

## **Chapter 2 – Service Area Characteristics**

### **2.1 Introduction**

A variety of demographic factors may affect water use, including current and projected population, climate, population density, and the mix of customer types. This chapter provides information on Redwood City's service area characteristics, including a description of the service area, its population and climate. The mix of customer types and their past, current, and project water use is provided in Chapter 5.

### **2.2 Description of Service Area**

The Redwood City water distribution system provides water retail services to Redwood City and portions of San Mateo County outside the corporate limits, including Cañada College and the Emerald Lake Hills area. The City's service area presently covers approximately 14 square miles. Service is provided to areas between Highways 280 and 101, between Whipple Avenue and Marsh Road in the area east of Highway 101, and in the non-contiguous Redwood Shores area. The City's service area varies in elevation, from about mean sea level along Seaport Boulevard to over 800 feet in the Emerald Lake Hills area.

### **2.3 Climate**

The basic controlling factor in the climate of northern California is the semi-permanent atmospheric high pressure cell (Pacific High) over the eastern Pacific Ocean. During the summer, the Pacific High is well established and usually deflects Pacific storms to the north of California. During the winter, the Pacific High weakens and shifts farther to the south. As a result, summers are generally clear and dry, while winters are cool with moderate rainfall. During the spring and summer, a low layer of stratus clouds frequently extends inland from the coast in the evening, night, and morning. A sea breeze is common during the daytime. The predominant wind direction at Redwood City is northwesterly, due to the winds west of the Pacific coastline drawn into the interior through the Golden Gate and over the lower portion of the San Francisco peninsula.

Table 2-1 provides climate data for Redwood City, including average maximum and minimum temperatures, rainfall, evapotranspiration (ET<sub>o</sub>), and net irrigation requirement (NIR). The average annual precipitation in Redwood City is approximately 20 inches and is generally confined to the "wet" season from late October to early May. A significant portion of Redwood City's water demand originates from irrigation of landscapes, and irrigation demands are greatest from May through September. A common measure of this climatic demand is called evapotranspiration or ET<sub>o</sub>. This is the amount of water used by a standard plant placed in Redwood City's climate, and is quantified as a depth of water per unit time (e.g., 0.25 inches per day, two inches per month, or 49.8 inches per year). Most plant species use water at a rate less than ET<sub>o</sub>, but studies indicate they use a proportional amount that is higher in the summer and low or non-existent in the winter. Characteristically, the rain arrives when ET<sub>o</sub> is relatively low and therefore is ineffective in offsetting much of the water demand in urban landscapes. Soil water storage for most landscape plants is relatively low, which further reduces rainfall effectiveness. Irrigation water must make up for most of the ET<sub>o</sub>-driven demand.

Net Irrigation Requirement (NIR) is a measurement of the integration of the ETo, the plant factor, and rainfall. It is important to understanding that about a third of the City's water sales is used for irrigation. It is a measure (typically in inches) of how much irrigation water is required for turf or lawn species maintained in the Redwood City environment.

<b>Table 2-1 Redwood City Climate</b>					
<b>Month</b>	<b>Max. Temp (F)</b>	<b>Min. Temp (F)</b>	<b>Rainfall (in.)</b>	<b>ETo (in.)</b>	<b>NIR (in.)</b>
Jan	58.0	39.2	4.29	1.65	0.55
Feb	61.8	41.9	3.60	2.13	0.90
Mar	65.5	43.6	2.81	3.44	1.99
Apr	69.9	45.2	1.24	4.64	3.73
May	74.7	48.6	0.43	5.96	5.55
Jun	79.6	52.1	0.11	6.62	6.51
Jul	82.4	54.5	0.02	7.00	6.98
Aug	82.0	54.3	0.06	6.29	6.23
Sep	80.8	52.9	0.17	5.00	4.87
Oct	74.6	48.9	0.99	3.52	3.04
Nov	65.3	43.5	2.32	2.07	1.18
Dec	58.7	40.1	3.80	1.51	0.55
Annual	71.2	47.1	19.82	49.83	42.10

NOAA Redwood City weather station No. 047339.  
 Period of Record: 1/ 1/1931 to 7/1/2005.  
 ET equals evapotranspiration calculated using the Hargreaves method based on extraterrestrial radiation and temperature values. NIR equals ET minus effective precipitation. Effective precipitation equals the amount rain effective in offsetting ET assuming soil moisture storage of 0.44 inches. Over the period, 39% of rainfall is effective rainfall.

