



TECHNICAL MEMORANDUM

DATE: September 9, 2021 Project No.: 21-5-034

TO: Jared Walker, General Manager, Willow County Water District

FROM: Oscar Serrano, PE, Senior Engineer
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SUBJECT: **Bella Vista Development – Water Supply Verification**

1. INTRODUCTION

The Bella Vista development is a proposed subdivision within the Willow County Water District (District) located in Mendocino County. The development is located at 3000 South State Street. It is approximately 0.45 miles south of the City of Ukiah limits. This technical memorandum (TM), prepared by Luhdorff and Scalmanini Consulting Engineers (LSCE), presents a Water Supply Verification for Bella Vista subdivision.

The proposed subdivision is presented on a conceptual plan dated August 31, 2020, by Guillon Inc. Construction titled Vesting Tentative Map, Bella Vista Subdivision ^[1]. The developer is seeking a determination of Water Supply Verification in accordance with Senate Bill 221 to confirm the District has available water supply to serve the proposed subdivision. The conceptual plan with 48.8 acres of land shows 132 single-family residential units, 39 age-restricted residential (senior housing) units, and 2.62 acres of park spaces ^[2]. The detailed land usage is listed in **Table 1-1**.

Table 1-1. Bella Vista Development Plan ^[2]		
Customer Class		Lots
Residential	Single Family	132
	Senior Lot	39
Total		171
		Area (Acres)
Irrigation	Neighborhood Park	1.96
	Linear Park	0.57
	Cottage Park	0.24
	Class I Bicycle Lane (Paved)*	0.15
Total		2.62
Total Net Density		3.5 (Units Per Acres)
Average Lot Size	Single Family	6,219 Square Feet
	Age Restricted (Senior Lot)	4,907 Square Feet

* Paved Class I Bicycle Lane (7-foot wide and 930-foot long) is part of the Linear Park.

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Water use factors within and around the District's service area were evaluated to estimate the potential water requirements of the Bella Vista development. The combined water demand of the development and the District's existing service area is presented herein, and is compared to the available water supplies during a normal, single-dry, and multiple-dry year period. Prior studies serving as a basis for available water supplies include the *Preliminary Water Demand Assessment* by Doble Thomas & Associates, Inc. dated January 2010, and the *Water Supply Assessment for the Ukiah Valley Area Plan* (UVAP) dated October 20, 2010. Updates are made to the available water supply characterized in those studies based on actual record of deliveries through years of recent drought that have occurred since the date of those studies.

2. EXISTING SYSTEM

The District (System No. CA2310005) serves 3,797 people with 1,070 service connections per the CA Drinking Water Watch website ^[3]. Per information provided by the District, a population of 4,000 people and 1,064 total service connections were used in this analysis. Of the total of 1,064 connections, 17 are irrigation services. According to the Estimates of the Resident Population by the U.S. Census Bureau, the percentage of population change over the last 10 years is -0.5% for the City of Ukiah, and -1.3% for the Mendocino County ^[4]; the US Census does not have specific information for Willow County Water District. For this analysis, the service connections and population were considered unchanged during the past 10 years. The District's boundary is shown in **Attachment A**.

3. WATER SUPPLY

The District's raw water supply is obtained from the Russian River pursuant to water rights held by the District, and a water supply contract with the Russian River Flood Control District (RRFCD). Limited emergency water supplies are available via an intertie with City of Ukiah (UVAP, 2010).

The District has water rights and contracts totaling 2,199 acre-feet (AF) per year, equal to 716.6 million-gallon (MG) per year (**Table 3-1**). The District holds two water right licenses from the CA State Water Resources Control Board, AA015721 and A017232, with face values of 724.5 AF and 884.8 AF, respectively (California Waterboard eWRIMS). Water right license A015721 is a year-round water right with a flow rate of 1 cubic foot per second (CFS), while water right license A017232 is a permitted flow rate of 3 CFS and can be used from November 1st of each year to July 1st of the succeeding year. The District's contract with RRFCD is up to 590 AF of purchased water, which can be used throughout the year.

Table 3-1. Water Supply Summary	
Application #	Water Right Details
A015721:	Maximum diversion rate of 1 CFS (449 Gallon Per Minute (GPM)) for year round use with a Face Value of 724 AF (235.9 MG) for Municipal Use with 2 points of diversion. Source: Russian River Underflow ^[5] .
A017232:	Maximum diversion rate of 3 CFS (1,346 GPM) from November 1 to July 1 with a Face Value of 884.8 AF (469.2 MG) for Municipal Use with 2 points of diversion. Source: Russian River Underflow ^[5] .
Contract Details	
RRFCD Contract:	590 AF (192.2 MG) under contract with 2 points of diversion.

The water right allocations over the course of a year are cited in the UVAP ^[5]. The water rights can be used, as needed, within the allowable constraints noted in Table 3-1 in terms of period of use, diversion flow rate, and total diversion. The face value for license A017232 is evenly distributed from November to June which results in a diversion factor of 1.84 CFS which meets the maximum 3 CFS requirement. RRFCD contract fills in the water supply from July to September with a diversion factor of 2.41 CFS. An example of the allocation of water rights and RRFCD contract water is shown in **Figure 3-1** demonstrating water supply availability throughout the year to maximize all water supplies. However, if for example the RRFCD water were to be curtailed, the District has the option to use more of the year-round right (A015721) during summer months July-October than in the winter months.

