SECTION 5: WATER SUPPLY RELIABILITY

5.1 DOCUMENT REQUIREMENTS

5.1.1 UWMP Requirements

This section will include the following:

- Describe water management tools and options to maximize resources and minimize the need to import water from other regions. (CWC, 10620(f))
- Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage and provide data for (A) an average water year, (B) a single dry water year, and (C) multiple dry water years. (CWC, 10631(c)(1))
- For any water source that may not be available at a consistent level of use - given specific legal, environmental, water quality, or climatic factors - describe plans to supplement or replace that source with alternative sources or water demand management measures, to the extent practicable. (CWC, 10631(c)(2))
- Provide an estimate of the minimum water supply available during each of the next three water years based on the driest three-year historic sequence for the agency's water supply. (CWC, 10632(b))
- Provide information, to the extent practicable, relating to the quality of existing sources of water available to the supplier over the same five-year increments, and the manner in which water quality affects water management strategies and supply reliability. [For years 2010, 2015, 2020, 2025, and 2030] (CWC, 10634)
- Assess the water supply reliability during normal, dry, and multiple dry water years by comparing the total water supply sources available to the water supplier with the total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and multiple dry water years. Base the assessment on the information compiled under Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier. (CWC, 10635(a))

5.1.2 AWMP REQUIREMENTS

The Water Code **§10826** require that the AWMP:

- *"(b) Describe the quantity and quality of water resources of the agricultural water supplier, including all of the following:*
  (7) Water accounting, including all of the following:
    (A) Quantifying the water supplier's water supplies.
    (B) Tabulating water uses.
    (C) Overall water budget."

The Water Code does not specify the mechanisms or level of detail that would satisfy requirements for water accounting. This section provides a reasonable process and level of detail to assist the agricultural water supplier in preparing an AWMP that can be used for water management planning and for addressing Water Code **§10826 (b)(7)** requirements. Additionally, as noted above, in accordance with Executive Order B-29-15, quantification of water supplies and demands are to be reported for 2013, 2014, and 2015, to the extent data is available.

Information presented in this document can be used to help complete the Water Code requirements for water accounting. As an overview of water supply use within the service area, annual amounts are appropriate; however, to provide more meaningful information to calculate the water budget annual amounts, additional water supply and use information (e.g., monthly/seasonal values, effective precipitation amounts, water losses, and others) can be included in this section. The additional information would also provide the agricultural water supplier with some data useful for estimating water use efficiency, if desired.

5.2 LOCAL WATER SUPPLY RELIABILITY

This section of the Urban Water Management Plan provides a description of the water management tools and options used by Casitas MWD that will maximize resources and minimize the need to import water from other regions. This section assesses the Casitas MWD's ability to provide reliable future water supplies in the event of any circumstance that may pose significant challenges. **Section 4** provided a summary of the Casitas MWD water supplies. As noted in **Table 4-1**, 100 percent of the Casitas MWD water supplies are currently obtained from local resources. In addition, the Casitas MWD anticipates that 100 percent of the water resources for the period 2020-2040 will be obtained from local resources (see **Table 4-4** for details).

5.3 ASSESSMENT OF WATER SUPPLY RELIABILITY

5.3.1 Reliability

Analysis of water supply reliability is one of the primary requirements of the Urban Water Management Plan (Water Code Section 10635(a)). This assessment includes an average water-year, single dry water-year, multiple dry water-years, and three-year minimum supply. In order to plan for a reliable water supply Casitas MWD staff examined both the possibility of short-term and long-term shortages. A short-term water shortage could result from a disaster such as an earthquake, flood, or even a widespread power outage. A long-term water shortage would most likely result from a long period of drought in the region.

The Urban Water Management Planning Act requires urban water suppliers to assess water supply reliability and vulnerability to seasonal and climatic shortage. Reliability is a measure of a water service system's anticipated success in managing water shortages.

Costs of demand management or supply augmentation options to reduce the frequency and severity of shortages are now high enough that planners must look more carefully at the costs of unreliability

to make the best possible estimate of the net benefit of taking specific actions, hence the term "reliability planning." To plan for long-term water supply reliability, planners examine an increasingly wide array of supply augmentation and demand reduction options to determine the best courses of action for meeting water service needs. Such options are generally evaluated using the water service reliability planning approach. Reliability planning requires information about the following: (1) expected frequency and severity of shortages; (2) how additional water management measures are likely to affect the frequency and severity of shortages; (3) how available contingency measures can reduce the impact of shortages when they occur.

