CITY OF MOUNTAIN VIEW
2015 URBAN WATER MANAGEMENT PLAN

PUBLIC DRAFT

May 10, 2016

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KEY ACRONYMS AND ABBREVIATIONS

AF—Acre-foot (of water)
AFY—Acre-feet per year
AMI—Advanced Metering Infrastructure
AMR—Automated Meter Reading
BARDP—Bay Area Regional Desalination Project
BAWSCA—Bay Area Water Supply and Conservation Agency
Cal Water—California Water Service Company
ccf—Hundred cubic feet (of water)
CII—Commercial, institutional and industrial
CUWCC—California Urban Water Council
CVP—Federal Central Valley Project
DSS model—Demand Side Management Decision Support System
DWR—California Department of Water Resources
ET—evapotranspiration
ft—foot (measurement)
ft bgs—Feet below the ground surface
GPCD—Gallons per capita per day
gpm—Gallons per minute
HGL—Hydraulic grade line
mgd—Million gallons per day
ppm—Parts per million
psi—Pounds per square inch
Regional System—San Francisco Hetch Hetchy Regional Water System
RWQCP—Palo Alto Regional Water Quality Control Plant
SCVWD—Santa Clara Valley Water District
SFPUC—San Francisco Public Utilities Commission
Shortage Plan—Mountain View's Water Shortage Contingency Plan
State Water Board—California State Water Resources Control Board
SWP—California State Water Project
TDS—Total dissolved solids
UWMP—Urban Water Management Plan
Water Code—California Water Code
WSA—Water Supply Assessment
WSIP—SFPUC Water System Improvement Program

1. INTRODUCTION

1.1 Overview and Purpose

This Urban Water Management Plan (UWMP) is a long-term analysis for the City of Mountain View (City or Mountain View) that compares available water supply to historical, current, and projected water demand. The UWMP is a link between land use and water supply planning developed to ensure that sufficient water is available to meet the needs of Mountain View's existing and future water customers.

The UWMP is also a foundational document for project-specific Water Supply Assessments (WSAs), which evaluate whether sufficient water is available for a particular development project. WSAs are prepared on a project-by-project basis as part of the environmental review process. Chapter 8 provides guidance to consultants preparing WSAs for projects within Mountain View's water service area, including instructions for analyzing supply availability for projects not included in this UWMP.

1.2 Requirements

The California Water Code (Water Code) requires that all urban water suppliers serving more than 3,000 customers (or 3,000 acre-feet of water per year) prepare and adopt a UWMP every five years. The City's 2010 UWMP was adopted in 2011, and the next update is scheduled for 2021.

The various requirements of a UWMP are stated in Water Code Division 6, Part 2.6 (referred to as the Urban Water Management Planning Act)—included as Appendix A. Several changes to the UWMP Act have occurred since adoption of the City's 2010 UWMP. A detailed summary of these changes is provided in Appendix B.

The California Department of Water Resources (DWR) outlines submittal requirements in their *Guidebook for Urban Water Suppliers* (DWR, 2016). Mountain View's 2015 UWMP was prepared in accordance with the Water Code and submitted pursuant to DWR's Guidebook. Information is presented in this UWMP in a slightly different order than was suggested by the DWR Guidebook, based on the unique characteristics of Mountain View's water management topics and challenges. A checklist cross-referencing information to the UWMP Act and DWR's Guidebook is provided in Appendix C, followed by the completed DWR Guidebook tables in Appendix D.

1.3 Report Format

Mountain View's 2015 UWMP is organized as follows.

Chapter 1 *Introduction – Overview, requirements, and preparation of the 2015 UWMP.*

Chapter 2 *Service Area – Description of Mountain View's population, employment, and land uses and a summary of local weather patterns.*

Chapter 3 *Water System Overview – Overview of the water system facilities owned and operated by the City of Mountain View.*

Chapter 4 *Water Demand – Review of current, historical and projected water demand within the City's water service area, and an analysis of Mountain View's 2020 urban water use target.*

Chapter 5 *Water Supply – Description and quantification of the City's available water supply, on a historical, current, and future basis.*

Chapter 6 *Water Supply Reliability – Discussion of the reliability of Mountain View's water supplies and the ability to meet demand during dry years.*

Chapter 7 *Water Conservation – Programs for reducing potable water demand in Mountain View.*

Chapter 8 *Water Supply Assessments – Guidance for preparing Water Supply Assessments for projects within Mountain View's water service area.*

Chapter 9 *Water Shortage Contingency – Summary of Mountain View's plan for reducing water use during drought and other water shortage scenarios.*

Chapter 10 *Catastrophic Supply Interruption – Mountain View's plan for addressing a catastrophic water supply interruption.*

Chapter 11 *References – List of sources and supporting documentation used during the preparation of this UWMP.*

1.4 Coordination and Outreach

Thorough preparation of a UWMP requires coordination with neighboring agencies, outreach to encourage public comment, and adoption by the urban supplier's

governing body, in this case the Mountain View City Council. A description of these actions is provided below. Examples of communications related to plan coordination, outreach, and adoption are included in Appendix E. Notices were sent to over three dozen representatives of public agencies, residential groups, and local businesses.

Wholesale Water Suppliers

The City of Mountain View worked collaboratively with its two wholesale water suppliers, the San Francisco Public Utilities Commission (SFPUC) and the Santa Clara Valley Water District (SCVWD), to exchange information needed to develop each agency's respective UWMP. Information exchanged included current and projected population, water use and water production estimates, and key water supply reliability information.

As a wholesale purchaser of SFPUC water, the City of Mountain View is a member of the Bay Area Water Supply and Conservation Agency (BAWSCA). City staff coordinated with BAWSCA and its member agencies on various matters related to the 2015 UWMP. To assist member agencies in the preparation of their UWMPs, BAWSCA provided language for agencies to include in their 2015 UWMPs. This language is incorporated throughout Mountain View's 2015 UWMP.

Wastewater Agencies

Wastewater and recycled water information, discussed in Chapter 5.4, was coordinated with the Palo Alto Regional Water Quality Control Plant (RWQCP) and its partner agencies. All of Mountain View's wastewater flows to the RWQCP treatment facility, in addition to wastewater flows from the City of Palo Alto, East Palo Alto Sanitary District, the City of Los Altos, the Town of Los Altos Hills, and Stanford University. Each of these partners received notification about the UWMP update process.

Neighboring Land Use and Water Agencies

Neighboring land use and water agencies were also provided an opportunity to comment on Mountain View's 2015 UWMP. Agencies notified of this UWMP update included the County of Santa Clara, City of Sunnyvale, City of Palo Alto, City of Los Altos, and California Water Service Company (Cal Water), BAWSCA, SFPUC, and SCVWD.

Residents and Businesses

Prior to updating the UWMP, City staff provided telephone, e-mail, and mailing contact information to the public for submittal of comments and questions about the 2015 UWMP. To inform the public of the UWMP update process, the City e-mailed notifications to the following community groups:

- Neighborhood Association presidents
- The Chamber of Commerce
- The Central Business Association
- Various interested businesses

Information about the UWMP update was posted on the City's website and listed in the spring 2016 edition of *The E-View* newsletter.

1.5 Plan Adoption and Submittal

Public Hearings and Plan Availability

The City of Mountain View held a public hearing prior to adoption of the 2015 UWMP. Notice of the hearing was published in the *Mountain View Voice* and the *San Jose Post Record* prior to the hearing date. Notices were also posted on the City's website and on the City Hall bulletin board. Samples of the public hearing notices are included in Appendix E.

Copies of the draft 2015 UWMP were made available for public review and comment prior to the May 24, 2016 public hearing. Paper copies were available for review at the Mountain View Public Library and at Mountain View City Hall prior to the hearing. An electronic copy of the UWMP was posted on the City's website.

Plan Adoption and Submittal

City Council adoption of the 2015 UWMP is scheduled for June 28, 2016 following the public hearing on May 24, 2016. A draft copy of the resolution adopting the UWMP is included as Appendix F. Following City Council adoption of the 2015 UWMP, copies of the UWMP will be placed in the Mountain View Public Library and in the City Clerk's Office, and electronically on the City's website.

Copies of the adopted 2015 UWMP will be provided to DWR, the California State Library, SFPUC, SCVWD, BAWSCA, and the County of Santa Clara.

2. SERVICE AREA

2.1 Land Use

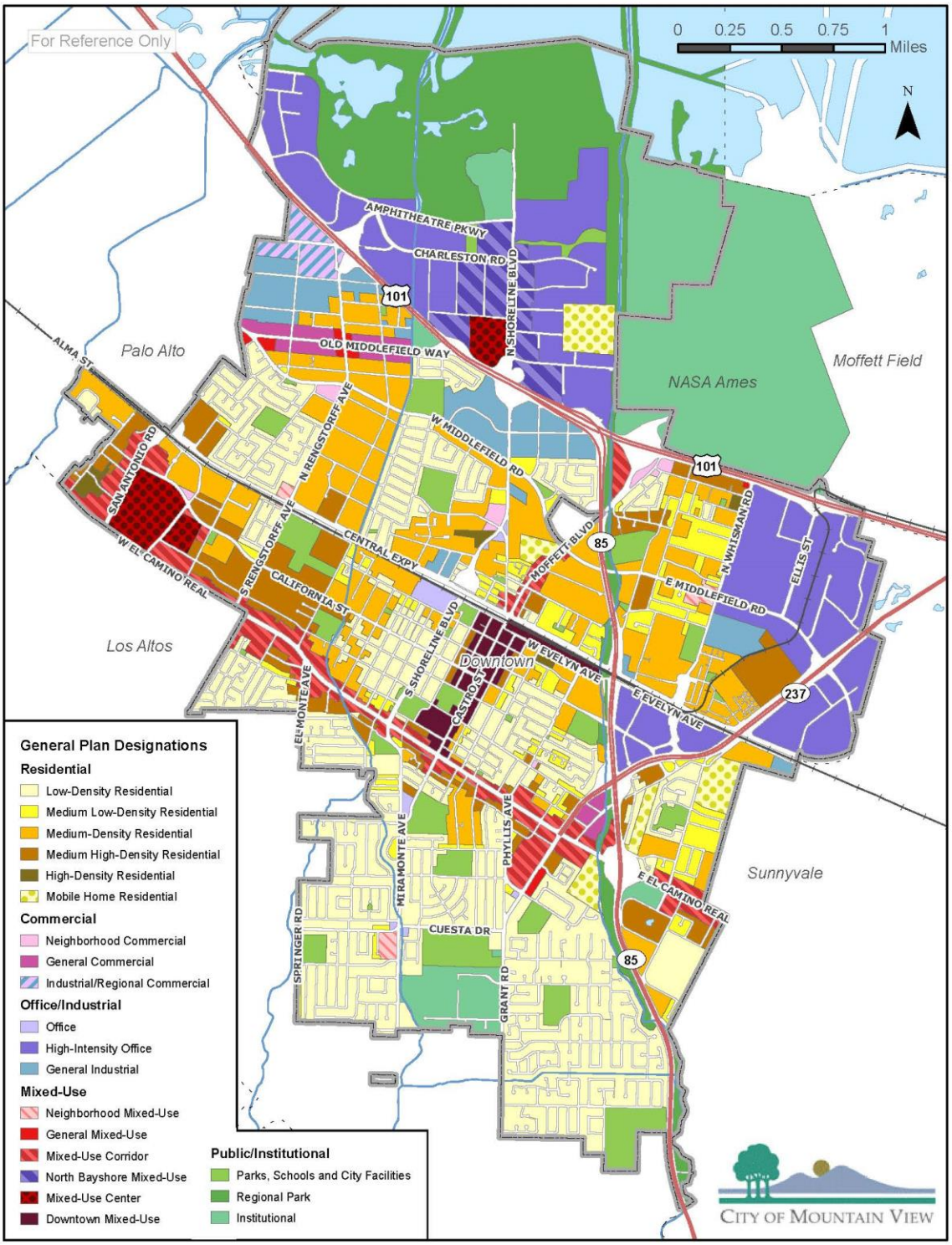
The City of Mountain View is approximately 12 square miles in area and is located about 10 miles north of San Jose and 35 miles south of San Francisco. Mountain View is situated between the Santa Cruz Mountains and the San Francisco Bay (Bay) and is considered the "gateway" to California's Silicon Valley. While Mountain View is predominantly a residential community, it is also home to several global high-tech companies, a large outdoor amphitheater, a center for the performing arts, a golf course, a sailing lake, regional medical facilities, and numerous local businesses that provide services to Mountain View and neighboring areas.

Changes to Mountain View's land uses occur pursuant to the City's General Plan. The General Plan identifies several "change areas" within which development will focus during the next several decades. Outside of these change areas, the General Plan aims to preserve the existing uses and intensities of the majority of Mountain View's neighborhoods. Below is a list of the major change areas identified in the General Plan (also shown in Figure 2-1):

- North Bayshore
- East Whisman
- El Camino Real
- San Antonio

Future land uses in the change areas focus on innovative and sustainable growth strategies to accommodate a mix of commercial and residential uses. Select areas may include increased density for office buildings, "village centers" with retail, office, and residential uses, and a variety of other land uses, such as entertainment facilities, hotels, and conference centers.

Figure 2-1: General Plan Land Use Map



2.2 Population and Employment

The total population served by Mountain View's municipal water system in 2015 was estimated at 75,430. Approximately 97 percent of the City's population receives water service from Mountain View's municipal water system. The remaining 3 percent are customers of a neighboring water retail agency, California Water Service Company (Cal Water). The estimated current and projected future population of Mountain View's water service area is shown in Table 2-1.

Table 2-1: Current and Projected Future Population and Employment[1]

Parameter	2015	2020	2025	2030	2035	2040
Population	75,430	79,010	82,590	86,170	89,750	93,330
Employment	80,817	84,585	88,352	92,120	95,888	99,655

Future population was developed from Mountain View's General Plan land use strategy, adopted by the City Council in July 2012. The 2030 General Plan supports as many as 86,170 residents within the municipal water system's service area in 2030. Extension of this growth trend through 2040 results in a projected population of 93,330.

Mountain View also supplies water to commercial, institutional, and industrial (CII) customers, which were collectively estimated to provide 80,817 jobs within the City's water service area in 2015. Based on the 2030 General Plan, job growth is anticipated to reach 92,120 in 2030. Extension of this trend through 2040 results in an estimated 99,655 jobs.

The 2015 UWMP water demand projections are based on a snapshot of approved development through 2040. This development includes 2030 General Plan growth estimates, plus growth affiliated with the approved North Bayshore, El Camino Real, and San Antonio Precise Plans. However, the General Plan is a living document and is subject to periodic amendments that can change projected growth. Currently, the City is considering several projects that have not been approved by Council (as of May 2016), but may result in increased population and job growth beyond what was envisioned in the General Plan. The following is a list of projects currently being studied.

[1] Current population is based the California Department of Finance data. Future population was estimated based on the 2030 General Plan. Both population and employment figures subtract for land uses included in the 2030 General Plan that are outside of the City's water service area (such as Cal Water customers).

- Housing in the North Bayshore area (approximately 10,000 dwelling units)
- Shenandoah (500 Moffett Boulevard)
- 779 East Evelyn Avenue
- 777 West Middlefield Road
- 555 West Middlefield Road
- 1001 North Shoreline Boulevard
- 1700 Villa Street
- East Whisman commercial development

These projects, if approved, are estimated to collectively raise Mountain View's 2040 population projection to 135,080 and employment projection to 111,322, which is a 79 percent and 38 percent increase from 2015 numbers, respectively. Analysis of water demand and supply availability for both growth scenarios is presented in Chapter 6.

2.3 Climate

Mountain View's semi-arid climate is temperate year-round. The average temperature is 58°F, with an average low of 47°F and an average high of 69°F (Table 2-2). The mean summer temperature (i.e., June through September) is 66°F.

Table 2-2: Average Climate Data[2]

Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
$Temp_{Ave}$ (°F)	48	51	54	57	61	65	67	67	65	61	54	48	**58**
$Temp_{Min}$ (°F)	39	41	43	45	49	53	55	55	53	48	43	38	**47**
$Temp_{Max}$ (°F)	57	61	64	68	73	77	78	78	78	73	64	58	**69**
Rainfall (in)	3.2	2.9	2.3	1.0	0.4	0.1	0.0	0.1	0.2	0.7	1.7	2.7	**15**
ET (in)	1.4	1.9	3.4	4.4	5.5	6.0	6.2	5.5	4.4	3.1	1.7	1.3	**45**

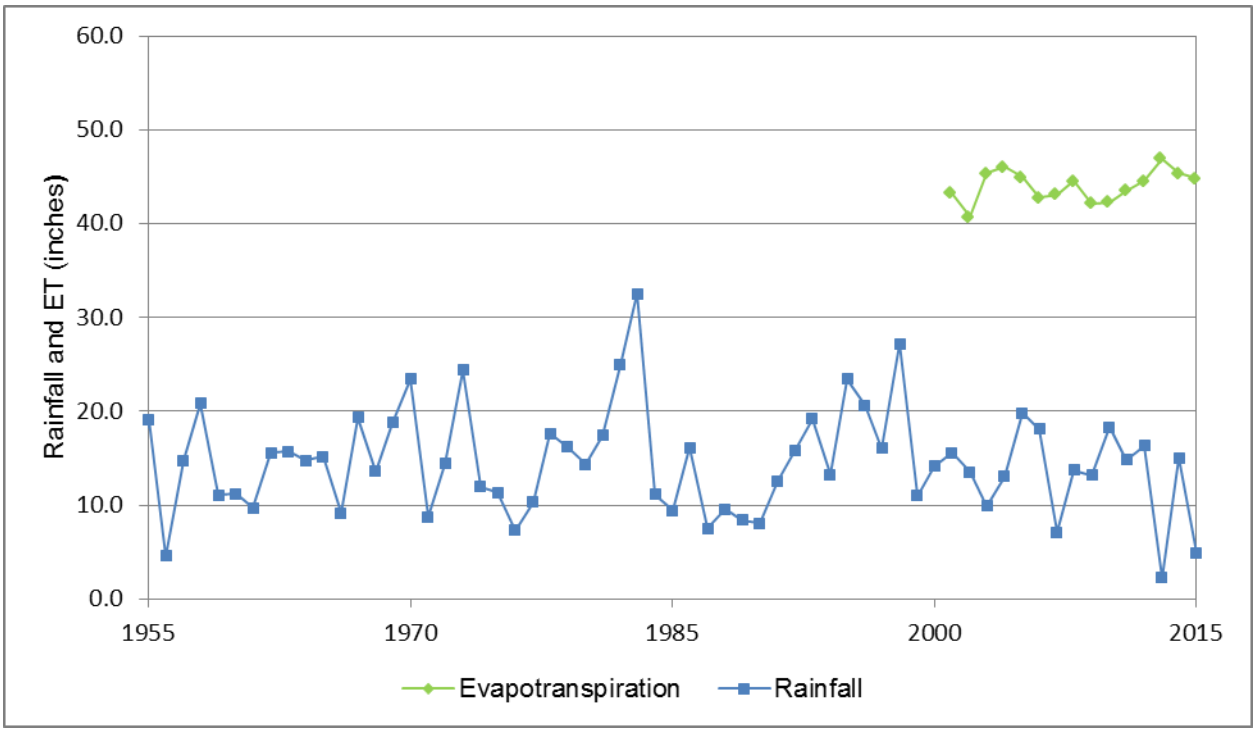
Rainfall in Mountain View averages 15 inches per year (in/yr) with most rainfall occurring between November and April. The lack of rainfall and high evapotranspiration during the warmer months contributes to a higher water demand in the summer. The term "evapotranspiration" (or "ET") is a combination of the words

[2] Rainfall and temperature data are from the Western Regional Climate Center, Palo Alto station (1953 to 2015). ET data are from the California Irrigation Management Information System, Union City station (1991 to 2015).

"evaporation" and "transpiration" that represents plant and soil water loss due to wind, heat, humidity, and other factors. ET records indicate an average loss of 45 in/yr, with highs of over 6 inches per month (in/mo) in June, July and August, and lows of less than 2 in/mo in December and January.

While these averages are useful in describing the typical climate in Mountain View, they do not demonstrate the variability in weather experienced from one year to the next. This variation is illustrated in Figure 2-2, which plots annual rainfall between 1955 and 2015, and ET from 2001 to 2015.

Figure 2-2: Historical Annual Rainfall and Evapotranspiration



Significant shifts in rainfall and ET can directly affect the City's water demand because irrigation often increases during unusually hot or dry years, and decreases during years with excess rainfall.

From 2012 to 2015, California endured the most severe drought since record keeping began in 1895. The average temperature Statewide during 2014 was more than 4°F higher than the 20th Century average.[3] Lower than average precipitation, coupled with

[3] California average temperature data from NOAA Climatological Rankings.

increased temperatures, greatly impacted the State's water supply and prompted historic actions to reduce water demand throughout California.

3. WATER SYSTEM OVERVIEW

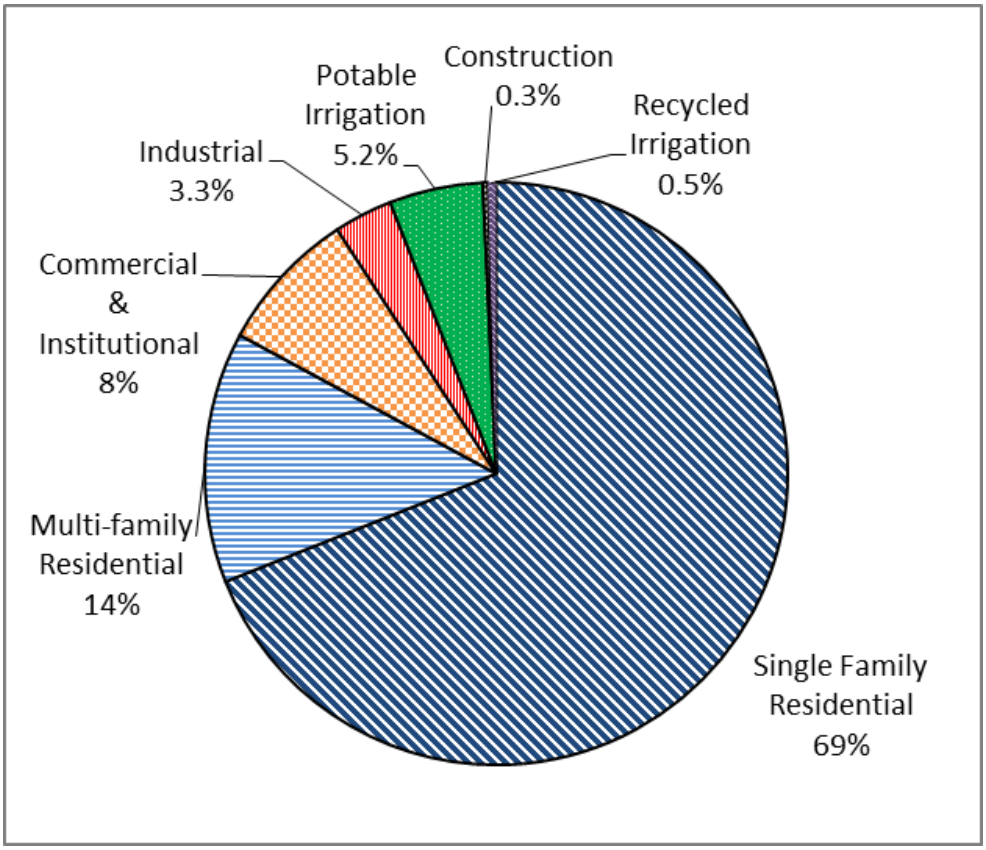
The City of Mountain View owns, operates, and maintains a potable water distribution system that serves water throughout Mountain View. Several small pockets within the City are served by neighboring Cal Water. The City's municipal water system services three pressure zones and consists of three wholesale water turnouts, four reservoirs, three pump stations, seven active groundwater supply wells, and buried pipes of varying composition, ages and sizes. Details of the City's potable water supply system are provided below, based on the *Mountain View Water Master Plan* (IEC, 2010). Details of Cal Water's potable water supply system are documented independently by Cal Water. Details of Mountain View's recycled water distribution system are provided in Chapter 5.4.

3.1 Service Connections

Mountain View provides water service to all of its businesses and residents within the City limits except those in the Cal Water service areas. Mountain View currently serves approximately 17,911 metered service connections. Single-family and multi-family homes account for approximately 83 percent of all connections, with the remaining connections distributed between CII and landscape accounts. Temporary construction meters and recycled water customers account for less than 1 percent of the City's service accounts (Figure 3-1).

