City Planning <sup>1</sup>	446	1,558	4,442	5,668
Hayward, City of	ABAG Sub. Reg. 2002	140,439	162,757	87,473	113,843
Hillsborough, Town of	ABAG Sub. Reg. 2002	11,618	12,708	1,216	1,380
Los Trancos County Water District	LTCWD Planning Study	740	1,094	NA <sup>3</sup>	NA <sup>3</sup>
Menlo Park, City of	ABAG Sub. Reg. 2002	12,153	13,655	10,053	13,287
Mid-Peninsula Water District	2000 UWMP	26,443	27,997	14,705	22,221
Millbrae, City of	2002 UWMP	21,460	25,174	6,664	8,009
Milpitas, City of	ABAG Sub. Reg. 2002	62,756	88,841	53,566	76,129
Mountain View, City of	ABAG Jurisdictional 2002	71,160	81,670	75,629	95,669
North Coast County Water District	ABAG Sub. Reg. 2002	40,457	47,829	5,797	7,478
Palo Alto, City of	ABAG Sub. Reg. 2002	59,954	69,199	105,432	114,224
Purissima Hills Water District	ABAG Sub. Reg. 2002	6,032	6,763	420	457
Redwood City, City of	2003 UWMP	81,888	93,535	66,389	83,678
San Bruno, City of	Draft General Plan <sup>4</sup>	40,727	48,229	16,622	25,770
San Jose, City of (portion of north San Jose)	ABAG Sub. Reg. 2002	11,098	13,686	2,500	3,353
Santa Clara, City of	ABAG Sub. Reg. 2002	104,349	140,698	138,163	177,027
Skyline County Water District	BAWUA Survey <sup>5</sup>	1,210	2,683	224	224
Stanford University	Water Master Plan <sup>3</sup>	19,738	27,924	NA <sup>3</sup>	NA <sup>3</sup>
Sunnyvale, City of	ABAG Sub. Reg. 2002	131,365	151,610	125,476	168,950
Westborough Water District	BAWUA Survey <sup>2</sup>	10,017	10,146	1,610	1,631
<b>Total</b>		<b>1,623,560</b>	<b>1,933,829</b>	<b>1,089,588</b>	<b>1,488,566</b>
<b>Increase in Population/Employment from 2001 (%)</b>		<b>19.1%</b>		<b>36.6%</b>	

<sup>1</sup>City planning projections were provided by the city of Brisbane on April 8, 2004, for both the City of Brisbane and Guadalupe Valley MID.

*Source: DSS Models*

<sup>2</sup>Total population projections were used to establish a growth rate for accounts. This 2030 employment number is projection from the 2001 employment using the total population growth rate.

<sup>3</sup>Employment projections are not applicable for LTCWD and Stanford University. LTCWD only has residential accounts. Stanford University used other parameters such as increase in building square footage increase to forecast growth in Non-Residential accounts. Residential account growth for Stanford University was projected using increase in dwelling units rather than population projections.

<sup>4</sup>The City of San Bruno provided projections from the City's Draft General Plan which has not been finalized.

<sup>5</sup>Employment projections were not developed for Skyline because growth is not anticipated in Commercial and Industrial Accounts. The number of accounts was assumed to remain constant.

NA - Not Applicable; CWS - California Water Service (Company); MID - Municipal Improvement District

The rate at which each fixture is replaced is input as a percentage of existing fixtures replaced in a year. The age of housing, income levels, fixture saturation study results, and replacement rate estimates by the CUWCC were all considered in establishing a best estimate of the replacement rates for wholesale customers. The assumed annual replacement rates for each of the three types of fixtures (old, intermediate, and new) are shown in Table 4-2.

**Table 4-2  
Assumed Annual Replacement Rates for Fixtures**

End Use (Account Type)	Average Annual Replacement Rate		
	Old	Intermediate	New
Toilets (Residential)	3.0%	3.0%	4.0%
Shower (Residential)	5.0%	5.0%	5.0%
Clothes Washers (Residential)	6.7%	6.7%	6.7%
Toilets (Commercial)	3.0%	3.0%	4.0%
Urinals (Commercial/Industrial)	3.0%	3.0%	3.0%

Source: CUWCC

A 3 percent replacement rate corresponds to approximately a 33-year fixture life. A 4 percent replacement rate corresponds to approximately a 25-year fixture life. A 6.7 percent replacement rate corresponds to approximately a 15-year fixture life.

**Clothes Washer Replacement Rates**

Because the federal legislation on high-efficiency clothes washers has only begun to affect the market, specific assumptions on the rate of replacement over time had to be made. The Clothes Washer Fixture Models contain an estimate of percent-of-market share for inefficient (old), intermediate-efficiency (intermediate), and high-efficiency (new) clothes washers at various points in time until 100 percent of the clothes washers available on the market are high-efficiency. Table 4-3 provides the market share assumptions used in the Fixture Models.

**Table 4-3  
Estimated Clothes Washer Market Shares**

Year	Clothes Washer Market Shares		
	Old (Top Loader)	Intermediate (Medium Efficiency)	New (Efficient)
1999	50.0%	44.0%	6.0%
2004	40.0%	40.0%	20.0%
2007	40.0%	40.0%	20.0%
2008	0.0%	25.0%	75.0%
2020	0.0%	0.0%	100.0%

Source: Consortium for Energy Efficiency ([www.cee1.org](http://www.cee1.org))

**4.4 RECYCLED WATER USE**

Recycled water was included in demand projections for wholesale customers with approved and funded recycled water programs because recycled water represents a demand that would otherwise be served by potable supply. The DSS model was not set up to project future recycled water use. Rather, a recycled water projection was obtained from those applicable wholesale customers, and simply added onto the *potable* water demand projection to obtain a *total* water demand projection. It was necessary to include all water demand in the future projection but to

continue to isolate potable accounts that would be switching to recycled water over time. The following wholesale customers provided information on approved and funded recycled water programs which was included in base year and/or future demand projections:

- City of Milpitas
- City of Palo Alto
- City of Redwood City
- City of Santa Clara
- City of Sunnyvale

Appendix D provides a complete summary of recycled water information provided by the SFPUC wholesale customers.

The customer-billing data obtained from each customer were solely for potable water consumption. If recycled water information was provided by a wholesale customer, a new account category for recycled water was added to their DSS model. Recycled water use was assumed to be 100 percent outdoor (irrigation) use.

#### **4.5 SUMMARY OF WATER DEMAND FORECASTING**

The water demand forecasting process detailed in this section consists of the following basic steps:

- Projecting growth in the number of accounts
- Applying the fixture models to accounts with applicable end uses, using yearly estimated replacement rates and plumbing codes to arrive at end use percentages for each account
- Adding up the water usage per end use in each billing category to get total new consumption per account per year
- Multiplying the per-account usage by the number of accounts
- Adding UFW as a fixed percentage per year
- Adding recycled water use on top of the potable demand to arrive at a total demand curve, where applicable

For each year in the forecast, the number of accounts for each billing category is increased from the prior year by the corresponding years growth rate. This growth rate is based on either a population or employment projection. Each account has an associated water use, in gallons per day, determined by the model calibration and affected over time by applicable fixture models. So adding a new account adds the applicable water use, which is then summed to make a new total consumption for each year. UFW is then added as a fixed percentage and that sum is the projected water production for that year. So year by year the projection is extended to the ending year (30 years from the start). The next section provides the 2030 demand projections resulting from the water demand forecasting.

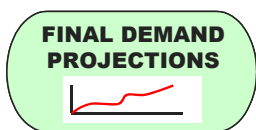


**Section 5**  
**Water Demand Projections**

**5.1 INTRODUCTION**

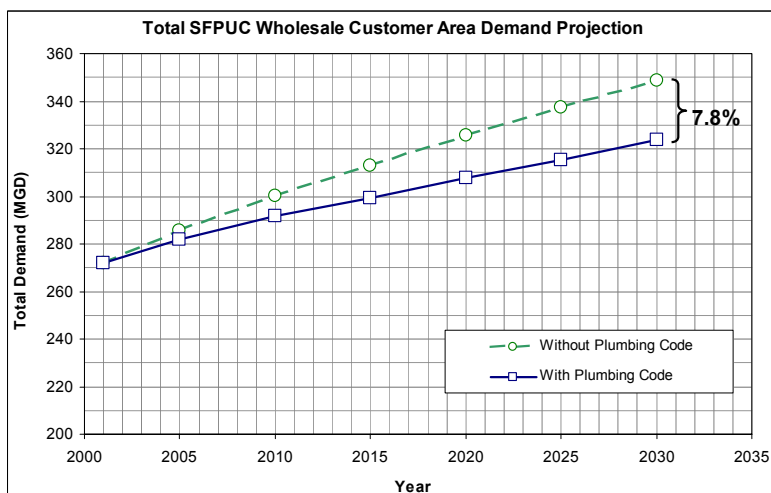
This section presents water demand projection results for each wholesale customer using the methodology described in this memo. Figure 5-1 and Table 5-1 summarize the demand projection results. Table 5-2 and Figure 5-2 provide additional summary data for the year 2030. The remainder of this section describes the concurrence process of the model input and outputs by the wholesale customers.

**5.2 WATER DEMAND PROJECTION RESULTS**



DSS model input and output were developed according to the methodology presented in Sections 3 and 4 of this report. Data obtained from each wholesale customer were combined with demographic data and water use parameters to establish and calibrate the base-year conditions. Population and employment projections were used to determine the future growth in accounts, and fixture models were used to reflect the impacts of plumbing codes, and natural replacement on accounts with applicable end uses (existing base-year accounts and new accounts). The effects of new future conservation programs in the wholesale customer service area are not included in these water demand projections. A companion report *SFPUC Wholesale Customer Water Conservation Potential* (URS 2004) provides an account of potential water conservation savings in the wholesale customer service area out to 2030. In addition, although future planned recycled water projects for which funding has already been set aside are incorporated into the final water demand projections, a technical memorandum, *SFPUC Wholesale Customer Recycled Water Potential* (RMC 2004), provides potential estimates on additional recycled water not yet funded in the wholesale customer service area.

Figure 5-1 shows the total water demand projection as a sum of all wholesale customers. This sum is projected total water demand, not demand for SFPUC supplies. To gauge the effect of the plumbing codes and natural fixture replacement, each DSS model was rerun without the fixture models in place. These results were also summed to obtain a total water demand projection without fixture replacement as illustrated in Figure 5-1. The plumbing codes and natural fixture replacement represents a 7.8% water savings in 2030.



**Figure 5-1 Total SFPUC Wholesale Customer Area Demand Projection**

# SECTION FIVE

# Water Demand Projections

Table 5-1 lists the total water demand projection results for all of the SFPUC wholesale customers.

**Table 5-1  
Total Water Demand Projections by SFPUC Wholesale Customer**

Wholesale Customer	Base Year 2001 (MGD)	Demand Projections (MGD)						Demand Increase from 2001	
		2005	2010	2015	2020	2025	2030	MGD	%
Alameda County Water District	51.1	53.2	54.5	55.5	56.6	57.9	59.3	8.20	16%
Brisbane, City of	0.44	0.50	0.58	0.67	0.76	0.84	0.93	0.49	111%
Burlingame, City of	4.8	4.8	4.8	4.8	4.9	4.9	4.9	0.12	3%
CWS - Bear Gulch District	13.4	13.5	13.6	13.6	13.7	13.7	13.9	0.48	4%
CWS - Mid Peninsula District	17.2	17.5	17.7	17.7	17.8	18.0	18.1	0.94	5%
CWS - South San Francisco District	8.9	9.0	9.1	9.2	9.5	9.6	9.9	1.00	11%
Coastside County Water District	2.6	2.7	2.9	3.0	3.1	3.1	3.2	0.63	25%
Daly City, City of	8.7	8.7	9.3	9.3	9.2	9.2	9.1	0.44	5%
East Palo Alto, City of	2.5	2.6	2.8	3.5	4.3	4.6	4.8	2.30	92%
Estero MID/Foster City	5.8	6.0	6.2	6.3	6.5	6.7	6.8	0.98	17%
Guadalupe Valley MID	0.32	0.39	0.47	0.56	0.64	0.72	0.81	0.49	153%
Hayward, City of	19.3	20.8	22.2	23.3	25.0	26.8	28.7	9.40	49%
Hillsborough, Town of	3.7	3.7	3.8	3.8	3.9	3.9	3.9	0.20	5%
Los Trancos County Water District	0.11	0.11	0.12	0.13	0.14	0.14	0.14	0.03	32%
Menlo Park, City of	4.1	4.1	4.3	4.4	4.5	4.6	4.7	0.61	15%
Mid-Peninsula Water District	3.7	3.7	3.6	3.7	3.7	3.7	3.8	0.15	4%
Millbrae, City of	3.1	3.3	3.3	3.3	3.3	3.3	3.3	0.17	5%
Milpitas, City of	12.0	13.0	14.2	15.3	16.1	16.9	17.7	5.74	48%
Mountain View, City of	13.3	13.4	13.8	14.1	14.4	14.6	14.8	1.53	12%
North Coast County Water District	3.6	3.7	3.7	3.7	3.7	3.7	3.8	0.17	5%
Palo Alto, City of	14.2	14.5	14.5	14.6	14.7	14.7	14.7	0.49	3%
Purissima Hills Water District	2.2	2.4	2.6	2.8	2.9	3.1	3.3	1.12	51%
Redwood City, City of	11.9	12.1	12.7	13.0	13.2	13.3	13.4	1.54	13%
San Bruno, City of	4.4	4.2	4.3	4.3	4.4	4.4	4.5	0.07	2%
San Jose, City of (portion of north San Jose)	5.2	5.4	5.7	6.0	6.1	6.3	6.5	1.31	25%
Santa Clara, City of	25.8	28.0	29.7	30.9	31.9	32.9	33.9	8.10	31%
Skyline County Water District	0.17	0.19	0.21	0.26	0.31	0.31	0.31	0.14	82%
Stanford University	3.9	4.3	4.7	5.1	5.7	6.2	6.8	2.94	76%
Sunnyvale, City of	24.8	25.0	25.3	25.6	25.9	26.3	26.8	1.99	8%
Westborough Water District	0.99	1.00	0.95	0.93	0.91	0.89	0.88	-0.11	-11%
<b>Total</b>	<b>272</b>	<b>282</b>	<b>292</b>	<b>299</b>	<b>308</b>	<b>315</b>	<b>324</b>	<b>52</b>	<b>19%</b>

CWS – California Water Service (Company)  
MID – Municipal Improvement District

Source: DSS Models

Table 5-2 provides a breakdown of the average indoor and outdoor water usage for Single-Family Residential, Multi-Family Residential, and Non-Residential accounts for the 2030 water demand projections.

**Table 5-2  
SFPUC Wholesale Customer Water Use (Projected Year 2030)**

Wholesale Customer	All Category TOTAL (gpcd)				Single-Family Residential (gpcd)				Multi-Family Residential (gpcd)				Non-Residential (gpcd)			
	Total Consumption	Indoor	Outdoor	% Outdoor	Total Consumption	Indoor	Outdoor	% Outdoor	Total Consumption	Indoor	Outdoor	% Outdoor	Total Consumption	Indoor	Outdoor	% Outdoor
Alameda County Water District	93	56	37	40%	96	61	36	37%	68	55	12	18%	97	52	45	47%
Brisbane, City of	36	22	14	39%	62	54	9	14%	41	35	6	14%	31	16	15	50%
Burlingame, City of	75	44	31	41%	95	57	37	40%	64	52	12	19%	46	34	12	26%
CWS - Bear Gulch District	116	47	69	59%	156	59	97	62%	62	51	10	17%	40	27	12	31%
CWS - Mid Peninsula District	79	47	31	40%	96	59	37	38%	56	49	7	12%	48	34	14	29%
CWS - South San Francisco District	98	59	39	40%	64	52	13	20%	51	49	2	4%	87	66	21	24%
Coastside County Water District	77	54	23	30%	62	50	12	20%	57	50	7	13%	214	67	147	69%
Daly City, City of	64	47	17	26%	58	49	9	15%	55	47	8	14%	57	44	13	22%
East Palo Alto, City of	122	78	44	36%	62	55	7	11%	44	39	6	12%	302	187	115	38%
Estero MID/Foster City	69	47	23	33%	114	74	39	34%	76	62	14	18%	87	22	65	75%
Guadalupe Valley MID	45	26	19	42%	79	57	22	28%	NA	NA	NA	NA	111	18	93	84%
Hayward, City of	113	64	49	43%	118	72	46	39%	61	43	18	29%	94	70	25	26%
Hillsborough, Town of	278	109	170	61%	278	109	170	61%	NA	NA	NA	NA	NA	NA	NA	NA
Los Trancos County Water District	117	47	69	60%	117	47	69	60%	NA	NA	NA	NA	NA	NA	NA	NA
Menlo Park, City of	187	99	88	47%	130	74	56	43%	67	49	18	27%	212	131	81	38%
Mid-Peninsula Water District	79	45	34	43%	95	53	42	44%	58	51	7	12%	54	37	17	32%
Millbrae, City of	100	60	40	40%	82	52	30	37%	55	46	8	15%	153	89	64	42%
Milpitas, City of	111	63	49	44%	95	57	38	40%	58	52	6	10%	117	71	46	39%
Mountain View, City of	75	45	29	39%	99	62	37	37%	67	54	13	19%	76	35	41	53%
North Coast County Water District	64	45	19	30%	65	47	19	29%	55	45	10	18%	66	34	32	48%
Palo Alto, City of	70	39	31	44%	132	70	62	47%	84	66	18	21%	50	22	28	57%
Purissima Hills Water District	292	78	214	73%	300	78	222	74%	NA	NA	NA	NA	346	89	257	74%
Redwood City, City of	68	42	26	38%	92	57	35	38%	85	63	22	26%	50	23	27	54%
San Bruno, City of	58	42	16	28%	66	54	12	19%	53	44	10	18%	44	26	18	41%
San Jose, City of (portion of north San Jose)	326	181	145	44%	78	62	16	21%	70	57	13	18%	1500	681	819	55%
Santa Clara, City of	116	62	54	46%	130	66	64	49%	71	53	18	26%	100	65	35	35%
Skyline County Water District	99	56	44	44%	99	56	43	43%	NA	NA	NA	NA	83	50	33	40%
Stanford University	83	43	40	48%	NA	NA	NA	NA	54	35	19	35%	NA	NA	NA	NA
Sunnyvale, City of	71	43	28	40%	111	67	44	39%	78	58	20	25%	60	25	35	58%
Westborough Water District	65	53	12	18%	61	55	6	10%	50	44	6	13%	128	49	78	61%
<b>Weighted Average</b>	<b>87</b>	<b>54</b>	<b>34</b>	<b>39%</b>	<b>102</b>	<b>61</b>	<b>41</b>	<b>41%</b>	<b>67</b>	<b>52</b>	<b>14</b>	<b>21%</b>	<b>85</b>	<b>48</b>	<b>37</b>	<b>44%</b>
<b>Median</b>	<b>81</b>	<b>47</b>	<b>35</b>	<b>44%</b>	<b>95</b>	<b>57</b>	<b>37</b>	<b>39%</b>	<b>58</b>	<b>50</b>	<b>10</b>	<b>18%</b>	<b>87</b>	<b>44</b>	<b>35</b>	<b>40%</b>

NA - Not Applicable

Single-family per capita - consumption divided by single-family population

Multi-family per capita - consumption divided by multi-family population

Non-residential per employee - consumption divided by employment

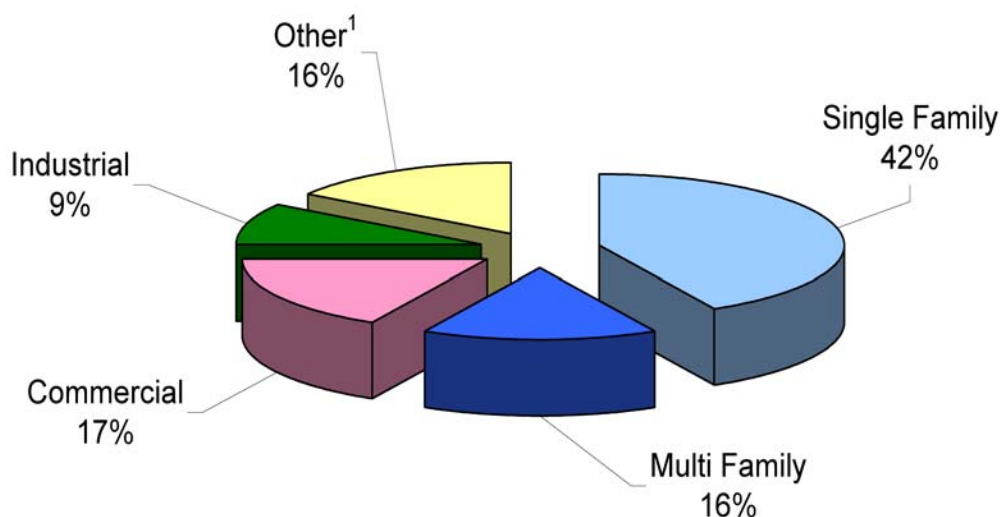
gped - gallons per employee per day

gpcd - gallons per capita per day

CWS - California Water Service (Company)

MID - Municipal Improvement District

Source: DSS models



<sup>1</sup>“Other” category includes miscellaneous uses, institutional uses, municipal uses, irrigation/landscape use where these water uses are separately metered.

**Figure 5-2 Breakdown of SFPUC Wholesale Customer Area Water Consumption by Customer Category (Projected Year 2030)**

Table 4-1 indicates that the population in the SFPUC wholesale customer service area will increase by 19.1 percent from 2001 to 2030, while the employment increase in the wholesale service area over the same period is 36.6 percent. Table 5-1 further indicates that water demands are expected to increase by only 19 percent despite the combined increase in employment and population. This is due to the effect of the plumbing code that reduces future projected demands by 7.8 percent.

Table 3-2 demonstrates indoor and outdoor consumption for residential and non-residential uses in the 2001 base year. For the base year, the weighted averages of residential water use are 108 gpcd and 75 gpcd for Single-Family and Multi-Family Residential accounts, respectively. As Table 5-2 indicates, for the projected year 2030 the weighted averages of residential water use are 102 gpcd and 67 gpcd for Single-Family and Multi-Family Residential accounts, respectively. Nearly all of the 2030 reduction is in indoor usage due to the plumbing code impacts.

Figure 3-2 shows the base year 2001 breakdown of SFPUC wholesale customers water use by customer category. Figure 5-2 shows the DSS projected year 2030 breakdown of SFPUC wholesale customers water use by customer category. The rates of increase from 2001 to 2030 in population (19.1 percent) and employment (36.6 percent), as discussed above, shift the water use percentages by customer category. A comparison of Figures 3-2 and Figure 5-2 demonstrates a slight decrease in the percentage of residential water use (4 percent) and a slight increase in the percentage of non-residential water use (4 percent) from 2001 to 2030.

### **5.3 CONCURRENCE PROCESS**

Wholesale customers selected and/or concurred in writing with the following items:

- Population Projection Source Selection
- DSS Input Sheets
- Projected Water Demands (Planning Estimate)

Table 4-1 summarizes the projection source selected by each wholesale customer. Copies of the DSS Input Sheets and graphs with final water demands for which each wholesale customer concurred are included in the wholesale customer's corresponding sub-appendix (C1 through C30).

#### **5.3.1 Workshops**

SFPUC organized four workshops to help the wholesale customers understand the modeling process, how each of their inputs would be used to generate results, and how those results will be used for future SFPUC planning purposes. The workshops were given by the SFPUC and its consultants for this study. The consulting team included five individuals who actually performed the modeling (the DSS modelers). One-on-one time was available with DSS modelers during one of the workshops and many wholesale customers used this time to work with their modeler for customizing their model to their agency or for answering technical or process questions.

#### **5.3.2 Correspondence and Feedback**

In addition to the workshops, on two separate occasions one-on-one meetings with SFPUC, its consultants, and BAWSCA were arranged for each wholesale customer. The wholesale customers were additionally provided drafts of their results as model runs were improved and completed. Each round of wholesale customer feedback was addressed by revising the model as needed and making wholesale customer specific adjustments in cases where necessary to appropriately and correctly calibrate the model.

Once the wholesale customers were satisfied with the input values and projection results, they submitted their concurrence forms, concurring with the SFPUC's 2030 projected water demand for their service area for use as an SFPUC planning estimate.

**Section 6**  
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**Appendix A**  
**Description of SFPUC Wholesale Customers**

## **SFPUC WHOLESAL CUSTOMER PROFILES**

### **Alameda County Water District**

The Alameda County Water District service area consists of approximately 103 square miles in southwestern Alameda County. The District supplies water to the cities of Fremont, Newark, and Union City. The combined population of the three cities in the service area in 2001 was 316,523. The District's highest served population is single-family, owner-occupied homes. Only 24.3 percent of the District's water was provided by the San Francisco Public Utilities Commission (SFPUC) in 2001–2002, while groundwater, local surface-water, and other water supplies meet the remaining need.

### **City of Brisbane**

The City of Brisbane is located in northern San Mateo County. In 2001, the City had a residential population of approximately 3,174 residents. The service area encompasses approximately 3.5 square miles, nearly half of which is vacant and in the process of being developed. The City operates two water districts concurrently: City of Brisbane Water District and Guadalupe Valley Municipal Improvement District. The City's only source of potable water is the SFPUC.

### **City of Burlingame**

The City of Burlingame is situated in central San Mateo County and in 2001 had a population of 30,154 residents. The City's water system serves the entire area within its city limits of approximately 5.5 square miles. The system serves portions of the unincorporated Burlingame Hills area and a few properties in the City of San Mateo and Town of Hillsborough as well. The predominant land use is residential, but about 34 percent of the area served is commercial/industrial. The City receives all of its water from the SFPUC.

### **California Water Service Company–Bear Gulch District**

California Water Service Company–Bear Gulch District, located in southern San Mateo County, serves the communities of Atherton, Portola Valley, Woodside, and adjacent unincorporated portions of San Mateo County including West Menlo Park, Ladera, North Fair Oaks, and Menlo Oaks. The District serves approximately 66,000 residents and encompasses nearly 23.8 square miles. The service area comprises predominantly single-family residences, many of which are located on large, landscaped lots. In 2001–2002, water purchased from the SFPUC supplied 90.6 percent of the District's needs, with the balance being supplied by local surface water supply.

## **Appendix A**

### **Description of SFPUC Wholesale Customers**

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#### **California Water Service Company–Mid Peninsula District**

California Water Service Company–Mid Peninsula District is located in central San Mateo County and serves the Cities of San Carlos and San Mateo and adjacent unincorporated portions of San Mateo County, including The Highlands and Palomar Park. In 2001, the District served a population of 120,856 residents and covered approximately 17 square miles. The western portion of the District is hilly and comprised of low density, single-family housing and open space. Lower elevations to the east are composed of higher-density single-family and multi-family residences intermixed with commercial development. All of the District’s water is supplied by the SFPUC.

#### **California Water Service Company–South San Francisco District**

California Water Service Company–South San Francisco District is located in northern San Mateo County, serves the cities of South San Francisco, Colma, a small portion of Daly City, and the unincorporated area known as Broadmoor, which lies between Daly City and Colma. In 2001, the District served a population of 49,207 and encompassed approximately 11.2 square miles. Land use in the service area comprises both residential and commercial areas. In 2001–2002 approximately 89 percent of the District’s water supply was provided by the SFPUC. The remaining was met by groundwater supply.

#### **Coastside County Water District**

Coastside County Water District provides water to the City of Half Moon Bay and several unincorporated coastal communities in San Mateo County, including El Granada, Miramar, and Princeton by the Sea (Pillar Point Harbor). The District’s service area encompasses approximately 14 square miles. In 2001, the District served 18,319 people. The predominant land use is residential surrounded by agricultural or light ranching activities. In 2001–2002 approximately 70 percent of CCWD water was provided by the SFPUC, with the balance provided by local surface water and groundwater.

#### **City of Daly City**

The City of Daly City is located in northern San Mateo County adjacent to the southern boundary of the City and County of San Francisco. In 2001, the City served a population of 106,117. The service area encompasses approximately 7.4 square miles. The predominant land use is residential with a solid core of retail commercial. Daly City receives its water from two primary sources: local groundwater and surface water provided by the SFPUC. In 2001–2002, Daly City purchased approximately 63 percent of its water supply from the SFPUC.

#### **City of East Palo Alto**

The City of East Palo Alto is located in southern San Mateo County. The City is a residential community with some commercial and industrial development. The area is characterized with mostly single-family housing. In 2001, the City had a residential population of 24,395. The City’s service area encompasses approximately 2.5 square miles. The City’s only source of supply is the SFPUC.

## **Appendix A**

### **Description of SFPUC Wholesale Customers**

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#### **Estero Municipal Improvement District**

Estero Municipal Improvement District is situated in central San Mateo County immediately adjacent to the Bay. The area served is predominantly residential with a broad cross section of commercial and light industrial development. The District's service area consists of the City of Foster City and a part of the City of San Mateo. The District serves a population of nearly 35,000 residents and covers approximately 4 square miles. SFPUC provides 100 percent of the District's water.

#### **Guadalupe Valley Municipal Improvements District**

Guadalupe Valley Municipal Improvements District, located in northern San Mateo County, consists primarily of an industrial park development located within the Brisbane City limits, and a small single-family residential enclave. The City of Brisbane operates the District's water utility. The District's service area comprises approximately half of a square mile. In 2001, the service area's residential population was 446, while the transient daytime population was roughly 5,000. The District's only source of potable water is the SFPUC.

#### **City of Hayward**

The City of Hayward, located in southern Alameda County on the east shore of San Francisco Bay, occupies an area of about 61 square miles and in 2001 served a population of roughly 140,000 residents. A balance exists between single-family and multi-family housing with new growth in its industrial sector. Hayward obtains its entire water supply from the SFPUC.

#### **Town of Hillsborough**

The Town of Hillsborough is situated in central San Mateo County. The Town is a single-family residential community zoned for residential estates. In 2001, the Town's population was 11,618. The Town's service area consists of approximately 6.25 square miles and includes the Town of Hillsborough and portions of unincorporated San Mateo County. The Town purchases all of its water from the SFPUC.

#### **Los Trancos County Water District**

Los Trancos County Water District is located in the rural foothills west of Highway 280 near the Town of Portola Valley. It serves a single-family residential population of nearly 740 people and encompasses roughly 4.5 square miles. The District's only source of supply is the SFPUC.

#### **City of Menlo Park**

The City of Menlo Park is located in southern San Mateo County. The City serves a balanced mix of residential, commercial, and industrial users. Though the population of the city of Menlo Park is over 30,785, the Menlo Park Municipal Water Department served only 12,153 residences in 2001. The remaining portions of Menlo Park are operated by the California Water Service's Bear Gulch District, and O'Conner Water District. The Water Department service area encompasses almost 4 square miles. About 96 percent of the water supply is purchased from the SFPUC.

### **Mid-Peninsula Water District**

Mid-Peninsula Water District is located in central San Mateo County, and encompasses approximately 5 square miles. The predominant land use is residential, and in 2001 the District served 26,443 residents living within the City of Belmont, portions of San Carlos, and unincorporated areas. All of the District's water supply is provided by the SFPUC.

### **City of Millbrae**

The City of Millbrae is a residential community situated in northern San Mateo County; the area contains regional commercial and light industrial development. In 2001, the City had a residential population of 21,460. The City owns and operates its water utility. The City's service area consists of approximately 3.2 square miles and includes Capuchino High School in San Bruno. The City's only source of water is the SFPUC.

### **City of Milpitas**

The City of Milpitas is situated in Santa Clara County, and occupies an area of about 13.6 square miles. In 2001, the service area population was 62,756 residents. The City owns and operates its own water utility. In 2001–2002, the City purchased approximately 59.3 percent of its water supply from the SFPUC, while other water sources and recycled water met the remaining need.

### **City of Mountain View**

The City of Mountain View is located in northern Santa Clara County between the cities of Sunnyvale and Palo Alto. The area has a balance of single-family and multi-family housing. In 2001, Mountain View provided water to 71,160 residents. The California Water Service Company serves approximately 625 customers in Mountain View. The City's service area encompasses 11.7 square miles. In 2001–2002, approximately 89.4 percent of the City's water was provided by the SFPUC, and the remaining was provided by groundwater supply and other sources.

### **North Coast County Water District**

North Coast County Water District serves the north coastal areas of San Mateo County. The District's boundaries are nearly those of the City of Pacifica. In 2001, the population of Pacifica was 40,457 residents. The District's service area is primarily residential and consists of nearly 12.6 square miles. The SFPUC provides 100 percent of the District's water supply.

### **City of Palo Alto**

The City of Palo Alto is the only municipality in California to operate six utilities: electric, water, gas, wastewater collection and treatment, storm drainage, and refuse. In 2001, Palo Alto had a residential population of 59,954. The service area encompasses approximately 26 square miles of land. Palo Alto is situated in northern Santa Clara County. In 2001–2001, approximately 99.4 percent of the City's water supply was provided by the SFPUC, while the remaining need was met by recycled water.

## **Appendix A**

### **Description of SFPUC Wholesale Customers**

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#### **Purissima Hills Water District**

Purissima Hills Water District provides service to two-thirds of the Town of Los Altos Hills and unincorporated Santa Clara County land to the south. The District covers 8,600 acres, and in 2001 had a population of 6,023 residents and served predominantly single-family homes on minimum 1-acre lots. The largest customer is Foothill College. The District purchases 100 percent of its water from the SFPUC.

#### **City of Redwood City**

The City of Redwood City is located in southern San Mateo County and supplies water to the City of Redwood City, unincorporated areas of San Mateo County, and portions of the City of San Carlos and the Town of Woodside. In 2001, the City's service area included 81,888 residents and covered roughly 35 square miles. The City purchases all of its potable water from the SFPUC.

#### **City of San Bruno**

The City of San Bruno is situated in northern San Mateo County. The City is a residential community with regional commercial and light industrial development. The City had a residential population of 40,727 in 2001. The City's service area covers nearly 6.1 square miles and includes the City of San Bruno and unincorporated areas of San Mateo County. Two primary water sources exist: local groundwater and surface water purchased from the SFPUC. In 2001–2002, the City purchased approximately 64 percent of its water supply from the SFPUC.

#### **City of San Jose**

The City of San Jose is located in Santa Clara County. The SFPUC serves an area of northern San Jose encompassing 5.3 square miles of land that is predominantly industrial with some residential and commercial land use. In 2001, the service area had a residential population of 11,098. In 2001–2002, the SFPUC provided approximately 96 percent of the service area's water. Recycled water supplied the remaining 4 percent.

#### **City of Santa Clara**

The City of Santa Clara is located at the south end of San Francisco Bay in Santa Clara County. In 2001, the City had a residential population of 104,349. The northern area of the City is predominantly commercial/industrial, while the southern part is primarily residential. The City's service area encompasses nearly 19.4 square miles. Local groundwater is the primary source of potable water. In 2001–2002, the SFPUC provided approximately 16.2 percent of the City's water. Groundwater, recycled water, and other water sources fulfill the remaining need.

## **Appendix A**

### **Description of SFPUC Wholesale Customers**

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#### **Skyline County Water District**

Skyline County Water District is centrally located in San Mateo County. The District is a rural residential community. In 2001, the District had a population of 1,210. The District's service area consists of about 17 square miles including a portion of the Town of Woodside and unincorporated areas of San Mateo County along Highway 35 (Skyline Boulevard) between Highway 84 and Highway 92. The SFPUC is the sole source of water for the District.

#### **Stanford University**

Stanford University lands encompass approximately 8,200 acres in northern Santa Clara County. The central campus, which is the main area served by the Stanford Utilities Division, consists of approximately 2,000 acres or 3.1 square miles. Stanford University has three sources of water supply: water purchased from the SFPUC, local groundwater, and local surface-water supply. In 2001–2002, Stanford University purchased approximately 68 percent of its water supply from the SFPUC.

#### **City of Sunnyvale**

The City of Sunnyvale is located in Santa Clara County. The City is an urban industrial and residential community. In 2001, the City reported a population of 131,356 residents. The service area for the water utility is contiguous with the City limits; however, California Water Service serves several small areas within the City. The service area encompasses nearly 24 square miles. In 2001–2002, approximately 43.6 percent of the City's water supply was provided by the SFPUC. The other sources of water are groundwater, recycled water, and other sources.

#### **Westborough Water District**

Westborough Water District is located in northern San Mateo County within the City of South San Francisco. In 2001, the District served a population of 10,017 residents and has a service area of approximately 1 square mile. The District provides both water and sewer service. The District acquires 100 percent of its water from the SFPUC.



**Appendix B**  
**Summary of Customer-Specific Model Adjustments**

## Appendix B

### Summary of Customer-Specific Model Adjustments

Wholesale Customer	Customer-Specific Adjustments for Model Calibration		
Alameda County Water District	<ul style="list-style-type: none"> <li>No specific assumptions.</li> </ul>		
Brisbane, City of	<ul style="list-style-type: none"> <li>As per the City's request, the following population and employment projections were used. The projections were submitted by the Brisbane City Planning Department (with revisions April 8, 2004).</li> </ul>		
	<b>2000</b>	<b>2030</b>	
	Population	4,606	
	Employment	19,575	
Burlingame, City of	<ul style="list-style-type: none"> <li>No specific assumptions.</li> </ul>		
CWS–Bear Gulch District	<ul style="list-style-type: none"> <li>The Bear Gulch service area is made up of several communities and areas. Therefore, the service area was apportioned into cities and unincorporated areas served.</li> </ul>		
CWS–Mid Peninsula District	<ul style="list-style-type: none"> <li>No specific assumptions.</li> </ul>		
CWS–South San Francisco District	<ul style="list-style-type: none"> <li>No specific assumptions.</li> </ul>		
Coastside County Water District	<ul style="list-style-type: none"> <li>Floriculture use was split out to a separate billing category.</li> <li>Mobile home parks in El Granada removed from multi-family population. Added additional Multi-Family accounts because 2- to 4-unit buildings are billed individually.</li> </ul>		
Daly City, City of	<ul style="list-style-type: none"> <li>Based on input from the City, initial proportion percentages were set for efficient commercial toilets at 50% and low flow Single-Family and Multi-Family Residential showers at 70%.</li> <li>Created new commercial category with a use rate of 25,000 gal/acct/day to account for additional water demand of 0.57 MGD planned in Daly City and provided for this study by the City of Daly City.</li> </ul>		
East Palo Alto, City of	<ul style="list-style-type: none"> <li>Created synthetic multi-family category based on Census 2000 housing data for the purpose of evaluating multi-family conservation measures.</li> <li>Created new categories to represent additional water demand of 1.5 MGD in the Ravenswood Business District as follows: <ul style="list-style-type: none"> <li>1.2 MGD from a new commercial category with a use rate of 5,000 gal/acct/day</li> <li>0.3 MGD from a new single-family category with a use rate of 340 gal/acct/day</li> </ul> </li> <li>Customers served by Palo Alto Mutual Park Water Company and O'Connor Tract Mutual Cooperative Water Company in East Palo Alto were subtracted from total population served, as follows:</li> </ul>		
		<b>Single-Family Residential Accounts</b>	<b>Multifamily Residential Accounts</b>
	Palo Alto Mutual Park Water Company	16	32
	O'Connor Tract Mutual Cooperative Water Company	578	2
Esterro MID/Foster City	<ul style="list-style-type: none"> <li>Used ABAG subregional employment projection for irrigation category because the increase in irrigation accounts will be linked more to growth in commercial accounts in this service area.</li> <li>A special billing category was created for "New Single-Family Residential" accounts. All new accounts above the initial number of single-family accounts in 2001 were placed into this new category. New homes were assumed to be larger and have a higher outdoor water usage than those that existed in 2001.</li> </ul>		

## Appendix B

### Summary of Customer-Specific Model Adjustments

Wholesale Customer	Customer-Specific Adjustments for Model Calibration									
Estero MID/Foster City (cont'd.)	<p>The per-account water usage for the New Single-Family Residential category was assumed to be 450 gpd/account, which is approximately 41% higher than the existing single-family water usage (320 gpd/account). This assumption was based on discussions with the wholesale customer. The increase in water usage was justified by an increasing trend in home prices. The median in 1990 was \$411,700, and in 2000, it was \$566,500, based on census data.</p> <ul style="list-style-type: none"> <li>A special billing category was created for “New Commercial” accounts. All new accounts above the initial number of commercial accounts in 2001 were placed into this new category. New commercial users were assumed to be larger and have a higher water usage than those that existed in 2001. The per-account water usage for the New Commercial 4,000 gpd/account. This assumption was based on discussions with the wholesale customer. Projected new development for commercial water use is expected to consist of large office building complexes.</li> <li>Added the 1,157 toilet rebates to increase the proportion of low flush toilets in Estero Water District to reflect implementation from existing rebate program.</li> </ul>									
Guadalupe Valley MID	<ul style="list-style-type: none"> <li>As per the request of Guadalupe Valley MID, the following population and employment projections were used. The projections were submitted by the Brisbane City Planning Department (with revisions April 8, 2004).</li> </ul> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th style="text-align: center;">2000</th> <th style="text-align: center;">2030</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Population</td> <td style="text-align: center;">438</td> <td style="text-align: center;">1,558</td> </tr> <tr> <td style="text-align: center;">Employment</td> <td style="text-align: center;">4,311</td> <td style="text-align: center;">5,668</td> </tr> </tbody> </table>		2000	2030	Population	438	1,558	Employment	4,311	5,668
	2000	2030								
Population	438	1,558								
Employment	4,311	5,668								
Hayward, City of	<ul style="list-style-type: none"> <li>The Unaccounted-For-Water (UFW) (Water Loss) was increased to 9% as stated in their December 2000 Urban Water Management Plan and requested by the City of Hayward in their memo dated October 24, 2003. The previous UFW was 7.2%, which was the 5-year BAWUA average. However, the 5-year maximum UFW in that same period was 8.7%. The UFW includes hydrant flushing and other maintenance purposes, which in many other cities is categorized as “other.” Based on this documentation, it was reasonable to change the UFW to 9%.</li> <li>A special billing-category account was created for new high-use single-family homes. The category was used to allow higher water usage per account for those future homes at rates provided by the City. An additional 2,200 new higher-use single-family homes with large lots sizes (with extensive landscaping) have been added to the model as requested in the City of Hayward October 24, 2003 memo. A value of 438 gpd/account was used for these new accounts (Hayward currently has single-family homes in the 240–270 range). A value of 400 gpd was originally used for these larger lots in their December 5, 2002 Water Master Plan (Chapter 3, pages 18-20). To date, the City has found in reality that these large lots now being built are actually using up to 600 gpd (October 24, 2003 memo). Therefore, the ultimate range for these new homes is 400–600 gpd. For the DSS model an average of 438 gpd was the number that would get an overall increase of 0.9 mgd by 2030, which seemed realistic for 2,200 larger homes. Again, this value is just slightly higher than the 400 gpd in their Water Master Plan because their field observations show 600 gpd per new account.</li> <li>A special billing-category account was created for new higher demand commercial and industrial users. This new category was based on the General Plan for the City of Hayward. The request was made in the October 24, 2003 memo to make this new higher-use commercial category based on the following statement, “The city anticipates, and is actively marketing to attract, high technology manufacturing facilities to locate in Hayward due to the</li> </ul>									

## Appendix B

# Summary of Customer-Specific Model Adjustments

Wholesale Customer	Customer-Specific Adjustments for Model Calibration
Hayward, City of (cont'd)	<p>affordable and available land for such purposes and proximity of the area to major freeways.” The assumed change for this new industrialization was 400,000 gpd. This new commercial category also includes water for the already city approved developments of a golf course (170,000 gpd for irrigation and up to 700,000 gpd during summer), the Blue Rock Country Club (100,000 gpd), and a new sports park (45,000 gpd).</p> <ul style="list-style-type: none"> <li>• A special billing-category account was created for new renovated single-family homes. The category was used to allow higher water usage per account renovation rate of 2% for single-family homes with 397 gpd per account. Hayward is experiencing renovation due to the fact that the homes in Hayward are more affordable than surrounding areas. The net effect is that homes are being purchased and then remodeled with nicer landscapes and a net increase in water usage. The City of Hayward anticipates the 2% growth rate to continue from now until 2030 creating a total of 16,504 renovated homes. This amount of homes equates to 50% of the new single-family development being “higher use homes.” The remaining 50% of single-family growth would be regular use homes at 245–270 gpd/account (rate changes due to plumbing code. This renovation and usage rate was reviewed and accepted by the City of Hayward and documented in e-mail from Marilyn Mosher on 02/25/04.</li> </ul>
Hillsborough, Town of	<ul style="list-style-type: none"> <li>• Only two customer accounts were used for Hillsborough: single-family homes and institutional employment. According to the Town of Hillsborough, the area has only single-family residential dwellings along with associated institutional accounts (schools, city offices, fire &amp; police dept, etc.).</li> </ul>
Los Trancos County Water District	<ul style="list-style-type: none"> <li>• As an unincorporated area, no census data were available for the Los Trancos Service Area. Demographic data were obtained from a Forecast Study completed by the District.</li> <li>• The demographic forecast used in the model was based on the projected future accounts provided in the Forecast Study completed by the District. This projection was for accounts instead of the usual population projection.</li> <li>• Los Trancos has only Single-Family Residential accounts. These accounts were broken up into two categories: Los Trancos Woods, and Northern, Blue Oaks, and Vista Verde.</li> <li>• The water usage for each category was based on the District’s study.</li> <li>• The average indoor water usage was increased by 10% for accounts in the Los Trancos Woods category to account for the known future conversion from septic to sanitary sewer.</li> <li>• The initial proportion of ULFT fixtures was raised to 90% to reflect current conditions resulting from aggressive implementation of a current toilet program.</li> </ul>
Menlo Park, City of	<ul style="list-style-type: none"> <li>• No specific assumptions.</li> </ul>
Mid-Peninsula Water District	<ul style="list-style-type: none"> <li>• No specific assumptions.</li> </ul>
Millbrae, City of	<ul style="list-style-type: none"> <li>• No specific assumptions.</li> </ul>
Milpitas, City of	<ul style="list-style-type: none"> <li>• A “Recycled Water” category was added to include the recycled water supply. Projected increases in recycled water supply were used to reduce potable water demand for “Irrigation” accounts.</li> <li>• A special billing category was created for “New Single-Family Residential” accounts. All new accounts above the initial number of Single-Family accounts in 2001 were placed into this new category. New homes were assumed to be larger and have a higher outdoor water usage than those that</li> </ul>