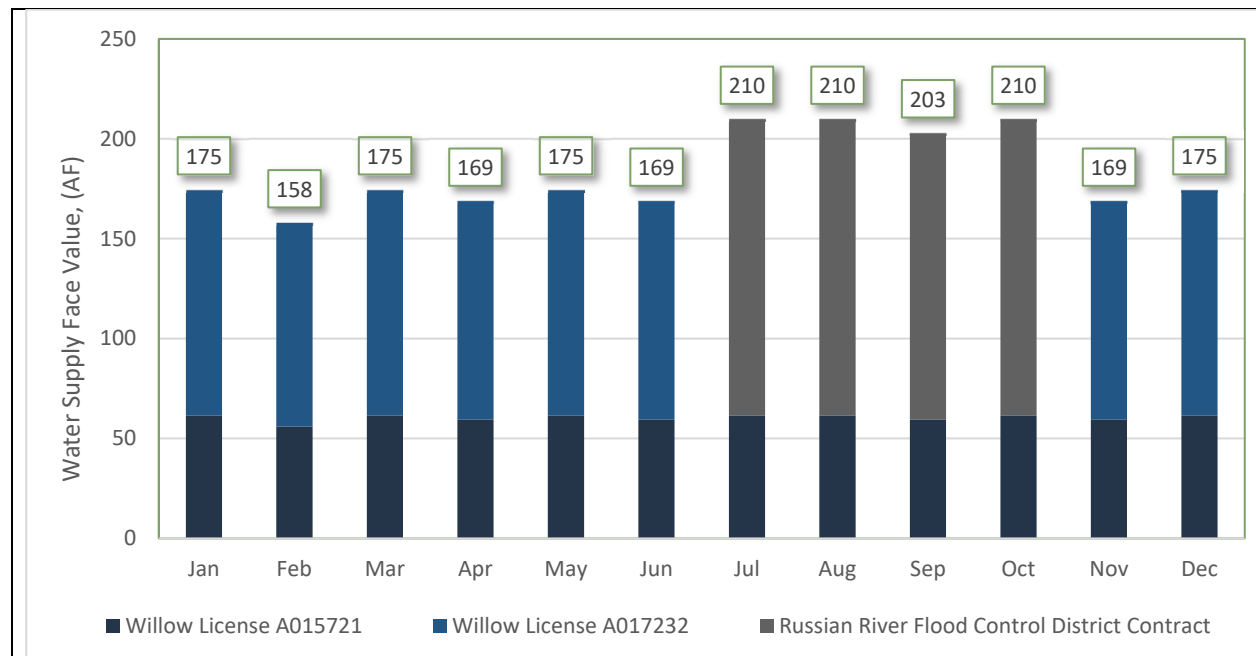


Figure 3-1. District Available Water Supply

4. WATER DEMAND ESTIMATES

Several methods are available and commonly applied to estimating water demand requirements, usually for the purpose of projecting increases in water demands over time. Among a broader range of methods, those with potential applicability to the District include the *Per-Capita Method*, the *Disaggregate Method*, the *Land Use Method*, and the *Regression Method*. For the development of this TM, LSCE employed the *Disaggregate Method* to calculate the residential water demand, as the available customer metering data was most conducive to this method.

In the *Disaggregate Method*, historical water metering records are subdivided, or disaggregated, into several significant use classes, e.g., residential, commercial/institutional, irrigation, and other. Based on disaggregated water use in each sector, unitized water consumptions are determined for each year of record, which is then used to develop a base water use for each customer class, e.g., gallons per day per residential service connection, commercial connection, and irrigation connection.

Once the unitized water consumption is determined per connection for each customer class, the service connections can be represented as an equivalent dwelling unit (EDU), which is the amount of water used by a typical single-family residential house. The water system size can be expressed as a total EDU for the existing system and at build-out.

For landscaping water demand, due to the unavailability of the planned connection services in this preliminary analysis, a water budget tool from EPA was used to estimate the maximum monthly landscape water allowance. Meanwhile, the method of *Maximum Applied Water Allowance (MAWA)* was conducted to cross-compare the estimate.

Finally, based on the projected population for the Bella Vista development, the *Per-Capita Method* was used to compare to the yearly water demand analysis above.

4.1 Water Production and Consumption

Historical water production was provided by the District and is depicted in **Figure 4-1** for the period of 2010 to 2020. The production growth generally coincides with the population growth in District. In the past 10 years, the production rate has been relatively constant with an average of 254.8 million gallons per year (MGY). The lowest production rates were in 2014 and 2015 during the drought where water rights were curtailed by 25% in 2014.

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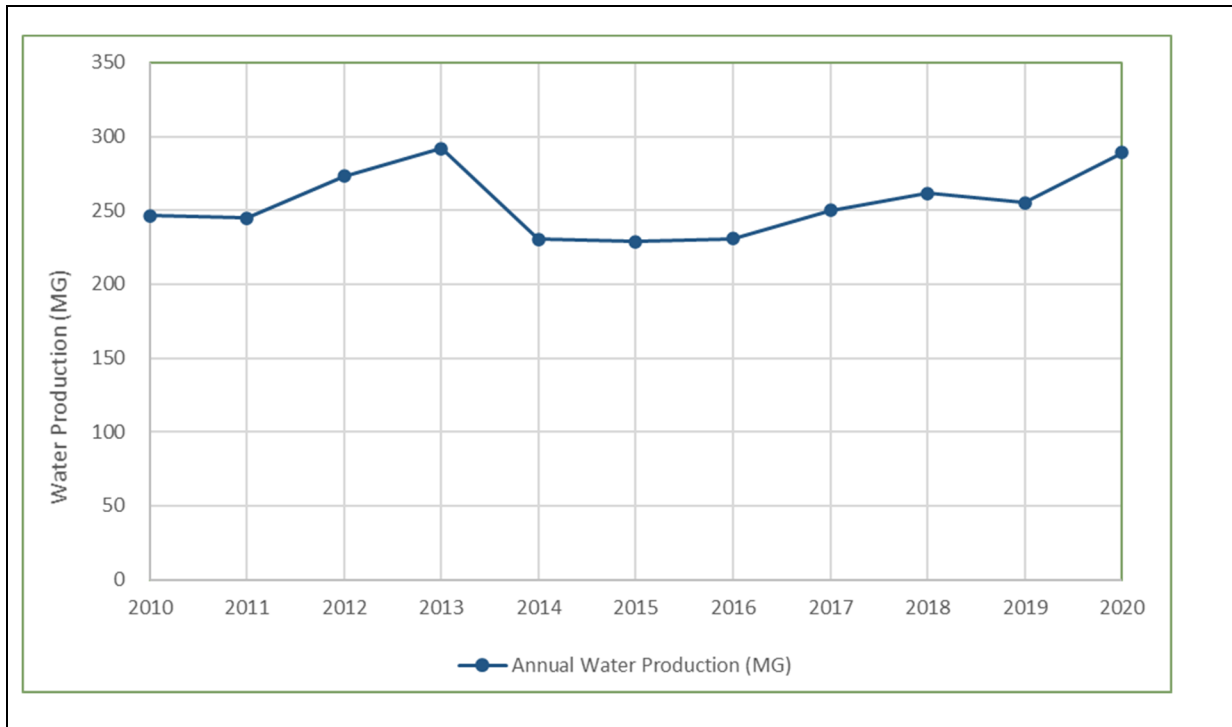


Figure 4-1. Historical Annual Water Production (2010 - 2020)

The water meter usage data from 2016 to 2020 was provided by the District. The average annual consumption with estimated losses is shown in **Figure 4-2**. Water consumption is comprised of approximately 62 % residential usage, 9 % irrigation usage, 12 % commercial/institutional usage, and 17 % system losses.