(FIGURE IS SHOWN ON THE FOLLOWING PAGE)

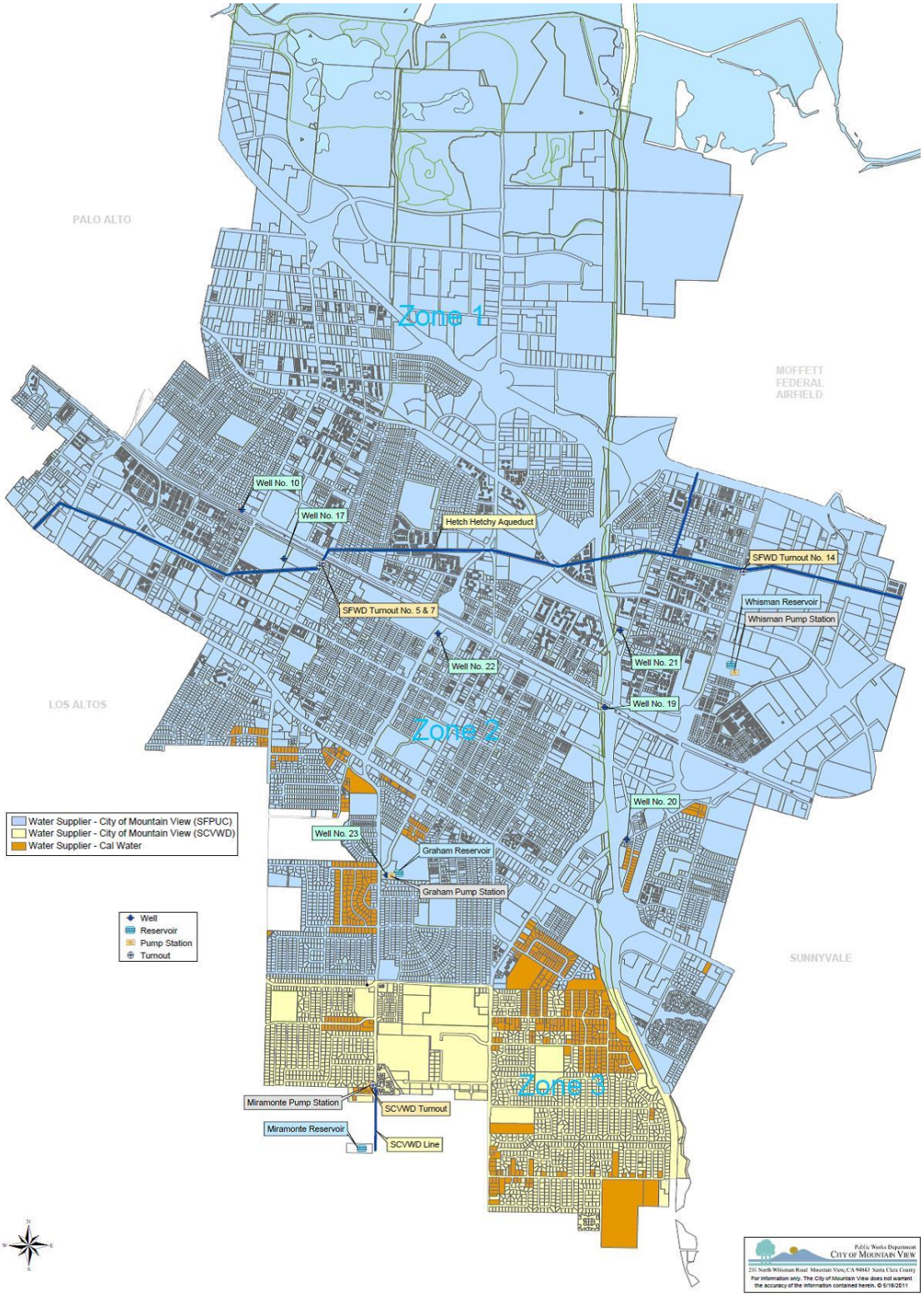
Figure 3-1: Water Service Connections



3.2 Turnouts

Mountain View imports more than 90 percent of its water supply. SFPUC is the predominant source Citywide, and SCVWD water is used within the southern portion of the Mountain View. These wholesale imported supplies are delivered through three turnouts, with two points of connection for SFPUC water and one point of connection for treated SCVWD water. Each turnout has one or more connection valves ranging in diameter from 8 inches to 14 inches, and ranging in pressure from 48 to 120 pounds per square inch (psi). Figure 3-2 shows the approximate location of each of the City's wholesale water supply turnouts.

Figure 3-2: Water Service Area Details



3.3 System Pressure

The topography in Mountain View slopes primarily downward from the foothills to the Bay, with an approximate 180′ decrease in elevation between the southern and northern City boundaries. The City's water distribution system utilizes three pressure zones to provide customers at varying elevations with water at a reasonable pressure. Zones 1 and 2 receive SFPUC water, supplemented by local groundwater, and Zone 3 receives treated water from SCVWD, supplemented periodically with SFPUC water (Figure 3-2).

The system includes over 176 miles of pipelines ranging in diameter up to 27″. The age of the pipes also varies, dating from before the 1940s to the present. Pressure zones are isolated by pressure reducing valves, pressure sustaining valves, and a number of normally closed interzonal valves.

3.4 Water Storage Facilities

Mountain View has four potable water storage reservoirs with an aggregate operating capacity of 14.3 million gallons (mg). The largest potable water storage facility, Graham Reservoir, was constructed in 2007 and holds a maximum of 8.0 mg. Graham Reservoir is installed beneath an artificial turf playing field at Graham Middle School. The City's smallest potable water storage facility, Miramonte Reservoir No. 1, was built in 1945 and has an operating capacity of 0.7 mg. Miramonte Reservoirs (No. 1 and 2) serve Zone 1 and also act as back-up and emergency storage for Zone 3. Table 3-1 lists each reservoir's year constructed, storage capacities, and service pressure zones.

Table 3-1: Water Storage Facilities[4]

Reservoir	Date Built	Maximum Capacity (mg)	Operational Capacity (mg)	Primary Service Area	Secondary Service Area
Miramonte 1	1945	1.0	0.7	Pressure Zone 1	Emergency & Back-up for Pressure Zone 3
Miramonte 2	2006	2.3	2.0	Pressure Zone 1	Emergency & Back-up for Pressure Zone 3
Whisman	1962	6.0	5.1	Pressure Zone 2	Pressure Zone 1
Graham	2007	8.0	6.5	Pressure Zone 2	Pressure Zone 1
Total	**-**	**17.3**	**14.3**	**-**	**-**

[4] From the *City of Mountain View Water Master Plan* (IEC, 2010).

3.5 Pump Stations

Water enters Mountain View's reservoirs by gravity and is pumped to the respective designated service pressure zones by three pump stations. The Graham and Whisman reservoirs each have their own pump station, and one pump station is used for both of the Miramonte reservoirs to provide emergency fire supply to Zone 3 and back-up for high demand. Each pump's pressure, flow rate, elevation, and hydraulic grade line (HGL) is listed in Table 3-2.

Table 3-2: Water System Pump Stations[5]

Pump Stations	Pump	Design Head		Design Flow Rate (gpm)	Ground Elevation (ft)	Total HGL (ft)
		(psi)	(ft)			
Graham Zone 1	Pump No. 1	32	75	2,800	125	200
	Pump No. 2	32	75	2,800	125	200
Graham Zone 2	Pump No. 1	101	234	2,700	125	359
	Pump No. 2	101	234	2,700	125	359
	Pump No. 3	101	234	2,700	125	359
Miramonte	Pump No. 1	52	120	870	171	291
	Pump No. 2	71	165	2,670	171	336
	Pump No. 3	71	165	2,670	171	336
	Pump No. 4	71	165	2,670	171	336
Whisman Zone 1	Pump No. 3	55	128	3,000	74	202
	Pump No. 4	55	128	3,000	74	202
Whisman Zone 2	Pump No. 1	99	228	2,500	74	302
	Pump No. 2	99	228	2,500	74	302

3.6 Groundwater Supply Wells

The City owns seven active potable groundwater supply wells distributed throughout its water service area. Wells range in depth from 520′ to 692′ below the ground surface (ft bgs), and the combined typical pumping rate for Mountain View's wells is 3,100 gallons per minute (gpm). Table 3-3 lists each potable well, its depth, year constructed, and production capacity.

[5] Ibid.

Table 3-3: Groundwater Supply Well Information[6]

Groundwater Supply Well	Depth (ft bgs)	Date Installed	Static Water Level (ft bgs)	Individual Max Pumping Rate (gpm)	Simultaneous Max Day Pumping Rate (gpm)	Typical Pumping Rate (gpm)
Well 10	560	1956	Flowing	800	500	350
Well 17	568	1960	0	200	--	150
Well 19	686	1985	23.3	1,200	800	400
Well 20	692	1985	47.8	1,200	900	400
Well 21	680	1997	13.9	500	500	400
Well 22	565	2002	10.4	1,000	1,000	600
Well 23	520	2005	53.6	1,000	1,000	800
Total	**--**	**--**	**--**	**--**	**4,700**	**3,100**

4. WATER DEMAND

Several events have occurred since 2010 to influence water use in Mountain View:

- Recovery from the 2007-2009 drought resulted in demand "rebound," and brief incremental increase in demand.
- Economic recovery following the "great recession" caused an employment boom of over 20,000 new jobs between 2012 and 2014, resulting in increased demand.
- New large commercial and residential development projects have come online.
- California experienced the most severe drought in recorded history resulting in more efficient water use.

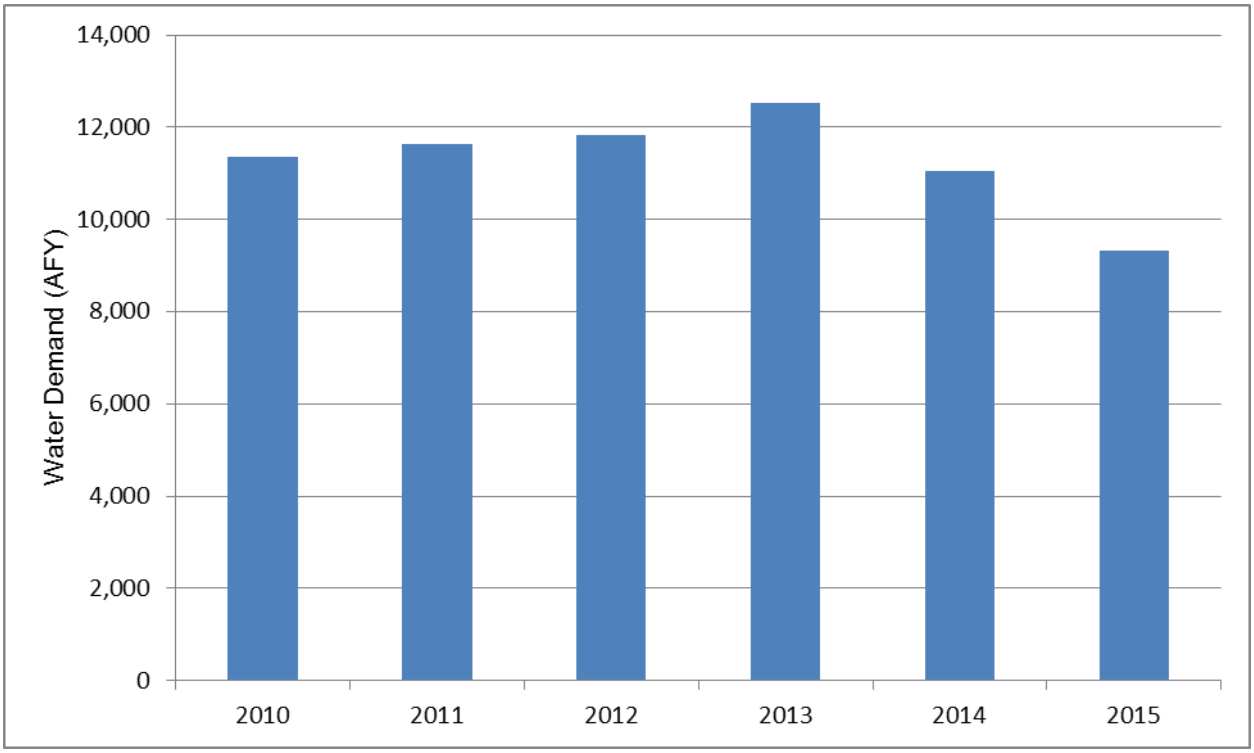
Over these past five years, the community has demonstrated an impressive adaptability to conserve water during times of drought, while continuing to thrive economically and maintain a high standard of living for its residents. This chapter describes current and historical water use trends in Mountain View and projections for future use.

[6] Ibid.

4.1 Current and Historical Water Demand

Mountain View's recent total water demand, potable and recycled, is shown in Figure 4-1. Water demand in 2015 was 19 percent lower than in 2010. Efforts to reduce water use, due to the drought, resulted in substantial water savings during 2015.

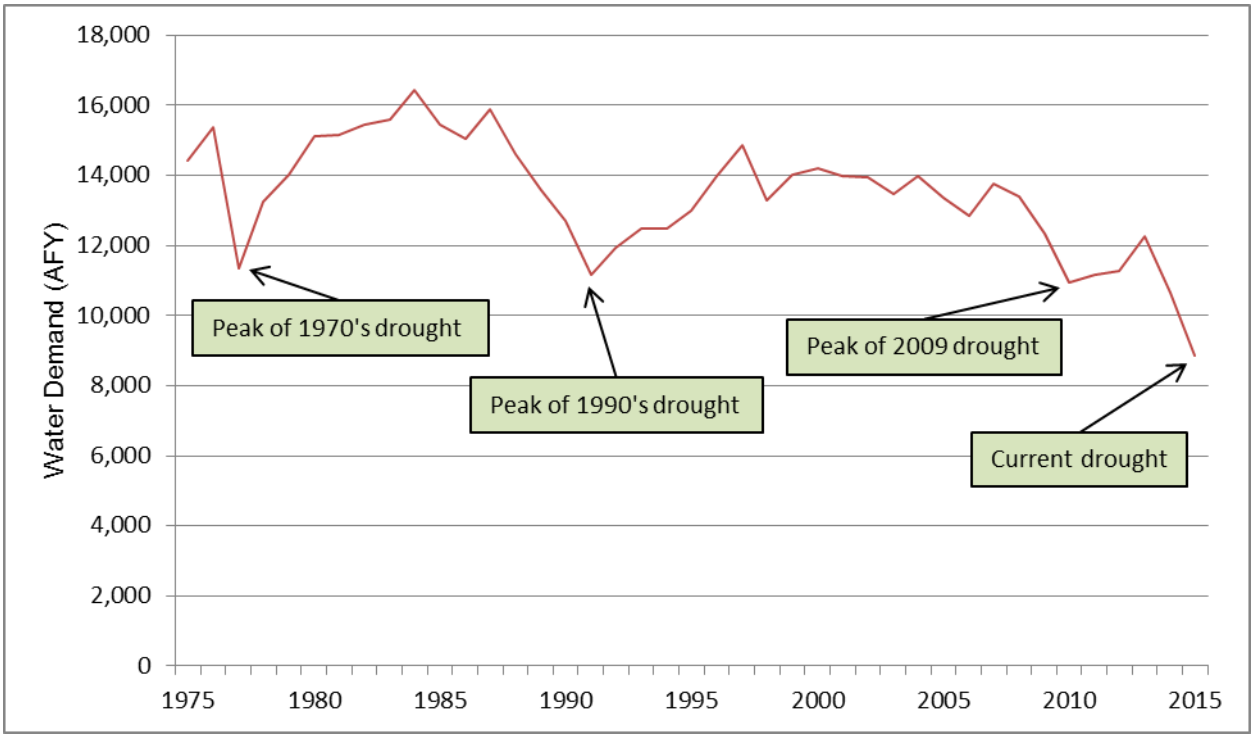
Figure 4-1: Recent Water Demand[7]



Reduced demand during 2015 was a result of communitywide response to severe drought conditions and mandated reductions. As seen in Figure 4-2, years of low demand typically correlate with drought years as customers respond to requested or mandated conservation. Mountain View's 2015 water demand was lower than at any point over the past 40 years. Note that a general downward trend in water use is also evident, due primarily to a shift in customer base (less agriculture and manufacturing, more office and residential), increasing plumbing and equipment efficiencies, changes in landscape aesthetics, and drought.

[7] Total demand includes customer use and nonrevenue water (based on production records).

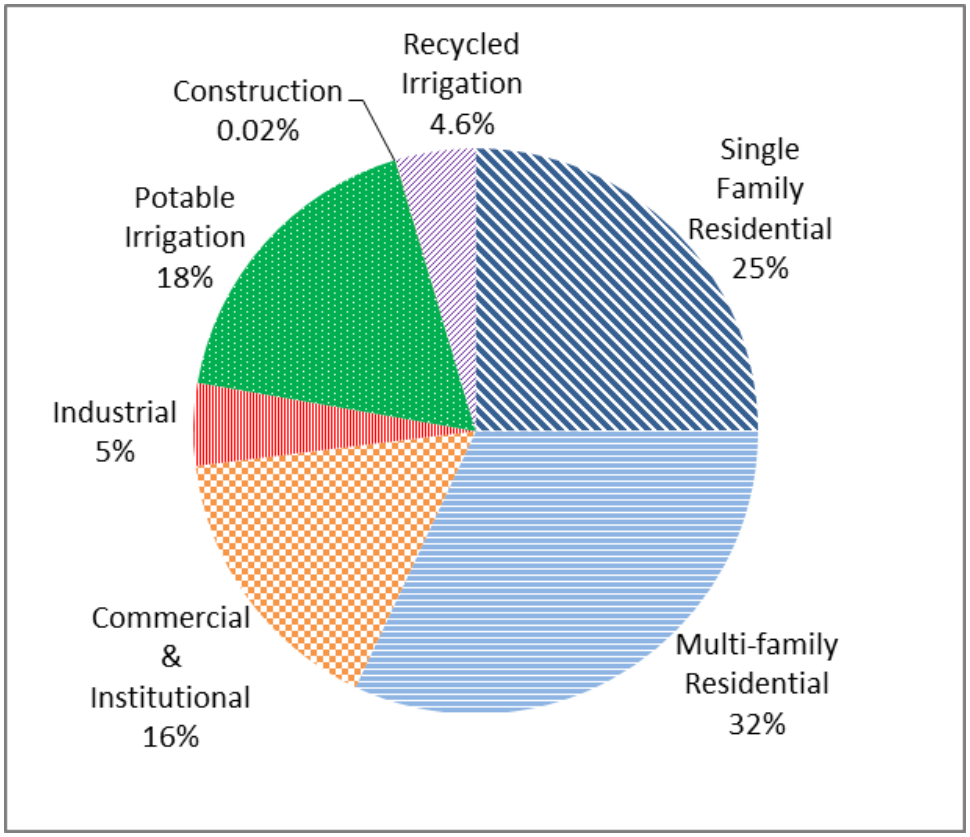
Figure 4-2: Historical Potable Water Demand



Water use by customer sector is shown in Figure 4-3. As in previous years, the largest water using group during 2015 was residential customers (57 percent of total use), followed by CII customers (21 percent), and landscape irrigation (18 percent). Recycled water irrigation accounted for nearly 5 percent of total use. Temporary construction use (potable and recycled) was less than 1 percent of total use.

(FIGURE IS SHOWN ON THE FOLLOWING PAGE)

Figure 4-3: 2015 Water Use by Customer Sector



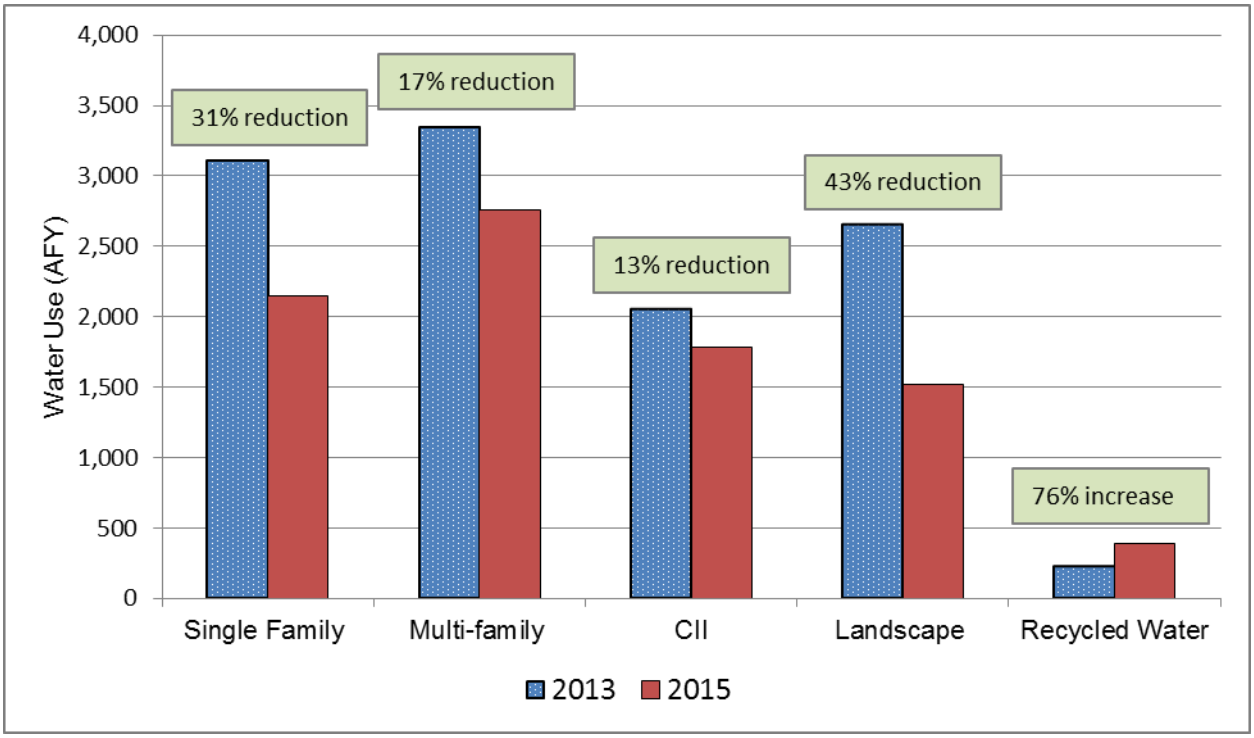
Recent annual water use is listed in Table 4-1 by customer sector, in acre-feet per year (AFY). Total water use was mostly static in 2010 and 2011, and subsequently increased for two years, peaking in 2013. Following 2013, water use dropped during 2014 and again in 2015. The recent decline in water use was assumed to be the direct result of conservation efforts and response to Statewide drought conditions.

Table 4-1: Historical Water Use by Customer Sector

Customer Type	Annual Water Use (AFY)					
	2010	**2011**	**2012**	**2013**	**2014**	**2015**
Potable Water Use						
Single-Family Residential	2,885	2,863	3,060	3,110	2,721	2,147
Multi-Family Residential	3,417	3,324	3,360	3,343	3,004	2,760
Commercial and Institutional	1,528	1,521	1,532	1,568	1,508	1,381
Industrial	451	470	475	487	497	405
Landscape Irrigation	2,088	2,091	2,247	2,651	2,190	1,520
Construction	5	7	4	3	7	3
Recycled Water Use						
Landscape Irrigation	502	468	547	224	395	394
Construction	0	0	0	0	5	1
Total	**10,876**	**10,744**	**11,225**	**11,386**	**10,327**	**8,611**

To further illustrate customer water savings during the current drought, Figure 4-4 shows annual water use by customer sector for 2013 and 2015. Although the current drought officially began in 2012, water supplies were sufficient not to require widespread drought response until 2014. As a result, 2013 is considered representative of "normal" water demand and generally used as the benchmark by which drought savings are measured. Figure 4-4 shows that the greatest water use reductions were achieved by large landscape accounts (public, commercial, and multi-family sites) and single-family homes. These sectors also account for the largest areas of landscape in the City and, therefore, have the greatest ability to conserve during dry years. Recycled water, which is considered a "droughtproof" supply, increased as new customers were added to the system and because drought reductions do not apply to recycled water users.

Figure 4-4: 2013 and 2015 Water Use Comparison



4.2 Projected Future Water Demand

4.2.1 Basis for Water Demand Projections

Mountain View's water demand projections were developed using Maddaus Water Management's Demand Side Management Decision Support System (DSS model). These projections were based on regional water demand and conservation modeling efforts completed over the past several years. Mountain View's DSS model was most recently revised during this UWMP process to account for new plumbing code requirements, updated population and employment projections, and revised conservation measures.