## Appendix B

### Summary of Customer-Specific Model Adjustments

Wholesale Customer	Customer-Specific Adjustments for Model Calibration																																	
Milpitas, City of (cont'd)	<p>existed in 2001. The per-account water usage for the New Single-Family Residential category was assumed to be 400 gpd/account, which is approximately 23% higher than the existing single-family water usage (325 gpd/account). This estimate was based on information provided in the Water Master Plan (December 2002) and conversations with the wholesale customer.</p> <ul style="list-style-type: none"> <li>• A special billing category was created for “New Commercial” accounts. All new account growth above the initial number of commercial accounts in 2001 was placed into this new category. These new accounts were assumed to have a higher water usage than those that existed in 2001. The per-account water usage for the New Commercial account category was assumed to be 4,500 gpd/account. This estimate was based on information provided in the Water Master Plan (December 2002) and conversations with the wholesale customer.</li> <li>• Water usage for “Ed Levin Park” was grouped into the “City Domestic Accounts” category. This assumption was made to reduce the number of account categories. Both types of accounts were modeled the same way with respect to growth, plumbing codes and conservation. Therefore grouping them together does not affect the final results.</li> <li>• The initial proportions of toilet fixtures and single-family washing machines was adjusted to account for the high penetration of programs run by Santa Clara Valley Water District.</li> </ul>																																	
Mountain View, City of	<ul style="list-style-type: none"> <li>• The initial proportions of toilet fixtures and single-family washing machines was adjusted to account for the high penetration of programs run by Santa Clara Valley Water District.</li> </ul>																																	
North Coast County Water District	<ul style="list-style-type: none"> <li>• Created synthetic multi-family category based on Census 2000 housing data for the purpose of evaluating multi-family conservation measures.</li> </ul>																																	
Palo Alto, City of	<ul style="list-style-type: none"> <li>• A new water use billing-category was added to the model for recycled water. The future (beyond the base year 2001) increase in recycled water use was used to decrease potable water demand in appropriate categories.</li> </ul>																																	
Purissima Hills Water District	<ul style="list-style-type: none"> <li>• No specific assumptions.</li> </ul>																																	
Redwood City, City of	<ul style="list-style-type: none"> <li>• Population growth was based upon Redwood City’s 2003 Urban Water Management Plan (UWMP) total population and single- and multi-family dwelling units found in Appendix A, page 10. The DSS Model uses the following drivers, which are the same as Redwood City’s Water Use Forecast prepared by John Whitcomb on June 20, 2002, page 4.</li> </ul> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="3" style="background-color: #d3d3d3;">Water Use Drivers by Sector</th> </tr> <tr> <th style="background-color: #d3d3d3;">Water Use Sector</th> <th style="background-color: #d3d3d3;">Water Use Driver</th> <th style="background-color: #d3d3d3;">Source</th> </tr> </thead> <tbody> <tr> <td style="background-color: #d3d3d3;">Single-Family</td> <td style="background-color: #d3d3d3;">Number of SF dwelling units</td> <td style="background-color: #d3d3d3;">2003 Redwood City Urban Water Management Plan</td> </tr> <tr> <td style="background-color: #d3d3d3;">Multifamily</td> <td style="background-color: #d3d3d3;">Number of MF dwelling units</td> <td style="background-color: #d3d3d3;">2003 Redwood City Urban Water Management Plan</td> </tr> <tr> <td style="background-color: #d3d3d3;">Commercial</td> <td style="background-color: #d3d3d3;">Number of employees</td> <td></td> </tr> <tr> <td style="background-color: #d3d3d3;">(in DSS Model listed as COM Employment)</td> <td style="background-color: #d3d3d3;">2002 ABAG</td> <td></td> </tr> <tr> <td style="background-color: #d3d3d3;">Commercial Irrigation</td> <td style="background-color: #d3d3d3;">Number of employees</td> <td></td> </tr> <tr> <td style="background-color: #d3d3d3;">(in DSS Model listed as COM Employment)</td> <td style="background-color: #d3d3d3;">2002 ABAG</td> <td></td> </tr> <tr> <td style="background-color: #d3d3d3;">Government</td> <td style="background-color: #d3d3d3;">Total Population</td> <td style="background-color: #d3d3d3;">2003 Redwood City Urban Water Management Plan</td> </tr> <tr> <td style="background-color: #d3d3d3;">Other</td> <td style="background-color: #d3d3d3;">Total Population</td> <td style="background-color: #d3d3d3;">2003 Redwood City Urban Water Management Plan</td> </tr> <tr> <td style="background-color: #d3d3d3;">Residential Irrigation</td> <td style="background-color: #d3d3d3;">Number of MF dwelling units</td> <td style="background-color: #d3d3d3;">2003 Redwood City Urban Water Management Plan</td> </tr> </tbody> </table>	Water Use Drivers by Sector			Water Use Sector	Water Use Driver	Source	Single-Family	Number of SF dwelling units	2003 Redwood City Urban Water Management Plan	Multifamily	Number of MF dwelling units	2003 Redwood City Urban Water Management Plan	Commercial	Number of employees		(in DSS Model listed as COM Employment)	2002 ABAG		Commercial Irrigation	Number of employees		(in DSS Model listed as COM Employment)	2002 ABAG		Government	Total Population	2003 Redwood City Urban Water Management Plan	Other	Total Population	2003 Redwood City Urban Water Management Plan	Residential Irrigation	Number of MF dwelling units	2003 Redwood City Urban Water Management Plan
Water Use Drivers by Sector																																		
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## Appendix B

# Summary of Customer-Specific Model Adjustments

Wholesale Customer	Customer-Specific Adjustments for Model Calibration
Redwood City, City of (cont'd.)	<ul style="list-style-type: none"> <li>The planning staff indicated (based on October 15, 2003 Redwood City memorandum) that only 68 additional single-family units in the City and 281 units outside the City will be built by the year 2020. Other than these 349 new Single-Family accounts, all other future residential housing growth will be in high-density multi-family dwelling units. The predicted number of accounts can be found in the 2003 Redwood City Urban Water Management Plan, Appendix A, page 10.</li> </ul>
San Bruno, City of	<ul style="list-style-type: none"> <li>Added in a special pattern of UFW as follows: 2001=14%, 2002=7%, 2003=7.5%, 2004=8%, and 2005=8.5%.</li> <li>Created synthetic multi-family category based on Census 2000 housing data for the purpose of evaluating multi-family conservation measures.</li> <li>Lowered the Single-Family Residential use rate because of the removal of some Multi-Family Residential accounts to create the multi-family category.</li> <li>Used population and employment projections from San Bruno Draft General Plan Update.</li> </ul>
San Jose, City of (portion of north San Jose)	<ul style="list-style-type: none"> <li>Demographic data were based on Census 2000 for the City of San Jose; however, the service area being modeled is only a portion of north San Jose. Therefore, the data were adjusted by the approximate percentage of the population that resides within that service area. This percentage was determined from the total service area population provided in the BAWUA survey.</li> <li>The initial proportions of toilet fixtures and single-family washing machines was adjusted to account for the high penetration of programs run by Santa Clara Valley Water District.</li> </ul>
Santa Clara, City of	<ul style="list-style-type: none"> <li>A new water use billing category was added to the model for recycled water. The future (beyond the base year 2001) increase in recycled water use was used to decrease potable water demand in appropriate categories.</li> <li>The recycled water sales to commercial accounts are much larger than those for other categories in Santa Clara (residential, institutional, or industrial). Also, only the commercial category showed a substantially increasing trend in the historical data. Therefore, all additional recycled water supply was subtracted from future commercial water demand.</li> <li>A special billing-category account was created for a power plant due to come on line at the end of 2004 in Santa Clara. Average water use for this account was provided by the City.</li> <li>A special billing-category account was created for new single-family homes. The category was used to allow higher water usage per account for those future homes at rates provided by the City.</li> <li>The initial proportions of toilet fixtures and single-family washing machines was adjusted to account for the high penetration of programs run by Santa Clara Valley Water District.</li> </ul>
Skyline County Water District	<ul style="list-style-type: none"> <li>Demographic data such as household sizes were checked against Census 2000 data for the City of Woodside, which is partially served by the District.</li> </ul>

## Appendix B

### Summary of Customer-Specific Model Adjustments

Wholesale Customer	Customer-Specific Adjustments for Model Calibration
Stanford University	<ul style="list-style-type: none"> <li>• Stanford University has special billing categories to reflect the campus as it is not a city, district, or agency. The categories used for Stanford University include; Residential student housing, faculty single-family housing, faculty multi-family housing, medical school occupants, construction projects, commercial space occupants, academic occupants, and athletic facility users.</li> <li>• A special billing-category account called “Lake System Water” was added. The category was used to include the lake water that is used for irrigation purposes on campus. The net effect of this specific change was an increase in the total water demand.</li> </ul>
Westborough Water District	<ul style="list-style-type: none"> <li>• Demographic data were based on Census 2000 for the City of South San Francisco; however, the service area being modeled is only a portion of that city. Therefore, the data were adjusted by the approximate percentage of the population that resides within that service area. This percentage was determined from the total service area population provided in the BAWUA Annual Survey (BAWUA 2002).</li> </ul>

ABAG - Association of Bay Area Governments  
 BAWUA - Bay Area Water Users Association  
 CWS - California Water Service (Company)  
 gpd - gallon(s) per day  
 MGD - million gallon(s) per day

MID - Municipal Improvement District  
 SFPUC - San Francisco Public Utilities Commission  
 UFW - Unaccounted-for-water  
 UWMP - Urban Water Management Plans

**Appendix C**  
**SFPUC Wholesale Customer Demand Projection Information**



**Appendix C1**  
**Alameda County Water District**

# Alameda County WD Water Service Area<sup>1</sup>

## DSS Input Sheet

### FINAL INPUT SHEET

#### Base Year Average Use and Indoor Percentages by Billing Category for DSS Model<sup>2</sup>

Year	Single family		Multifamily		Business		Industrial		Other		Irrigation									
	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor
2001	331	67%	3747	84%	2023	81%	6402	80%	4803	39%	2809	0%								

Bimonthly                      Bimonthly

Data for DSS Model - - Base Year 2001						
Category	Number of Accounts FY. 2001 <sup>3</sup>	Water Use 2001 gpd/a <sup>4</sup>	Water Use, MGD 2001	Use Profile Percent	Water Use gpd	Indoor Water Use gpd
Single family	70,021	331	23.17	48.88%	107	72
Multifamily	2,100	3,747	7.87	16.60%	78	65
Business	2,347	2,023	4.75	10.02%		
Industrial	719	6,402	4.60	9.70%		
Other	425	4,803	2.04	4.30%		
Irrigation	1,772	2,809	4.98	10.50%		
0	0	0	0.00	0.00%		
0	0	0	0.00	0.00%		
Total	77,383		47.41	100.00%		
Total Water Purchased (produced) <sup>5</sup> =			46.84	MGD		
Unaccounted For Water (UFW) <sup>6</sup> =			7.8%	Percent	From 5 year BAWUA Survey average	
<b>Estimated UFW for DSS Model</b> =			7.8%	Percent	7% if actual is < 7%, otherwise = E25	
Water Produced for use in DSS Model			51.10	MGD	Add UFW to Total Water Use	
Peaking Factor			1.80	Provided by Agency or SFPUC Water Master Plan (or NA)		
<b>Peaking Factor for DSS Model</b> =			1.8	If NA use default value of 1.6.		

Blue cells are entered by modeler  
Yellow cells are input to DSS Model

#### NOTES

1 - Communities served (includes all or portions of) Fremont, Newark and Union City according to BAWUA survey

2 - Average gpd/a is based on a 12-month moving average through December 2001. Indoor use is based on average of 2 lowest consecutive months in the winter if meters read bimonthly, or single lowest month if meters read monthly.

3 - Number of accounts is from data provided by water agency for this project (see worksheet with account data in this file)

4 - Total water Purchased (produced) taken from BAWUA for Fiscal Year 2001-2002 or agency if provided. For ACWD the information was provided and can be found in this file.

5 - Unaccounted for Water (UFW) is the percent difference between the total water purchased and the total water use.

6 - For reference see additional population estimates provided in population and employment estimates corresponding to service area table.

7 - Initial estimate based on census data for renter occupied units. For reference see table below that has 2000 census data for corresponding water service area city or cities.

2000 Census Data	
Average household size	3.13
Average household size of owner-occupied unit	3.21
Average household size of renter-occupied unit	2.99
Homeowner vacancy rate (percent)	0.55
Rental vacancy rate (percent)	1.55

8 - (INSERT ADDITIONAL ASSUMPTIONS FOR THIS SERVICE AREA)

Data Prepared : July 24, 2003                      By: M. Maddaus  
Revised: September 05, 2003

#### Reconcile agency account billing data and census data

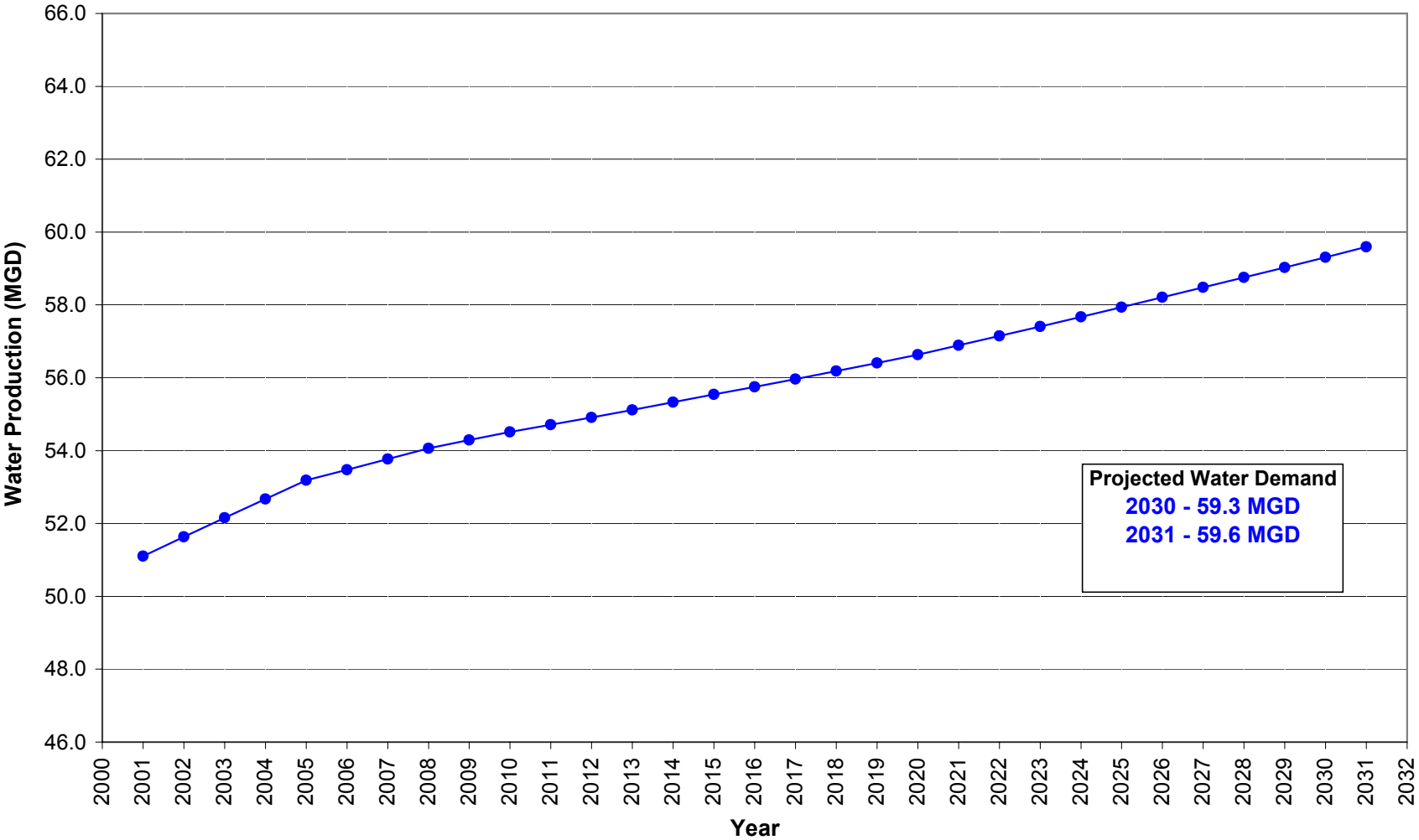
Total Dwelling Units in Census 2000 for Fremont, Newark, and Union City						
Category	2000 Units	No. Buildings	Service Area Billing Accounts - Year 2000		Difference between billing and census data	Data Sources / Notes
			3			
<b>Single family</b>						
1-detached	62,474	62,474				
1-attached	10,724	10,724				
Subtotal	73,198	73,198	67,256		-5,942	Housing Characteristics from U.S. Census Bureau
<b>Multi family</b>						
2-units	940	470				
3-4 units	3,893	1,112				
5 to 9 units	4,041	577				
10-19 units	3,486	232				
20 or more units	14,167	283				Meter for assumed 50 units per building
mobile homes	922	18				Meter for mobile home parks, assume 50 per park
Subtotal	27,449	2,694	2,059		-635	Must be more than one building on an MF meter.
MF Average =	10.2	units/building			13.3	units/account
Total SF + MF units =	100,647					

Population and Household Size in Census 2000 for Fremont, Newark, Union City						
Category	ACWD Service Area Cities		Estimated Service Area Population 2001	Data Sources / Notes		
	Census Population 2000	Estimated Population 2001				
Total Population from Census data <sup>6</sup> =	312,753	316,800		Estimated growth from 2000 to 2001 (CA DOF Projections):	1.29%	
Subtract Institutionalized Population =	970	983		Estimated employment growth from 2000 to 2001 (ABAG Employment Projections):	1.49%	
Residential Population =	311,783	315,817		Water use for the institutionalized population is accounted for in nonresidential billing categories		
Avg. HHS <sup>7</sup> =	3.10			Residential population shown corresponds to the city or cities represented by Census data		
MF Pop @ MF HHS <sup>7</sup> =	3.60	98,816	100,095	100,800	31.7%	Percent of Population that is MF
SF Pop =	212,967	215,722	215,722	215,722	68.3%	Percent of Population that is SF
SF HHS <sup>7</sup> =	2.91					
Total			316,523	100.0%		
			-4,402			Difference in our estimate and average of 2000-2001 and 2001-2002 BAWUA Surveys
			-5,385			Difference in our estimate and the average 2000-2001 and 2001-2002 BAWUA Surveys including institutionalized population
Estimate Service Area Dwelling Units for 2001						
SF Res	74,145	Equals No. Buildings from cell M21 plus growth in accounts for one year from cell T38				
MF Res	28,000	Equals billing accounts in 2001 from cell C16 times average units per account in cell N30 (or average units per building in cell L30 to minimize population difference in cell N47)				
Population and Employment Estimates Corresponding to Service Area						
		Population	Employment			
2000 Census data for jurisdiction		312,753	NA			
2000 ABAG (jurisdictional)		312,753	145,770			
2005 ABAG Projection (jurisdictional)		333,900	156,660			
2000 ABAG (subregional)		312,767	145,760			
2005 ABAG Projection (subregional)		333,900	156,660			
2000 Department of Finance Benchmark		312,753		From State of California Department of Finance (DOF) table E-4 as of 4-1-2000. Website www.dof.ca.gov		
2001 Department of Finance Estimate		316,800		From State of California Department of Finance table E-4 as of 1-1-2001. Website www.dof.ca.gov		
2002 Department of Finance Estimate		321,750		From State of California Department of Finance table E-4 as of 1-1-2002. Website www.dof.ca.gov		
FY 2000-2001 BAWUA service area		319,400	NA			
FY 2001-2002 BAWUA service area		322,450	NA			
2001 Employment in Service Area (input to DSS Model) =			151,092	Service Area Employment is determined by the ratio of the 2000-2001 BAWUA service area population to the 2000 ABAG Subregional Population and escalated to 2001 using the assumed growth rate in cell T39. (EXPLAIN SOURCE)		

#### Definitions / Abbreviations

ABAG	Association of Bay Area Governments	MF	multi family
BAWUA	Bay Area Water Users Association	MGD	million gallons per day
DSS	Decision Support System Model	No.	number
du	dwelling unit	Pop	population
FY	Fiscal Year	Res	residential
gpd/a	gallons per day / per account	SF	single family
gpd	gallons per day	UFW	unaccounted for water
HHS	household size		

# ACWD Projected Water Demand (Planning Estimate) FINAL RESULTS



**Appendix C2**  
**Brisbane, City of**

# City of Brisbane Water Service Area<sup>1</sup>

## DSS Input Sheet

### FINAL INPUT SHEET

#### Base Year Average Use and Indoor Percentages by Billing Category for DSS Model<sup>2</sup>

Year	Single Family		Multifamily		Commercial		Irrigation													
	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor
2001	165	88%	476	88%	845	76%	5400	0%												

#### Data for DSS Model - - Base Year 2001

Category	Number of Accounts FY. 2001 <sup>3</sup>	Water Use 2001 gpd/a <sup>2</sup>	Water Use, MGD 2001	Use Profile Percent	Water Use gpd	Indoor Water Use gpd
Single Family	941	165	0.16	37.93%	72	63
Multifamily	106	476	0.05	12.36%	50	44
Commercial	99	845	0.08	20.47%		
Irrigation	22	5,400	0.12	29.24%		
0		0	0.00	0.00%		
0		0	0.00	0.00%		
0		0	0.00	0.00%		
0		0	0.00	0.00%		
Total	1,169		0.41	100.00%		
Total Water Purchased (produced) <sup>4</sup> =			0.41	MGD		
Unaccounted For Water (UFW) <sup>5</sup> =			3%	Percent		
<b>Estimated UFW for DSS Model =</b>			7%	Percent	From 5 year BAWUA Survey average	
Water Produced for use in DSS Model			0.44	MGD	Add UFW to Total Water Use	
Peaking Factor			1.90	Provided by Agency or SFPUC Water Master Plan (or NA)		
<b>Peaking Factor for DSS Model =</b>			1.9	If NA use default value of 1.6.		

- Yellow cells are input to DSS Model

#### NOTES

1 - Communities served (includes all or portions of) Brisbane and nearby unincorporated areas according to BAWUA survey

2 - Average gpd/a is based on a 12-month moving average through December 2001. Indoor use is based on average of 2 lowest consecutive months in the winter if meters read bimonthly, or single lowest month if meters read monthly.

3 - Number of accounts is from data provided by water agency for this project (see worksheet with account data in this file)

4 - Total water Purchased (produced) taken from BAWUA for Fiscal Year 2001-2002 or agency if provided.

5 - Unaccounted for Water (UFW) is the percent difference between the total water purchased and the total water use.

6 - For reference see additional population estimates provided in population and employment estimates corresponding to service area table.

7 - Initial estimate based on census data for renter occupied units. For reference see table below that has 2000 census data for corresponding water service area city or cities.

#### 2000 Census Data

Average household size	2.20
Average household size of owner-occupied unit	2.39
Average household size of renter-occupied unit	1.81
Homeowner vacancy rate (percent)	6.90
Rental vacancy rate (percent)	4.10

Data Prepared : August 15, 2003

Revised: April 8, 2004

By: B. Skeens

#### Reconcile agency account billing data and census data

##### Total Dwelling Units in Census 2000 for the Brisbane WD (Subtract GVMID Housing Units, assume all SF)

Category	2000 Units	No. Buildings	Service Area Billing Accounts - Year 2000 <sup>3</sup>	Difference between billing and census data	Data Sources / Notes
<b>Single family</b>					
1-detached	617	617			383 Subtract housing units in Guadalupe WD (assume all SF)
1-attached	258	258			
Subtotal	875	875	941		
<b>Multi family</b>					66 Housing Characteristics from U.S. Census Bureau
2-units	133	67			
3-4 units	41	12			
5 to 9 units	141	20			
10-19 units	152	10			
20 or more units	50	1			Meter for assumed 50 units per building
mobile homes	43	1			Meter for mobile home parks, assume 50 per park
Subtotal	560	110	109	-1	
MF Average =	5.1	units/building		5.1	units/account
Total SF + MF units =	1,435				

##### Population and Household Size in Census 2000 for the Brisbane WD (Subtract GVMID population)

Category	Brisbane WD Census Population 2000	Brisbane WD Estimated Population 2001	Estimated Residential Service Area Population 2001	Data Sources / Notes
Total Population from Census data <sup>6</sup> =	3,154	3,174	3,174	Estimated growth from 2000 to 2001 (CA DOF Projections): 0.64%
Subtract Institutionalized Population =	0	0	0	Estimated employment growth from 2000 to 2001 (ABAG Employment Projections): 1.73%
Residential Population =	3,154	3,174	3,174	Water use for the institutionalized population is accounted for in nonresidential billing categories
Avg. HHS <sup>7</sup> =	2.20			Residential population shown corresponds to the city or cities represented by Census data
MF Pop @ MF HHS <sup>7</sup> =	1,800	1,008	1,014	443 Subtract people in Guadalupe WD
SF Pop =	2,146	2,160	2,160	Percent of Population that is MF
SF HHS <sup>7</sup> =	2.45			Percent of Population that is SF
Total		3,174	3,174	100.0%
		5	5	Difference in our estimate and average of 2000-2001 and 2001-2002 BAWUA Surveys
		5	5	Difference in our estimate and the average 2000-2001 and 2001-2002 BAWUA Surveys including institutionalized population

##### Estimate Service Area Dwelling Units for 2001

SF Res	881	Equals No. Buildings from cell M21 plus growth in accounts for one year from cell T38
MF Res	564	Equals No. Units from cell L29 plus growth in accounts for one year from cell T38

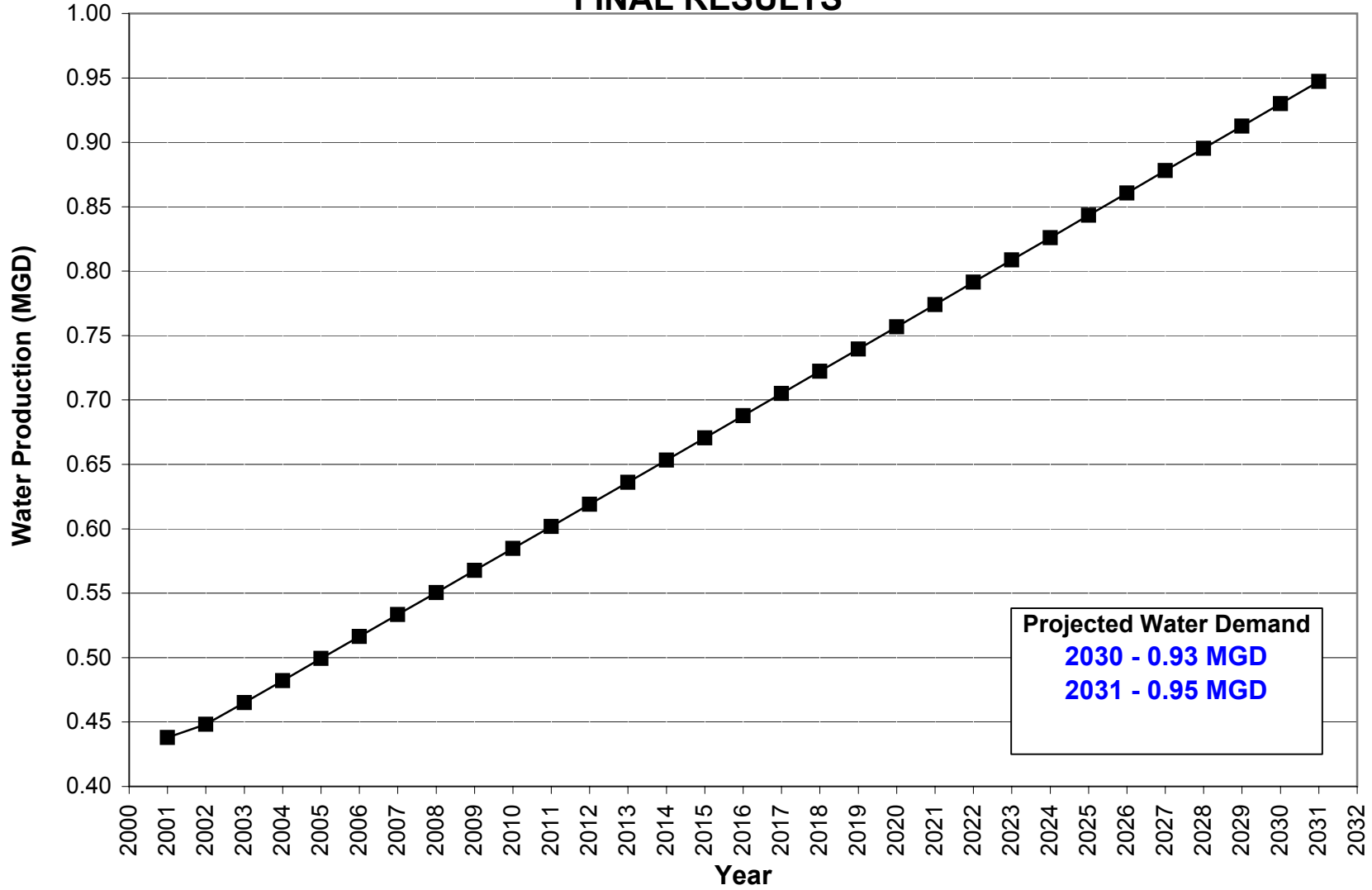
##### Population and Employment Estimates Corresponding to Service Area

	Population	Employment	
2000 Census data for jurisdiction	3,154	NA	Brisbane WD
2000 ABAG (jurisdictional)	3,597	8,100	City of Brisbane
2005 ABAG Projection (jurisdictional)	3,870	8,800	City of Brisbane
2000 ABAG (subregional)	3,597	8,100	City of Brisbane
2005 ABAG Projection (subregional)	3,870	8,800	City of Brisbane
2000 Department of Finance Benchmark	3,597		City of Brisbane
2001 Department of Finance Estimate	3,620		City of Brisbane
2002 Department of Finance Estimate	3,640		City of Brisbane
FY 2000-2001 BAWUA service area	3,165	NA	Brisbane WD
FY 2001-2002 BAWUA service area	3,174	NA	Brisbane WD
2001 Employment in Service Area (input to DSS Model) =		3,789	4311 Subtract jobs in GVMID

#### Definitions / Abbreviations

ABAG	Association of Bay Area Governments	MF	multi family
BAWUA	Bay Area Water Users Association	MGD	million gallons per day
DSS	Decision Support System Model	No.	number
du	dwelling unit	Pop	population
FY	Fiscal Year	Res	residential
gpd/a	gallons per day / per account	SF	single family
gpd	gallons per day	UFW	unaccounted for water
HHS	household size	DOF	California Department of Finance

# City of Brisbane Projected Water Demand (Planning Estimate) FINAL RESULTS



**Appendix C3**  
**Burlingame, City of**

# City of Burlingame Water Service Area<sup>1</sup>

## DSS Input Sheet

### FINAL INPUT SHEET

#### Base Year Average Use and Indoor Percentages by Billing Category for DSS Model<sup>2</sup>

Year	Single Family		Multifamily		Commercial		Industrial		Institutional		Irrigation									
	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor
2001	300	65%	800	84%	850	97%	2400	82%	1100	61%	1200	0%								

#### Data for DSS Model - - Base Year 2001

Category	Number of Accounts FY. 2001 <sup>3</sup>	Water Use 2001 gpd/a <sup>2</sup>	Water Use, MGD 2001	Use Profile Percent	Water Use gpd	Indoor Water Use gpd
Single Family	6,600	300	1.98	44.33%	108	70
Multifamily	1,138	800	0.91	20.39%	77	65
Commercial	713	850	0.61	13.58%		
Industrial	257	2,400	0.62	13.78%		
Institutional	146	1,100	0.16	3.59%		
Irrigation	162	1,200	0.19	4.34%		
	0	0	0.00	0.00%		
	0	0	0.00	0.00%		
Total	9,016		4.47	100.00%		
Total Water Purchased (produced) <sup>4</sup> =			4.63	MGD		
Unaccounted For Water (UFW) <sup>5</sup> =			5%	Percent		
Estimated UFW for DSS Model =			7%	Percent		
Water Produced for use in DSS Model			4.78	MGD		
Peaking Factor			NA	Provided by Agency or SFPUC Water Master Plan (or NA)		
Peaking Factor for DSS Model =			1.6	If NA use default value of 1.6.		

*- Yellow cells are input to DSS Model*

#### NOTES

1. - Communities served (includes all or portions of) City of Burlingame nearby unincorporated areas according to BAWUA survey

2. - Average gpd/a is based on a 12-month moving average through December 2001. Indoor use is based on average of 2 lowest consecutive months in the winter if meters read bimonthly, or single lowest month if meters read monthly.

3. - Number of accounts is from data provided by water agency for this project (see worksheet with account data in this file) and calculated from combined categories

4. - Total water Purchased (produced) taken from BAWUA for Fiscal Year 2001-2002.

5. - Unaccounted for Water (UFW) is the percent difference between the total water purchased and the total water use.

6. - For reference see additional population estimates provided in population and employment estimates corresponding to service area table.

7. - Initial estimate based on census data for renter occupied units. For reference see table below that has 2000 census data for corresponding water service area city or cities.

#### 2000 Census Data

Average household size	2.21
Average household size of owner-occupied unit	2.58
Average household size of renter-occupied unit	1.87
Homeowner vacancy rate (percent)	0.40
Rental vacancy rate (percent)	2.20

Data Prepared : July 31, 2003

Revised: September 5, 2003

By: B. Skeens

#### Reconcile agency account billing data and census data

Total Dwelling Units in Census 2000 for Burlingame		2000 Units	No. Buildings	Service Area Billing Accounts - Year 2000 <sup>3</sup>	Difference between billing and census data	Data Sources / Notes
<b>Single family</b>						
1-detached		6,111	6,111			
Subtotal		6,111	6,111	5,985	-127	
<b>Multi family</b>						
1-attached		409	409			
2-units		311	156			
3-4 units		672	192			
5 to 9 units		1,705	244			
10-19 units		1,288	86			
20 or more units		2,362	47			
mobile homes		0	0			
Subtotal		6,747	1,133	1,159	25	
MF Average =		6.0	units/building	5.8	units/account	
Total SF + MF units =		12,858				

#### Population and Household Size in Census 2000 for Burlingame

	City of Burlingame Census Population 2000	City of Burlingame Estimated Population 2001	Estimated Residential Service Area Population 2001		Data Sources / Notes
Total Population from Census data <sup>6</sup> =	30,158	30,364			Estimated growth from 2000 to 2001 (CA DOF Projections): <span style="border: 1px solid black; padding: 2px;">0.68%</span>
Subtract Institutionalized Population =	428	431			Estimated employment growth from 2000 to 2001 (ABAG Employment Projections): <span style="border: 1px solid black; padding: 2px;">0.84%</span>
Residential Population =	29,730	29,933			Water use for the institutionalized population is accounted for in nonresidential billing categories
Avg. HHS <sup>7</sup> =	2.31				Residential population shown corresponds to the city or cities represented by Census data
MF Pop @ MF HHS <sup>7</sup> =	1.70	11,470	11,548	11,769	38.6% Percent of Population that is MF
SF Pop =	18,260	18,385	18,385		61.4% Percent of Population that is SF
SF HHS <sup>7</sup> =	2.99				
Total			30,154	100.0%	
			154		Difference in our estimate and average of 2000-2001 and 2001-2002 BAWUA Surveys
			-277		Difference in our estimate and the average 2000-2001 and 2001-2002 BAWUA Surveys including institutionalized population

#### Estimate Service Area Dwelling Units for 2001

SF Res	6,153	Equals No. Buildings from cell M21 plus growth in accounts for one year from cell T38
MF Res	6,629	Equals billing accounts in 2001 from cell C16 times average units per account in cell N30 (or average units per building in cell L30 to minimize population difference in cell N47)

#### Population and Employment Estimates Corresponding to Service Area

	Population	Employment
2000 Census data for jurisdiction	30,158	NA
2000 ABAG (jurisdictional)	28,158	28,580
2005 ABAG Projection (jurisdictional)	29,100	29,780
2000 ABAG (subregional)	29,354	28,580
2005 ABAG Projection (subregional)	30,300	29,780
2000 Department of Finance Benchmark	28,158	From State of California Department of Finance (DOF) table E-4 as of 4-1-2000. Website www.dof.ca.gov
2001 Department of Finance Estimate	28,350	From State of California Department of Finance table E-4 as of 1-1-2001. Website www.dof.ca.gov
2002 Department of Finance Estimate	28,300	From State of California Department of Finance table E-4 as of 1-1-2002. Website www.dof.ca.gov
FY 2000-2001 BAWUA service area	30,000	NA
FY 2001-2002 BAWUA service area	30,000	NA
2001 Employment in Service Area (input to DSS Model) =		31,205

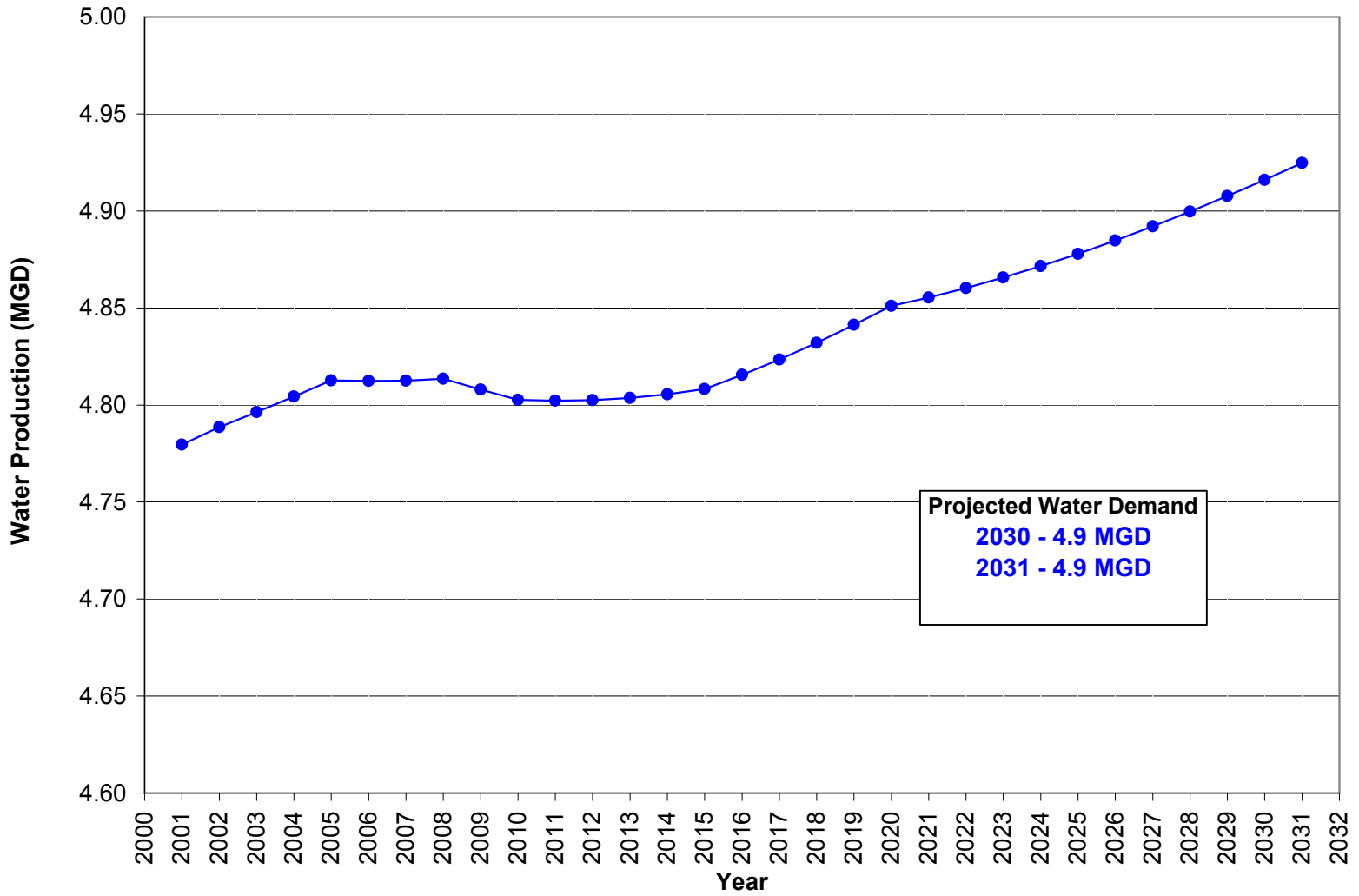
Service Area Employment is determined by the ratio of the 2000-2001 BAWUA service area population to the 2000 ABAG Subregional Population and escalated to 2001 using the assumed growth rate in cell T39.

#### Definitions / Abbreviations

ABAG	Association of Bay Area Governments	MF	multi family
BAWUA	Bay Area Water Users Association	MGD	million gallons per day
DSS	Decision Support System Model	No.	number
du	dwelling unit	Pop	population
FY	Fiscal Year	Res	residential
gpd/a	gallons per day / per account	SF	single family
gpd	gallons per day	UFW	unaccounted for water
HHS	household size	DOF	California Department of Finance



# City of Burlingame Projected Water Demand (Planning Estimate) FINAL RESULTS



**Appendix C4**  
**California Water Service Company - Bear Gulch District**

# Cal Water Bear Gulch Water Service Area<sup>1</sup>

## DSS Input Sheet

### FINAL INPUT SHEET

#### Base Year Average Use and Indoor Percentages by Billing Category for DSS Model<sup>2</sup>

Year	Residential		Multi Residential		Business		Industrial		Public Authority		Other										
	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	
2001	670	42%	3692	86%	1054	78%	4183	8%	2614	34%	1632	78%									

#### Data for DSS Model -- Base Year 2001

Category	Number of Accounts FY. 2001 <sup>3</sup>	Water Use 2001 gpd/a <sup>4</sup>	Water Use, MGD 2001	Use Profile Percent	Water Use gpd	Indoor Water Use gpd
Residential	15,875	670	10.64	84.85%	169	71
Multi Residential	64	3,692	0.24	1.88%	73	63
Business	1,280	1,054	1.35	10.76%		
Industrial	1	4,183	0.00	0.03%		
Public Authority	95	2,614	0.25	1.98%		
Other	38	1,632	0.06	0.50%		
	0	0	0.00	0.00%		
	0	0	0.00	0.00%		
<b>Total</b>	<b>17,354</b>		<b>12.54</b>	<b>100.00%</b>		
Total Water Purchased (produced) <sup>5</sup> =			12.96 MGD			
Unaccounted For Water (UFW) <sup>6</sup> =			4.3% Percent			
<b>Estimated UFW for DSS Model =</b>			7% Percent			
Water Produced for use in DSS Model			13.42 MGD			
Peaking Factor			1.75			
<b>Peaking Factor for DSS Model =</b>			1.75			

Blue cells are entered by modeler  
 Yellow cells are input to DSS Model

#### NOTES

- Communities served (includes all or portions of) Atherton, Ladera Heights, North Fair Oaks, Portola Valley, Portola Hills, Woodside, and Menlo Park (West) according to BAWUA survey
- Average gpd/a is based on a 12-month moving average through December 2001. Indoor use is based on average of 2 lowest consecutive months in the winter if meters read bimonthly, or single lowest month if meters read monthly.
- Number of accounts is from data provided by water agency for this project (see worksheet with account data in this file)
- Total water Purchased (produced) taken from BAWUA for Fiscal Year 2001-2002 or agency if provided. For Cal Water Bear Gulch, number of accounts was provided by the agency and is provided in this file.
- Unaccounted for Water (UFW) is the percent difference between the total water purchased and the total water use.
- For reference see additional population estimates provided in population and employment estimates corresponding to service area table.
- Initial estimate based on census data for renter occupied units. For reference see table below that has 2000 census data for corresponding water service area city or cities.

#### 2000 Census Data

Average household size	2.84
Average household size of owner-occupied unit	2.82
Average household size of renter-occupied unit	2.75
Homeowner vacancy rate (percent)	0.37
Rental vacancy rate (percent)	2.27

8 - (INSERT ADDITIONAL ASSUMPTIONS FOR THIS SERVICE AREA)

Data Prepared : July 23, 2003  
 Revised: January 8, 2004

By: M. Maddaus

#### Reconcile agency account billing data and census data

Total Dwelling Units in Census 2000 for Atherton, Ladera Heights, North Fair Oaks, Portola Valley, Portola Hills, Woodside, and Menlo Park (West)						
	2000 Units	No. Buildings	Service Area Billing Accounts - Year 2000 <sup>3</sup>	Difference between billing and census data	Data Sources / Notes	
<b>Single family</b>						
1-detached	14,462	14,462				
1-attached	1,239	1,239				
Subtotal	15,837	15,769	15,816			47 Housing Characteristics from U.S. Census Bureau
<b>Multi family</b>						
2-units	136	68				Move people from Redwood City
3-4 units	439	125				
5 to 9 units	278	40				Move dwelling units to Redwood City
10-19 units	218	15				
20 or more units	300	6				Meter for assumed 50 units per building
mobile homes	58	1				Meter for mobile home parks, assume 50 per park
Subtotal	1,292	187	64			-123 Must be more than one building on an MF meter.
MF Average =	6.92	units/building	20	units/account		
Total SF + MF units =	17,129					

#### Population and Household Size in Census 2000 for Atherton, Ladera Heights, North Fair Oaks, Portola Valley, Portola Hills, Woodside, and Menlo Park (West)

	Bear Gulch Census Population 2000	Bear Gulch Estimated Population 2001	Estimated Service Area Population 2001	Difference	Percent	Data Sources / Notes
Total Population from Census data <sup>6</sup> =	65,960		67,009			Estimated growth from 2000 to 2001 (CA DOF Projections): 1.59%
Subtract Institutionalized Population =	481		489			Estimated employment growth from 2000 to 2001 (ABAG Employment Projections): -0.47%
Residential Population =	65,479		66,520			Water use for the institutionalized population is accounted for in nonresidential billing categories
Avg. HHS <sup>7</sup> =	3.82					Residential population shown corresponds to the city or cities represented by Census data
MF Pop @ MF HHS <sup>7</sup> =	2.50	3,231	3,231		4.9%	Percent of Population that is MF
SF Pop =	62,248	63,238	62,966		95.1%	Percent of Population that is SF
SF HHS <sup>7</sup> =	3.93					
Total			66,197	107	100.0%	
				-382		Difference in our estimate and average of 2000-2001 and 2001-2002 BAWUA Surveys
						Difference in our estimate and the average 2000-2001 and 2001-2002 BAWUA Surveys including institutionalized population

#### Estimate Service Area Dwelling Units for 2001

SF Res	16,019	Equals No. Buildings from cell M21 plus growth in accounts for one year from cell T38
MF Res	1,292	Equals billing accounts in 2001 from cell C16 times average units per account in cell N30 (or average units per building in cell L30 to minimize population difference in cell N47)

#### Population and Employment Estimates Corresponding to Service Area

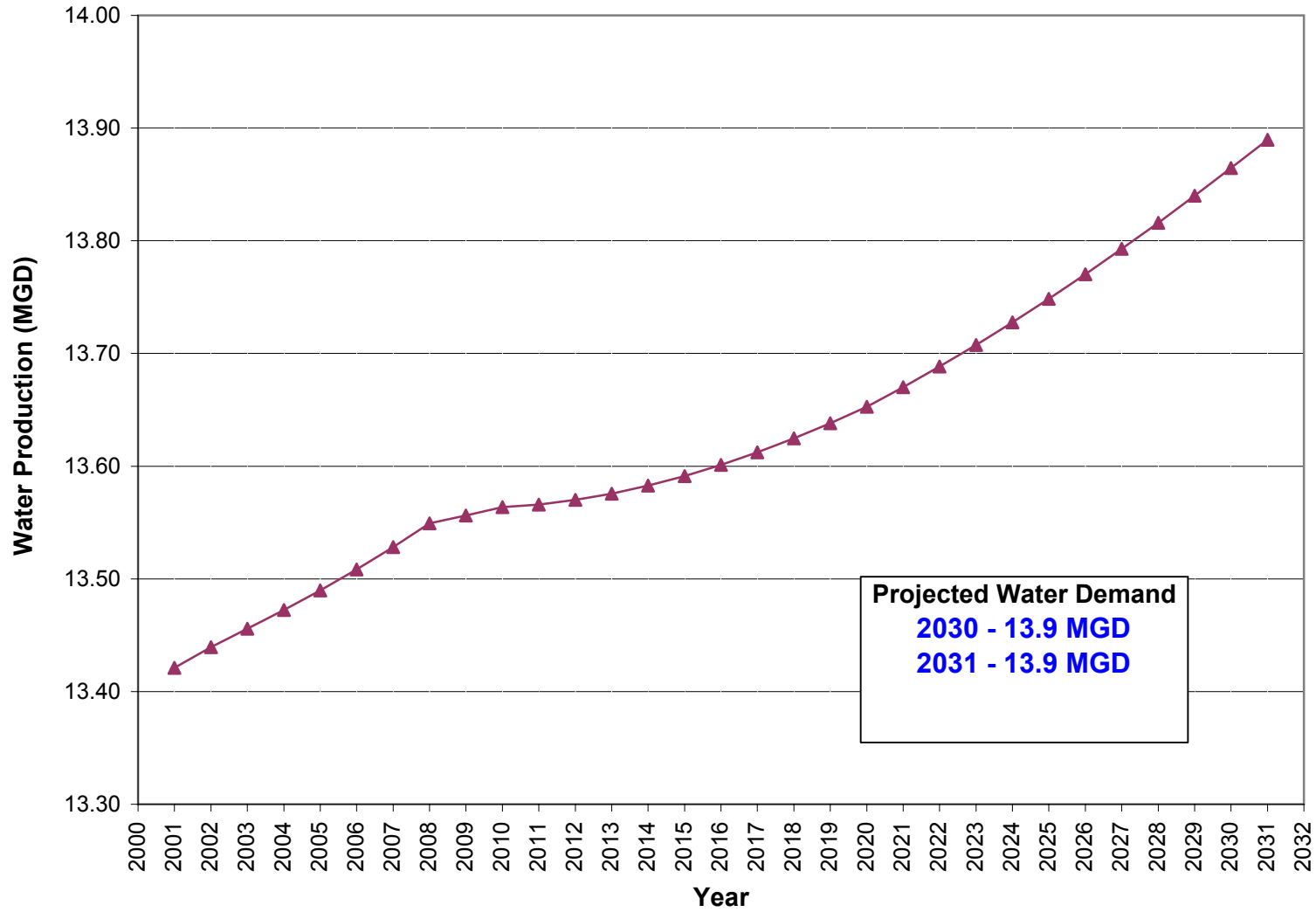
	Population	Employment
2000 Census data for jurisdiction	65,960	NA
2000 ABAG (jurisdictional)	67,003	43,784
2005 ABAG Projection (jurisdictional)	69,267	42,750
2000 ABAG (subregional)	47,423	27,142
2005 ABAG Projection (subregional)	46,838	26,183
2000 Department of Finance Benchmark	68,759	From State of California Department of Finance (DOF) table E-4 as of 4-1-2000. Website www.dof.ca.gov
2001 Department of Finance Estimate	69,852	From State of California Department of Finance table E-4 as of 1-1-2001. Website www.dof.ca.gov
2002 Department of Finance Estimate	69,957	From State of California Department of Finance table E-4 as of 1-1-2002. Website www.dof.ca.gov
FY 2000-2001 BAWUA service area	65,960	NA
FY 2001-2002 BAWUA service area	66,220	NA
2001 Employment in Service Area (input to DSS Model) =		42,899

Service Area Employment is determined by the ratio of the 2000-2001 BAWUA service area population to the 2000 ABAG Subregional Population and escalated to 2001 using the assumed growth rate in cell T39. (EXPLAIN SOURCE)

#### Definitions / Abbreviations

ABAG	Association of Bay Area Governments	MF	multi family
BAWUA	Bay Area Water Users Association	MGD	million gallons per day
DSS	Decision Support System Model	No.	number
du	dwelling unit	Pop	population
FY	Fiscal Year	Res	residential
gpd/a	gallons per day / per account	SF	single family
gpd	gallons per day	UFW	unaccounted for water
HHS	household size		

# CWS- Bear Gulch District Projected Demand (Planning Estimates) FINAL RESULTS



**Appendix C5**  
**California Water Service Company - Mid Peninsula District**

# Cal Water Mid Peninsula Water Service Area<sup>1</sup>

## DSS Input Sheet FINAL INPUT SHEET

### Base Year Average Use and Indoor Percentages by Billing Category for DSS Model<sup>2</sup>

Year	Single family		Multifamily		Business		Industrial		Public Authority		Other									
	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor
2001	314	66%	3612	90%	935	81%	1,083	81%	2522	48%	6056	35%								

#### Data for DSS Model - - Base Year 2001

Category	Number of Accounts FY, 2001 <sup>3</sup>	Water Use 2001 gpd/a <sup>2</sup>	Water Use, MGD 2001	Use Profile Percent	Water Use gpd	Indoor Water Use gpd
Single family	30,943	314	9.72	60.59%	108	71
Multifamily	583	3,612	2.11	13.13%	67	60
Business	3,289	935	3.07	19.16%		
Industrial	102	1,083	0.11	0.69%		
Public Authority	327	2,522	0.83	5.15%		
Other	34	6,056	0.21	1.29%		
0	0	0	0.00	0.00%		
0	0	0	0.00	0.00%		
<b>Total</b>	<b>35,278</b>		<b>16.04</b>	<b>100.00%</b>		
Total Water Purchased (produced) =			17.23 MGD			
Unaccounted For Water (UFW) =			6.4% Percent	From 5 year BAWUA Survey average		
<b>Estimated UFW for DSS Model =</b>			7% Percent	7% if actual is < 7%, otherwise = E25		
Water Produced for use in DSS Model			17.16 MGD	Add UFW to Total Water Use		
Peaking Factor			1.53	Provided by Agency or SFPUC Water Master Plan (or NA)		
<b>Peaking Factor for DSS Model =</b>			1.53	If NA use default value of 1.6.		

