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WATER
MANAGEMENT INC.*

Technical Memorandum

Prepared for: Rancho Murieta Community Services District
Project Title: Water Supply Assessment – Rancho Murieta North Project

Technical Memorandum

Subject: Final Water Supply Assessment
Date: December 11, 2015
To: Darlene Gillum, General Manager, Rancho Murieta Community Services District
From: Lisa Maddaus, Maddaus Water Management, Inc.
Reviewed by: Bill Maddaus, Maddaus Water Management, Inc.

EXECUTIVE SUMMARY

The Water Supply Assessment (WSA) provides information for use in the California Environmental Quality Act (CEQA) analysis for the proposed project, Rancho Murieta North PLNP2014-00206. The Rancho Murieta Community Services District (District) has completed the WSA at the County of Sacramento's request based on Board adopted planning documents, recent review of District water demands, and information provided by the County and Project Proponent. One future project, Rancho Murieta North Development Project, on undeveloped land within the District's existing service area is presented in this WSA.

The requirements for the WSA are described in the California Water Code Sections 10910 through 10915, amended by the enactment of Senate Bill 610 (SB 610) in 2002. SB 610 requires an assessment of whether available water supplies are sufficient to serve the demand generated by the new project, as well as the reasonably foreseeable cumulative demand during normal year, single dry year, and multiple dry year conditions over the next 20 years.

While the District is below the threshold of 3,000 connections and 3,000 AFY to prepare an Urban Water Management Plan for submission to the California Department of Water Resources, this WSA builds on previous water demand projections created as part of the Rancho Murieta Community Services District 2010 Integrated Water Master Plan Update (IWMP) adopted by the District Board on October 18, 2010. The IWMP buildout demand, based on 600 gallons per day per EDU for new development, is assumed to occur in year 2035, which is included in the 20-year time horizon required by the WSA. The number of residential accounts at buildout was drawn from Sacramento County approved land use projections included in the IWMP.

Since the 2010 IWMP Update was completed, more recent information has been included in the WSA analysis as noted throughout the technical memorandum. For example, average and projected residential account water use is based on the District's Summary of Residential Demand Factors Analysis published June 19, 2013 and was updated to consider more recent water use trends. Both residential and commercial demands are planned as part of the proposed development included in this WSA.

The supply information is also based on the 2010 IWMP Update. Since the IWMP was approved, several interim projects have begun or been proposed and average account water use has been reviewed such that the demand calculations for the new projects are included in this report to illustrate a comprehensive overview of system-wide supply and demand.

The Rancho Murieta North Development project proposes 827 new residential lots, a small commercial 39-acre parcel development and 382.7 acres of parks, open spaces, trails and other non-residential land uses (equivalent to 215 Equivalent Dwelling Units or EDUs) which is estimated to require approximately 1,326 acre-feet per year (AFY) of additional total potable and non-potable water demand. This project is currently in the County application process. This WSA was developed by Maddaus Water Management, Inc. and District staff independent from the applicant as required by California Code, including a detailed estimate for project water demands.

The number of connections and projected water demand for this proposed project do not exceed the adopted demand projection in the 2010 IWMP Update. As a result, the analysis shows that the District can meet its obligation to serve proposed development within the service area boundary and its existing customers using current supply sources in the 20-year time horizon required by Senate Bill 610 Water Supply Assessment requirements.

1 INTRODUCTION

1.1 Purpose and Authorization

The purpose of the Water Supply Assessment (WSA) is to determine whether there is adequate water supply to meet the water needs of the new proposed project within the Rancho Murieta Community Services District service area. The WSA was developed by the collaborative efforts of the project team consisting of Maddaus Water Management, Inc. (MWM) and Rancho Murieta Community Services District (District). MWM provided estimated calculations for the water demand of the project and assisted to compile the WSA report; the District provided information on this project and also all other development projects and water demands contained in the report.

1.2 Scope of Investigation

This WSA focuses on the proposed Rancho Murieta North Development project. As shown in figure 1-1 below, the project property is located on private land within the Rancho Murieta Planned Development boundaries.