The DSS model typically uses two steps to project water demand: (1) establish base-year water demand at the end-use level; and (2) forecast future water demand based on existing water service accounts and future growth projections. A third step utilizing econometrics was added to Mountain View's model in 2014, during a regionwide demand analysis for all BAWSCA member agencies.

Establishing base-year water demand at the end-use level was accomplished by analyzing historical water use for each customer sector (single-family, multi-family, commercial, etc.) and assigning use to specific end uses, such as toilets, faucets, showers, and irrigation. The model uses the base year of 2013 to represent "normal-year" water demand.

Water account growth was estimated for each customer sector and their water end-uses based on population and job projections, and water demand forecasts were developed for each customer type.

The new econometric analysis, performed in 2014, evaluated variables such as price, weather data (i.e., precipitation, average temperature), and unemployment rate to determine if a statistically significant relationship between these variables and water demand existed. Results from this analysis showed that 4 variables (of 12 studied) significantly influenced water demand in the BAWSCA service area and adjustment parameters were added into the model for all member agencies (BAWSCA, 2014).

Below are the three scenarios used to evaluate and forecast Mountain View's future water demand through the year 2040. The original "base-case" scenario does not include savings from increased plumbing fixture efficiencies or additional conservation measures, which are captured by two additional scenarios.

- **Scenario A (Base-Case):** Using base-year water use trends.
- **Scenario B (Plumbing Codes):** Incorporating water savings from plumbing code updates requiring the installation of water-efficient fixtures.
- **Scenario C (Plumbing Codes and Conservation):** Incorporating water savings from discretionary water conservation measures.

Water-efficient fixtures considered in the plumbing code update included toilets, urinals, showers, and clothes washers. The estimated volume of water used by modern fixtures, compared to older fixtures, is listed in Table 4-2.

Table 4-2: Plumbing Fixture Water Use

Plumbing Fixture	Water Use for Older Fixture	Water Use for Modern Fixture
Toilet	1.6 to 3.5 gallons/flush	<1.0 to 1.28 gallons/flush
Urinal	1 to 3 gallons/flush	0.0 to 0.5 gallons/flush
Shower	15 to 20 gallons per shower	7 to 14 gallons/shower
Clothes Washer	36 to 43 gallons/load	13 to 19 gallons/load

Water conservation measures included in the DSS model are listed in Table 4-3 along with the total number of actions (e.g., surveys or rebates) projected to be implemented over the next 25 years. Achieving the targeted conservation depends on several factors, including funding availability and customer participation.

Table 4-3: DSS Model Conservation Assumptions (2015-2040)

Conservation Measure	Assumed Actions[8]
School education program	20,000 students
Public information	150,000 contacts
Water saving fixture giveaway	1,100 giveaways
Residential water survey	6,000 surveys
High-efficiency clothes washer rebate	2,200 rebates
Landscape water audit	275 audits
Landscape irrigation code applicability	1,400 sites

In addition to the conservation measures listed in Table 4-3, the DSS model also included savings from landscape water budget reports, conservation pricing, advance metering infrastructure (AMI), and home water reports. Comparative details for conservation measures implemented over the past five years are presented in Chapter 7. The results of Mountain View's DSS model are presented in the following paragraphs.

[8] Values are rounded.

4.2.2 Water Demand Modeling Results

Mountain View's updated DSS model results are shown in Table 4-4 in five-year increments through the year 2040, based on General Plan growth. Results are shown for the base-case scenario and for scenarios incorporating water savings due to plumbing code updates and conservation measures.

Table 4-4: Water Model Results

Water Model Scenario (demand reduction method)	Total Water Demand (AFY)				
	2020	2025	2030	2035	2040
Scenario A (Base-Case)	12,578	13,127	13,675	14,223	14,771
Scenario B (Plumbing Codes)	12,307	12,577	12,844	13,160	13,509
Scenario C (Plumbing Codes and Conservation)	11,276	11,516	11,766	12,060	12,393

Recent updates to the plumbing code (included in Scenarios B and C) are expected to reduce Mountain View's water use by 2 percent in 2020, and up to 9 percent in 2040 (from the base-case scenario). The implementation of new conservation measures (included in Scenario C) is projected to reduce water use by 8 percent in 2020 and 2040, from the base-case scenario.

Projected Water Use by Customer Type

Table 4-5 presents projected demand on the City's water system by customer sector in five-year increments through 2040 (for Scenario B). For conservative planning purposes, these projections incorporate water savings from plumbing code updates, but do not subtract for conservation, the benefits of which are shown in Table 4-4. The CII and landscape sectors include both potable and recycled demands.

Table 4-5: Projected Water Demand by Customer Sector[9]

Customer Sector	Projected Water Demand (AFY) [10]				
	2020	**2025**	**2030**	**2035**	**2040**
Single Family Residential	3,140	3,146	3,150	3,175	3,214
Multi-Family Residential	3,240	3,298	3,351	3,430	3,525
Commercial and Institutional	1,728	1,778	1,830	1,885	1,942
Industrial	515	509	504	499	494
Landscape Irrigation	2,799	2,923	3,046	3,170	3,293
Construction	5	6	6	6	6
Nonrevenue Water	880	919	957	996	1,034
Total Demand	**12,307**	**12,577**	**12,844**	**13,160**	**13,509**

4.2.3 Higher-Growth Alternative

Demand projections listed in Table 4-4 and Table 4-5 are based on Council-approved growth consistent with the General Plan. Alternative water demand projections were also generated based on additional development projects currently being studied by staff (see Chapter 2.2). The projected 2040 water demand for this cumulative higher-growth alternative is listed below:

- **Scenario A (Base-Case):** 19,284 AFY
- **Scenario B (Plumbing Codes):** 17,442 AFY
- **Scenario C (Plumbing Codes and Conservation):** 16,117

Cumulative demand for a higher-growth alternative is shown above to provide a scale of the level of development currently being studied and how it may, collectively, impact the City's future water demand. Chapter 6.8 discusses supply reliability for this "higher-growth alternative."

[9] Projections are based on Scenario B of the water model scenarios.
[10] Includes both potable and recycled water use.

4.2.4 Water Demand for Lower-Income Households

As required by Water Code Section 10631.1(a), water use projections for lower-income households are listed in Table 4-6. These projections assume that approximately 30 percent of households in Mountain View are lower-income, based on the City's *2010-2015 Consolidated Plan* (BAE, 2010). Water demand for lower-income households was estimated to account for approximately 25 percent of the total residential water use in Mountain View.

Table 4-6: Estimated Water Use for Lower-Income Households

Customer	Projected Annual Water Use (AFY)				
	2020	2025	2030	2035	2040
Lower-Income Households	1,595	1,611	1,625	1,651	1,685

4.3 2020 Urban Water Use Target

The Water Conservation Act of 2009 (also referred to as SB X7-7) requires each urban water retail supplier in California to develop a water use target for the year 2020 as part of a cooperative effort to reduce Statewide urban per capita water use by 20 percent by the year 2020. Mountain View's 2010 UWMP included details regarding its 2020 urban water use target, baseline daily water use, "interim" urban water use target, and "compliance" daily water use. A summary of Mountain View's urban water use targets are discussed below. Required SB X7-7 verification forms and tables are included in Appendix D.

4.3.1 Base Daily Water Use

The initial step in developing a 2020 water use target is establishing base consumption. As part of its 2010 UWMP, Mountain View calculated base consumption at 180 gallons per capita daily (GPCD), using a base period of 1995 to 2004. Supporting data for the baseline calculation is presented in Table 4-7 and in the SB X7-7 tables (Appendix D).

Water retailers submitting a 2015 UWMP were instructed to update their base consumption if population estimates from the 2010 Census data set were not used in their 2010 UWMP (the full data set was not available until 2012). Currently available 2010 Census population estimates for Mountain View's baseline period (1995-2004) and compliance period (2006-2010) differ slightly from what was used in the 2010 UWMP but do not change the outcome of the baseline period GPCD calculation. The

population numbers presented in Table 4-7 and the SB X7-7 tables reflect the updated estimates per the 2010 Census, and subtract for residents served by Cal Water.

Table 4-7: Base Daily Water Use Calculations[11]

Year	Population	Gross Water Use (mgd)	Per Capita Water Use (GPCD)
2010	72,458	9.78	135
2009	71,574	11.00	154
2008	70,563	11.97	170
2007	69,910	12.27	176
2006	69,109	11.47	166
2005	69,129	11.92	172
2004	69,499	12.48	180
2003	69,634	12.02	173
2002	69,412	12.46	180
2001	69,587	12.47	179
2000	69,207	12.68	183
1999	68,711	12.52	182
1998	68,774	11.85	172
1997	67,815	13.25	195
1996	67,338	12.47	185
1995	66,915	11.60	173
Base Daily Water Use (1995-2004)			**180**

4.3.2 Urban Water Use Target

As part of the 2010 UWMP, Mountain View analyzed four methodologies developed by DWR for setting an urban water use target. Method 4, which uses water-saving fixture assumptions for different customer sectors, was selected. Application of the Method 4 equations resulted in a 2020 target of 146 GPCD and a 2015 interim target of 163 GPCD (an 18 percent and 9 percent reduction, respectively). Supporting information for the Method 4 target calculations is provided in Appendix G.

[11] "Gross water use" is the total potable water production and does not include recycled water. Population is from the 2010 Census and subtracts for residents served by Cal Water.

4.3.3 Compliance Daily Water Use

Drought response, fixture efficiency, and conservation programs resulted in an average daily water use of 105 GPCD during 2015, well below the 2015 interim target of 163 GPCD and the 2020 target of 146 GPCD. Although a portion of the water savings is expected to be temporary, the exact percentage is not known at this time. Water use following the 1976-77 drought took only three years to reach predrought levels, while water use following the 1987-1992 drought rebounded for six years before entering a slow decline, and still have not returned to pre-1987 levels (see Figure 4-2 on Page 17).

4.3.4 Plan for Meeting 2020 Urban Water Use Target

According to the DSS model results, no additional actions are necessary for Mountain View to meet its 2020 water use target. The GPCD projections from Mountain View's DSS model are presented in Table 4-8.

Table 4-8: Projected 2020 Compliance Daily Water Use[12]

Water Model Scenario (demand reduction measure)	2020 Per Capita Water Use (GPCD)
Scenario A (Base-Case)	142
Scenario B (Plumbing Codes)	139
Scenario C (Plumbing Codes and Conservation)	127
Water Use Target	**146**

Demand projections show that the City expects to meet its 2020 water use target under all three water model scenarios (A, B and C). Compliance under the "higher-growth" alternative would depend on the relative proportion of different types of development approved - with new housing decreasing the GPCD and new jobs increasing the GPCD.

5. WATER SUPPLY SOURCES

The City of Mountain View purchases the majority of its drinking water from SFPUC and SCVWD. These sources are supplemented by drinking water pumped from local groundwater wells. In 2009, Mountain View completed construction of a new recycled

[12] These results reflect total demand (potable and recycled) and are, therefore, higher than actual expected gross per-capita water use.

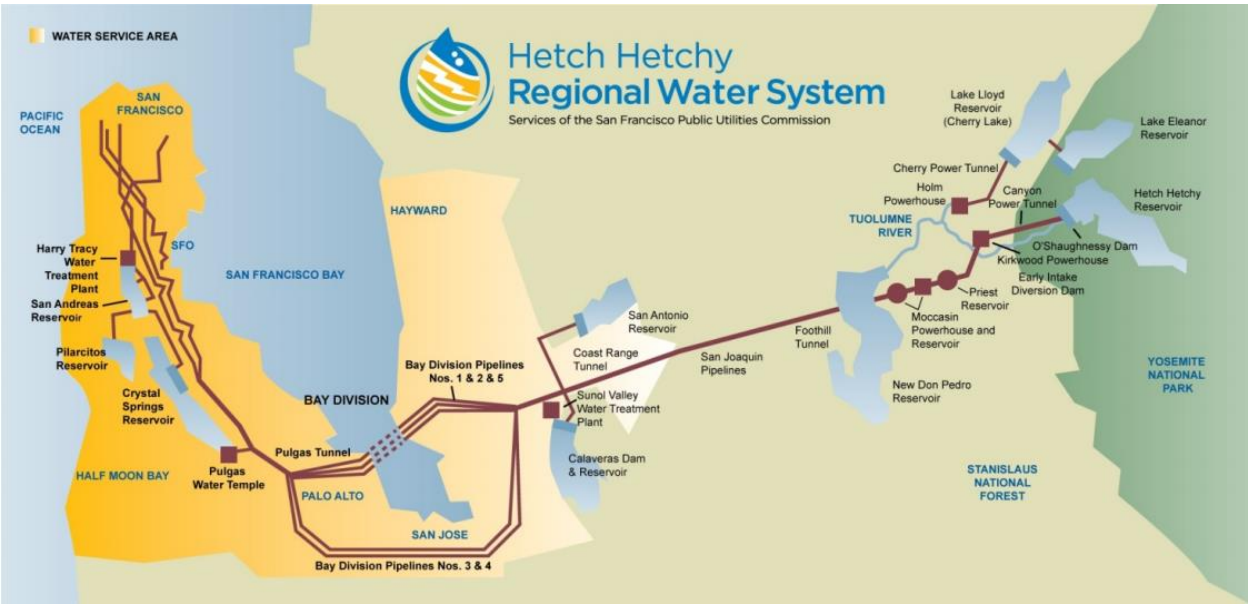
water distribution system. In 2015, water supplies used by the City (both potable and recycled) included 86 percent SFPUC water, 7 percent SCVWD treated water, 2 percent groundwater and 5 percent recycled water. The supply mix portfolio changes slightly from year to year due to operational requests from the City's wholesalers.

This chapter contains a description of the City's water supply sources, estimates of the maximum supply available to Mountain View from each source, and projections for anticipated volumes of water to be used from each source through 2040.

5.1 San Francisco Public Utilities Commission

The City of Mountain View receives water from the City and County of San Francisco's Hetch Hetchy Regional Water System (Regional System), operated by SFPUC. This supply originates predominantly from the Sierra Nevada, delivered through the Hetch Hetchy aqueducts, but also includes treated water produced by SFPUC from its local watersheds and facilities in Alameda, Santa Clara, and San Mateo counties. Figure 5-1 shows an illustrated schematic of the Regional System.

Figure 5-1: Schematic of the Hetch Hetchy Regional Water System[13]



Approximately 85 percent of the Regional System supply originates from the Tuolumne River watershed, through Hetch Hetchy Reservoir. The remaining 15 percent comes

[13] From the *Water Availability Study for the City and County of San Francisco* (SFPUC, 2013).

from local watersheds through the San Antonio, Calaveras, Crystal Springs, Pilarcitos, and San Andreas reservoirs.

5.1.1 Water Supply Agreement

The business relationship between San Francisco and its wholesale customers (including Mountain View) is defined by the *Water Supply Agreement between the City and County of San Francisco and Wholesale Customers in Alameda County, San Mateo County and Santa Clara County* (Supply Agreement) entered into in July 2009. The Supply Agreement, which has a 25-year term, addresses water supply availability for the Regional System as well as the methodology used by the SFPUC in setting wholesale water rates. This agreement succeeds a 25-year agreement signed in 1984.

The Supply Agreement provides 184 million gallons per day (mgd) to the wholesale customers during normal water years. This volume, referred to as the "Supply Assurance," is subject to reduction during periods of water shortage due to drought, emergencies, or other scenarios resulting in a water shortage. Each wholesale customer's share of the 184 mgd is referred to as their Individual Supply Guarantee (Individual Guarantee). Mountain View's Individual Guarantee is 13.46 mgd (or approximately 15,077 AFY). Although the Supply Agreement expires in 2034, the Supply Assurance and Individual Guarantees continue in perpetuity.

5.1.2 Bay Area Water Supply and Conservation Agency

BAWSCA was created in 2003 to represent the interests of the 26 agencies in Alameda, Santa Clara, and San Mateo counties that purchase water on a wholesale basis from the San Francisco Regional System. Collectively, BAWSCA agencies are referred to as the "wholesale customers."

Through BAWSCA, the wholesale customers can work with SFPUC on an equal basis to ensure rehabilitation and maintenance of the Regional System. In addition to representing the wholesale customers in interactions with SFPUC, BAWSCA also has the authority to:

- Coordinate water conservation, supply, and recycling activities for its agencies.
- Acquire water and make it available to other agencies on a wholesale basis.
- Finance projects, including improvements to the Regional System.

- Build facilities jointly with other local public agencies or on its own to carry out the agency's purposes.

BAWSCA's Long Term Reliable Water Supply Strategy is discussed in Chapter 6.1.5 of this UWMP.

5.2 Santa Clara Valley Water District

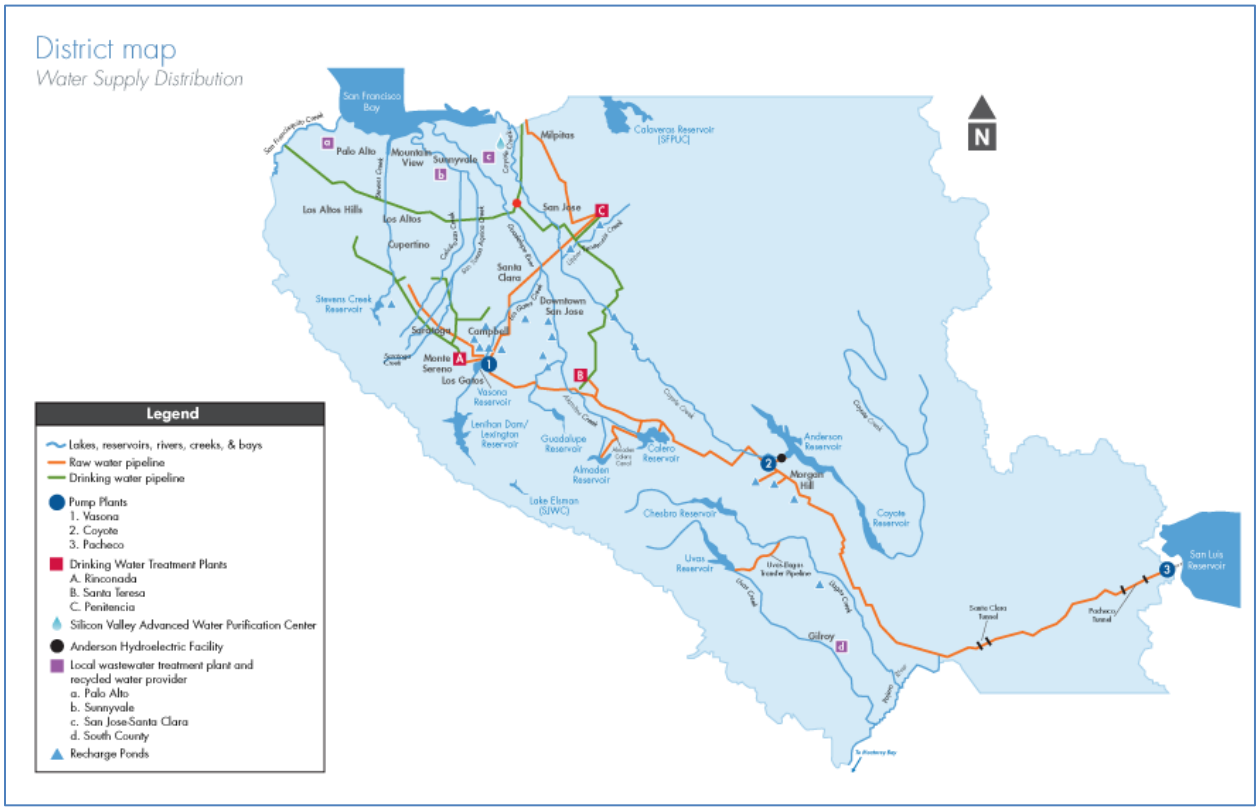
SCVWD is an independent special district that provides wholesale water supply, groundwater management, flood protection and stream stewardship. Its service area includes all of Santa Clara County, which encompasses approximately 1,300 square miles and has a population of about 1.9 million.

SCVWD was formed as the Santa Clara Valley Water Conservation District in 1929 in response to groundwater overdraft and significant land subsidence. In 1954, it annexed the Central Santa Clara Valley Water District. In 1968, it merged with the Countywide flood control district to form one agency to manage the water supply and flood programs for most of the County. The Gavilan Water District in southern Santa Clara County was annexed in 1987 and today SCVWD provides services for the entire County. SCVWD is governed by an elected seven-member Board of Directors following the District Act and its own Board Governance Policies.

Sources of supply for SCVWD include natural groundwater recharge, local surface water, imported surface water from the State Water Project (SWP) and Central Valley Project (CVP), recycled and purified water, and transfers. SCVWD supplies are used to recharge the local groundwater subbasins, treated at drinking water treatment plants, released to local creeks to meet environmental needs, or sent directly to water users. Potable reuse (groundwater recharge with purified recycled water) is a planned future water supply for SCVWD.

SCVWD's water supply, treatment, and distribution system includes surface water reservoirs, canals, water supply diversions, groundwater recharge ponds, controlled in-stream recharge, raw and treated water pipelines, pumping stations, and water treatment plants. Figure 5-2 shows a general schematic of SCVWD's water system (from SCVWD's retailer draft 2015 UWMP).

Figure 5-2: Schematic of SCVWD Water Supply System



5.2.1 Water Supply Contract

Mountain View's treated water supply relationship with SCVWD is governed by a 70-year water supply contract entered into in 1984. Pursuant to this agreement, Mountain View submits proposed delivery schedules to SCVWD estimating the volume of treated water needed in three-year periods. In addition to the estimated three-year delivery schedule, retailers also submit anticipated monthly deliveries for the coming year, and information needed for SCVWD to project annual deliveries for the next seven years. SCVWD manages all of its water supplies in an effort to meet the requested treated water deliveries, while balancing other demands on the system—such as groundwater recharge and banking. Mountain View began receiving treated drinking water from SCVWD in 1991.

5.2.2 Sources of Supply

Local Surface Water

SCVWD currently has 20 appropriative water rights licenses and one permit filed with the State Water Resources Control Board (State Water Board) totaling over 227,300 AFY. Local runoff is captured in local reservoirs or diverted downstream for recharge at the groundwater basin or treatment at SCVWD's drinking water treatment plants. The total storage capacity of SCVWD's reservoirs is about 169,000 acre-feet (AF), though several are operating at restricted capacity due to seismic stability concerns.

Most of the reservoirs are sized for annual operations, storing water in winter for use in summer and fall. The exception is the Anderson-Coyote reservoir system, which provides valuable carryover of supplies from year to year.

Imported Surface Water

SCVWD imported water is conveyed through the Sacramento-San Joaquin Delta and then pumped and delivered to the County through the South Bay Aqueduct, which carries water from the SWP, and through the San Felipe Division, which brings in water from the CVP.

SCVWD has a contract for 100,000 AFY from the SWP and a contract for 152,500 AFY from the CVP. The actual amount of water delivered is typically less than these contractual amounts and depends on hydrology, conveyance limitations, and environmental regulations. Supplemental imported water is acquired through transfers and exchanges as needed and available. In addition, SCVWD deposits a portion of its imported water supplies into carryover and Semitropic Groundwater Bank for later withdrawal and use. Imported supplies are delivered to SCVWD's three drinking water treatment plants, groundwater recharge facilities, and irrigation customers.