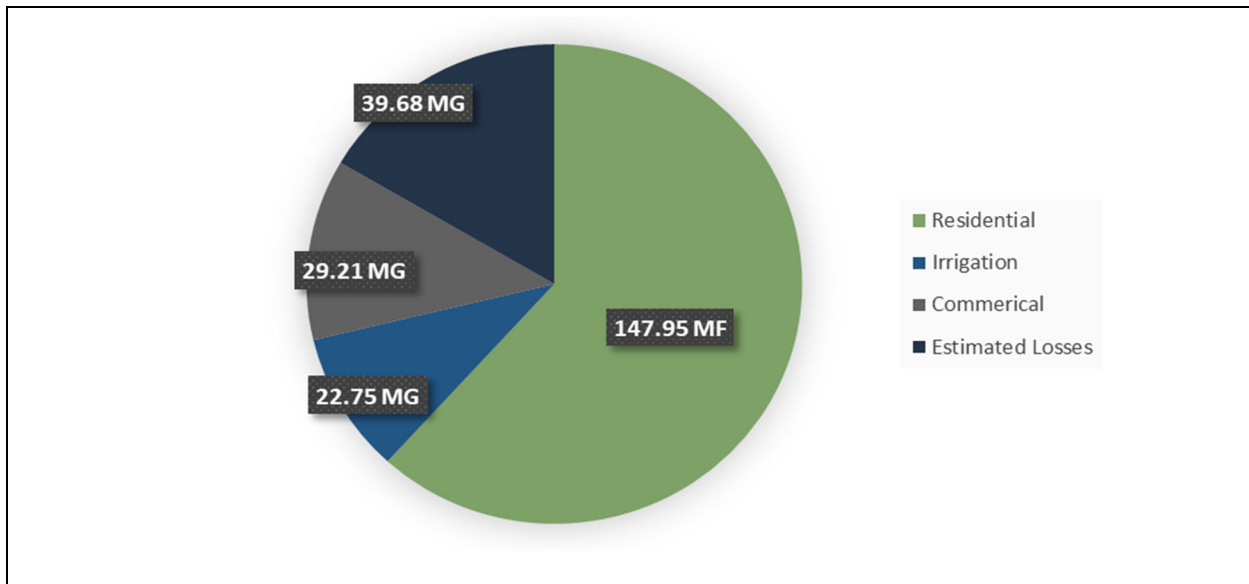


Figure 4-2. Annual Consumption

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The metering data records (2016-2020) were plotted to show the average total consumption by month, average total production (2010-2020) by month, and available water supply (Figure 3-1) by month, as shown in **Figure 4-3**. The total available water supply is 716.6 MGY. The average total production is 254.8 MGY which is 35.6% of the available water supply. The average total consumption is 199.9 MGY.

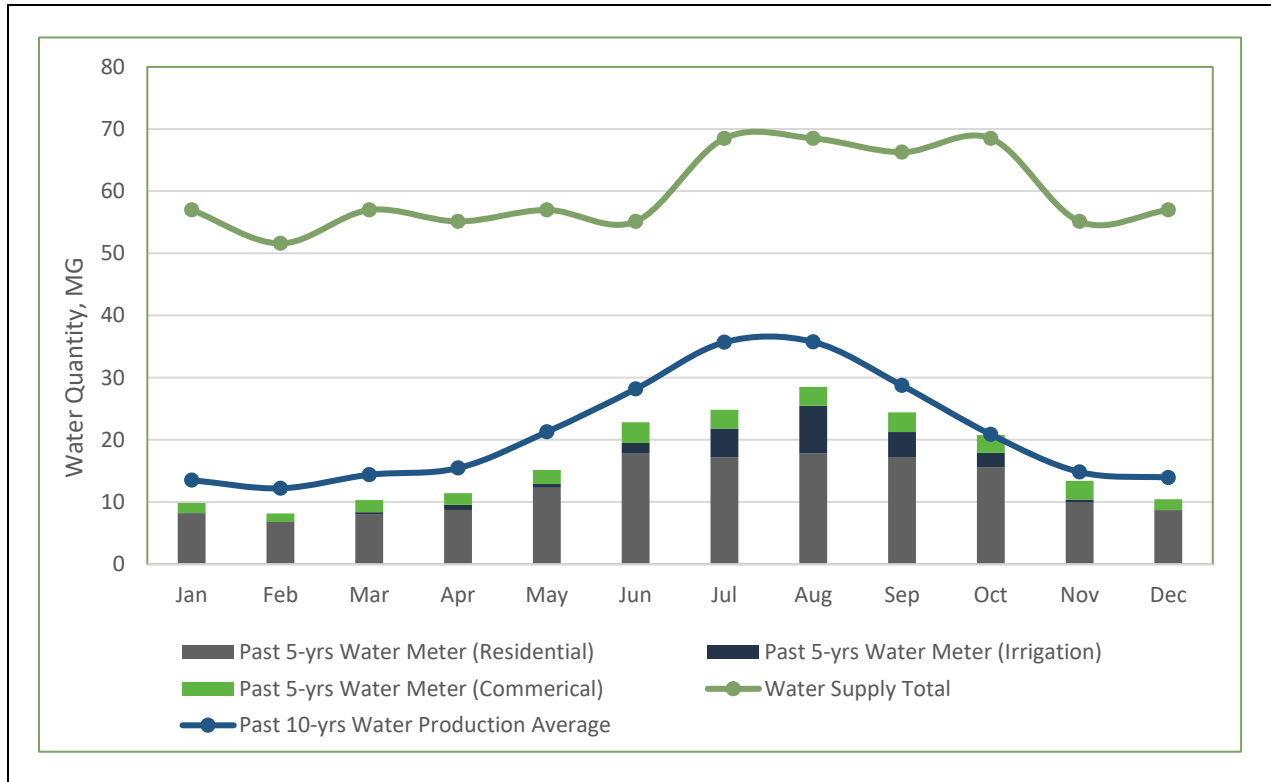


Figure 4-3 Historical Average Annual Consumption, Average Annual Production, and Available Water Supply by Month

As seen in Figure 4-3, the minimum water usage occurs in the winter (December – February) and is approximately 9.5 MG per month with zero irrigation use. Water usage increases with drier and warmer weather primarily from outdoor usage. On this basis, the estimated annual indoor consumption is 114 MGY, and outdoor consumption is 86 MGY.

