8.0 WATER SUPPLY VERSUS DEMAND COMPARISON

This section synthesizes the water supply information developed in Chapters 3, 4 and 5 and compares this to the City's projected demands which were developed in Chapter 6. Comparisons are provided under DWR's required range of hydrologic conditions including the Normal, Single Dry and Multiple Dry Year scenarios.

8.1 Summary of Supply

The City has three sources of water supply: Agency supply, groundwater, and recycled water. Opportunities for the use of desalinated water were not evaluated because neither the ocean nor San Pablo Bay is in close proximity to the City and because neither brackish nor impaired groundwater is present. Table 8-1 summarizes the City's supplies.

The City is able to balance these supplies as necessary to meet demands and minimize impacts. For example, the City currently reduces its use of Agency supply between June and September in accordance with the Temporary Impairment MOU. During these months the City includes groundwater and recycled water in its supply mix. Outside the months of June to September, the City minimizes its use of groundwater, drawing primarily on the Agency supply, in accordance with its General Plan policies.

Table 8-1 (DWR Table 4) Current and Planned Water Supplies

Water Supply Sources	2005 AFY	2010 AFY	2015 AFY	2020 AFY	2025 AFY	2030 AFY
Sonoma County Water Agency	6,372.0	6,372.0	6,372.0	6,372.0	6,372.0	6,372.0
Supplier produced groundwater	2,577.0	2,577.0	2,577.0	2,577.0	2,577.0	2,577.0
Supplier surface diversions	0.0	0.0	0.0	0.0	0.0	0.0
Transfers in or out	0.0	0.0	0.0	0.0	0.0	0.0
Exchanges in or out	0.0	0.0	0.0	0.0	0.0	0.0
Recycled water	1,000.0	1,200.0	1,300.0	1,300.0	1,300.0	1,300.0
Desalination	0.0	0.0	0.0	0.0	0.0	0.0
Other	0.0	0.0	0.0	0.0	0.0	0.0
Total	9,949.0	10,149.0	10,249.0	10,249.0	10,249.0	10,249.0

The Subregional System is planning a project that will result in the supply expansions outlined in Table 8-1. Table 8-2 summarizes the future recycled water supplies that would result from this planning.

Table 8-2 (DWR Table 17) Future Water Supply Projects

Project Name	Projected Start Date	Projected Completion Date	Normal Year Yield to City (AFY)	Single Dry Year Yield To City (AFY)	Multiple Dry Year Yield to City		
					Year 1 (AFY)	Year 2 (AFY)	Year 3 (AFY)
Subregional System's IRWP[a]	2008	2015	300.0	300.0	300.0	300.0	300.0
Total			300.0	300.0	300.0	300.0	300.0

[a] The Subregional System has completed a Program EIR and is beginning community specific feasibility studies related to expanded urban water recycling.

The City has two wholesale water suppliers: the Agency and the Subregional System. Table 8-3 illustrates the projected amount of water that the City expects to purchase from these suppliers to meet water demands in the future. The City has existing contracts for up to 7,500 AFY of Agency supply and 1,000 AFY of Subregional System recycled water supply. As described in Chapter 3, the City does not believe it is prudent to rely on its full contractual allocation from the Agency. As described in Chapter 5, the City believes it is reasonable to assume that the planned recycled water system expansion will occur because: 1) it is within the scope of the Subregional System's IRWP Master Plan, 2) documentation under CEQA is complete, and 3) funding mechanisms have been established and predesign efforts are underway.

Table 8-3 (DWR Table 19) City Demand Projections to Wholesale Suppliers

Wholesaler	2010 AFY	2015 AFY	2020 AFY	2025 AFY	2030 AFY
Sonoma County Water Agency	6,372.0	6,372.0	6,372.0	6,372.0	6,372.0
Subregional System IRWP	1,200.0	1,300.0	1,300.0	1,300.0	1,300.0

8.2 Water Supply Reliability

The reliability of the City's water sources is summarized in Tables 8-4a and 8-4 b and supported by data presented in Tables 8-5 and 8-6. These tables are a comprehensive presentation of the City's supply and include wholesaler information from both the Agency and the Subregional system. The City's analysis relies upon the Agency's existing permitted water rights which are more restrictive than any hydrological conditions.