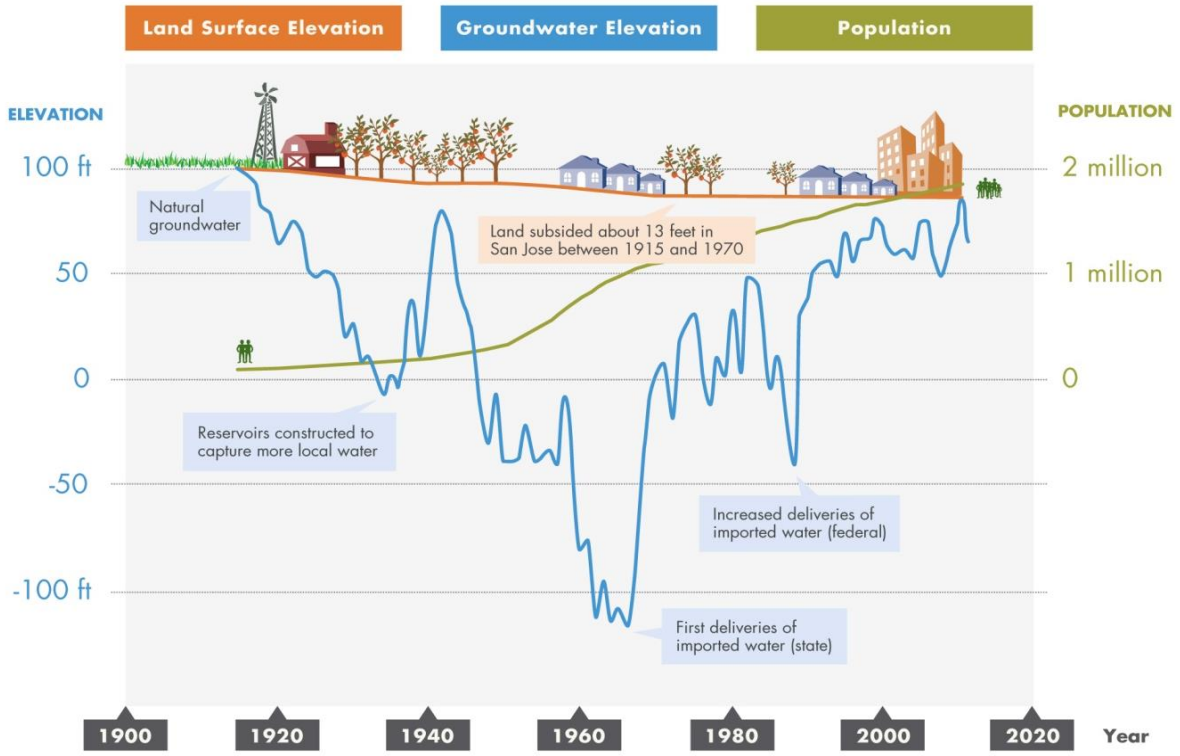
Groundwater Conjunctive Use

SCVWD manages the groundwater subbasins for the benefit of its groundwater customers and the County at large. SCVWD's water supply strategy since the 1930s has been to maximize conjunctive use, the coordinated management of surface and groundwater supplies, to enhance water supply reliability and avoid land subsidence. SCVWD has been a leader in conjunctive use in California for decades, utilizing imported and local surface water to supplement groundwater and to maintain reliability in dry years. Conjunctive use helps protect local subbasins from overdraft, land subsidence, and saltwater intrusion and provides critical groundwater storage

reserves for use during droughts or outages. Two-thirds of the groundwater Santa Clara County is supplied by managed recharge from SCVWD's conjunctive use program.

Figure 5-3 illustrates how SCVWD's water management activities have contributed to a sustainable water supply in the County. After its formation to address declining groundwater levels and land subsidence, SCVWD constructed reservoirs to capture local surface water. However, local supplies were insufficient to meet the County's growing population. SCVWD began importing water from the SWP in 1965 and from the CVP's San Felipe Division in 1987. These investments, along with water recycling and conservation, have resulted in reliable water supplies for the County and sustainable management of groundwater subbasins.

Figure 5-3: Historical Groundwater Conditions in Santa Clara County



Over the years, the water district's water importation and groundwater management activities have stabilized groundwater levels and prevented land subsidence, or sinking.

Recycled and Purified Water

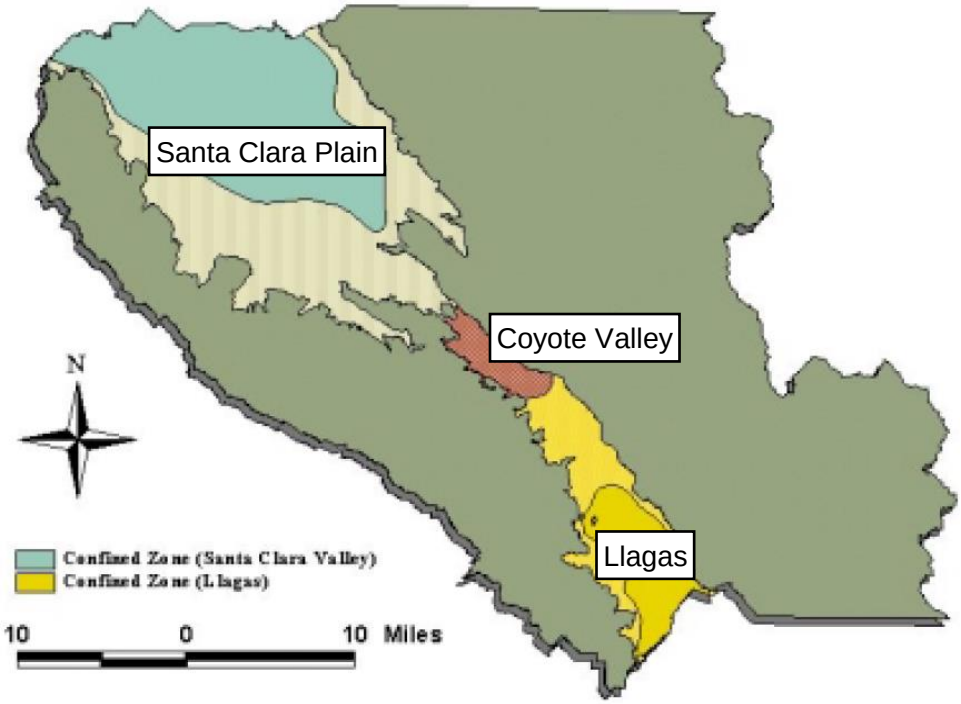
A growing source of water for Santa Clara County is recycled and purified water. Using recycled water helps augment drinking water and groundwater supplies through in-lieu recharge; provides a reliable, droughtproof, locally-controlled water supply; and reduces reliance on imported water. Recycled water is currently about 5 percent (or about 20,000 AFY) of the County's supply and is distributed for nonpotable uses such as landscape and agricultural irrigation, industrial cooling, and toilet flushing at dual plumbed facilities. Recycled water is produced at four wastewater plants in the County—located in Palo Alto, Sunnyvale, San Jose, and Gilroy. Although SCVWD does not own or operate any of the four wastewater treatment plants, it has an interest in developing and accelerating recycled water use. In 2014, SCVWD completed construction of the Silicon Valley Advanced Water Purification Center. Potable reuse of advanced purified water is later discussed in Chapter 5.4.8 and Chapter 6.5.2.

SCVWD is currently in the process of preparing a Countywide recycled water master plan that will outline its approach to increasing recycled water use within the County, including both nonpotable and potable reuse, to 10 percent of total supply by 2025.

5.3 Local Groundwater

SCVWD is responsible in groundwater management for Santa Clara County. The County covers portions of two groundwater basins defined by DWR: the Santa Clara Valley Basin (Basin 2-9) and the Gilroy-Hollister Valley Basin (Basin 3-3). The two groundwater subbasins within Santa Clara County are the Santa Clara Subbasin (Subbasin 2-9.02) and the Llagas Subbasin (Subbasin 3-3.01), which cover a surface area of approximately 385 square miles. Due to different land use and management characteristics, SCVWD further delineates the Santa Clara Subbasin into two management areas: the Santa Clara Plain and the Coyote Valley. Figure 5-4 shows the approximate boundaries of the groundwater subareas managed by SCVWD. Mountain View owns and operates water supply wells that extract groundwater from the Santa Clara Plain subarea of the Santa Clara Subbasin.

Figure 5-4: Santa Clara County Groundwater Basins[14]



The following paragraphs describe Mountain View's groundwater supply, including groundwater management, water-bearing formations, water levels, and water quality. Information about the subbasin presented herein is based largely on *California's Groundwater – Bulletin 118* (DWR, 2003a), the *Santa Clara Valley Water District Groundwater Management Plan* (SCVWD, 2012a), and language from SCVWD's retailer draft 2015 UWMP.

5.3.1 Description

The Santa Clara Subbasin is bounded by the Diablo Range on the east and by the Santa Cruz Mountains on the west. The subbasin extends from the northern border of Santa Clara County to the groundwater divide near Morgan Hill, and has a surface area of 240 square miles. The dominant geohydrologic feature is the Santa Clara Valley, which drains northward to the San Francisco Bay by tributaries such as Coyote Creek, the Guadalupe River, and Los Gatos Creek. The two drainages running through Mountain View's City boundaries include Stevens Creek and Permanente Creek, which flow from the Santa Cruz Mountains to the Bay (DWR, 2003a).

[14] Modified from the *Santa Clara Valley Water District Groundwater Management Plan* (SCVWD, 2001).

5.3.2 Groundwater Management

Groundwater pumping provides up to one-half of the County's water supply during normal years. Several programs operate collectively to maintain a reliable groundwater supply for the County. SCVWD's *Groundwater Management Plan* (included in Appendix H) identifies the following two basin management objectives (BMO):

- BMO 1: Groundwater supplies are managed to optimize water supply reliability and minimize land subsidence.

- BMO 2: Groundwater is protected from existing and potential contamination, including salt water intrusion.

These BMOs describe the overall goals of SCVWD's groundwater management program. The basin management strategies are the methods that will be used to meet the BMOs. Many of these strategies have overlapping benefits to groundwater resources, acting to improve water supply reliability, minimize subsidence, and protect or improve groundwater quality. The strategies are listed below.

1. Manage groundwater in conjunction with surface water through direct and in-lieu recharge programs to sustain groundwater supplies and to minimize saltwater intrusion and land subsidence.

2. Implement programs to protect or promote groundwater quality to support beneficial uses.

3. Maintain and develop adequate groundwater models and monitoring systems.

4. Work with regulatory and land use agencies to protect recharge areas, promote natural recharge, and prevent groundwater contamination.

SCVWD and local partners have implemented numerous programs to protect groundwater resources and SCVWD has established comprehensive monitoring programs related to groundwater levels, land subsidence, groundwater quality, recharge water quality, and surface water flow. In addition, SCVWD has developed the following outcome measures to gauge performance in meeting the basin management objectives:

1. Projected end-of-year groundwater storage is greater than 278,000 AF in the Santa Clara Plain, 5,000 AF in Coyote Valley, and 17,000 AF in the Llagas Subbasin.

2. Groundwater levels are above subsidence thresholds at the subsidence index wells.

3. At least 95 percent of Countywide water supply wells meet primary drinking water standards and at least 90 percent of South County wells meet Basin Plan agricultural objectives.

4. At least 90 percent of wells in both the shallow and principal aquifer zones have stable or decreasing concentrations of nitrate, chloride, and total dissolved solids (TDS).

SCVWD plans to update its Groundwater Management Plan in 2016 to meet the requirements of the Sustainable Groundwater Management Act of 2014.

5.3.3 Groundwater Quality

Groundwater quality in the Santa Clara Subbasin is very good. Groundwater in the major producing aquifers within the subbasin is generally of a bicarbonate type, with sodium and calcium as the principal cations. Although hard, it is of good to excellent mineral composition and suitable for most uses. Drinking water standards are met at public supply wells without the use of treatment methods (DWR, 2003a).

Areas with somewhat elevated mineral levels, perhaps associated with historical saltwater intrusion, have been observed in the northern subbasin, although not in Mountain View. Some wells with elevated nitrate concentration have been identified in the southern portion of the subbasin (DWR, 2003a). Groundwater from Mountain View's water supply wells meet all water quality standards (Mountain View, 2015).

5.3.4 Source Assessment and Protection

As part of the State Water Board's Drinking Water Source Assessment Protection Program, Mountain View has conducted an assessment of the potential hazards within the capture zone of each groundwater well. This assessment found that groundwater pumped by Mountain View's potable supply wells is potentially vulnerable to contamination. The State Water Board assessment also found that potential impacts are likely to be confined to the upper aquifer and that the physical barriers at the wells were highly effective in preventing migration into the lower aquifer, where the City's wells extract groundwater.

Although the vulnerabilities vary for each well site, some of the concerns identified in the assessment included: known contaminant plumes, leaking underground storage tanks, gas stations, repair and body shops, transportation corridors, dry cleaners, high-density housing, office buildings, research labs, dental/medical clinics, sewer systems, and storm drain discharge points. Regular monitoring and cleanup activities at known contamination sites also help to protect Mountain View's potable groundwater supply.

5.3.5 Mountain View Groundwater Use

The City of Mountain View operates 7 active potable groundwater wells to supplement imported water supplies. The City also owns an inactive irrigation well at Shoreline Regional Park, which has not been in operation since 2008. When previously in operation, water from the irrigation well did not enter the potable water system but, instead, was used directly for landscape irrigation. Since 2009, this nonpotable irrigation well supply has been replaced with recycled water from the RWQCP.

Most of Mountain View's groundwater is pumped directly into the potable water distribution system; however, a portion of the water is also used for general operation and maintenance of the groundwater wells.

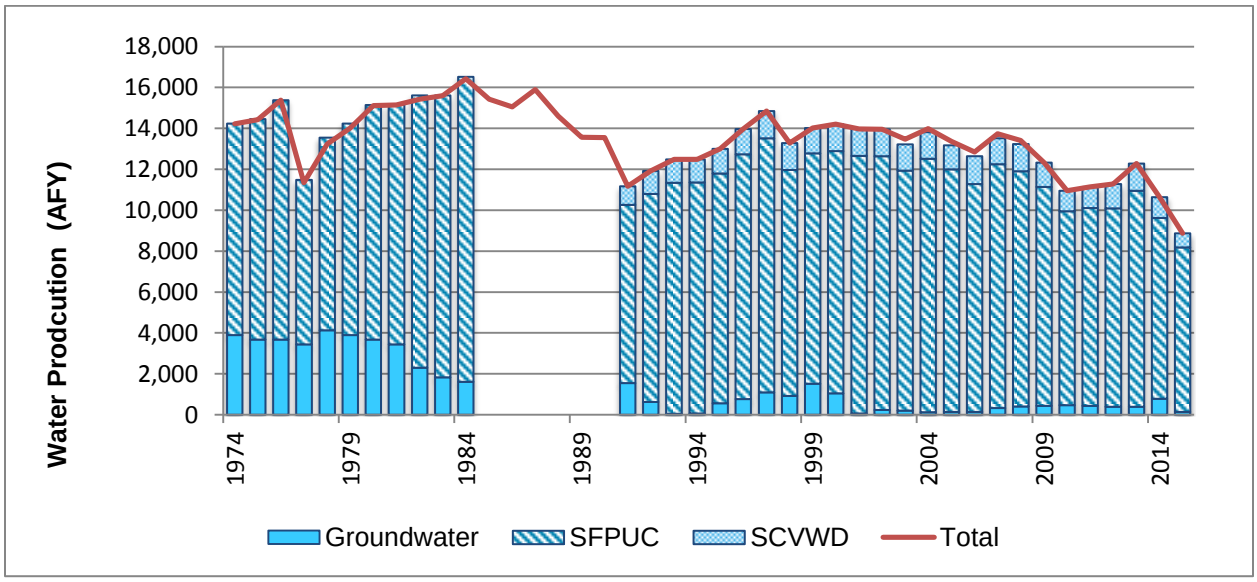
As shown in Table 5-1, 2015 groundwater production was approximately 145 AF. This is less than 1 percent of total subbasin withdraws. Annual production varies based on several factors, including operational needs and the availability of imported supplies.

Table 5-1: Recent Groundwater Production

Groundwater Production (AFY)	
Year	**Production (AFY)**
2015	145[15]
2014	782
2013	389
2012	387
2011	441
2010	476

In the past 20-years, Mountain View has produced an average of 563 AFY, with a high of over 1,500 AF in 1999. Longer-term records of groundwater production from Mountain View's 1985 UWMP indicate that groundwater historically accounted for up to 25 percent of the City's total supply, or approximately 4,000 AFY, prior to the extension of SCVWD's treated water distribution line to serve Mountain View in 1991 (LHI, 1985). Figure 5-5 plots data for the City's three potable supply sources over the past 40 years.

Figure 5-5: Historical Potable Supply Production (40 Years)[16]



[15] Groundwater production in 2015 was low due to reduced pumping required Countywide to address concerns of overdraft within the subbasin.
[16] Individual supply use was not available for 1985 to 1990.

Groundwater production in future years is anticipated to continue at similar volumes as in recent years. Projected water supply availability for all of Mountain View's supplies is quantified in Chapter 5.6.

5.4 Recycled Water

Mountain View uses tertiary treated recycled water from the RWQCP for irrigation in the North Bayshore Area. The City has used recycled water since 1980, the early efforts of which are summarized in the 2010 UWMP and *Recycled Water Feasibility Study* (Carollo, 2014). More current developments are discussed below. Future uses include greenroof irrigation, toilet flushing and cooling.

5.4.1 Wastewater Treatment and Generation

Mountain View's sanitary sewer system includes 159 miles of mains and two pump stations to carry wastewater from the City to the RWQCP in Palo Alto for treatment. In addition to Mountain View's flows, the RWQCP also treats wastewater generated by the communities of Palo Alto, East Palo Alto, Los Altos, Los Altos Hills, Stanford University, and Moffett Field (the latter conveyed through Mountain View's system).

The RWQCP is designed for an average dry-weather wastewater flow capacity of 39 mgd with full tertiary treatment. Average flow in 2015 was 18.4 mgd. The RWQCP uses a multi-step process to filter, clean, and disinfect wastewater so that it can safely be discharged to the Bay or used for irrigation and other approved nonpotable uses. The RWQCP treatment process includes:

- Primary treatment: Bar screening and primary sedimentation.
- Secondary treatment: Fixed film reactors, conventional activated sludge, clarification, and filtration.
- Tertiary treatment: Filtration through a sand and coal filter and disinfection.

All wastewater treated at the RWQCP meets the California Code of Regulations Title 22 tertiary standards for restricted reuse. An additional reclamation facility furthers filters and disinfects up to 4.5 mgd of recycled water to meet Title 22 tertiary standards for unrestricted reuse. Capacity expansion and advanced treatment to reduce TDS are being evaluated to allow for increased future recycled water use.

Current wastewater generation for Mountain View is 6.4 mgd (7,129 AF). Information on total flows to the RWQCP (e.g., from all partner agencies) is included in the City of Palo Alto's UWMP (Palo Alto, 2016).

5.4.2 Recycled Water Supply Contract

The RWQCP operates under the terms of a 1968 agreement (Partner's Agreement) in which the cities of Mountain View and Los Altos agreed to retire their treatment plants and partner with the City of Palo Alto to construct a regional treatment plant. The RWQCP provides recycled water through a 2007 agreement that delineates the cost sharing of the original system construction and allocates 3.0 mgd of recycled water to Mountain View at no cost through 2035, concurrent with the expiration of the Partner's Agreement. In October 2015, Mountain View's City Council authorized staff to negotiate an amended contract to:

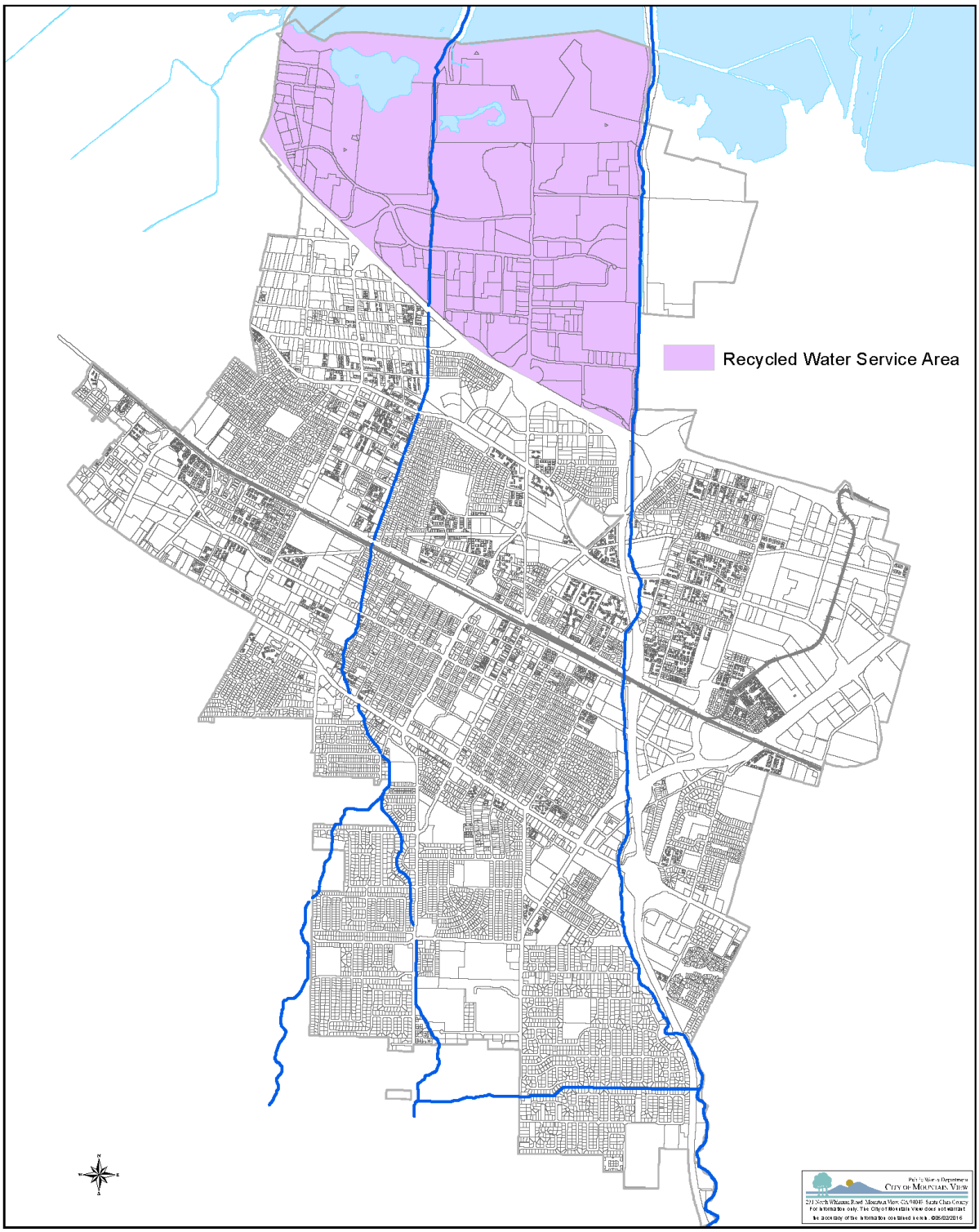
- Implement and fund facilities rehabilitation and construction.
- Increase system backup and reliability.
- Establish a cost allocation method for generating recycled water.
- Continue salinity reduction efforts.
- Extend the life of the agreement to 2060.

Contract negotiations are expected to be completed by the end of the year.

5.4.3 Current Recycled Water Service Area

Mountain View's recycled water distribution system includes 5.5 miles of recycled water mains, serving areas north of U.S. Route 101 and west of California Route 237. The approximate boundaries of Mountain View's current recycled water service area are shown in Figure 5-6. There are currently 50 customer connections to the City's recycled water distribution system.

Figure 5-6: Recycled Water Service Area



5.4.4 Feasibility Expansion Study

In 2014, Mountain View completed a study to determine the feasibility of expanding the existing recycled water system to increase recycled water use and improve system reliability. The study, performed by Carollo Engineers, identified five possible alternatives for expansion based on current and expected recycled water demand throughout the entire City. Each alternative was evaluated for environmental impacts, cost impacts, energy impacts, potable water offset, ease of implementation, and supply reliability. The recommended expansion alternative alignment extends from the City's existing recycled water mains on Charleston Road and Crittenden Lane, through NASA Ames and Moffett Field, under U.S. Route 101 and into the Middlefield-Ellis-Whisman area of Mountain View. Recycled water uses considered in the 2014 study included irrigation, toilet flushing, and cooling towers both inside and outside of the City's water service area where recycled water may be feasible in the future.

5.4.5 Current and Projected Recycled Water Use

Recycled water use within Mountain View's water service area in 2015 was 450 AF. Mountain View's 2010 UWMP projected 1,026 AF of recycled water irrigation use for within the North Bayshore Area in 2015.

The City's recycled water use projections were updated during the 2014 feasibility study, and in subsequent discussions with NASA, Google, and the City of Sunnyvale. In addition to existing and planned uses inside Mountain View's water service area, potential recycled water users have also been identified outside of the City's water service area. Future external customers could include the NASA-Bayview area[17] and the City of Sunnyvale (by interconnecting to two cities recycled distribution systems near California Route 237). Although external users would increase the City's total recycled water use, they would not reduce the City's potable water demand since Mountain View is not the potable water provider to these locations. Current and projected recycled water use is shown in Table 5-2.