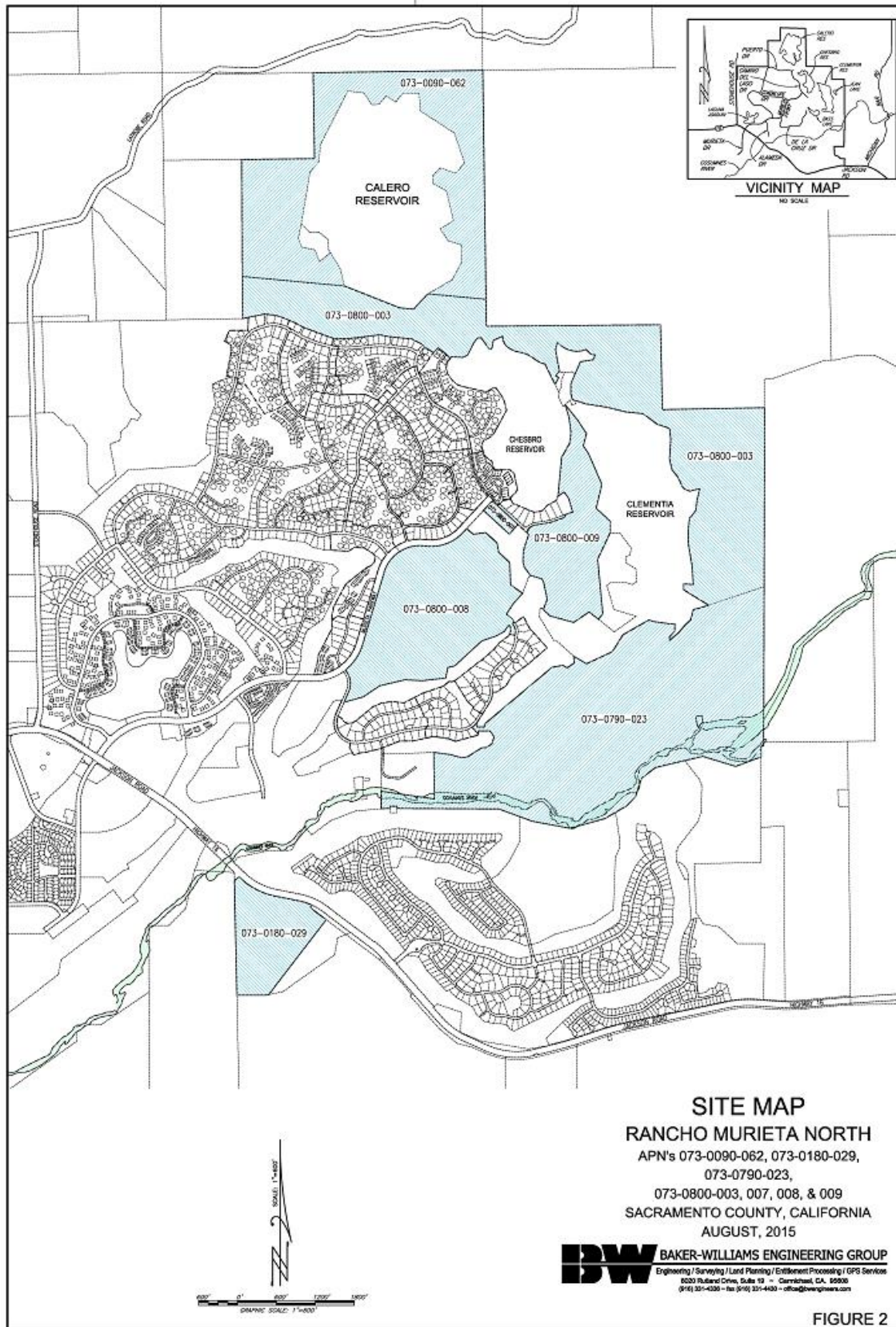
1.3 Documents and Persons Consulted

Water supply source related information in this report is primarily based on the District's 2010 Integrated Water Master Plan Update, Final 2020 Compliance Plan, and 2013 Summary of Residential Demand Factors Analysis, unless more updated information was applicable.

Demand projections were developed independently by the District and MWM based on assumptions using District provided data. The future demand projection to buildout was adopted by the District in the 2010 IWMP Update. The number of connections and projected water demand for this proposed project are not exceeded based on this adopted demand projection.

Some information specific to Rancho Murieta North Development project was provided by District staff and Sacramento County in August through November 2015.

Figure 1-1. Project Site Vicinity Map



Source: Baker-Williams Engineering Group, Rancho Murieta North Planning with APNs

2 DEVELOPMENT PROJECT DESCRIPTION

2.1 Description

The proposed project elements of the Rancho Murieta North Development project included in this WSA are described below. Key project features and phasing are also presented.

The proposed Rancho Murieta North Development project is on approximately 730 acres of land located in the Rancho Murieta Community Services District. The proposed project includes 827 residential lots in Villages A-H, a 39-acre commercial development, and 215 EDUs of park and additional non-residential land uses. Individual village communities proposed have a combination of three different lot sizes: (1) estate areas of less than 12,000 square feet, (2) estate areas between 12,000 and 24,000 square feet, and (3) estates greater than 24,000 square feet. Lots greater than 24,000 square feet may have more irrigated turf or an additional small housing unit on the property referred to as a “casita.”

The proposed 39-acre General Commercial (GC) parcel will be located on the south side of Jackson Road (Highway 16) just east of the Cosumnes River. The property was historically used by Operating Engineers Local #3 for heavy equipment training purposes. The intended use for this parcel may include, but is not be limited to, warehousing, light industrial, retail, some residential housing, and/or recreation uses as allowable in a GC zone development.

Table 2-1 presents the proposed sizes of the Rancho Murieta North project non-residential development and residential village lots, as well as the development schedule.

Information associated with the project demands are presented in Section 4.

Table 2-1. Proposed Residential, Commercial, and Common Area Sizes – Rancho Murieta North Project

Village	Lot Sizes (square feet)			Total Lots	Development Schedule			
	Less Than 12,000 SF	12,000 to 24,000	More Than 24,000		2020	2025	2030	2035 or later
Village A	91	68	8	167	70%	15%	7%	8%
Village B	45	116	6	167	10%	30%	30%	30%
Village C	85	45	0	130	10%	40%	40%	10%
Village D	0	40	2	42	0%	25%	25%	50%
Village E	0	11	32	43	0%	0%	20%	80%
Village F	40	54	1	95	0%	2%	38%	60%
Village G	7	29	17	53	0%	0%	10%	90%
Village H	24	103	3	130	0%	10%	25%	65%
Non-Residential								
Commercial			4 parcels or 39 acres		15%	30%	30%	25%
Park and Non-Residential EDUs (Lettered Lots/Common Area)				215 EDUs	11%	15%	25%	49%

3 PROJECT WATER SUPPLY SOURCE

The water supply sources for the District are described in detail in the 2010 IWMP Update. This section provides an overview of the District's supply sources. The Rancho Murieta North Development project is within the existing service area of Rancho Murieta Community Services District and is included in past planning efforts to be served by the existing water sources.