Table 8-4a (DWR Table 8- modified) Current Supply Reliability Percent of Normal

			Multiple Dry Water Years		
Sources	**Normal Water Year**	**Single Dry Water Year**	**Year 1**	**Year 2**	**Year 3**
Sonoma County Water Agency	6,372.0	6,372.0	6,372.0	6,372.0	6,372.0
Groundwater	2,577.0	2,577.0	2,577.0	2,577.0	2,577.0
Recycled Water	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0
Totals	9,949.0	9,949.0	9,949.0	9,949.0	9,949.0
Percent of Normal	100%	100%	100%	100%	100%

Table 8-4b (DWR Table 8- modified) Year 2030 Supply Reliability Percent of Normal

			Multiple Dry Water Years		
Sources	**Normal Water Year**	**Single Dry Water Year**	**Year 1**	**Year 2**	**Year 3**
Sonoma County Water Agency	6,372.0	6,372.0	6,372.0	6,372.0	6,372.0
Groundwater	2,577.0	2,577.0	2,577.0	2,577.0	2,577.0
Recycled Water	1,300.0	1,300.0	1,300.0	1,300.0	1,300.0
Totals	10,249.0	10,249.0	10,249.0	10,249.0	10,249.0
Percent of Normal	100%	100%	100%	100%	100%

Table 8-5 lists the years upon which the data in Table 8-4a and 8-4b are based.

Table 8-5 (DWR Table 9) Basis of Water Year Data

Water Year Type	Base Year(s)	Historical Sequence
Normal Water Year	1962	Slightly dry and preceded by 2 similar years
Single-Dry Water Year	1977	Single driest year on record
Multiple-Dry Water Years	1990-1992	Driest 3 year period with full operation of the Russian River System[23]

Note: Sonoma County Water Agency (a), page 3-4

Factors resulting in inconsistency of supply are summarized in Table 8-6. The City's current Agency supply, groundwater supply and recycled water supply are all highly stable.

The Agency's proposed supply increase is not predictable, particularly with respect to the schedule upon which it can be delivered. While the Agency anticipates the increased supply will be available after 2020, the City has assumed that the supply will not be available until after 2030. The anticipated increase in recycled water deliveries is highly predictable as discussed in Chapter 5 of this Plan.

Table 8-6 (DWR Table 10) Description of the Factors Resulting in Inconsistency of Supply

Name of supply	Legal	Environmental	Water Quality	Climatic
Sonoma County Water Agency	Current supply is stable with regard to these factors. Future supply increase may not be stable due to delays in construction, approval of water rights application, or in environmental documentation		None	Current supply is stable with respect to climate and hydrology. Future supply increase could be curtailed by drought conditions.
Groundwater	None	None	None	None
Recycled water	None	None	None	None

8.3 Water Quality Impacts on Future Water Supply

The quality of the City's water deliveries is regulated by the CDPH, which requires regular collection and testing of water samples to ensure that the quality meets regulatory standards for potable and recycled water. The City, the Agency and the Subregional System perform water quality testing, which has consistently yielded results within the acceptable regulatory limits (Dyett & Bhatia, 2000).

The quality of existing surface water, groundwater, and recycled water supply sources over the next 25 years is expected to be adequate. Surface and groundwater water will continue to be treated to drinking water standards, and no surface water, groundwater, or recycled water quality

[23] The 1990-1992 dry period occurred after the construction of Lake Mendocino and Lake Sonoma and at a time when the Agency's permitted water rights were 75,000 AFY.

deficiencies are foreseen to occur in the next 25 years. Table 8-7 summarizes the current and projected water supply changes due to water quality.

Table 8-7 (DWR Table 39) Current and Projected Water Supply Changes due to Water Quality – Percentage

Water Source	2005	2010	2015	2020	2025	2030
Sonoma County Water Agency	0	0	0	0	0	0
Groundwater	0	0	0	0	0	0
Recycled water	0	0	0	0	0	0
Total	0	0	0	0	0	0

8.4 Normal Year Water Supply vs. Demand Comparison

The analysis compares the projected Normal Year water supply available to the City and projected customer demands from 2010 to 2030, in five-year increments. The projected available Normal Year supply and demands are presented in Tables 8-8 and 8-9, respectively. The comparison of projected water supply and demand is presented in Table 8-10.