[17] The NASA-Bayview area is located on City and Federal land bounded on the south by U.S. Route 101, on the west by Mountain View, on the east by Sunnyvale, and on the north by San Francisco Bay.

Table 5-2: Projected Recycled Water Use

Use Area	Projected Recycled Water Use (AFY)					
	2015	2020	2025	2030	2035	2040
Inside Service Area	450	955	1,091	1,091	1,091	1,091
Outside Service Area	0	75	1,316	1,437	1,437	1,437

5.4.6 Recycled Water Quality

Although recycled water is being used for irrigation in Palo Alto and Mountain View, its salt content is above the threshold tolerable for certain salt-sensitive plants such as redwood trees. In an ongoing effort to address recycled water salinity, the RWQCP and partner agencies have developed and implemented strategies for reducing salt content in the wastewater stream, the source of the recycled water. These efforts have included:

- **Salinity Reduction Policy:** The objective of the policy is to identify sources of waste stream salinity and develop actions to reduce recycled water salinity to 600 parts per million (ppm). Average recycled water TDS in 2015 was 887 ppm.

- **Sanitary Sewer Rehabilitation:** Infiltration of saline groundwater into the sanitary sewer mains is known to cause high waste stream salinity. Sanitary sewer rehabilitation projects performed in Mountain View, Palo Alto, and East Palo Alto for pipe integrity and extended life had the additional benefit of reducing waste stream salinity. Mountain View's Shoreline Park Sewer Trunk Rehabilitation project rehabilitated 4,150' of sanitary sewer trunk main and nine manholes between Stevens Creek and the Sewage Pump Station, reducing recycled water salinity by over 300 ppm (Mountain View, 2013).

- **Rerouting Discharge:** As other sources of wastewater stream salinity were identified, RWQCP partner agencies worked to remove high-saline discharges from the wastewater stream. Key locations in Mountain View where high-salinity discharge was rerouted from the sanitary sewer included three groundwater extraction wells affiliated with the landfill monitoring program and a dewatering sump pump located in Shoreline Park.

- **Redwood Tree Monitoring:** In addition to salinity reduction efforts, the RWQCP and City also implemented efforts to monitor and manage soil salinity as part of the redwood tree monitory program. Sampling is performed triennially at 10 sites. During the sampling events, soil and foliage samples are collected and tested for

pH and salinity, soil moisture data is captured, and each tree is rated visually using a standard index of leaf health and canopy density. Results from this study, which began in 2009, have documented the extent of chloride and sodium build-up in soil and redwood tree tissue. Although there are varying degrees of salt build-up, increased salinity is evident in all trees irrigated with recycled water and efforts to mitigate damage through gypsum application have shown limited success. These effects are believed to be exacerbated by the severe drought, which has produced insufficient rainfall to flush salts downward in the water table.

Despite these efforts, recycled water salinity has not yet reached the desired levels and TDS remains above the 600 ppm goal. Reduced sewer flows and changes in source water chemistry due to the drought have exacerbated the problem. As a result, the City, RWQCP, and SCVWD are studying the feasibility of utilizing advanced treatment (microfiltration and reverse osmosis) to produce purified recycled water, which could be blended with the tertiary recycled water to provide lower-salinity recycled water.

5.4.7 Encouraging the Use of Recycled Water

Recycled water for irrigation is required in the North Bayshore Area, pursuant to Article V, Chapter 35 of the City Code (adopted by Council in 2004) and encouraged for toilet flushing and cooling. Penalties for noncompliance include discontinuance of potable water service and a 50 percent surcharge for the use of potable water. Given the elevated salinity levels for recycled water the City has granted some temporary adjustments, such as delayed conversion and dual-irrigation systems to route potable water to redwood trees.

The rules for utilizing recycled water are detailed in Mountain View's *Customer Guidelines for Recycled Water Use,* last updated in January 2016. This document outlines design and installation specifications, operation and maintenance responsibilities, and the process for connecting to Mountain View's recycled water system. An electronic copy of the Customer Guidelines is available online at recycledwater.mountainview.gov.

To further encourage the use of recycled water, the City charges customers less for recycled water than for potable water. In 2015, recycled water was available for $2.89 per 100 cubic feet (ccf), approximately half the nonresidential potable water rate of $5.77 per ccf. Furthermore, recycled water is not subject to potable water drought restrictions and, therefore, provides customers with a reliable irrigation supply, even during dry years.

5.4.8 Indirect Potable Recycled Water Use

Mountain View has not evaluated the potential for indirect potable reuse within its service area. However, SCVWD, one of the City's wholesale water suppliers and the groundwater management agency for Santa Clara County, is evaluating the use of highly treated recycled water for groundwater recharge. Opened in 2014, the Silicon Valley Advanced Water Purification Center treats up to 8 mgd of recycled water from San Jose-Santa Clara Regional Wastewater Facility using microfiltration, reverse osmosis, and UV disinfection. Once purified, the water is blended with its source recycled water to achieve a salinity of 500 ppm (approximately 25 percent lower than the source recycled water salinity).[18] This blend is used for irrigation, toilet flushing, cooling and other nonpotable uses in the cities of San Jose, Santa Clara and Milpitas. Due to potable water supply constraints during the current drought, the SCVWD has recently expedited studies of indirect potable recharge, including expanded purification facilities to provide up to 45,000 AFY of purified water for indirect or direct potable reuse (SCVWD, 2016a).

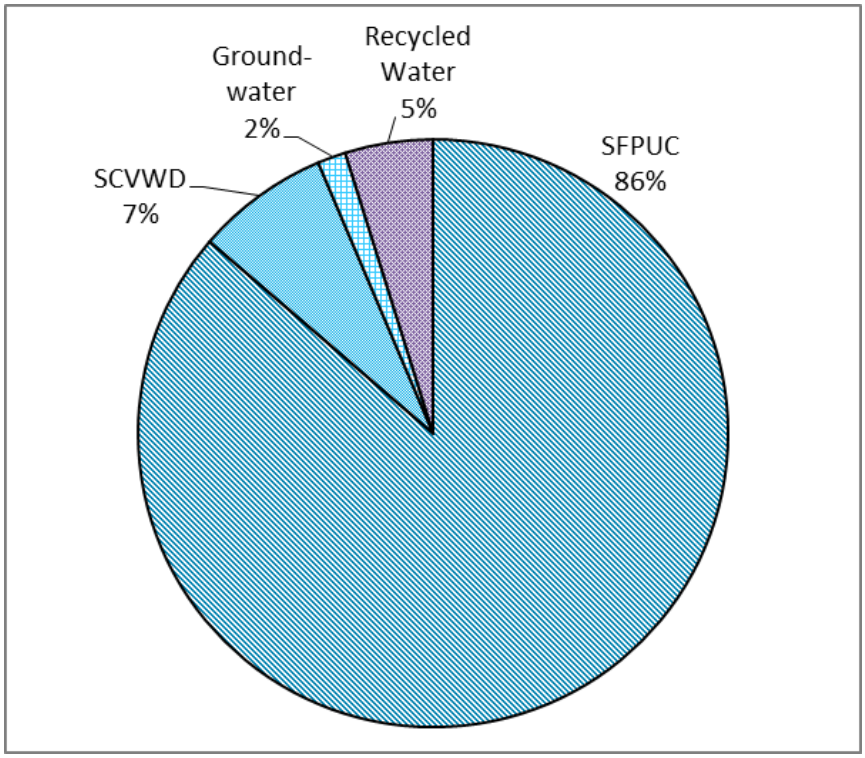
5.5 Historical Water Supply Production

In 2015, approximately 86 percent of Mountain View's total water supply (both potable and nonpotable) came from the SFPUC—7 percent was purchased from the SCVWD treated water system; 2 percent was produced at local groundwater wells; and 5 percent was delivered from the RWQCP for landscape irrigation (Figure 5-7).

(FIGURE IS SHOWN ON THE FOLLOWING PAGE)

[18] From: *purewater4u.org*—accessed on March 9, 2016.

Figure 5-7: 2010 Water Supply Production

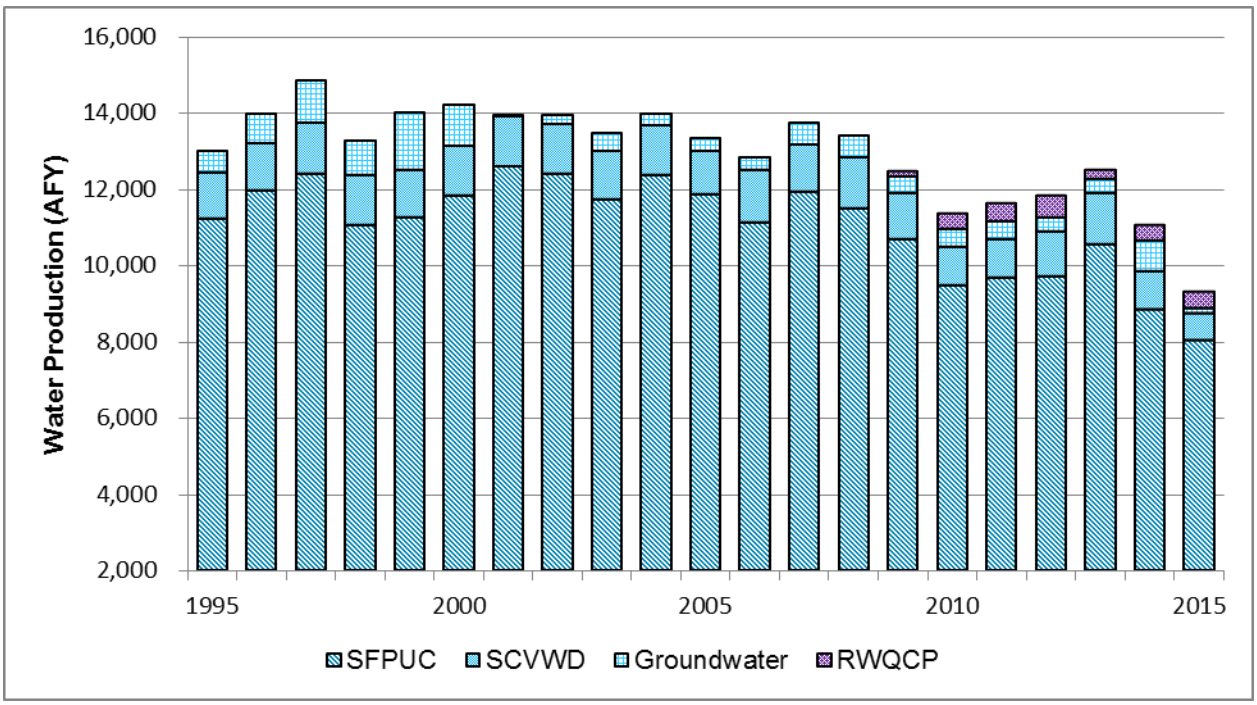


A complete view of Mountain View's water supply production over the past five years is provided in Table 5-3 and Figure 5-8. Although total supply production varies from year to year, the proportion of Mountain View's water supply that is purchased from each of its wholesale suppliers and pumped from groundwater wells has been relatively constant over the past 20 years. Chapter 5.3.5 discussed longer-term trends documented in previous UWMPs, back to 1974, when groundwater usage was higher than it is now, and before SCVWD treated water was available to Mountain View. A general downward trend in overall production is also evident over the past 20 years, likely due to changes in the City's customer base (e.g., less manufacturing, more office and residential), increased plumbing and equipment efficiencies, changes in landscape aesthetics and drought conditions.

Table 5-3: Recent Water Supply Production

Year	Supply Source (AFY)					
	SFPUC	SCVWD Treated	Total Imported	Ground-Water[19]	Recycled Water	Total
2015	8,043	682[20]	8,726	145	450	**9,320**
2014	8,847	1,017	9,864	782	413	**11,059**
2013	10,559	1,327	11,886	389	242	**12,518**
2012	9,702	1,188	10,890	387	550	**11,827**
2011	9,668	1,038	10,706	441	483	**11,630**
2010	9,476	1,007	10,484	476	389	**11,348**
5-year average	**9,364**	**1,050**	**10,414**	**429**	**428**	**11,271**
20-year average	**11,055**	**1,209**	**12,265**	**563**	**NA**	**12,961**

Figure 5-8: Historical Water Supply Production (20 Years)



[19] Most groundwater produced is pumped directly into the potable water distribution system; however, a portion is used for general operation and maintenance of the groundwater wells.
[20] SCVWD treated water use was reduced due to water chemistry changes resulting from the drought.

5.6 Projected Water Supply Availability and Production

The availability of each of Mountain View's water supplies is presented in the following paragraphs. Demand on these supplies will change based on several factors affecting water use, such as development intensity, employment density, source-water quality and drought. Table 5-4 identifies Mountain View's estimated maximum available water supplies, based on existing contracts with its wholesale suppliers and the RWQCP, and historical groundwater production over a 20-year period.

Table 5-4: Estimated Maximum Available Water Supply

Supply Source	Estimated Maximum Available Supply (AFY)	Basis
SFPUC	15,078	Individual Supply guarantee
SCVWD Treated	1,200	7-year projections
Groundwater	1,525	20-year historical maximum
Recycled Water	3,361	Capacity ownership
Total Supply	21,164	–

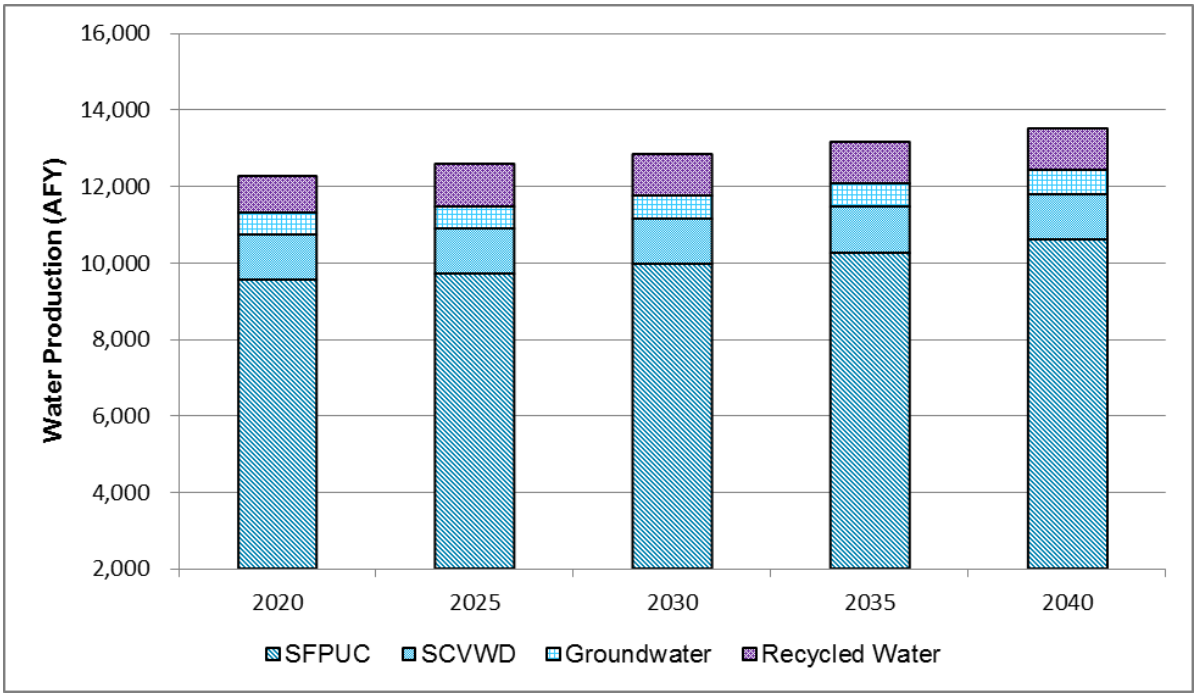
In order to meet the projected water demand presented in Chapter 4.2, Mountain View expects to utilize its water supplies in the approximate volumes presented in Table 5-5 and Figure 5-9. Actual use of each supply may increase or decrease depending on realized water demand in future years.

Table 5-5: Projected Water Supply Production[21]

Supply Source	Projected Water Supply Production (AFY)				
	2020	**2025**	**2030**	**2035**	**2040**
SFPUC	9,546	9,713	9,966	10,266	10,603
SCVWD Treated	1,200	1,200	1,200	1,200	1,195
Groundwater	566	574	588	604	621
Potable Supply	11,312	11,487	11,754	12,070	12,419
Recycled Supply	955	1,091	1,091	1,091	1,091
Total Supply	**12,307**	**12,578**	**12,845**	**13,161**	**13,510**

[21] Based on the General Plan. The cumulative effect of a "higher-growth" alternative, discussed in Chapter 6.8, is estimated to require 17,442 AFY of water if all projects are approved.

Figure 5-9: Projected Water Supply Production



6. WATER SUPPLY RELIABILITY

Water supply reliability information was provided by the City's three wholesale water suppliers: SFPUC, SCVWD, and BAWSCA. The information presented below includes a summary of projects and other events that may increase or decrease the ability of SFPUC and SCVWD to meet the needs of their retail suppliers (such as Mountain View). Also included is an evaluation of each wholesaler's ability to meet demands during normal years, single dry years and multiple dry-year periods. In their dry-year analyses, each wholesaler reviewed the hydrologic record and evaluated their ability to deliver water during a future repeat of: (1) the driest single year on record ("single dry year"); and (2) the driest multiple dry year period on record ("multiple dry years"). Mountain View's wholesale suppliers provided information based on the following: SFPUC—a single dry year of 1977 and multiple dry years of 1988 to 1992; SCVWD—a single dry year of 1977 and multiple dry years of 2013 to 2015.

6.1 Reliability of the SFPUC Regional Water System

SFPUC expects to be able to meet the wholesale customers' collective demand on the Regional System during normal years through 2040. During dry years, SFPUC

anticipates it will be able to meet at least 80 percent of combined retail and wholesale customer demand by implementing dry-year water supply projects included in the Water System Improvement Program (WSIP).

The following paragraphs discuss the ability of SFPUC's Regional System to meet future demand, including plans for system improvements; reliability concerns; methods for allocating supply during dry years; and measures being undertaken by BAWSCA to ensure a reliable source of water for its member agencies.

6.1.1 Water System Improvement Plan

In order to enhance the ability of the SFPUC Regional System and meet its goals for water quality, seismic reliability, delivery reliability, and water supply, SFPUC approved a $4.8 billion WSIP in 2008. The WSIP includes over 30 capital improvement projects to enhance SFPUC's ability to provide reliable, affordable, high-quality water in an environmentally sustainable manner. Projects include rehabilitation, construction, replacement, and upgrades to pipelines, reservoirs, dams, treatment facilities, tunnels, and power facilities. Major goals of the WSIP are to:

- Maintain high water quality.
- Reduce vulnerability to earthquakes.
- Increase delivery reliability and improve ability to maintain the system.
- Meet customer water needs in nonddrought and drought periods.
- Enhance sustainability in all system activities.
- Achieve a cost-effective, fully operational system.

Key water supply performance objectives of the WSIP are to:

- Meet water demands of 265 mgd during nondry years through 2018.
- Meet at least 80 percent of systemwide dry-year demands through 2018.
- Diversify water supply options during nondrought and drought periods.
- Improve the use of new water sources and drought management, including groundwater, recycled water, conservation, and transfers.

As of the end of 2015, the WSIP was approximately 90 percent complete and is scheduled to be fully completed in 2019.

6.1.2 Normal-Year Supply Reliability

SFPUC expects to be able to meet normal-year demands from the wholesale customers through 2040.

As part of the WSIP, SFPUC adopted an Interim Limitation to cap sales from the Regional System to an average annual of 265 mgd through 2018. The wholesale customers' collective allocation under the Interim Limitation is 184 mgd and San Francisco's is 81 mgd.

Each individual wholesale customer's share of the Interim Limitation is referred to as the Interim Supply Allocations (Interim Allocation). In December 2010, the SFPUC established each agency's Interim Allocation through 2018, based on projected fiscal year 2017-18 purchase projections and Individual Guarantees. The Interim Allocations are effective through December 31, 2018 and do not affect the Supply Assurance or Individual Guarantees. Mountain View's Interim Allocation is 11.43 mgd.

As an incentive to keep deliveries below 265 mgd, SFPUC adopted an Environmental Enhancement Surcharge for collective deliveries in excess of 265 mgd. This volume-based surcharge would be unilaterally imposed by the SFPUC on individual customers if systemwide water sales exceed 265 mgd. Actual charges would be determined based on each agency's respective amount(s) of excess use over their Interim Allocation. To date, no Environmental Enhancement Surcharges have been levied.

6.1.3 Dry-Year Supply Reliability

The adopted WSIP includes the following water supply projects to meet dry-year demands with no greater than 20 percent systemwide rationing in any one year:

- **Calaveras Dam Replacement Project:** Calaveras Dam is located near a seismically active fault zone and was determined to be seismically vulnerable. To address this vulnerability, SFPUC is constructing a new dam of equal height downstream of the existing dam. The Environmental Impact Report (EIR) was certified by the San Francisco City Planning Commission in 2011, and construction is now ongoing. Construction of the new dam is slated for completion in 2018; the entire project should be completed in 2019.

- **Alameda Creek Recapture Project:** The Alameda Creek Recapture Project will recapture the water system yield lost due to instream flow releases at Calaveras Reservoir or bypassed around the Alameda Creek Diversion Dam and return this yield to the Regional System through facilities in the Sunol Valley. Water that naturally infiltrates from Alameda Creek will be recaptured into an existing quarry pond known as Surface Mining Permit-24 Pond F2. The project will be designed to allow the recaptured water to be pumped to the Sunol Valley Water Treatment

Plant or to San Antonio Reservoir. The project's Draft EIR will be released in the spring of 2016, and construction will occur from spring 2017 to fall 2018.

- **Lower Crystal Springs Dam Improvements:** The Lower Crystal Springs Dam Improvements were substantially completed in November 2011. While the project has been completed, permitting issues for reservoir operation have become significant. When the reservoir elevation was lowered due to Division of Safety of Dams restrictions, the habitat for the Fountain Thistle, an endangered plant, followed the lowered reservoir elevation. Raising the reservoir elevation now requires that new plant populations be restored incrementally before the reservoir elevation is raised. The result is that it may be several years before the original reservoir elevation can be restored.

- **Regional Groundwater Storage and Recovery Project:** The Groundwater Storage and Recovery Project is a strategic partnership between SFPUC and three San Mateo County agencies: the California Water Service Company (serving South San Francisco and Colma), the City of Daly City, and the City of San Bruno. The project seeks to balance the management of groundwater and surface water resources in a way that safeguards supplies during times of drought. During years of normal or heavy rainfall, the project would provide additional surface water to the partner agencies in San Mateo County, allowing them to reduce the amount of groundwater they pump from the South Westside Groundwater Basin. Over time, the reduced pumping would allow the aquifer to recharge and result in increased groundwater storage of up to 20 billion gallons.

  The project's Final EIR was certified in August 2014, and the project also received Commission approval that month. The well station construction contract Notice to Proceed was issued in April 2015, and construction is expected to be completed in spring 2018.

- **2 mgd Dry-Year Water Transfer:** In 2012, the dry-year transfer was proposed between the Modesto Irrigation District and the SFPUC. Negotiations were terminated because an agreement could not be reached. Subsequently, the SFPUC is having ongoing discussions with the Oakdale Irrigation District for a one-year transfer agreement with the SFPUC for 2 mgd (2,240 AF).

In order to achieve its target of meeting at least 80 percent of its customer demand during droughts at 265 mgd, SFPUC must successfully implement all dry-year water supply projects included in the WSIP.

Impact of Fishery Flows on Dry-Year Reliability

In adopting the Calaveras Dam Replacement Project and the Lower Crystal Springs Dam Improvements Project, SFPUC committed to providing fishery flows below Calaveras Dam and Lower Crystal Springs Dam, as well as bypass flows below Alameda Creek Diversion Dam. The fishery flow schedules for Alameda Creek and San Mateo Creek represent a potential decrease in available water supply of an average annual 9.3 mgd and 3.5 mgd, respectively, with a total of 12.8 mgd average annually. The Alameda Creek Recapture Project, described above, will replace the 9.3 mgd of supply lost to Alameda Creek fishery flows. Therefore, the remaining 3.5 mgd of fishery flows for San Mateo Creek will potentially create a shortfall in meeting SFPUC demands of 265 mgd and slightly increase SFPUC's dry-year water supply needs.