3.1 Service Area Background Information

The District was formed in 1982 to provide water supply collection (treatment and distribution), wastewater collection (treatment and reuse), and storm drainage collection, disposal, and flood control services for the community of Rancho Murieta. The area served by the District encompasses approximately 3,500 acres in eastern Sacramento County. The region is similar to a Mediterranean climate, marked by precipitation typically occurring only in winter months.

While the District is below the threshold of 3,000 connections and 3,000 AFY to prepare an Urban Water Management Plan for submission to the California Department of Water Resources, the District's future demand projection to buildout was adopted by the District in the 2010 IWMP Update.

Land uses within the District's service area show the development of approximately 1,920 acres in 2004 for single-family residences, townhouses, duplexes, and mobile homes (MacKay & Soms, 2004).

District water is taken from the Cosumnes River at Granlees Dam and pumped into Calero, Chesbro, and Clementia Reservoirs from November 1st until May 31st of each year; it is subject to provisions in the water rights permit 16762. The stored water is used throughout the year for the needs of the community. These reservoirs work as large settlement basins before the water is transferred to the Water Treatment Plant at the foot of the Chesbro Dam.

3.2 Potable Water Treatment and Distribution

Water is processed by conventional and membrane filtration through two treatment plants, disinfected through chlorine contact chambers, and pumped to storage in the 1.2 MG storage tank on Rio Oso Drive and the 3.0 MG storage tank on Van Vleck Ranch (east of Rancho Murieta). These tanks hold water for distribution and fire protection to the customers of Rancho Murieta Community Services District.

The system is divided into two separate systems: a pressure system and a gravity feed system. The area north of Guadalupe Drive is the pressure system and its water comes from the booster system at the Rio Oso Drive storage tank. The rest of the system is gravity flow and the water comes from the Van Vleck tank through the south area across the yellow bridge to the area south of the second Guadalupe Drive.

Water Treatment Plant. A retrofit and expansion project to upgrade the existing 1.5 MGD conventional water treatment plant (WTP) to 4 MGD of ultrafiltration, expandable to 6 MGD as needed, is being installed and includes influent piping through new 400-micron auto-strainers as well as modifications to the Plant 1 flash mixer and flocculation basins. This WTP project is scheduled to be completed by year end 2015. Also, two new treated water booster pumps have been added to pump the treated water out to the distribution system.

3.3 Recycled Water

The use of recycled water in Rancho Murieta offsets the demand for potable use. The new development is required to use recycled water for outdoor irrigation where economically feasible per District Policy 2011-07, adopted July 20, 2011. It also prevents the need for the District to obtain a National Pollutant Discharge Elimination System (NPDES) permit for disposing of treated wastewater.

Recycled water of the tertiary treated wastewater effluent is currently used exclusively on the two golf courses. They have a combined irrigation area of approximately 250 acres and annual average demand of 550 AF (179.2 million gallons). The District's tertiary treatment plant typically operates annually from late April through October to produce recycled water for the golf courses' irrigation needs. Should the District have an excess of recycled water, it may be delivered for use on adjacent property located at the Van Vleck Ranch.

The District stops supplying recycled water in coordination with the Rancho Murieta Country Club (RMCC) each fall per a Waste Discharge Requirement with the Regional Water Quality Control Board, as well as when supplies are exhausted. RMCC then draws down the levels in their ponds at Holes 10, 11, 16 and 17 on the South Course and partially draws down Bass Lake on the North Course. This is to keep the ponds from violating the minimum of two feet from spillway requirement from the Regional Water Quality Control Board to prevent the ponds from overflowing due to storm water runoff during the rainy season.

Recycled water is distributed in a separate network of pipes that keeps reclaimed water pipes completely separate from potable water pipes. The non-potable reclaimed water is distributed in lavender (light purple) pipes or marked as "RECYCLED WATER" to distinguish it from potable water. Where economically feasible, future development is required to install purple pipe and supply recycled water for residential and common area irrigation purposes.

3.4 Raw Water

The District's raw water infrastructure consists of an intake from the Cosumnes River at its Granlees Dam and diversion structure, diversion pumps, and piping to feed the three primary raw water storage reservoirs. The three primary storage reservoirs, Calero, Chesbro and Clementia have an estimated usable combined storage capacity of 4,608 AF. This value does NOT include the minimum storage volume that cannot be put into use (dead storage). Usable reservoir volume with stop logs (flashboards) in place (and excluding dead storage) is 4,723 AF. The total available storage for the District is assumed to be the reservoir volume with the flashboards installed. During the 2012-2015 drought, the District was able to fill the reservoirs with the flashboards in place.

Raw water can be conveyed from Granlees Dam to either Calero or Chesbro Reservoirs via a 33-inch pipeline or to Clementia Reservoir via a 21-inch pipeline. Calero Reservoir is at the highest elevation of the three reservoirs and is the first to be drawn down. It is drawn down by transferring raw water via a 30-inch siphon pipeline to Chesbro Reservoir. Raw water needed to meet the community's needs is drawn from Chesbro Reservoir to the water treatment plants through a gravity-driven 36-inch raw water supply pipeline. In addition to raw water storage, Clementia Reservoir can be used to route water to a number of other areas within the community. Clementia Reservoir is also used for irrigation supply and recreational uses.