4.2 Water Service Connections

The District has a total of 1,064 accounts of which 17 are irrigation services and the remaining are residential and commercial connections. The District could not distinguish the residential and commercial total accounts therefore the remaining 1,047 accounts were all counted as residential connections for this analysis.

The Bella Vista subdivision includes 171 units of residential houses with 132 being single-family residences and 39 senior homes. The irrigation services were not provided by the developer, Guillon Inc. Construction. Irrigation water demand is evaluated based on irrigation acres rather than services, which is most accurate. With the addition of the Bella Vista subdivision, the District's residential connections increase from 1,064 to 1,235 plus the Bella Vista landscape usage estimates. Of this total, the residential connections increase from 1,047 to 1,218, which is a 16% increase (**Table 4-1**).

Table 4-1. Service Connections (SC)			
Customer Class	Existing Willow	Bella Vista	Total
Total Residential	1,047	171	1,218
Irrigation	17	0	17
Commercial*	N/A	N/A	N/A
Total	1,064	171	1,235

*Existing commercial service connection totals were not available (N/A) from the District and none are included for the proposed development.

4.3 Water Use Factors

A review of meter data and service connection data from 2016 - 2020 (**Table 4-2**) was used to estimate water use factors for each customer class. Annual consumption for each customer class is presented as an average flow rate (GPM) and divided by the total connections to determine the flow rate per service connection (GPM/SC) for each customer class, respectively. Several months of meter data were missing for 2016, 2017, and 2019, so the years 2018 and 2020 were selected to conduct the analysis, and the data in 2020 was used for further analysis.

Table 4-2. District's Meter Data (MG), Service Connections (SC), and Equivalent Dwelling Unit (EDU)								
Customer Class	2018				2020			
	MG	SC	GPM / SC	EDU	MG	SC	GPM / SC	EDU
Total Residential	162.8	1,047	0.30	1.0	185.7	1,047	0.34	1.0
Irrigation	24.0	17	2.68	9.1	29.1	17	3.25	9.7
Commercial	40.5	N/A	N/A	N/A	29.7	N/A	N/A	N/A
Total	227.3	1,064			244.5	1,064		

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As **Table 4-2** shows, residential and irrigation annual water usage was relatively the same in 2018 and 2020. These findings are consistent with the water production and population trends that demonstrate a stable water system for the District.

Based on a comparison of the water production and water meter usage, water loss for the District's water system was determined to be 44 MG or 16.8% in 2020. These losses change year-to-year due to varying operational practices (e.g., hydrant flushing), leakage, and meter reading inaccuracies. With the count of system water loss, one EDU (or one typical single-family household) is estimated to require on average approximately 0.40 GPM as shown in **Table 4-3**, it is equal to 582 gallons per day, 18,000 gallons per month, and 217,000 gallons per year in 2020. Comparing with the single residential usage of 0.4 GPM/SC as one EDU, each irrigation connection consumed 9.7 equivalent EDU units of water in 2020.

Based on the EDU analysis, the total current average annual water requirements and total EDUs in the system are presented in **Table 4-3**.

Table 4-3. Existing Willow County EDU and Usage (2020)					
Customer Class	Existing Connections	Average Usage Per Connection	EDU Factor	Equivalent EDU	Water Usage
	SC	GPM			MGY
Total Residential	1,047	0.40	1.0	1,047	223
Irrigation	17	3.91	9.7	164	35
Commercial					
Total	1,064	4.31	10.7	1,211	257

By utilizing the future connections in the system (Table 4-1), with the Bella Vista residential water demand, the average annual water requirements at build-out and the total EDUs at build-out are presented in **Table 4-4**.

Table 4-4. Future Willow County & Bella Vista's Residential EDU and Usage					
Customer Class	Future Connections	Average Usage Per Connection	EDU Factor	Equivalent EDU	Water Use
	SC	GPM			MGY
Total Residential	1,218	0.40	1.0	1,218	259
Irrigation	17*	3.91	9.7	164	35
Commercial					
Total	1,235	4.31	10.7	1,382	294

* 17 connections represent current Willow County Water District irrigation system. The Bella Vista irrigation demand will be analyzed separately.

4.4 Bella Vista Landscaping Water Demand

The Bella Vista development has a planned 2.77-acre park area (Table 1-1) with 0.15 acres paved class I bicycle lane, which gives the potential irrigation area of 2.62 acres (114,151 square feet). The Bella Vista project description ^[2] states that landscaping shall be installed per AB 1881 Water Usage Requirements (Water Conservation in Landscaping Act of 2006) with drought-tolerant plants and a drip irrigation system on a timer. Applying these criteria to the WaterSense New Home Specification: Water Budget Tool (V 1.04) from EPA ^[6], the Monthly Landscape Water Allowance (LWA) is 324,369 gallons per month (0.32 MG/month) for the 2.62 acres of proposed irrigation area within the development. Although the highest production month is August in the District's records, EPA Water Budget Tool used the peak watering month of July decided by the zip code of the Bella Vista development in the model.

Factors of average irrigation usage between each month to July were calculated according to the monthly usage data in the District from 2016-2020. Applying the factors to the EPA LWA of 0.32 MG/month (in July) results in a 1.58 MGY landscape water allowance for Bella Vista.

For comparison, a second analysis was done utilizing the Maximum Applied Water Allowance (MAWA) for landscaping as shown in **Table 4-5**. The reference evapotranspiration data was obtained from the Irrigation Training & Research Center (ITRC) California Polytechnic State University database ^[7]. The selection was for Zone 4 (Mendocino County) for a typical year with drip/micro-irrigation system and grass surface.

Table 4-5. Maximum Applied Water Allowance (MAWA) for Landscape with ITRC Data

Month	Reference Evapotranspiration (ET _o)	Conversion Factor	ET Adjustment Factor (ETAF)	Landscape Area including SLA	Additional Water Allowance Factor for SLA	Special Landscape Area	MAW
	Inches/Month	To Gallons		SQFT		SQFT	Gallons
Jan	1.53	0.62	0.70	114,151	0.30	0.0	75,799
Feb	2.43	0.62	0.70	114,151	0.30	0.0	120,386
Mar	3.44	0.62	0.70	114,151	0.30	0.0	170,423
Apr	4.82	0.62	0.70	114,151	0.30	0.0	238,791
May	5.74	0.62	0.70	114,151	0.30	0.0	284,369
Jun	5.79	0.62	0.70	114,151	0.30	0.0	286,846
Jul	5.92	0.62	0.70	114,151	0.30	0.0	293,286
Aug	5.70	0.62	0.70	114,151	0.30	0.0	282,387
Sep	4.78	0.62	0.70	114,151	0.30	0.0	236,809
Oct	3.58	0.62	0.70	114,151	0.30	0.0	177,359
Nov	1.56	0.62	0.70	114,151	0.30	0.0	77,285
Dec	1.74	0.62	0.70	114,151	0.30	0.0	86,202
Total	47.03	0.62	0.70	114,151.2	0.30	0.0	2,329,942