Blue cells are entered by modeler  
Yellow cells are input to DSS Model

#### NOTES

- Communities served (includes all or portions of) San Mateo, San Carlos and nearby unincorporated areas according to BAWUA survey
- Average gpd/a is based on a 12-month moving average through December 2001. Indoor use is based on average of 2 lowest consecutive months in the winter if meters read bimonthly, or single lowest month if meters read monthly.
- Number of accounts is from data provided by water agency for this project (see worksheet with account data in this file)
- Total water Purchased (produced) taken from BAWUA for Fiscal Year 2001-2002 or agency if provided. (INSERT SOURCE OF PURCHASE DATA - SURVEY OR AGENCY)
- Unaccounted for Water (UFW) is the percent difference between the total water purchased and the total water use.
- For reference see additional population estimates provided in population and employment estimates corresponding to service area table.
- Initial estimate based on census data for renter occupied units. For reference see table below that has 2000 census data for corresponding water service area city or cities.

#### 2000 Census Data

Average household size	2.37
Average household size of owner-occupied unit	2.47
Average household size of renter-occupied unit	2.21
Homeowner vacancy rate (percent)	0.44
Rental vacancy rate (percent)	1.65

8 -(INSERT ADDITIONAL ASSUMPTIONS FOR THIS SERVICE AREA)

Data Prepared : July 22, 2003 By: M. Maddaus  
Revised: January 10, 2004

#### Reconcile agency account billing data and census data

Total Dwelling Units in Census 2000 for San Mateo and San Carlos				Service Area Billing Accounts - Year 2000		Difference between billing and census data		Data Sources / Notes
Category	2000 Units	No. Buildings						
<b>Single family</b>								
1-detached	25,829	25,829						
1-attached	4,094	4,094						
2-units	1,236	618						
Subtotal	31,159	30,541			30,931			390 Housing Characteristics from U.S. Census Bureau
<b>Multi family</b>								
3-4 units	1,681	480						
5 to 9 units	3,039	434						
10-19 units	2,581	172						
20 or more units	6,765	135						Meter for assumed 50 units per building
mobile homes	43	1						Meter for mobile home parks, assume 50 per park
Subtotal	14,109	1,223			582			-641 Must be more than one building on an MF meter
MF Average =	11.54	units/building						24 units/account
Total SF + MF units =	45,268							

Population and Household Size in Census 2000 for San Mateo and San Carlos				Estimated Residential Service Area Population		Data Sources / Notes
	City of San Mateo and San Carlos		Estimated Population 2001	2001	2001	
	Census Population 2000	Estimated Population 2001				
Total Population from Census data <sup>6</sup> =	122,823	123,553				Estimated growth from 2000 to 2001 (CA DOF Projections): 0.59%
Subtract Institutionalized Population =	753	757				Estimated employment growth from 2000 to 2001 (ABAG Employment Projections): 0.87%
Residential Population =	122,070	122,796				Water use for the institutionalized population is accounted for in nonresidential billing categories
Avg. HHS <sup>7</sup> =	2.70					Residential population shown corresponds to the city or cities represented by Census data
MF Pop @ MF HHS <sup>7</sup> =	2.21	31,221	31,406	31,298	25.6%	Percent of Population that is MF
SF Pop =	90,850	91,390	89,559		74.4%	Percent of Population that is SF
SF HHS <sup>7</sup> =	2.92					
Total			120,856		100.0%	
			-1,254			Difference in our estimate and average of 2000-2001 and 2001-2002 BAWUA Surveys
			-2,011			Difference in our estimate and the average 2000-2001 and 2001-2002 BAWUA Surveys including institutionalized population

#### Estimate Service Area Dwelling Units for 2001

SF Res	30,723	Equals No. Buildings from cell M21 plus growth in accounts for one year from cell T38
MF Res	14,135	Equals billing accounts in 2001 from cell C16 times average units per account in cell N30 (or average units per building in cell L30 to minimize population difference in cell N47)

#### Population and Employment Estimates Corresponding to Service Area

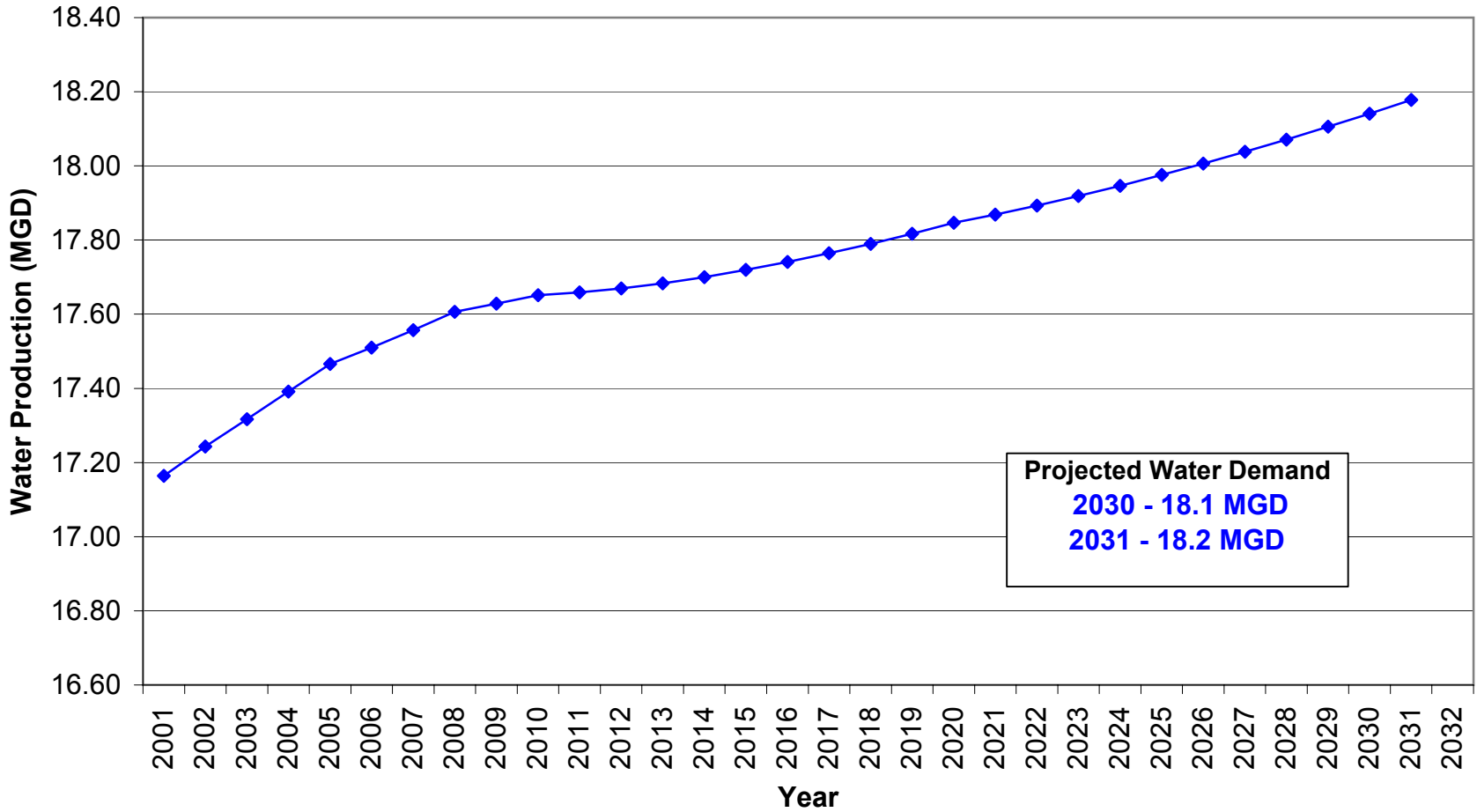
	Population	Employment
2000 Census data for jurisdiction	122,823	NA
2000 ABAG (jurisdictional)	123,183	79,527
2005 ABAG Projection (jurisdictional)	128,532	82,981
2000 ABAG (subregional)	125,729	78,512
2005 ABAG Projection (subregional)	131,540	81,963
2000 Department of Finance Benchmark	122,823	From State of California Department of Finance (DOF) table E-4 as of 4-1-2000. Website www.dof.ca.gov
2001 Department of Finance Estimate	123,553	From State of California Department of Finance table E-4 as of 1-1-2001. Website www.dof.ca.gov
2002 Department of Finance Estimate	124,218	From State of California Department of Finance table E-4 as of 1-1-2002. Website www.dof.ca.gov
FY 2000-2001 BAWUA service area	122,070	NA
FY 2001-2002 BAWUA service area	122,150	NA
2001 Employment in Service Area (input to DSS Model) =		79,493

Service Area Employment is determined by the ratio of the 2000-2001 BAWUA service area population to the 2000 ABAG Subregional Population and escalated to 2001 using the assumed growth rate in cell T39.

#### Definitions / Abbreviations

ABAG	Association of Bay Area Governments	MF	multi family
BAWUA	Bay Area Water Users Association	MGD	million gallons per day
DSS	Decision Support System Model	No.	number
du	dwelling unit	Pop	population
FY	Fiscal Year	Res	residential
gpd/a	gallons per day / per account	SF	single family
gpd	gallons per day	UFW	unaccounted for water
HHS	household size		

**CWS- Mid Peninsula District Projected Water Demand (Planning Estimates)  
FINAL RESULTS**



**Appendix C6**  
**California Water Service Company - South San Francisco District**



# Cal Water South San Francisco (SSF) Water Service Area<sup>1</sup>

## DSS Input Sheet FINAL INPUT SHEET

### Base Year Average Use and Indoor Percentages by Billing Category for DSS Model<sup>2</sup>

Year	Residential		Multi Residential		Business		Industrial		Public Authority		Other									
	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor
2001	240	83%	2733	97%	1888	80%	8610	92%	2334	39%	665	37%								

Data for DSS Model - - Base Year 2001						
Category	Number of Accounts FY, 2001 <sup>3</sup>	Water Use 2001 gpd/a <sup>2</sup>	Water Use, MGD 2001	Use Profile Percent	Water Use gpd	Indoor Water Use gpd
Residential	13,466	240	3.24	38.92%	76	63
Multi Residential	151	2,733	0.41	4.96%	62	60
Business	1,840	1,888	3.47	41.78%		
Industrial	74	8,610	0.64	7.64%		
Public Authority	219	2,334	0.51	6.14%		
Other	69	665	0.05	0.55%		
0	0	0	0.00	0.00%		
0	0	0	0.00	0.00%		
Total	15,818		8.31	100.00%		
Total Water Purchased (produced) =			8.58 MGD			
Unaccounted For Water (UFW) =			4% Percent	From 5 year BAWUA Survey average		
<b>Estimated UFW for DSS Model =</b>			7% Percent	7% if actual is < 7%, otherwise = E25		
Water Produced for use in DSS Model			8.90 MGD	Add UFW to Total Water Use		
Peaking Factor			1.42	Provided by Agency or SFPUC Water Master Plan (or NA)		
<b>Peaking Factor for DSS Model =</b>			1.4	If NA use default value of 1.6.		

Blue cells are entered by modeler  
Yellow cells are input to DSS Model

#### NOTES

1 - Communities served (includes all or portions of) South San Francisco, Coloma, a small portion of Daily City, and the unincorporated area known as Broadmoor according to BAWUA survey

2 - Average gpd/a is based on a 12-month moving average through December 2001. Indoor use is based on average of 2 lowest consecutive months in the winter if meters read bimonthly, or single lowest month if meters read monthly.

3 - Number of accounts is from data provided by water agency for this project (see worksheet with account data in this file)

4 - Total water Purchased (produced) taken from BAWUA for Fiscal Year 2001-2002 or agency if provided. For Cal Water South San Francisco, the agency provided purchase information which can be found in this file.

5 - Unaccounted for Water (UFW) is the percent difference between the total water purchased and the total water use.

6 - For reference see additional population estimates provided in population and employment estimates corresponding to service area table.

7 - Initial estimate based on census data for renter occupied units. For reference see table below that has 2000 census data for corresponding water service area city or cities.

2000 Census Data	
Average household size	3.06
Average household size of owner-occupied unit	3.03
Average household size of renter-occupied unit	3.16
Homeowner vacancy rate (percent)	0.67
Rental vacancy rate (percent)	1.31

8 -(INSERT ADDITIONAL ASSUMPTIONS FOR THIS SERVICE AREA)

Data Prepared : July 25, 2003 By: M. Maddaus  
Revised: September 6, 2003

### Reconcile agency account billing data and census data

#### Total Dwelling Units in Census 2000 for Broadmoor, Colma, Daly City, and South San Francisco

Single family	2000 Units		No. Buildings	Service Area Billing Accounts - Year 2000 <sup>3</sup>	Difference between billing and census data	Data Sources / Notes
	2000 Units	No. Buildings				
1-detached	11,634		11,634			
1-attached	2,173		2,173			
Subtotal	13,807		13,807	13,450		-357 Housing Characteristics from U.S. Census Bureau
<b>Multi family</b>						
2-units	504		252			
3-4 units	1,010		288			
5 to 9 units	1,284		183			
10-19 units	685		46			
20 or more units	1,307		26			Meter for assumed 50 units per building
mobile homes	303		6			Meter for mobile home parks, assume 50 per park
Subtotal	5,093		802	151		-651 Must be more than one building on an MF meter.
MF Average =	6.4		units/building	33.8		units/account
Total SF + MF units =	18,900					

#### Population and Household Size in Census 2000 for Broadmoor, Colma, Daly City, and South San Francisco

	Cal Water South San Francisco		Estimated Service Area Population 2001		Data Sources / Notes
	Census Population 2000	Estimated Population 2001			
Total Population from Census data <sup>6</sup> =	56,283		56,607		Estimated growth from 2000 to 2001 (CA DOF Projections): 0.57%
Subtract Institutionalized Population =	216		217		Estimated employment growth from 2000 to 2001 (ABAG Employment Projections): 0.82%
Residential Population =	56,068		56,390		Water use for the institutionalized population is accounted for in nonresidential billing categories
Avg. HHS <sup>7</sup> =	2.97				Residential population shown corresponds to the city or cities represented by Census data
MF Pop @ MF HHS <sup>7</sup> =	2.70	13,751	13,830	6,648	24.5% Percent of Population that is MF
SF Pop =		42,316	42,559	42,559	75.5% Percent of Population that is SF
SF HHS <sup>7</sup> =		3.06			
Total			49,207	100.0%	
			-5,098		Difference in our estimate and average of 2000-2001 and 2001-2002 BAWUA Surveys
			-5,315		Difference in our estimate and the average 2000-2001 and 2001-2002 BAWUA Surveys including institutionalized population

#### Estimate Service Area Dwelling Units for 2001

SF Res	13,886	Equals No. Buildings from cell M21 plus growth in accounts for one year from cell T38
MF Res	2,462	Equals dwelling units in 1999 from Urban Water Management Plan times the square of the growth factor in cell T38 to scale up to the year 2001

#### Population and Employment Estimates Corresponding to Service Area

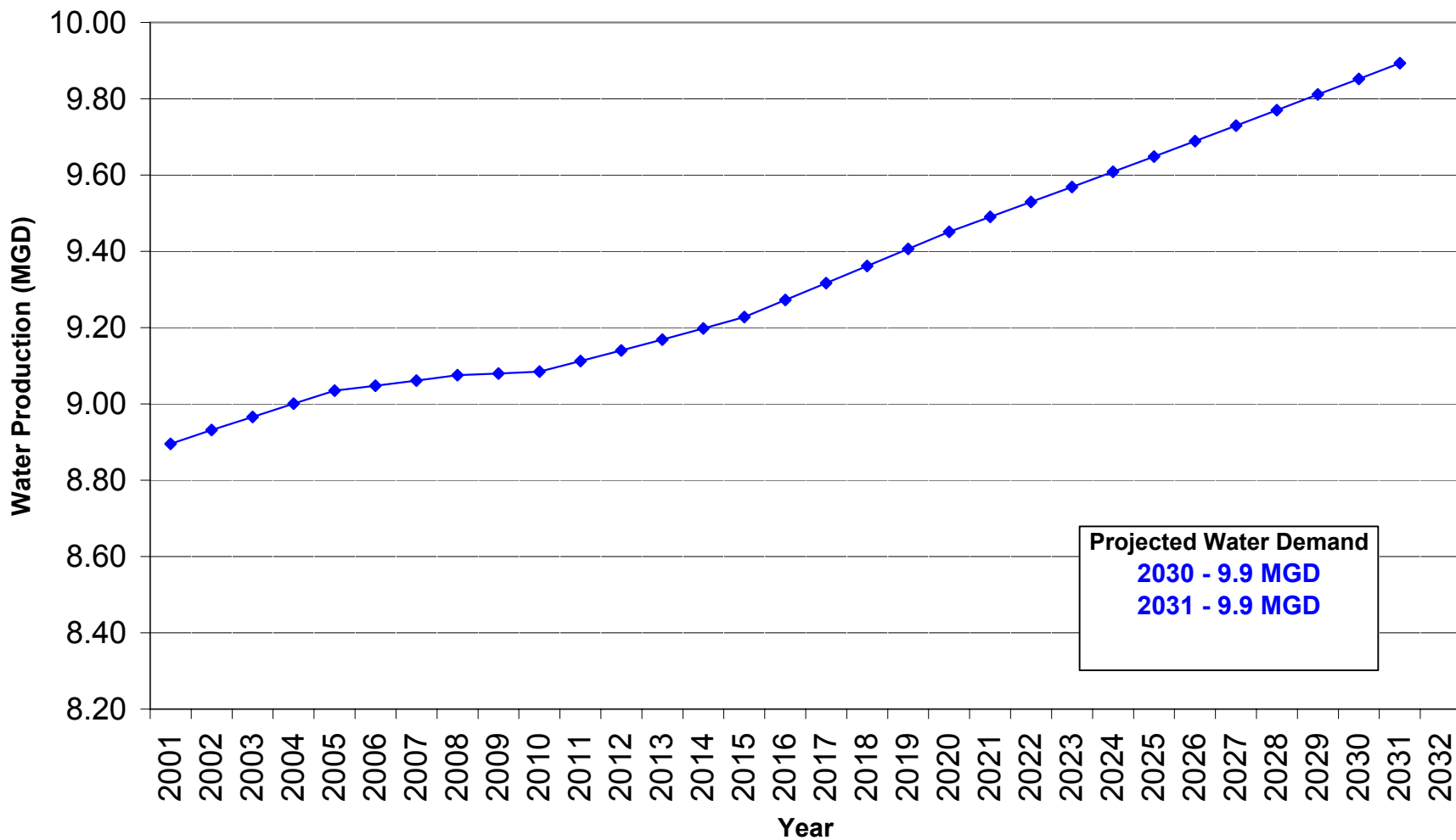
	Population	Employment
2000 Census data for jurisdiction	56,283	NA
2000 ABAG (jurisdictional)	53,091	47,836
2005 ABAG Projection (jurisdictional)	54,983	49,790
2000 ABAG (subregional)	55,025	47,872
2005 ABAG Projection (subregional)	55,186	49,826
2000 Department of Finance Benchmark	51,487	From State of California Department of Finance (DOF) table E-4 as of 4-1-2000. Website www.dof.ca.gov
2001 Department of Finance Estimate	51,783	From State of California Department of Finance table E-4 as of 1-1-2001. Website www.dof.ca.gov
2002 Department of Finance Estimate	51,698	From State of California Department of Finance table E-4 as of 1-1-2002. Website www.dof.ca.gov
FY 2000-2001 BAWUA service area	54,260	NA
FY 2001-2002 BAWUA service area	54,350	NA
2001 Employment in Service Area (input to DSS Model) =		49,288

Service Area Employment is determined by the ratio of the 2000-2001 BAWUA service area population to the 2000 ABAG Subregional Population and escalated to 2001 using the assumed growth rate in cell T39. (EXPLAIN SOURCE)

#### Definitions / Abbreviations

ABAG	Association of Bay Area Governments	MF	multi family
BAWUA	Bay Area Water Users Association	MGD	million gallons per day
DSS	Decision Support System Model	No.	number
du	dwelling unit	Pop	population
FY	Fiscal Year	Res	residential
gpd/a	gallons per day / per account	SF	single family
gpd	gallons per day	UFW	unaccounted for water
HHS	household size		

**CWS - South San Francisco District Projected Water Demand (Planning Estimate)  
FINAL RESULTS**



**Appendix C7**  
**Coastside County Water District**

# Coastside County WD Water Service Area<sup>1</sup>

## DSS Input Sheet

### FINAL INPUT SHEET

#### Base Year Average Use and Indoor Percentages by Billing Category for DSS Model<sup>2</sup>

Year	Single Family		Multifamily		Commercial		Business		Municipal		Institutional		Irrigation		Floriculture					
	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor
2001	239	83%	309	89%	600	78%	1450	85%	5000	63%	2600	27%	4900	0%	10,000	0%				

#### Data for DSS Model - - Base Year 2001

Category	Number of Accounts FY. 2001 <sup>3</sup>	Water Use 2001 gpd/a <sup>2</sup>	Water Use, MGD 2001	Use Profile Percent	Water Use gpd	Indoor Water Use gpd
Single Family	4,600	239	1.10	45.64%	72	59
Multifamily	642	309	0.20	8.25%	66	58
Commercial	269	600	0.16	6.71%		
Business	58	1,450	0.08	3.50%		
Municipal	49	5,000	0.25	10.19%		
Institutional	18	2,600	0.05	1.95%		
Irrigation	41	4,900	0.20	8.36%		
Floriculture	37	10,000	0.37	15.39%		
Total	5,714		2.40	100.00%		
Total Water Purchased (produced) <sup>4</sup> =			2.42	MGD		
Unaccounted For Water (UFW) <sup>5</sup> =			5%	Percent		
<b>Estimated UFW for DSS Model =</b>			7%	Percent		
Water Produced for use in DSS Model			2.57	MGD		
Peaking Factor			1.80	Provided by Agency or SFPUC Water Master Plan (or NA)		
<b>Peaking Factor for DSS Model =</b>			1.8	IF NA use default value of 1.6.		

- Yellow cells are input to DSS Model

#### NOTES

1 - Communities served (includes all or portions of) Half Moon Bay, Princeton by the Sea, Miramar, and El Granada according to BAWUA survey

2 - Average gpd/a is based on a 12-month moving average through December 2001. Indoor use is based on average of 2 lowest consecutive months in the winter if meters read bimonthly, or single lowest month if meters read monthly.

3 - Number of accounts is from data provided by water agency for this project (see worksheet with account data in this file)

4 - Total water Purchased (produced) taken from BAWUA for Fiscal Year 2001-2002 or agency if provided.

5 - Unaccounted for Water (UFW) is the percent difference between the total water purchased and the total water use.

6 - For reference see additional population estimates provided in population and employment estimates corresponding to service area table.

7 - Initial estimate based on census data for renter occupied units. For reference see table below that has 2000 census data for corresponding water service area city or cities.

#### Weighted Average of Half Moon Bay and El Granada

2000 Census Data	
Average household size	2.77
Average household size of owner-occupied unit	2.70
Average household size of renter-occupied unit	2.94
Homeowner vacancy rate (percent)	0.60
Rental vacancy rate (percent)	1.93

Data Prepared : August 7, 2003

By: B. Skeens

Revised: December 5, 2003

#### Reconcile agency account billing data and census data

Total Dwelling Units in Census 2000 for Half Moon Bay and El Granada				Service Area Billing Accounts - Year 2000		Difference between billing and census data		Data Sources / Notes	
Category	2000 Units	No. Buildings							
<b>Single family</b>									
1-detached	4,291	4,291							
1-attached	569	569							
Subtotal	4,860	4,860			4,515			-345 Housing Characteristics from U.S. Census Bureau	
<b>Multi family</b>									
2-units	115	115							
3-4 units	260	260							
5 to 9 units	227	65							
10-19 units	68	18							
20 or more units	88	7							
mobile homes	431	9						Meter for assumed 50 units per building	
Subtotal	1,189	474			478			Meter for mobile home parks, assume 50 per park	
MF Average =	2.5	units/building							
Total SF + MF units =	6,049								

#### Population and Household Size in Census 2000 for Half Moon Bay and El Granada

Category	City of Half Moon Bay and El Gf Half Moon Bay and El Gr		Estimated Residential Service Area Population		Data Sources / Notes
	2000 Census Population	Estimated Population 2001	2001	2001	
Total Population from Census data <sup>6</sup> =	18,066	18,307			Estimated growth from 2000 to 2001 (CA DOF Projections): 1.33%
Subtract Institutionalized Population =	794	805			Estimated employment growth from 2000 to 2001 (ABAG Employment Projections): 1.27%
Residential Population =	17,272	17,502			Water use for the institutionalized population is accounted for in nonresidential billing categories
Avg. HHS <sup>7</sup> =	2.86				Residential population shown corresponds to the city or cities represented by Census data
MF Pop @ MF HHS <sup>7</sup> =	1.70	2,021	2,048	3,015	11.7% Percent of Population that is MF
SF Pop =	15,251	15,454	15,304		88.3% Percent of Population that is SF
SF HHS <sup>7</sup> =	3.14				
Total			18,319	100.0%	
			169		Difference in our estimate and average of 2000-2001 and 2001-2002 BAWUA Surveys
			-636		Difference in our estimate and the average 2000-2001 and 2001-2002 BAWUA Surveys including institutionalized population

#### Estimate Service Area Dwelling Units for 2001

SF Res	4,925	Equals No. Buildings from cell M21 plus growth in accounts for one year from cell T38
MF Res	1,597	Equals billing accounts in 2001 from cell C16 times average units per account in cell N30 (or average units per building in cell L30 to minimize population difference in cell N47)

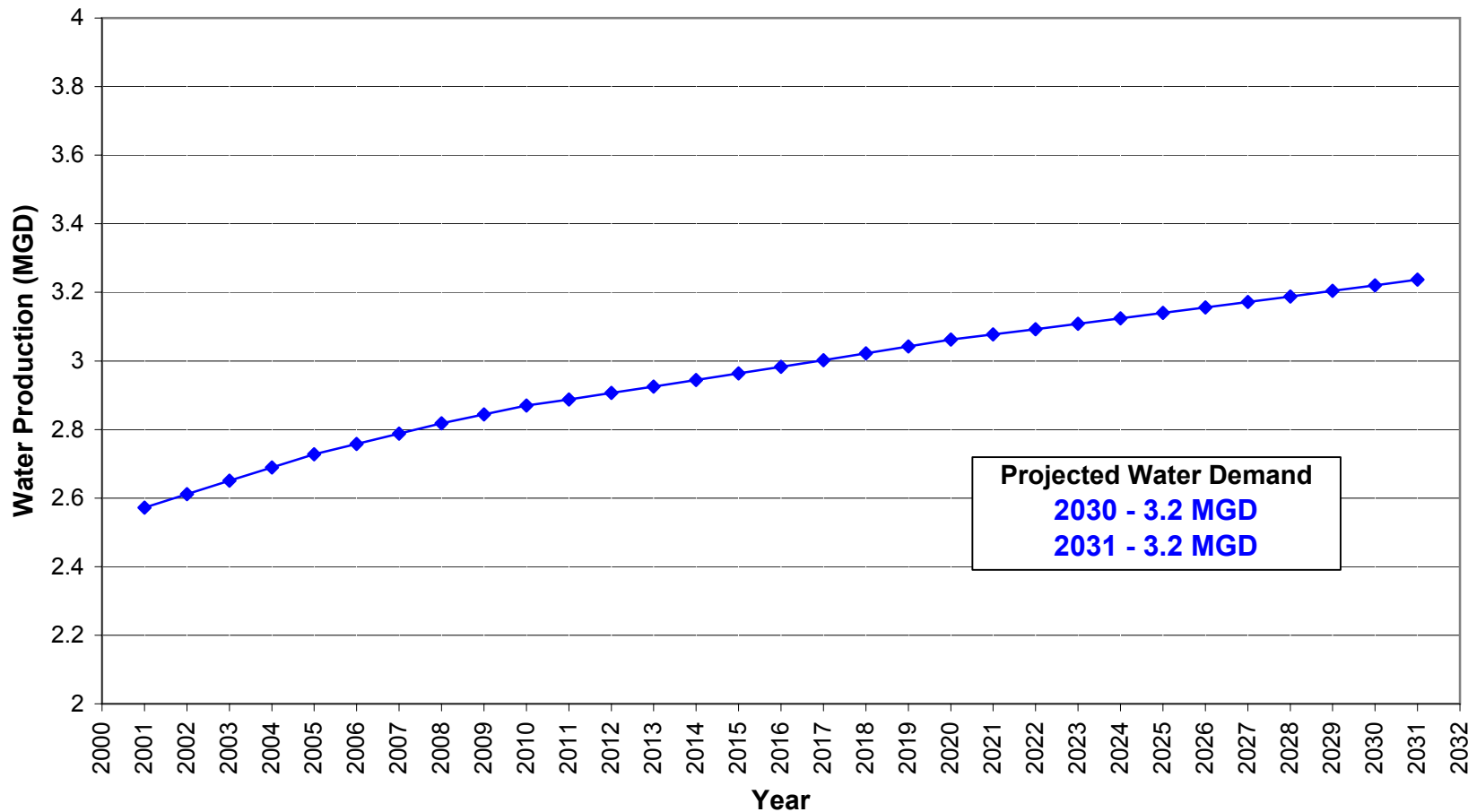
#### Population and Employment Estimates Corresponding to Service Area

	Population	Employment	
2000 Census data for jurisdiction	18,066	NA	
2000 ABAG (jurisdictional)	11,842	3,310	HMB only
2005 ABAG Projection (jurisdictional)	13,200	3,520	HMB only
2000 ABAG (subregional)	11,842	3,310	HMB only
2005 ABAG Projection (subregional)	13,200	3,520	HMB only
2000 Department of Finance Benchmark	11,842		HMB only
2001 Department of Finance Estimate	12,000		HMB only
2002 Department of Finance Estimate	12,150		HMB only
FY 2000-2001 BAWUA service area	18,200	NA	
FY 2001-2002 BAWUA service area	18,100	NA	
2001 Employment in Service Area (input to DSS Model) =		5,402	Service Area Employment is determined by the ratio of the 2000-2001 BAWUA service area population to the 2000 ABAG Subregional Population and escalated to 2001 using the assumed growth rate in cell T39.

#### Definitions / Abbreviations

ABAG	Association of Bay Area Governments	MF	multi family
BAWUA	Bay Area Water Users Association	MGD	million gallons per day
DSS	Decision Support System Model	No.	number
du	dwelling unit	Pop	population
FY	Fiscal Year	Res	residential
gpd/a	gallons per day / per account	SF	single family
gpd	gallons per day	UFW	unaccounted for water
HHS	household size	DOF	California Department of Finance

# Coastside County Water District Projected Water Demand (Planning Estimate) FINAL RESULTS



**Appendix C8**  
**Daly City, City of**

# City of Daly City Water Service Area<sup>1</sup>

## DSS Input Sheet

### FINAL INPUT SHEET

#### Base Year Average Use and Indoor Percentages by Billing Category for DSS Model<sup>2</sup>

Year	Single Family		Multifamily		Commercial		Industrial		Institutional		Governmental		Irrigation		New Commercial		Average, gpd/a		Indoor		Average, gpd/a		Indoor	
	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor		
2001	236	86%	862	87%	1054	89%	3460	85%	2494	78%	1699	67%	1082	0%	25732	89%								

#### Data for DSS Model - - Base Year 2001

Category	Number of Accounts FY. 2001 <sup>3</sup>	Water Use 2001 gpd/a <sup>4</sup>	Water Use, MGD 2001	Use Profile Percent	Water Use gpd	Indoor Water Use gpd
Single Family	18,683	236	4.41	54.50%	66	57 SF
Multifamily	2,840	862	2.45	30.26%	63	55 MF
Commercial	664	1,054	0.60	7.38%	65 total res gpd	
Industrial	5	3,460	0.01	0.13%	41 nonres gal/emp/day	
Institutional	80	2,494	0.20	2.47%		
Governmental	112	1,699	0.19	2.35%		
Irrigation	123	1,082	0.13	1.64%		
New Commercial	4	25,732	0.10	1.27%		
<b>Total</b>	<b>22,509</b>		<b>8.09</b>	<b>100.00%</b>	<b>76 total gpd</b>	
Total Water Purchased (produced) <sup>5</sup> =			8.45 MGD			
Unaccounted For Water (UFW) <sup>6</sup> =			6% Percent		From 5 year BAWUA Survey average	
<b>Estimated UFW for DSS Model =</b>			7% Percent		7% if actual is < 7%, otherwise = E25	
Water Produced for use in DSS Model			8.66 MGD		Add UFW to Total Water Use	
Peaking Factor			1.50		Provided by Agency or SFPUC Water Master Plan (or NA)	
<b>Peaking Factor for DSS Model=</b>			1.5		If NA use default value of 1.6.	

*- Yellow cells are input to DSS Model*

#### NOTES

1 - Communities served includes Daly City and nearby unincorporated areas according to BAWUA survey

2 - Average gpd/a is based on a 12-month moving average through December 2001. Indoor use is based on average of 2 lowest consecutive months in the winter if meters read bimonthly, or single lowest month if meters read monthly.

3 - Number of accounts is from data provided by water agency for this project (see worksheet with account data in this file)

4 - Total water Purchased (produced) taken from BAWUA for Fiscal Year 2001-2002 or agency if provided.

5 - Unaccounted for Water (UFW) is the percent difference between the total water purchased and the total water use.

6 - For reference see additional population estimates provided in population and employment estimates corresponding to service area table.

7 - Initial estimate based on census data for renter occupied units. For reference see table below that has 2000 census data for corresponding water service area city or cities.

#### 2000 Census Data

Average household size	3.34
Average household size of owner-occupied unit	3.48
Average household size of renter-occupied unit	3.13
Homeowner vacancy rate (percent)	0.30
Rental vacancy rate (percent)	1.70

Data Prepared : August 4, 2003

By: B. Skeens

Revised: September 24, 2003

#### Reconcile agency account billing data and census data

##### Total Dwelling Units in Census 2000 for Daly City

Single family	2000 Units	No. Buildings	Service Area Billing Accounts - Year 2000 <sup>3</sup>	Difference between billing and census data	Data Sources / Notes
1-detached	15,856	15,856			
1-attached	2,230	2,230			
mobile homes	544	11			Meter for mobile home parks, assume 50 per park
<b>Subtotal</b>	<b>18,630</b>	<b>18,097</b>	<b>18,557</b>		460 Housing Characteristics from U.S. Census Bureau
<b>Multi family</b>					
1-attached	2,230	2,230			
2-units	934	467			
3-4 units	1,867	533			
5 to 9 units	1,100	157			
10-19 units	1,369	91			
20 or more units	5,112	102			Meter for assumed 50 units per building
<b>Subtotal</b>	<b>12,612</b>	<b>1,351</b>	<b>2,840</b>		1,489 Must be more than one building on an MF meter.
MF Average =	9.3	units/building	4.4	units/account	Units include all multi-family dwellings plus half the "1-attached" dwellings.
<b>Total SF + MF units =</b>	<b>31,242</b>				

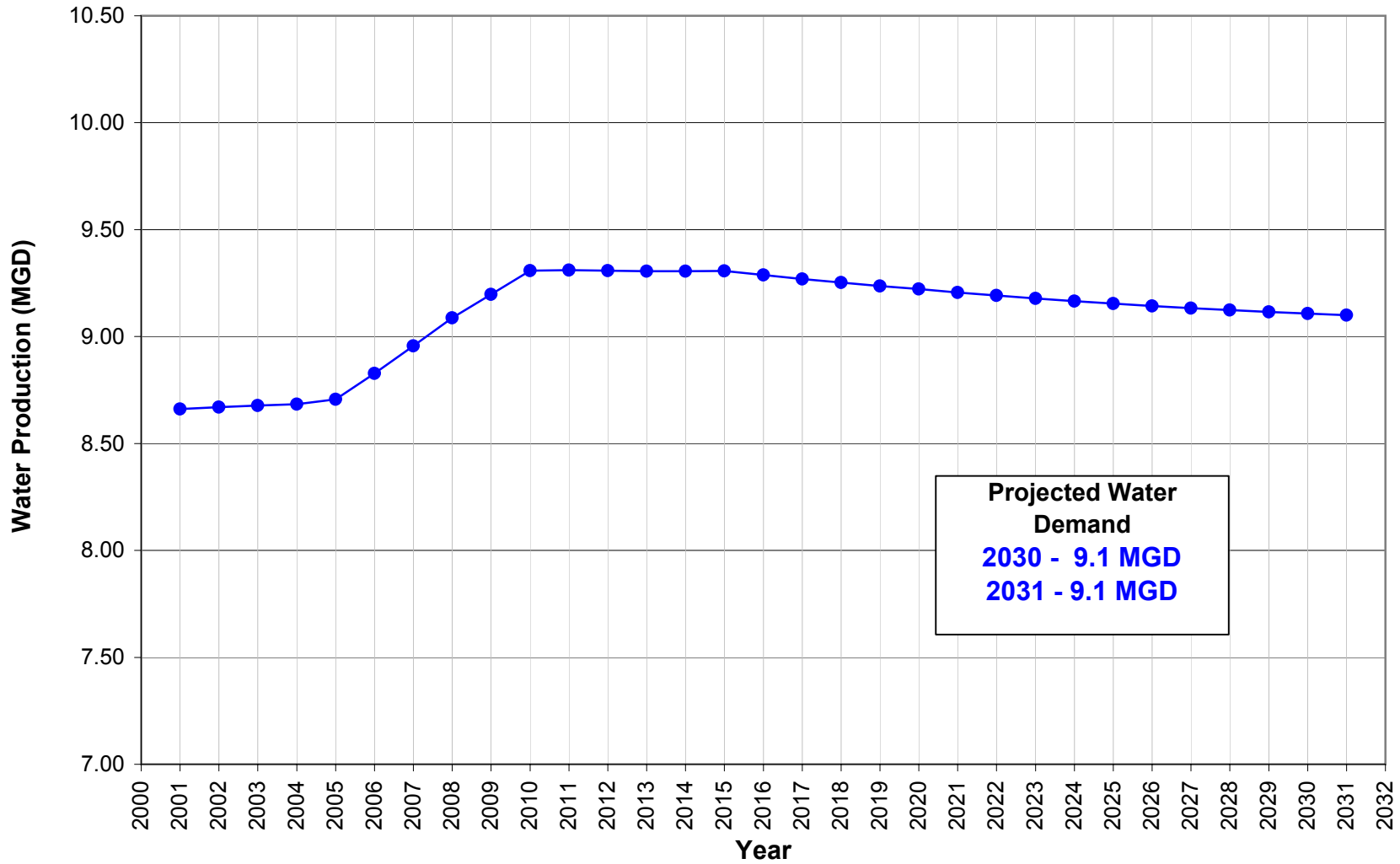
##### Population and Household Size in Census 2000 for Daly City

	City of Daly City Census Population 2000	City of Daly City Estimated Population 2001	Estimated Residential Service Area Population 2001	Data Sources / Notes
106,200 from 2001 UWMP	106,200	107,148	106,117	Estimated growth from 2000 to 2001 (CA DOF Projections): 0.55%
Total Population from Census data <sup>6</sup> =	106,200	107,148		Estimated employment growth from 2000 to 2001 (ABAG Employment Projections): 0.89%
Subtract Institutionalized Population =	532	537		Water use for the institutionalized population is accounted for in nonresidential billing categories
Residential Population =	105,668	106,611		Residential population shown corresponds to the city or cities represented by Census data
Avg. HHS <sup>7</sup> =	3.38			
MF Pop @ MF HHS <sup>7</sup> =	3,101	39,097	38,991	37.0% Percent of Population that is MF
SF Pop =	66,571	67,165	67,126	63.0% Percent of Population that is SF
SF HHS <sup>7</sup> =	3.57			
<b>Total</b>			<b>106,117</b>	100.0%
			1,955	Difference in our estimate and average of 2000-2001 and 2001-2002 BAWUA Surveys
			1,418	Difference in our estimate and the average 2000-2001 and 2001-2002 BAWUA Surveys including institutionalized population
Estimate Service Area Dwelling Units for 2001				
SF Res	18,858	Equals No. Buildings from cell M21 plus growth in accounts for one year from cell T38		
MF Res	12,627	Equals billing accounts in 2001 from cell C16 times average units per account in cell N30 (or average units per building in cell L30 to minimize population difference in cell N47)		
Population and Employment Estimates Corresponding to Service Area				
		Population	Employment	
2000 Census data for jurisdiction		103,621	NA	
2000 ABAG (jurisdictional)		103,621	24,650	
2005 ABAG Projection (jurisdictional)		106,100	25,750	
2000 ABAG (subregional)		108,777	25,150	
2005 ABAG Projection (subregional)		111,300	26,250	
2000 Department of Finance Benchmark		103,625		From State of California Department of Finance (DOF) table E-4 as of 4-1-2000. Website www.dof.ca.gov
2001 Department of Finance Estimate		104,200		From State of California Department of Finance table E-4 as of 1-1-2001. Website www.dof.ca.gov
2002 Department of Finance Estimate		104,000		From State of California Department of Finance table E-4 as of 1-1-2002. Website www.dof.ca.gov
FY 2000-2001 BAWUA service area		103,916	NA	
FY 2001-2002 BAWUA service area		104,407	NA	
2001 Employment in Service Area (input to DSS Model) =			26,941	Service Area Employment is determined by the ratio of the 2000-2001 BAWUA service area population to the 2000 ABAG Subregional Population and escalated to 2001 using the assumed growth rate in cell T39.

#### Definitions / Abbreviations

ABAG	Association of Bay Area Governments	MF	multi family
BAWUA	Bay Area Water Users Association	MGD	million gallons per day
DSS	Decision Support System Model	No.	number
du	dwelling unit	Pop	population
FY	Fiscal Year	Res	residential
gpd/a	gallons per day / per account	SF	single family
gpd	gallons per day	UFW	unaccounted for water
HHS	household size	DOF	California Department of Finance

# City of Daly City Projected Water Demand (Planning Estimate) FINAL RESULTS





**Appendix C9**  
**East Palo Alto, City of**

# East Palo Alto Water Service Area<sup>1</sup>

## DSS Input Sheet

### FINAL INPUT SHEET

#### Base Year Average Use and Indoor Percentages by Billing Category for DSS Model<sup>2</sup>

Year	Single Family		Multifamily		Commercial		Industrial		Municipal		Fire		Portable		New Commercial		New Single Family	
	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor
2001	314	90%	2665	90%	1,675	85%	766	56%	2030	25%	1	0%	72,805	0%	5493	85%	340	90%

#### Data for DSS Model -- Base Year 2001

Category	Number of Accounts FY, 2001 <sup>3</sup>	Water Use 2001 gpd/a <sup>4</sup>	Water Use, MGD 2001	Use Profile Percent	Water Use gpd	Indoor Water Use gpd
Single Family	3,338	314	1.05	44.87%	71	64
Multifamily	200	2,665	0.53	22.85%	56	50
Commercial	102	1,675	0.15	6.37%		
Industrial	117	766	0.09	3.83%		
Municipal	27	2,030	0.05	2.32%		
Fire	30	1	0.00	0.00%		
Portable	6	72,805	0.44	18.83%		
New Commercial	4	5,493	0.02	0.94%		
New Single Family	1	340	0.00	0.01%		
Total	3,823		2.33	100.01%		
Total Water Purchased (produced) <sup>5</sup> =			2.33	MGD		
Unaccounted For Water (UFW) <sup>6</sup> =			6%	Percent		
Estimated UFW for DSS Model =			7%	Percent		From 5 year BAWUA Survey average
Water Produced for use in DSS Model			2.50	MGD		Add UFW to Total Water Use
Peaking Factor			NA	Provided by Agency or SFPUC Water Master Plan (or NA)		
Peaking Factor for DSS Model =			1.6	If NA use default value of 1.6.		

- Yellow cells are input to DSS Model

#### NOTES

- Communities served (includes all or portions of) City of East Palo Alto, Menlo Park and nearby unincorporated areas according to BAWUA survey
- Average gpd/a is based on a 12-month moving average through December 2001. Indoor use is based on average of 2 lowest consecutive months in the winter if meters read bimonthly, or single lowest month if meters read monthly.
- Number of accounts is from data provided by water agency for this project (see worksheet with account data in this file)
- Total water Purchased (produced) taken from BAWUA for Fiscal Year 2001-2002 or agency if provided.
- Unaccounted for Water (UFW) is the percent difference between the total water purchased and the total water use.
- For reference see additional population estimates provided in population and employment estimates corresponding to service area table.
- Initial estimate based on census data for renter occupied units. For reference see table below that has 2000 census data for corresponding water service area city or cities.
- Customers served by Palo Alto Mutual Park Water Company and O'Connor Tract Water Company in East Palo Alto subtracted. Palo Alto Mutual Water Company - 16 RSF Accounts, 32 RMF Accounts. O'Connor Tract Mutual Coop. Water Company - 578 RSF Accounts, 2 RMF Accounts.