The adopted WSIP water supply objectives include: (1) meeting a target delivery of 265 mgd through 2018; and (2) rationing at no greater than 20 percent systemwide in any one year of a drought. As a result of the fishery flows, SFPUC may not be able to meet these objectives between 2015 and 2018, and instead has projected rationing of up to 22 percent through 2018. Participation in the Bay Area Regional Desalination Project (BARDP—described in Chapter 6.5.1) and additional water transfers may help manage the water supply loss associated with the fishery flows.

6.1.4 Drought Allocation Plan

As discussed in Chapter 5.1.1, SFPUC and wholesale customers are governed by a 2009 Water Supply Agreement. This agreement includes a Water Shortage Allocation Plan (Allocation Plan) to allocate water from the Regional System between SFPUC and the wholesale customers during systemwide shortages of 20 percent or less. The Allocation Plan has two components:

- The Tier One Plan, which allocates water between SFPUC and the wholesale customers collectively.

- The Tier Two Plan, which allocates the collective wholesale customer share among the wholesale customers.

Tier One Drought Allocations

The Tier One Plan allocates water between SFPUC and the wholesale customers collectively based on four levels of systemwide shortage, presented in Table 6-1.

Table 6-1: SFPUC Tier One Drought Allocations

Systemwide Reduction	Share of Available Water (percent of total)	
	SFPUC	Wholesale Customers
5 percent or less	35.5	64.5
6 to 10 percent	36.0	64.0
11 to 15 percent	37.0	63.0
16 to 20 percent	37.5	62.5

The Tier One Plan allows for voluntary transfers of shortage allocations between SFPUC and any wholesale customer and between wholesale customers themselves. In addition, water "banked" by a wholesale customer, through reductions in usage greater than required, may also be transferred.

Unless mutually extended by San Francisco and the wholesale customers, the Tier One Plan will expire at the end of the term of the Supply Agreement in 2034.

The Tier One Plan applies only when SFPUC determines that a systemwide water shortage exists and issues a declaration of a water shortage emergency under Water Code Section 350. Separate from a declaration of a water shortage emergency, SFPUC may opt to request voluntary cutbacks from San Francisco and the wholesale customers to achieve necessary water use reductions during drought periods. During the current drought to date, SFPUC has requested, but has not mandated, a 10 percent systemwide reduction since January 2014. SFPUC has not yet been compelled to declare a water shortage emergency and implement the Tier One Plan because its customers have exceeded the 10 percent voluntary systemwide reduction in conjunction with the Statewide mandatory reductions assigned by the State Water Board.

Tier Two Drought Allocations

In 2010, the wholesale customers negotiated and adopted the Tier Two Drought Implementation Plan (Tier Two Plan), which allocates the collective wholesale customer share among each of the 26 wholesale customers. This Tier Two Plan allocation is based on a formula that takes into account multiple factors for each wholesale customer, including:

- Individual Supply Guarantee
- Seasonal use of all available water supplies
- Residential per-capita use

The water supplies made available from SFPUC will be allocated to individual wholesale customers in proportion to each wholesale customer's Allocation Basis, which, in turn, is the weighted average of two components. The first component is the fixed wholesale customer's Individual Guarantee as stated in the Supply Agreement. The second component is the Base/Seasonal Component, which is variable and is calculated using each wholesale customer's total monthly water use from all available water supplies during the three consecutive years prior to the onset of the drought. The second component is accorded twice the weight of the first component in calculating the Allocation Basis. Minor adjustments to the Allocation Basis are then made to ensure a minimum cutback level, a maximum cutback level, and a minimum level of supply to meet health and safety needs for certain wholesale customers.

Each wholesale customer's Allocation Factor, which represents its percentage allocation of the total available water supplies, is calculated from its proportionate share of the total of all wholesale customers' Allocation Bases. The final shortage allocation for each wholesale customer is determined by multiplying the amount of water available to the wholesale customers' collectively under the Tier One Plan, by the wholesale customer's Allocation Factor.

The Tier Two Plan requires that the Allocation Factors be calculated by BAWSCA each year in preparation for a potential water shortage emergency. As the wholesale customers change their water use characteristics (e.g., increases or decreases in SFPUC purchases and use of other water sources, changes in monthly water use patterns, or changes in residential per-capita water use), the Allocation Factor for each wholesale customer also changes.

For long-term planning purposes, each wholesale customer has been provided with the Tier Two Allocation Factors calculated by BAWSCA based upon the most recent normal year to determine its share of available Regional System supplies. However, actual allocations to each wholesale customer during a future shortage event will be calculated in accordance with the Tier Two plan at the onset of the shortage. For the purpose of this UWMP, Mountain View used Allocation Factors of 6.2 percent to 6.5 percent to project future supply availability in Chapter 6.6 (based on information provided by BAWSCA. The current Tier Two Plan will expire in 2018 unless extended by the wholesale customers.

6.1.5 BAWSCA's Long-Term Reliable Water Supply Strategy

BAWSCA's Long-Term Reliable Water Supply Strategy (Strategy) was developed to quantify the water supply reliability needs of the BAWSCA member agencies through 2040, identify the water supply management projects and programs that could be developed to meet those needs, and prepare an implementation plan for the Strategy's recommendations. Successful implementation of the Strategy is critical to ensuring sufficient and reliable water supplies for the BAWSCA member agencies and their customers in the future.

Phase II of the Strategy was completed in February 2015 with release of the Strategy Phase II Final Report. Phase II's water demand analysis resulted in the following key findings:

- There is no longer a regional normal year supply shortfall.
- There is a regional drought year supply shortfall of up to 43 mgd.

In addition to the demand and supply analysis, over 65 potential water transfer, storage, reuse, groundwater, and desalination projects were identified and evaluated as potential methods for meeting BAWSCA member agency dry-year reliability needs. Phase II's project evaluation analysis resulted in the following key findings:

- Water transfers score consistently high across the various performance measures and within various portfolio constructs and, thus, represent a high-priority element of the Strategy.
- Desalination potentially provides substantial yield, but high cost and intense permitting requirements make this option a less attractive drought-year supply alternative. However, given the limited options for generating significant yield for the region, desalination warrants further investment in information as a hedge against the loss of local or other imported supplies.
- The other potential regional projects provide tangible, though limited, benefits in reducing dry-year shortfalls given the small average yields in drought years.[22]

[22] While specific projects were not developed or evaluated for the Strategy, regional discussions on indirect/direct potable reuse have accelerated dramatically in the last year, making this a water supply management project BAWSCA is tracking closely.

The recommended Phase II Strategy included the following actions:

- Lead water transfer development and implementation, including identifying and evaluating water storage options.
- Facilitate desalination partnerships and pursue outside funding for related studies.
- Support agency-identified projects (i.e., recycled water and groundwater) and local capture and reuse.
- Participate in regional planning studies in cooperation with others.
- Continue monitoring regional water supply investments and policies.

BAWSCA is now implementing the Strategy recommendations in coordination with its member agencies. Strategy implementation will be adaptively managed to account for changing conditions and to ensure that the goals of the Strategy are met efficiently and cost-effectively.

Due to the size of the supply and reliability need, and the uncertainty around yield of some Strategy projects, BAWSCA will need to pursue multiple actions and projects in order to provide some level of increased water supply reliability for its member agencies. On an annual basis, BAWSCA will reevaluate Strategy recommendations and results in conjunction with development of the work plan for the following year. In this way, actions can be modified to accommodate changing conditions and new developments.

6.2 Reliability of the SCVWD Water System

The information below is summarized from SCVWD's adopted *Water Supply and Infrastructure Master Plan* (Water Master Plan, SCVWD, 2012b) and language provided to the City from SCVWD's retailer draft 2015 UWMP.

6.2.1 Water Supply and Infrastructure Master Plan

The SCVWD Water Master Plan evaluates potential supply options for meeting future water demands. The Water Master Plan relies on optimizing existing supplies and infrastructure, increasing recycled water use and conservation, and managing risks from climate change and imported water reductions. Below is a list of key options addressed in the Water Master Plan.

- Natural groundwater recharge, local surface water supplies, and imported water supplies.
- Recycled water use and conservation savings.
- Treatment plant capacity, pipeline repairs, dam retrofits, and operating restrictions.

The Water Master Plan is scheduled to be updated in 2017.

6.2.2 Constraints on Local Surface Water

Local surface water supplies are vulnerable to hydrologic variability, with most reservoirs sized for annual operations. In wetter years, SCVWD is challenged to capture available supply due to capacity constraints and flood protection needs. In drier years, SCVWD is challenged to maintain its groundwater recharge program due to regulations and permit conditions that require SCVWD to maintain bypass flows.

Several factors can impact SCVWD's reservoir operations and its use of surface water rights, including meeting reservoir operating rules designed to reduce flood risk, maintaining storage levels for environmental or recreation purposes, dam safety requirements, and managing total SCVWD supplies for reliability.

The 1997 listing of Central California Coast Steelhead as a threatened species under Federal Endangered Species Act requires SCVWD to obtain permits to address the impacts of its water supply activities on aquatic habitat and instream flows. SCVWD will continue to work with the State Water Board to complete the modification of water rights licenses to allow SCVWD to supply water for the residents of Santa Clara County while supporting the environmental needs of fish and other aquatic life. This includes the development of a proposed fish habitat restoration plan (FHRP). The outcome of the FHRP and modification of water rights licenses, future Lake and Streambed Alteration Agreements, additional environmental requirements, and future seismic assessments could all affect future local surface water supply availability.

6.2.3 Constraints on Imported Water Supplies

Imported water supplies are subject to hydrologic variability. Storage can help mitigate the impacts of hydrologic variability, as does the development of nonweather-dependent supplies.

SCVWD's SWP and CVP water supplies are also subject to a number of additional constraints, including operations to manage flows and water quality in the Delta, seismic threats to the levee system, and water quality variations (including algal blooms). Water quality variations are addressed at SCVWD's drinking water treatment plants by blending sources and/or switching sources. Algae and disinfection byproduct precursors can be especially challenging during drought conditions. In addition to developing local supplies, securing and optimizing SCVWD's existing local water system, and expanding water conservation, SCVWD is evaluating the costs and benefits of participating in the California WaterFix as a means of improving imported water reliability.

To evaluate SWP supply availability under future conditions, DWR performed four model studies. The first of the future-conditions studies, the Early Long-Term (ELT) scenario, used all of the same model assumptions for current conditions, but reflected changes expected to occur from climate change, specifically a 2025 emission level and a 15 cm sea level rise. The other three future-conditions include varying model assumptions related to the Bay Delta Conservation Plan/California Water Fix, such as changes to facilities and/or regulatory and operational constraints.

SCVWD's retailer draft 2015 UWMP uses the ELT scenario to estimate future SWP and CVP supply availability because it is based on existing facilities and regulatory constraints, with hydrology adjusted for the expected effects of climate change. This scenario is consistent with studies DWR has used in its previous SWP Delivery Reliability Reports for supply availability under future conditions. The assumptions regarding future SWP and CVP supply availability will be updated when there is more certainty regarding future infrastructure, operations, and regulations.

6.2.4 Normal and Dry-Year Supply Reliability

Modeling performed by SCVWD indicates the ability to meet demands of the retail agencies during normal years through 2035, with a shortfall of less than 1 percent in 2040.

SCVWD aims to limit dry-year reductions to no greater than 10 percent. Single dry-year model results show zero shortfalls through 2035 and an 8 percent shortfall in 2040. The greatest challenge to water supply reliability is multiple dry years. Although supply in each year may be greater than in a single dry year, multiple dry-year periods deplete reserves from regional storage facilities and local groundwater storage. As reserves from groundwater storage are depleted, the risk of permanent land subsidence

increases. SCVWD modeling indicates Countywide supply shortfalls of between 15 percent and 37 percent during multiple dry years. To bridge the gap between supplies and demands during a multi-year drought, SCVWD would likely implement a combination of calls for short-term water use reductions, use of reserves, and obtaining additional supplement supplies through transfers and/or exchanges. The actual mix of these options would be determined through SCVWD's annual operations planning process. SCVWD plans to identify projects and programs for additional supply or conservation savings during its 2017 Water Master Plan update (SCVWD, 2016b).

6.3 Water Quality Impacts on Supply Reliability

The City of Mountain View provides high-quality water that meets all current State and Federal water quality standards. Staff from SFPUC, SCVWD, and Mountain View regularly collect and test water samples from reservoirs, wells, and designated sampling points to ensure that the water supplied to Mountain View customers meets or exceeds all applicable standards. Based on the results of drinking water source assessments prepared for each of the City's three potable water supply sources, no long-term water quality impacts are anticipated. Additional information about Mountain View's water quality is reported annually in the Consumer Confidence Report (Mountain View, 2015).

6.4 Effects of Climate Change on Supply Reliability

The issue of climate change has become an important factor in water resources planning throughout the State and is frequently considered in urban water management planning purposes, although the extent and precise effects of climate change remain uncertain. Increasing concentrations of greenhouse gases have caused and will continue to cause a rise in temperatures around the world, which will result in a wide range of changes in climate patterns. Moreover, observational data show that a warming trend occurred during the latter part of the 20th Century and virtually all projections indicate this will continue through the 21st Century. These changes will have a direct effect on water resources in California, and numerous studies have been conducted to determine the potential impacts to water resources. Based on these studies, climate change could result in the following types of water resource impacts, including impacts on the watersheds in the Bay Area:

- Reductions in the average annual snowpack due to a rise in the snowline and a shallower snowpack in the low and medium elevation zones, such as in the Tuolumne River basin, and a shift in snowmelt runoff to earlier in the year.

- Changes in the timing, intensity and variability of precipitation, and an increased amount of precipitation falling as rain instead of as snow.
- Long-term changes in watershed vegetation and increased incidence of wildfires that could affect water quality and quantity.
- Sea level rise and an increase in saltwater intrusion.
- Increased water temperatures with accompanying potential adverse effects on some fisheries and water quality.
- Increases in evaporation and concomitant increased irrigation need.
- Changes in urban and agricultural water demand.

Both SFPUC and BAWSCA participated in the 2013 update of the Bay Area Integrated Regional Water Management Plan, which includes an assessment of the potential climate change vulnerabilities of the region's water resources and identifies climate change adaptation strategies.

6.4.1 SFPUC Regional System

SFPUC continues to assess the effects of climate change, which is viewed as an ongoing project requiring regular updating to reflect improvements in climate science, atmospheric/ocean modeling, and human response to the threat of greenhouse gas emissions. Climate change research by SFPUC began in 2009 and continues to be refined. In its 2012 report *Sensitivity of Upper Tuolumne River Flow to Climate Change Scenarios* (SFPUC, 2012), SFPUC assessed the sensitivity of runoff into Hetch Hetchy Reservoir to a range of changes in temperature and precipitation due to climate change. Key conclusions from the report include the following:

- With differing increases in temperature alone, the median annual runoff at Hetch Hetchy would decrease by 0.7 percent to 2.1 percent from present-day conditions by 2040 and by 2.6 percent to 10.2 percent from present-day by 2100. Adding differing decreases in precipitation on top of temperature increases, the median annual runoff at Hetch Hetchy would decrease by 7.6 percent to 8.6 percent from present-day conditions by 2040 and by 24.7 percent to 29.4 percent from present-day conditions by 2100.

- In critically dry years, these reductions in annual runoff at Hetch Hetchy would be significantly greater, with runoff decreasing up to 46.5 percent from present-day conditions by 2100 utilizing the same climate change scenarios.

- In addition to the total change in runoff, there will be a shift in the annual distribution of runoff. Winter and early spring runoff would increase and late spring and summer runoff would decrease.

- Under all scenarios, snow accumulation would be reduced and snow would melt earlier in the spring, with significant reductions in maximum peak snow water equivalent under most scenarios.

Currently, SFPUC is planning to conduct a comprehensive assessment of the potential effects of climate change on water supply. The assessment will incorporate an investigation of new research on the current drought and is anticipated to be completed in late 2016 or early 2017.

6.4.2 SCVWD Water System

SCVWD's ability to provide a reliable, clean water supply is challenged by the potential of warmer temperatures, changing precipitation and runoff patterns, reduced snowpack, and rising sea levels. SCVWD's water supply vulnerabilities to climate change include a decrease in imported water supplies as a result of a potential reduction in snowpack and a shift in the timing of runoff, a decrease in local surface water supplies as result of reduced precipitation, more frequent and severe droughts, changes in surface water quality associated with changes in flows and temperature, and changes in imported water quality due to salinity intrusion in the Delta. Additional vulnerabilities include more frequent algal blooms, invasive and/or nonnative species, and wildfire threats to supply infrastructure.

To address constraints on water supplies and the challenges of an uncertain future and imprecise projections of future conditions and potential impacts on water supplies, SCVWD relies on its long-term planning efforts that continually develop and improve resilient and adaptable water supplies and strategies and consider changing and uncertain conditions. SCVWD is preparing to update its Water Master Plan in 2017. The plan is reviewed annually and updated every five years to evolve to changing conditions. The 2017 update will build upon the Board-approved strategies to secure and optimize the use of existing supplies and infrastructure and meet future increases in demands with conservation and recycling. The Water Master Plan will continue to develop elements that adapt well to future climate changes.

6.5 Potential Future Water Supply Projects

Projects specific to Mountain View's wholesale water suppliers (SFPUC and SCVWD) are discussed in their respective UWMPs. Mountain View plans to perform a groundwater well site planning study in the next two years to determine a feasible location for a new well.

6.5.1 Bay Area Regional Desalination Project

Mountain View has not independently evaluated the potential for desalination. Desalination is, however, being pursued on a regional basis and by the City's two wholesale suppliers. Below is a summary of these efforts based on information provided by the BARDP's reports.

Five Bay Area water agencies, including SCVWD, SFPUC, East Bay Municipal Utility District (EBMUD), Contra Costa Water District (CCWD), and Zone 7 Water Agency (Zone 7), are currently collaborating on the BARDP. The BARDP will leverage existing pipelines and interties so multiple agencies can share a new regional desalination facility. The planned facility will increase regional supply reliability, especially in the face of emergencies, droughts, and temporary maintenance closures of other major facilities. The desalination facility is envisioned to operate in all-year types to serve the needs of SFPUC and Zone 7, whereas demand for SCVWD, CCWD, and EBMUD's would vary depending on factors such as water year type.

Since 2010, the BARDP has completed several studies and pilot testing. At the conclusion of the Institutional Analysis conducted in 2010, the BARDP chose the Mallard Slough Pump Station near Pittsburg, California, as the best site for potential desalination. Although other potential sites were evaluated, one along Ocean Beach in San Francisco and another near the Bay Bridge in Oakland, they were eventually deemed infeasible for desalination. Figure 6-1 shows the location of the BARDP's Mallard Slough pilot desalination facility.

Figure 6-1: Key Bay Area Desalination Study Sites

In 2011, the BARDP partner agencies funded several site-specific analyses for a desalination facility at the Mallard Slough Pump Station. Impacts to water quality, sensitive fish populations, conjunctive operation of Los Vaqueros Reservoir, estimation of greenhouse gas emissions, and distribution modeling through EBMUD's conveyance system were all studied, resulting in the following:[23]

- Up to 20 mgd could be transferred to the Hayward Intertie at least 90 percent of the year, and 10 mgd to Zone 7 over 95 percent of the year.

[23] From: http://www.regionaldesal.com/about.html and (*BARDP, 2014*).

- Operation of a 20 mgd plant at Mallard Slough would not have a significant impact on water quality or beneficial uses.

- Sensitive fish species are present in the vicinity of the treatment plant February through May.

- Energy use and associated greenhouse gas emissions are less than for other desalination projects because of existing facilities and brackish source water.

- The option to store water in Los Vaqueros could help meet over 80 percent of agencies' collective drought needs.

The next step for the BARDP is to revisit the project's role within the context of each agency's changing water supply and demand picture through 2030.

6.5.2 Potable Reuse of Advanced Purified Water

SCVWD has been moving forward with plans to develop potable reuse of advanced purified water. As discussed in Chapter 5.4.8, the Silicon Valley Advanced Water Purification Center currently provides advanced treatment for up to 8 mgd. SCVWD has recently expedited studies of potable reuse, including expanded facilities to provide 20,000 to 45,000 AFY of purified water for potable reuse (SCVWD, 2016a). More information on plans for potable reuse is available from SCVWD.

6.5.3 Transfer and Exchange Opportunities

The City of Mountain View has potable water system interties with the City of Sunnyvale and the City of Palo Alto to assist in short-term water transfers during periods of system maintenance or in the event of an emergency. Hydrants located in Cal Water service areas are also available for the City to use in an emergency.

Mountain View's diverse water supply enables the City to provide a reliable supply of water without the need to exchange or transfer water on a long-term basis. If necessary, however, the current water supply contracts for the SFPUC Regional System do allow interagency transfer of entitlements or unused water allocations. Mountain View may explore potential options in the future, if it is deemed beneficial to the City.

SFPUC and SCVWD independently manage water transfers and exchanges that affect their respective systems. SCVWD has historically used transfers and exchanges as part

of its water supply portfolio. Details of these efforts are described by SFPUC and SCVWD in their respective UWMPs.

6.6 Estimated Minimum Three-Year Supply

As discussed in previous chapters, Mountain View imports about 86 percent of its total water supply from the SFPUC; 7 percent is imported from the SCVWD; 2 percent is produced at local groundwater wells; and 5 percent is recycled water delivered from the RWQCP for nonpotable purposes.

Based on the above information provided by Mountain View's wholesale agencies, Table 6-2 presents Mountain View's estimated minimum three-year supply for 2016 through 2019. Despite the current historic drought, SCVWD's supply modeling shows potable supplies to exceed current Countywide demands (from 2013 and 2015) by at least 10 percent (SCVWD, 2016c).

Table 6-2: Estimated Minimum Three-Year Supply

Source	Actual 2015 Production	Single Dry Year	Multiple Dry Year		
			Year 1	Year 2	Year 3
SFPUC	8,043	9,526	9,526	9,116	9,116
SCVWD	682	1,200	1,200	1,200	1,200
Groundwater	145	565	565	561	554
Potable Water	8,870	11,290	11,290	10,877	10,871
Recycled Water	450	555	555	662	916
Total Supply	9,320	11,845	11,845	11,539	11,787

6.7 Water Demand and Supply Comparison

Mountain View expects to meet projected water demands during normal and dry-year scenarios through a combination of potable and recycled supply sources, water conservation, and water shortage contingency measures.

The following paragraphs provide a comparison of projected supply production and water demand during normal, single dry, and multiple dry-year scenarios. This analysis is based on information provided by Mountain View's wholesale suppliers, anticipated groundwater production, and anticipated recycled water use. As discussed at the beginning of Chapter 6, "normal year," "single dry year," and "multiple dry

years" refer to hydrologic conditions experienced in the past. For the purpose of this UWMP, the year 1977 was used to represent the "single dry year" scenario and the periods 1988 to 1992 and 2013 to 2015 were used to represent the "multiple dry years" scenario for SFPUC and SCVWD, respectively. Demand projections utilized in this analysis are presented in Chapter 4.2, based on population and employment growth envisioned by the adopted 2030 General Plan. A separate supply analysis for additional projects currently under evaluation (referred to collectively as the "higher-growth" alternative) is presented in Chapter 6.8.

6.7.1 Normal Water Year

Under the General Plan growth patterns, Mountain View expects to meet projected water demands in its service area during normal years through 2040.

Table 6-3: Normal Year Supply and Demand Comparison

Supply Source	Normal Year Projected Water Supply and Demand (AFY)				
	2020	2025	2030	2035	2040
SFPUC	9,546	9,713	9,966	10,266	10,603
SCVWD	1,200	1,200	1,200	1,200	1,195[24]
Groundwater	566	574	588	604	621
Potable Supply	11,312	11,487	11,754	12,070	12,419
Potable Demand	11,312	11,487	11,754	12,070	12,419
Difference (% demand)	**0%**	**0%**	**0%**	**0%**	**0%**
Recycled Supply	995	1,091	1,091	1,091	1,091
Recycled Demand	995	1,091	1,091	1,091	1,091
Difference (% demand)	**0%**	**0%**	**0%**	**0%**	**0%**

The supply numbers presented in Table 6-3 for normal years are based on expected supply needs and do not necessarily reflect the maximum supply availability. For conservative planning purposes, the demands presented above include water savings expected from plumbing code updates but do not incorporate active conservation program savings (Scenario B in Chapter 4.2.1).

[24] Reflects a 0.4 percent reduction in normal year supplies in 2040, according to SCVWD.