* SQFT: Square Feet

The Equation used for the MAWA method in Table 4-5 is presented in **Equation 4-1**.

$$MAWA = (ET_o) \times (0.62) \times [(0.7 \times LA) + (0.3 \times SLA)] \quad \text{Equation 4-1}$$

Where:

MAWA = Maximum Applied Water Allowance (gallons per year)

ET_o = Reference Evapotranspiration (inches per year)

0.62 = Conversion Factor (to gallons)

0.7 = ET Adjustment Factor (ETAF)

LA = Landscape Area including SLA (square feet)

0.3 = Additional Water Allowance Factor for SLA

SLA = Special Landscape Area (square feet) (areas dedicated to edible plants, areas irrigated with recycled water, water features using recycled water, and areas dedicated to active play)

The resultant water demand utilizing the MAWA method is 2.33 MGY and exceeds the EPA water budget method result of 1.58 MGY. To be conservative, the 2.33 MGY of landscape water demand will be used.

4.5 District Build-out Demand with Bella Vista

Summarizing the analysis above, the proposed Bella Vista subdivision will add 171 residential connections to the current District's water system. The Bella Vista development will increase the District's water demand from 257 MGY (Table 4-3) to 294 MGY (Table 4-4). The planned 2.62 acres of irrigatable parks will introduce a 2.33 MGY water demand to the District, which results in a total 296 MGY build-out demand for the District with the Bella Vista Development.

As shown in **Figure 4-4**, a set of monthly distribution factors were calculated utilizing the past ten years of production records and were utilized to estimate the proposed Bella Vista developments water demand. The figure demonstrates that the future water demand still meets the water right summarized in Section 3 and Figure 3-1.

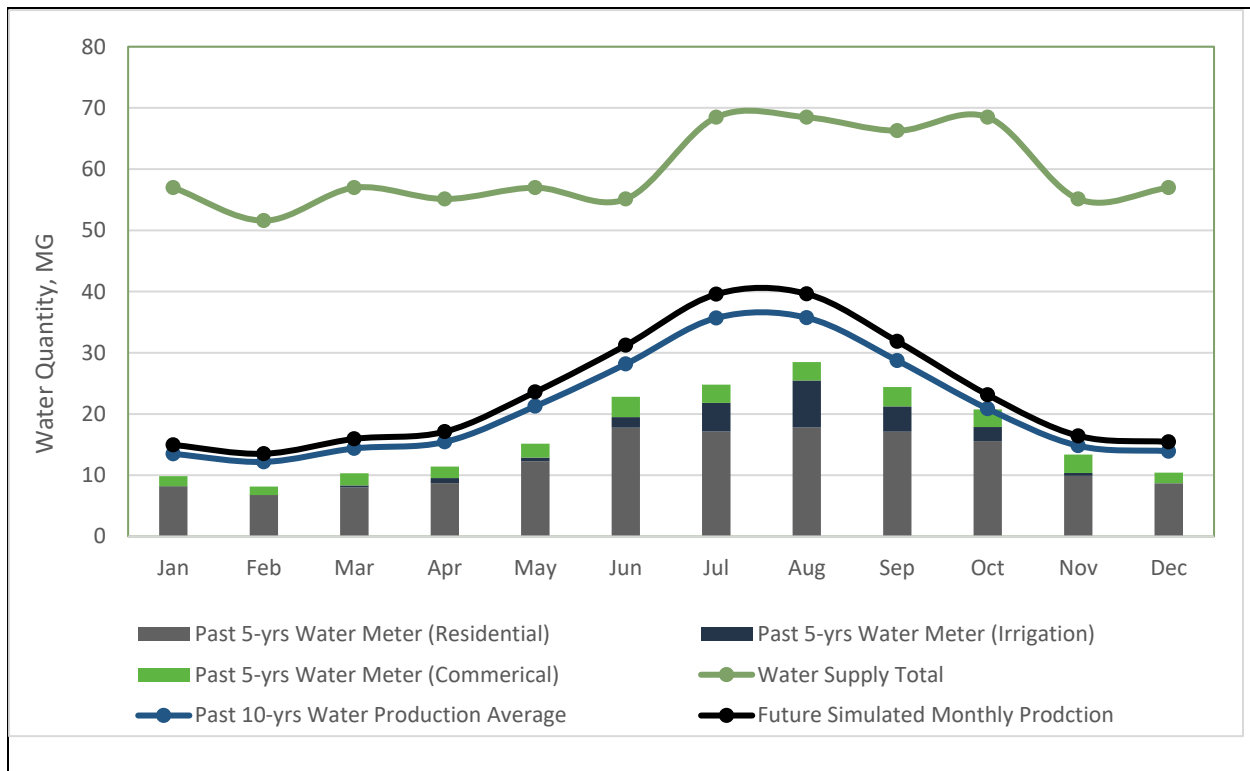


Figure 4-4 Future Average Annual Consumption, Average Annual Consumption, and Water Supply by Month, with Bella Vista Development

To examine the above conclusions, the *Per-Capita Method* was employed on this estimate. From the U.S. Census Bureau estimate, there are 2.55 people per household in Ukiah City [4]. The proposed 171 residential accounts for the Bella Vista subdivision projects to 436 people (Table 4-6). The build-out demand for the District and Bella Vista is 283 MGY, which is smaller than the *Disaggregate Method* result of 296 MGY. So, 296 MGY of future demand (Figure 4-4) is used to estimate water supplies.

Table 4-6. Bella Vista Water Usage Projection		
		Unit
Willow County Past 10-yrs, GPCD	63,696	Gallon Per Person per Year
Bella Vista Projection Population	436	People
Bella Vista Water Usage Projection	27.77	MG per Year
Future Willow County Annually Water Demand w/ Bella Vista	282.56	MGY

5. INFRASTRUCTURE SOURCE CAPACITY

The standards governing any proposed facilities discussed in this Technical Memorandum conform with the standards set forth (and not limited to) those listed below. These apply to all municipal drinking water systems in California, be they private (or investor-owned) and governmental entities:

1. Environmental Protection Agency of the Federal Government
2. California Code of Regulations, Title 22, Chapter 16 “California Waterworks Standards”
3. American Water Works Standards – current edition
4. Local county requirements
5. California Fire Code for fire flow requirements

5.1 Daily Water Demand and Peaking Factors

This section develops the daily water use and peaking factors that are needed to evaluate the adequacy of source and storage capacity in subsequent tasks.