2000 Census Data	
Average household size	4.20
Average household size of owner-occupied unit	4.69
Average household size of renter-occupied unit	3.83
Homeowner vacancy rate (percent)	0.30
Rental vacancy rate (percent)	1.00

Data Prepared : August 15, 2003 By: B. Skeens  
 Revised: March 2, 2004

#### Reconcile agency account billing data and census data

Total Dwelling Units in Census 2000 for East Palo Alto						
Customers of Palo Alto Mutual Park Water Company and O'Connor Tract Coop. Water Company in East Palo Alto subtracted here.						
	2000 Units	No. Buildings	Service Area Billing Accounts - Year 2000 <sup>3</sup>	Difference between billing and census data	Data Sources / Notes	
<b>Single family</b>						
1-detached	3,008	3,008				
1-attached	373	373				
Subtotal	3,381	3,381	3,538			157 Housing Characteristics from U.S. Census Bureau
<b>Multi family</b>						
2-units	145	71				
3-4 units	205	51				
5 to 9 units	272	39				
10-19 units	-74	-5				
20 or more units	1,890	38				Meter for assumed 50 units per building
mobile homes	140	3				Meter for mobile home parks, assume 50 per park
Subtotal	2,578	196		-196		
MF Average =	13.1	units/building	#DIV/0!	units/account		
Total SF + MF units =	5,959					

Population and Household Size in Census 2000 for East Palo Alto				
Customers of Palo Alto Mutual Park Water Company and O'Connor Tract Coop. Water Company in East Palo Alto subtracted.				
	City of East Palo Alto Census Population 2000	City of East Palo Alto Estimated Population 2001	Estimated Residential Service Area Population 2001	Data Sources / Notes
Total Population from Census data <sup>6</sup> =	25,142		25,307	Estimated growth from 2000 to 2001 (CA DOF Projections): 0.66%
Subtract Institutionalized Population =	41		41	Estimated employment growth from 2000 to 2001 (ABAG Employment Projections): 1.94%
Residential Population =	25,101		25,266	Water use for the institutionalized population is accounted for in nonresidential billing categories
Avg. HHS <sup>7</sup> =	4.21			Residential population shown corresponds to the city or cities represented by Census data
MF Pop @ MF HHS <sup>7</sup> =	3.50	9,023	9,596	35.9% Percent of Population that is MF
SF Pop =	16,078	16,184	14,798	64.1% Percent of Population that is SF
SF HHS <sup>7</sup> =	4.76			
Total			24,395	100.0%
			-3,855	Difference in our estimate and average of 2000-2001 and 2001-2002 BAWUA Surveys
			-3,896	Difference in our estimate and the average 2000-2001 and 2001-2002 BAWUA Surveys including institutionalized population

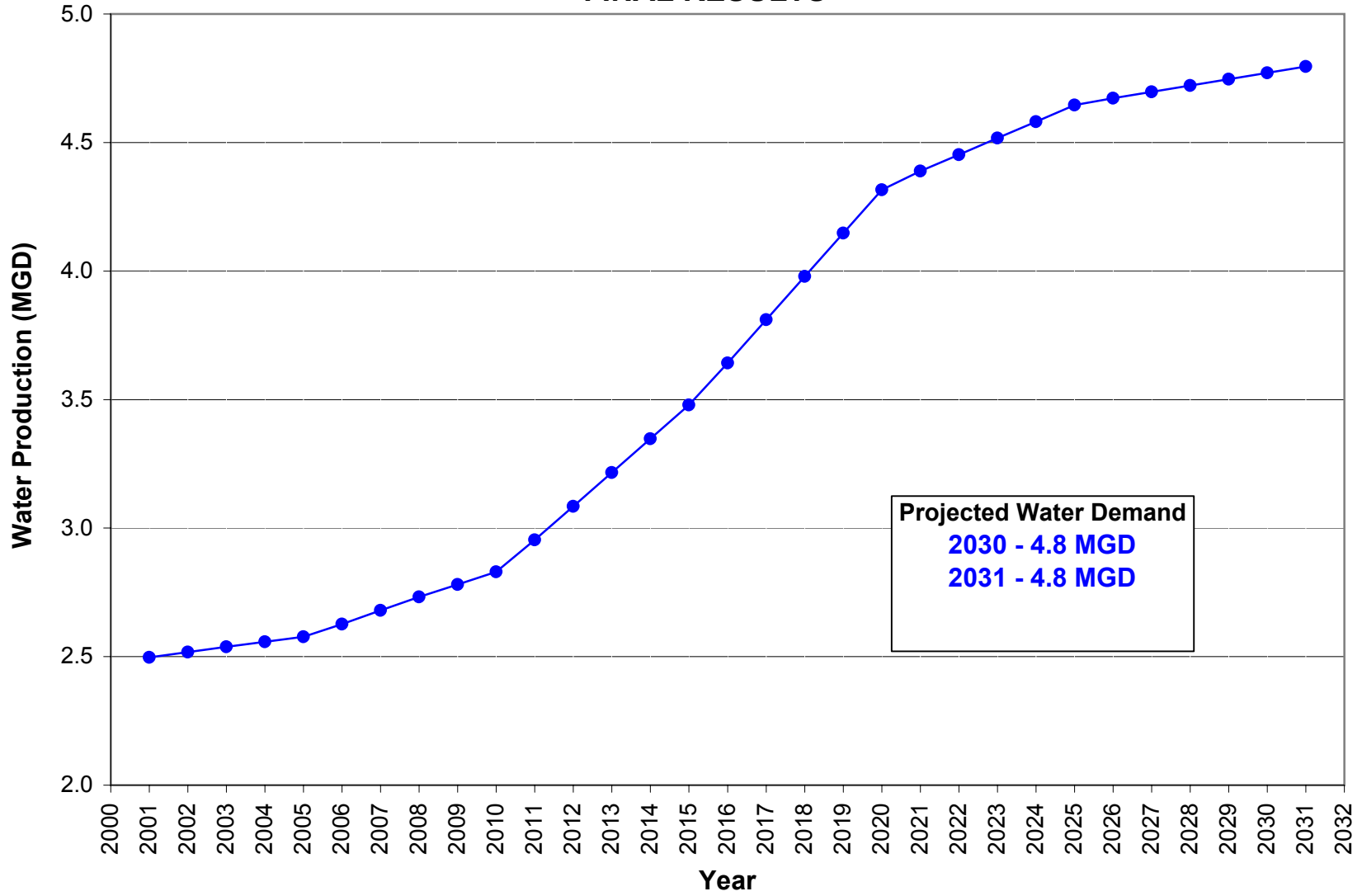
Estimate Service Area Dwelling Units for 2001		
SF Res	3,028	Equals No. Buildings from cell M21 plus growth in accounts for one year from cell T38
MF Res	2,970	Equals No. Buildings from cell L20 and L29 plus growth in accounts for one year from cell T38

Population and Employment Estimates Corresponding to Service Area			
	Population	Employment	
2000 Census data for jurisdiction	25,142	NA	
2000 ABAG (jurisdictional)	29,506	3,400	
2005 ABAG Projection (jurisdictional)	34,500	3,730	
2000 ABAG (subregional)	29,506	3,400	
2005 ABAG Projection (subregional)	31,500	3,730	
2000 Department of Finance Benchmark	29,506		From State of California Department of Finance (DOF) table E-4 as of 4-1-2000. Website www.dof.ca.gov
2001 Department of Finance Estimate	29,700		From State of California Department of Finance table E-4 as of 1-1-2001. Website www.dof.ca.gov
2002 Department of Finance Estimate	31,000		From State of California Department of Finance table E-4 as of 1-1-2002. Website www.dof.ca.gov
FY 2000-2001 BAWUA service area	28,000	NA	
FY 2001-2002 BAWUA service area	28,500	NA	
2001 Employment in Service Area (input to DSS Model) =		3,289	Service Area Employment is determined by the ratio of the 2000-2001 BAWUA service area population to the 2000 ABAG Subregional Population and escalated to 2001 using the assumed growth rate in cell T39.

Definitions / Abbreviations			
ABAG	Association of Bay Area Governments	MF	multi family
BAWUA	Bay Area Water Users Association	MGD	million gallons per day
DSS	Decision Support System Model	No.	number
du	dwelling unit	Pop	population
FY	Fiscal Year	Res	residential
gpd/a	gallons per day / per account	SF	single family
gpd	gallons per day	UFW	unaccounted for water
HHS	household size	DOF	California Department of Finance

Estimate Multi Family Accounts and Water Use	
MF Indoor Use (gpd) =	50
MF Indoor % =	90%
MF mgd =	0.53
2000 Accts from SF	196
2000 Accts from COM	0
2001 Accts	200
2001 gpd/acct	2665
2001 mgd from SF	0.52
2001 mgd from COM	0.00
2001 Accts from SF	1667
2001 Accts from COM	0

# City of East Palo Alto Projected Water Demand (Planning Estimate) FINAL RESULTS



**Appendix C10**  
**Estero Municipal Improvement District/Foster City**

# Estero Municipal Improvement District Water Service Area<sup>1</sup>

## DSS Input Sheet

### FINAL INPUT SHEET

#### Base Year Average Use and Indoor Percentages by Billing Category for DSS Model<sup>2</sup>

Year	Single Family		Multifamily		Commercial/Institutional		Industrial		Irrigation		Fire		New Commercial/Institutional		New Single Family		Average, gpd/a	Indoor	Average, gpd/a	Indoor
	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor				
2001	320	68%	678	84%	2250	86%	1900	79%	3000	0%	750	17%	4000	86%	450	68%				

#### Data for DSS Model - - Base Year 2001

Category	Number of Accounts FY. 2001 <sup>3</sup>	Water Use 2001 gpd/a <sup>2</sup>	Water Use, MGD 2001	Use Profile Percent	Water Use gpd	Indoor Water Use gpd
Single Family	4,698	320	1.50	27.65%	115	77
Multifamily	2,692	678	1.83	33.57%	85	71
Commercial/Instit	215	2,250	0.48	8.90%		
Industrial	68	1,900	0.13	2.38%		
Irrigation	484	3,000	1.45	26.71%		
Fire	58	750	0.04	0.80%		
New Commercial/In	1	4,000	0.00	0.00%		
New Single Family	1	450	0.00	0.00%		
Total	8,217		5.44	100.00%		
Total Water Purchased (produced) <sup>4</sup> =			5.79	MGD		
Unaccounted For Water (UFW) <sup>5</sup> =			6%	Percent		
<b>Estimated UFW for DSS Model =</b>			7%	Percent		
Water Produced for use in DSS Model			5.82	MGD		
Peaking Factor			1.59	Provided by Agency or SFPUC Water Master Plan (or NA)		
<b>Peaking Factor for DSS Model =</b>			1.59	If NA use default value of 1.6.		

<sup>6</sup> - Yellow cells are input to DSS Model

#### NOTES

1 - Communities served (includes all or portions of) Foster City and San Mateo according to BAWUA survey

2 - Average gpd/a is based on a 12-month moving average through December 2001. Indoor use is based on average of 2 lowest consecutive months in the winter if meters read bimonthly, or single lowest month if meters read monthly.

3 - Number of accounts is from data provided by water agency for this project (see worksheet with account data in this file)

4 - Total water Purchased (produced) taken from BAWUA for Fiscal Year 2001-2002 or agency if provided.

5 - Unaccounted for Water (UFW) is the percent difference between the total water purchased and the total water use.

6 - For reference see additional population estimates provided in population and employment estimates corresponding to service area table.

7 - Initial estimate based on census data for renter occupied units. For reference see table below that has 2000 census data for corresponding water service area city or cities.

2000 Census Data	
Average household size	2.47
Average household size of owner-occupied unit	2.64
Average household size of renter-occupied unit	2.21
Homeowner vacancy rate (percent)	0.30
Rental vacancy rate (percent)	2.60

Data Prepared : August 15, 2003

Revised: February 3, 2004

By: B. Skeens

#### Reconcile agency account billing data and census data

Total Dwelling Units in Census 2000 for Foster City		Service Area Billing Accounts - Year 2000 <sup>3</sup>	Difference between billing and census data	Data Sources / Notes
<b>Single family</b>	<b>2000 Units</b>	<b>No. Buildings</b>		
1-detached	4,808	4,808		
Subtotal	4,808	4,808	4,698	-110 Housing Characteristics from U.S. Census Bureau
<b>Multi family</b>				
1-attached	2,464	2,464		
2-units	24	12		
3-4 units	743	212		
5 to 9 units	614	88		
10-19 units	810	54		
20 or more units	2,539	51		
mobile homes		0		
Subtotal	7,201	2,881	2,692	Meter for assumed 50 units per building Meter for mobile home parks, assume 50 per park -189 Must be more than one building on an MF meter. Units include all multi-family dwellings plus the "1-attached" dwellings.
MF Average =	2.5	units/building	2.7	units/account
Total SF + MF units =	12,009			

#### Population and Household Size in Census 2000 for Foster City

	City of Foster City Census Population 2000	City of Foster City Estimated Population 2001	Estimated Residential Service Area Population 2001	Data Sources / Notes
Total Population from Census data <sup>6</sup> =	31,876	32,039		Estimated growth from 2000 to 2001 (CA DOF Projections): 0.51%
Subtract Institutionalized Population =	67	67		Estimated employment growth from 2000 to 2001 (ABAG Employment Projections): 0.94%
Residential Population =	31,809	31,971		Water use for the institutionalized population is accounted for in nonresidential billing categories Residential population shown corresponds to the city or cities represented by Census data
Avg. HHS <sup>7</sup> =	2.65			
MF Pop @ MF HHS <sup>7</sup> =	19,443	19,542	21,439	61.1% Percent of Population that is MF
SF Pop =	12,366	12,429	13,129	38.9% Percent of Population that is SF
SF HHS <sup>7</sup> =	2.57			
Total			34,568	100.0%
			183	Difference in our estimate and average of 2000-2001 and 2001-2002 BAWUA Surveys
			116	Difference in our estimate and the average 2000-2001 and 2001-2002 BAWUA Surveys including institutionalized population

#### Estimate Service Area Dwelling Units for 2001

SF Res	4,833	Equals No. Buildings from cell M21 plus growth in accounts for one year from cell T38
MF Res	7,940	Equals billing accounts in 2001 from cell C16 times average units per account in cell N30 (or average units per building in cell L30 to minimize population difference in cell N47)

#### Population and Employment Estimates Corresponding to Service Area

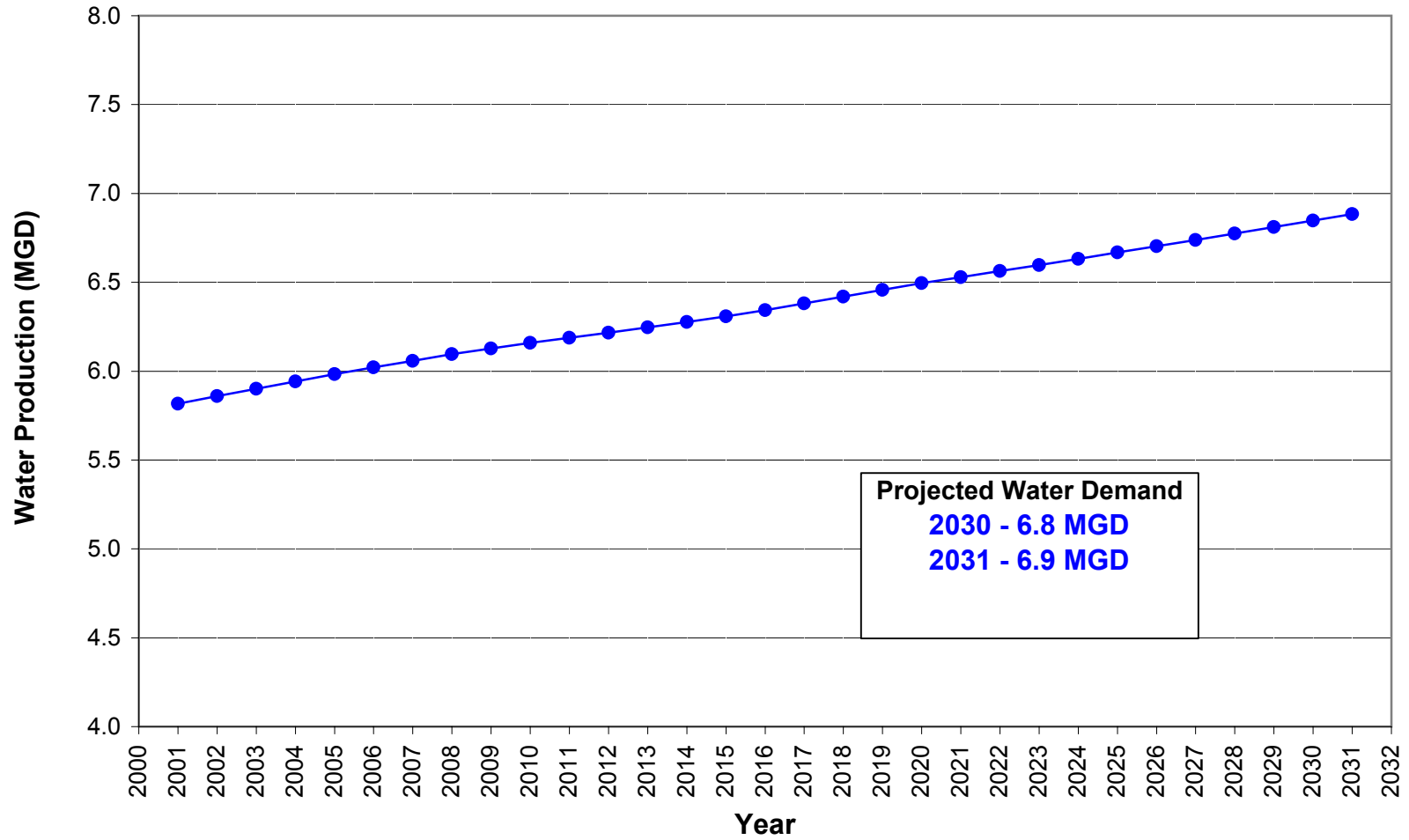
	Population	Employment
2000 Census data for jurisdiction	31,876	NA
2000 ABAG (jurisdictional)	28,803	20,180
2005 ABAG Projection (jurisdictional)	29,900	21,130
2000 ABAG (subregional)	28,803	20,180
2005 ABAG Projection (subregional)	29,900	21,130
2000 Department of Finance Benchmark	28,803	From State of California Department of Finance (DOF) table E-4 as of 4-1-2000. Website www.dof.ca.gov
2001 Department of Finance Estimate	28,950	From State of California Department of Finance table E-4 as of 1-1-2001. Website www.dof.ca.gov
2002 Department of Finance Estimate	28,800	From State of California Department of Finance table E-4 as of 1-1-2002. Website www.dof.ca.gov
FY 2000-2001 BAWUA service area	34,385	NA
FY 2001-2002 BAWUA service area	34,385	NA
2001 Employment in Service Area (input to DSS Model) =		24,318

Service Area Employment is determined by the ratio of the 2000-2001 BAWUA service area population to the 2000 ABAG Subregional Population and escalated to 2001 using the assumed growth rate in cell T39.

#### Definitions / Abbreviations

ABAG	Association of Bay Area Governments	MF	multi family
BAWUA	Bay Area Water Users Association	MGD	million gallons per day
DSS	Decision Support System Model	No.	number
du	dwelling unit	Pop	population
FY	Fiscal Year	Res	residential
gpd/a	gallons per day / per account	SF	single family
gpd	gallons per day	UFW	unaccounted for water
HHS	household size	DOF	California Department of Finance

## Estero MID Projected Water Demand (Planning Estimate) FINAL RESULTS



**Appendix C11**  
**Guadalupe Valley Municipal Improvement District**

# Guadalupe Valley Municipal Improvement District Water Service Area<sup>1</sup>

## DSS Input Sheet

### FINAL INPUT SHEET

Year	Single Family		Commercial		Irrigation															
	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor
2001	110	75%			716	80%	3280	0%												

Data for DSS Model - - Base Year 2001						
Category	Number of Accounts FY. 2001 <sup>3</sup>	Water Use 2001 gpd/a <sup>2</sup>	Water Use, MGD 2001	Use Profile Percent	Water Use gpd	Indoor Water Use gpd
Single Family	364	110	0.04	13.35%	89	67
Commercial	161	716	0.12	38.52%		
Irrigation	44	3,280	0.14	48.14%		
	0	0	0.00	0.00%		
	0	0	0.00	0.00%		
	0	0	0.00	0.00%		
	0	0	0.00	0.00%		
Total	568		0.30	100.00%		
Total Water Purchased (produced) <sup>4</sup> =			0.34	MGD		
Unaccounted For Water (UFW) <sup>5</sup> =			5%	Percent		
<b>Estimated UFW for DSS Model =</b>			7%	Percent		
Water Produced for use in DSS Model			0.32	MGD		
Peaking Factor			2.70	Provided by Agency or SFPUC Water Master Plan (or NA)		
<b>Peaking Factor for DSS Model=</b>			2.7	If NA use default value of 1.6.		

- Yellow cells are input to DSS Model

#### NOTES

1 - Communities served (includes all or portions of) industrial park within the City of Brisbane according to BAWUA survey

2 - Average gpd/a is based on a 12-month moving average through December 2001. Indoor use is based on average of 2 lowest consecutive months in the winter if meters read bimonthly, or single lowest month if meters read monthly.

3 - Number of accounts is from data provided by water agency for this project (see worksheet with account data in this file)

4 - Total water Purchased (produced) taken from BAWUA for Fiscal Year 2001-2002 or agency if provided.

5 - Unaccounted for Water (UFW) is the percent difference between the total water purchased and the total water use.

2000 Census Data for the City of Brisbane	
Average household size	2.20
Average household size of owner-occupied unit	2.39
Average household size of renter-occupied unit	1.81
Homeowner vacancy rate (percent)	6.90
Rental vacancy rate (percent)	4.10

For comparative purposes only

Data Prepared : August 15, 2003

Revised: April 8, 2004

By: B. Skeens

Reconcile agency account billing data and census data					
Total Dwelling Units in Census 2000 for Census Block 3012, 3013, 3014, 3015, Census Tract 6001, San Mateo County, California					
GVMID	2000 Units	No. Buildings	GVMID Service Area Billing Accounts - Year 2000 <sup>3</sup>	Difference between billing and census data	Data Sources / Notes
Total Housing units =	383		206	-177	Many number of Housing Units under construction in 2000 All Accounts are Billed as Single Family

Population in Census 2000 for Census Block 3012, 3013, 3014, 3015, Census Tract 6001, San Mateo County, California				
GVMID	GVMID Census Population 2000	GVMID Estimated Population 2001	Service Area Population 2001	Data Sources / Notes
Total Population from Census data =	443	446		Estimated growth in City of Brisbane from 2000 to 2001 (CA DOF Projections): 0.64% Estimated employment growth from 2000 to 2001 (ABAG Employment Projections): 1.73%
Residential Population =	443	446		Residential population shown corresponds to Census Block 3012, 3013, 3014, 3015, Census Tract 6001
Avg. HHS <sup>7</sup> =	1.16			
SF Pop =	443	446	446	100.0% Percent of Population that is SF
SF HHS =	1.16			
		Total	446	100.0%
			0	Difference in our estimate and average of 2000-2001 and 2001-2002 BAWUA Surveys

Estimate Service Area Dwelling Units for 2001			
SF Res	Population	Employment	GVMID
	385		
Equals housing units from cell L21 plus growth in accounts for one year from cell T38			

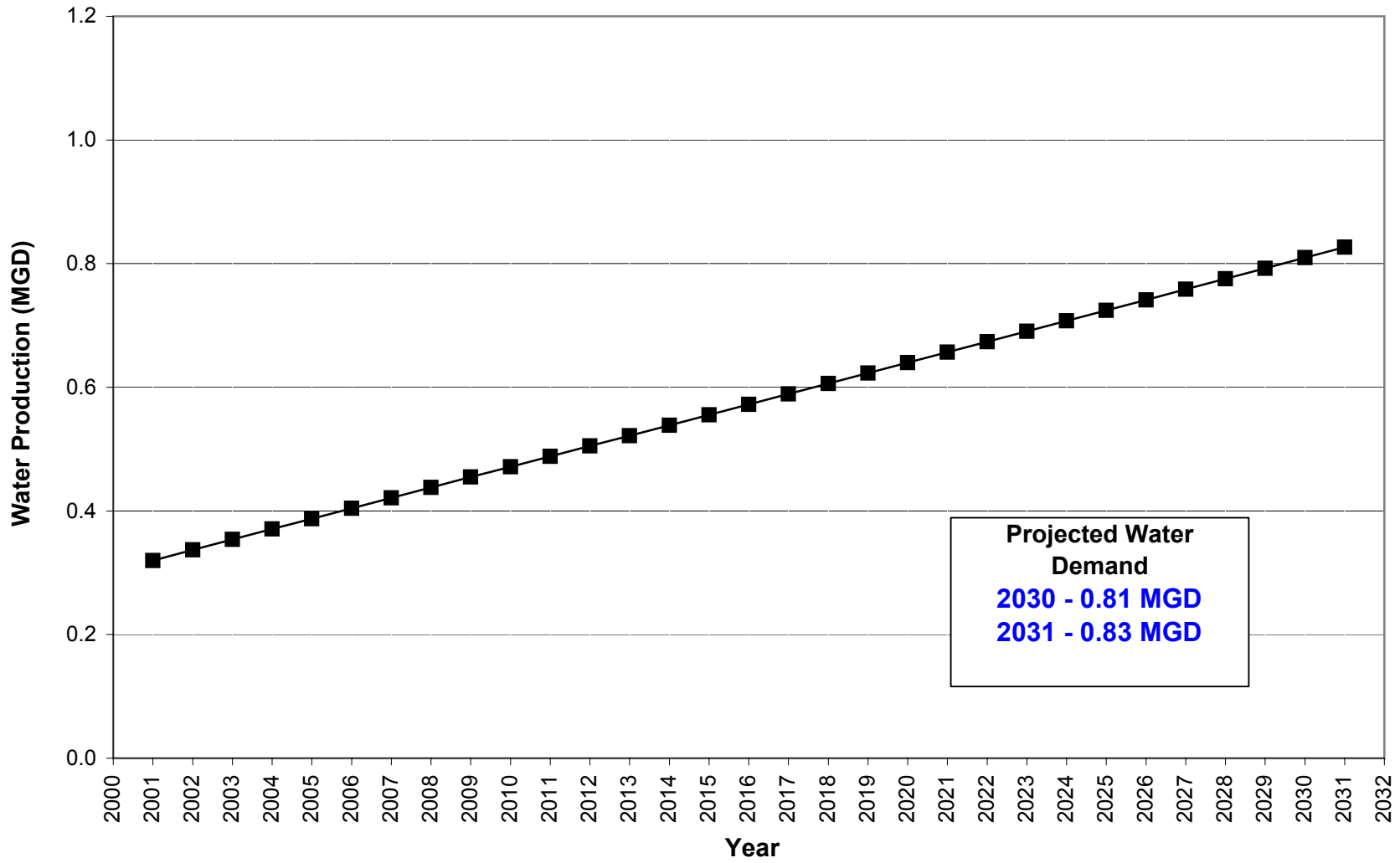
Population and Employment Estimates Corresponding to Service Area			
	Population	Employment	GVMID
2000 Census data for Census Blocks	443	NA	
2000 ABAG (jurisdictional)	3,597	8,100	City of Brisbane
2005 ABAG Projection (jurisdictional)	3,870	8,800	City of Brisbane
2000 ABAG (subregional)	3,597	8,100	City of Brisbane
2005 ABAG Projection (subregional)	3,870	8,800	City of Brisbane
2000 Department of Finance Benchmark	3,597		City of Brisbane
2001 Department of Finance Estimate	3,620		City of Brisbane
2002 Department of Finance Estimate	3,640		City of Brisbane
FY 2000-2001 BAWUA service area	685	NA	GVMID
FY 2001-2002 BAWUA service area	685	NA	GVMID
2001 Employment in Service Area (input to DSS Model) =		4,442	

3658 Subtract jobs in Brisbane WD

Definitions / Abbreviations			
ABAG	Association of Bay Area Governments	MF	multi family
BAWUA	Bay Area Water Users Association	MGD	million gallons per day
DSS	Decision Support System Model	No.	number
du	dwelling unit	Pop	population
FY	Fiscal Year	Res	residential
gpd/a	gallons per day / per account	SF	single family
gpd	gallons per day	UFW	unaccounted for water
HHS	household size	DOF	California Department of Finance



# Guadalupe Valley MID Projected Water Demand (Planning Estimate) FINAL RESULTS



**Appendix C12**  
**Hayward, City of**

# Hayward Water Service Area<sup>1</sup>

## DSS Input Sheet FINAL INPUT SHEET

### Base Year Average Use and Indoor Percentages by Billing Category for DSS Model<sup>2</sup>

Year	Single family		Multifamily		Commercial / Institutional		Industrial		Other		New Renovated Single Family		New Commercial / Industrial		New High Use Single Family		Average, gpd/a	Indoor	Average, gpd/a	Indoor
	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor				
2001	275	73%	3175	75%	1775	70%	2175	72%	140	56%	400	60%	8,500	80%	440	33%				

Includes schools, government, parks, and business

Metered use from hydrants

### Data for DSS Model - - Base Year 2001

Category	Number of Accounts FY, 2001 <sup>3</sup>	Water Use 2001 gpd/a <sup>4</sup>	Water Use, MGD 2001	Use Profile Percent	Water Use gpd	Indoor Water Use gpd
Single family	25,135	275	6.91	39.03%	83	60
Multifamily	1,286	3,175	4.08	23.06%	71	54
Commercial / Institu	1,715	1,775	3.04	17.19%		
Industrial	1,651	2,175	3.59	20.28%		
Other	486	140	0.07	0.3842%		
New Renovated Sing	1	400	0.00	0.0023%		
New Commercial / I	1	8,500	0.01	0.0480%		
New High Use Singl	1	440	0.00	0.0025%		
<b>Total</b>	<b>30,276</b>		<b>17.71</b>	<b>100.00%</b>		
Total Water Purchased (produced) <sup>5</sup> =			17.92 MGD			
Unaccounted For Water (UFW) =			9.0% Percent			
<b>Estimated UFW for DSS Model =</b>			<b>9.0%</b> Percent			
Water Produced for use in DSS Model			19.30 MGD			
Peaking Factor			1.80			
<b>Peaking Factor for DSS Model =</b>			<b>1.8</b>			

- Yellow cells are input to DSS Model

#### NOTES

1 - Communities served (includes all or portions of) Hayward and nearby unincorporated areas according to BAWUA survey

2 - Average gpd/a is based on a 12-month moving average through December 2001. Indoor use is based on average of 2 lowest consecutive months in the winter if meters read bimonthly, or single lowest month if meters read monthly.

3 - Number of accounts is from data provided by water agency for this project (see worksheet with account data in this file)

4 - Total water Purchased (produced) taken from BAWUA for Fiscal Year 2001-2002 or agency if provided. Water purchased was taken from information provided by the agency as shown in this file.

5 - Unaccounted for Water (UFW) is the percent difference between the total water purchased and the total water use.

6 - For reference see additional population estimates provided in population and employment estimates corresponding to service area table.

7 - Initial estimate based on census data for renter occupied units. For reference see table below that has 2000 census data for corresponding water service area city or cities.

2000 Census Data	
Average household size	3.08
Average household size of owner-occupied unit	3.13
Average household size of renter-occupied unit	3.02
Homeowner vacancy rate (percent)	0.60
Rental vacancy rate (percent)	2.60

8 -(INSERT ADDITIONAL ASSUMPTIONS FOR THIS SERVICE AREA)

Data Prepared : July 1, 2003

By: M. Maddaus

Revised: September 5, 2003

### Reconcile agency account billing data and census data

Total Dwelling Units in Census 2000 for Hayward				Service Area Billing Accounts - Year 2000 <sup>3</sup>	Difference between billing and census data	Data Sources / Notes
Single family	2000 Units	No. Buildings				
1-detached	22,773	22,773				
1-attached	3,401	3,401				
<b>Subtotal</b>	<b>26,174</b>	<b>26,174</b>		<b>25,025</b>		-1,149 Housing Characteristics from U.S. Census Bureau
Multi family						
2-units	835	418				
3-4 units	2,517	719				
5 to 9 units	2,590	370				
10-19 units	2,247	150				
20 or more units	9,296	186				Meter for assumed 50 units per building
mobile homes	2,301	46				Meter for mobile home parks, assume 50 per park
<b>Subtotal</b>	<b>19,786</b>	<b>1,888</b>		<b>1,291</b>		-597 Must be more than one building on an MF meter.
MF Average =	10.48	units/building				15 units/account
<b>Total SF + MF units =</b>	<b>45,960</b>					

### Population and Household Size in Census 2000 for Hayward

	City of Hayward Census Population 2000	City of Hayward Estimated Population 2001	Estimated Service Area Population 2001	Data Sources / Notes
	2000	2001	2001	
Total Population from Census data <sup>6</sup> =	140,030	142,400		Estimated growth from 2000 to 2001 (CA DOF Projections): 1.69%
Subtract Institutionalized Population =	755	768		Estimated employment growth from 2000 to 2001 (ABAG Employment Projections): 1.32%
Residential Population =	139,275	141,632		Water use for the institutionalized population is accounted for in nonresidential billing categories
Avg. HHS <sup>7</sup> =	3.03			Residential population shown corresponds to the city or cities represented by Census data
MF Pop @ MF HHS <sup>7</sup> =	2.90	57,379	58,351	41.2% Percent of Population that is MF
SF Pop =	81,896	83,282	83,282	58.8% Percent of Population that is SF
SF HHS <sup>7</sup> =	3.13			
<b>Total</b>			<b>140,439</b>	100.0%
			-1,561	Difference in our estimate and average of 2000-2001 and 2001-2002 BAWUA Surveys
			-2,329	Difference in our estimate and the average 2000-2001 and 2001-2002 BAWUA Surveys including institutionalized population
Estimate Service Area Dwelling Units for 2001				
SF Res	26,617	Equals No. Buildings from cell M21 plus growth in accounts for one year from cell T38		
MF Res	19,709	Equals billing accounts in 2001 from cell C16 times average units per account in cell N30 (or average units per building in cell L30 to minimize population difference in cell N47)		

#### Population and Employment Estimates Corresponding to Service Area

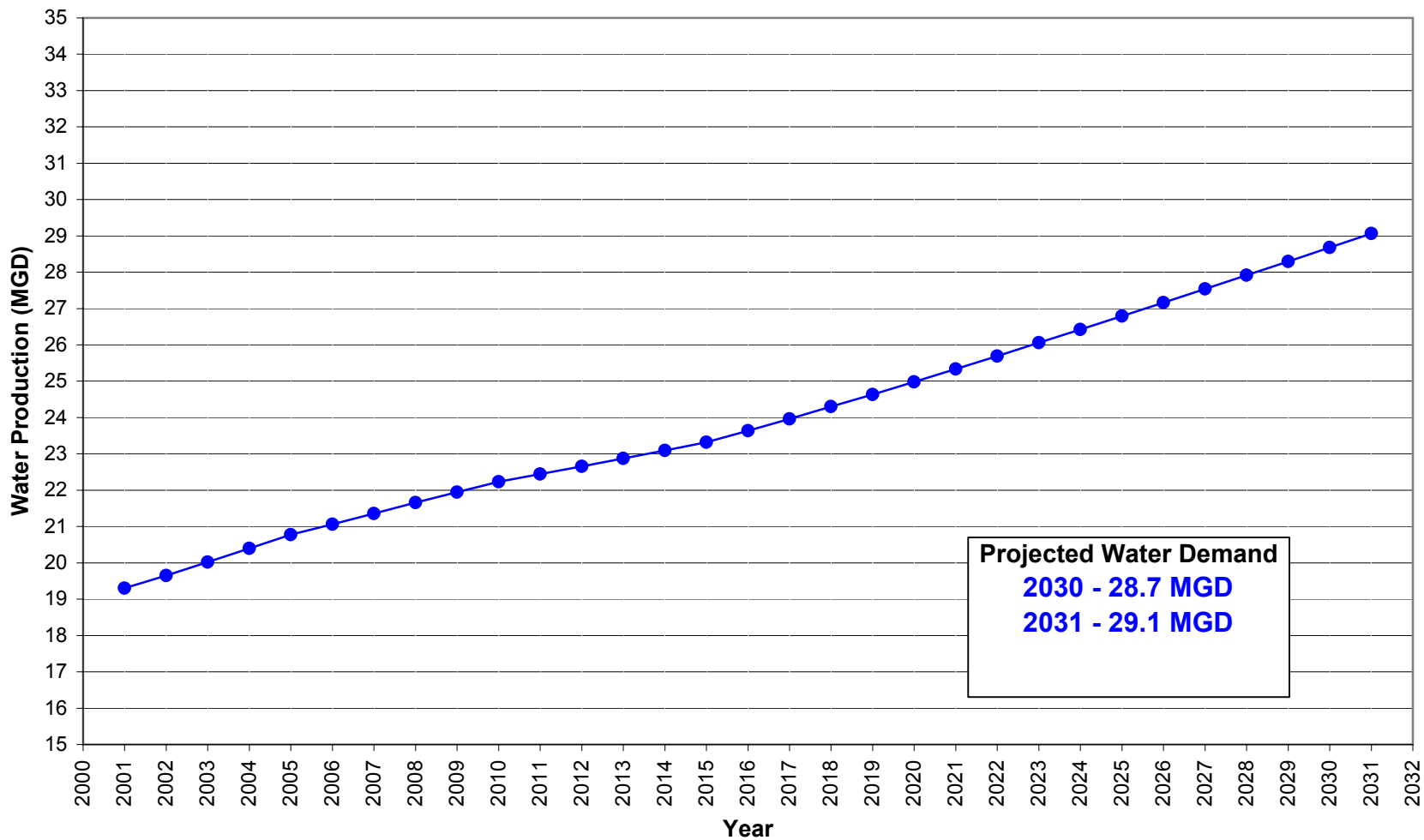
	Population	Employment
2000 Census data for jurisdiction	140,030	NA
2000 ABAG (jurisdictional)	140,030	86,350
2005 ABAG Projection (jurisdictional)	148,880	92,060
2000 ABAG (subregional)	140,660	87,380
2005 ABAG Projection (subregional)	148,100	91,050
2000 Department of Finance Benchmark	140,030	From State of California Department of Finance (DOF) table E-4 as of 4-1-2000. Website www.dof.ca.gov
2001 Department of Finance Estimate	142,400	From State of California Department of Finance table E-4 as of 1-1-2001. Website www.dof.ca.gov
2002 Department of Finance Estimate	144,000	From State of California Department of Finance table E-4 as of 1-1-2002. Website www.dof.ca.gov
FY 2000-2001 BAWUA service area	140,000	NA
FY 2001-2002 BAWUA service area	144,000	NA
2001 Employment in Service Area (input to DSS Model) =		87,473

Service Area Employment is determined by the annualized growth in employment from the ABAG 2000 employment to the ABAG 2005 employment as calculated in cell T39.

### Definitions / Abbreviations

ABAG	Association of Bay Area Governments	MF	multi family
BAWUA	Bay Area Water Users Association	MGD	million gallons per day
DSS	Decision Support System Model	No.	number
du	dwelling unit	Pop	population
FY	Fiscal Year	Res	residential
gpd/a	gallons per day / per account	SF	single family
gpd	gallons per day	UFW	unaccounted for water
HHS	household size		

### City of Hayward Projected Water Demand (Planning Estimates) FINAL RESULTS



**Appendix C13**  
**Hillsborough, Town of**

# Town of Hillsborough Water Service Area<sup>1</sup>

## DSS Input Sheet FINAL INPUT SHEET

### Base Year Average Use and Indoor Percentages by Billing Category for DSS Model<sup>2</sup>

Year	Single family		Multifamily		Commercial		Other		Institutional											
	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor
2001	795	42%	0	0%	0	0%	1,574	42%	2134	42%										

Changed commercial use to "other use" based on phone conversation from 08-05-03. No industrial use so not listed as a category.

#### Data for DSS Model - - Base Year 2001

Category	Number of Accounts FY, 2001 <sup>3</sup>	Water Use 2001 gpd/a <sup>2</sup>	Water Use, MGD 2001	Use Profile Percent	Water Use gpd	Indoor Water Use gpd
Single family	4,262	795	3.39	98.01%	292	121
Multifamily	0	0	0.00	0.00%	#DIV/0!	#DIV/0!
Commercial	0	0	0.00	0.00%		
Other	18	1,574	0.03	0.82%		
Institutional	19	2,134	0.04	1.17%		
	0	0	0.00	0.00%		
	0	0	0.00	0.00%		
	0	0	0.00	0.00%		
Total	4,299		3.46	100.00%		
Total Water Purchased (produced) <sup>4</sup> =			3.95 MGD		BAWUA Survey	
Unaccounted For Water (UFW) <sup>5</sup> =			6.3% Percent		From 5 year BAWUA Survey average	
<b>Estimated UFW for DSS Model =</b>			7% Percent		7% if actual is < 7%, otherwise = E25	
Water Produced for use in DSS Model			3.70 MGD		Add UFW to Total Water Use	
Peaking Factor			2.00		Provided by Agency or SFPUC Water Master Plan (or NA)	
<b>Peaking Factor for DSS Model =</b>			2.0		If NA use default value of 1.6.	

Blue cells are entered by modeler  
Yellow cells are input to DSS Model

#### NOTES

1 - Communities served (includes all or portions of) Hillsborough and nearby unincorporated areas according to BAWUA survey

2 - Average gpd/a is based on a 12-month moving average through December 2001. Indoor use is based on average of 2 lowest consecutive months in the winter if meters read bimonthly, or single lowest month if meters read monthly.

3 - Number of accounts is from data provided by water agency for this project (see worksheet with account data in this file)

4 - Total water Purchased (produced) taken from BAWUA for Fiscal Year 2001-2002 or agency if provided. In this case, the information was provided by Hillsborough and can be found in this file.

5 - Unaccounted for Water (UFW) is the percent difference between the total water purchased and the total water use.

6 - For reference see additional population estimates provided in population and employment estimates corresponding to service area table. For this service area 358 was added to census data for the unincorporated areas as instructed by Hillsboro Water Service Area. This 358 unincorporated population can be

7 - Initial estimate based on census data for renter occupied units. For reference see table below that has 2000 census data for corresponding water service area city or cities.

#### 2000 Census Data

Average household size	2.93
Average household size of owner-occupied unit	2.93
Average household size of renter-occupied unit	3.09
Homeowner vacancy rate (percent)	0.40
Rental vacancy rate (percent)	4.30

8 -(INSERT ADDITIONAL ASSUMPTIONS FOR THIS SERVICE AREA)

Data Prepared : July 30, 2003

By: M. Maddaus

Revised: January 10, 2004

#### Reconcile agency account billing data and census data

Total Dwelling Units in Census 2000 for Hillsborough				Service Area Billing Accounts - Year 2000		Difference between billing and census data		Data Sources / Notes
Category	2000 Units	No. Buildings						
<b>Single family</b>								
1-detached	3,787	3,787						
1-attached	8	8						
Subtotal	3,795	3,795		4,257			462 Housing Characteristics from U.S. Census Bureau	
<b>Multi family</b>								
2-units		0						
3-4 units	9	3						
5 to 9 units		0						
10-19 units		0						
20 or more units		0					Meter for assumed 50 units per building	
mobile homes		0					Meter for mobile home parks, assume 50 per park	
Subtotal	9	3		0			-3 Must be more than one building on an MF meter.	
MF Average =	3.5	units/building		#DIV/0!		units/account		
Total SF + MF units =	3,804							

#### Population and Household Size in Census 2000 for Hillsborough

	Town of Hillsborough		Estimated Service Area Population 2001	Estimated growth from 2000 to 2001 (CA DOF Projections):	Data Sources / Notes
	Census Population 2000	Estimated Population 2001			
Total Population from Census data <sup>6</sup> =	11,183	11,260		0.69%	Estimated employment growth from 2000 to 2001 (ABAG Employment Projections):
Subtract Institutionalized Population =	0	0		0.50%	Water use for the institutionalized population is accounted for in nonresidential billing categories
Residential Population =	11,183	11,260			Residential population shown corresponds to the city or cities represented by Census data
Avg. HHS <sup>7</sup> =	2.94				
MF Pop @ MF HHS <sup>7</sup> =	0.00	0	0	0.0%	Percent of Population that is MF
SF Pop =	11,183	11,618	11,618	103.2%	Percent of Population that is SF
SF HHS <sup>7</sup> =	2.73				
Total			11,618	103.2%	
			719		Difference in our estimate and average of 2000-2001 and 2001-2002 BAWUA Surveys
			719		Difference in our estimate and the average 2000-2001 and 2001-2002 BAWUA Surveys including institutionalized population

#### Estimate Service Area Dwelling Units for 2001

SF Res	4,262	Equals No. Buildings from cell M21 plus growth in accounts for one year from cell T38
MF Res	0	Equals billing accounts in 2001 from cell C16 times average units per account in cell N30 (or average units per building in cell L30 to minimize population difference in cell N47)

#### Population and Employment Estimates Corresponding to Service Area

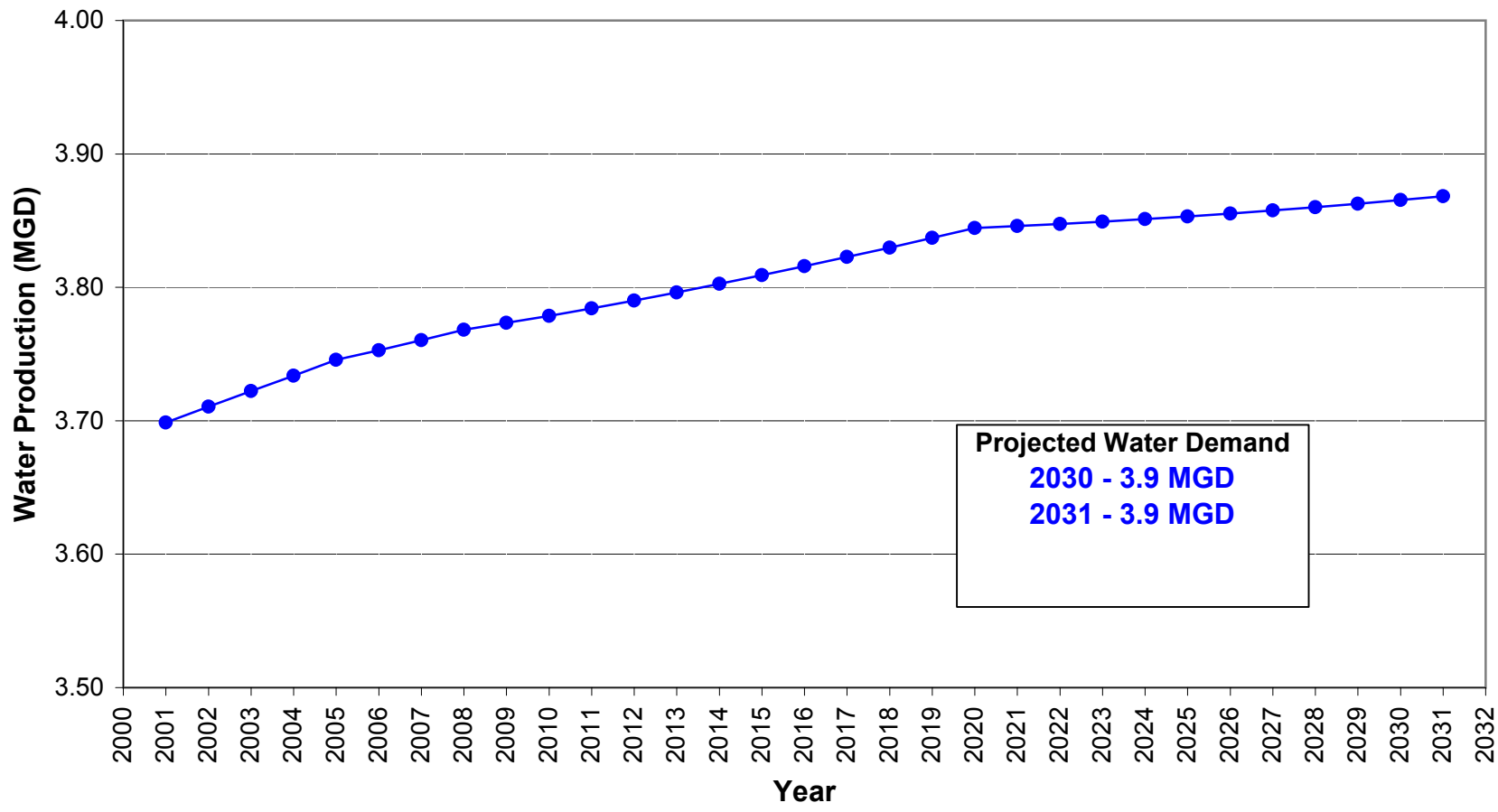
	Population	Employment
2000 Census data for jurisdiction	11,183	NA
2000 ABAG (jurisdictional)	10,825	1,210
2005 ABAG Projection (jurisdictional)	11,100	1,240
2000 ABAG (subregional)	10,825	1,210
2005 ABAG Projection (subregional)	11,100	1,240
2000 Department of Finance Benchmark	10,825	From State of California Department of Finance (DOF) table E-4 as of 4-1-2000. Website www.dof.ca.gov
2001 Department of Finance Estimate	10,900	From State of California Department of Finance table E-4 as of 1-1-2001. Website www.dof.ca.gov
2002 Department of Finance Estimate	10,950	From State of California Department of Finance table E-4 as of 1-1-2002. Website www.dof.ca.gov
FY 2000-2001 BAWUA service area	10,825	NA
FY 2001-2002 BAWUA service area	10,973	NA
2001 Employment in Service Area (input to DSS Model) =		1,216

Service Area Employment is determined by the ratio of the 2000-2001 BAWUA service area population to the 2000 ABAG Subregional Population and escalated to 2001 using the assumed growth rate in cell T39. (EXPLAIN SOURCE)

#### Definitions / Abbreviations

ABAG	Association of Bay Area Governments	MF	multi family
BAWUA	Bay Area Water Users Association	MGD	million gallons per day
DSS	Decision Support System Model	No.	number
du	dwelling unit	Pop	population
FY	Fiscal Year	Res	residential
gpd/a	gallons per day / per account	SF	single family
gpd	gallons per day	UFW	unaccounted for water
HHS	household size		

# Town of Hillsborough Projected Water Demand (Planning Estimates) FINAL RESULTS



**Appendix C14**  
**Los Trancos County Water District**



# Los Trancos County Water District Service Area<sup>1</sup>

## DSS Input Sheet

### FINAL INPUT SHEET

#### Base Year Average Use and Indoor Percentages by Billing Category for DSS Model<sup>2</sup>

Year	Los Trancos Woods		Northern, Blue Oaks, Vista Verde																	
	Average <sup>9</sup> , gpd/a	Indoor	Average <sup>10</sup> , gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor
2001	228	66%	567	26%																

#### Data for DSS Model -- Base Year 2001

Category	Number of Accounts FY. 2001 <sup>3,6</sup>	Water Use 2001 gpd/a <sup>2</sup>	Water Use, MGD 2001	Use Profile Percent	gpd	gpd
Los Trancos Wood	140	228	0.03	32.33%	43	28
Northern, Blue Oa	118	567	0.07	67.67%	91	24
0		0	0.00	0.00%		
0		0	0.00	0.00%		
0		0	0.00	0.00%		
0		0	0.00	0.00%		
0		0	0.00	0.00%		
0		0	0.00	0.00%		
0		0	0.00	0.00%		
Total	258		0.10	100.00%		
Total Water Purchased (produced) <sup>4</sup> =			0.11	MGD		
Unaccounted For Water (UFW) <sup>5</sup> =			6.6%	Percent		
Estimated UFW for DSS Model =			7.0%	Percent		
Water Produced for use in DSS Model			0.106	MGD		
Peaking Factor			NA	Provided by Agency or SFPUC Water Master Plan (or NA)		
Peaking Factor for DSS Model=			1.6	If NA use default value of 1.6.		