Casitas MWD determined that climate, and specifically precipitation, is the factor to most likely influence reliability of local water supplies for the period 2015-2040. Issues associated with climate change were summarized in **Section 4.6**. Other issues that may affect reliability of water supplies include, but not limited to, the following: future water quality of runoff from Matilija Creek associated with the proposed demolition of Matilija Dam, endangered species, invasive species, earthquakes, disastrous storm events, climate change, and lake water quality. Invasive species may impact Lake Casitas water quality and or infrastructure such as intake structures. Potential invasive species include, but not limited to, New Zealand Mud Snails, Quagga Mussels, and Zebra Mussels.

5.3.2 Basis of Water Year Data

As required, Casitas MWD determined the basis of water year data. These years represent the historical average water-year (average water-year), single driest water-year (single dry water-year), and driest multiple year period (multiple dry water-year). **Table 5-1** summarizes the Casitas MWD basis of water-year data. The "volume available" column in **Table 5-1** represents the water supply expected if there were a repeat of the hydrology from that type of year. Casitas MWD selected 2011 as the average water-year, 2014 as the single dry water-year, and 1987-1989 as the multiple dry water-year. As indicated in **Table 5-1**, Casitas MWD determined that the water supply available will be 20,840 AFY in all three base water-year types. See **Appendix E Worksheet 7-1** for additional details.

5.3.3 Reliability Assessment

Casitas MWD prepared an assessment to determine water supply reliability. This assessment includes a comparison of the total projected water demand with the water supplies available for the following conditions: (1) normal/average water-year, (2) single dry water-year, (3) multiple consecutive dry water-years, and (4) three-year minimum water supply. Assessment results for each of these conditions are summarized below.

5.3.3.1 Normal Water-Year

A normal water-year can be defined as a year in the historical sequence that most closely represents median local runoff levels and patterns. The Casitas MWD selected fiscal year 2011 to represent the normal or average water-year. For the purposes of this assessment, normal and average water year will be used interchangeably. Fiscal year 2011 is the most recent year that closely represents a normal water-year. Local precipitation for fiscal year 2011 is 24.8 inches. The fiscal year 2011 total surface water delivery from Lake Casitas is 14,678 acre-feet. The minimum storage level of Lake Casitas in fiscal year 2011 is 221,751 acre-feet. The actual water use in fiscal year 2011 is 13,549 acre-feet.

TABLE 5-1
BASIS OF WATER YEAR DATA

Water-Year Type	Base Year(s)	Volume Available (AFY)
Average Water-Year	2011	20,840
Single Dry Water-Year	2014	20,840
Multiple Dry Water-Years	1987 1988 1989	20,840 20,840 20,840

Notes:
Source, CMWD, 2016. All values in AF, rounded.

Table 5-2 summarizes the Casitas MWD projected normal water-year supply and demands for the period 2020-2040. For planning purposes, Casitas MWD projected that 100 percent of the safe-yield will be available for both Lake Casitas surface water at **20,540 acre-feet** (CMWD, 2004; copy provided in **Appendix H**) and 300 AF of Mira Monte Well groundwater. However, the Casitas MWD may extract more than the safe-yield in any one year (or years) to meet demands. For example, in 1989, the Casitas MWD extracted 26,180 AF from Lake Casitas to meet local demands. Casitas MWD chose to use a conservative (high) projection of water demand at 17,200 AFY (more than the recent average 16,000 AFY for years 2010-2015) for the period 2020-2025, and 17,500 AFY for the period 2030-2040. **Table 5-2** indicates that, for a normal water-year during the period 2020-2025, Casitas MWD's water supply will exceed water demand by 3,640 AFY. For a normal water-year during the period 2030-2040, **Table 5-2** indicates that Casitas MWD's water supply will exceed water demand by 3,340 AFY. See **Appendix E Worksheet 7-2** for additional details.