For an average rainfall year during the diversion season, flow into the system is greater than flow out of the system. Surplus water is moved to storage and reservoir depths increase until they are filled to capacity. The opposite state

occurs during the summer-to-fall draw down season, when flow out of the storage is greater than flow into storage. Reservoirs decrease in volume depth until the minimum allowable reservoir volume is reached (dead storage) or until the diversion season starts once again. Typically, the District enters into the draw down period with all three reservoirs filled to capacity. During severe drought conditions, flow out of storage to the water treatment plant facility remains greater than flow into the system for most of the drought period, including the diversion season. Under shortage conditions, including droughts, the District is preparing to diversify supply sources by using groundwater wells and expanded use of recycled water.

3.5 Supply Source and Contractual Provisions

As summarized in the District's 2010 IWMP Update, the District's water supply consists of seasonal diversions and diversions under Permit 16762 from the Cosumnes River that are normally diverted to three storage reservoirs (Calero, Chesbro, and Clementia). More details on the District's diversion limitations can be found in their 2010 IWMP Update.

Water right permit 16762 was issued in 1969, amended in 1980, 2000, and again in 2006. In 2006, the permit was renewed and extended with no new permit requirements through 2020 in consideration that the community was not at full build-out. It now appears likely that in 2020, the community will not have reached full build-out and the District will request another extension of the permit.

The Cosumnes River water supply is subject to drought restrictions. In 1976 and 1977, the District experienced the driest one-year drought span on record. The most recent drought of 2012-2015 did not impact the District's ability to divert water from the river, which did occur under 1977 river hydrology conditions. The first District drought resolution was adopted in 1990 as Policy 90-2. In February 2012 the District adopted Chapter 14 of the Water Code with updates and enhancements to water use efficiency, wasteful use of water and drought response regulations. The District continues to maintain a drought ordinance to mitigate community impacts in time of water supply shortages. Since 1989, many studies and exploratory measures have been executed to determine potential water supply alternatives. In addition, other studies have evaluated alternative build-out projections and assessed reclaimed water disposal needs and offsets to potable water use.

3.6 Water Supply Plan

According to the District's IWMP, previous studies show that providing new groundwater supply is more cost-effective than other alternatives to increasing supply reliability in times of water shortage. Preliminary well field explorations show that potential well fields exist within close proximity of Rancho Murieta. Early findings indicate an individual well could provide a potential of up to 500 gpm (Dunn, 2013) and identified two potential groundwater well sites. However, a capacity of approximately 400 gpm would be required if this option were used to eliminate drought deficit only. A detailed description of the infrastructure required for this option was presented in the evaluation of the 2006 IWMP (HDR, 2006).

Also, there are several agricultural fields in close proximity of Rancho Murieta. Potentially, the District could form an agreement with a local rancher or farmer to trade recycled water for groundwater. This option requires installation of pipeline and conveyance infrastructure to route raw water from the groundwater well to Chesbro Reservoir and recycled water from the storage reservoir to the agricultural application area. However, this alternative does not provide any off-set or reduction to potable water demand within the District.

3.7 District Water Supply Projections

The following table presents the District’s projected water supplies from the Cosumnes River that are normally diverted to three storage reservoirs (Calero, Chesbro, and Clementia). In addition to other use limitations as presented in the previous sections (water treatment plant capacities, etc.), the total amount of water taken from the Cosumnes River cannot exceed 6,368 AFY.

Table 3-1. District Potable Supply Sources

Water Supply Source	2015	2020	2025	2030	2035	Notes
Seasonal Diversion Allotment from the Cosumnes River, AFY	6,368	6,368	6,368	6,368	6,368	Total amount of water taken from the Cosumnes River cannot exceed 6,368 AFY.
Water Treatment Capacity, MGD	4.0	6.0	6.0	6.0	6.0	Water treatment capacity is 3.5 MGD (2010 IWMP Update). Expansion to 4.0 MGD by year-end 2015, and expansion to 6.0 MGD when needed.
Water Treatment Capacity, AFY	4,481	6,721	6,721	6,721	6,721	
Total Useable Water Storage Capacity with Stop Logs, AFY	4,723	4,723	4,723	4,723	4,723	Three primary storage reservoirs Calero, Chesbro and Clementia have an estimated usable reservoir volume with stop logs in place and excluding dead storage of 4,723 AF. This value does NOT include water that is directly supplied to customers during the pumping season.
Additional Recycled Water Supply, AFY				280	560	Offset on potable irrigation demand for new residential development. 2010 IWMP Update: Table 3-5. Available at buildout as "credit" towards potable water supplies (versus lower potable demands). Assume 50% of buildout by 2030.
Projected Accessible Potable Supply, AFY	4,481	4,723	4,723	5,003	5,283	This represents the minimum of diversion, treatment, and storage capacity (the most limiting element) plus available additional recycled water supplies.

Note:

The District is currently planning augmentation of the water supply for drought and emergency needs with the drilling of two groundwater wells with a combined production capacity of approximately 400 gpm. Assuming average ongoing well production, this equates to approximately 645 AF per year (Dunn, 2013). This additional supply is not included in the Table 3-1 potable supply.

The following table presents the District’s estimated annual supply allocations for a single dry year and multiple consecutive dry years. An average supply year of 2020 (which includes the expanded water treatment plant supply) is used. As shown, the dry year conditions presented in Table 3-2 illustrate a progressive 10% cutback per year down to a total of 50% in compliance with California Water Code 10632.

The District’s supply reliability under any shortage condition is dependent on future climate conditions and was thoroughly evaluated during the development of the 2010 IWMP Update. There were adequate supplies to serve the

projected demands and the District adopted the plan with a recommended alternative to improve supply reliability in times of water shortages through the future addition of groundwater supplies and the expansion of the recycled water systems to serve new homes using less water than existing homes for outdoor irrigation.