Blue cells are entered by modeler  
Yellow cells are input to DSS Model

- NOTES**
- Communities served are unincorporated area of Santa Clara and San Mateo Counties according to BAWUA survey
  - Average water use water determined from the LTCWD Forecast Study (2002). The average water use per account in this study differs by 2% from the average computed from billing data. Indoor use is based on the lowest month in the winter from monthly billing data.
  - Number of accounts is based on the LTCWD Forecast Study (2002). 100% of the accounts are single family (SF) residential. Those accounts in the Los Trancos Woods zone are in a separate category because the water usage is low than the rest of the service area.
  - Total water Purchased (produced) taken from BAWUA for Fiscal Year 2001-2002 or agency if provided.
  - Unaccounted for Water (UFW) is the percent difference between the total water purchased and the total water use.
  - For reference see additional population estimates provided in population and employment estimates corresponding to service area table.
  - No multi-family households are included in the service area. MF household size was assumed zero. SF household size was assumed to be 2.87 (similar to nearby Town of Portola Valley).

#### 2000 Census Data

Average household size	2.58
Average household size of owner-occupied unit	2.75
Average household size of renter-occupied unit	1.67
Homeowner vacancy rate (percent)	0.20
Rental vacancy rate (percent)	6.20

Data Prepared : July 24, 2003 By: N. Foged  
Revised: June 7, 2004 By: N. Foged

#### Reconcile agency account billing data and census data

Total Dwelling Units in Census 2000 for Portola Valley Town					
	2000 Units	No. Buildings	Service Area Billing Accounts - Year 2000 <sup>3</sup>	Difference between billing and census data	Data Sources / Notes
<b>Single family</b>					
1-detached	1,510	1,510			
1-attached	34	34			
Subtotal	1,544	1,544	265	-1,279	Housing Characteristics from U.S. Census Bureau
<b>Multi family</b>					
2-units	0	0			
3-4 units	0	0			
5 to 9 units	84	12			
10-19 units	97	6			
20 or more units	84	2			
mobile homes	0	0			Meter for assumed 50 units per building. Meter for mobile home parks, assume 50 per park.
Subtotal	265	20	0	-20	
MF Average =	13.15	units/building			units/account
Total SF + MF units =	1,809				

Population and Household Size in Census 2000 for Portola Valley Town					
	Portola Valley Town Census Population 2000	Portola Valley Town Estimated Population 2001	Estimated Residential Service Area Population 2001		Data Sources / Notes
Total Population from Census data <sup>6</sup> =	4,462	4,480		0.40%	Estimated growth from 2000 to 2001 (CA DOF Projections):
Subtract Institutionalized Population =	36	36		0.23%	Estimated employment growth from 2000 to 2001 (ABAG Employment Projections):
Residential Population =	4,426	4,444			Water use for the institutionalized population is accounted for in nonresidential billing categories Residential population shown corresponds to the city or cities represented by Census data
Avg. HHS <sup>7</sup> =	2.45				
MF Pop @ MF HHS <sup>7</sup>	0	0	0	0.0%	Percent of Population that is MF
SF Pop =	4,426	4,444	740	100.0%	Percent of Population that is SF
SF HHS <sup>7</sup> =	2.87				
Total			740	100.0%	
			-515		Difference in our estimate and average of 2000-2001 and 2001-2002 BAWUA Surveys
			-479		Difference in our estimate and the average 2000-2001 and 2001-2002 BAWUA Surveys including institutionalized population

#### Estimate Service Area Dwelling Units for 2001

SF Res	258	Equals billing accounts in 2001 from cell C15
MF Res	1,552	Equals billing accounts in 2001 from cell C16 times average units per building in cell L31

#### Population and Employment Estimates Corresponding to Service Area

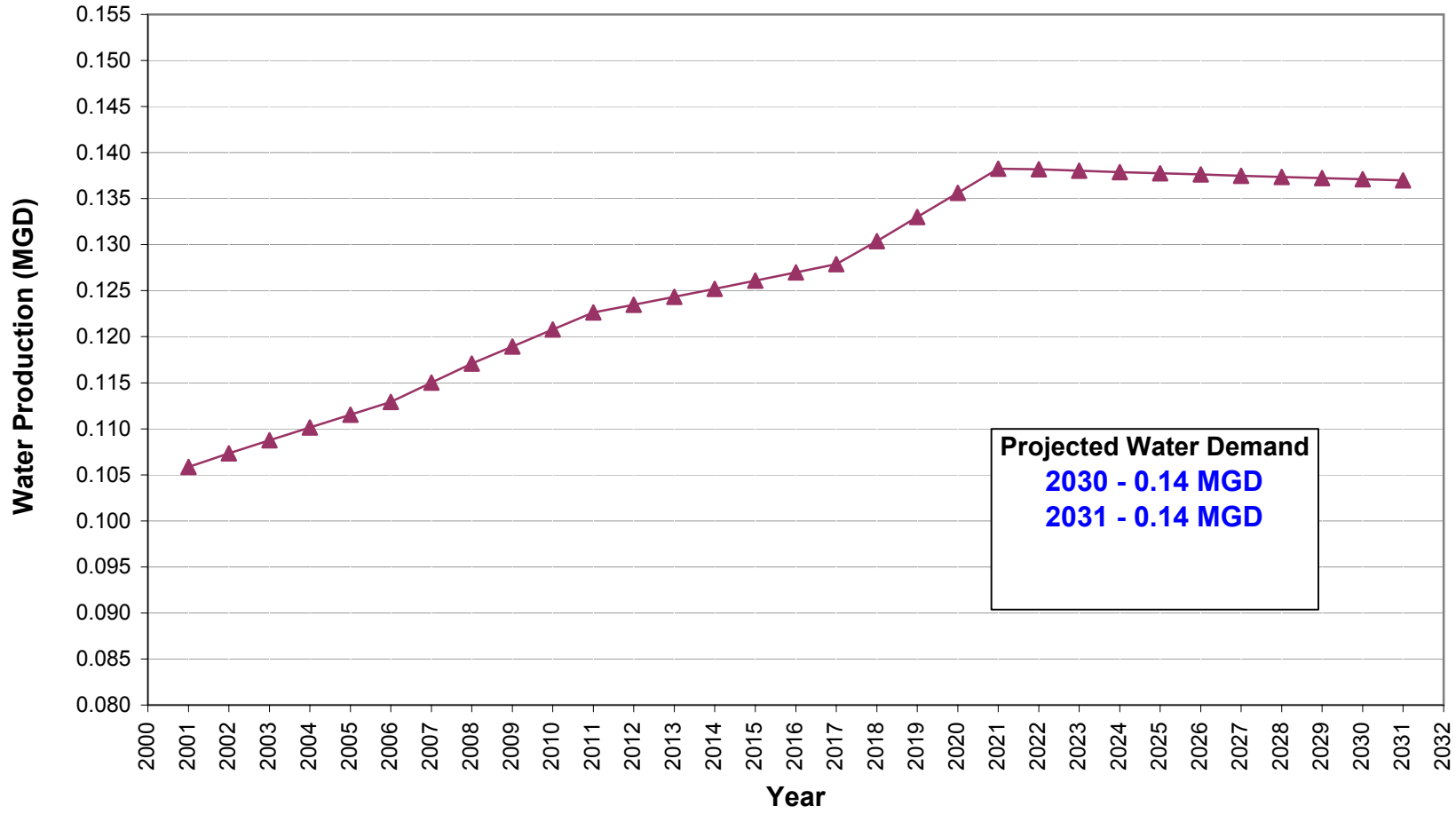
	Population	Employment
2000 Census data for jurisdiction	4,462	NA
2000 ABAG (jurisdictional)	4,462	880
2005 ABAG Projection (jurisdictional)	4,800	890
2000 ABAG (subregional)	6,905	1,130
2005 ABAG Projection (subregional)	7,300	1,140
2000 Department of Finance Benchmark	4,462	From State of California Department of Finance (DOF) table E-4 as of 4-1-2000. Website www.dof.ca.gov
2001 Department of Finance Estimate	4,480	From State of California Department of Finance table E-4 as of 1-1-2001. Website www.dof.ca.gov
2002 Department of Finance Estimate	4,490	From State of California Department of Finance table E-4 as of 1-1-2002. Website www.dof.ca.gov
FY 2000-2001 BAWUA service area	1,250	NA
FY 2001-2002 BAWUA service area	1,260	NA
2001 Employment in Service Area (input to DSS Model) =		0

Assume that there is no service area employment because, "the District is and will remain into the future as 100% single family residential." (LTCWD 2003).

#### Definitions / Abbreviations

ABAG	Association of Bay Area Governments	MF	multi family
BAWUA	Bay Area Water Users Association	MGD	million gallons per day
DSS	Decision Support System Model	No.	number
du	dwelling unit	Pop	population
FY	Fiscal Year	Res	residential
gpd/a	gallons per day / per account	SF	single family
gpd	gallons per day	UFW	unaccounted for water
HHS	household size		

### Los Trancos County WD Projected Water Demand (Planning Estimate) FINAL RESULTS



**Appendix C15**  
**Menlo Park, City of**

# Menlo Park Water Service Area<sup>1</sup>

## DSS Input Sheet FINAL INPUT SHEET

### Base Year Average Use and Indoor Percentages by Billing Category for DSS Model<sup>2</sup>

Year	Single family		Multifamily		Commercial		Industrial		Landscape/Irrigation		Temporary Meter		Public Facility								
	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	
2001	390	61%	2100	77%	2500	66%	5300	78%	3680	7%	360	5%	8740	41%							
Bimonthly data		Bimonthly data																			

Data for DSS Model - - Base Year 2001						
Category	Number of Accounts FY. 2001 <sup>3</sup>	Water Use 2001 gpd/a <sup>4</sup>	Water Use, MGD 2001	Use Profile Percent	Water Use gcd	Indoor Water Use gcd
Single family	3,366	390	1.31	34.35%	141	85
Multifamily	107	2,100	0.22	5.88%	79	60
Commercial	188	2,500	0.47	12.27%		
Industrial	212	5,300	1.12	29.42%		
Landscape/Irrigation	111	3,680	0.41	10.67%		
Temporary Meter	6	360	0.00	0.05%		
Public Facility	32	8,740	0.28	7.36%		
0	0	0	0.00	0.00%		
Total	4,021		3.82	100.00%		
Total Water Purchased (produced) <sup>5</sup> =			3.53	MGD		
Unaccounted For Water (UFW) =			1.8%	Percent		
Estimated UFW for DSS Model =			7%	Percent		
Water Produced for use in DSS Model			4.09	MGD		
Peaking Factor			NA	Provided by Agency or SFPUC Water Master Plan (or NA)		
Peaking Factor for DSS Model =			1.6	If NA use default value of 1.6.		

Blue cells are entered by modeler  
Yellow cells are input to DSS Model

- NOTES**
- Communities served (includes all or portions of) Menlo Park (East) and unincorporated areas according to BAWUA survey
  - Average gpd/a is based on a 12-month moving average through December 2001. Indoor use is based on average of 2 lowest consecutive months in the winter if meters read bimonthly, or single lowest month if meters read monthly.
  - Number of accounts is from data provided by water agency for this project (see worksheet with account data in this file)
  - Total water Purchased (produced) taken from BAWUA for Fiscal Year 2001-2002 or agency if provided. For Menlo Park the total amount of water purchased in 2001 was provided by the agency and is shown in this file.
  - Unaccounted for Water (UFW) is the percent difference between the total water purchased and the total water use.
  - For reference see additional population estimates provided in population and employment estimates corresponding to service area table.
  - Initial estimate based on census data for renter occupied units. For reference see table below that has 2000 census data for corresponding water service area city or cities.

2000 Census Data	
Average household size (persons)	2.41
Average household size of owner-occupied unit (persons)	2.67
Average household size of renter-occupied unit (persons)	2.07
Homeowner vacancy rate (percent)	0.30
Rental vacancy rate (percent)	1.50

8 - (INSERT ADDITIONAL ASSUMPTIONS FOR THIS SERVICE AREA)

Data Prepared: July 15, 2003 By: M. Maddaus  
Revised: September 7, 2003

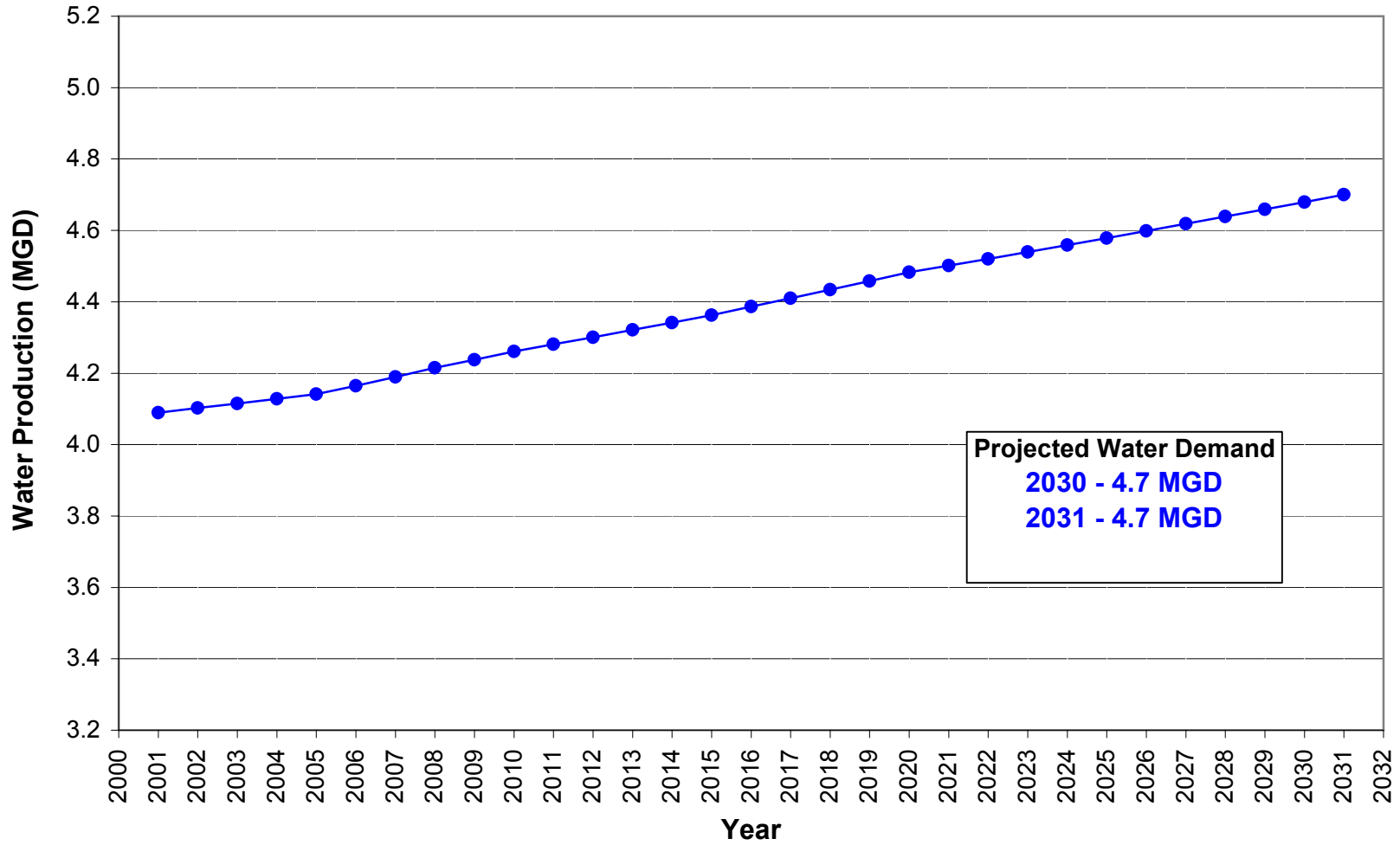
Reconcile agency account billing data and census data						
Total Dwelling Units in Census 2000 for City of Menlo Park						
	2000 Units	No. Buildings	Service Area Billing Accounts - Year 2000 <sup>3</sup>	Difference between billing and census data	Data Sources / Notes	
<b>Single family</b>						
1-detached	2,261	2,261				
1-attached	308	308				
Subtotal	2,569	2,569	3,354			785 Housing Characteristics from U.S. Census Bureau
<b>Multi family</b>						
2-units	95	48				
3-4 units	425	121				
5 to 9 units	381	54				
10-19 units	291	19				
20 or more units	440	9				Meter for assumed 50 units per building
mobile homes	2	0				Meter for mobile home parks, assume 50 per park
Subtotal	1,635	252	107			-145 Must be more than one building on an MF meter.
MF Average =	6.49 units/building		15 units/account			
Total SF + MF units =	4,204					

Population and Household Size in Census 2000 for City of Menlo Park					Estimated Service Area Population		Data Sources / Notes	
	City of Menlo Park Census Population 2000	City of Menlo Park Estimated Population 2001	Estimated Service Area Population 2001					
Total Population from Census data <sup>6</sup> =	10,159	10,230						Estimated growth from 2000 to 2001 (CA DOF Projections): 0.70%
Subtract Institutionalized Population =	206	208						Estimated employment growth from 2000 to 2001 (ABAG Employment Projections): 0.66%
Residential Population =	9,953	10,022						Water use for the institutionalized population is accounted for in nonresidential billing categories
Avg. HHS <sup>7</sup> =	2.37							Residential population shown corresponds to the city or cities represented by Census data
MF Pop @ MF HHS <sup>7</sup> =	1.75	2,861	2,881	2,861	28.7%			Percent of Population that is MF
SF Pop =	7,092	7,141	9,292		71.3%			Percent of Population that is SF
SF HHS <sup>7</sup> =	2.76							
Total			12,153	100.0%				
			1,853					Difference in our estimate and average of 2000-2001 and 2001-2002 BAWUA Surveys
			1,645					Difference in our estimate and the average 2000-2001 and 2001-2002 BAWUA Surveys including institutionalized population

Estimate Service Area Dwelling Units for 2001			
	Population	Employment	
SF Res	3,366	NA	Equals No. Buildings from cell M21 plus growth in accounts for one year from cell T38
MF Res	1,635		Equals billing accounts in 2001 from cell C16 times average units per account in cell N30 (or average units per building in cell L30 to minimize population difference in cell N47)
Population and Employment Estimates Corresponding to Service Area			
2000 Census data for jurisdiction	10,159	NA	
2000 ABAG (jurisdictional)	10,159	9,851	
2005 ABAG Projection (jurisdictional)	10,395	10,177	
2000 ABAG (subregional)	11,634	9,950	
2005 ABAG Projection (subregional)	11,913	10,276	
2000 Department of Finance Benchmark	10,159		From State of California Department of Finance (DOF) table E-4 as of 4-1-2000. Website www.dof.ca.gov
2001 Department of Finance Estimate	10,230		From State of California Department of Finance table E-4 as of 1-1-2001. Website www.dof.ca.gov
2002 Department of Finance Estimate	10,214		From State of California Department of Finance table E-4 as of 1-1-2002. Website www.dof.ca.gov
FY 2000-2001 BAWUA service area	10,300	NA	
FY 2001-2002 BAWUA service area	10,300	NA	
2001 Employment in Service Area (input to DSS Model) =		10,053	Service Area Employment is determined by the ratio of the 2000-2001 BAWUA service area population to the 2000 ABAG Subregional Population and escalated to 2001 using the assumed growth rate in cell T39. (EXPLAIN SOURCE)

Definitions / Abbreviations			
ABAG	Association of Bay Area Governments	MF	multi family
BAWUA	Bay Area Water Users Association	MGD	million gallons per day
DSS	Decision Support System Model	No.	number
du	dwelling unit	Pop	population
FY	Fiscal Year	Res	residential
gpd/a	gallons per day / per account	SF	single family
gpd	gallons per day	UFW	unaccounted for water
HHS	household size		

# City of Menlo Park Projected Water Demand (Planning Estimates) FINAL RESULTS



**Appendix C16**  
**Mid-Peninsula Water District**

**Mid Peninsula (Belmont) Water Service Area<sup>1</sup>**  
**DSS Input Sheet**  
**FINAL INPUT SHEET**

**Base Year Average Use and Indoor Percentages by Billing Category for DSS Model<sup>2</sup>**

Year	Residential		Apartments		Commercial		Industrial		Other Public Authority									
	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor
2001	280	60%	2650	90%	1050	73%	4175	86%	2260	37%								

Monthly as of Jan 2001

Monthly as of Jan 2001

Other is City, State, or County accounts

**Data for DSS Model - - Base Year 2001**

Category	Number of Accounts FY. 2001 <sup>3</sup>	Water Use 2001 gpd/a <sup>4</sup>	Water Use, MGD 2001	Use Profile Percent	Water Use gpd	Indoor Water Use gpd
Residential	7,010	280	1.96	57.56%	106	64
Apartments	206	2,650	0.55	16.01%	69	61
Commercial	466	1,050	0.49	14.35%		
Industrial	50	4,175	0.21	6.12%		
Other Public Autho <sup>r</sup>	90	2,260	0.20	5.96%		
0	0	0	0.00	0.00%		
0	0	0	0.00	0.00%		
0	0	0	0.00	0.00%		
Total	7,822		3.41	100.00%		
Total Water Purchased (produced) <sup>5</sup> =			3.54	MGD		
Unaccounted For Water (UFW) <sup>6</sup> =			3.1%	Percent		
<b>Estimated UFW for DSS Model =</b>			7%	Percent		
Water Produced for use in DSS Model			3.65	MGD		
Peaking Factor			1.95	Provided by Agency or SFPUC Water Master Plan (or NA)		
<b>Peaking Factor for DSS Model=</b>			1.95	If NA use default value of 1.6.		

Blue cells are entered by modeler  
Yellow cells are input to DSS Model

**NOTES**

1 - Communities served (includes all or portions of) Belmont, San Carlos, and nearby unincorporated areas according to BAWUA survey. Serve 152 customers in San Carlos.

2 - Average gpd/a is based on a 12-month moving average through December 2001. Indoor use is based on average of 2 lowest consecutive months in the winter if meters read bimonthly, or single lowest month if meters read monthly.

3 - Number of accounts is from data provided by water agency for this project (see worksheet with account data in this file)

4 - Total water Purchased (produced) taken from BAWUA for Fiscal Year 2001-2002 or agency if provided. Water purchase data was provided by Mid Peninsula agency and is provided in this file.

5 - Unaccounted for Water (UFW) is the percent difference between the total water purchased and the total water use.

6 - For reference see additional population estimates provided in population and employment estimates corresponding to service area table.

7 - Initial estimate based on census data for renter occupied units. For reference see table below that has 2000 census data for corresponding water service area city or cities.

**2000 Census Data**

Average household size	2.35
Average household size of owner-occupied unit	2.59
Average household size of renter-occupied unit	1.99
Homeowner vacancy rate (percent)	0.30
Rental vacancy rate (percent)	1.00

8 -(INSERT ADDITIONAL ASSUMPTIONS FOR THIS SERVICE AREA)

Data Prepared : July 21, 2003

By: M. Maddaus

Revised: September 5, 2003

**Reconcile agency account billing data and census data**

**Total Dwelling Units in Census 2000 for Belmont and SAN CARLOS**

	2000 Units	No. Buildings	Service Area Billing Accounts - Year 2000 <sup>3</sup>	Difference between billing and census data	Data Sources / Notes
<b>Single family</b>					
1-detached	6,577	6,577			
1-attached	612	612			
Subtotal	7,190	7,190	7,015	-175	Housing Characteristics from U.S. Census Bureau
<b>Multi family</b>					
2-units	113	57			
3-4 units	178	51			
5 to 9 units	557	80			
10-19 units	1,207	80			
20 or more units	1,903	38			
mobile homes	0	0			Meter for assumed 50 units per building Meter for mobile home parks, assume 50 per park
Subtotal	3,958	306	205	-101	Must be more than one building on an MF meter.
MF Average =	12.95	units/building	19		
Total SF + MF units =	11,148				

**Population and Household Size in Census 2000 for Belmont and SAN CARLOS**

	City of Belmont Census Population 2000	City of Belmont Estimated Population 2001	Estimated Service Area Population 2001	Data Sources / Notes
Total Population from Census data <sup>6</sup> =	26,400	26,557		Estimated growth from 2000 to 2001 (CA DOF Projections): 0.59%
Subtract Institutionalized Population =	104	105		Estimated employment growth from 2000 to 2001 (ABAG Employment Projections): 1.45%
Residential Population =	26,296	26,452		Water use for the institutionalized population is accounted for in nonresidential billing categories
Avg. HHS <sup>7</sup> =	2.36			Residential population shown corresponds to the city or cities represented by Census data
MF Pop @ MF HHS <sup>7</sup> =	2.00	7,916	7,955	30.1% Percent of Population that is MF
SF Pop =	18,380	18,489	18,489	69.9% Percent of Population that is SF
SF HHS <sup>7</sup> =	2.56			
Total			26,443	100.0%
			393	Difference in our estimate and average of 2000-2001 and 2001-2002 BAWUA Surveys
			288	Difference in our estimate and the average 2000-2001 and 2001-2002 BAWUA Surveys including institutionalized population

**Estimate Service Area Dwelling Units for 2001**

SF Res	7,232	Equals No. Buildings from cell M21 plus growth in accounts for one year from cell T38
MF Res	3,977	Equals billing accounts in 2001 from cell C16 times average units per account in cell N30 (or average units per building in cell L30 to minimize population difference in cell N47)

**Population and Employment Estimates Corresponding to Service Area**

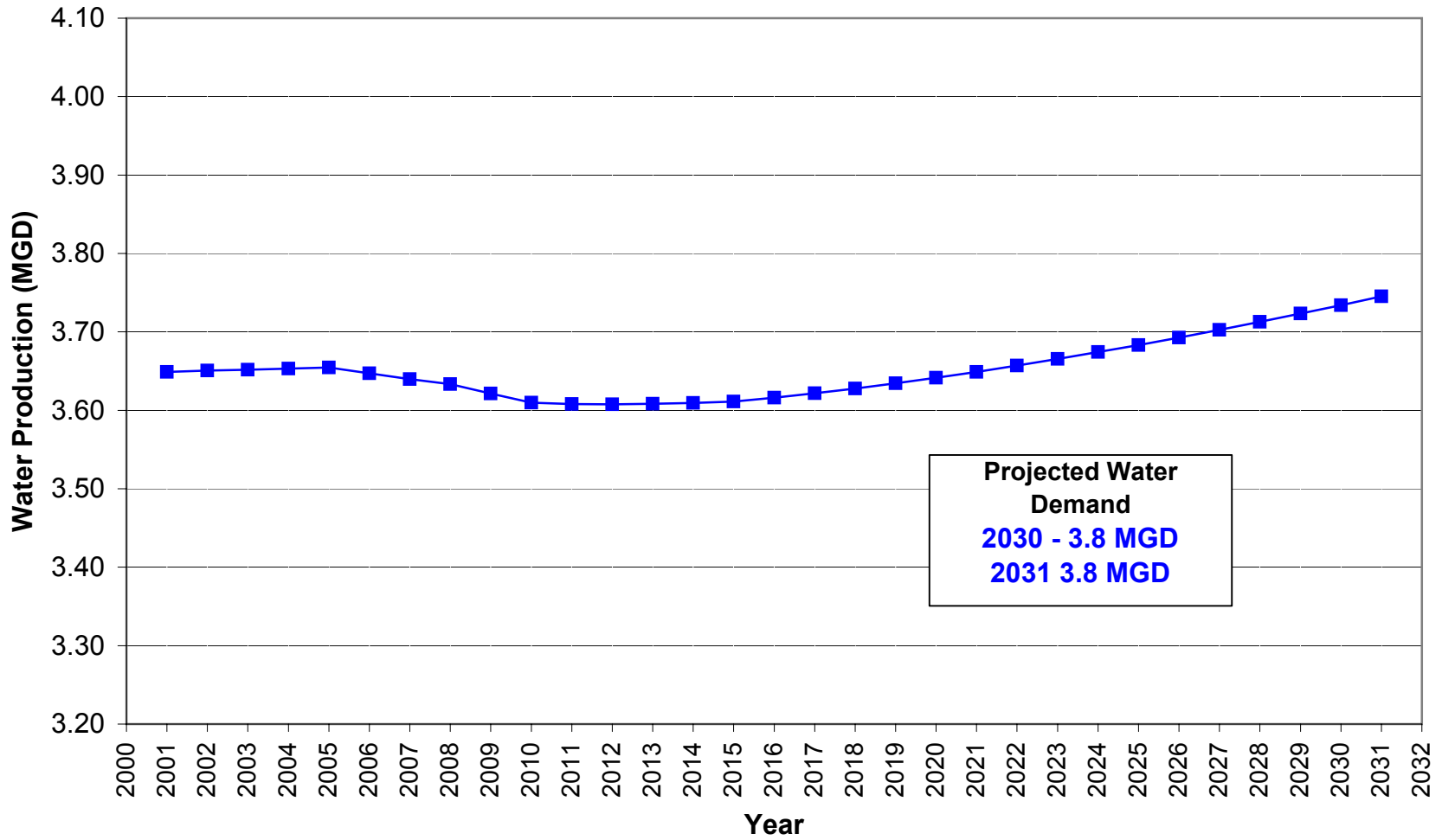
	Population	Employment
2000 Census data for jurisdiction	26,400	NA
2000 ABAG (jurisdictional)	25,810	14,361
2005 ABAG Projection (jurisdictional)	26,402	15,403
2000 ABAG (subregional)	25,990	14,768
2005 ABAG Projection (subregional)	26,619	15,810
2000 Department of Finance Benchmark	26,400	From State of California Department of Finance (DOF) table E-4 as of 4-1-2000. Website www.dof.ca.gov
2001 Department of Finance Estimate	26,557	From State of California Department of Finance table E-4 as of 1-1-2001. Website www.dof.ca.gov
2002 Department of Finance Estimate	26,461	From State of California Department of Finance table E-4 as of 1-1-2002. Website www.dof.ca.gov
FY 2000-2001 BAWUA service area	26,050	NA
FY 2001-2002 BAWUA service area	26,050	NA
2001 Employment in Service Area (input to DSS Model) =		14,705

Service Area Employment is determined by the ratio of the 2000-2001 BAWUA service area population to the 2000 ABAG Subregional Population and escalated to 2001 using the assumed growth rate in cell T39. (EXPLAIN SOURCE)

**Definitions / Abbreviations**

ABAG	Association of Bay Area Governments	MF	multi family
BAWUA	Bay Area Water Users Association	MGD	million gallons per day
DSS	Decision Support System Model	No.	number
du	dwelling unit	Pop	population
FY	Fiscal Year	Res	residential
gpd/a	gallons per day / per account	SF	single family
gpd	gallons per day	UFW	unaccounted for water
HHS	household size		

**Mid-Peninsula Water District Projected Water Demand (Planning Estimates)  
FINAL RESULTS**





**Appendix C17**  
**Millbrae, City of**

# City of Millbrae Water Service Area<sup>1</sup>

## DSS Input Sheet

### FINAL INPUT SHEET

#### Base Year Average Use and Indoor Percentages by Billing Category for DSS Model<sup>2</sup>

Year	Single Family		Multifamily		Commercial		Business		Institutional		City		Irrigation		Temporary			
	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor
2001	259	68%	1500	87%	1674	99%	4902	88%	1474	36%	1100	30%	2577.5	12%	45000	4%		

#### Data for DSS Model - - Base Year 2001

Category	Number of Accounts FY. 2001 <sup>3</sup>	Water Use 2001 gpd/a <sup>4</sup>	Water Use, MGD 2001	Use Profile Percent	Water Use gcd	Indoor Water Use gcd
Single Family	5,694	259	1.47	50.49%	94	63
Multifamily	254	1,500	0.38	13.04%	66	58
Commercial	248	1,674	0.41	14.20%		
Business	40	4,902	0.20	6.74%		
Institutional	71	1,474	0.10	3.58%		
City	28	1,100	0.03	1.05%		
Irrigation	54	2,578	0.14	4.74%		
Temporary	4	45,000	0.18	6.16%		
Total	6,393		2.92	100.00%		
Total Water Purchased (produced) <sup>5</sup> =			2.69	MGD		
Unaccounted For Water (UFW) <sup>6</sup> =			2%	Percent		
<b>Estimated UFW for DSS Model =</b>			7%	Percent		
Water Produced for use in DSS Model			3.13	MGD		
Peaking Factor			1.51	Provided by Agency or SFPUC Water Master Plan (or NA)		
<b>Peaking Factor for DSS Model =</b>			1.5	If NA use default value of 1.6.		

- Yellow cells are input to DSS Model

#### NOTES

1 - Communities served (includes all or portions of) Millbrae and nearby unincorporated areas according to BAWUA survey

2 - Average gpd/a is based on a 12-month moving average through December 2001. Indoor use is based on average of 2 lowest consecutive months in the winter if meters read bimonthly, or single lowest month if meters read monthly.

3 - Number of accounts is from data provided by water agency for this project (see worksheet with account data in this file)

4 - Total water Purchased (produced) taken from BAWUA for Fiscal Year 2001-2002 or agency if provided.

5 - Unaccounted for Water (UFW) is the percent difference between the total water purchased and the total water use.

6 - For reference see additional population estimates provided in population and employment estimates corresponding to service area table.

7 - Initial estimate based on census data for renter occupied units. For reference see table below that has 2000 census data for corresponding water service area city or cities.

#### 2000 Census Data

Average household size	2.56
Average household size of owner-occupied unit	2.71
Average household size of renter-occupied unit	2.30
Homeowner vacancy rate (percent)	0.40
Rental vacancy rate (percent)	2.60

Data Prepared : August 15, 2003

By: B. Skeens

Revised: September 5, 2003

#### Reconcile agency account billing data and census data

Total Dwelling Units in Census 2000 for Millbrae				Service Area Billing Accounts - Year 2000 <sup>3</sup>	Difference between billing and census data	Data Sources / Notes
Category	2000 Units	No. Buildings				
<b>Single family</b>						
1-detached	5,317	5,317				
1-attached	269	269				
Subtotal	5,586	5,586		5,694		108 Housing Characteristics from U.S. Census Bureau
<b>Multi family</b>						
2-units	210	105				
3-4 units	214	61				
5 to 9 units	604	86				
10-19 units	401	27				
20 or more units	1,088	22				
mobile homes	11	0				
Subtotal	2,528	301		254		Meter for assumed 50 units per building Meter for mobile home parks, assume 50 per park -47 Must be more than one building on an MF meter
MF Average =	8.4	units/building		10.0	units/account	
Total SF + MF units =	8,114					

#### Population and Household Size in Census 2000 for Millbrae

	City of Millbrae Census Population 2000	City of Millbrae Estimated Population 2001	Estimated Residential Service Area Population 2001		Data Sources / Notes
Total Population from Census data <sup>6</sup> =	20,718	20,800			Estimated growth from 2000 to 2001 (CA DOF Projections): <span style="border: 1px solid black; padding: 2px;">0.40%</span>
Subtract Institutionalized Population =	317	318			Estimated employment growth from 2000 to 2001 (ABAG Employment Projections): <span style="border: 1px solid black; padding: 2px;">0.60%</span>
Residential Population =	20,401	20,482			Water use for the institutionalized population is accounted for in nonresidential billing categories
Avg. HHS <sup>7</sup> =	2.51				Residential population shown corresponds to the city or cities represented by Census data
MF Pop @ MF HHS <sup>7</sup> =	2.18	5,511	5,533	5,761	27.0% Percent of Population that is MF
SF Pop =	14,890	14,949	15,699		73.0% Percent of Population that is SF
SF HHS <sup>7</sup> =	2.67				
Total			21,460		100.0%
			-96		Difference in our estimate and average of 2000-2001 and 2001-2002 BAWUA Surveys
			-414		Difference in our estimate and the average 2000-2001 and 2001-2002 BAWUA Surveys including institutionalized population

#### Estimate Service Area Dwelling Units for 2001

SF Res	5,608	Equals No. Buildings from cell M21 plus growth in accounts for one year from cell T38
MF Res	2,528	Equals billing accounts in 2001 from cell C16 times average units per account in cell N30 (or average units per building in cell L30 to minimize population difference in cell N47)

#### Population and Employment Estimates Corresponding to Service Area

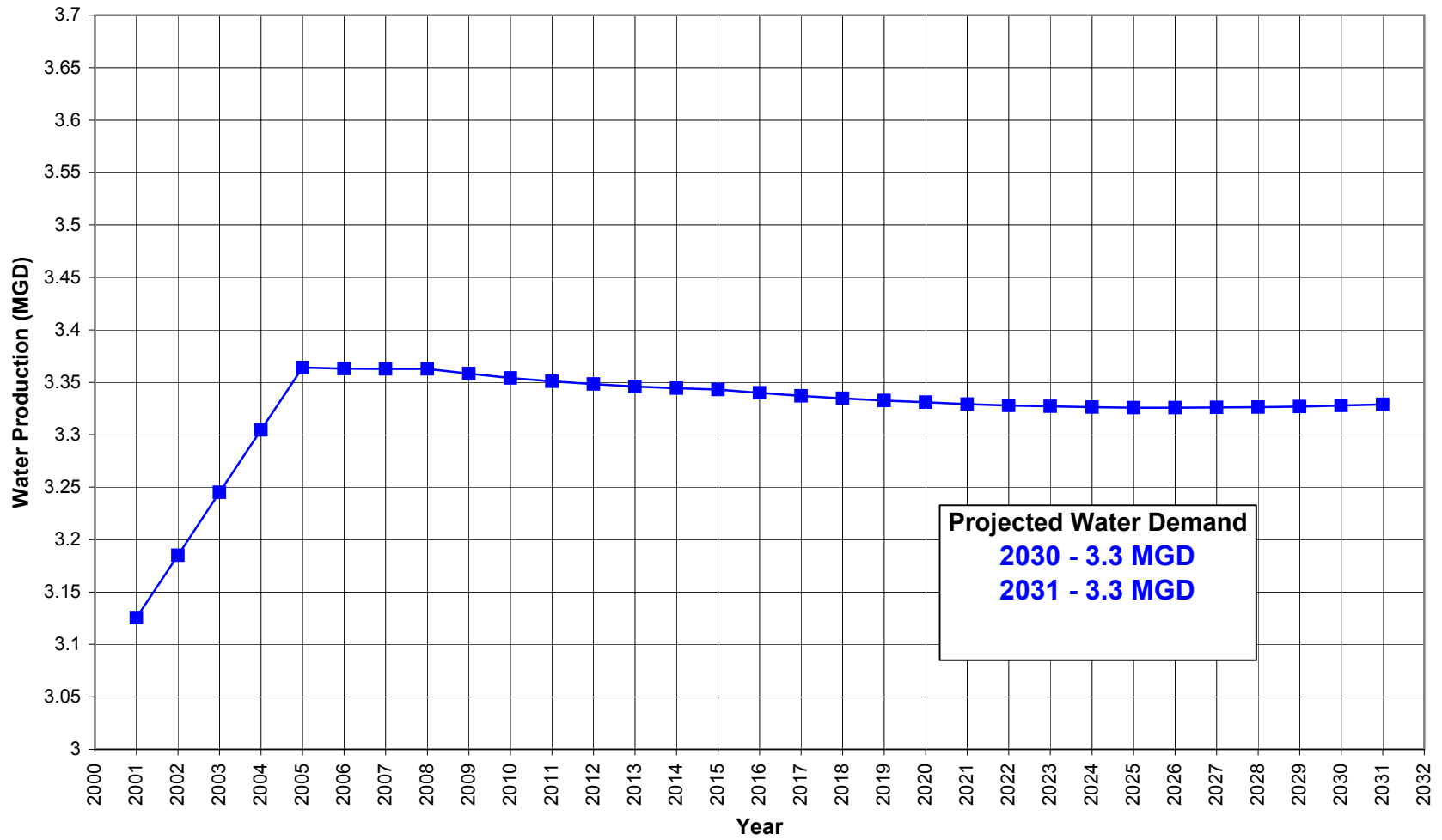
	Population	Employment
2000 Census data for jurisdiction	20,718	NA
2000 ABAG (jurisdictional)	20,718	6,030
2005 ABAG Projection (jurisdictional)	21,400	6,210
2000 ABAG (subregional)	20,718	6,030
2005 ABAG Projection (subregional)	21,400	6,210
2000 Department of Finance Benchmark	20,718	From State of California Department of Finance (DOF) table E-4 as of 4-1-2000. Website www.dof.ca.gov
2001 Department of Finance Estimate	20,800	From State of California Department of Finance table E-4 as of 1-1-2001. Website www.dof.ca.gov
2002 Department of Finance Estimate	20,750	From State of California Department of Finance table E-4 as of 1-1-2002. Website www.dof.ca.gov
FY 2000-2001 BAWUA service area	21,394	NA
FY 2001-2002 BAWUA service area	21,718	NA
2001 Employment in Service Area (input to DSS Model) =		6,664

Service Area Employment is determined by the ratio of the 2000-2001 BAWUA service area population to the 2000 ABAG Subregional Population and escalated to 2001 using the assumed growth rate in cell T39.

#### Definitions / Abbreviations

ABAG	Association of Bay Area Governments	MF	multi family
BAWUA	Bay Area Water Users Association	MGD	million gallons per day
DSS	Decision Support System Model	No.	number
du	dwelling unit	Pop	population
FY	Fiscal Year	Res	residential
gpd/a	gallons per day / per account	SF	single family
gpd	gallons per day	UFW	unaccounted for water
HHS	household size	DOF	California Department of Finance

### City of Millbrae Projected Water Demand (Planning Estimate) FINAL RESULTS



**Appendix C18**  
**Milpitas, City of**

# City of Milpitas Water Service Area<sup>1</sup>

## DSS Input Sheet

### FINAL INPUT SHEET

#### Base Year Average Use and Indoor Percentages by Billing Category for DSS Model<sup>2</sup>

Year	Single Family		Multifamily		Commercial		Industrial		Institutional, Schools, Government		Irrigation		Recycled		City Domestic Accounts		New SF Residential		New Commercial	
	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor
2001	325	71%	827	91%	2,164	89%	6,818	87%	8,114	92%	2,804	34%	507,677	0%	1,756	38%	500	46%	4,500	43%

#### Data for DSS Model -- Base Year 2001

Category <sup>8</sup>	Number of Accounts 2001 <sup>9</sup>	Water Use 2001 gpd/a <sup>4</sup>	Water Use, MGD 2001	Use Profile Percent	gpd	gpd
Single Family	11,955	325	3.89	34.75%	87	62
Multifamily	1,445	827	1.20	10.69%	67	61
Commercial	555	2,164	1.20	10.73%		
Industrial	354	6,818	2.41	21.55%		
Institutional, School	44	8,114	0.36	3.19%		
Irrigation	555	2,804	1.55	13.91%		
Recycled	1	507,677	0.51	4.54%		
City Domestic Accounts	38	1,756	0.07	0.60%		
New SF Residential	1	500	0.000500	0.0045%		
New Commercial	1	4,500	0.004500	0.0402%		
<b>Total</b>	<b>14,947</b>		<b>11.18</b>	<b>100.00%</b>		
Total Water Purchased (produced) =			11.52 MGD			
Unaccounted For Water (UFW) <sup>5</sup> =			5.6% Percent			
<b>Estimated UFW for DSS Model =</b>			7% Percent			
Water Produced for use in DSS Model			11.96 MGD			
Peaking Factor			1.9			
Peaking Factor for DSS Model =			1.9			

Blue cells are entered by modeler  
Yellow cells are input to DSS Model

#### NOTES

- Service area consists of the City of Milpitas according to BAWUA survey
- Average water use for each category in gallons-per-day-per-account was determined by averaging the water sales over the 2001 calendar year. Indoor use is based on average of 2 lowest consecutive months in the winter if meters read bimonthly, or single lowest month if meters read monthly.
- Number of accounts is from data provided by water agency for this project (see worksheet with account data in this file)
- Total Water Purchased (produced) taken from BAWUA for Fiscal Year 2001-2002. Input here for comparison.
- Unaccounted for Water (UFW) is the percent difference between the total water purchased and the total water use. The number input here is the 5-year average of the UFW reported to BAWUA.
- Total population for City of Milpitas obtained from 2000 Census. This number was escalated to 2001 using the California Department of Finance growth projections and used as reference for determining the 2001 base year service area population. Additional population estimates provided at lower right.
- Census data used to reconcile SF and MF population and dwelling units. An initial estimate of household size was made based on census data for owner-occupied and renter-occupied units (SF and MF respectively). See table below for 2000 Census data for City of Milpitas.

#### 2000 Census Data

Average household size	3.47
Average household size of owner-occupied unit	3.49
Average household size of renter-occupied unit	3.44
Homeowner vacancy rate (percent)	0.40
Rental vacancy rate (percent)	2.10

- New single family residential accounts input as a separate category to allow for a higher average rate of water usage. It was assumed that these accounts use approximately 50% more water than existing accounts (all of which is allocated to outdoor use).
- New commercial accounts input as a separate category to allow for a higher average rate of water usage. It was assumed that these accounts use approximately 100% more water than existing accounts (all of which is allocated to outdoor use).
- The Ed Levin Park account is included under the City Domestic Accounts category.
- Recycled Water Category included based on numbers received from the City of Milpitas (May 14, 2004.) The Irrigation water usage is potable only.