Table 8-8 (DWR Table 40) Projected Normal Year Water Supply

(from DWR Table 4)	2010 AFY	2015 AFY	2020 AFY	2025 AFY	2030 AFY
Supply[a]	10,149.0	10,249.0	10,249.0	10,249.0	10,249.0
Percent of year 2005	102%	103%	103%	103%	103%

Table 8-9 (DWR Table 41) Projected Normal Year Water Demand

(from DWR Table 15)	2010 AFY	2015 AFY	2020 AFY	2025 AFY	2030 AFY
Demand	8,316.4	8,680.3	8,962.0	9,067.3	9,131.3
Percent of year 2005	108%	113%	116%	118%	118%

Table 8-10 (DWR Table 42) Projected Normal Year Supply and Demand Comparison

	2010 AFY	2015 AFY	2020 AFY	2025 AFY	2030 AFY
Supply totals	10,149.0	10,249.0	10,249.0	10,249.0	10,249.0
Demand totals	8,316.4	8,680.3	8,962.0	9,067.3	9,131.3
Difference	1,832.6	1,568.7	1,287.0	1,181.7	1,117.7
Difference as Percent of Supply	18.1%	15.3%	12.6%	11.5%	10.9%
Difference as Percent of Demand	22.0%	18.1%	14.3%	13.0%	12.2%

8.5 Single Dry Year Water Supply vs. Demand Comparison

Tables 8-11 through 8-13 provide a comparison of a Single Dry Year water supply with projected total water use over the next 25 years, in five-year increments. Because the City has based its planning on the Agency's current water rights and because those rights are more restrictive than more restrictive than any hydrologic condition, including the Single Dry Year condition, this comparison is identical to the Normal Year Comparison.

Table 8-11 (DWR Table 43) Projected Single Dry Year Water Supply

	2010 AFY	2015 AFY	2020 AFY	2025 AFY	2030 AFY
Supply	10,149.0	10,249.0	10,249.0	10,249.0	10,249.0
Percent of projected normal	100%	100%	100%	100%	100%

Table 8-12 (DWR Table 44) Projected Single Dry Year Water Demand

	2010 AFY	2015 AFY	2020 AFY	2025 AFY	2030 AFY
Demand	8,316.4	8,680.3	8,962.0	9,067.3	9,131.3
Percent of projected normal	100%	100%	100%	114%	115%

Table 8-13 (DWR Table 45) Projected Single Dry Year Supply and Demand Comparison

	2010 AFY	2015 AFY	2020 AFY	2025 AFY	2030 AFY
Supply totals	10,149.0	10,249.0	10,249.0	10,249.0	10,249.0
Demand totals	8,316.4	8,680.3	8,962.0	9,067.3	9,131.3
Difference	1,832.6	1,568.7	1,287.0	1,181.7	1,117.7
Difference as Percent of Supply	18.1%	15.3%	12.6%	11.5%	10.9%
Difference as Percent of Demand	22.0%	18.1%	14.3%	13.0%	12.2%

8.6 Multiple Dry Year Water Supply vs. Demand Comparison

Tables 8-14 through 8-28 compare the total water supply available in Multiple Dry Years with projected total water use over the next 25 years, in one-year increments. Because the City has based its planning on the Agency's current water rights and because these current water rights are more restrictive than any hydrologic condition, including the Multiple Dry Year condition, this comparison is generally similar to the Normal Year comparison, although the year-by-year comparison provides additional detail.

Table 8-14 (DWR Table 46) Projected Supply during Multiple Dry Year Period Ending in 2010

	2006 AFY	2007 AFY	2008 AFY	2009 AFY	2010 AFY
Supply	9,949.0	9,949.0	9,949.0	9,949.0	10,149.0
Percent of projected normal	100%	100%	100%	100%	100%

Table 8-15 (DWR Table 47) Projected Demand Multiple Dry Year Period Ending in 2010

	2006 AFY	2007 AFY	2008 AFY	2009 AFY	2010 AFY
Demand	7,831.1	7,952.4	8,073.8	8,195.1	8,316.4
Percent of projected normal	100%	100%	100%	100%	100%

Table 8-16 (DWR Table 48) Projected Supply and Demand Comparison during Multiple Dry Year Period Ending in 2010