Table 3-2. District Projected Annual Supply Allocations for a Single and Multiple Dry Years

Water Supply Source	Normal Year Supply (2020)	Single Year Year 1	Year 2	Year 3	Year 4	Year 5
Supply, AFY	4,723	4,251	3,778	3,306	2,834	2,362
% Reduction	0%	10%	20%	30%	40%	50%

Notes:

1. Normal year supply is based on the usable storage capacity, which is more limiting than the Cosumnes River diversion allotment in a normal year per Table 3-1.
2. Reduction percentages shown are based on Section 10632 of the California Water Code. Based on the 2010 IWMP Update analysis, these levels of cutbacks are more extreme than is projected to actually occur in the District service area.

3.8 Water Supply Shortage Contingency

The District Water Shortage Contingency Plan (WSCP) was adopted September 14, 2012 in line with the California Water Code and industry best practices to provide direction on specific actions to be taken by District staff and customers in response to increasingly severe water supply shortage conditions. In case of water system failure or water quality issues requiring immediate response and action, refer to the District’s Emergency Operations Procedures. The District intends to use this Plan to meet the requirements of the California Water Code, Section 10632. A water shortage contingency analysis based on the historic driest three-years on record was previously prepared as part of the Integrated Water Master Plan (Brown and Caldwell, 2010).

The current IWMP presents water supply demands and drought responses for the available supply. In an effort to provide a uniform basis for requesting cutbacks in consumption due to reductions in supply from minor to emergency conditions, the District has a program of four levels of actions based on the severity of the water shortage. The District previously adopted shortage mitigation measures, which are included in District Code Chapter 14 - Water Code, updated most recently in 2012. This WSCP is consistent with District policies, District codes, and the District’s 2010 Integrated Water Master Plan. The names for stages in this Plan are consistent with other water purveyors in the Sacramento region.

“Normal” – Normal Water Supply and On-going Conservation: The District’s supply or distribution system is able to meet all water demands of its customers in the immediate future. All customers are encouraged to use water for beneficial and reasonable uses. District customer demands are being monitored for meeting 20% reduction by 2020 in compliance with state law, Senate Bill SBX7-7.

Stage One – Water Alert: There is a probability that the District’s supply or distribution system will not be able to meet all the water demands of its customers and the District’s ability to pump to reservoir systems may be impacted.

Stage Two – Water Warning: The District’s supply or distribution system is forecasted to not be able to meet all the water demands of its customers and District’s ability to pump to reservoir systems is forecasted to be, or is actively being, impacted.

Stage Three – Water Crisis: The District’s supply or distribution system is projected to not be able to meet all the water demands of its customers under Stage 2 - Water Warning requirements and the District’s ability to pump to reservoir systems is predicted to be, or is actually being, impacted.

Stage Four – Water Emergency: The District is projecting an imminent failure of a water supply, storage, or distribution facility based on an estimate of remaining supply.

Information about water shortage stage determination and declaration as well as WSCP implementation and drought monitoring can be found in the Water Shortage Contingency Plan.

3.9 Projections under Water Supply Shortage Conditions

The Cosumnes River water supply is subject to drought restrictions under low flow conditions. In 1976 and 1977, California experienced the driest single year drought span on record that would have a direct impact on District supply availability. This drought also represented the driest three-year sequence drought event (1976, 1977, and 1978) impact on the District. In each of these historical droughts, the District’s water withdrawals would have been significantly curtailed or ceased all together. The river hydrology of 1976, 1977 and 1978 is still the worst case planning scenario for the District, given pumping was permissible in 2014 and in 2015 and the District was able to fill the three storage reservoirs to capacity.

As presented in the 2010 IWMP Update, the Shared Vision Model (SVM) analyzed several different multi-year drought scenarios including climate change. As published in the 2010 IWMP Update, annual river diversions for the driest three-year sequence (1976, 1977, and 1978) are 1,440 AFY, 0 AFY, and 3,596 AFY, respectively. To this date, the 1976-1978 drought remains the driest three years in relation to District water supply operations. During the drought conditions of 2012-2015, river diversion pumping levels to the District’s reservoirs were sufficient to fill to capacity.

Additional information is presented in Section 6, Table 6-2, where the three-year estimated minimum water supply is presented as a three-year worst case supply projection (e.g., in a case of drought or other causes of reduced water supply) based on the 2010 IWMP Update. The calculated supply under shortage conditions would meet the projected demand in any single dry year from 2015-2035. In the case of the District anticipating being unable to meet a possible dry year demand, the District would implement additional measures to reduce consumption (as described in the Water Shortage Contingency Plan) for all District customers.

4 WATER DEMAND PROJECTIONS

4.1 Future System Potable and Non-Potable Water Demand Projections

In addition to existing year 2015 demand for the District and the Rancho Murieta North Development project proposed demand, the following residential and commercial developments have been approved: The Retreats, Murieta Gardens Extended Stay, Murieta Gardens Residential, Murieta Gardens II-Commercial, and Murieta Inn (all with a projected year of completion of 2020); and Riverview, Lakeview, Residences-East, and Residences-West (all with a projected completion year of 2025). The following table presents projected District demands. The proposed project demands are further described in Section 4.3.

Table 4-1. Future System Potable and Non-Potable Water Demand Projections (AFY)

	2015	2020	2025	2030	2035
Existing Demand, AFY¹	1,711	1,711	1,711	1,711	1,711
Approved Projected Demand, AFY	0	126	265	265	265
Subtotal Future System Demand (without proposed projects)	1,711	1,837	1,976	1,976	1,976
Proposed Rancho Murieta North Project Demand, AFY²	0	204	429	752	1,326
Total Future Demand (with Project), AFY	1,711	2,041	2,405	2,728	3,302

¹ Existing demand is based on average production from 2009-2013 (not including drought year 2014).