Data Prepared : July 23, 2003  
Revised: May 27, 2004

By: N. Foged  
By: N. Foged

#### Reconcile agency account billing data and census data

##### Total Dwelling Units in Census 2000 for City of Milpitas

Category	2000 Units	No. Buildings	Service Area Billing Accounts - Year 2000		Difference between billing and census data	Data Sources / Notes
			3	5		
<b>Single family</b>						
1-detached	10,918	10,918				
1-attached	2,226	2,226				
Subtotal	13,144	13,144	11,940			1,022 Housing Characteristics from U.S. Census Bureau
<b>Multi family</b>						
2-units	178	89				
3-4 units	1,294	370				
5 to 9 units	622	89				
10-19 units	543	36				
20 or more units	1,016	20				
mobile homes	550	11				
Subtotal	4,203	615	1,269			Meter for assumed 50 units per building. Meter for mobile home parks, assume 50 per park. 97 Must be more than one building on an MF meter. Units include all multi-family dwellings plus the "1-attached" dwellings.
MF Average =	6.8	units/building				
Total SF + MF units =	17,347					

##### Population and Household Size in Census 2000 for City of Milpitas

Category	City of Milpitas		Estimated Service Area Residential Population 2001	Data Sources / Notes
	Census Population 2000	City of Milpitas Estimated Population 2001		
Total Population from Census data <sup>6</sup> =	62,698	63,100		Estimated growth from 2000 to 2001 (CA DOF Projections): 0.64%
Subtract Institutionalized Population =	3,116	3136		Estimated employment growth from 2000 to 2001 (ABAG Employment Projections): 1.21%
Residential Population =	59,582	59,964		Water use for the institutionalized population is accounted for in nonresidential billing categories Residential population shown corresponds to the city or cities represented by Census data
Avg. HHS <sup>7</sup> =	3.43			
MF Pop @ MF HHS <sup>7</sup> =	2.45	10,297	17,929	17.3% Percent of Population that is MF
SF Pop =	49,285	49,601	44,826	82.7% Percent of Population that is SF
SF HHS <sup>7</sup> =	3.75			
<b>Total</b>			62,756	100.0%
			-4,144	Difference in our estimate and average of 2000-2001 and 2001-2002 BAWUA Surveys
			-1,008	Difference in our estimate and the average 2000-2001 and 2001-2002 BAWUA Surveys including institutionalized population

##### Estimate Service Area Dwelling Units for 2001

SF Res	11,955	Equals billing accounts in 2001 from cell C15
MF Res	7,318	Equals billing accounts in 2001 from cell C16 times average units per account in cell N30

##### Population and Employment Estimates Corresponding to Service Area

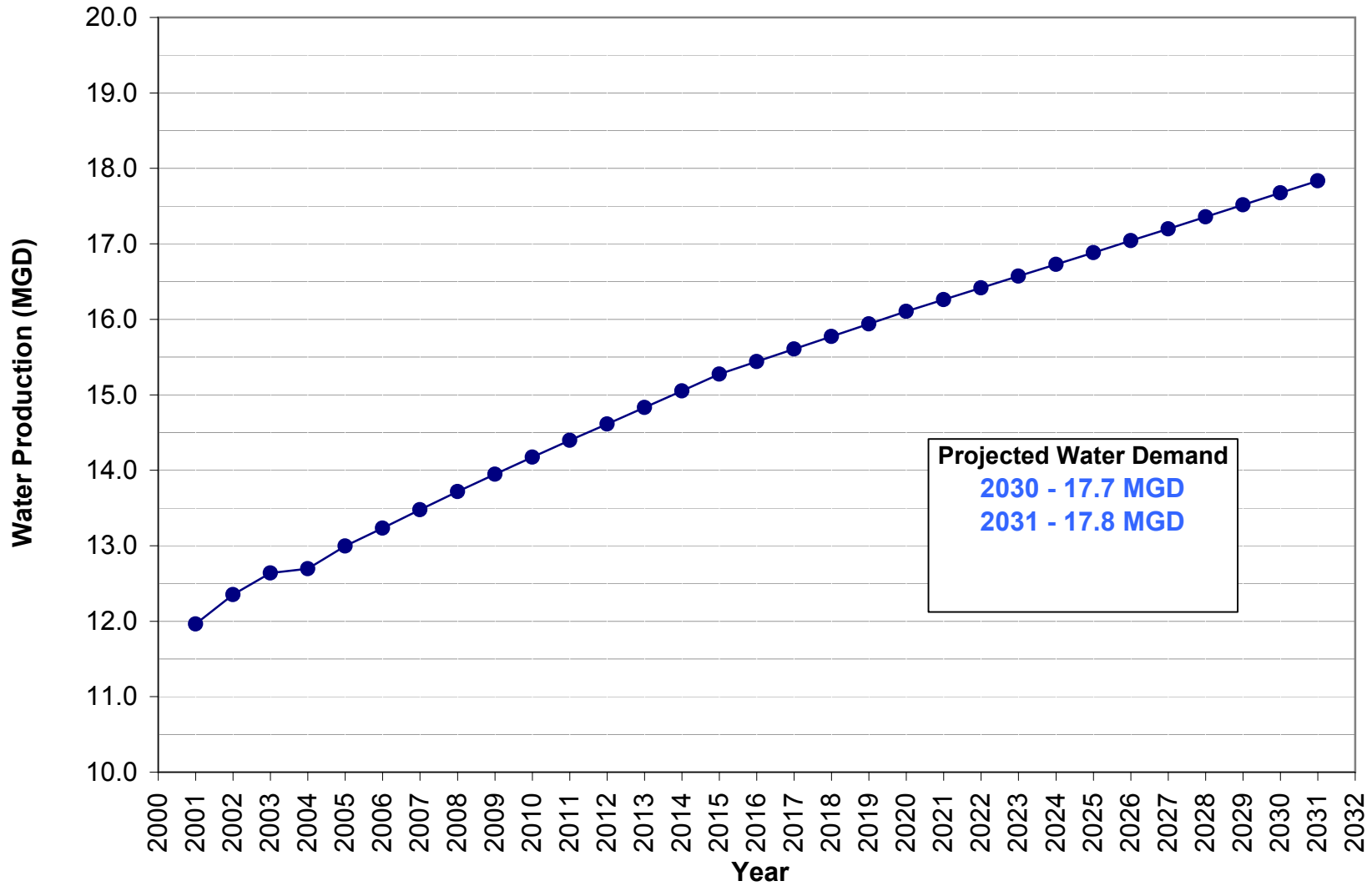
Category	Population		Employment
	2000 Census data for jurisdiction	2001	
2000 ABAG (jurisdictional)	62,698	62,698	NA
2005 ABAG Projection (jurisdictional)	68,300	68,300	53,310
2000 ABAG (subregional)	62,810	62,810	50,280
2005 ABAG Projection (subregional)	68,400	68,400	53,310
2000 Department of Finance Benchmark	62,698	62,698	From State of California Department of Finance (DOF) table E-4 as of 4-1-2000. Website www.dof.ca.gov
2001 Department of Finance Estimate	63,100	63,100	From State of California Department of Finance table E-4 as of 1-1-2001. Website www.dof.ca.gov
2002 Department of Finance Estimate	63,700	63,700	From State of California Department of Finance table E-4 as of 1-1-2002. Website www.dof.ca.gov
FY 2000-2001 BAWUA service area	66,000	66,000	NA
FY 2001-2002 BAWUA service area	67,800	67,800	NA
2001 Employment in Service Area (input to DSS Model) =			53,566

Service Area Employment is determined by the ratio of the 2000-2001 BAWUA service area population to the 2000 ABAG Subregional Population and escalated to 2001 using the assumed growth rate in cell T39. (EXPLAIN SOURCE)

#### Definitions / Abbreviations

ABAG	Association of Bay Area Governments	MF	multi family
BAWUA	Bay Area Water Users Association	MGD	million gallons per day
DSS	Decision Support System Model	No.	number
du	dwelling unit	Pop	population
FY	Fiscal Year	Res	residential
gpd/a	gallons per day / per account	SF	single family
gpd	gallons per day	UFW	unaccounted for water
HHS	household size		

# City of Milpitas Projected Water Demand (Planning Estimates) FINAL RESULTS



**Appendix C19**  
**Mountain View, City of**

## City of Mountain View Water Service Area<sup>1</sup>, DSS Input Sheet, FINAL INPUT SHEET

### Base Year Average Use and Indoor Percentages by Billing Category for DSS Model<sup>2</sup>

Year	Single Family		Multifamily		Commercial		Industrial		Landscape Irrigation		Other									
	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor
2001	242	66%	4105	83%	1691	86%	1702	74%	4641	22%	250	18%								

### Data for DSS Model -- Base Year 2001

Category	Number of Accounts FY, 2001 <sup>3</sup>	Water Use 2001 gpd/a <sup>c</sup>	Water Use, MGD 2001	Use Profile Percent	Water Use gpd	Indoor Water Use gpd
Single Family	12,473	242	3.01	24.30%	109	72
Multifamily	815	4,105	3.35	26.98%	77	64
Commercial	1,162	1,691	1.96	15.85%		
Industrial	416	1,702	0.71	5.71%		
Landscape Irrigation	723	4,641	3.36	27.06%		
Other	49	250	0.01	0.10%		
	0	0	0.00	0.00%		
	0	0	0.00	0.00%		
Total	15,638		12.40	100.00%		
Total Water Purchased (produced) <sup>4</sup> =			12.26	MGD		
Unaccounted For Water (UFW) <sup>5</sup> =			2.2%	Percent		
<b>Estimated UFW for DSS Model =</b>			7%	Percent		
Water Produced for use in DSS Model			13.27	MGD		
Peaking Factor			1.50	Provided by Agency or SFPUC Water Master Plan (or NA)		
Peaking Factor for DSS Model =			1.5	If NA use default value of 1.6.		

Blue cells are entered by modeler  
Yellow cells are input to DSS Model

12,630

#### NOTES

1 - Communities served includes City of Mountain View according to BAWUA survey

2 - Average gpd/a is based on a 12-month moving average through December 2001. Indoor use is based on average of 2 lowest consecutive months in the winter if meters read bimonthly, or single lowest month if meters read monthly.

3 - Number of accounts is from data provided by water agency for this project (see worksheet with account data in this file)

4 - Total water Purchased (produced) taken from BAWUA for Fiscal Year 2001-2002.

5 - Unaccounted for Water (UFW) is the percent difference between the total water purchased and the total water use.

6 - For reference see additional population estimates provided in population and employment estimates corresponding to service area table.

7 - Initial estimate based on census data for renter occupied units. For reference see table below that has 2000 census data for corresponding water service area city or cities.

#### 2000 Census Data

Average household size	2.25
Average household size of owner-occupied unit	2.30
Average household size of renter-occupied unit	2.21
Homeowner vacancy rate (percent)	0.60
Rental vacancy rate (percent)	1.60

Data Prepared : July 24, 2003

By: N. Foged

Revised: January 21, 2004

By: N. Foged

### Reconcile agency account billing data and census data

Total Dwelling Units in Census 2000 for City of Mountain View				Service Area Billing Accounts - Year 2000 <sup>3</sup>	Difference between billing and census data	Data Sources / Notes
Category	2000 Units	No. Buildings				
<b>Single family</b>						
1-detached	9,147	9,147				
1-attached	3,701	3,701				
Subtotal	12,848	12,848		10,800	-2,048	Housing Characteristics from U.S. Census Bureau
<b>Multi family</b>						
2-units	783	392				
3-4 units	1,887	539				
5 to 9 units	2,870	410				
10-19 units	2,916	194				
20 or more units	9,902	198				Meter for assumed 50 units per building.
mobile homes	1,195	24				Meter for mobile home parks, assume 50 per park.
Subtotal	19,553	1,757		2,493	736	
MF Average =	11.1	units/building			7.8	units/account
Total SF + MF units =	32,401					

### Population and Household Size in Census 2000 for City of Mountain View

	City of Mountain View Census Population 2000	City of Mountain View Estimated Population 2001	Estimated Residential Service Area Population 2001	Data Sources / Notes
Total Population from Census data <sup>6</sup> =	70,708	71,500		Estimated growth from 2000 to 2001 (CA DOF Projections): 1.12%
Subtract Institutionalized Population =	307	310		Estimated employment growth from 2000 to 2001 (ABAG Employment Projections): 0.36%
Residential Population =	70,401	71,190		Water use for the institutionalized population is accounted for in nonresidential billing categories
Avg. HHS <sup>7</sup> =	2.17			Residential population shown corresponds to the city or cities represented by Census data
MF Pop @ MF HHS <sup>7</sup> =	42,039	42,510	43,625	59.7% Percent of Population that is MF
SF Pop =	28,362	28,680	27,534	40.3% Percent of Population that is SF
SF HHS <sup>7</sup> =	2.21			
Total			71,160	100.0%
			-190	Difference in our estimate and average of 2000-2001 and 2001-2002 BAWUA Surveys
			120	Difference in our estimate and the average 2000-2001 and 2001-2002 BAWUA Surveys including institutionalized population

#### Estimate Service Area Dwelling Units for 2001

SF Res	12,473	Equals billing accounts in 2001 from cell C15
MF Res	20,291	Equals billing accounts in 2001 from cell C16 times average units per building in cell L31

#### Population and Employment Estimates Corresponding to Service Area

	Population	Employment
2000 Census data for jurisdiction	70,708	NA
2000 ABAG (jurisdictional)	70,708	75,370
2005 ABAG Projection (jurisdictional)	73,100	76,710
2000 ABAG (subregional)	70,877	77,370
2005 ABAG Projection (subregional)	73,300	78,710
2000 Department of Finance Benchmark	70,708	From State of California Department of Finance (DOF) table E-4 as of 4-1-2000. Website www.dof.ca.gov
2001 Department of Finance Estimate	71,500	From State of California Department of Finance table E-4 as of 1-1-2001. Website www.dof.ca.gov
2002 Department of Finance Estimate	71,500	From State of California Department of Finance table E-4 as of 1-1-2002. Website www.dof.ca.gov
FY 2000-2001 BAWUA service area	70,700	NA
FY 2001-2002 BAWUA service area	72,000	
2001 Employment in Service Area (input to DSS Model) =		75,629

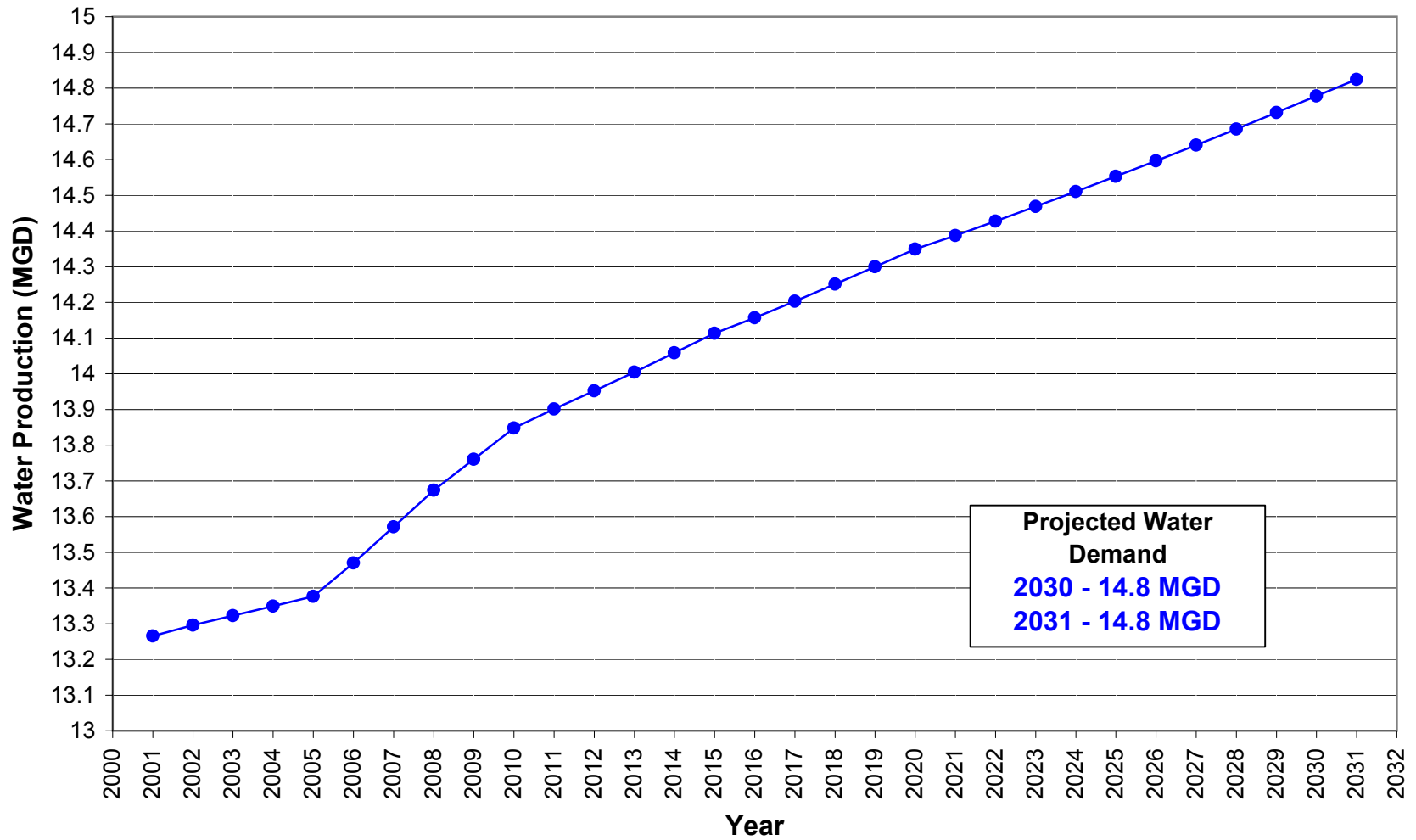
Service Area Employment is determined by the ratio of the 2000-2001 BAWUA service area population to the 2000 ABAG Subregional Population and escalated to 2001 using the assumed growth rate (ABAG, 2002)

### Definitions / Abbreviations

ABAG	Association of Bay Area Governments	MF	multi family
BAWUA	Bay Area Water Users Association	MGD	million gallons per day
DSS	Decision Support System Model	No.	number
du	dwelling unit	Pop	population
FY	Fiscal Year	Res	residential
gpd/a	gallons per day / per account	SF	single family
gpd	gallons per day	UFW	unaccounted for water
HHS	household size		



**City of Mountain View Projected Water Demand (Planning Estimates)  
FINAL RESULTS**



**Appendix C20**  
**North Coast County Water District**

# North Coast County WD Water Service Area<sup>1</sup>

## DSS Input Sheet

### FINAL INPUT SHEET

#### Base Year Average Use and Indoor Percentages by Billing Category for DSS Model<sup>2</sup>

Year	Single Family		Multifamily		Commercial		Irrigation		Other									
	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor
2001	260	75%	1391	85%	790	85%	600	0%	1721	32%								

#### Data for DSS Model - - Base Year 2001

Category	Number of Accounts FY. 2001 <sup>3</sup>	Water Use 2001 gpd/a <sup>4</sup>	Water Use, MGD 2001	Use Profile Percent	Water Use gpd	Indoor Water Use gpd
Single Family	9,309	260	2.42	71.30%	75	57
Multifamily	392	1,391	0.55	16.07%	65	56
Commercial	250	790	0.20	5.81%		
Irrigation	59	600	0.04	1.04%		
Other	114	1,721	0.20	5.78%		
0	0	0	0.00	0.00%		
0	0	0	0.00	0.00%		
0	0	0	0.00	0.00%		
Total	10,123		3.39	100.00%		
Total Water Purchased (produced) =			3.40 MGD			
Unaccounted For Water (UFW) <sup>5</sup> =			6% Percent	From 5 year BAWUA Survey average		
Estimated UFW for DSS Model =			7% Percent	7% if actual is < 7%, otherwise = E25		
Water Produced for use in DSS Model			3.63 MGD	Add UFW to Total Water Use		
Peaking Factor			NA	Provided by Agency or SFPUC Water Master Plan (or NA)		
Peaking Factor for DSS Model =			1.6	If NA use default value of 1.6.		

- Yellow cells are input to DSS Model

#### NOTES

1 - Communities served (includes all or portions of) Pacifica and nearby unincorporated areas according to BAWUA survey

2 - Average gpd/a is based on a 12-month moving average through December 2001. Indoor use is based on average of 2 lowest consecutive months in the winter if meters read bimonthly, or single lowest month if meters read monthly.

3 - Number of accounts is from data provided by water agency for this project (see worksheet with account data in this file)

4 - Total water Purchased (produced) taken from BAWUA for Fiscal Year 2001-2002 or agency if provided.

5 - Unaccounted for Water (UFW) is the percent difference between the total water purchased and the total water use.

6 - For reference see additional population estimates provided in population and employment estimates corresponding to service area table.

7 - Initial estimate based on census data for renter occupied units. For reference see table below that has 2000 census data for corresponding water service area city or cities.

2000 Census Data	
Average household size	2.73
Average household size of owner-occupied unit	2.88
Average household size of renter-occupied unit	2.41
Homeowner vacancy rate (percent)	0.20
Rental vacancy rate (percent)	1.90

Data Prepared : August 15, 2003  
Revised: September 5, 2003

By: B. Skeens

#### Reconcile agency account billing data and census data

Total Dwelling Units in Census 2000 for Pacifica				Service Area Billing Accounts - Year 2000 <sup>3</sup>	Difference between billing and census data	Data Sources / Notes
Single family	2000 Units	No. Buildings				
1-detached	10,276	10,276				
1-attached	775	775				
Subtotal	11,051	11,051		11,218		167 Housing Characteristics from U.S. Census Bureau
<b>Multi family</b>						
2-units	172	86				
3-4 units	535	153				
5 to 9 units	686	98				
10-19 units	370	25				
20 or more units	1,343	27				Meter for assumed 50 units per building
mobile homes	98	2				Meter for mobile home parks, assume 50 per park
Subtotal	3,204	390		362		-29 See estimate at bottom.
MF Average =	8.2	units/building		8.9	units/account	
Total SF + MF units =	14,255					

Population and Household Size in Census 2000 for Pacifica				Estimated Residential Service Area Population 2001	Data Sources / Notes
	City of Pacifica Census Population 2000	City of Pacifica Estimated Population 2001			
Total Population from Census data <sup>6</sup> =	38,390	38,700			Estimated growth from 2000 to 2001 (CA DOF Projections): 0.81%
Subtract Institutionalized Population =	142	143			Estimated employment growth from 2000 to 2001 (ABAG Employment Projections): 0.93%
Residential Population =	38,248	38,557			Water use for the institutionalized population is accounted for in nonresidential billing categories
Avg. HHS <sup>7</sup> =	2.68				Residential population shown corresponds to the city or cities represented by Census data
MF Pop @ MF HHS <sup>7</sup> =	2.40	7,752	8,352	20.1%	Percent of Population that is MF
SF Pop =	30,558	30,805	32,105	79.9%	Percent of Population that is SF
SF HHS <sup>7</sup> =	2.77				
Total			40,457	100.0%	
			-43		Difference in our estimate and average of 2000-2001 and 2001-2002 BAWUA Surveys
			-186		Difference in our estimate and the average 2000-2001 and 2001-2002 BAWUA Surveys including institutionalized population

#### Estimate Service Area Dwelling Units for 2001

SF Res	11,140	Equals No. Buildings from cell M21 plus growth in accounts for one year from cell T38
MF Res	3,230	Equals billing accounts in 2001 from cell C16 times average units per account in cell N30 (or average units per building in cell L30 to minimize population difference in cell N47)

#### Population and Employment Estimates Corresponding to Service Area

	Population	Employment
2000 Census data for jurisdiction	38,390	NA
2000 ABAG (jurisdictional)	38,390	4,740
2005 ABAG Projection (jurisdictional)	39,900	4,960
2000 ABAG (subregional)	38,445	4,740
2005 ABAG Projection (subregional)	40,000	4,960
2000 Department of Finance Benchmark	38,390	
2001 Department of Finance Estimate	38,700	
2002 Department of Finance Estimate	38,600	
FY 2000-2001 BAWUA service area	40,500	NA
FY 2001-2002 BAWUA service area	40,500	NA
2001 Employment in Service Area (input to DSS Model) =		5,797

Service Area Employment is determined by the ratio of the 2000-2001 BAWUA service area population to the 2000 ABAG Subregional Population and escalated to 2001 using the assumed growth rate in cell T39.

#### Definitions / Abbreviations

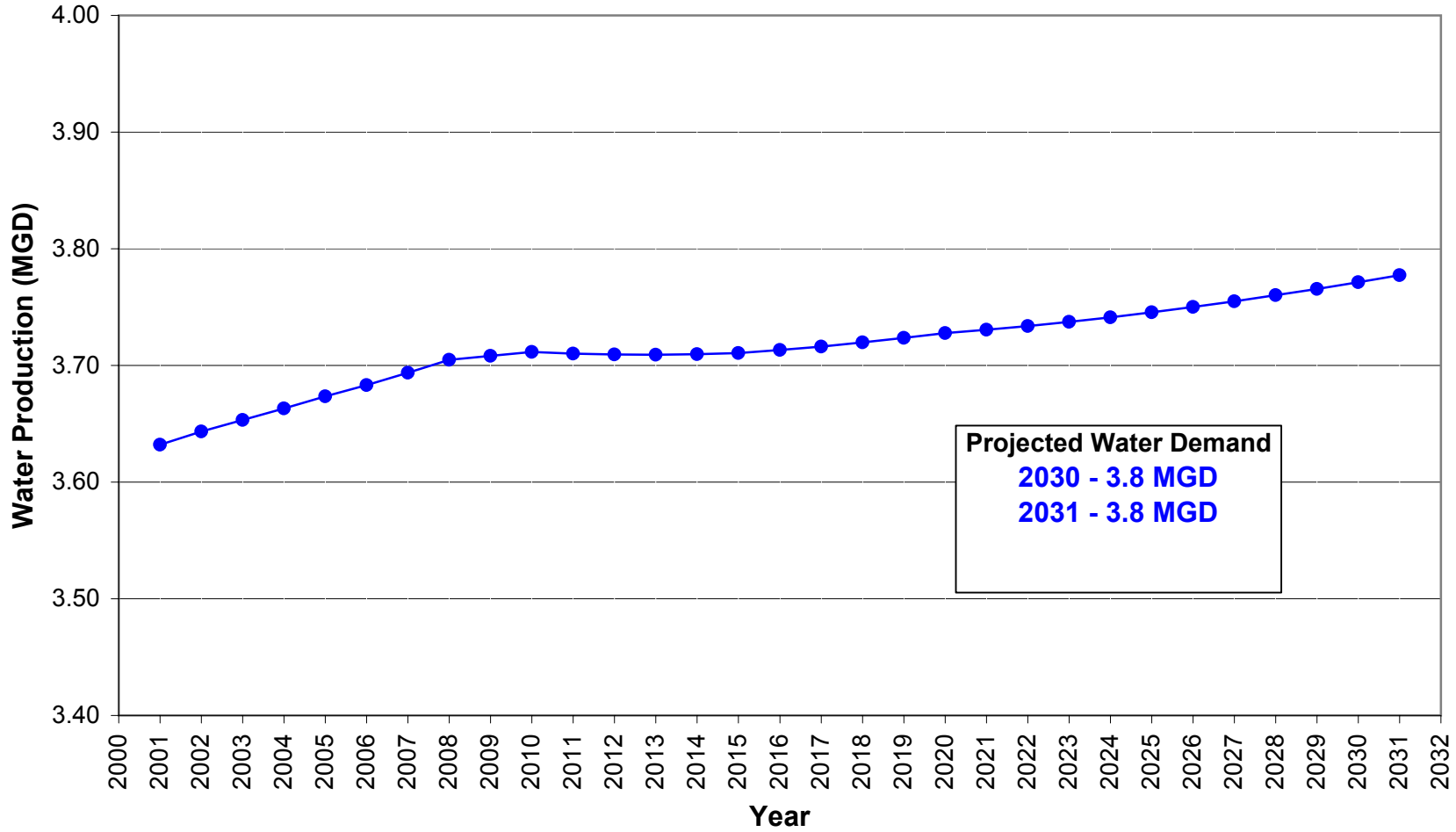
ABAG	Association of Bay Area Governments	MF	multi family
BAWUA	Bay Area Water Users Association	MGD	million gallons per day
DSS	Decision Support System Model	No.	number
du	dwelling unit	Pop	population
FY	Fiscal Year	Res	residential
gpd/a	gallons per day / per account	SF	single family
gpd	gallons per day	UFW	unaccounted for water
HHS	household size	DOF	California Department of Finance

#### Estimate Multi Family Accounts and Water Use

MF Indoor Use (gpd)	56
MF Indoor % =	85%
MF mgd =	0.55
2000 Accts from SF	362
2000 Accts from COM	27
2001 Accts	392
2001 gpd/acct	1391
2001 mgd from SF	0.50
2001 mgd from COM	0.04
2001 Accts from SF	1934
2001 Accts from COM	47
MF HHS =	2.59
SF HHS =	3.45

Baseline H45  
Baseline H44

# North Coast County WD Projected Water Demand (Planning Estimate) FINAL RESULTS



**Appendix C21**  
**Palo Alto, City of**

**Palo Alto Water Service Area<sup>1</sup>**  
**DSS Input Sheet**  
**FINAL INPUT SHEET**

**Base Year Average Use and Indoor Percentages by Billing Category for DSS Model<sup>2</sup>**

Year	Single family		Multifamily		Commercial		Industrial		Public Facility		Other		Recycled Water							
	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor
2001	395	57%	1042	81%	1482	63%	4987	65%	5316	34%	1902	23%	265,592	0%						

Note: Accounts are read monthly

**Data for DSS Model - - Base Year 2001**

Category	Number of Accounts FY. 2001 <sup>3</sup>	Water Use 2001 gpd/a <sup>4</sup>	Water Use, MGD 2001	Use Profile Percent	Water Use gcd	Indoor Water Use gcd
Single family	14,515	395	5.73	43.12%	145	83
Multifamily	1,886	1,042	1.97	14.79%	96	78
Commercial	1,629	1,482	2.41	18.17%		
Industrial	247	4,987	1.23	9.28%		
Public Facility	64	5,316	0.34	2.54%		
Other	286	1,902	0.54	4.09%		
Recycled Water	4	265,592	1.06	8.00%		
	0	0	0.00	0.00%		
Total	18,631		13.28	100.00%		
Total Water Purchased (produced) <sup>5</sup> =			13.53	MGD		
Unaccounted For Water (UFW) <sup>6</sup> =			6.3%	Percent		
<b>Estimated UFW for DSS Model =</b>			7%	Percent		
Water Produced for use in DSS Model			14.21	MGD		
Peaking Factor			1.50	Provided by Agency or SFPUC Water Master Plan (or NA)		
<b>Peaking Factor for DSS Model =</b>			1.5	If NA use default value of 1.6.		

Blue cells are entered by modeler  
Yellow cells are input to DSS Model

**NOTES**

1 - Communities served (includes all or portions of) Palo Alto and nearby unincorporated areas according to BAWUA survey

2 - Average gpd/a is based on a 12-month moving average through December 2001. Indoor use is based on average of 2 lowest consecutive months in the winter if meters read bimonthly, or single lowest month if meters read monthly.

3 - Number of accounts is from data provided by water agency for this project were taken from the BAWUA Survey.

4 - Total water Purchased (produced) taken from BAWUA for Fiscal Year 2001-2002 or agency if provided. For Palo Alto, the agency provided water purchase information.

5 - Unaccounted for Water (UFW) is the percent difference between the total water purchased and the total water use.

6 - For reference see additional population estimates provided in population and employment estimates corresponding to service area table.

7 - Initial estimate based on census data for renter occupied units. For reference see table below that has 2000 census data for corresponding water service area city or cities.

**2000 Census Data**

Average household size	2.30
Average household size of owner-occupied unit	2.55
Average household size of renter-occupied unit	1.96
Homeowner vacancy rate (percent)	0.60
Rental vacancy rate (percent)	2.00

8 - Average Recycled Water Usage per Account is the average of each of the 4 uses: water trucks, Greer Park, golf course and wastewater treatment plant.

Data Prepared : July 14, 2003

By: M. Maddaus

Revised: June 8, 2004

**Reconcile agency account billing data and census data**

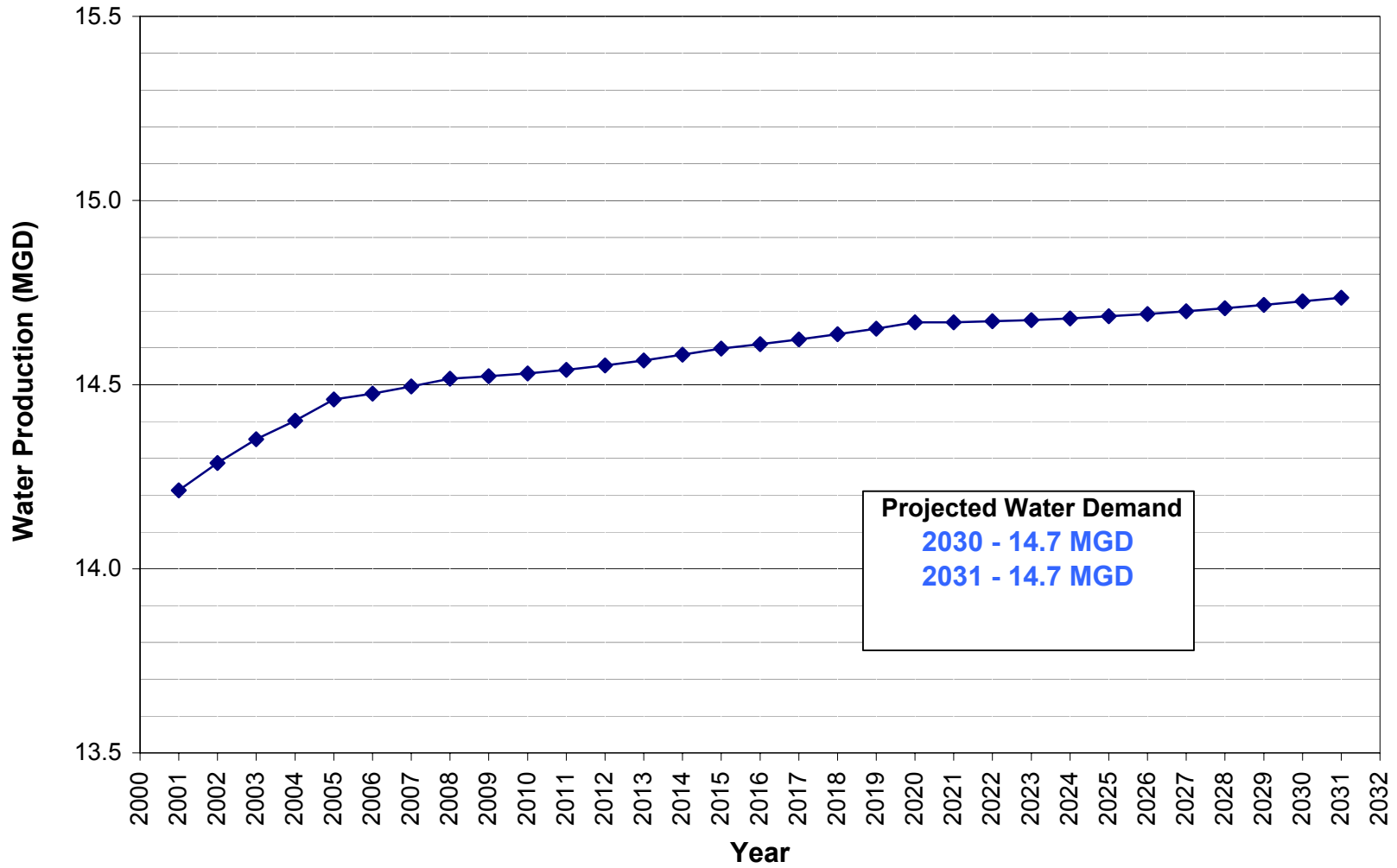
Category	2000 Units	No. Buildings	Service Area Billing Accounts - Year 2000 <sup>3</sup>	Difference between billing and census data	Data Sources / Notes
<b>Single family</b>					
1-detached	15,387	15,387			
1-attached	978	978			
Subtotal	16,365	16,365	14,771	-1,594	Housing Characteristics from U.S. Census Bureau
<b>Multi family</b>					
2-units	474	237			
3-4 units	1,254	358			
5 to 9 units	1,653	236			
10-19 units	1,602	107			
20 or more units	4,642	93			Meter for assumed 50 units per building
mobile homes	156	3			Meter for mobile home parks, assume 50 per park
Subtotal	9,781	1,034	1,929	895	Must be more than one building on an MF meter.
MF Average =	9.46	units/building		5.07	units/account
Total SF + MF units =	26,146				

Category	City of Palo Alto Census Population 2000	City of Palo Alto Estimated Population 2001	Estimated Residential Service Area Population 2001	Data Sources / Notes
Total Population from Census data <sup>6</sup> =	58,598	60,400		Estimated growth from 2000 to 2001 (CA DOF Projections): 3.08%
Subtract Institutionalized Population =	433	446		Estimated employment growth from 2000 to 2001 (ABAG Employment Projections): 0.20%
Residential Population =	58,165	59,954		Water use for the institutionalized population is accounted for in nonresidential billing categories
Avg. HHS <sup>7</sup> =	2.22			Residential population shown corresponds to the city or cities represented by Census data
MF Pop @ MF HHS <sup>7</sup> =	2.03	19,855	20,466	34.1% Percent of Population that is MF
SF Pop =	38,310	39,488	39,488	65.9% Percent of Population that is SF
SF HHS <sup>7</sup> =	2.34			
Total			59,954	100.0%
			104	Difference in our estimate and average of 2000-2001 and 2001-2002 BAWUA Surveys
			-343	Difference in our estimate and the average 2000-2001 and 2001-2002 BAWUA Surveys including institutionalized population
<b>Estimate Service Area Dwelling Units for 2001</b>				
SF Res	16,868			Equals No. Buildings from cell M21 plus growth in accounts for one year from cell T38
MF Res	10,082			Equals 2000 units from cell L29 plus the growth rate in accounts for one year from cell T38
<b>Population and Employment Estimates Corresponding to Service Area</b>				
2000 Census data for jurisdiction	58,598	Population	NA	Employment
2000 ABAG (jurisdictional)	58,598		103,890	
2005 ABAG Projection (jurisdictional)	61,200		104,920	
2000 ABAG (subregional)	71,914		110,890	
2005 ABAG Projection (subregional)	75,800		112,520	
2000 Department of Finance Benchmark	58,598			From State of California Department of Finance (DOF) table E-4 as of 4-1-2000. Website www.dof.ca.gov
2001 Department of Finance Estimate	60,400			From State of California Department of Finance table E-4 as of 1-1-2001. Website www.dof.ca.gov
2002 Department of Finance Estimate	60,400			From State of California Department of Finance table E-4 as of 1-1-2002. Website www.dof.ca.gov
FY 2000-2001 BAWUA service area	59,350		NA	
FY 2001-2002 BAWUA service area	60,350		NA	
2001 Employment in Service Area (input to DSS Model) =			105,432	Service Area Employment is determined by the ratio of the 2000-2001 BAWUA service area population to the 2000 ABAG Subregional Population and escalated to 2001 using the assumed growth rate in cell T39. (EXPLAIN SOURCE)

**Definitions / Abbreviations**

ABAG	Association of Bay Area Governments	MF	multi family
BAWUA	Bay Area Water Users Association	MGD	million gallons per day
DSS	Decision Support System Model	No.	number
du	dwelling unit	Pop	population
FY	Fiscal Year	Res	residential
gpd/a	gallons per day / per account	SF	single family
gpd	gallons per day	UFW	unaccounted for water
HHS	household size		

# City of Palo Alto Projected Water Demand (Planning Estimate) FINAL RESULTS



**Appendix C22**  
**Purissima Hills Water District**



**Purissima Hills Water District Service Area  
DSS Input Sheet  
FINAL INPUT SHEET**

**Base Year Average Use and Indoor Percentages by Billing Category for DSS Model<sup>2</sup>**

Year	Old SF Res		Multifamily		Commercial		Industrial		New/Renovated SF Res		Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor
	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor								
2001	716	35%	0	0%	2530	26%			1605	16%								

**Data for DSS Model - - Base Year 2001**

Category	Number of Accounts FY. 2001 <sup>3</sup>	Water Use 2001 gpd/a <sup>4</sup>	Water Use, MGD 2001	Use Profile Percent	Water Use gpd	Indoor Water Use gpd
Old SF Res	1,580	716	1.13	55.58%	188	66
Multifamily	0	0	0.00	0.00%		
Commercial	62	2,530	0.16	7.76%		
Industrial	0	0	0.00	0.00%		
New/Renovated SF	465	1,605	0.75	36.67%		
0	0	0	0.00	0.00%		
0	0	0	0.00	0.00%		
0	0	0	0.00	0.00%		
0	0	0	0.00	0.00%		
Total	2,107		2.04	100.00%		
Total Water Purchased (produced) =			2.20	MGD		
Unaccounted For Water (UFW) <sup>5</sup> =			5%	Percent		
<b>Estimated UFW for DSS Model =</b>			7.0%	Percent		
Water Produced for use in DSS Model			2.18	MGD		
Peaking Factor			1.78	Provided by Agency or SFPUC Water Master Plan (or NA)		
Peaking Factor for DSS Model =			1.78	If NA use default value of 1.6.		

Blue cells are entered by modeler  
Yellow cells are input to DSS Model

**NOTES**

- Communities served (includes all or portions of) the Town of Los Altos and nearby unincorporated areas according to BAWUA survey
- Average gpd/a is based on a 12-month moving average through December 2001. Indoor use is based on average of 2 lowest consecutive months in the winter if meters read bimonthly, or single lowest month if meters read monthly.
- Number of accounts is from data provided by water agency for this project (see worksheet with account data in this file)
- Total water Purchased (produced) taken from BAWUA for Fiscal Year 2001-2002 or agency if provided.
- Unaccounted for Water (UFW) is the percent difference between the total water purchased and the total water use.
- For reference see additional population estimates provided in population and employment estimates corresponding to service area table.
- Initial estimate based on census data for renter occupied units. For reference see table below that has 2000 census data for corresponding water service area city or cities. This estimate was revised in order to produce a service area population closer to the BAWUA survey for 2001-2002.

**2000 Census Data**

Average household size	2.86
Average household size of owner-occupied unit	2.88
Average household size of renter-occupied unit	2.53
Homeowner vacancy rate (percent)	0.70
Rental vacancy rate (percent)	2.90

8 - "Old" SF residential accounts are assumed to use the rate of water use given by 1994 billing records: 716 gpd/account. The number of "old" versus "new/renovated" residential accounts was determined by assuming a 3% renovation rate since 1994. This assumption corresponds to a "new/renovated" water usage of 1605 gpd/account in order to maintain the average water use for all residential accounts as given by the billing data for 2001.

Data Prepared : July 24, 2003 By: N. Foged  
Revised: August 15, 2003 By: J. Hudson

**Reconcile agency account billing data and census data**

**Total Dwelling Units in Census 2000 for Town of Los Altos Hills**

	2000 Units	No. Buildings	Service Area Billing Accounts - Year 2000 <sup>3</sup>	Difference between billing and census data	Data Sources / Notes
<b>Single family</b>					
1-detached	2,771	2,771			
1-attached	32	32			
Subtotal	2,803	2,803	2,034		-769 Housing Characteristics from U.S. Census Bureau
<b>Multi family</b>					
2-units	17	9			
3-4 units	0	0			
5 to 9 units	0	0			
10-19 units	0	0			
20 or more units	9	9			Assumed a meter for each unit.
mobile homes	6	6			Assumed a meter for each unit.
Subtotal	32	24	0		-24
MF Average =	1.36	units/building	#DIV/0!	units/account	
Total SF + MF units =	2,835				

**Population and Household Size in Census 2000 for Town of Los Altos Hills**

	Town of Los Altos Hills Census Population 2000	Town of Los Altos Hills Estimated Population 2001	Estimated Residential Service Area Population 2001	Data Sources / Notes
Total Population from Census data <sup>6</sup> =	7,902	7,950		Estimated growth from 2000 to 2001 (CA DOF Projections): 0.61%
Subtract Institutionalized Population =	0	0		Estimated employment growth from 2000 to 2001 (ABAG Employment Projections): 0.07%
Residential Population =	7,902	7,950		Water use for the institutionalized population is accounted for in nonresidential billing categories
Avg. HHS <sup>7</sup> =	2.79			Residential population shown corresponds to the city or cities represented by Census data
MF Pop @ MF HHS <sup>7</sup> =	2.86	92	0	1.2% Percent of Population that is MF
SF Pop =	7,810	7,858	6,032	98.8% Percent of Population that is SF
SF HHS <sup>7</sup> =	2.95			
Total			6,032	100.0%
			95	Difference in our estimate and average of 2000-2001 and 2001-2002 BAWUA Surveys
			95	Difference in our estimate and the average 2000-2001 and 2001-2002 BAWUA Surveys including institutionalized population

*Estimate Service Area Dwelling Units for 2001*

SF Res 2,045 Equals billing accounts in 2001 from cell C15  
MF Res 0 Assume no multi-family dwelling units.

*Population and Employment Estimates Corresponding to Service Area*

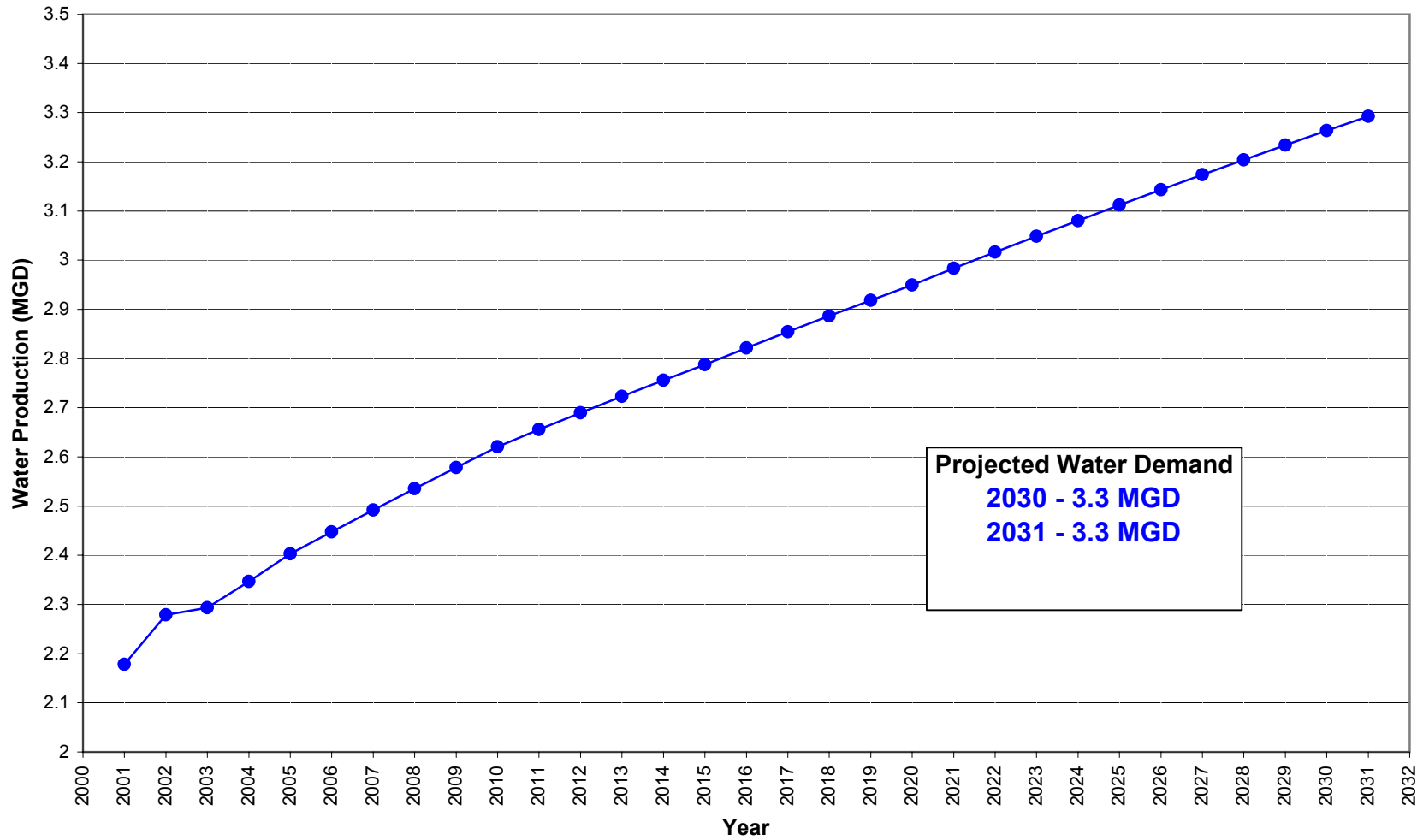
	Population	Employment
2000 Census data for jurisdiction	7,902	NA
2000 ABAG (jurisdictional)	7,902	2,720
2005 ABAG Projection (jurisdictional)	8,300	2,730
2000 ABAG (subregional)	9,455	2,720
2005 ABAG Projection (subregional)	10,000	2,730
2000 Department of Finance Benchmark	7,902	From State of California Department of Finance (DOF) table E-4 as of 4-1-2000. Website www.dof.ca.gov
2001 Department of Finance Estimate	7,950	From State of California Department of Finance table E-4 as of 1-1-2001. Website www.dof.ca.gov
2002 Department of Finance Estimate	8,000	From State of California Department of Finance table E-4 as of 1-1-2002. Website www.dof.ca.gov
FY 2000-2001 BAWUA service area	5,800	NA
FY 2001-2002 BAWUA service area	6,073	NA
2001 Employment in Service Area (input to DSS Model) =		420

Service Area Employment is determined by the ratio of the 2000-2001 BAWUA service area population to the 2000 ABAG Subregional Population and escalated to 2001 using the assumed growth rate (ABAG, 2002). In order to obtain at least 50 gal/employee/day, this value was multiplied by 0.25.