Average Day Demand (ADD): The ADD is determined by dividing the annual water requirements by 365 days. The current annual water requirement in the District’s system is 257 MGY, as determined in Table 4-3. This equates to an ADD of 0.71 million gallons per day (MGD), or an average flow of 490 GPM. The annual water requirement at build-out is 296 MGY, as determined in Section 4.3 and Table 4-4. This equates to an ADD of 0.81 MGD or an average flow of 563 GPM.

Maximum Day Demand (MDD): In accordance with the California Waterworks Standards (Title 22), a public water system shall determine the MDD using the most recent ten years of data using daily production records, if available. When daily production data is not available, the MDD can be determined using the maximum month of production over the most recent ten years of operation and multiplying a factor of 1.5 times the average daily consumption in the maximum month.

Daily production records were not available and the multiplier of 1.5 times the average flow for the maximum month was used as allowed in Title 22. **Table 5-1** summarizes the historic production since 2010 including the maximum month of each year. The maximum day demand (MDD) was calculated using the maximum month production with the 1.5 multiplier.

The ratio of the MDD to ADD (referred to as the MDD peaking factor) is used for projecting future demands based on the future ADD estimates. From the current MDD of 1.96 MGD (1,363 GPM) and the current ADD of 0.71 MG, the MDD peaking factor is 2.78.

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Table 5-1. District Maximum Day Demand (MDD) (2010 - 2020)			
Year	Annual Production	Max. Month Production	MDD using Title 22
	(MG)	(MG)	(MGD)
2010	247	37	1.77
2011	245	36	1.76
2012	273	40	1.92
2013	292	41	1.96
2014	230	32	1.53
2015	229	29	1.39
2016	231	34	1.63
2017	250	37	1.80
2018	262	39	1.90
2019	255	36	1.75
2020	289	40	1.96
Maximum	292	41	1.96

Peak Hour Demand (PHD): The peak hour demand (PHD) is the peak flow rate that occurs over a period of several hours on the day of maximum use. Certain factors specific to each system affect the peak hour demand, such as irrigation timers and residential use patterns, which can be measured and represented by a system's diurnal curve if hourly data is available. In the absence of that information, Title 22 permits the use of a factor of 1.5 multiplied by the MDD. Diurnal curves were not evaluated in this study. The PHD of 2,044 GPM is calculated by multiplying 1.5 times the MDD of 1,363 GPM. The ratio of PHD to ADD (or the PHD peaking factor) is 4.17.

For the Bella Vista development, the estimated residential ADD is 69 GPM using 0.40 GPM/EDU (Section 4.3). The MDD is 192 GPM using the peaking factor of 2.78, and the PHD is 289 GPM using the peaking factor of 4.17. The estimated landscaping ADD is 4 GPM converting the 2.33 MGY determined in Section 4.4. The MDD is 12 GPM using the peaking factor of 2.78, and the PHD is 18 GPM using the peaking factor of 4.17. The estimated current and future water demands at build-out are shown in **Table 5-2**.

Table 5-2. Willow County Water District and Bella Vista – Water Demand (ADD, MDD, PHD)						
	Equivalent EDU	ADD		MDD		PHD
		GPM	MGD	GPM	MGD	GPM
Existing Willow District	1,211	490	0.71	1,363	1.96	2,044
Bella Vista Residential	171	69	0.10	192	0.28	289
Bella Vista Landscaping	2.62 Acres	4	0.01	12	0.03	18
Total	1,382	563	0.81	1,567	2.27	2,351

5.2 District Existing Water Infrastructure Capacity

The District currently serves potable drinking water to an estimated 4,000 people via approximately 1,064 service connections. Supplies are obtained from two Well Fields, referred to as the Burke Hill Well Field and the Norgard Well Field. There are five underflow supply wells. Two wells are dedicated to Burke Hill Well Field and three wells are dedicated to Norgard Well Field. Storage tanks are located in two pressure zones. The main pressure zone has a 1.55 MG storage capacity, while the upper pressure zone holds 0.048 MG capacity. The details of the existing water supply infrastructures are listed in **Table 5-3**.

Table 5-3. Water Intake and Supply Infrastructures							
Water Wells						Storage Tanks	
Well Field	Well Name	Production Rate	Function	Function	Water Source	Zone	Storage Size
		GPM					Gallon
Burke Hill Well Field	Well 7	1,000	Primary	Mostly only use one well at a time	Underflow Wells	Main Pressure	1,550,000
	Well 8	1,000	Backup			Upper Pressure	48,000
Norgard Well Field	Well 3	300	Combine Production Rate	Operation from May 1 to Sep. 30			
	Well 5						
	Well 6						

5.3 Water Supply Analysis

As shown in Table 5-3, Well 7 is the primary well with a pumping capacity of 1,000 GPM and Well 8 serves as the backup well with a capacity of 1,000 GPM. In the summer, the District has an additional 300 GPM available from Well's 3, 5 and 6. However, the District does not typically operate Well 7 and Well 8 at the same time since they are located in the same well field, so the District's pumping capacity is 1,300 GPM from May to September and 1,000 GPM beside the summer period. The District has approximately 1.6 MG of storage capacity.

Well Capacity, as required in the California Waterworks Standards (Title 22), must always meet the MDD of the system. The District's current MDD is 1,363 GPM and the build-out MDD is 1,567 GPM. Meanwhile, the well production rate is 1,000 GPM. In the summer with high water demand, the available well capacity is 1,300 GPM. Thus, with only 1,000 GPM from Well 7 (or Well 8) plus the additional 300 GPM capacity available in the summer, the District cannot meet the current MDD of 1,363 GPM and the build-out MDD of 1,567 GPM. If the District has all wells available, Wells 3, 5, 6, 7, and 8 the total pumping capacity is 2,300 GPM in summer and 2,000 GPM in the other seasons, the District could meet the MDD.

From the District's 10-year historical production, the maximum production 908 GPM, which is less than the available well supply (1,300 GPM). We assume the District does not pump Well 7 and Well 8 together since the system does not have the demand to do so.