² The Rancho Murieta North Project Demands are presented in Table 4-5 and Table 4-6.

The following Table 4-2 presents the adopted total demand forecast in the 2010 IWMP Update for future connections and EDUs based on 600 gpd per EDU compared to future proposed projects with recycled water supplied to support outdoor irrigation. The analysis illustrates that the use of non-potable irrigation for new residential connections is projected to use less than the previously adopted demand forecast using reservoir supplies to meet potable irrigation demand. The recycled water is also needed for the District's wastewater disposal requirements. The use of recycled water therefore is intended to also assist with increasing the supply reliability for the District when buildout occurs (2035).

Table 4-2. Future Proposed Demands Comparison (normal conditions)

	2015	2020	2025	2030	2035
2010 IWMP Update Demand Projection (using 600 gpd/EDU)¹	1,525	1,992	2,460	2,928	2,928
Total Future Demand (with Project), AFY	1,711	2,041	2,405	2,728	3,302
Total Estimated Recycled Water	-	-	-	280	560
Total Potable Demand (Reservoir Supplied), AFY	1,711	2,041	2,405	2,448	2,742

4.2 Net Additional Demand from Proposed Projects

The following table presents the future system demand projections and the difference (estimated remaining supply) until 2035. As shown, available supplies are sufficient to meet system demands under normal conditions.

Table 4-3. Current System Demands (normal conditions without proposed projects)

	2015	2020	2025	2030	2035
Supply, AFY	4,481	4,723	4,723	5,003	5,283
Current and Approved Demand, AFY	1,711	1,837	1,976	1,976	1,976
Annual Estimated Supply Remaining, AFY	2,770	2,886	2,747	3,027	3,307
Percent Remaining	61.8%	61.1%	58.2%	60.5%	62.6%

The following table presents the future system demand projections INCLUDING the proposed Rancho Murieta North project demand and the difference (estimated remaining supply) until 2035. As shown, available supplies are sufficient to meet system demand projections.

Table 4-4. Future System Demand Projections (with proposed project)*

	2015	2020	2025	2030	2035
Supply, AFY	4,481	4,723	4,723	5,003	5,283
Current, Approved and Proposed Demand, AFY*	1,711	2,041	2,405	2,728	3,302
Annual Estimated Supply Remaining, AFY	2,770	2,682	2,318	2,275	1,981
Percent Supply Remaining (normal conditions)	61.8%	56.8%	49.1%	45.5%	37.5%

*All water demands were estimated by District staff except for Rancho Murieta North Development demands, which were calculated by Maddaus Water Management staff.

4.3 Estimated Proposed Project Demands

The following Table 4-5 presents the various analysis input parameters and assumptions.

Table 4-5. Analysis Input Parameters and Assumptions

Analysis Input Parameter	Input Value	Notes/Source						
Indoor Water Use, gpcd	60.7	Indoor water use based on the minimum of 2010-2015 average low month acct water use and 3 persons per lot (ppl) per acct. Smaller estate lots less than 12,000 SF have average lowest month water use of 57 gpcd. This is a conservative assumption given new homes have been documented to use as low as 45 gpd per person under the more recent building codes with more efficient fixtures.						
Persons per Lot	3.0	Persons per lot (ppl) is based on 2020 compliance assumptions of 3 ppl per household. This is conservative given it's higher than the 2010 census 2.25 people per household (pph). Though this value may seem low for estates >24,000 SF, which may have casitas, assumption is that the additional ppl per casita water use is equivalent to the irrigated square footage for that area should there NOT be a casita. Again, we assume more landscaped area for larger lots in lieu of casitas (a more conservative approach than adding more people per lot for a casita).						
Applied Water Estimate (ft/yr)	4.18	Applied Water Estimate is based on the applied water from 100% of the 2010-2015 five-year historical average reference evapotranspiration (watering requirements for healthy cool season turf grass 4-7 inches tall in full sun) for the California Irrigation Management Information System (CIMIS) for the Fair Oaks station no. 131. Outdoor irrigation demand was based on an applied water rate of 4.2 feet (30-year average reference evapotranspiration for the Fair Oaks CIMIS). This outdoor use assumption is conservative given existing homes are using approximately 5.5 to 7.0 feet of water per year as published in the 2013 District Demand Factors Technical Memorandum.						
Irrigated Area	<table border="1"> <tr> <td>Estate >24,000 SF</td> <td>33,000</td> </tr> <tr> <td>Estate 12,000-24,000 SF</td> <td>11,250</td> </tr> <tr> <td>Estate <12,000 SF</td> <td>8,000</td> </tr> </table>	Estate >24,000 SF	33,000	Estate 12,000-24,000 SF	11,250	Estate <12,000 SF	8,000	Irrigated area (per square foot) is based on Project Proponent provided information related to the assumed irrigated area for the lot types. The outdoor water demand is assumed to meet County ordinance requirements for the Maximum Applied Water Allowance (compliant with the most recent state adopted ordinance requirements as of December 1, 2015). A long term average irrigation efficiency of 55% is also conservatively assumed (compared to ordinance levels of 0.75 for overhead spray and 0.81 for drip systems).
Estate >24,000 SF	33,000							
Estate 12,000-24,000 SF	11,250							
Estate <12,000 SF	8,000							
Commercial Water Use per Acre (MG/Acre)	0.56	Using the normal year 2013 water use of a local commercial area of approximately 9 acres, an annual commercial water use factor of 0.56 MG/acre was determined. Some of the commercial water use contained in this sample area includes a Chinese restaurant, post office, parking lot, dentist, country store, and landscape area.						
Park and Non-Residential (Common Area)	<table border="1"> <tr> <td>215 EDUs</td> <td></td> </tr> <tr> <td>600</td> <td>600 gpd per lettered lot EDU</td> </tr> </table>	215 EDUs		600	600 gpd per lettered lot EDU	Total allocation in 2010 IWMP Update buildout demands is 269 EDUs and historical use has been 54 EDUs; leaving 215 EDUs for parks and other non-residential uses.		
215 EDUs								
600	600 gpd per lettered lot EDU							