**Definitions / Abbreviations**

ABAG	Association of Bay Area Governments	MF	multi family
BAWUA	Bay Area Water Users Association	MGD	million gallons per day
DSS	Decision Support System Model	No.	number
du	dwelling unit	Pop	population
FY	Fiscal Year	Res	residential
gpd/a	gallons per day / per account	SF	single family
gpd	gallons per day	UFW	unaccounted for water
HHS	household size		

## Purissima Hills WD Projected Water Demand (Planning Estimates) FINAL RESULTS



**Appendix C23**  
**Redwood City, City of**

# Redwood City Water Service Area<sup>1</sup>

## DSS Input Sheet

### FINAL INPUT SHEET

#### Base Year Average Use and Indoor Percentages by Billing Category for DSS Model<sup>2</sup>

Year	Single family		Apartments		Commercial		Commercial Irrigation		Municipal		Residential Irrigation		Other							
	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor
2001	289	66%	1,374	78%	1,451	79%	3,933	0%	2,334	29%	2,835	0%	2,618	35%						

Includes industrial and hospitals

City Buildings

Large turf areas such as homeowner associations

Schools and Churches

Data for DSS Model -- Base Year 2001							
Category	Number of Accounts FY. 2001 <sup>3</sup>	Water Use 2001 gpd/a <sup>4</sup>	Water Use, MGD 2001	Use Profile Percent	Water Use gpd	Indoor Water Use gpd	
Single family	18,525	289	5.35	48.24%	104	68	
Apartments	1,701	1,374	2.34	21.08%	77	60	
Commercial	1,439	1,451	2.09	18.84%			
Commercial Irrigation	245	3,933	0.96	8.70%			
Municipal	7	2,334	0.02	0.14%			
Residential Irrigation	80	2,835	0.23	2.05%			
Other	40	2,618	0.10	0.94%			
0		0	0.00	0.00%			
<b>Total</b>	<b>22,037</b>		<b>11.08</b>	<b>100.00%</b>			
Total Water Purchased (produced) =			11.81 MGD				
Unaccounted For Water (UFW) <sup>5</sup> =			4.6% Percent				
<b>Estimated UFW for DSS Model =</b>			7% Percent				
Water Produced for use in DSS Model			11.86 MGD				
Peaking Factor			NA				
<b>Peaking Factor for DSS Model =</b>			1.6				

Blue cells are entered by modeler  
Yellow cells are input to DSS Model

#### NOTES

1. - Communities served (includes all or portions of) Redwood City, unincorporated areas of San Mateo county, Town of Woodside, and portions of the city of San Carlos according to BAWUA survey. According to Redwood City agency, they only serve 1-3 blocks of San Carlos.

2. - Average gpd/a is based on a 12-month moving average through December 2001. Indoor use is based on average of 2 lowest consecutive months in the winter if meters read bimonthly, or single lowest month if meters read monthly.

3. - Number of accounts is from data provided by water agency for this project (see worksheet with account data in this file)

4. - Total water Purchased (produced) taken from BAWUA for Fiscal Year 2001-2002 or agency if provided. For Redwood City data was provided by the city.

5. - Unaccounted for Water (UFW) is the percent difference between the total water purchased and the total water use.

6. - For reference see additional population estimates provided in population and employment estimates corresponding to table on "Redwood City Demographics" worksheet.

7. - Initial estimate based on census data for renter occupied units. For reference see table below that has 2000 census data for corresponding water service area city or cities.

2000 Census Data	
Average household size	2.62
Average household size of owner-occupied unit	2.61
Average household size of renter-occupied unit	2.63
Homeowner vacancy rate (percent)	0.40
Rental vacancy rate (percent)	2.30

Data Prepared : July 1, 2003

By: M. Maddaus

Revised: March 4, 2004

#### Reconcile agency account billing data and census data

##### Total Dwelling Units in Census 2000 for Redwood City Service Area

Category	2000 Units	No. Buildings	Service Area Billing Accounts - Fiscal Year 2001 <sup>3</sup>	Difference between billing and census data	Data Sources / Notes
<b>Single family</b>					
1-detached	14,729	14,729			
1-attached	3,974	3,974			
Subtotal	18,703	18,703	18,525	-178	Housing Characteristics from U.S. Census Bureau
<b>Multi family</b>					
2-units	1,276	638			
3-4 units	1,629	465			
5 to 9 units	2,628	375			
10-19 units	2,613	174			
20 or more units	3,940	79			Meter for assumed 50 units per building
mobile homes	628	13			Meter for mobile home parks, assume 50 per park
Subtotal	12,712	1,744	1,701	-43	Must be more than one building on an MF meter.
MF Average =	7.3 units/building		7.5 units/account		
Total SF + MF units =	31,416				

##### Population and Household Size in Census 2000 for Redwood City Service Area

	Redwood City Service Area Based on 2000 Census	Redwood City Estimated Population (DOF)	Estimated Residential Service Area Population	Data Sources / Notes
	2000	2001	2001	
Total Population from Census data <sup>6</sup> =	83,000	83,598		Estimated growth from 2000 to 2001 (CA DOF Projections): 0.72%
Subtract Institutionalized Population =	1,481	1,492		Estimated employment growth from 2000 to 2001 (ABAG Employment Projections): 0.77%
Residential Population =	81,519	82,106		Water use for the institutionalized population is accounted for in nonresidential billing categories
Avg. HHS <sup>7</sup> =	2.59			Residential population shown corresponds to the city or cities represented by Census data
MF Pop @ MF HHS <sup>7</sup> =	2.38	30,256	30,256	37.1% Percent of Population that is MF
SF Pop =	51,263	51,633	51,633	62.9% Percent of Population that is SF
SF HHS <sup>7</sup> =	2.74			
Total			81,888	100.0%
			-1,112	Difference in our estimate and average of 2000-2001 and 2001-2002 BAWUA Surveys
			-2,603	Difference in our estimate and the average 2000-2001 and 2001-2002 BAWUA Surveys including institutionalized population

##### Estimate Service Area Dwelling Units for 2001

SF Res	18,838	Equals No. Buildings from cell M21 plus growth in accounts for one year from cell T38
MF Res	12,712	Equals billing accounts in 2001 from cell C16 times average units per account in cell N30 (or average units per building in cell L30 to minimize population difference in cell N47)

##### Population and Employment Estimates Corresponding to Service Area

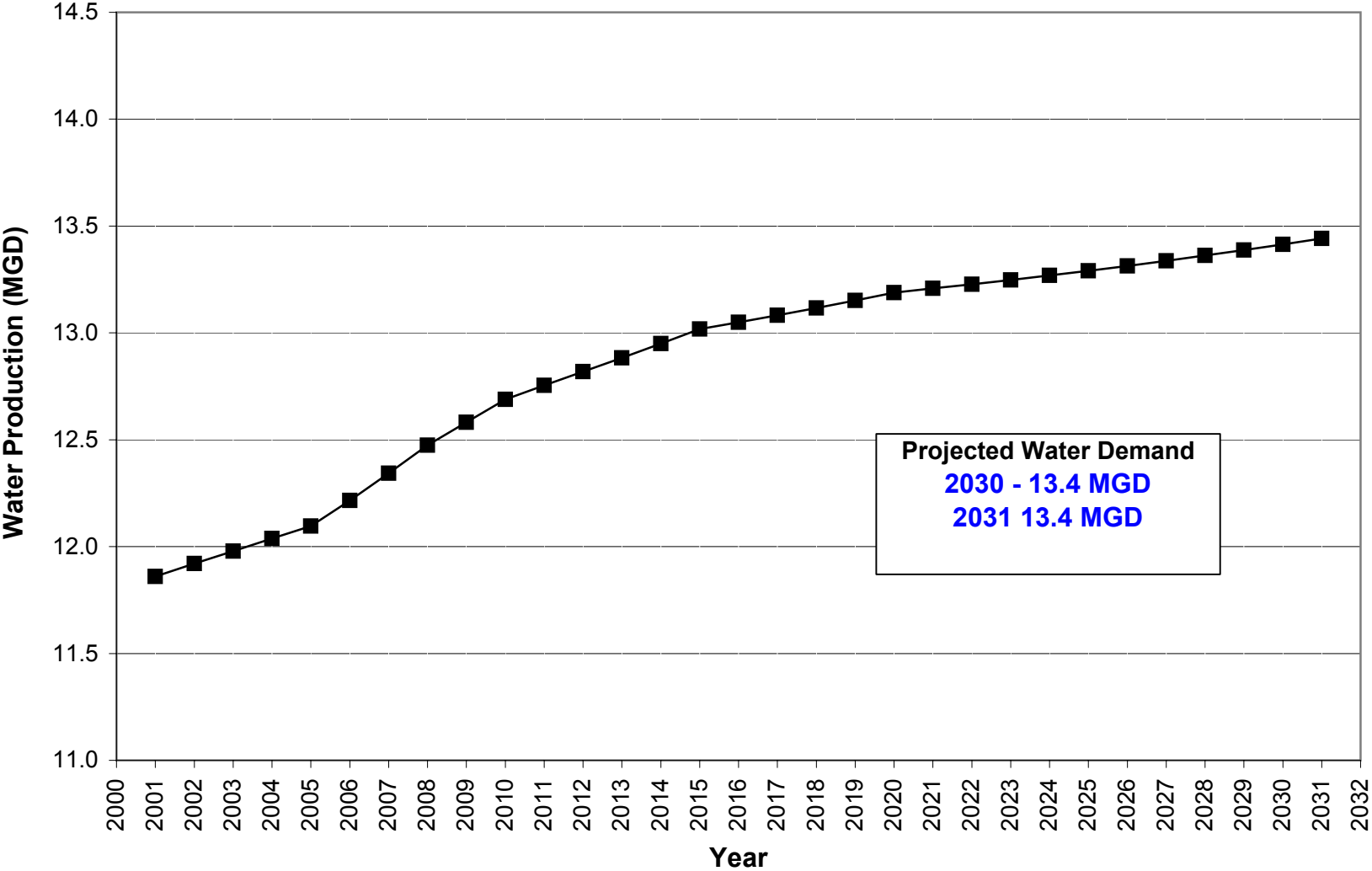
	Population	Employment
2000 Census data for jurisdiction	83,000	NA
2000 ABAG (jurisdictional)	82,944	65,838
2005 ABAG Projection (jurisdictional)	100,593	68,369
2000 ABAG (subregional)	86,434	62,297
2005 ABAG Projection (subregional)	104,558	65,319
2000 Department of Finance Benchmark	82,944	From State of California Department of Finance (DOF) table E-4 as of 4-1-2000. Website www.dof.ca.gov
2001 Department of Finance Estimate	83,542	From State of California Department of Finance table E-4 as of 1-1-2001. Website www.dof.ca.gov
2002 Department of Finance Estimate	83,876	From State of California Department of Finance table E-4 as of 1-1-2002. Website www.dof.ca.gov
FY 2000-2001 BAWUA service area	83,000	NA
FY 2001-2002 BAWUA service area	83,000	NA
2001 Employment in Service Area (input to DSS Model) =		66,389

Service Area Employment is determined by the ratio of the 2000-2001 BAWUA service area population to the 2000 ABAG Subregional Population and escalated to 2001 using the assumed growth rate in cell T39. (EXPLAIN SOURCE)

#### Definitions / Abbreviations

ABAG	Association of Bay Area Governments	MF	multi family
BAWUA	Bay Area Water Users Association	MGD	million gallons per day
DSS	Decision Support System Model	No.	number
du	dwelling unit	Pop	population
FY	Fiscal Year	Res	residential
gpd/a	gallons per day / per account	SF	single family
gpd	gallons per day	UFW	unaccounted for water
HHS	household size		

# City of Redwood City Projected Water Demand (Planning Estimate) FINAL RESULTS



**Appendix C24**  
**San Bruno, City of**

# City of San Bruno Water Service Area<sup>1</sup>

## DSS Input Sheet

### FINAL INPUT SHEET

#### Base Year Average Use and Indoor Percentages by Billing Category for DSS Model<sup>2</sup>

Year	Single Family		Multifamily		Commercial		Misc													
	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor
2001	223	84%	834	85%	1100	76%	1000	18%												

#### Data for DSS Model - - Base Year 2001

Category	Number of Accounts FY. 2001 <sup>3</sup>	Water Use 2001 gpd/a <sup>4</sup>	Water Use, MGD 2001	Use Profile Percent	Water Use gpd	Indoor Water Use gpd
Single Family	9,340	223	2.08	53.67%	78	66
Multifamily	1,098	834	0.92	23.64%	65	55
Commercial	585	1,100	0.64	16.61%		
Misc	236	1,000	0.24	6.09%		
0	0	0	0.00	0.00%		
0	0	0	0.00	0.00%		
0	0	0	0.00	0.00%		
0	0	0	0.00	0.00%		3.875895949
Total	11,259		3.88	100.00%		
Total Water Purchased (produced) <sup>5</sup> =			4.28	MGD		
Unaccounted For Water (UFW) <sup>6</sup> =			14%	Percent		
<b>Estimated UFW for DSS Model =</b>			14%	Percent		
Water Produced for use in DSS Model			4.43	MGD		
Peaking Factor			NA	Provided by Agency or SFPUC Water Master Plan (or NA)		
<b>Peaking Factor for DSS Model =</b>			1.6	If NA use default value of 1.6.		

- Yellow cells are input to DSS Model

#### NOTES

1. - Communities served (includes all or portions of) San Bruno and nearby unincorporated areas according to BAWUA survey

2. - Average gpd/a is based on a 12-month moving average through December 2001. Indoor use is based on average of 2 lowest consecutive months in the winter if meters read bimonthly, or single lowest month if meters read monthly.

3. - Number of accounts is from data provided by water agency for this project (see worksheet with account data in this file)

4. - Total water Purchased (produced) taken from BAWUA for Fiscal Year 2001-2002 or agency if provided.

5. - Unaccounted for Water (UFW) is the percent difference between the total water purchased and the total water use.

6. - For reference see additional population estimates provided in population and employment estimates corresponding to service area table.

7. - Initial estimate based on census data for renter occupied units. For reference see table below that has 2000 census data for corresponding water service area city or cities.

Average household size  
 Average household size of owner-occupied unit  
 Average household size of renter-occupied unit  
 Homeowner vacancy rate (percent)  
 Rental vacancy rate (percent)

2000 Census Data	
Average household size	2.72
Average household size of owner-occupied unit	2.76
Average household size of renter-occupied unit	2.66
Homeowner vacancy rate (percent)	0.40
Rental vacancy rate (percent)	1.70

Data Prepared : August 15, 2003

By: B. Skeens

Revised: April 21, 2004

#### Reconcile agency account billing data and census data

##### Total Dwelling Units in Census 2000 for San Bruno

Category	2000 Units	No. Buildings	Service Area Billing Accounts - Year 2000 <sup>3</sup>	Difference between billing and census data	Data Sources / Notes
<b>Single family</b>					
1-detached	9,040	9,040			
1-attached	565	424			Assume 3/4 of 1-attached billed as single family
Subtotal	9,605	9,464	9,340	-124	Housing Characteristics from U.S. Census Bureau
<b>Multi family</b>					
2-units	409	550			Assume individual meters, add in 1/4 of 1-attached units billed as multi family
3-4 units	777	222			
5 to 9 units	1,079	154			
10-19 units	779	52			
20 or more units	2,280	114			Meter for assumed 20 units per building
mobile homes	15	1			Meter for mobile home parks, assume 15 per park
Subtotal	5,339	1,093	1,075	-18	
MF Average =	4.9	units/building	5.0	units/account	
Total SF + MF units =	14,944				

##### Population and Household Size in Census 2000 for San Bruno

Category	City of San Bruno Census Population 2000	City of San Bruno Estimated Population 2001	Estimated Residential Service Area Population 2001	Difference	Data Sources / Notes
Total Population from Census data <sup>6</sup> =	40,165	40,350			Estimated growth from 2000 to 2001 (CA DOF Projections): 0.46%
Subtract Institutionalized Population =	122	123			Estimated employment growth from 2000 to 2001 (ABAG Employment Projections): 0.44%
Residential Population =	40,043	40,227			Water use for the institutionalized population is accounted for in nonresidential billing categories
Avg. HHS <sup>7</sup> =	2.68				Residential population shown corresponds to the city or cities represented by Census data
MF Pop @ MF HHS <sup>7</sup> =	2.64	14,095	14,160	35.2%	Percent of Population that is MF
SF Pop =	25,948	26,068	26,568	64.8%	Percent of Population that is SF
SF HHS <sup>7</sup> =	2.70				
Total			40,727	100.0%	
			163		Difference in our estimate and average of 2000-2001 and 2001-2002 BAWUA Surveys
			41		Difference in our estimate and the average 2000-2001 and 2001-2002 BAWUA Surveys including institutionalized population

##### Estimate Service Area Dwelling Units for 2001

SF Res	9,649	Equals No. Units from cell L21 plus growth in accounts for one year from cell T38
MF Res	5,364	Equals billing accounts in 2001 from cell C16 times average units per account in cell N30 (or average units per building in cell L30 to minimize population difference in cell N47)

##### Population and Employment Estimates Corresponding to Service Area

	Population	Employment
2000 Census data for jurisdiction	40,165	NA
2000 ABAG (jurisdictional)	40,165	15,810
2005 ABAG Projection (jurisdictional)	41,200	16,160
2000 ABAG (subregional)	40,165	16,330
2005 ABAG Projection (subregional)	41,200	16,680
2000 Department of Finance Benchmark	40,165	From State of California Department of Finance (DOF) table E-4 as of 4-1-2000. Website www.dof.ca.gov
2001 Department of Finance Estimate	40,350	From State of California Department of Finance table E-4 as of 1-1-2001. Website www.dof.ca.gov
2002 Department of Finance Estimate	40,200	From State of California Department of Finance table E-4 as of 1-1-2002. Website www.dof.ca.gov
FY 2000-2001 BAWUA service area	40,778	NA
FY 2001-2002 BAWUA service area	40,350	NA
2001 Employment in Service Area (input to DSS Model) =		16,622

Service Area Employment is determined by the ratio of the 2000-2001 BAWUA service area population to the 2000 ABAG Subregional Population and escalated to 2001 using the assumed growth rate in cell T39.

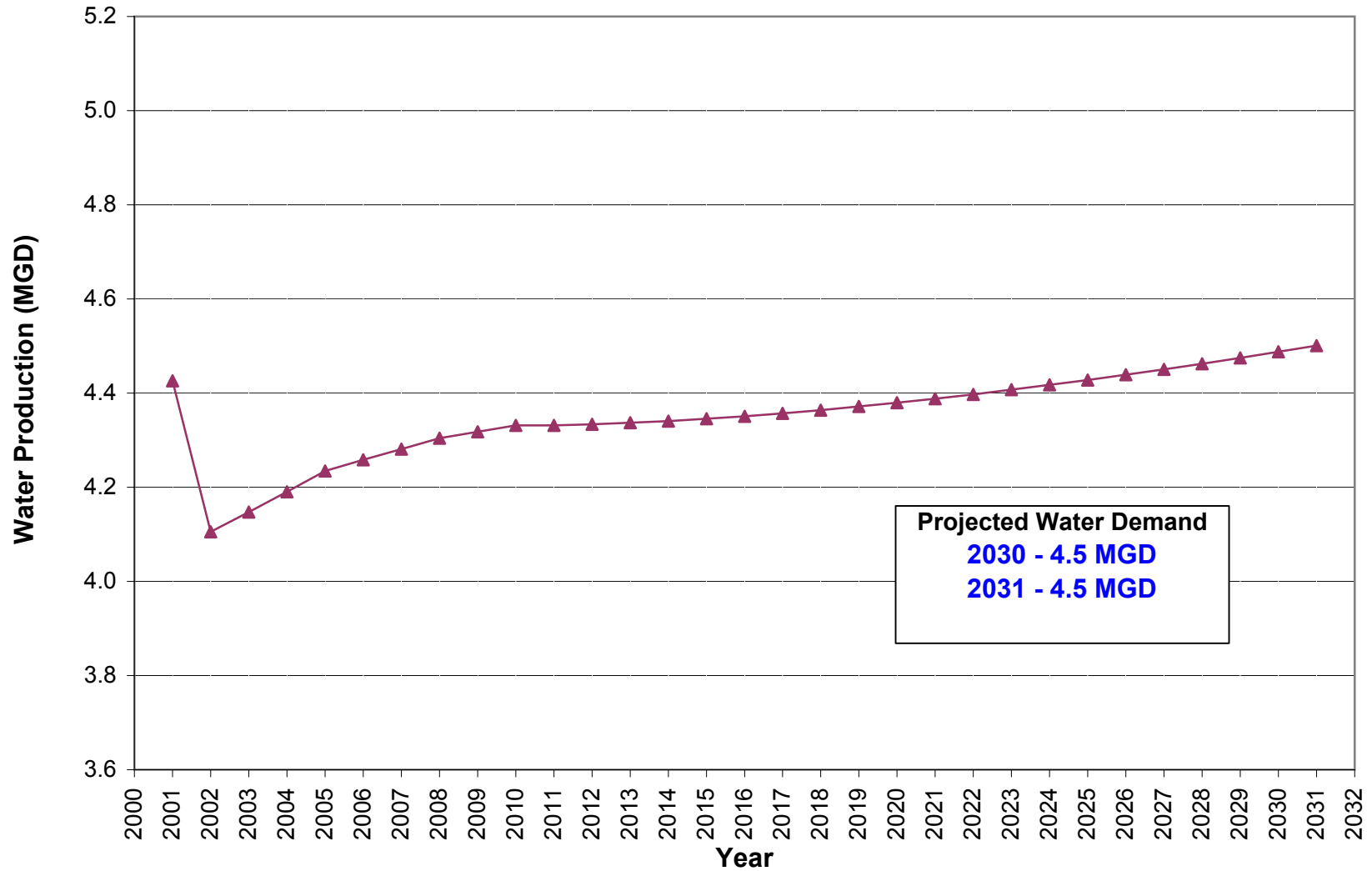
#### Definitions / Abbreviations

ABAG	Association of Bay Area Governments	MF	multi family
BAWUA	Bay Area Water Users Association	MGD	million gallons per day
DSS	Decision Support System Model	No.	number
du	dwelling unit	Pop	population
FY	Fiscal Year	Res	residential
gpd/a	gallons per day / per account	SF	single family
gpd	gallons per day	UFW	unaccounted for water
HHS	household size	DOF	California Department of Finance

#### Estimate Multi Family Accounts and Water Use

MF Indoor Use (gpd)	55
MF Indoor % =	85%
MF mgd =	0.92
2000 Accts from SF	793
2000 Accts from COI	300
2001 Accts	1098
2001 gpd/acct	834
2001 mgd from SF	0.66
2001 mgd from COM	0.25
2001 Accts from SF	2972
2001 Accts from COI	228

## City of San Bruno Projected Water Demand (Planning Estimate) FINAL RESULTS



Note: San Bruno experienced abnormally high water loss in 2001. They corrected the problem and provided a yearly unaccounted-for-water projection for DSS modeling which included the 2001 anomaly and the reduction in water loss from 2002-2030.



**Appendix C25**  
**San Jose, City of (portion of north San Jose)**

## North San Jose Municipal Water System Service Area<sup>1</sup>, DSS Input Sheet, FINAL INPUT SHEET

### Base Year Average Use and Indoor Percentages by Billing Category for DSS Model<sup>2</sup>

Year	Single Family		Multifamily		Commercial		Industrial		Public Irrigation		Private Irrigation		Public Accounts (schools, etc)		Temporary Meters (construction, etc)					
	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor
2001	240	82%	5,135	84%	1,903	80%	7,155	78%	1786	36%	7,276	36%	12,870	55%	1,990	65%				

#### Data for DSS Model -- Base Year 2001

Category	Number of Accounts FY. 2001 <sup>3</sup>	Water Use 2001 gpd/a <sup>4</sup>	Water Use, MGD 2001	Use Profile Percent	gpd	gpd
Single Family	1,096	240	0.26	5.43%	88	72
Multifamily	129	5,135	0.66	13.60%	81	68
Commercial	88	1,903	0.17	3.45%		
Industrial	258	7,155	1.85	38.04%		
Public Irrigation	69	1,786	0.12	2.54%		
Private Irrigation	206	7,276	1.50	30.88%		
Public Accounts (sch)	19	12,870	0.24	5.04%		
Temporary Meters (c)	25	1,990	0.05	1.02%		
Total	1,890		4.85	100.00%		
Total Water Purchased (produced) =			4.61	MGD		
Unaccounted For Water (UFW) <sup>5</sup> =			1.0%	Percent		From 5 year BAWUA Survey average
<b>Estimated UFW for DSS Model =</b>			7%	Percent		7% if actual is < 7%, otherwise = E25
Water Produced for use in DSS Model			5.19	MGD		Add UFW to Total Water Use
Peaking Factor			2.00			Provided by Agency or SFPUC Water Master Plan (or NA)
Peaking Factor for DSS Model =			2.0			IFNA use default value of 1.6.

Blue cells are entered by modeler  
Yellow cells are input to DSS Model

#### NOTES

- Communities served includes North San Jose/Alviso and nearby unincorporated areas according to BAWUA survey
- Average gpd/a is based on a 12-month moving average through December 2001. Indoor use is based on average of 2 lowest consecutive months in the winter if meters read bimonthly, or single lowest month if meters read monthly.
- Number of accounts is from data provided by water agency for this project (see worksheet with account data in this file)
- Total water Purchased (produced) taken from BAWUA for Fiscal Year 2001-2002.
- Unaccounted for Water (UFW) is the percent difference between the total water purchased and the total water use.
- For reference see additional population estimates provided in population and employment estimates corresponding to service area table. Total population is based on the ratio of the BAWUA service area to the ABAG population.
- Initial estimate based on census data for renter occupied units. For reference see table below that has 2000 census data for corresponding water service area city or cities.

#### 2000 Census Data

Average household size	3.20
Average household size of owner-occupied unit	3.22
Average household size of renter-occupied unit	3.16
Homeowner vacancy rate (percent)	0.40
Rental vacancy rate (percent)	1.80

Data Prepared : 07-24-03 By: J. Hudson, N.Foged  
Revised: 09-05-03

#### Reconcile agency account billing data and census data

Total Dwelling Units in Census 2000 for City of San Jose				Service Area Billing Accounts - Year 2000 <sup>3</sup>	Difference between billing and census data	Data Sources / Notes
Single family	2000 Units	No. Buildings				
1-detached	2,125	2,125				
1-attached	362	362				
Subtotal	2,487	2,487		1,029		-1,458 Housing Characteristics from U.S. Census Bureau -1,096 Difference without including "1-attached" dwellings.
<b>Multi family</b>						
2-units	75	38				
3-4 units	228	65				
5 to 9 units	177	25				
10-19 units	170	11				
20 or more units	414	8				Meter for assumed 40 units per building
mobile homes	140	3				Meter for mobile home parks, assume 30 per park
Subtotal	1,566	151		119		-32
MF Average =	10.4	units/building		16	units/account	Units include all multi-family dwellings plus the "1-attached" dwellings
Total SF + MF units =	4,053					

Population and Household Size in Census 2000 for City of San Jose				Estimated Residential Service Area Population 2001	Data Sources / Notes
	North San Jose Census Population 2000	North San Jose Estimated Population 2001			
Total Population from Census data <sup>6</sup> =	11,742	11,895		11,098	Estimated growth from 2000 to 2001 (CA DOF Projections): 1.30%
Subtract Institutionalized Population =	50	51			Estimated employment growth from 2000 to 2001 (ABAG Employment Projections): 0.74%
Residential Population =	11,692	11,844			Water use for the institutionalized population is accounted for in nonresidential billing categories
Avg. HHS <sup>7</sup> =	2.88				Residential population shown corresponds to the city or cities represented by Census data
MF Pop @ MF HHS <sup>7</sup> =	3,900	6,188	8,119	52.2%	Percent of Population that is MF
SF Pop =	5,583	5,655	2,979	47.8%	Percent of Population that is SF
SF HHS <sup>7</sup> =	2.63				
Total			11,098	100.0%	
			1,727		Difference in our estimate and average of 2000-2001 and 2001-2002 BAWUA Surveys
			1,778		Difference in our estimate and the average 2000-2001 and 2001-2002 BAWUA Surveys including institutionalized population

#### Estimate Service Area Dwelling Units for 2001

SF Res	1,134	Equals billing accounts in 2001 from cell C15 + number of 2-unit bldgs
MF Res	2,082	Equals billing accounts in 2001 from cell C16 times average units per acct in cell N30

#### Population and Employment Estimates Corresponding to Service Area

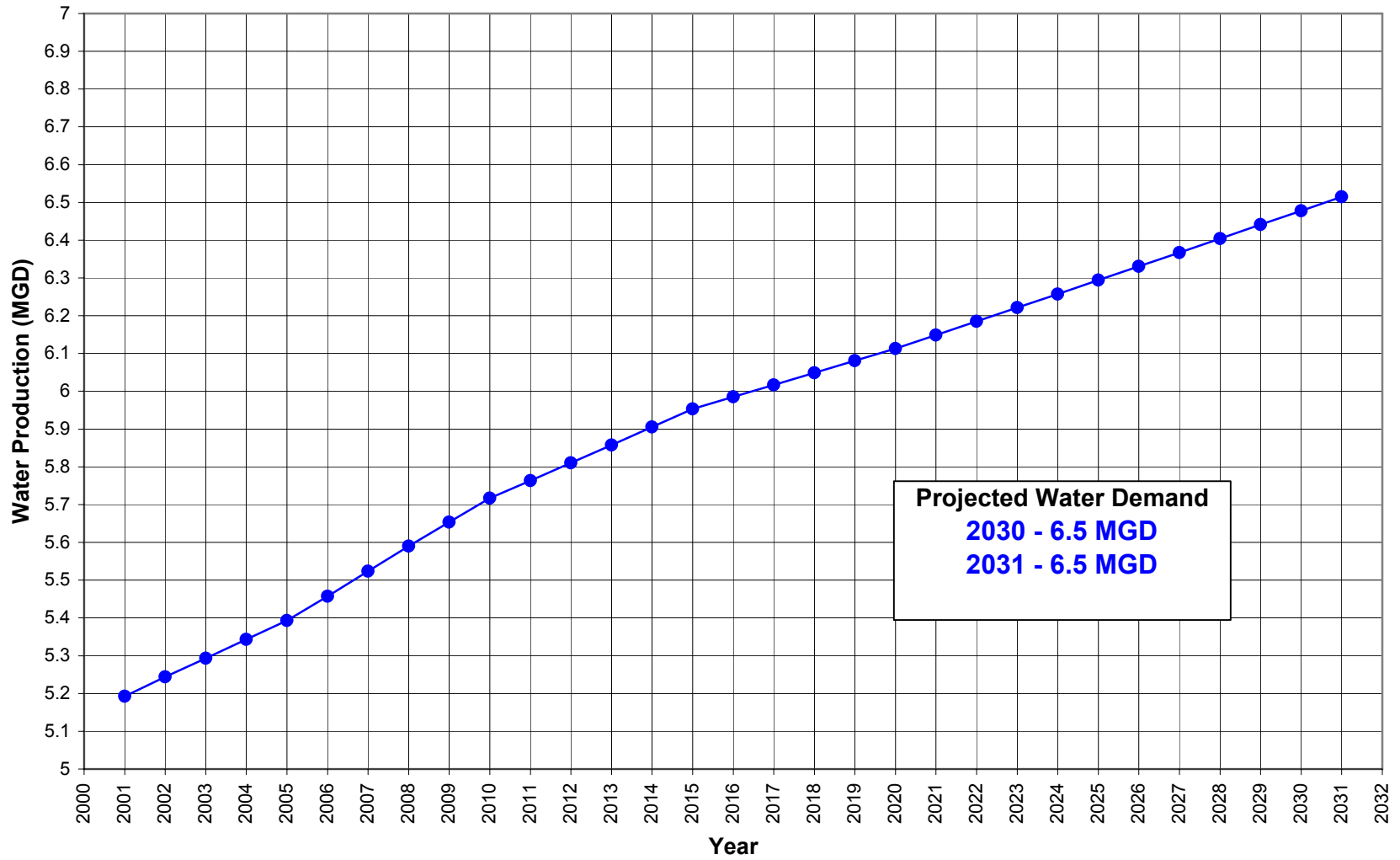
	Population	Employment
2000 Census data for jurisdiction	894,943	NA
2000 ABAG (jurisdictional)	894,943	427,670
2005 ABAG Projection (jurisdictional)	956,800	443,590
2000 ABAG (subregional)	941,998	442,670
2005 ABAG Projection (subregional)	1,005,100	459,590
2000 Department of Finance Benchmark	894,943	From State of California Department of Finance (DOF) table E-4 as of 4-1-2000. Website www.dof.ca.gov
2001 Department of Finance Estimate	906,600	From State of California Department of Finance table E-4 as of 1-1-2001. Website www.dof.ca.gov
2002 Department of Finance Estimate	916,500	From State of California Department of Finance table E-4 as of 1-1-2002. Website www.dof.ca.gov
FY 2000-2001 BAWUA service area	7,000	NA
FY 2001-2002 BAWUA service area	11,742	NA
2001 Employment in Service Area (input to DSS Model) =		2,500

Service Area Employment was estimated based on assuming consumption of at least 50 gal/employee/day

#### Definitions / Abbreviations

ABAG	Association of Bay Area Governments	MF	multi family
BAWUA	Bay Area Water Users Association	MGD	million gallons per day
DSS	Decision Support System Model	No.	number
du	dwelling unit	Pop	population
FY	Fiscal Year	Res	residential
gpd/a	gallons per day / per account	SF	single family
gpd	gallons per day	UFW	unaccounted for water
HHS	household size		

**City of San Jose (portion of north San Jose) Projected Water Demand (Planning Estimates)  
FINAL RESULTS**



**Appendix C26**  
**Santa Clara, City of**

## City of Santa Clara Water Service Area<sup>1</sup>, DSS Input Data Sheet, FINAL INPUT SHEET

**Base Year Average Use and Indoor Percentages by Billing Category for DSS Model<sup>2</sup>**

Year	Single Family		Multifamily		Commercial		Industrial		Institutional		Municipal		PPPlant		Recycled Water		New SF Residential		Average, gpd/a	Indoor
	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor				
2001	361	58%	1277	77%	2008	75%	10985	84%	5884	49%	1537	27%	1	100%	1,533,699	0%	500	42%		

**Data for DSS Model -- Base Year 2001**

Category <sup>8,9,10</sup>	Number of Accounts FY. 2001 <sup>7</sup>	Water Use 2001 gpd/a <sup>4</sup>	Water Use, MGD 2001	Use Profile Percent	gpd	gpd
Single Family	16,659	361	6.02	24.96%	125	73
Multifamily	3,545	1,277	4.53	18.78%	80	62
Commercial	2,964	2,008	5.95	24.69%		
Industrial	444	10,985	4.88	20.23%		
Institutional	116	5,884	0.68	2.83%		
Municipal	338	1,537	0.52	2.15%		
PPPlant	1	1	0.00	0.00%		
Recycled Water	1	1,533,699	1.53	6.36%		
New SF Residential	1	500	0.00	0.002074%		
<b>Total</b>			<b>24.11</b>	<b>100.00%</b>		
Total Water Purchased (produced) <sup>5</sup> =			23.71 MGD	Check		
Unaccounted For Water (UFW) <sup>6</sup> =			1.2% Percent	From 5 year BAWUA Survey average		
<b>Estimated UFW for DSS Model =</b>			<b>7.0%</b> Percent	7% if actual is < 7%, otherwise = E25		
Water Produced for use in DSS Model			25.80 MGD	Add UFW to Total Water Use		
Peaking Factor			1.50	Provided by Agency or SFPUC Water Master Plan (or NA)		
Peaking Factor for DSS Model =			1.5	If NA use default value of 1.6.		

Blue cells are entered by modeler  
Yellow cells are input to DSS Model

**NOTES**

- Service area consists of the City of Santa Clara according to BAWUA survey
- Average water use for each category in gallons-per-day-per-account was determined by averaging the water sales over the 2001 calendar year. Indoor use is based on average of 2 lowest consecutive months in the winter if meters read bimonthly, or single lowest month if meters read monthly.
- Number of accounts is from data provided by water agency for this project (see worksheet with account data in this file)
- Total Water Purchased (produced) taken from BAWUA for Fiscal Year 2001-2002. Input here for comparison.
- Unaccounted for Water (UFW) is the percent difference between the total water purchased and the total water use. The number input here is the 5-year average of the UFW reported to BAWUA.
- Total population for City of Santa Clara obtained from 2000 Census. This number was escalated to 2001 using the California Department of Finance growth projections and used as reference for determining the 2001 base year service area population. Additional population estimates provided at lower right.
- Census data used to reconcile SF and MF population and dwelling units. An initial estimate of household size was made based on census data for owner-occupied and renter-occupied units (SF and MF respectively). See table below for 2000 Census data for City of Santa Clara.

2000 Census Data	
Average household size	2.58
Average household size of owner-occupied unit	2.69
Average household size of renter-occupied unit	2.49
Homeowner vacancy rate (percent)	0.40
Rental vacancy rate (percent)	1.80

- A new category called "PPPlant" was added to allow for a single new large account to go on-line at some point in the future. As a place-holder, 1 gal/day was used for this account in the base year of 2001 (considered negligible). This category was added based on information received from City of Santa Clara, 10/7/03. Assume 100% indoor water usage.
- A recycled water supply category was added and represented as a single account. This category was added to account for future increases in recycled water supply. The average daily recycled water supply in 2001 was taken from data provided for the City's 2002 Water Master Plan (WMP). Future recycled water supply projections were obtained from the WMP and are given in the "Recycled Water" sheet of this workbook. These future projections were used to determine the increase in recycled water supply in terms of a ratio to the 2001 average. This projected ratio was input into the DSS model as a demographic forecast for future calculations. It was also assumed that water use for the PPPlant category would be 100% recycled water. This water was added onto the recycled water calculated from the WMP and assumed the water production for this category would be met by additional recycled water supply.

- New single family residential accounts input as a separate category to allow for a higher average rate of water usage. It was assumed that these accounts use approximately 40% more water than existing accounts (all of which is allocated to outdoor use).

Data Prepared : July 23, 2003 By: N. Foged  
Revised: February 5, 2004 By: N. Foged

**Reconcile agency account billing data and census data**

**Total Dwelling Units in Census 2000 for City of Santa Clara**

Category	2000 Units	No. Buildings	Service Area Billing Accounts - Year 2000 <sup>3</sup>	Difference between billing and census data	Data Sources / Notes
<b>Single family</b>					
1-detached	17,633	17,633			
1-attached	3,585	3,585			
Subtotal	21,218	21,218	16,650	-4,568	Housing Characteristics from U.S. Census Bureau
<b>Multi family</b>					
2-units	929	465			
3-4 units	2,943	841			
5 to 9 units	3,467	495			
10-19 units	3,038	203			
20 or more units	7,898	158			Meter for assumed 50 units per building
mobile homes	102	2			Meter for mobile home parks, assume 50 per park.
Subtotal	18,377	2,163	3,465	1,302	Units include all multi-family dwellings plus the "1-attached" dwellings.
MF Average =	8.50	units/building	6.34	units/account	
			6.62	new units/account	
Total SF + MF units =	39,595				

**Population and Household Size in Census 2000 for City of Santa Clara**

	City of Santa Clara Census Population 2000	City of Santa Clara Estimated Population 2001	Estimated Residential Service Area Population 2001	Data Sources / Notes
Total Population from Census data <sup>6</sup> =	102,361	103,500		Estimated growth from 2000 to 2001 (CA DOF Projections): 1.11%
Subtract Institutionalized Population =	459	464		Estimated employment growth from 2000 to 2001 (ABAG Employment Projections): 0.71%
Residential Population =	101,902	103,036		Water use for the institutionalized population is accounted for in nonresidential billing categories
Avg. HHS <sup>7</sup> =	2.57			Residential population shown corresponds to the city or cities represented by Census data
MF Pop @ MF HHS <sup>7</sup> =	44,105	44,596	56,317	43.3% Percent of Population that is MF
SF Pop =	57,797	58,440	48,032	56.7% Percent of Population that is SF
SF HHS <sup>7</sup> =	2.72			
Total			104,349	100.0%
			409	Difference in our estimate and average of 2000-2001 and 2001-2002 BAWUA Surveys
			873	Difference in our estimate and the average 2000-2001 and 2001-2002 BAWUA Surveys including institutionalized population

**Estimate Service Area Dwelling Units for 2001**

SF Res	17,633	Number of SF "1-detached" buildings (Census, 2000) escalated to 2001 using growth rate (cell T38)
MF Res	23,466	Equals billing accounts in 2001 (cell C16) times average units per account (cell N30)

**Population and Employment Estimates Corresponding to Service Area**

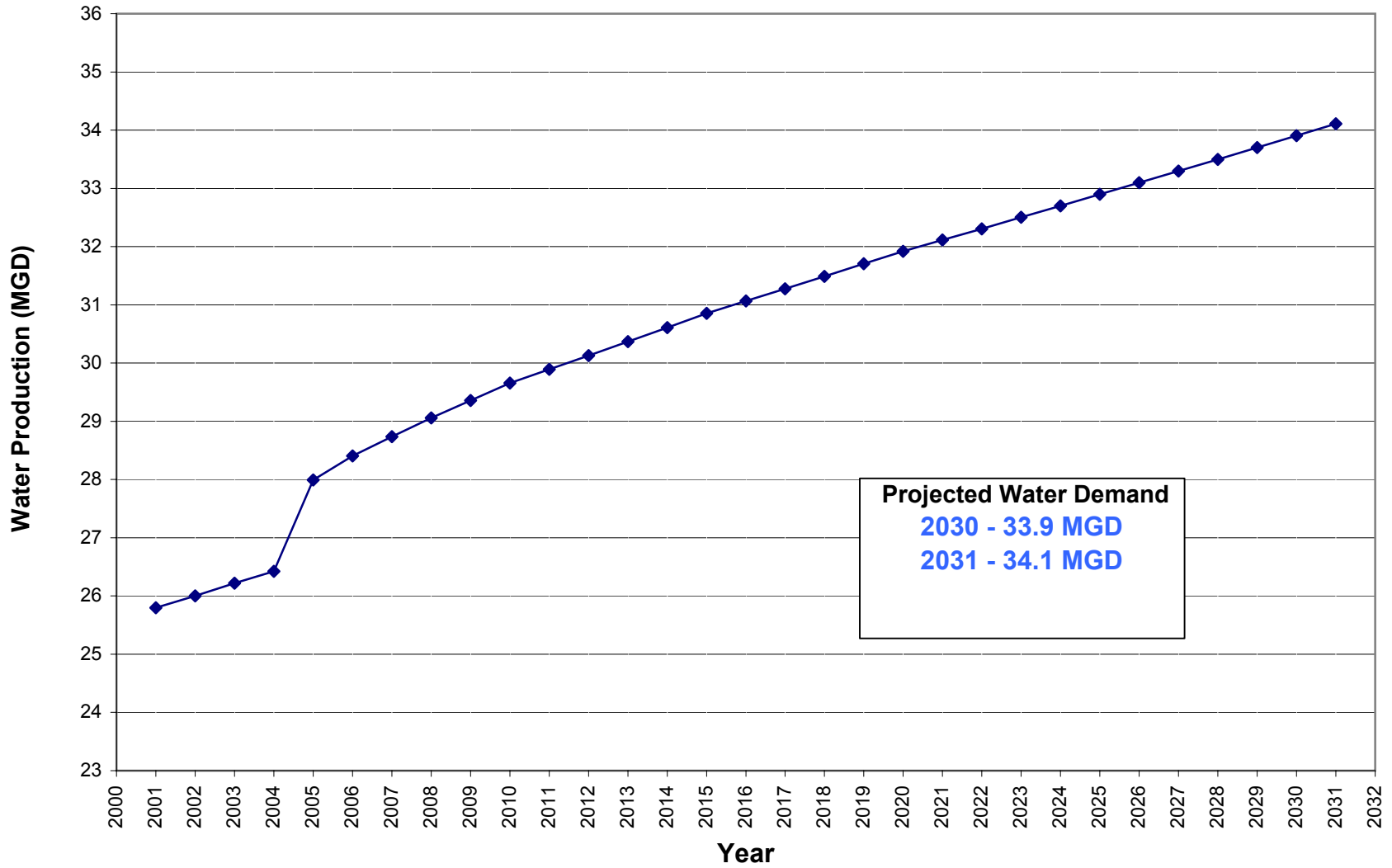
	Population	Employment
2000 Census data for jurisdiction	102,361	NA
2000 ABAG (jurisdictional)	102,361	135,960
2005 ABAG Projection (jurisdictional)	108,600	140,820
2000 ABAG (subregional)	102,361	135,960
2005 ABAG Projection (subregional)	108,600	140,820
2000 Department of Finance Benchmark	102,361	From State of California Department of Finance (DOF) table E-4 as of 4-1-2000. Website www.dof.ca.gov
2001 Department of Finance Estimate	103,500	From State of California Department of Finance table E-4 as of 1-1-2001. Website www.dof.ca.gov
2002 Department of Finance Estimate	104,100	From State of California Department of Finance table E-4 as of 1-1-2002. Website www.dof.ca.gov
FY 2000-2001 BAWUA service area	103,281	NA
FY 2001-2002 BAWUA service area	104,600	NA

2001 Employment in Service Area (input to DSS Model) = 138,163  
Service Area Employment is determined by the ratio of the 2000-2001 BAWUA service area population to the 2000 ABAG Subregional Population and escalated to 2001 using the assumed growth rate in cell T39.

**Definitions / Abbreviations**

ABAG	Association of Bay Area Governments	MF	multi family
BAWUA	Bay Area Water Users Association	MGD	million gallons per day
DSS	Decision Support System Model	No.	number
du	dwelling unit	Pop	population
FY	Fiscal Year	Res	residential
gpd/a	gallons per day / per account	SF	single family
gpd	gallons per day	UFW	unaccounted for water
HHS	household size		

# City of Santa Clara Projected Water Demand (Planning Estimates) FINAL RESULTS



**Appendix C27**  
**Skyline County Water District**

## Skyline County Water District Water Service Area<sup>1</sup>, DSS input Sheet, FINAL INPUT SHEET

Base Year Average Use and Indoor Percentages by Billing Category for DSS Model <sup>2</sup>																		
Year	Single Family		Multifamily		Commercial		Industrial		Other		Average, gpd/a		Indoor		Average, gpd/a		Indoor	
	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor
2001	318	62%			1868	62%												

Data for DSS Model -- Base Year 2001						
Category	Number of Accounts <sup>9</sup> FY 2001 <sup>7</sup>	Water Use 2001 gpd/a <sup>2</sup>	Water Use, MGD 2001	Use Profile Percent	Water Use gpd	Indoor Water Use gpd
Single Family	448	318	0.14	87.50%	116	72
Multifamily	0	0	0.00	0.00%	NA	NA
Commercial	10	1,868	0.02	12.50%		
Industrial		0	0.00	0.00%		
Other		0	0.00	0.00%		
	0	0	0.00	0.00%		
	0	0	0.00	0.00%		
	0	0	0.00	0.00%		
Total	458		0.16	100.00%		
Total Water Purchased (produced) <sup>4</sup> =			0.17	MGD		
Unaccounted For Water (UFW) <sup>5</sup> =			8.0%	Percent	From 5 year BAWUA Survey average	
Estimated UFW for DSS Model =			8.0%	Percent	7% if actual is < 7%, otherwise = E25	
Water Produced for use in DSS Mode			0.17	MGD	Add UFW to Total Water Use	
Peaking Factor			2.05		Provided by Agency or SFPUC Water Master Plan (or NA	
Peaking Factor for DSS Model <sup>6</sup> =			2.1		If NA use default value of 1.6	

Blue cells are entered by modeler  
 Yellow cells are input to DSS Model

### NOTES

- Communities served include the town of Woodside and unincorporated areas of San Mateo County along Hwy 35 (Skyline Blvd) from Hwy 84 to Hwy 92 according to BAWUA survey
- Average gpd/a is based on a 12-month moving average through December 2001. Indoor use is based on average of 2 lowest consecutive months in the winter if meters read bimonthly, or single lowest month if meters read monthly.
- Number of single family accounts is from data provided by BAWUA for FY 2000-01.
- Total water Purchased (produced) calculated from Skyline County Water District data for Calendar Year 2001. BAWUA shows 0.2 MGD purchased by Skyline in FY 2001-02.
- Unaccounted for Water (UFW) is the percent difference between the total water purchased and the total water use.
- For reference see additional population estimates provided in population and employment estimates corresponding to service area table.
- Initial estimate based on census data for renter occupied units. For reference see table below that has 2000 census data for corresponding water service area city or cities.

2000 Census Data	
Average household size	2.74
Average household size of owner-occupied unit	2.80
Average household size of renter-occupied unit	2.27
Homeowner vacancy rate (percent)	0.50
Rental vacancy rate (percent)	2.60

8 - If unaccounted for water (UFW) is less than zero, assume 5.0%, else use calculated UFW.