5.3.3.2 Single Dry Water-Year

Lake Casitas is sized, constructed, and operated as both a primary water source and a backup water supply for the groundwater basins of western Ventura County. Lake Casitas is a long-term water storage facility so precipitation (or lack of precipitation) in any single year does not change the projected safe-yield of a long term period. As previously noted, Casitas MWD selected fiscal year 2014 as the most recent year that closely represents a single dry water-year. Local precipitation for fiscal year 2014 is 9.50 inches with over 82 percent recorded in February and March. The fiscal year 2014 total surface water delivery from Lake Casitas is 18,811 acre-feet. The minimum storage level of Lake Casitas in fiscal year 2014 is 131,511 acre-feet. The actual water use in fiscal year 2014 is 19,093 acre-feet.

TABLE 5-2
PROJECTED SUPPLY AND DEMAND COMPARISON FOR NORMAL WATER-YEAR FOR 2020-2040

	2020	2025	2030	2035	2040
Supply totals (AFY)	20,840	20,840	20,840	20,840	20,840
Demand totals (AFY)	17,200	17,200	17,500	17,500	17,500
Difference (supply minus demand) (AFY)	**3,640**	**3,640**	**3,340**	**3,340**	**3,340**

Notes:
Source, CMWD, 2016. All values in AF, rounded.

Table 5-3 summarizes the Casitas MWD projected single dry water-year water supply and water demands for the period 2020-2040. For planning purposes, Casitas MWD projected that 100 percent of the safe-yield will be available for both Lake Casitas surface water at **20,540 acre-feet** (CMWD, 2004; copy provided in **Appendix H**) and 300 AF of Mira Monte Well groundwater. However, the Casitas MWD may extract more than the safe-yield in any one year (or years) to meet demands. For example, in 1989, the Casitas MWD extracted 26,180 AF from Lake Casitas to meet local demands. Casitas MWD chose to use a conservative (high) projection of water demand at 20,840 AFY for the period 2020-2040 (exceeding than the maximum demand during the period 2010-2015 of 19,093 AF in 2014). **Table 5-3** indicates that, for a single dry water-year during the period 2020-2040, Casitas MWD's water supply will be equivalent to water demand. See **Appendix E Worksheet 7-3** for additional details.

TABLE 5-3
PROJECTED SUPPLY AND DEMAND COMPARISON FOR SINGLE DRY WATER-YEAR FOR 2020-2040

	2020	2025	2030	2035	2040
Supply totals (AFY)	20,840	20,840	20,840	20,840	20,840
Demand totals (AFY)	20,840	20,840	20,840	20,840	20,840
Difference (supply minus demand) (AFY)	**0**	**0**	**0**	**0**	**0**

Notes:
Source, CMWD, 2016. All values in AF, rounded.

5.3.3.3 Multiple Dry Water-Years

The historical record provides information regarding 'a multiple dry year' occurrence in a drought period, which results in an escalation of water demands. During multiple dry years, surface flow in the Ventura River becomes non-existent and the groundwater in the Ventura River and Ojai Basins are diminished due to well extractions, natural drainage, and a lack of replenishment from rainfall. Water demands on Lake Casitas have been observed to escalate significantly due to multiple years of less than average rainfall and the transition from groundwater sources to the Lake Casitas supply. Further escalation in Lake Casitas demands resulted from the water demands of local agriculture that needed to supplement the lack of rainfall with an alternate water supply in order to continue to produce crops.

As previously noted, Lake Casitas is a long-term water storage facility so precipitation (or lack of precipitation) in any three-year does not change the projected safe-yield of a long term period. Casitas MWD selected fiscal years 1987-1988-1989 as the most recent three-year period that closely represents the multiple dry water-years. Local average precipitation for fiscal years 1987-1989 is 12.55 inches. The average surface water delivery for fiscal years 1987-1989 is 23,289 acre-feet. The minimum storage level of Lake Casitas for fiscal years 1987-1989 is 160,587 acre-feet. The actual average water use in fiscal years 1987-1989 is 23,216 acre-feet.

Table 5-4 summarizes the Casitas MWD projected multiple dry water-year water supply and water demands for the period 2020-2040. For planning purposes, Casitas MWD projected that 100 percent of the safe-yield will be available for both Lake Casitas surface water at **20,540 acre-feet** (CMWD, 2004; copy provided in **Appendix H**) and 300 AF of Mira Monte Well groundwater. However, the Casitas MWD may extract more than the safe-yield in any one year (or years) to meet demands. For example, in 1989, the Casitas MWD extracted 26,180 AF from Lake Casitas to meet local demands. Casitas MWD chose to use a conservative (high) projection of water demand at 20,840 AFY for the period 2020-2040 (exceeding the maximum demand during the period 2010-2015 of 19,093 AF in 2014). **Table 5-4** indicates that, for the multiple dry water-years during the period 2020-2040, Casitas MWD's water supply will be equivalent to water demand. See **Appendix E Worksheet 7-3** for additional details.