The following Table 4-6 presents the Rancho Murieta North Development project buildout population and water use. This estimate was prepared using the assumptions shown above in Table 4-5. To calculate the indoor water demand, the estimate is based on gallons per day of 60.7 multiplied by average of 3 persons per lot for every day of the year. The outdoor water demand was estimated based on the calculation for water budgets per the County Ordinance and assuming less irrigation efficiency (more water required) of 4.18 ft per year of applied water multiplied by the estimated irrigated square footage provided for each lot multiplied by the number of lots. The commercial demand estimate was based on a similar mixed commercial use demand factor developed from the existing parcels in the District’s service area on an acre feet per acre basis that resulted in 0.56 MG per year multiplied by the 39 acres. The park and other areas were based on a 600 gpd per EDU for the 215 EDUs for an estimated volume of outdoor irrigation water demand.

Table 4-6. Proposed Water Demand Analysis – Rancho Murieta North Project

Water Using Type	No. of Lots	Population	Indoor Water Use (AFY)	Outdoor Water Use (AFY)	Average Annual Water Use (AFY)
Village A	167	501	34	169	203
Village B	167	501	34	179	213
Village C	130	390	27	114	140
Village D	42	126	9	50	58
Village E	43	129	9	113	122
Village F	95	285	19	92	112
Village G	53	159	11	91	101
Village H	130	390	27	139	166
Subtotal Villages	827	2,481	169	946	1,115
Commercial Mixed Use	4 parcels or 39 acres	N/A	N/A	N/A	67
Park/Common Area	215 EDUs	N/A	N/A	N/A	145
Total	N/A	2,481	N/A	N/A	1,326

The following table 4-7 presents the Rancho Murieta North Project proposed development water use in five-year increments.

Table 4-7. Proposed Potable and Non-Potable Water Demand Growth – Rancho Murieta North Project*

Lot Type	Cumulative Potable and Non-Potable Water Demand, AFY*			
	2020	2025	2030	2035
Estate >24,000 SF	21	34	75	233
Estate 12,000-24,000 SF	82	190	343	598
Estate <12,000 SF	75	137	211	284
Total Residential	177	361	628	1,115
Commercial Mixed Use	10	30	50	67
Park/Common Area	16	38	74	145
Total	204	429	752	1,326

* The project demand estimate includes the use of recycled water estimated at 560 AFY projected to offset potable irrigation demands at buildout.

5 DESCRIPTION OF ADOPTED WATER CONSERVATION MEASURES

Over the years, the District has implemented demand management measures in an effort to reduce the overall demand for water. Water conservation helpful tips are available online and in brochures to educate customers. Furthermore, the District has actively used non-potable water for meeting golf course irrigation demands since the courses were built and switched over to recycled water in 1988 with raw water augmenting supply. Over time it is the District's intent to supply 100% of the golf course's irrigation demand with recycled water, even in drought and low water years. Also, in July 2011 the District adopted Policy #2011-07 mandating the use of recycled water for all new development where economically and physically reasonable.

The District is currently and has historically been engaged in promoting water conservation awareness to its customers, which includes the following activities:

- Continue to designate ongoing conservation program funding in yearly budget planning
- Provide new home Welcome Packets, which include copies of water conservation water code and a copy of the River Friendly Landscaping Guidelines
- Assist Rancho Murieta Association (home owner association) with landscape plan reviews related to water efficient landscaping and work to incorporate the new Sacramento County Landscaping Ordinance requirements into future plan reviews
- Participate in the Regional Water Efficiency Program public outreach and rebate programs for high efficiency toilets and washers started in 2010
- Host web pages focused on water conservation education and awareness
- Support active water waste reporting and follow-up: staff notifications given if seen and anonymous reporting via the District web site. Through October 2015, the District issued 342 notices of violation and levied 5 fines.
- Added additional conservation incentives in October 2015 for Drought Irrigation Efficiencies through participation with the Regional Water Authority and the Proposition 84 Drought Grant Irrigation Efficiency Project

In September 2014, the District implemented mandatory outside irrigation restrictions to include limiting outside watering to two days per week. Year-to-date through October 2015, the District has achieved a 32% reduction in residential water demand as compared to 2013.

The proposed project development is scheduled to begin just prior to year 2020 and all the latest applicable Sacramento County building and landscape codes and ordinances will apply to this development per County's approval.

6 COMPARISON OF SUPPLY ALLOCATION VS. WATER DEMAND PROJECTIONS

As shown in the following table, there will continue to be sufficient supplies to meet all projected demand, including the net additional demand generated from the proposed projects in all conditions until year 2035. This conclusion is dependent on the District implementing the mandatory demand reduction as outlined in the District’s Water Shortage Contingency Plan.