	2006 AFY	2007 AFY	2008 AFY	2009 AFY	2010 AFY
Supply totals	9,949.0	9,949.0	9,949.0	9,949.0	10,149.0
Demand totals	7,831.1	7,952.4	8,073.8	8,195.1	8,316.4
Difference	2,117.9	1,996.6	1,875.2	1,753.9	1,832.6
Difference as Percent of Supply	21.3%	20.1%	18.6%	17.6%	18.0%
Difference as Percent of Demand	27.0%	25.1%	23.2%	21.4%	22.0%

Table 8-17 (DWR Table 49) Projected Supply during Multiple Dry Year Ending in 2015

	2011 AFY	2012 AFY	2013 AFY	2014 AFY	2015 AFY
Supply	10,149.0	10,149.0	10,149.0	10,149.0	10,249.0
Percent of projected normal	100%	100%	100%	100%	100%

Table 8-18 (DWR Table 50) Projected Demand Multiple Dry Year Period Ending in 2015

	2011 AFY	2012 AFY	2013 AFY	2014 AFY	2015 AFY
Demand	8,389.2	8,462.0	8,534.7	8,607.5	8,680.3
Percent of projected normal	100%	100%	100%	100%	100%

Table 8-19 (DWR Table 51) Projected Supply and Demand Comparison during Multiple Dry Year Period Ending in 2015

	2011 AFY	2012 AFY	2013 AFY	2014 AFY	2015 AFY
Supply totals	10,149.0	10,149.0	10,149.0	10,149.0	10,249.0
Demand totals	8,389.2	8,462.0	8,534.7	8,607.5	8,680.3
Difference	1,759.8	1,687.0	1,614.3	1,541.5	1,568.7
Difference as Percent of Supply	17.3%	16.6%	15.9%	15.2%	15.3%
Difference as Percent of Demand	21.0%	19.9%	18.9%	17.9%	18.1%

Table 8-20 (DWR Table 52) Projected Supply during Multiple Dry Year Period Ending in 2020

	2016 AFY	2017 AFY	2018 AFY	2019 AFY	2020 AFY
Supply	10,249.0	10,249.0	10,249.0	10,249.0	10,249.0
Percent of projected normal	100%	100%	100%	100%	100%

Table 8-21 (DWR Table 53) Projected Demand Multiple Dry Year Period Ending in 2020

	2016 AFY	2017 AFY	2018 AFY	2019 AFY	2020 AFY
Demand	8,736.6	8,793.0	8,849.3	8,905.7	8,962.0
Percent of projected normal	100%	100%	100%	100%	100%

Table 8-22 (DWR Table 54) Projected Supply and Demand Comparison during Multiple Dry Year Period Ending in 2020

8462.0 8534.7	2016 AFY	2017 AFY	2018 AFY	2019 AFY	2020 AFY
Supply totals	10,249.0	10,249.0	10,249.0	10,249.0	10,249.0
Demand totals	8,736.6	8,793.0	8,849.3	8,905.7	8,962.0
Difference	1,512.4	1,456.0	1,399.7	1,343.3	1,287.0
Difference as Percent of Supply	14.8%	14.2%	13.7%	13.1%	12.6%
Difference as Percent of Demand	17.3%	16.6%	15.8%	15.1%	14.3%

Table 8-23 (DWR Table 55) Projected Supply during Multiple Dry Year Period Ending in 2025

	2021 AFY	2022 AFY	2023 AFY	2024 AFY	2025 AFY
Supply	10,249.0	10,249.0	10,249.0	10,249.0	10,249.0
Percent of projected normal	100%	100%	100%	100%	100%

Table 8-24 (DWR Table 56) Projected Multiple Dry Year Period Ending in 2025

	2021 AFY	2022 AFY	2023 AFY	2024 AFY	2025 AFY
Demand	8,983.1	9,004.1	9,025.2	9,046.2	9,067.3
Percent of projected normal	100%	100%	100%	100%	100%

Table 8-25 (DWR Table 57) Projected Supply and Demand Comparison during Multiple Dry Year Period Ending in 2025