5.3.3.4 Minimum Water Supply for Next Three Years

The Casitas MWD evaluated minimum water supplies which would be available during a three-year period. For planning purposes, Casitas MWD projected that 100 percent of the safe-yield will be available for both Lake Casitas surface water at **20,540 acre-feet** (CMWD, 2004; copy provided in **Appendix H**) and 300 AF of Mira Monte Well groundwater. Therefore, the three-year minimum water supply is 20,840 AF resulting from surface water and groundwater as summarized in **Table 5-5** (see **Appendix E Worksheet 8-4** for details). However, the Casitas MWD may extract more than the safe-yield in any one year (or years) to meet demands. For example, in 1989, the Casitas MWD extracted 26,180 AF to meet local demands.

TABLE 5-4
PROJECTED SUPPLY AND DEMAND COMPARISON FOR MULTIPLE DRY WATER-YEARS FOR 2020-2040

		2020	2025	2030	2035	2040
First Year	Supply totals (AFY)	20,840	20,840	20,840	20,840	20,840
	Demand totals (AFY)	20,840	20,840	20,840	20,840	20,840
	Difference (supply minus demand) (AFY)	**0**	**0**	**0**	**0**	**0**
Second Year	Supply totals (AFY)	20,840	20,840	20,840	20,840	20,840
	Demand totals (AFY)	20,840	20,840	20,840	20,840	20,840
	Difference (supply minus demand) (AFY)	**0**	**0**	**0**	**0**	**0**
Third Year	Supply totals (AFY)	20,840	20,840	20,840	20,840	20,840
	Demand totals (AFY)	20,840	20,840	20,840	20,840	20,840
	Difference (supply minus demand) (AFY)	**0**	**0**	**0**	**0**	**0**

Notes:
Source, CMWD, 2016. All values in AF, rounded.

TABLE 5-5
PROJECTED MINIMUM WATER SUPPLY FOR 2016-2018

	2016	2017	2018
Available Water Supply (AFY)	**20,840**	**20,840**	**20,840**

Notes:
Source, CMWD, 2016. All values in AF, rounded.

5.4 WATER QUALITY IMPACTS ON RELIABILITY

The water quality of Lake Casitas may significantly vary as the lake storage transitions from full stage to minimum pool. Surface water supply from Lake Casitas is treated by filtration and chloramination prior to the delivery to the distribution system. The treatment process ensures that the water meets all state and federal regulations. At lower levels of Lake Casitas storage there are specific lake water quality issues that will challenge Casitas MWD's ability to treat and deliver potable water from Lake

Casitas. During a condition of low lake level, the water quality can unfavorably change due to the concentrating of nutrients resulting in lake eutrophication, increased algae blooms, reduction in dissolved oxygen, and increased turbidity during storm event that could significantly impact filtration treatment process and the rate of water production for the distribution system. Casitas MWD has also been concerned about the release of organic-laden silts from Matilija Dam that, if not properly mitigated during the Matilija Dam decommissioning, can add to the mass balance of nitrogen and phosphorous compounds and increased turbidity of water flowing into Lake Casitas.

Specific actions that Casitas MWD has considered and implemented are lake management strategies such as algae control and hypolimnetic aeration system (2015). The level of the lake management implementation may increase as the problem intensifies during low storage conditions.

Casitas MWD's groundwater source represents only 300 acre-feet of water per year (1.5 percent) compared to the nearly 20,500 acre-feet (98.5 percent) from Lake Casitas. The well water is blended with lake water at a high ratio with surface water to ensure the maximum contamination level for nitrate is met. The resulting blended water is well below the maximum contamination level for nitrate. Drought impacts to the well water quality are not understood completely. Casitas MWD has an agreement with a neighboring water agency to cease pumping at a specific groundwater elevation. Over the past twenty years, the groundwater elevation has remained above the agreement level. Additional consideration for on-site treatment and additional blending may be required to mitigate the drought caused water quality in the Mira Monte Well.