Storage Capacity is sized for the instantaneous peak flows (operational storage), fire safety, emergency, and unusable storage volumes. Storage requirements are unique to each storage site because of the hydraulic demands specific to each WTP during peak instantaneous and fire flows. Storage capacity requirements are summarized in **Table 5-4** and described below. The District has a 1.6 MG storage capacity which is sufficient for the 0.95 MG storage requirement.

- **Operational Storage:** Per regulations (Title 22), storage tanks are sized to meet 4 hours of Peak Hour Demand (PHD).
- **Fire Storage:** Fire flows in the distribution system are sized for the suppression of residential or commercial fires. There must be enough volume held in storage to fight the larger requirement, which is a commercial fire flow of 3,000 GPM, for a three-hour duration.
- **Emergency Storage:** Emergency storage is the volume held in residence for periods where there are interruptions in the water supplies from the wells. Industry practice is to maintain an emergency volume of one MDD to protect against prolonged power outages. Alternatively, standby emergency generators can be equipped to ensure there are uninterrupted power supplies to the water supply facilities.
- **Unusable Storage:** Unusable storage is the volume of water that is not available from a nominal tank volume due to inlet and outlet pipe configurations. The unusable volume is assumed to be ten percent of the nominal volume of storage required.

Operation Storage	Fire Storage	Unusable Storage	Total
MG	MG	MG	MG
0.32	0.54	0.09	0.95

6. WATER SUPPLY RISK DURING DROUGHT

The District uses the Russian River Underflow for their water supply. Based on the historical records, an average of 35.6% of the appropriative water rights have been used during the last 10 years, and an estimated 41.3% of the water rights will be used in the future with the Bella Vista development.

The UVAP assessment report shows that from 2007 to 2009, the Ukiah Valley Area (UVA) experienced severe drought conditions, and well below average precipitation in 2002. Especially in 2009, Lake Mendocino water levels receded to record lows, and the Mendocino County Board of Supervisors issued a mandatory 50% reduction in water use. Comparing with this critically dry year, with the Bella Vista development, Willow County Water District uses 41.3% of the regular water rights and still could meet the 50% reduction requirement. UVAP also mentions the District's current water supplies are sufficient to meet the existing and projected future water demands, in normal, critically dry, and extended dry years^[5].

The District's water rights were curtailed by a mandatory reduction of 25% in 2014 and 2021. The District met the reduction in 2014. In 2021, purchased water from RRFC was also cut by 20% due to the water shortage caused by the current drought. As shown in **Figure 6-1**, with a 25% reduction on the two Willow licenses, the total water right reduces to 82% of the regular years. And with an additional 20% reduction

Jared Walker, Willow County Water District

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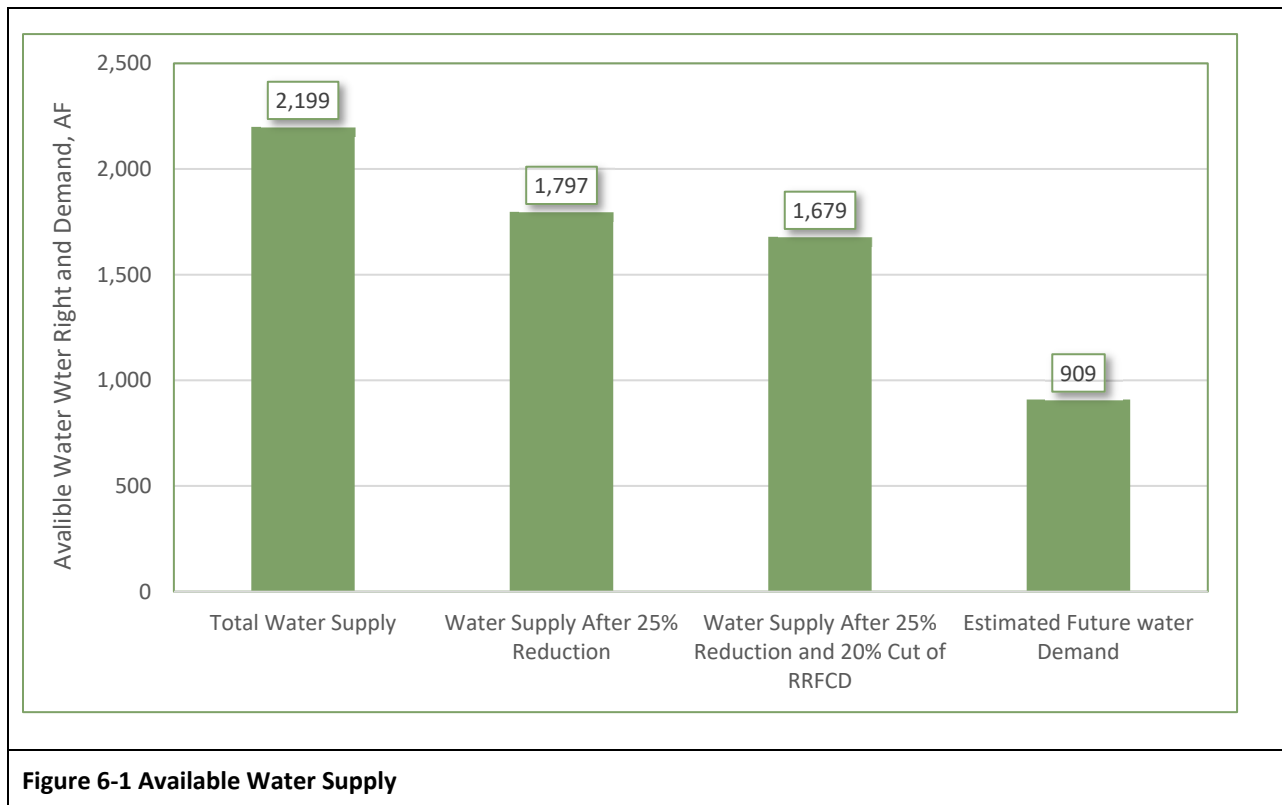
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on the purchased RRFC water, the water availability for the District is 76% compared to a normal-year. Under restrictions like 2021, the estimated water consumption of 909 AF per year (296 MGY) is 41% of the available water supply and can still be met when the water supply is curtailed.

Water Shortage Contingency Plan

In 1983 the state passed the California Urban Water Management Act (Act) which requires all urban water suppliers who serve 3,000 or more customers or who provide 3,000 or more-acre feet of water per year to prepare an Urban Water Management Plan (UWMP) every 5 years and submit the UWMP to the California Department of Water Resources (DWR). The purpose of the Act is to ensure that water suppliers plan for the long-term conservation and efficient use of the State's water supplies.