9 - For purposes of calculating gpd/a in calendar year 2001, the number of accounts were taken from BAWUA data for FY 2001-02. The percentage of the total water consumption by single family users and commercial users in FY 2001-02 was applied to the monthly total usage in order to estimate monthly values for SF and Commercial categories and to calculate indoor use.

10 - For purposes of calculating % growth, the number of single family accounts were taken from BAWUA data for FY 2001-02 and 2000-01.

Data Prepared : 07-23-2003  
 Revised: January 28, 2004

By: N. Foged  
 By: N. Foged

### Reconcile agency account billing data and census data

Total Dwelling Units in Census 2000 for Town of Woodside						
	2000 Units	No. Buildings	Service Area Billing Accounts - Year 2000 <sup>3</sup>	Difference between billing and census data	Data Sources / Notes	
<b>Single family</b>						
1-detached	1,930	1,930				
1-attached	27	27				
Subtotal	1,957	1,957	448	-1,509	Housing Characteristics from U.S. Census Bureau	
<b>Multi family</b>						
2-units	20	10				
3-4 units	7	2				
5 to 9 units	5	1				
10-19 units	0	0				
20 or more units	0	0				
mobile homes	0	0				Meter for assumed 50 units per building
Subtotal	32	13	0	-13	No multifamily accounts in portion of Woodside that is within service area.	
MF Average =	2.46	units/building	#DIV/0!	units/account		
Total SF + MF units =	1,989					

Population and Household Size in Census 2000 for Town of Woodside					Estimated Residential Service Area Population		Data Sources / Notes	
	City of Woodside Census Population 2000	City of Woodside Estimated Population 2001			2001			
Total Population from Census data <sup>8</sup> =	5,352	5,375					Estimated growth from 2000 to 2001 (CA DOF Projections): 0.43%	
Subtract Institutionalized Population =	0	0					Estimated employment growth from 2000 to 2001 (ABAG Employment Projections): 0.00%	
Residential Population =	5,352	5,375					Water use for the institutionalized population is accounted for in nonresidential billing categories	
Avg. HHS <sup>7</sup> =	2.69						Residential population shown corresponds to the city or cities represented by Census data	
MF Pop @ MF HHS <sup>7</sup> =	2.27	73	0	1.4%			Percent of Population that is MF	
SF Pop =	5,279	5,302	1,210	98.6%			Percent of Population that is SF	
SF HHS <sup>7</sup> =	2.70							
Total			1,210	100.0%				
			-439				Difference in our estimate and average of 2000-2001 and 2001-2002 BAWUA Surveys	
			-439				Difference in our estimate and the average 2000-2001 and 2001-2002 BAWUA Surveys including institutionalized population	

### Estimate Service Area Dwelling Units for 2001

SF Res	448	Equals billing accounts in 2001 from cell C15
MF Res	0	Equals billing accounts in 2001 from cell C16 times average units per building in cell L30

### Population and Employment Estimates Corresponding to Service Area

	Population	Employment
2000 Census data for jurisdiction	5,352	NA
2000 ABAG (jurisdictional)	5,352	2,050
2005 ABAG Projection (jurisdictional)	5,500	2,050
2000 ABAG (subregional)	6,456	2,050
2005 ABAG Projection (subregional)	6,600	2,050
2000 Department of Finance Benchmark	5,352	From State of California Department of Finance (DOF) table E-4 as of 4-1-2000. Website www.dof.ca.gov
2001 Department of Finance Estimate	5,375	From State of California Department of Finance table E-4 as of 1-1-2001. Website www.dof.ca.gov
2002 Department of Finance Estimate	5,375	From State of California Department of Finance table E-4 as of 1-1-2002. Website www.dof.ca.gov
FY 2000-2001 BAWUA service area	1,649	NA
FY 2001-2002 BAWUA service area	1,649	NA
2001 Employment in Service Area (input to DSS Model) =		224

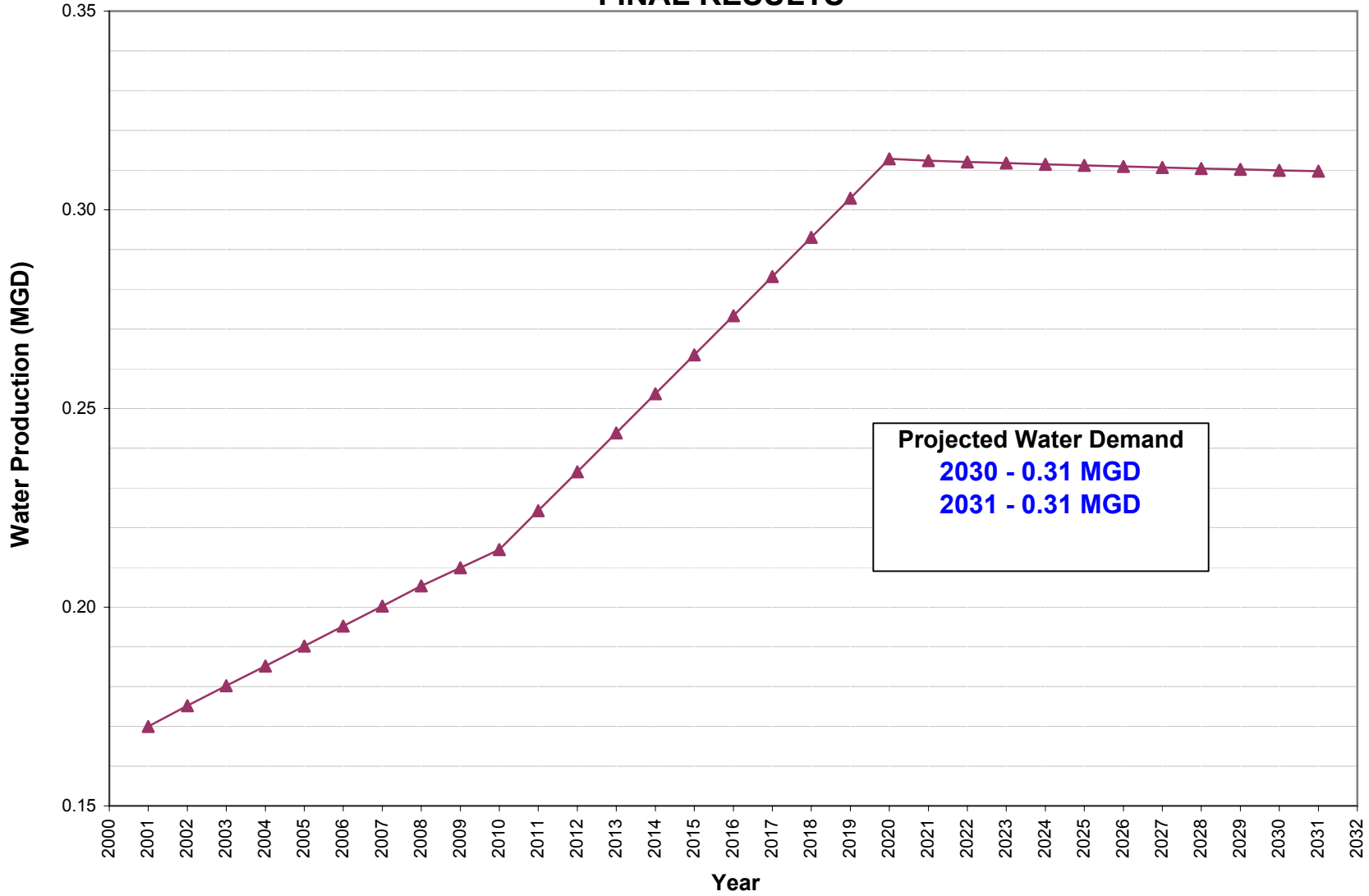
Service Area Employment is determined by the ratio of the 2000-2001 BAWUA service area population in Woodside (167 accounts x 3.5, from Agency comments) to the 2000 ABAG Jurisdictional Population and escalated to 2001 using the assumed growth rate in cell T39.

### Definitions / Abbreviations

ABAG	Association of Bay Area Governments	MF	multi family
BAWUA	Bay Area Water Users Association	MGD	million gallons per day
DSS	Decision Support System Model	No.	number
du	dwelling unit	Pop	population
FY	Fiscal Year	Res	residential
gpd/a	gallons per day / per account	SF	single family
gpd	gallons per day	UFW	unaccounted for water
HHS	household size		



# Skyline County WD Projected Water Demand (Planning Estimates) FINAL RESULTS



**Appendix C28**  
**Stanford University**

# Stanford University Water Service Area<sup>1</sup>

## DSS Input Sheet FINAL INPUT SHEET

### Base Year Average Use and Indoor Percentages by Billing Category for DSS Model<sup>2</sup>

Year	Student Housing		FS SFD Housing		FS MFD Housing		Academic		Athletics		Construction Projects		Comm Spaces		Medical School		CEF		Lake System	
	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor
2000	37665	70%	78678	36%	26784	62%	1812.061856	80%	75330	45%	50220	0%	75330	50%	87885	75%	552420	100%	1093911	0%

NOTE: Census data in this table is provided for reference only. For Stanford University, the data from the Final Water Conservation, Reuse, and Recycling Master Plan dated October 2003, is much more accurate as it was generated from campus data directly through the Housing Department and the Stanford water utilities department.

In order to use the most accurate and current data available, the DSS model includes information from this Stanford University Water Conservation, Reuse, and Recycling Master Plan report rather than the census data.

#### Data for DSS Model -- Base Year 2000

Category	Number of Accounts FY. 2000 <sup>3</sup>	Water Use 2000 gpd/a <sup>4</sup>	Water Use, MGD 2000	Use Profile Percent	Water Use gcd	Indoor Water Use gcd
Student Housing	18	37,665	0.68	18.81%	92	52
FS SFD Housing	6	78,678	0.47	13.10%	The water use gcd is combined	
FS MFD Housing	3	26,784	0.08	2.23%	for the student housing + faculty staff SF	
Academic	194	1,812	0.35	9.75%	+ faculty staff MF	
Athletics	1	75,330	0.08	2.09%		
Construction Project	1	50,220	0.05	1.39%		
Comm Spaces	1	75,330	0.08	2.09%		
Med School_Hospit	2	87,885	0.18	4.88%		
CEF	1	552,420	0.55	15.32%		
Lake System	1	1,093,911	1.09	30.35%		
Total	228		3.60	100.00%		
Total Water Purchased (produced) =			2.70	MGD	From 5 year BAWUA Survey average	
Unaccounted For Water (UFW) <sup>5</sup> =			6.6%	Percent	7% if actual is < 7%, otherwise = E25	
<b>Estimated UFW for DSS Model =</b>			7%	Percent	Add UFW to Total Water Use	
Water Produced for use in DSS Model			3.86	MGD		
Peaking Factor			1.58	Provided by Agency or SFPUC Water Master Plan (or NA)		
<b>Peaking Factor for DSS Model=</b>			1.58	If NA use default value of 1.6.		

  - Blue cells are entered by modeler

  - Yellow cells are input to DSS Model

#### NOTES

1 - Communities served includes all or portions of Stanford University according to BAWUA survey

2 - Average gpd/a is based on a 12-month moving average through December 2000. Indoor use is based on average of 2 lowest consecutive months in the winter if meters read bimonthly, or single lowest month if meters read monthly.

3 - Number of accounts is from data provided by water agency for this project (see worksheet with account data in this file)

4 - Total water Purchased (produced) taken from BAWUA for Fiscal Year 2001-2002 or agency if provided.

5 - Unaccounted for Water (UFW) is the percent difference between the total water purchased and the total water use.

6 - For reference see additional population estimates provided in population and employment estimates corresponding to service area table.

7 - For reference see table below that has 2000 census data for corresponding water service area city or cities. For Stanford, actual housing information in the DSS model was provided by Stanford Planning Department.

	2000 Census Data
Average household size	2.22
Average household size of owner-occupied unit	2.51
Average household size of renter-occupied unit	2.13
Homeowner vacancy rate (percent)	0.40
Rental vacancy rate (percent)	3.00

Data Prepared : September 7, 2003

Revised: March 2, 2004

By: M. Maddaus

#### Reconcile agency account billing data and census / Stanford University water master plan report data

##### Total Dwelling Units in Census 2000 and Water Conservation, Reuse and Recycling Master Plan for Stanford University

	CENSUS DATA			2003 WATER CONSERVATION, REUSE AND RECYCLING MASTER PLAN DATA		
	2000 Units	No. Buildings	Accounts - Year 2000 <sup>3</sup>	2000 Data Category	2000 Data	Data Sources / Notes
<b>Single family</b>						
1-detached	615	615		Gross Academic Square Footage	8,342,334	These numbers are
1-attached	319	319		Student Housing Beds	9,354	from Stanford University
Subtotal	934	934	NA	Faculty/Staff Housing Units	882	Water Conservation, Reuse, and Recycling Master Plan
<b>Multi family</b>				Medical School Occupants	4,082	October 2003 page 21
2-units	38	19		Total Population	19,666	
3-4 units	279	80				
5 to 9 units	562	80				
10-19 units	206	14				
20 or more units	1,242	25				
mobile homes	0	0				
Subtotal	2,327	218	NA			
MF Average =	10.7	units/building	NA			
Total SF + MF units =	3,261					

##### Population and Household Size in Census 2000 and Water Conservation, Reuse, and Recycling Master Plan data for Stanford University

	Stanford Census Population 2000	Stanford Estimated Population 2000	Estimated Residential Service Area Population 2000	Data Sources / Notes
Total Population from Census data <sup>6</sup> =	13,315	13315		Estimated growth from 2000 to 2001 (CA DOF Projections):
Subtract Institutionalized Population =	0	0		Estimated employment growth from 2000 to 2001 (ABAG Employment Projections):
Residential Population =	13,315	13,315		Water use for the institutionalized population is accounted for in nonresidential billing categories
Avg. HHS <sup>7</sup> =	4.08			Residential population shown corresponds to the city or cities represented by Census data
MF Pop @ MF HHS <sup>7</sup> =	2.13	4,957	4,957	37.2% Percent of Population that is MF
SF Pop =	8,358	8,358	8,358	62.8% Percent of Population that is SF
SF HHS <sup>7</sup> =	8.95			
Total			13,315	100.0%
			-11,385	Difference in our estimate and average of 2000-2001 and 2001-2002 BAWUA Surveys
			-11,385	Difference in our estimate and the average 2000-2001 and 2001-2002 BAWUA Surveys including institutionalized population

^^Census data for Stanford is for reference only. Actual data used provided

by Stanford Planning Department, a campus population of 19,666 in year 2000

which is also used in the 2003 Water Conservation, Reuse and Recycling Master Plan

19,666

5,034

Difference in Stanford Planning Department estimates of daytime population and 2000-2001 BAWUA Surveys

#### Estimate Service Area Dwelling Units for 2001

SF Res	934	Equals No. Buildings from cell M21 plus growth in accounts for one year from cell T38
MF Res	64	Equals billing accounts in 2000 from cell C17 times average units per building in cell L30 to minimize population difference in cell N47

#### Population and Employment Estimates Corresponding to Service Area

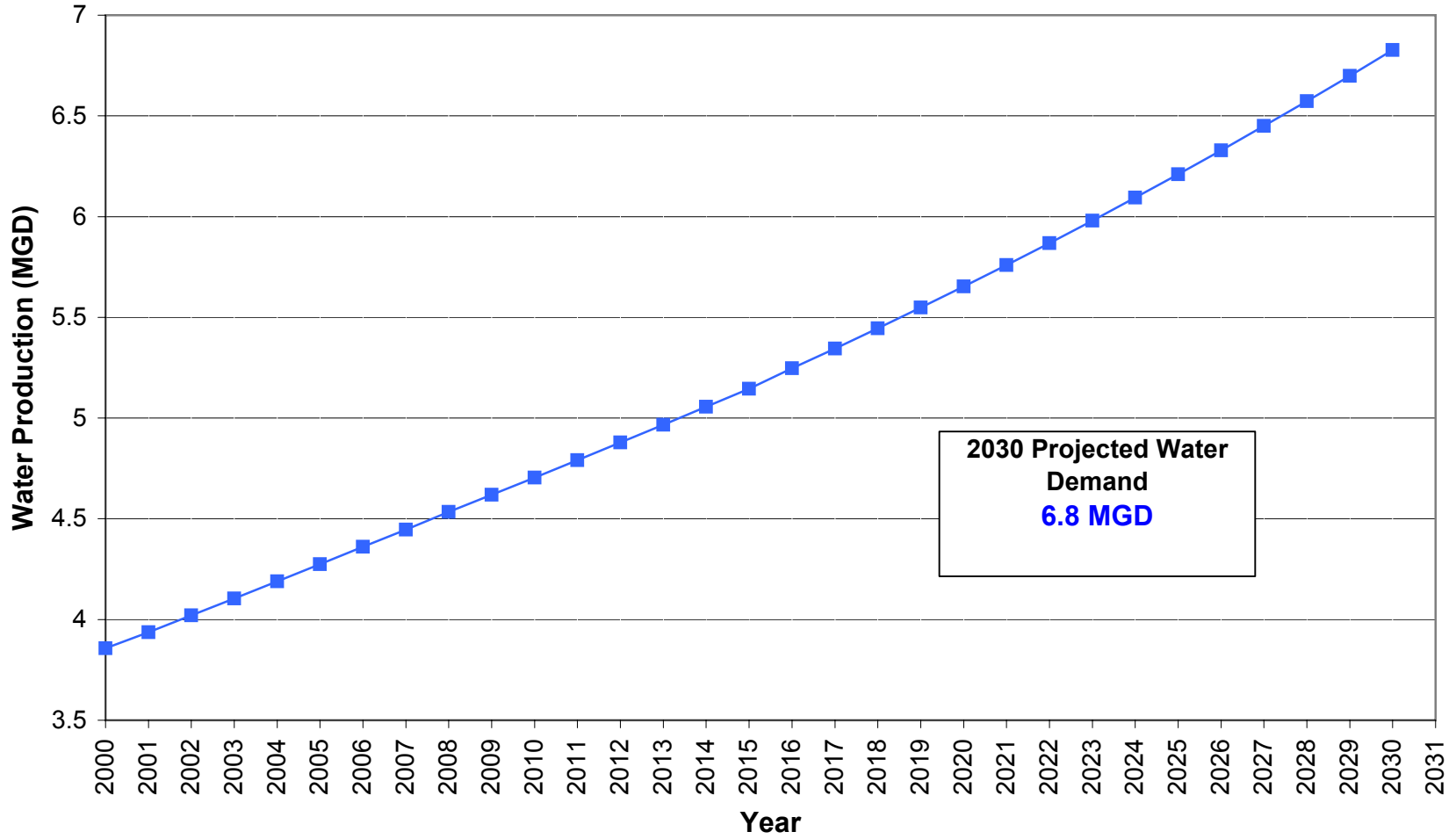
	Population	Employment
2000 Census data for jurisdiction	13,315	NA
2000 ABAG (jurisdictional)	NA	NA
2005 ABAG Projection (jurisdictional)	NA	NA
2000 ABAG (subregional)	NA	NA
2005 ABAG Projection (subregional)	NA	NA
2000 Department of Finance Benchmark	NA	From State of California Department of Finance (DOF) table E-4 as of 4-1-2000. Website www.dof.ca.gov
2001 Department of Finance Estimate	NA	From State of California Department of Finance table E-4 as of 1-1-2001. Website www.dof.ca.gov
2002 Department of Finance Estimate	NA	From State of California Department of Finance table E-4 as of 1-1-2002. Website www.dof.ca.gov
FY 2000-2001 BAWUA service area	24,700	NA
FY 2001-2002 BAWUA service area	24,700	NA
2001 Employment in Service Area (input to DSS Model) =		NA

Service Area Employment is determined by the ratio of the 2000-2001 BAWUA service area population to the 2000 ABAG Subregional Population and escalated to 2001 using the assumed growth rate in cell T39. (EXPLAIN SOURCE)

#### Definitions / Abbreviations

ABAG	Association of Bay Area Governments	MF	multi family
BAWUA	Bay Area Water Users Association	MGD	million gallons per day
DSS	Decision Support System Model	No.	number
du	dwelling unit	Pop	population
FY	Fiscal Year	Res	residential
gpd/a	gallons per day / per account	SF	single family
gpd	gallons per day	UFW	unaccounted for water
HHS	household size		

# Stanford University Projected Water Demand (Planning Estimate) FINAL RESULTS



**Appendix C29**  
**Sunnyvale, City of**

# City of Sunnyvale Water Service Area<sup>1</sup>

## DSS Input Sheet

### FINAL INPUT SHEET

**Base Year Average Use and Indoor Percentages by Billing Category for DSS Model<sup>2,9</sup>**

Year	Single Family		Multifamily		Commercial		Industrial		Fireline		Institutional		Landscape		Recycled					
	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average <sup>8</sup> , gpd/a	Indoor	Average <sup>8</sup> , gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average <sup>9</sup> , gpd/a	Indoor	Average <sup>9</sup> , gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor
2001	324	64%	3,532	77%	1,675	76%			22	24%	4,169	43%	2,133	0%	2,133	0%				

Data for DSS Model -- Base Year 2001						
Category	Number of Accounts FY. 2001 <sup>3</sup>	Water Use 2001 gpd/a <sup>4</sup>	Water Use, MGD 2001	Use Profile Percent	gpd	gpd
Single Family	24,564	324	7.96	34.74%	121	77
Multifamily	1,661	3,532	5.86	25.61%	89	69
Commercial	2,880	1,675	4.83	21.07%		
Industrial		0	0.00	0.00%		
Fireline	1,413	22	0.03	0.14%		
Institutional	171	4,169	0.71	3.11%		
Landscape	1,204	2,133	2.57	11.21%		
Recycled	445	2,133	0.95	4.14%		
Total	32,336		22.90	100.00%		
Total Water Purchased (produced) <sup>5</sup> =			22.24	MGD		
Unaccounted For Water (UFW) <sup>6</sup> =			8.3%	Percent		From 5 year BAWUA Survey average
Estimated UFW for DSS Model =			8.3%	Percent		7% if actual is < 7%, otherwise = E25
Water Produced for use in DSS Model			24.81	MGD		Add UFW to Total Water Use
Peaking Factor			1.75			Provided by Agency or SFPUC Water Master Plan (or NA)
Peaking Factor for DSS Model =			1.75			If NA use default value of 1.6.

Blue cells are entered by modeler  
 Yellow cells are input to DSS Model

**NOTES**

- Communities served includes City of Sunnyvale and unincorporated areas according to BAWUA survey
  - Average gpd/a is based on a 12-month moving average through December 2001. Indoor use is based on average of 2 lowest consecutive months in the winter if meters read bimonthly, or single lowest month if meters read monthly.
  - Number of accounts is from data provided by water agency for this project (see worksheet with account data in this file). Average of accounts billed for each month of the calendar year (because individual accounts are billed every two months the average must be multiplied two).
  - Total water Purchased (produced) taken from BAWUA for Fiscal Year 2001-2002.
  - Unaccounted for Water (UFW) is the percent difference between the total water purchased and the total water use. Minimum value: 7%. Five-year average from BAWUA survey used for Sunnyvale: 8.3%.
  - For reference see additional population estimates provided in population and employment estimates corresponding to service area table.
  - Initial estimate based on census data for renter occupied units. For reference see table below that has 2000 census data for corresponding water service area city or cities.
- | 2000 Census Data                               |      |
|--|------|
| Average household size                         | 2.49 |
| Average household size of owner-occupied unit  | 2.60 |
| Average household size of renter-occupied unit | 2.39 |
| Homeowner vacancy rate (percent)               | 0.50 |
| Rental vacancy rate (percent)                  | 1.30 |
- For billing purposes, industrial use was grouped with commercial use.
  - Recycled water data provided by City. Number of accounts for recycled water determined by assuming the same average water use per account and Landscape accounts. Growth in Recycled water use was assumed to reduce the Landscape accounts, because the Landscape category only includes those using potable water.

Data Prepared : 07-23-03 By: J. Hudson, N. Foged  
 Revised: 06-07-2004

**Reconcile agency account billing data and census data**

Total Dwelling Units in Census 2000 for City of Sunnyvale						
	2000 Units	No. Buildings	Service Area Billing Accounts - Year 2000 <sup>3</sup>	Difference between billing and census data	Data Sources / Notes	
<b>Single family</b>						
1-detached	21,006	21,006				
1-attached	3,924	3,924				
Subtotal	24,930	24,930	24,147	-783	Housing Characteristics from U.S. Census Bureau	
<b>Multi family</b>						
2-units	789	395				
3-4 units	4,119	1,177				
5 to 9 units	3,571	510				
10-19 units	4,171	278				
20 or more units	12,077	242				Meter for assumed 50 units per building
mobile homes	4,040	81				Meter for mobile home parks, assume 50 per park
Subtotal	28,767	2,682	1,668	-1,014	Must be more than one building on an MF meter.	
MF Average =	10.73	units/building	17	units/account		
Total SF + MF units =	53,697					

Population and Household Size in Census 2000 for City of Sunnyvale				Estimated Residential Service Area Population 2001	Data Sources / Notes
	City of Sunnyvale Census Population 2000	City of Sunnyvale Estimated Population 2001			
Total Population from Census data <sup>6</sup> =	131,760	132,600			Estimated growth from 2000 to 2001 (CA DOF Projections): 0.64%
Subtract Institutionalized Population =	499	502			Estimated employment growth from 2000 to 2001 (ABAG Employment Projections): 0.75%
Residential Population =	131,261	132,098			Water use for the institutionalized population is accounted for in nonresidential billing categories
Avg. HHS <sup>7</sup> =	2.44				Residential population shown corresponds to the city or cities represented by census data
MF Pop @ MF HHS <sup>7</sup> =	2.30	66,164	65,853	50.4%	Percent of Population that is MF
SF Pop =	65,097	65,512	65,512	49.6%	Percent of Population that is SF
SF HHS <sup>7</sup> =	2.61				
Total			131,365	100.0%	
			-515		Difference in our estimate and average of 2000-2001 and 2001-2002 BAWUA Surveys
			-12		Difference in our estimate and the average 2000-2001 and 2001-2002 BAWUA Surveys including institutionalized population

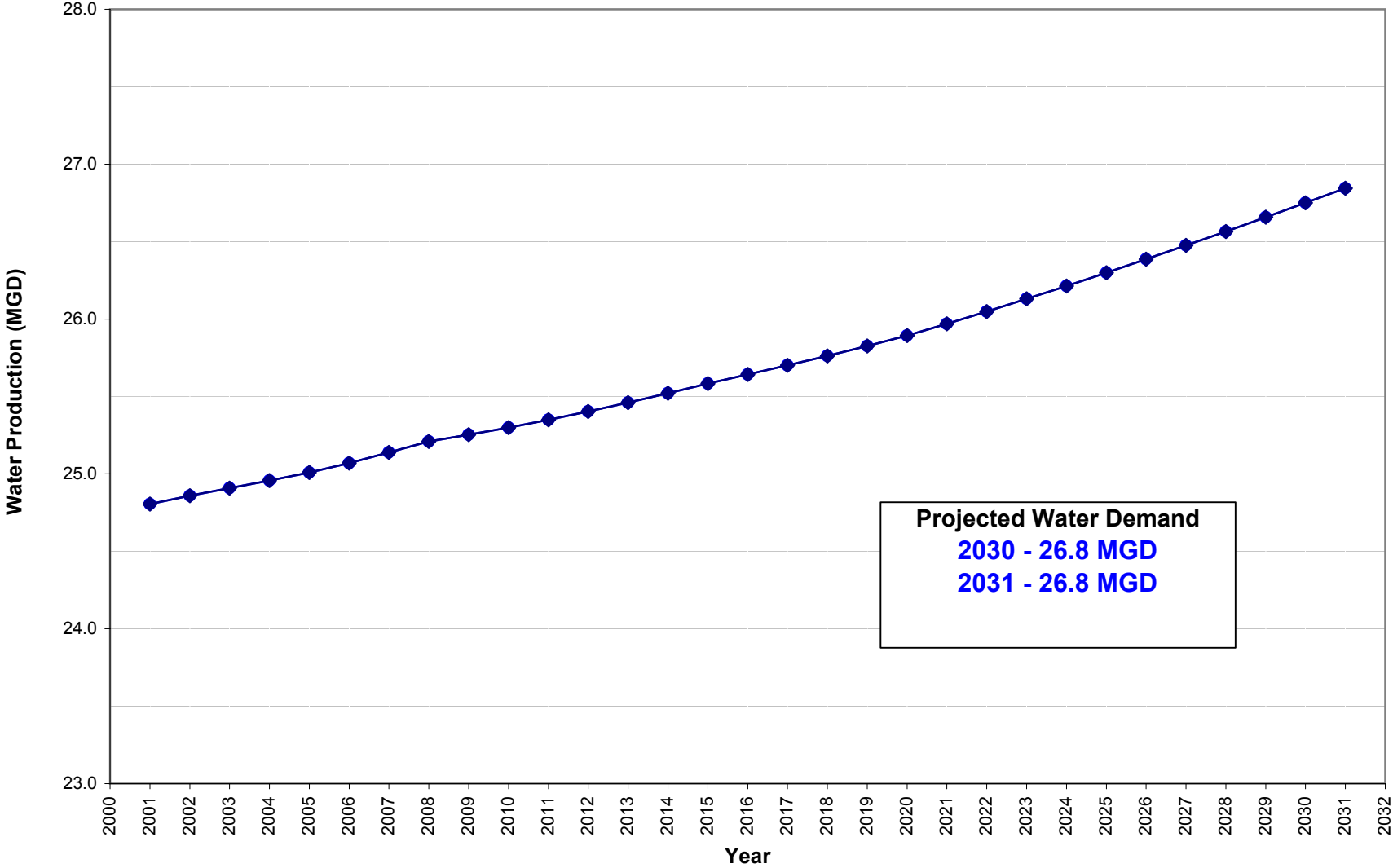
Estimate Service Area Dwelling Units for 2001  
 SF Res 25,089 Number of SF buildings (Census, 2000) escalated to 2001 using growth rate (cell T38)  
 MF Res 28,632 Equals billing accounts in 2001 (cell C16) times average units per account (cell N30)

Population and Employment Estimates Corresponding to Service Area		
	Population	Employment
2000 Census data for jurisdiction	131,760	NA
2000 ABAG (jurisdictional)	131,760	124,540
2005 ABAG Projection (jurisdictional)	136,200	129,220
2000 ABAG (subregional)	133,086	124,540
2005 ABAG Projection (subregional)	137,000	129,220
2000 Department of Finance Benchmark	131,760	From State of California Department of Finance (DOF) table E-4 as of 4-1-2000. Website www.dof.ca.gov
2001 Department of Finance Estimate	132,600	From State of California Department of Finance table E-4 as of 1-1-2001. Website www.dof.ca.gov
2002 Department of Finance Estimate	132,600	From State of California Department of Finance table E-4 as of 1-1-2002. Website www.dof.ca.gov
FY 2000-2001 BAWUA service area	131,760	NA
FY 2001-2002 BAWUA service area	132,000	NA
2001 Employment in Service Area (input to DSS Model) =		125,476

Service Area Employment is determined by the ratio of the 2000-2001 BAWUA service area population to the 2000 ABAG Subregional Population and escalated to 2001 using the assumed growth rate in cell T39. (EXPLAIN SOURCE)

Definitions / Abbreviations			
ABAG	Association of Bay Area Governments	MF	multi family
BAWUA	Bay Area Water Users Association	MGD	million gallons per day
DSS	Decision Support System Model	No.	number
du	dwelling unit	Pop	population
FY	Fiscal Year	Res	residential
gpd/a	gallons per day / per account	SF	single family
gpd	gallons per day	UFW	unaccounted for water
HHS	household size		

**City of Sunnyvale Projected Water Demand (Planning Estimates)  
FINAL RESULTS**



**Appendix C30**  
**Westborough Water District**



# Westborough County Water District Service Area<sup>1</sup>, DSS Input Sheet, FINAL INPUT SHEET

## Base Year Average Use and Indoor Percentages by Billing Category for DSS Model<sup>2</sup>

Year	Single Family		Multifamily		Commercial		Industrial		Irrigation									
	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor
2001	195	92%	10668	89%	1269	89%			1350	15%								

### Data for DSS Model -- Base Year 2001

Category	Number of Accounts FY. 2001 <sup>3</sup>	Water Use 2001 gpd/a <sup>4</sup>	Water Use, MGD 2001	Use Profile Percent	Water Use gpd	Indoor Water Use gpd
Single Family	3,336	195	0.65	70.10%	73	67
Multifamily	6	10,668	0.06	6.90%	61	55
Commercial	76	1,269	0.10	10.35%		
Industrial		0	0.00	0.00%		
Irrigation	87	1,350	0.12	12.66%		
	0	0	0.00	0.00%		
	0	0	0.00	0.00%		
	0	0	0.00	0.00%		
Total	3,505		0.93	100.00%		
Total Water Purchased (produced) <sup>5</sup> =			1.02 MGD			
Unaccounted For Water (UFW) <sup>6</sup> =			5.4% Percent			
<b>Estimated UFW for DSS Model =</b>			7% Percent			
Water Produced for use in DSS Model			0.99 MGD			
Peaking Factor			3.68 Provided by Agency or SFPUC Water Master Plan (or NA)			
Peaking Factor for DSS Model =			3.7 If NA use default value of 1.6.			

Blue cells are entered by modeler  
Yellow cells are input to DSS Model

#### NOTES

1 - Westborough County Water District serves the Westborough area within South San Francisco.

2 - Average gpd/a is based on a 12-month moving average through December 2001. Indoor use is based on average of 2 lowest consecutive months in the winter (meters read bimonthly).

3 - Total number of residential accounts is from data provided by water agency for this project (see worksheet with account data in this file). Number of multi-family accounts was obtained from data in the Urban Water Management Plan, 2000 (UWMP).

4 - Total water Purchased (produced) taken from BAWUA for Fiscal Year 2001-2002.

5 - Unaccounted for Water (UFW) is the percent difference between the total water purchased and the total water use.

6 - The portion of the South San Francisco population that is within the service area is assumed to be equal to the BAWUA 2000-2001 service area population.

7 - Initial estimate based on census data for renter occupied units. However it was determined that the household sizes in the Westborough area are smaller than the average for South San Francisco.

#### 2000 Census Data

Average household size	3.05
Average household size of owner-occupied unit	3.02
Average household size of renter-occupied unit	3.11
Homeowner vacancy rate (percent)	0.70
Rental vacancy rate (percent)	1.30

8 - Unaccounted for water assumed equal to the 5-yr average from the BAWUA survey data if greater than 7%, otherwise a minimum of 7% was used.

9 - Based on information in the UWMP, it was assumed that 6 of the commercial accounts were multifamily residential (containing approx. 550 apartments) and consumed 1/3 of the total water use for the commercial accounts. The total commercial accounts and water consumption reported by the agency were adjusted accordingly.

Data Prepared : July 23, 2003

By: N. Foged, J Hudson

Revised: September 5, 2003

### Reconcile agency account billing data and census data

Total Dwelling Units in Census 2000 for the portion of South San Francisco in Westborough County Water District				Service Area Billing Accounts - Year 2000 <sup>3</sup>	Difference between billing and census data	Data Sources / Notes
Single family	2000 Units	No. Buildings				
1-detached	3,340	3,340				
1-attached	0	0				
Subtotal	3,340	3,340		3,340		0 Assume each residential account corresponds to one single family detached unit in the Census (2000)
<b>Multi family</b>						
2-units	0	0				
3-4 units	0	0				
5 to 9 units	0	0				
10-19 units	0	0				
20 or more units	550	6				The number of multi-family units is assumed to be 550 and the number of accounts servicing these units is 6 (Westborough Water District Urban Water Management Plan, 2000).
mobile homes	0	0				
Subtotal	550	6		6		0 Must be more than one building on an MF meter. (ONLY USE THIS NOTE IF BUILDINGS>METERS) Units include all multi-family dwellings plus the "1-attached" dwellings.
MF Average =	91.7	units/building			91.7	units/account
Total SF + MF units =	3,890					

### Population and Household Size in Census 2000 for South San Francisco

	The Portion of South San Francisco within Westborough CWD		Estimated Residential Service Area Population 2001		Data Sources / Notes
	Census Population 2000	Estimated Population 2001			
Total Population from Census data <sup>6</sup> =	9,990	10,047			Estimated growth from 2000 to 2001 (CA DOF Projections): 0.57%
Subtract Institutionalized Population =	24	25			Estimated employment growth from 2000 to 2001 (ABAG Employment Projections): 0.80%
Residential Population =	9,966	10,023			Water use for the institutionalized population is accounted for in nonresidential billing categories
Avg. HHS <sup>7</sup> =	2.56				Residential population shown corresponds to the city or cities represented by Census data
MF Pop @ MF HHS <sup>7</sup> =	1,90	1,045	1,051	1,045	10.5% Percent of Population that is MF
SF Pop =	8,921	8,972	8,972	8,972	89.5% Percent of Population that is SF
SF HHS <sup>7</sup> =	2.67				
Total			10,017	100.0%	
			27		Difference in our estimate and average of 2000-2001 and 2001-2002 BAWUA Surveys
			51		Difference in our estimate and the average 2000-2001 and 2001-2002 BAWUA Surveys including institutionalized population

#### Estimate Service Area Dwelling Units for 2001

SF Res	3,359	Equals No. Buildings from cell M21 plus growth in accounts for one year from cell T38
MF Res	550	Equals billing accounts in 2001 from cell C16 times average units per account in cell N30 (or average units per building in cell L30 to minimize population difference in cell N47)

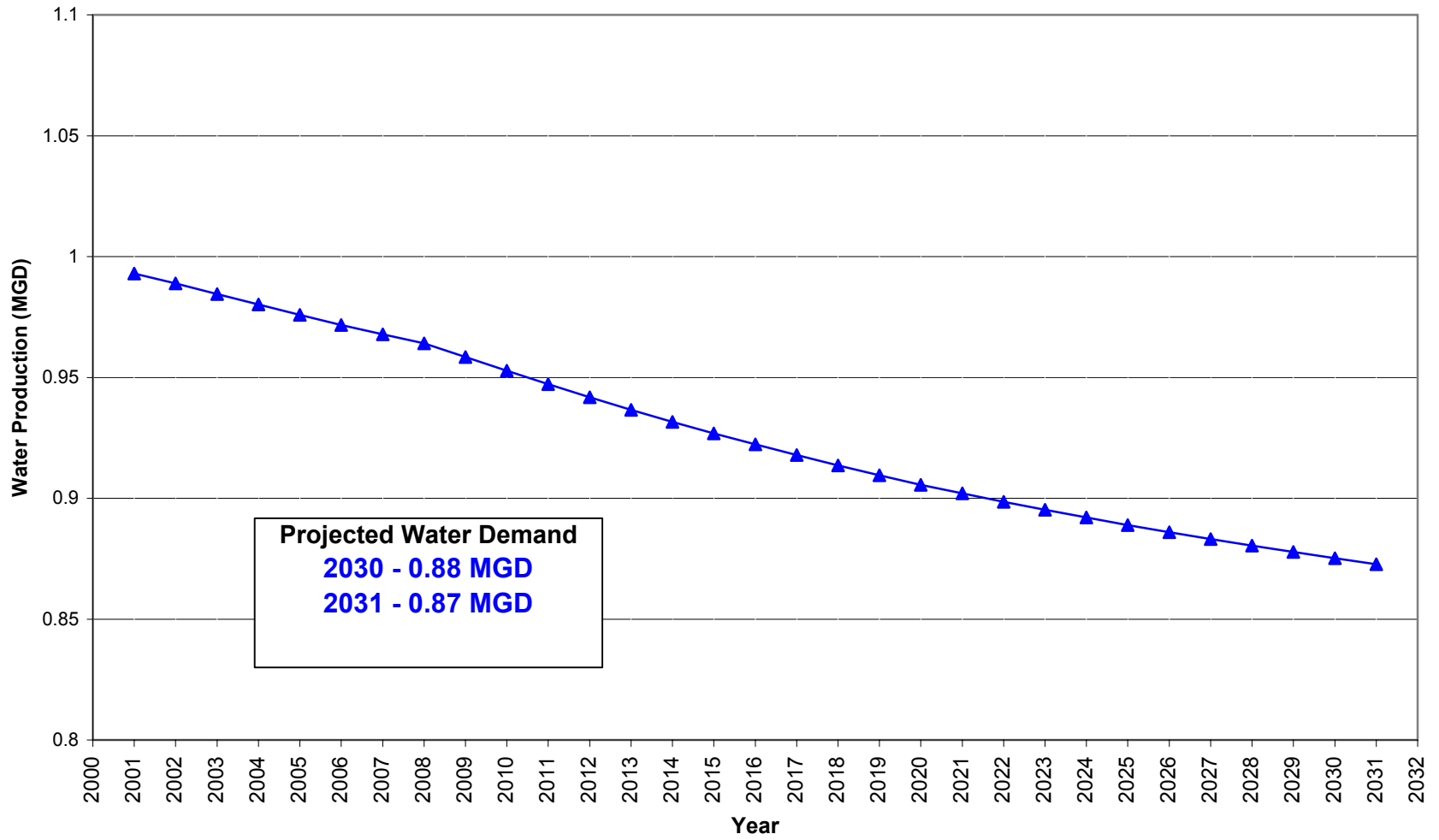
#### Population and Employment Estimates Corresponding to Service Area

	Population	Employment
2000 Census data for jurisdiction	9,990	NA
2000 ABAG (jurisdictional)	60,552	53,190
2005 ABAG Projection (jurisdictional)	62,600	55,330
2000 ABAG (subregional)	60,732	53,230
2005 ABAG Projection (subregional)	62,800	55,370
2000 Department of Finance Benchmark	60,552	From State of California Department of Finance (DOF) table E-4 as of 4-1-2000. Website www.dof.ca.gov
2001 Department of Finance Estimate	60,900	From State of California Department of Finance table E-4 as of 1-1-2001. Website www.dof.ca.gov
2002 Department of Finance Estimate	60,800	From State of California Department of Finance table E-4 as of 1-1-2002. Website www.dof.ca.gov
FY 2000-2001 BAWUA service area	9,990	NA
FY 2001-2002 BAWUA service area	9,990	NA
2001 Employment in Service Area (input to DSS Model) =		1,610
		Assume 3% of South San Francisco 2000 ABAG subregional employment (escalated to 2001 using the assumed growth rate in cell T39) is found in Westborough CWD commercial sectors

### Definitions / Abbreviations

ABAG	Association of Bay Area Governments	MF	multi family
BAWUA	Bay Area Water Users Association	MGD	million gallons per day
DSS	Decision Support System Model	No.	number
du	dwelling unit	Pop	population
FY	Fiscal Year	Res	residential
gpd/a	gallons per day / per account	SF	single family
gpd	gallons per day	UFW	unaccounted for water
HHS	household size		

## Westborough Water District Projected Water Demand (Planning Estimates) FINAL RESULTS



**Appendix D**  
**Summary of SFPUC Wholesale Customer Recycled Water Information**

**Summary of SFPUC Wholesale Customer Recycled Water Information**

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This Appendix summarizes the recycled water use reported by the SFPUC wholesale customers and whether it was incorporated into the DSS model for demand projections. Several wholesale customers included recycled water use in their demand projections, including recycled water used at wastewater treatment plants. In general, recycled water use was included in total demand projections for wholesale customers with approved and funded recycled water projects, because recycled water use is a demand that would otherwise be served by potable supply.

The following table indicates which wholesale customers have wastewater treatment plants in their service area, how much recycled water is used by the plant and whether or not this demand was incorporated into the DSS model demand projections. Additionally, the table indicates which wholesale customers incorporated future recycled water projects in their demand projections.

**Appendix D**

**Summary of SFPUC Wholesale Customer Recycled Water Information**

SFPUC Wholesale Customer	Recycled Water Use at Treatment Plant and other facility?	Included in DSS Demands for Base Year? Y/N/NA	Other Recycled Water Projects Included in DSS Demands for Base Year? Y/N	Future Recycled Water Projects Included in DSS Demands (2030)? Y/N
ACWD	Union Sanitary District–2.5 MGD for washdown and process operation.	No	No	No
City of Brisbane	No wastewater plant in service area. Wastewater treatment provided by SFPUC.	NA	No	No
City of Burlingame	City of Burlingame uses 250,000 gpd at the wastewater treatment plant.	No	No	No
CWS–Bear Gulch	No wastewater plant in service area. Wastewater treatment service provided by South Bayside System Authority.	NA	No	No
CWS–Mid Pen	No wastewater plant in service area. Wastewater treatment service provided by City of San Mateo.	NA	No	No
CWS–South San Francisco District	No wastewater plant in service area. Wastewater treatment provided by South San Francisco/San Bruno Water Quality Control Plant located in San Bruno.	NA	No	No
Coastside County Water District	No wastewater plant in service area. Wastewater treatment service provided by Half Moon Bay.	NA	No	No
City of Daly City	1 MGD.	No	No	No
City of East Palo Alto	No wastewater plant in service area. Wastewater treatment service provided by Palo Alto Regional Water Quality Control Plant.	NA	No	No
Estero MID	No wastewater plant in service area. Wastewater treatment service provided by City of San Mateo.	NA	No	No
Guadalupe Valley MID	No wastewater plant in service area. Wastewater treatment service provided by SFPUC.	NA	No	No
City of Hayward	The City of Hayward Water Pollution Control Facility discharges effluent to San Francisco Bay through the East Bay Dischargers Authority discharge system. Hayward’s Facility provides 0.2 MGD to Skywest Golf Course.	Yes	No	No
Town of Hillsborough	No wastewater plant in service area. Wastewater treatment provided by City of Burlingame.	NA	No	No
Los Trancos County Water District	No wastewater plant in service area. Wastewater treatment provided by South Bayside System Authority and local septic tanks.	NA	No	No

**Appendix D**

**Summary of SFPUC Wholesale Customer Recycled Water Information**

SFPUC Wholesale Customer	Recycled Water Use at Treatment Plant and other facility?	Included in DSS Demands for Base Year? Y/N/NA	Other Recycled Water Projects Included in DSS Demands for Base Year? Y/N	Future Recycled Water Projects Included in DSS Demands (2030)? Y/N
City of Menlo Park	No wastewater plant in service area. Wastewater treatment provided by South Bayside System Authority.	NA	No	No
Mid-Peninsula Water District	No wastewater plant in service area. Wastewater treatment provided by South Bayside System Authority.	NA	No	No
City of Millbrae	In 2003: July 588.2 HCF Aug 575.4 HCF Sept. 244.1 HCF Oct. 257.3 HCF	No	No	No
City of Milpitas	No wastewater plant in service area. Wastewater treatment service provided by San Jose/Santa Clara Water Pollution Control Plant.	NA	Yes	Yes
City of Mountain View	No wastewater plant in service area. Wastewater treatment service provided by Palo Alto Regional Water Quality Control Plant.	NA	No	No
North Coast County Water District	City of Pacifica provides wastewater service.	NA	No	No
City of Palo Alto	Palo Alto Regional Water Quality Control Plant uses 1 MGD for scrubbers, equipment cooling, landscape irrigation, etc.	Yes	Yes	Yes
Purissima Hills Water District	No wastewater plant in service area. Wastewater treatment provided by South Bayside System Authority.	NA	No	No
City of Redwood City	South Bayside System Authority in 2003 used 21 mg for landscape impoundment and 28,000-gallon truck fill station.	No	No	Yes
City of San Bruno	South San Francisco/San Bruno Water Quality Control Plant.	No	No	No
City of San Jose (portion of north San Jose)	San Jose/Santa Clara Water Pollution Control Plant. Their treatment plant uses 2 MGD but it is not quite relevant to the area served by SFPUC.	No	No	No
City of Santa Clara	No wastewater plant in service area. Wastewater treatment service provided by San Jose/Santa Clara Water Pollution Control Plant.	NA	Yes	Yes
Skyline County Water District	No wastewater plant in service area. Skyline County Water District residents have septic systems.	NA	No	No

**Appendix D**  
**Summary of SFPUC Wholesale Customer Recycled Water Information**

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<b>SFPUC Wholesale Customer</b>	<b>Recycled Water Use at Treatment Plant and other facility?</b>	<b>Included in DSS Demands for Base Year? Y/N/NA</b>	<b>Other Recycled Water Projects Included in DSS Demands for Base Year? Y/N</b>	<b>Future Recycled Water Projects Included in DSS Demands (2030)? Y/N</b>
Stanford University	No wastewater plant in service area. Wastewater treatment plant service provided by Palo Alto Regional Water Quality Control Plant.	NA	No	No
City of Sunnyvale	City of Sunnyvale treatment plant uses 850 acre-feet/year.	Yes	Yes	Yes
Westborough Water District	No wastewater treatment plant in service area. South San Francisco/San Bruno Water Quality Control Plant provides wastewater treatment service.	NA	No	No

CWS - California Water Service  
 MGD - million gallons per day  
 MID - Municipal Improvement District  
 NA - Not Applicable