Table 6-1. Total System Demand with Added Rancho Murieta North Project¹

System Demand, No Drought, AFY	2015	2020	2025	2030	2035
District Demand Projection (assumes water conservation achieved and approved lots included)	1,711	1,837	1,976	1,976	1,976
Net Demand from Additional Project Rancho Murieta North, AFY	-	204	429	752	1,326
Total System Demand, AFY	1,711	2,041	2,405	2,728	3,302
Total Projected Supply Availability, AFY	4,481	4,723	4,723	5,003	5,283
Estimated Remaining Supply, AFY	2,770	2,682	2,318	2,275	1,981
Est. Remaining Supply Reliability, %	62%	57%	49%	45%	37%

¹All water demands were estimated by District staff except for Rancho Murieta North Development project demands, which were calculated by Maddaus Water Management staff based on information provided and/or industry standards. This estimate includes recycled water and does not include groundwater supplies.

In the event of prolonged drought conditions, the District would implement their Water Shortage Contingency Plan (WSCP). The Plan provides a framework to address demand curtailment of up to 50 percent within the service area. Per California Water Code, the District has complied with preparing a WSCP down to an assumed 50% reduction in supply.

Therefore, the water demand associated with the proposed project and all foreseeable development could be accommodated during multiple dry years through implementation of the voluntary and possibly mandatory demand reductions.

Table 6-2. Annual Supply Allocation vs. Multiple Dry Years Demand (AFY)¹

Year		Allocation AFY	Single Dry Year	Year 2	Year 3	Year 4	Year 5
			Supply and Demand Reduction %				
			10%	20%	30%	40%	50%
2015	Supply	4,481	4,033	3,584	3,136	2,688	2,240
	Demand (With approved projects, and NOT including proposed projects)	1,711	1,540	1,369	1,198	1,027	856
	Demand (including proposed projects)	1,711	1,540	1,369	1,198	1,027	856
	Supply Remaining (NOT including proposed projects)	2,770	2,493	2,216	1,939	1,662	1,385
	Supply Remaining (including proposed projects)	2,770	2,493	2,216	1,939	1,662	1,385
2020	Supply	4,723	4,251	3,778	3,306	2,834	2,362
	Demand (NOT including proposed projects)	1,837	1,654	1,470	1,286	1,102	919
	Demand (including proposed projects)	2,041	1,837	1,633	1,429	1,225	1,020
	Supply Remaining (NOT including proposed projects)	2,886	2,597	2,309	2,020	1,731	1,443
	Supply Remaining (including proposed projects)	2,682	2,414	2,146	1,877	1,609	1,341
2025	Supply	4,723	4,251	3,778	3,306	2,834	2,362
	Demand (NOT including proposed projects)	1,976	1,778	1,581	1,383	1,186	988
	Demand (including proposed projects)	2,405	2,165	1,924	1,684	1,443	1,203
	Supply Remaining (NOT including proposed projects)	2,747	2,472	2,198	1,923	1,648	1,374
	Supply Remaining (including proposed projects)	2,318	2,086	1,854	1,622	1,391	1,159
2030	Supply ²	5,003	4,503	4,002	3,502	3,002	2,502
	Demand (NOT including proposed projects)	1,976	1,778	1,581	1,383	1,186	988
	Demand (including proposed projects)	2,728	2,455	2,182	1,909	1,637	1,364
	Supply Remaining (NOT including proposed projects)	3,027	2,724	2,422	2,119	1,816	1,514
	Supply Remaining (including proposed projects)	2,275	2,048	1,820	1,593	1,365	1,138
2035	Supply ²	5,283	4,755	4,226	3,698	3,170	2,642
	Demand (NOT including proposed projects)	1,976	1,778	1,581	1,383	1,186	988
	Demand (including proposed projects)	3,302	2,972	2,642	2,311	1,981	1,651
	Supply Remaining (NOT including proposed projects)	3,307	2,976	2,646	2,315	1,984	1,654
	Supply Remaining (including proposed projects)	1,981	1,783	1,585	1,387	1,189	990

¹Year 2030 and 2035 supplies include projected new recycled water supplies, anticipated to partially come online in 2030 (50%) and fully by buildout (2035). New recycled water supplies are anticipated to be modestly reduced in dry years as customers seek to cut back on indoor potable water demands that would reduce wastewater generation and as a result recycled water availability.

²Without groundwater supplies including to augment multi-year drought supplies.

7 CONCLUSION

The District currently has estimated available supplies of 5,283 AFY in 2035, which includes the reservoir storage capacity as a limiting factor plus an estimated 560 AFY of recycled water to meet projected buildout demands. In addition, there is a contingency supply planned for additional groundwater resources for emergency shortage conditions, including droughts, of 524 AFY. Given the groundwater wells have been tested but not yet constructed, this supply was not included in this WSA (which would further improve the water supply reliability).

The District's estimated future demand through buildout is forecasted to be 2,928 AFY per the 2010 IWMP Update (using 600 gpd per EDU). The future demand projection developed within this WSA presents, that with the proposed project included, future demands are estimated at 3,302 AFY (Table 4-2). Numerous conservative assumptions were made when independently estimating the project demands (Section 4.3). By accounting for the added recycled water supplies generated from future development, estimated at 560 AFY, there is an offset to potable water demands within the District such that total demands are estimated at 2,742 AFY. The District is requiring the use of recycled water where economically feasible to meet outdoor irrigation demands and as a wastewater disposal alternative.

The Water Supply Assessment, prepared per the requirements of California Water Code and SB610, finds the proposed project would result in a less-than-significant impact upon potable water supply by not exceeding the demand forecast previously adopted by the District. In other words, the projected demands include sufficient water to serve the Rancho Murieta North Project with excess capacity remaining. This is important as the District has an obligation to have supply capacity available to serve the one remaining parcel to be developed within the District's service area boundary.

8 REFERENCES

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