The District is not required to prepare an UWMP or a Water Shortage Contingency Plan as they do not have over 3,000 customers (i.e. service connections) or supply over 3,000 acre-feet of water. However, earlier this year in 2021, the District did approve a new water shortage contingency resolution asking for 25% mandatory water use conservation during periods of drought.



7. SUMMARY

The District has approximately a total of 2,199 AF (717 MG) water to use yearly under the two water right licenses and a purchased water contract. Historical records show the District uses an average of 255 MGY, approximately 35.6% of the available 717 MG water supply. With the Bella Vista subdivision development, the District will consume 296 MGY, which occupies 41.3% of the available water supply.

Well 7 is the District's primary well with a pumping capacity of 1,000 gallons per minute (gpm) and Well 8 serves as the backup well with a capacity of 1,000 gpm. In the summer, the District has an additional 300 gpm available from Well's 3, 5 and 6. Historically, the District has not utilized Well 7 and Well 8 together since the system does not have the demand to do so but the District could operate both wells concurrently if needed. From the District's 10-year historical production data, the maximum production is close to 1,000 gpm.

The District's calculated Maximum Day Demand (MDD) is 1,363 gpm and the build-out MDD is 1,567 gpm. Thus, with only 1,000 gpm from Well 7 (or Well 8) plus the additional 300 gpm capacity available in the summer, the District has a well capacity of 1,300 gpm and cannot meet the MDD of 1,363 gpm. If the District has all wells available, Wells: 3, 5, 6, 7, and 8 the total pumping capacity is 2,300 gpm and the District could meet the MDD.

The District has 1.6 MG storage capacity which is sufficient to meet the estimated 0.95 MG storage requirement.

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The District's water rights were curtailed to 1,679 AF by a mandatory reduction of 25% on the water rights and a 20% reduction on the purchased water from RRFC in 2021. In dry years like 2021, the District has sufficient water supply availability to meet the estimated future water demand of 909 AF, with the Bella Vista development.

In conclusion, this technical memorandum provides verification that the District has sufficient water supply for the proposed Bella Vista development.

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REFERENCES:

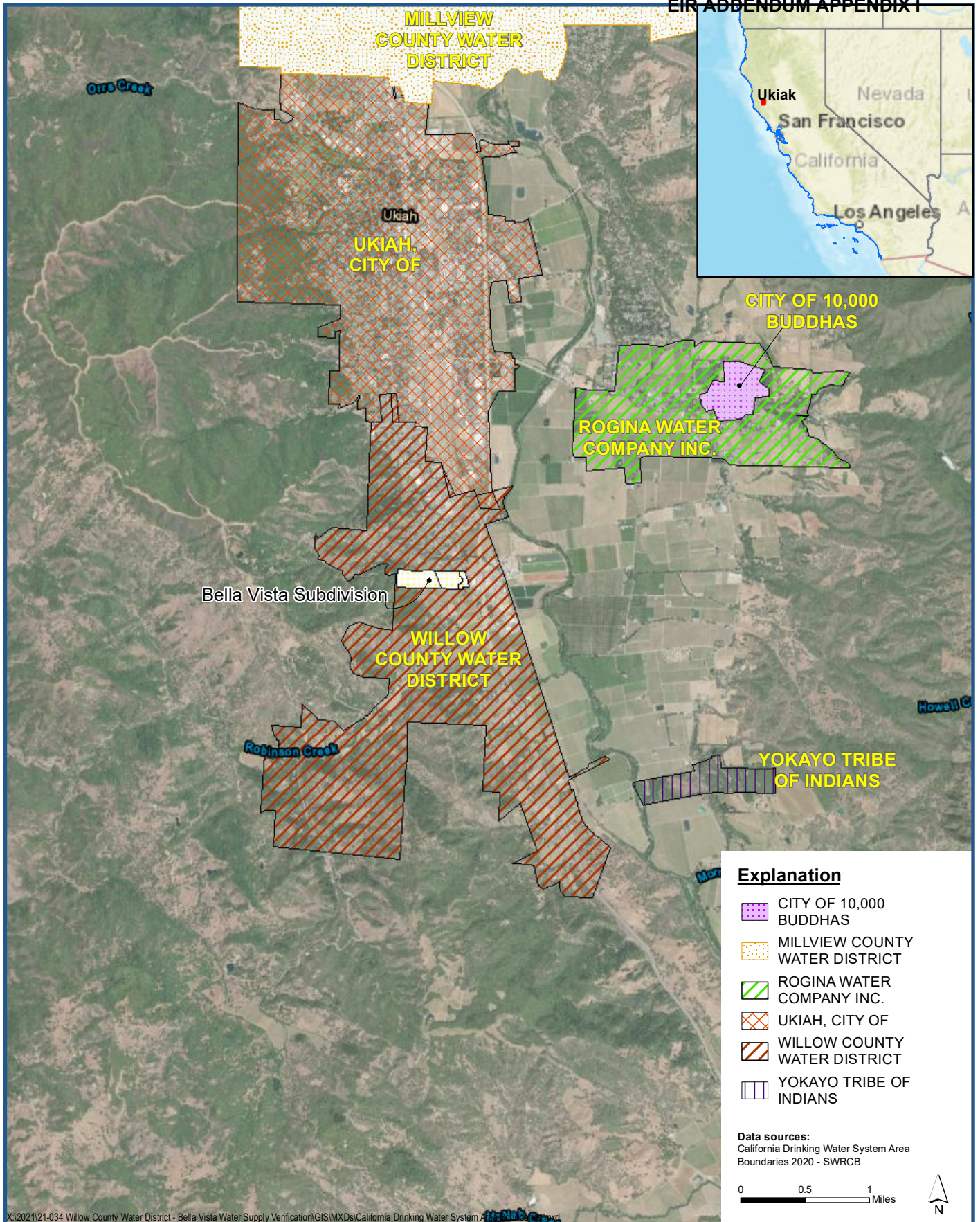
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- [5] Mendocino County Water Agency, October 20, 2010, Water Supply Assessment for the Ukiah Valley Area Plan
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ATTACHMENT(S):

Attachment A - Map of Willow County Water District and Bella Vista Development

ATTACHMENT A

Map of Willow County Water District and Bella Vista Development



X:\2021\21-034 Willow County Water District - Bella Vista Water Supply Verification\GIS\MXDs\California Drinking Water System Area Boundaries 2020 - SWRCB



Willow County Water District Boundary Map

*Bella Vista Development Water Supply Verification
Willow County Water District/Mendocino County*

Attachment A