## **2.4 Population and Demographics**

As discussed in Chapter 1, the population and demographics data reported in this section has been coordinated with the City Community Development Services Department and its General Plan update process. Redwood City is largely built-out and is expected to experience only modest growth over the next 25 years. Based on future developments identified by the Community Development Services Department, Redwood City population is expected to grow by 9.9 percent between 2000 and 2030, as shown in Table 2-2.<sup>1</sup> There are 68 single-family lots which are undeveloped within the City limits and most future growth is expected to be associated with new and infill large multiple unit developments. Additionally, there are approximately 250-300 undeveloped single-family parcels in the unincorporated (San Mateo County) portion of the City's service area. The density of new residential development will be higher than the dwellings or other development they replace. While these new developments will be

<sup>1</sup>The population estimate derived from projects identified by the City Community Development Services Department results in a lower population estimate than that prepared by the Association of Bay Area Governments (ABAG) in 2005. ABAG estimates the City population to increase by 25.1 percent between 2000 and 2030. The City believes that the population estimates derived by actual land use planning analysis and information is more accurate than the macro population models used by ABAG for this application.

more water-efficient because of regulatory requirements, the higher density of development is expected to result in more water usage per acre of land.

Employment in Redwood City decreased significantly between 2000 and 2005, largely related to office space vacated by technology companies. Employment is expected to rebound to year 2000 levels by around 2015. After 2015, employment is expected to increase significantly.

<b>Table 2-2 Housing Units, Population and Employment</b>							
	<b>2000</b>	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Single Family Residences	18,365	18,622	18,655	18,675	18,713	18,772	18,857
Cumulative Change from 2000		257	290	310	348	407	492
% Change from 2000		1.4%	1.6%	1.7%	1.9%	2.2%	2.7%
Multiple Family Units	11,242	11,378	12,248	13,251	14,174	14,874	15,738
Cumulative Change from 2000		136	1,006	2,009	2,932	3,632	4,496
% Change from 2000		1.2%	8.9%	17.9%	26.1%	32.3%	40.0%
Population – Service Area <sup>(1)</sup>	82,088	83,093	85,098	87,359	89,492	91,195	93,329
Cumulative Change from 2000		1,004	3,010	5,271	7,404	9,107	11,241
% Change from 2000		1.2%	3.7%	6.4%	9.0%	11.1%	13.7%
Total Employment – City <sup>(2)</sup>	57,980	50,020	55,460	57,850	61,290	65,320	69,980
Cumulative Change from 2000		-7,960	-2,520	-130	3,310	7,340	12,000
% Change from 2000		-13.7%	-4.3%	-0.2%	5.7%	12.7%	20.7%
<p>(1) Population for 2000 is based on the 2000 U.S. Census. It includes the population within the City limits (75,402) plus an estimate for outside City customers (2,352 single family accounts * 2.74 persons per home + 93 multiple family units * 2.6 persons per unit). Future year projections are based on multiplying new dwelling units identified by the City Community Development Services Department by person per unit factors.</p> <p>(2) Employment projections made by the Association of Bay Area Governments in 2005 for the Redwood City Jurisdictional Boundary.</p>							

Assumed growth in housing stock (and, in turn, increased demand for potable water) will be driven by development of high-density multi-family units, primarily in the Downtown core and along adjacent, major transit corridors. The prior methodology of projecting future water demand utilizing specific development projects – whether anticipated or in the approval process – has been replaced with an area-based projection, and is tied primarily to recent policy discussions about the pending Downtown Specific Plan. Table 2-3 summarizes projected changes in housing units in five-year increments. The data supporting the table was prepared in close collaboration with City Planning and Redevelopment staff.

**Table 2-3**  
**Assumptions for Growth in Multi-Family Housing Units**  
(In number of housing units)

<b>Description of Units</b>	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Pending Downtown Specific Plan housing units (Scenario 'C')	0	658	1,316	2,100	2,800	3,664
Accessory Dwelling Units (General Plan Housing Element)	50	100	150	200	200	200
50-foot Wide Duplex Lots	32	66	100	134	134	134
Transit Corridors (Housing units in Mixed-use districts)	54	182	443	498	498	498
<b>Total Projected New Housing Units</b>	<b>136</b>	<b>1,006</b>	<b>2,009</b>	<b>2,932</b>	<b>3,632</b>	<b>4,496</b>