6.7.2 Single Dry Water Year

During single dry years through 2035, Mountain View expects to meet projected water demands in the service area for growth envisioned by the General Plan. A supply shortfall of 1 percent is projected for the single dry-year scenario in 2040 (Table 6-4).

Table 6-4: Single Dry-Year Supply and Demand Comparison

Supply Source	Single Dry Year Projected Water Supply and Demand (AFY)				
	2020	**2025**	**2030**	**2035**	**2040**
SFPUC	9,546	9,713	9,966	10,266	10,597
SCVWD	1,200	1,200	1,200	1,200	1,104[25]
Groundwater	566	574	588	604	621
Potable Supply	11,312	11,487	11,754	12,070	12,322
Potable Demand	11,312	11,487	11,754	12,070	12,419
Difference (% demand)	**0%**	**0%**	**0%**	**0%**	**-1%**
Recycled Supply	955	1,091	1,091	1,091	1,091
Recycled Demand	955	1,091	1,091	1,091	1,091
Difference (% demand)	**0%**	**0%**	**0%**	**0%**	**0%**

6.7.3 Multiple Dry Water Years

Water agencies are required to analyze supply reliability for three years of consecutive drought. Mountain View anticipates supply shortfalls of up to 4 percent during a multi-year drought (Table 6-5).

Projected dry-year supply shortfalls will be met through the implementation of temporary demand reduction measures in accordance with the City's Water Shortage Contingency Plan (Chapter 9).

[25] Reflects an 8 percent reduction in single dry-year supplies in 2040, according to SCVWD.

Table 6-5: Multiple Dry-Year Supply and Demand Comparison

Supply Source	Multiple Dry Years Projected Water Supply and Demand (AFY)								
	2020			2025			2030		
	Year 1	**Year 2**	**Year 3**	**Year 1**	**Year 2**	**Year 3**	**Year 1**	**Year 2**	**Year 3**
SFPUC	9,546	9,546	9,546	9,713	9,713	9,713	9,966	9,966	9,966
SCVWD	978	769	894	1,016	833	937	992	805	906
Groundwater	566	566	566	574	574	574	588	588	588
Potable Supply	11,090	10,881	11,006	11,303	11,120	11,224	11,546	11,359	11,460
Potable Demand	11,312	11,312	11,312	11,487	11,487	11,487	11,754	11,754	11,754
Difference (% demand)	**-2%**	**-4%**	**-3%**	**-2%**	**-3%**	**-2%**	**-2%**	**-3%**	**-2%**
Recycled Supply	995	995	995	1,091	1,091	1,091	1,091	1,091	1,091
Recycled Demand	995	995	995	1,091	1,091	1,091	1,091	1,091	1,091
Difference (% demand)	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**

Supply Source	Multiple Dry Years Projected Water Supply and Demand (AFY)					
	2035			2040		
	Year 1	**Year 2**	**Year 3**	**Year 1**	**Year 2**	**Year 3**
SFPUC	10,266	10,266	10,266	10,603	10,597	10,597
SCVWD	968	778	864	954	755	843
Groundwater	604	604	604	621	621	621
Potable Supply	11,838	11,648	11,734	12,178	11,972	12,061
Potable Demand	12,070	12,070	12,070	12,419	12,419	12,419
Difference (% demand)	**-2%**	**-3%**	**-3%**	**-2%**	**-4%**	**-3%**
Recycled Supply	1,091	1,091	1,091	1,091	1,091	1,091
Recycled Demand	1,091	1,091	1,091	1,091	1,091	1,091
Difference (% demand)	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**

6.8 Ability to meet Demand of Higher-Growth Alternative

Chapter 4 presents water demand projections for population and job growth envisioned in the General Plan, which was adopted in 2012. Expected growth included a population increase of 17,900 and a job increase of 18,838 between 2015 and 2040, which equates to nearly 24 percent more residents and 19 percent more jobs created over the next 25 years.

Several changes have occurred since 2012, however, and the City is contemplating additional projects that could add another 41,750 residents and 11,667 jobs in 2040, beyond what was envisioned in the General Plan. Although this "higher-growth alternative" is a combination of multiple projects that are being studied independent of each other, it is important to consider their collective possible impact on water supply reliability—if all such projects were approved. The estimated cumulative impact of all higher-growth projects and the adopted General Plan is a 79 percent increase in population and a 38 percent increase in jobs, compared to 2015 numbers.

Normal-year water demand for this higher-growth alternative was projected using the same method outlined in Chapter 4.2, resulting in a 2040 demand of 17,442 AFY, of which 1,091 AFY is expected to be met using recycled water. Application of the supply availability formulae used to evaluate supply sufficiency in Chapter 6.6 resulted in the following potable water supply shortfalls:

- Normal Year—No shortfalls through 2040.
- Single Dry Years—A shortfall of 2 percent in 2020, increasing to 25 percent shortfall in 2040.
- Multiple Dry Years—Shortfalls of 11 percent to 13 percent in 2020, increasing to 24 percent to 26 percent in 2040.

Based on this analysis, the City appears to have sufficient normal-year water supplies to support the "higher-growth" alternative; however, considerable dry-year shortfalls are expected. The volumes of multi-year drought supply shortfalls range from approximately 1,400 AFY to 4,100 AFY. Given the community's demonstrated ability to reduce demand during the current drought, including by 28 percent in 2015 (nearly 2,800 AFY), it is reasonable to assume that drought reductions on the order of 26 percent are achievable in the future; however, they would require considerable effort and widespread compliance. Implementation of new conservation programs and/or recycled water projects may reduce the expected dry-year supply shortfall. The

conservation savings modeled as part of this UWMP (Chapter 4) estimated approximately 1,325 AFY of conservation savings for the higher-growth alternative—based on Scenario C demand projection and conservation program assumptions. Many of the conservation measures evaluated in Scenario C are currently being implemented or studied for future implementation.

With respect to the methodology for estimating future dry-year supplies, it is important to note that dry-year supply availability from SFPUC, as it is currently agreed, depends on actual water use by each of the wholesale customers during the most recent normal year preceding any future drought. As such, if growth in Mountain View exceeds growth in neighboring cities, Mountain View would receive a larger drought allocation than was modeled as part of this UWMP. Conversely, if development is greater in other neighboring areas, Mountain View's allocation would be smaller than anticipated in this UWMP. The current Drought Allocation Plan (described in Chapter 6.1.4) expires in 2018. Its successor will be described in the City's 2020 UWMP.

7. WATER CONSERVATION

Mountain View recognizes the importance of water conservation and is committed to promoting and practicing the sustainable use of water resources. Mountain View demonstrates this commitment through outreach and educational programs, financial incentive programs through its water wholesalers, and by implementing water conservation measures at City properties. This chapter describes the City's current water conservation measures, many of which are implemented in collaboration with SCVWD or BAWSCA. Mountain View has also been a member of the California Urban Water Conservation Council (CUWCC) since its inception in 1991. CUWCC is a partnership of water suppliers, environmental groups, and others interested in conserving California's water resources.

The following paragraphs outline the City's effort to promote conservation and to reduce current and future demands on the potable water system.

7.1 Regulations

7.1.1 Water Waste Prevention Ordinance

Mountain View has had a water waste prevention ordinance since at least 1989. In 2015, the ordinance was updated and expanded in response to recent drought conditions. The ordinance includes permanent water-use restrictions and increasingly restrictive prohibitions according to increasing stages of water shortage. Restrictions

focus on reducing water use for "nonessential" purposes, which are defined based on the severity of the water shortage, and generally include discretionary water use—beyond what is required for public health and business operations. Some permanent water-use restrictions in effect at all times, regardless of supply conditions, include: using water in a manner that results in flooding or runoff; wasting water from broken or defective water systems; using a hose for vehicle washing without a positive shutoff valve; and serving water in a restaurant, except upon request. The full text and list of water-use restrictions for all water supply conditions is included in Appendix I.

7.1.2 Landscaping Regulations

Mountain View's Water Conservation in Landscaping Regulations are designed to increase landscape and irrigation water use efficiency. The regulations promote region-appropriate plants and establish standards for irrigation efficiency. These regulations were originally adopted in 1992, and updated in May 2010 and again in February 2016. The current regulations apply to projects requiring a Planning-level permit that contain over 500 square feet of new or rehabilitated landscape area.

7.1.3 Mountain View Green Building Code (MVGBC)

The MVGBC was approved by the City Council in March 2011. The code was modeled after the California Green Building Code (CalGreen) and sets standards for improved energy efficiency, water conservation, indoor environmental quality, and waste reduction. Under the MVGBC, new and renovated buildings must use water-efficient plumbing fixtures or demonstrate a 20 percent reduction from a baseline water use.

7.2 Water Metering

The City meters all water accounts and bills customers based on the volume of water used. Customer water use has been metered since at least 1938, when the City Code was originally adopted (Section 35.16).

7.2.1 Smart Metering

Starting in 2007, the City began installing radio-equipped meters throughout its service area to enable drive-by meter reading. The primary purpose of this project (referred to as "Automated Meter Reading" or "AMR") was to save time and operating costs by eliminating the need to manually read water meters. As the capability to utilize the radio-equipped meters advanced, a newer form of meter reading emerged through "Advanced Metering Infrastructure" or "AMI." The primary advantage held by AMI

over AMR is that it eliminates the need for any field meter reading (manual or drive-by) and generates valuable real-time water use data. Recent developments in software "dashboards" enable customers to monitor water use on a real-time basis. Customers can learn how and when they use water, promoting efficiency, and reducing leaks. Mountain View is currently conducting a feasibility study and planning to pilot-test AMI technologies later this year. This project will help inform the City of the costs and benefits of AMI and identify a preferred technology for full deployment.

7.2.2 Landscape Irrigation Metering

Many water accounts with large landscape areas (e.g., multi-family, commercial, and public properties) are metered using individual landscape meters. Accounts with over 500 ccf in annual irrigation water use receive a monthly report that tracks actual usage compared to a calculated budget based on landscape area and climate conditions. These reports bridge the gap between stakeholders, including landscapers, property managers, and owners, by providing a platform of communication and the tools necessary to efficiently manage irrigation water use.

7.3 Conservation Pricing

The City uses a tiered rate structure for single family and multi-family residential water accounts. Commercial and other nonresidential accounts are billed by the volume of water used, at a uniform rate. CUWCC considers both tiered rates and uniform rates conservation-oriented.

7.4 Dedicated Conservation Staff

The City's Water Conservation Program consists of two permanent full time positions. Current coordinator information is listed below:

Name:	Elizabeth Flegel
Title:	Water Conservation Coordinator
Address:	231 North Whisman Road, Mountain View, CA 94043
Phone:	650-903-6774
E-mail:	elizabeth.flegel@mountainview.gov

The second position, Water Resources Technician, provides technical assistance in the development and implementation of the City's Water Conservation Program. This position also serves as the City representative for community outreach and educational water conservation issues.

7.5 Water Loss Control

The City tracks system water loss on an annual basis as part of its water loss control and prevention program. System losses are calculated by comparing the volume of water purchased from wholesalers and pumped from local wells to the volume of water delivered to customers. Mountain View's annual system audits have shown less than 10 percent system water loss, which is consistent with the industry standard. In addition to monitoring water losses, the City maintains an infrastructure and capital improvement program, as well as ongoing maintenance and repair activities, to maintain the integrity of its water system.

7.6 Customer Reports, Surveys, Rebates, and Free Equipment

The City works with SCVWD and BAWSCA on conservation programs, including customer reports, rebates, surveys, and free equipment giveaways. Monthly usage reports are provided to single-family homes and large landscape accounts. Surveys are available for residential and large landscape customers. Rebates are available to all properties in Santa Clara County for replacing water using fixtures such as toilets, washing machines, and high-water-using landscapes. Giveaways include items such as high-efficiency showerheads, faucet aerators, replacement flapper valves for toilets, and spray nozzles for garden hoses.

7.6.1 Home Water Reports

Starting in 2015, the City began distributing Home Water Reports to single-family residential accounts. These bimonthly reports are in addition to a household water bill and serve as an educational tool. Household water use for the previous billing period is compared to that of other similar homes, based on the number of occupants and yard size. In addition to comparing water use, the reports present personalized water conservation tips to help reduce household water use.

7.6.2 Home Water Surveys

Free water-use surveys are available to single-family and multi-family residents through the "Water-Wise House Call" program. The survey provides recommendations for saving water, high-efficiency showerheads and faucet aerators, and a customized irrigation schedule. Over 1,100 surveys have been completed in Mountain View since 2010.

7.6.3 Landscape Water Budget Reports

In a partnership with SCVWD, Mountain View provides landscape water budget reports to the City's largest dedicated landscape irrigation accounts. Each month, account owners and landscape managers receive a customized report that compares actual irrigation water use to the ideal water use for their site. Water budgets are calculated using individual sites conditions and current weather data. This program is free for report recipients and helps to connect the individuals paying the water bill with those managing the landscape's irrigation. By the end of 2015, 277 potable irrigation sites were receiving water budget reports.

7.6.4 Large Landscape Water Audits

Mountain View encourages eligible landscape water budget recipients to participate in a free landscape water audit. Auditors provide landscape managers with water-use analyses, scheduling information, in-depth irrigation evaluation, and recommendations for affordable irrigation upgrades. A total of 24 landscape water audits have been conducted in Mountain View since 2010.

7.6.5 Plumbing Fixture Replacement

High-Efficiency Toilets (HET)

Rebates are available to residential customers that install qualifying high-efficiency toilets. The rebate program, which is available for single-family and multi-family customers, currently offers $125 per toilet. Over 800 residential toilets have been rebated since 2010. Free HET direct installations are available to CII customers and multi-family residences with 3.5 gallons per flush (gpf) toilets. Since 2010, over 1,100 water-efficient toilets have been installed through this program. CII buildings with urinals using one gallon or more per flush may have the urinal valves retrofitted for free to reduce the flush volume to 0.5 gpf.

High-Efficiency Clothes Washers (HEW)

Residential customers who purchase qualifying high-efficiency clothes washers (HEW) can receive a rebate of up to $150 through SCVWD's residential HEW incentive program. Over 1,900 residential HEWs have been installed in Mountain View since 2010 as part of this program. Laundromats and customers with common-area laundry rooms that purchase water-efficient commercial-grade clothes washers are eligible for a rebate of up to $400 per machine through SCVWD's commercial washer rebate

program. Through this program, 119 HEWs have been installed in CII settings in Mountain View since 2010.

Prerinse Dishwashing Spray Valves

Low-flow prerinse dishwashing spray valves are available to restaurants with less efficient spray valves. Both Mountain View and SCVWD distribute these devices upon request.

Commercial Equipment Rebates

Businesses that implement process and equipment changes resulting in significant water savings are eligible for SCVWD's Custom Rebate Program. Improving cooling system efficiency, installing a recirculating car wash system, and utilizing an ozone laundry system are some examples of projects that businesses may complete to increase their water-use efficiency. The rebate amount awarded is determined by the actual water savings realized by the project, up to $50,000 per customer.

Submeter Rebates

Many Mountain View multi-family complexes share a single water meter and, thus, are unable to bill residents based on their actual water use. It has been shown when residents are accountable and billed for their own water use, apartment complex water use decreases by an average of 25 percent. This rebate program pays up to $150 of the cost of installing a submeter at mobile home parks and apartment complexes.

7.6.6 Landscape Upgrades

Customers who install water-efficient irrigation equipment and/or replace turf with low-water-use plantings may receive rebates from SCVWD. Irrigation equipment rebates are available for the installation of dedicated irrigation meters, weather-based controllers, and other high-efficiency irrigation equipment. Landscape rebates are determined by the total area converted from high-water-use turf to drought-tolerant plantings. Since 2010, over 140 customers have received rebates for installing water-efficient irrigation equipment and/or replacing turf with low-water-use plantings.

7.7 Education and Outreach

7.7.1 School Education

Complimentary assemblies by EarthCapades are available to all public and private elementary and middle schools within Mountain View. The age-appropriate assemblies focus on drought preparedness and teach students the importance of water and how to conserve, protect, and respect water through engaging performances. SCVWD also provides free in-class lessons and materials to schools in Santa Clara County for varying grade levels. Lessons fulfill California core curriculum standards.

7.7.2 Landscape Education Classes

Starting in 2009, Mountain View has hosted six to eight free landscape classes each year through a partnership with BAWSCA. The classes focus on water-efficient gardening principles and techniques and are taught by local landscape professionals. The City will continue to partner with BAWSCA in the future to provide this educational resource to the community.

7.7.3 Website and Social Media

The Water Conservation Program maintains a website that serves as a repository of information about Mountain View's conservation programs and offerings and useful resources. In coordination with the City Manager's Office, regular water conservation updates are posted on Facebook, Twitter and Nextdoor.

7.7.4 Utility Bill Design, Messaging, and Inserts

Space on customer utility bills is used on an annual basis for conservation messaging and to promote incentive programs. Bill inserts are used to publicize events such as the Landscape Education Classes or to notify customers of water-use restrictions. Additional information provided on every bill includes: usage by rate tier, usage in gallons per day, a chart showing usage by bill period for the current and prior year, and a comparison to the average account use (for single-family homes). During the current drought, usage during 2013 was also added to the chart so that customers can compare their current water use to predrought levels.

7.7.5 Brochure Racks

The City provides educational and program material in brochure racks in buildings throughout the City. Brochure racks are located at Mountain View City Hall, Mountain View Public Library, Mountain View Senior Center, YMCA, and Mountain View Community Center.

7.7.6 Phone Hotline

Mountain View maintains a dedicated phone line for water conservation-related customer inquiries. The hotline phone number is 650-903-6216.

7.7.7 Events

Water conservation staff distributes education materials, program information, and free low-flow fixtures at community and corporate events such as the City's "Thursday Night Live," Public Works Week, Arbor Day, Spring Parade, Council Neighborhoods Committee meetings, and Earth Day celebrations.

7.8 Results of Conservation Measures

Table 7-1 provides a list of the implemented conservation measures.

Table 7-1: Results of Conservation Measures (2010-2015)

Conservation Measure	Actions
School education program	3,761 students
Landscape education classes	1,764 attendees
Water saving fixture giveaway	4,209 fixtures
Residential water survey	1,111 surveys
High-efficiency toilet/urinal rebate and install	2,055 installs
High-efficiency clothes washer rebate	2,035 rebates
Submeter rebate	143 rebates
Landscape rebate	97 sites
Landscape water budgets	277 sites
Landscape water audit	42 audits

8. WATER SUPPLY ASSESSMENT

The following chapter is intended to serve as guidance for the completion of a Water Supply Assessment (WSA) for projects within the Mountain View's water service area. The full requirements of a WSA are governed by California Water Code Section 10910-10915, and summarized in the *Guidebook for Implementation of Senate Bill 610 and Senate Bill 221 of 2001* (DWR, 2003b).

A WSA is a detailed analysis of water use and supply for a proposed development project. The purpose of a WSA is to determine if the water use associated with a proposed project can sufficiently be met by the water supplier serving the project area. A WSA is required for any "project," defined by Water Code Section 10912, which is also subject to the California Environmental Quality Act. Common projects where a WSA is required include residential developments with more than 500 dwelling units, and commercial projects with more than 250,000 square feet of floor space.

WSAs prepared for projects within Mountain View must include key items related to water supply and demand for the project and for the City's entire water service area, as required by the Water Code. These include, among other items:

- Project description.
- The projected water demand associated with the project and methodology of how this was calculated.
- The total projected demand for the City for the next 20 years, including all projects that have been approved, are in plan check phase, or are under construction.
- The total projected water supply available to the City under normal, single dry, and multiple dry-year scenarios for the next 20 years.
- A discussion of the project's water use, as well as cumulative demands for all approved projects within the City.
- An analysis of supply and total City demand, including all approved projects and the proposed project, under normal, single dry, and multiple dry-year scenarios for the next 20 years.

In order to maintain consistency between WSAs prepared by different consultants, the City has specified the following requirements for WSAs prepared for projects located within Mountain View's water service area. These requirements supersede the City's previous WSA Guidance, last updated in December 2014. Consultants preparing a WSA are encouraged to organize the analysis in a logical format, which may differ from the chronological Water Code section numbers. Brevity is encouraged. Samples of previously completed WSAs will be made available by the City upon request.

8.1 Historical Water Use Records

Depending on the size and previous ownership of the project site, historical water use data may be provided by the City. Applicants should work through the EIR process to request any data available from the City.

8.2 Unit Duty Factors

Official water demand projections utilized in a WSA must be based on unit duty factors issued or approved by the City, although alternative methodologies may be included to provide a range in estimated demands.

In previous iterations of the City's WSA guidance, duty factors were required to match those in the City's 2010 *Water Master Plan* and 2011 *General Plan Update Utility Impact Study*—which presented gross land use factors developed from historical water use on designated land use classifications. The City is currently in the process of updating its unit duty factors based on current water use trends and will issue updated guidance in the near future.

8.3 Project Water Demand

In order to estimate water demand for a project, consultants should apply the applicable unit duty factors specified by City staff. Water demand projections shall be presented both for the entire project, and for the net "change" from existing site conditions to quantify the net increase associated with the project.

8.4 Demand from Other Previously Approved Projects

In addition to project water demand, WSAs prepared in Mountain View must also estimate and list water demand for all other previously approved projects that are not yet receiving water (e.g., approved, in plan check, or under construction). Lists shall be obtained from the Planning Division, and water demand estimates shall be prepared

using the specified unit duty factors. Demand estimates for previously approved projects are not to be added to the systemwide supply analysis (the 2015 UWMP water demand projections), but serve to provide the City with a tracking mechanism to ensure that water is available for all previously approved projects.

8.5 Systemwide Water Demand

Projects Included in the General Plan

Projects included in the General Plan are accounted for in the demand projections presented herein and are, therefore, considered to be included in this UWMP. Projects within the General Plan shall rely on the analysis presented in this UWMP for the systemwide supply analysis in their WSA.

Projects Not Included in the General Plan

Projects not envisioned by the General Plan are not considered to be included in the demand analysis presented in this UWMP. As such, any new project that is outside of the scope of the General Plan must add the individual project water demands to the systemwide water demands presented in Chapter 4.2 for the purpose of their WSA supply reliability analysis. This requirement applies even if systemwide water demand at the time the WSA is prepared is below that which was projected in this UWMP.

9. WATER SHORTAGE CONTINGENCY PLAN

9.1 Guiding Principles

This chapter contains Mountain View's Water Shortage Contingency Plan (Shortage Plan), developed to serve as a flexible framework of planned response measures to mitigate water supply shortages of up to 50 percent. Mountain View's Shortage Plan was prepared in accordance with the following guiding principles:

- Shared contribution: All customers will share the burden of reducing water use in order to meet necessary reduction goals during water shortages.

- Meet basic health and safety needs: The plan gives the highest priority to essential health and safety uses.

- Prioritize reducing nonessential water uses: The plan concentrates on the elimination of nonessential water uses and on outdoor reductions.

- Minimize economic impacts to businesses: The plan minimizes actions that would have substantial impact on the community's economy and prioritizes job-related water use over residential and landscape water use.

- Communication at every stage: Public outreach and communication at every level of shortage is essential for customer response and will instill confidence in the City's ability to respond to water shortages.

The City most recently updated its Shortage Plan in May 2015, in response to the current drought. A copy of the current Shortage Plan (City Code Section 35.28.1 *et seq.*) is provided in Appendix I.

9.2 Customer Water Use Trends

As discussed in Chapter 4, residential customers represent the largest proportion of the City's water demand, followed by landscape irrigation. Water use across all customer sectors varies seasonally, with demand lowest in the winter and highest in the summer. Most of the increased summer consumption is attributed to higher volumes of outdoor water use for landscape irrigation. During water supply shortages, landscape irrigation is considered a nonessential water use and its reduction is prioritized over essential business and home water use. In Mountain View, most of this irrigation occurs in three customer categories: (1) dedicated landscape irrigation accounts; (2) single-family residential accounts; and (3) multi-family residential accounts.

In contrast to residential water use, seasonal variations in use for CII water accounts likely reflect changes in cooling requirements for buildings and production processes more than they do changes landscape irrigation needs. One reason for this is because most large CII customers utilize a dedicated irrigation meter for outdoor uses. Since outdoor use represents a relatively small proportion of CII account water demand, CII customers generally have fewer opportunities to reduce water use without changing their operations or incurring significant economic impacts.

9.3 Supply Augmentation

In the event of a water supply reduction, Mountain View is capable of augmenting a small portion of its supply with groundwater. However, since groundwater recharge is largely dependent on managed programs from SCVWD, cumulative subbasin impacts must also be considered.