	2021 AFY	2022 AFY	2023 AFY	2024 AFY	2025 AFY
Supply totals	10,249.0	10,249.0	10,249.0	10,249.0	10,249.0
Demand totals	8,983.1	9,004.1	9,025.2	9,046.2	9,067.3
Difference	1,265.9	1,244.9	1,223.8	1,202.8	1,181.7
Difference as Percent of Supply	12.4%	12.2%	11.9%	11.7%	11.5%
Difference as Percent of Demand	14.1%	13.8%	13.6%	13.3%	13.0%

Table 8-26 Projected Supply during Multiple Dry Year Period Ending in 2030

	2026 AFY	2027 AFY	2028 AFY	2029 AFY	2030 AFY
Supply	10,249.0	10,249.0	10,249.0	10,249.0	10,249.0
Percent of projected normal	100%	100%	100%	100%	100%

Table 8-27 Projected Multiple Dry Year Period Ending in 2030

	2026 AFY	2027 AFY	2028 AFY	2029 AFY	2030 AFY
Demand	9,080.1	9,092.9	9,105.7	9,118.5	9,131.3
Percent of projected normal	100%	100%	100%	100%	100%

Table 8-28 Projected Supply and Demand Comparison during Multiple Dry Year Period Ending in 2030

	2026 AFY	2027 AFY	2028 AFY	2029 AFY	2030 AFY
Supply totals	10,249.0	10,249.0	10,249.0	10,249.0	10,249.0
Demand totals	9,080.1	9,092.9	9,105.7	9,118.5	9,131.3
Difference	1,168.9	1,156.1	1,143.3	1,130.5	1,117.7
Difference as Percent of Supply	11.4%	11.3%	11.2%	11.0%	10.9%
Difference as Percent of Demand	12.9%	12.7%	12.6%	12.4%	12.2%

8.7 Summary of Comparative Analysis

As indicated in Section 1 the City, often in cooperation with the Agency, has previously prepared water supply planning documents. This document is a regular update to the City's Urban Water Management Plan as anticipated by the Act. The regular update process allows water suppliers to provide current information regarding their projected water supplies and demands. While this document is generally consistent with previous work, it incorporates information that became available after the completion of the City's previous comprehensive analysis in January 2005.

Highlights of this analysis include:

1. The City is basing its projections of available Agency supply on the Agency's current water rights, which are more restrictive than hydrologic constraints. The City projects

that 6,372 AFY of Agency supply will be available over the horizon of this Plan. This projection is consistent with the Agency's adopted Water Shortage Allocation Model and is within 2% of the projections the City made in its 2005 City-wide Water Supply Assessment.

2. The City is basing its projections of groundwater availability upon the findings of its local policy documents and an ongoing analysis of groundwater pumping and levels in the basin from which it pumps. The City projects that 2,577 AFY of groundwater supply will be available over the horizon of this Plan. This projection is consistent with legal decisions and is sustainable based on analysis of the City's demands and other demands in the area and is identical to the projections the City made in its 2005 City-wide Water Supply Assessment.

3. The City is basing its projections of available recycled water on existing contracts for supply and a planned expansion. The City projects that a total 1,300 AFY of recycled water will be available over the horizon of this Plan. This includes 1,000 AFY of currently contracted supply and 300 AFY of planned expansions. This projection is consistent with Subregional System's adopted IRWP Master Plan and EIR and is identical to the projections the City made in its 2005 City-wide Water Supply Assessment.

4. The City is basing its demand projections on a detailed demand model developed in partnership with the Agency. The demand model utilizes the City's current billing records as the basis for projections and includes allowances for Plumbing Code changes and a variety of demand management measures. This method of analysis is different from that employed in the 2005 City-wide Water Supply Assessment, which was based on land use. By way of comparison, this Plan projects a 2025 water demand of 9,067.3 AFY, which is within 5% of the demand projected in 2005 City-wide Water Supply Assessment. The major difference between the two analyses is a more rigorous documentation in this Plan of future demand management potential.

5. The City's combined projected water supplies, for all 5-year increments through 2030, are sufficient to meet its projected demands. For example in 2030, the projected combined water supplies are 10,249 AF while the projected demands are 9,131 AF. The City's projected water supply portfolio, consisting of a mix of surface water, groundwater and recycled water, is highly stable because it relies largely on current contracted and permitted water supplies that are not subject to hydrologic constraints.