Recycled water distribution via tanker trucks is available outside of the North Bayshore Area for construction, landscape irrigation, and other nonpotable water uses. The current hydrant program has designated two purple hydrants as public truck fill stations. Additional stations could be added if necessary. As mentioned in Chapter 4.1, current recycled water irrigation use represents about 5 percent of the City's annual water use. Potable construction use represents less than 1 percent of the City's annual water use.

9.4 Stages of Action

Multiple factors, including drought, disaster, and water supply system failure, could cause a reduction in Mountain View's water supply. The following paragraphs describe the actions Mountain View will take to respond to water shortages of various levels. Mountain View's Shortage Plan.

Mountain View will implement each Stage of Action Shortage Plan when the City's annual water supply is reduced by the specific levels outlined below: up to 10 percent, 11 percent to 25 percent, 26 percent to 40 percent, and greater than 40 percent.

The overall concept of this approach is that water shortages of different magnitudes require different measures to overcome the supply deficiency. As explained in further detail below, each stage includes a set of demand reduction actions and measures which become progressively more stringent as the shortage condition escalates. All of the stages are designed for adequate water to protect public health and safety and satisfy the fire protection needs of the City.

9.5 Demand Reduction

Normal Supply Conditions:

Under all water supply conditions, Mountain View enforces six water use prohibitions and implements conservation measures. The existing potable water use prohibitions, listed below, are currently incorporated into Mountain View's City Code.

- Wasting water from broken or defective water systems. Time allowed for repairs is 10 days.
- Using water in a manner that results in flooding or runoff into the gutter.
- Cleaning hard-surfaced areas with a hose unless equipped with a shutoff valve.

- Washing vehicles with a hose unless equipped with a shutoff valve.
- Serving water in restaurants, except on request.
- Operating single-pass cooling systems.

In addition to Mountain View's current water waste prohibitions, the City encourages water conservation through ongoing implementation of several conservation measures. These measures, which are discussed in greater detail in Chapter 7, include indoor and landscape water use surveys, rebates for high-efficiency plumbing fixtures, and public outreach activities.

Stage 1: Up to 10 Percent Water Shortage

During supply shortages of up to 10 percent, the City will expand existing efforts to promote conservation and will also intensify water conservation public information and outreach programs, notifying customers of the water shortage and the need to voluntarily conserve.

Stage 2: 11 to 25 Percent Water Shortage

Stage 2 initiates several mandatory water use restrictions and requirements that affect a broad range of activities:

- Washing paved or hard surfaces is prohibited, except by bucket or for health and safety reasons.
- At-home vehicle washing is prohibited, except by bucket.
- Watering or irrigating landscapes is prohibited:
  - Between 9:00 a.m. and 5:00 p.m. (except by bucket, hose, or for system repair).
  - More than one to three days per week as scheduled and posted by the City (except for system repair).
  - More than 15 minutes per day (except for drip irrigation or for system repair).

- Using potable water to fill decorative water features is prohibited, except to sustain aquatic life.
- Constructing or installing and operating new commercial car washes and commercial laundry systems that do not use water-recirculating technologies is prohibited.
- Using potable water for construction needs is prohibited when recycled water is readily available.
- Water-conserving restaurant dishwashing spray valves are required.
- Hotels must offer guests the option to reuse sheets and towels.

As an alternative to the restrictions limiting irrigation days and duration, large landscape customers may instead limit irrigation to a set percentage of their budget, as determined by the City based on the severity of the water shortage.

Additionally, the time allowed to repair broken or defective water systems is reduced to 5 days during a Stage 2 shortage (compared to 10 days under normal conditions).

Stage 3: 26 Percent to 40 Percent Water Shortage

During a Stage 3 shortage, the City will further restrict water used in swimming pools and commercial car washes, and limit repair time to three days. Below are the two additional Stage 3 restrictions:

- Operating commercial car washes that do not use water-recirculating technologies.
- Using potable water to full pools and spas.

Stage 4: Greater than 40 Percent Water Shortage

Under supply reductions of 40 percent or greater, the City will restrict the following:

- Irrigating landscapes, except for:
  - Fire prevention, erosion control, environmental mitigation projects.

- Maintenance of public parks, playing fields, day-care centers, or school grounds (which are allowed one day of irrigation per week).

The time allowed to repair broken or defective water systems is reduced to 24 hours. If additional reductions are necessary, the City will consider intensifying previous water use prohibitions or adding new restrictions.

9.6 Water Use Monitoring

Staff currently monitors water use through daily analyses of wholesale water purchases, well production data, and recycled water use. Irrigation use for the City's largest landscapes is monitored monthly through the Landscape Water Budget Program. During a supply shortage, staff will continue to monitor water use on at least a monthly basis to determine the effectiveness of the Shortage Plan's water use restrictions. Cumulative water use at City facilities (including buildings, parks, and the golf course) during 2015 was 46 percent less than in 2013—equal to 374 AF.

9.7 Publicity and Communication

Even before formal declaration of a water shortage, a public information program will be activated to provide customers with as much advance notice as possible. Following Council action declaring a shortage, residents and businesses would need to be provided notice of water shortage rules and regulations via a variety of media and communications methods. Coordination between City departments and with other public agencies can begin prior to formal declaration of a water shortage and can be accomplished through regular meetings, e-mail group updates, and presentations.

In a regional water shortage scenario, the City would use the public outreach resources and materials provided by SCVWD and/or BAWSCA. In addition to these materials, the City may develop its own materials and use the following media and methods to communicate with customers:

- City of Mountain View website.
- *The View* (a Citywide newsletter).
- Utility bill messaging and inserts.
- Television public service announcements.

- Brochure racks distributed throughout the City.
- Newspaper ads (e.g., the *Mountain View Voice*).
- Water Conservation phone hotline.
- Booths at community and corporate events.

9.8 Staff Resources

The City of Mountain View currently has two full-time staff positions dedicated to water conservation. Under normal conditions, a portion of conservation staff time is allotted to activities indirectly related to water conservation. Staff time dedicated to activities related solely to water conservation will increase with the severity of a supply shortage. Additional duties may be assigned to current City employees or hiring of temporary staff may be considered to meet staffing needs during extreme shortages.

9.9 Revenue Impacts of a Water Shortage

Mountain View's water rates are designed to fully fund ongoing annual costs such as wholesale water purchases and water system operation, a base level of annual capital improvement projects, and maintain an adequate Water Fund reserve. Water rates are composed of a flat fee and a per-unit fee for water consumed. Under Mountain View's three-tiered rate structure, residential customers' per-unit fee increases as the quantity of water used increases. Nonresidential customers pay a uniform rate for each volume of water used. The City's Finance and Administrative Services Department balances Water Fund revenues and expenditures each year during the budget process, and recommends rate adjustments as appropriate.

Reduced water consumption during a water shortage will cause Water Fund operating revenues to decline. Water Fund expenditures are approximately $26 million, of which 58 percent is used to purchase the water itself (a volumetric expense), while the remaining is for operational and maintenance costs (a largely fixed expense). In comparison, Water Fund revenues are approximately 80 percent volumetric and 20 percent fixed. This relationship can cause revenues to be insufficient during periods of reduced consumption, requiring either the use of reserves or generation of additional revenues (e.g., through drought surcharges or rate increases). Table 9-1 provides a high-level estimate of revenue impacts of a water shortage at a 10 percent, 25 percent, 40 percent, and 50 percent water supply reduction, in the absence of revenue adjustments.

Table 9-1: Estimated Revenue and Expenditure Impacts[26]

Estimated Impacts	Stage of Action (% reduction in water sales)			
	1	2	3	4
Supply and demand reduction	10%	25%	40%	50%
Reduction in volumetric water revenue	13%	28%	43%	53%
Reduction in total water revenue	11%	22%	34%	42%
Reduction in water costs	10%	25%	40%	50%
Reduction in total expenditures	6%	14%	23%	29%
Increased outreach (mailing/advertising)	No Change	$10,000	$20,000	$25,000
Increased enforcement (staff hours)	No Change	$20,000	$50,000	$100,000

During a water shortage, City staff evaluates options for correcting revenue shortfalls depending on the severity of the shortage and the City's ability to recover both operationally and financially. The City may consider several actions, including increasing water rates, adjusting the water rate structure, implementing a one-time water use surcharge, reallocating staff resources, and reassessing capital improvement project expenditures (Table 9-2).

Table 9-2: Possible Cost Recovery Measures

Possible Measure	Stage of Action			
	1	2	3	4
Add additional rate tiers	X	X	X	X
Change rate structure; increase higher consumption tiers		X	X	X
Reevaluate fixed charge component to ensure fixed costs are captured	X	X	X	X
Reevaluate staffing levels, reassigning as needed or applicable		X	X	X
Penalty assessment for noncompliant customers		X	X	X
Reassess capital improvement project expenditures			X	X
Implement a one-time emergency surcharge			X	X

[26] Based on high-level information from the FY 2014-15 budget and assumptions about tiered water usage summarized in the City's *Water and Sewer Rate Study* (Bartle Wells, 2013).

9.10 Enforcement

Enforcement of Mountain View's water conservation regulations is focused on soliciting cooperation from water customers who are unaware of the restrictions or have failed to comply with the provisions of the ordinance. If discussions with the customer are unsuccessful in obtaining compliance, available enforcement mechanisms detailed in Mountain View's City Code include fines, installation of flow restrictors and, as a last resort, discontinuation of service.

City employees and members of the public may register water-waste complaints through in person or by phone, e-mail or through the City's online *AskMountainView* tool (mountainview.gov/AskMV). Staff will be available to provide information and respond to complaints. Water conservation staff may seek assistance from the Code Enforcement Division in responding to complaints and enforcing water use restrictions.

9.11 Water Shortage Contingency Plan Termination

A water supply shortage ends when available wholesale deliveries improve to the point where the water system is once again capable of supporting normal water use, and any special water use rules and regulations in effect at the time are officially rescinded by City Council and public notice is given that the water shortage is over. The Public Works Director would then oversee any remaining termination and plan review activities. These activities could include:

- Publicize gratitude for the community's cooperation.
- Restore water utility operations, organization, and services to pre-event levels.
- Document the event and response and compile applicable records for future reference.
- Collect cost accounting information, assess revenue losses and financial impact, and review deferred projects or programs.
- Debrief staff to review effectiveness of actions, to identify the lessons learned, and to enhance response and recovery efforts in the future.
- Complete a detailed evaluation of affected facilities and services to prepare an "after action" report.

- Update the Water Shortage Contingency Plan as needed.

9.12 Recent Drought Actions

Over the past four years, California has experienced the most severe drought since record keeping began in 1895. Lower than average precipitation, coupled with record-high temperatures, greatly impacted water supplies across the State, resulting in severe cutbacks by many water agencies.

Locally, the drought impacted Mountain View's two water wholesale water suppliers in dramatically different ways. SFPUC requested 10 percent "voluntary" conservation or both 2014 and 2015, while SCVWD's Board of Directors requested 20 percent conservation in 2014, increased to 30 percent reduction in 2015.

California's largest reservoir, the Sierra Nevada snowpack, dropped to a record low of 5 percent of normal snow-water-equivalent during DWR's 2015 spring snow survey. Reduced snowpack, coupled with low reservoir levels in both State and Federal conveyance systems, prompted Governor Edmund G. Brown to issue the first mandatory water reductions in the State's history. The following paragraphs contain details about the current drought, including Statewide, regional, and local actions.

9.12.1 Statewide Actions

In January 2014, California Governor Brown proclaimed a state of emergency in response to historic Statewide drought conditions. In order to educate the public about the drought, the State initiated a water conservation awareness campaign focusing on reducing water use by 20 percent.

In March 2014, SWRCB adopted new emergency water conservation regulations. Nonessential uses of water, such as washing down hardscapes and causing runoff from excessive irrigation, were prohibited Statewide.

In November 2014, SWRCB adopted expanded emergency regulation to safeguard the State's remaining water supplies. The expanded regulation instructed urban water suppliers to implement the stage of their water shortage contingency plan that limited irrigation water use. If a supplier's plan did not contain a specific limit, irrigation was limited to two days per week.

In April 2015, Governor Brown issued Executive Order B-29-15 in response to continuing severe drought conditions. The Executive Order listed several actions for

the State to implement in order to save water, increase enforcement to prevent wasteful water use, streamline the State's drought response, and invest in new technologies that will make California more drought-resilient. Principally among the actions was the order for the State Water Board to impose mandatory water restrictions to achieve a Statewide 25 percent reduction in potable urban water usage through February 2016. To achieve this task, the State Water Board assigned reductions to each of the State's water suppliers ranging from 4 percent to 36 percent, compared to 2013 levels. The individually assigned reduction was based on each supplier's summer residential per-capita water use and was to be measured between June 2015 and February 2016. Mountain View was assigned a reduction of 16 percent. Also listed among the actions was banning the use of potable water for irrigating grass on public street medians.

9.12.2 Regional Actions

Regional drought response was performed primarily by SCVWD in Santa Clara County, and BAWSCA and SFPUC in the SFPUC wholesale customer service area.

SCVWD's Board of Directors requested 20 percent conservation throughout the County in February 2014—increased to 30 percent in March 2015. SCVWD allocated additional funding for conservation and updated many programs to motivate increased participation, such as doubling many rebate amounts and removing the rebate caps. SCVWD hired temporary employees to handle drought-response and coordinated near-Countywide adoption of a twice-per-week irrigation schedule. Water savings across the County was reported cumulatively at 27 percent for the 2015 calendar year. A complete list of drought response is provided in SCVWD's 2015 UWMP.

Similar to SCVWD, BAWSCA also implemented new drought-response programs, including marketing through TV ads, billboards, newspaper ads, and other media. BAWSCA worked with SCVWD on the two-day-per-week irrigation schedule and promoted it throughout the member service area. Collective water use by the BAWSCA member agencies during 2015 was 22 percent less than in 2013.

9.12.3 Local Actions

Upon declaration of a Statewide drought, City staff began increasing promotion of current conservation measures and planning possible expansion if additional reductions were necessary. In April 2014, Mountain View's City Council officially adopted the draft Shortage Plan contained in the City's 2010 UWMP, with minor updates. At this same time, Council also declared a Stage 1 Water Shortage—one of the first agencies in Santa Clara County to do so. Customers were notified and reminded of

the declared shortage and applicable water use restrictions via mail, utility bill inserts, website postings, and social media. The response was significant, and the City experienced a 13 percent decrease in water use between 2013 and 2014, despite an increased customer base.

In May 2015, Mountain View increased to a Stage 2 water shortage. The City implemented a two-day-per-week watering schedule (based on property address), and adopted an optional 20 percent reduction for irrigation customers receiving Landscape Water Budget Reports (as an alternative to the two-day schedule). One additional part-time employee was hired to provide customer service, and the Council appropriated nearly $300,000 for drought response. Projects included home water reports, smart metering pilot projects, school assemblies, outreach materials, a conservation database, and temporary staff. Customer interest in conservation increased dramatically, from approximately 100 inquiries in 2011 to over 1,600 inquiries in 2015. Customer response, in the form of conservation, was also dramatic, with a 28 percent reduction in water use during 2015 (compared to 2013). Cumulative water savings at City facilities (including buildings, parks and the golf course) was 46 percent.

Concluding the 2016 rainy season, Statewide water supply conditions have improved significantly; however, the future need for reductions has not been addressed by the State Water Board or the City's wholesale water suppliers. A public hearing is scheduled for May 18, 2016 to discuss amendments to the State's mandatory reductions.

10. CATASTROPHIC SUPPLY INTERRUPTION PLAN

In compliance with the Federal Bioterrorism Act and Department of Homeland Security guidelines, the City prepared a Water System Emergency Response Plan to mitigate the effects of natural disasters and man-made threats on Mountain View's water supply.

This confidential document:

- Identifies the types of emergencies to which Mountain View may need to respond, including power outages, floods and earthquakes.
- Describes the roles and responsibilities of City personnel during an emergency response.
- Outlines the processes and procedures for responding to different threats and emergencies.

Based on the type and severity of the emergency, the City will implement corrective measures which may include isolating water storage reservoirs, isolating portions of the water system, and deploying emergency generators to operate groundwater wells. In the event of a sudden supply interruption, the City will maintain the ability to provide a minimum amount of water to customers for life safety and sanitary provisions.

10.1 SFPUC Regional System

The information below was written in coordination with SFPUC.

Emergency Operations Plan

Following the 1989 Loma Prieta Earthquake, SFPUC created an Emergency Operations Plan (EOP). The EOP was originally released in 1992 and has been updated as necessary, most recently in September 2012. The EOP addresses a broad range of potential emergency situations that may affect SFPUC and that supplements other plans prepared by the San Francisco Department of Emergency Management. Specifically, the purpose of SFPUC EOP is to describe the department's emergency management organization, roles and responsibilities, and emergency policies and procedures. The EOP is supplemented by Division EOPs for divisions within SFPUC that clarify specific roles for each branch of the Department.

Regional Water System Emergency Response and Recovery Plan

In 2006, SFPUC updated the SFPUC Regional Water System Emergency Response and Recovery Plan (ERRP), originally prepared in 2003. The purpose of this plan is to describe the SFPUC Regional System emergency management organizations, roles and responsibilities within those organizations, and emergency management procedures. This contingency plan addresses how to respond to and to recover from a major seismic event, or other major disaster. The ERRP complements the other SFPUC emergency operations plans at the department, division, and bureau levels for major system emergencies. This plan complements other SFPUC emergency plans at the division and department levels for major system emergencies.

Emergency and Operations Plan for Water Supply and Treatment

Following a major emergency event, SFPUC will work closely with wholesale customers to monitor customer demand. In the event that any individual customer's uncontrolled distribution system leaks could result in major water waste and endanger the supply provided by the Regional Water System as a whole, flow through specific

customer connections may need to be temporarily reduced or terminated. SFPUC will work closely with customers to assess the nature of the demand (e.g., firefighting versus leakage), so that public health and safety protection is given top priority.

Power Outage Preparedness and Response

SFPUC's water transmission system is primarily gravity-fed from Hetch Hetchy Reservoir. Although water conveyance throughout the Regional System would not be greatly impacted by power outages because it is gravity-fed, SFPUC has prepared for potential regional power outages as follows:

- The Tesla disinfection facility, the Sunol Valley Water Treatment Plant, and the San Antonio Pump Station have back-up power in the form of generators or diesel-powered pumps. Additionally, both the Sunol Treatment Plant and the San Antonio Pump Station would not be impacted by a failure of the regional power grid because they run off of the SFPUC hydro-power generated by the Regional System.

- Both the Harry Tracy Water Treatment Plant and the Baden Pump Station have back-up generators in place.

- SFPUC has an emergency water supply connection with SCVWD, which also has back-up generators in place.

The WSIP also includes projects which will expand SFPUC's ability to remain in operation during power outages and other emergency situations.

10.2 SCVWD System

The information below was provided by SCVWD on March 20, 2016, from their retailer draft 2015 UWMP language.

Infrastructure Reliability Project

SCVWD completed its first Water Utility Infrastructure Reliability Plan in 2005 (Infrastructure Reliability Plan). This project measured the baseline performance of critical SCVWD facilities in emergency events and identified system vulnerabilities. The Reliability Plan concluded that SCVWD's water supply system could suffer up to a 60-day outage if a major event, such as a 7.9 magnitude earthquake on the San Andreas Fault, were to occur. Less severe hazards, such as other earthquakes, flooding, and

regional power outages had less of an impact on SCVWD, with outage times ranging from 1 to 45 days.

The project recommended several improvements to reduce the expected outage times, which SCVWD has been implementing. Materials including large-diameter spare pipe, internal pipeline joint seals, valves, and appurtenances were stockpiled to ensure reliability. SCVWD has also implemented several emergency planning recommendations to meet the goal of reducing outage time to 30 days. These include developing a list of contractors available on standing order to use during an emergency event and participating in CalWARN, a mutual aid network for water and wastewater utilities. Additional planned projects include installing four line valves on SCVWD's treated water pipelines to allow SCVWD to isolate damaged portions of pipelines.

In addition, SCVWD is making other substantial investments in reliability, including seismic retrofits at Anderson and Calero Dams and reliability upgrades at the Rinconada Water Treatment Plant, and retailers have made substantial improvements to their systems.

SCVWD is currently updating its Infrastructure Reliability Plan with the goal to identify new reliability improvements that are more regional. So far, the project has analyzed several outage scenarios, including earthquake, super-storm, and Delta outage (discussed in the following section), and has identified the expected outage duration of SCVWD's system for each event. Analyses show that expected outage time for SCVWD's system in a major event is approximately 30 days. The project team has also worked with SCVWD's retail customers to identify a reasonable level of service goal for hazard events. In most cases, retailers can continue to provide average winter demands without SCVWD treated water for the full outage duration of 30 days or more. Projects likely to be recommended include new or upgraded retailer interties, more isolation valves on SCVWD's pipelines, new retailer wells, and operational agreements for use of SCVWD or retailer systems to convey water to other retailers. The updated plan and final recommendations will be complete in June 2016.

Emergency Operations Center

SCVWD's Security and Emergency Services Unit (SESU) coordinates emergency response and recovery for SCVWD. During any emergency, SCVWD continues the primary missions of providing clean, safe water and flood protection to the people of Santa Clara County. SESU ensures that critical services are maintained and emergency response is centralized. SESU maintains a full-time professional emergency

management staff trained and equipped to respond quickly at any time of day or night to support SCVWD's Emergency Operations Center (EOC) and field responders.

The EOC is connected to other agencies and jurisdictions by an array of telecommunications, two-way radio, satellite telephone, and wireless messaging systems. In addition, two response vehicles with many of the same communications capabilities of the EOC enable staff to establish mobile emergency command posts where field operations may require. OES maintains communications with local, State, and national emergency management organizations and allied disaster preparedness and response agencies.

Delta-Conveyed Supply Interruption

DWR has estimated that in the event of a major earthquake in or near the Delta, regular water supply deliveries from the SWP could be interrupted for up to three years, posing a substantial risk to the California business economy. Accordingly, a postevent strategy has been developed which would provide necessary water supply protections. This strategy has been coordinated through DWR, the Army Corps of Engineers (Corps), Bureau of Reclamation, California Office of Emergency Services (Cal OES), the Metropolitan Water District of Southern California, and the State Water Contractors. Full implementation of the strategy would enable resumption of at least partial deliveries from the Delta in less than six months.

DWR's Delta Flood Emergency Management Plan (Flood Plan) includes strategies for responding to Delta levee failures, including establishing an emergency freshwater pathway from the central Delta to the export pumps in the south Delta. The Flood Plan includes the prepositioning of emergency construction materials at existing and new stockpiles and warehouse sites in the Delta, and development of tactical modeling tools to predict levee repair logistics, water quality conditions, and timelines of levee repair and suitable water quality to restore exports. The Flood Plan has been extensively coordinated with State, Federal, and local emergency response agencies. DWR, in conjunction with local agencies, the Corps, and Cal OES, regularly conduct simulated and field exercises to test and revise the Flood Plan under real-time conditions.

DWR's Delta Levees Subvention Program has prioritized, funded, and implemented levee improvements along the emergency freshwater pathway and other water supply corridors in the central and south Delta region. These efforts have been complementary to the DWR Flood Plan which, along with use of prepositioned emergency materials in the Delta, relies on pathway and other levees providing reasonable seismic performance to facilitate restoration of the freshwater pathway after a severe earthquake. Together,

these two programs have been successful in implementing a coordinated strategy of emergency preparedness for the benefit of the SWP and CVP systems.

SCVWD analyzed the impacts of a Delta outage to determine if continued limited service for the outage duration was possible without imported water. This Delta outage analysis assumed that all local District infrastructure will remain intact. An earthquake or flood in the Delta is unlikely to also badly damage local infrastructure. The analysis also assumed normal hydrologic conditions and starting storage conditions, rather than stacking disaster upon disaster (i.e., earthquake plus drought, etc.), access to SFPUC supplies, and implementation of water use reductions of 20 percent.

SCVWD's Delta outage analysis indicates that the impacts of a six-month Delta outage are largely operational as they would require retailers to supplement their treated water supplies with groundwater and for SCVWD to actively manage the groundwater recharge program to meet Countywide needs. Even with increased pumping, groundwater storage is estimated to remain in the normal/Stage 1 range. Thus, the impacts of a Delta outage are manageable assuming SCVWD continues with planned investments described in the *Water Supply and Infrastructure Master Plan* (SCVWD 2015b).

SCVWD would call for more aggressive water use reductions (up to 50 percent) if a Delta outage were to occur during a drought.

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