Water Supply Assessment

For EWTR22-00598

DECEMBER 2022

Prepared by Water Systems Consulting, Inc

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1.0 Introduction and Purpose

This Water Supply Assessment (WSA) was prepared on behalf of Victorville Water District (District), a subsidiary of the City of Victorville (City), by Water Systems Consulting, Inc. (WSC) to satisfy the requirements of California Water Code (CWC) Section 10910 (Senate Bill 221) for the EWTR22-00598 development (Project). The Project is a proposed 1,111,360 square foot warehouse on a 66.4-acre lot located in the District's Zone 3170. The Project lies within the City limits and the City is the Lead Agency for the Project under the California Environmental Quality Act (CEQA). The Project's developer is currently preparing the Project's Environmental Impact Report (EIR).

As required by Senate Bill 610 (SB 610), the District is responsible for assessing whether the total projected water supplies available during average, single dry, and five-consecutive dry water years during a 20-year projection will meet the projected water demand for the Project, in addition to the District's existing and planned future uses. A water supplier's Urban Water Management Plan (UMWP) serves as a foundational document for a WSA. The water demands for the proposed Project were not explicitly accounted for in the District's *2020 Urban Water Management* (2020 UWMP) [1], as submitted to the California Department of Water Resources (DWR) in June 2021, but fall within the expected demand growth accounted for in the 2020 UWMP. Additional information from other sources is also incorporated into this WSA to document supplies from all sources, including groundwater and purchased water. Documentation includes identifying and quantifying supply water rights, contracts, and/or entitlements. The District must provide the results of the assessment to the City, as the Lead Agency, for inclusion in the CEQA document for the Project. This WSA includes the following:

- Overview of the District's water system (Section 2)
- Description of the Project and proposed water demand (Section 3 and 4)
- Information on the District's current and projected water demands in the water service area (Section 2)
- Information on the District's current and projected water supplies (Section 5)
- Discussion of the District's water service area water supply reliability (Section 6)
- Comparison of the District's water service area water supplies and water demands for average, single dry, and multiple dry years (Section 6)
- Determination of the District's water service area water supply sufficiency (Section 7)

1.1 Legislation

The District has determined that the Project is subject to review under CEQA (*Public Resources Code, Section 21000 et seq.*), and the state CEQA Guidelines (*California Code of Regulations, Section 15000 et. seq.*) The District has determined that the Project is a "project" as defined in CWC 10912 and has determined that an EIR is required for the Project.

SB 610 amended the Public Resources Code, effective January 1, 2002, to incorporate CWC requirements for certain types of development projects to improve the link between information on water supply availability and certain land use decisions made by cities and counties. SB 610 seeks to promote more collaborative planning between local water suppliers, cities, and counties by requiring detailed information regarding water availability to be provided to the city and county decision-makers prior to approval of specified large development projects.

Under SB 610, water suppliers must prepare WSAs for projects meeting certain project size criteria and deliver them to local governments for inclusion in any environmental documentation. The Project requires a WSA because it is an industrial project that is over the 650,000 square foot building and 40-acre WSA requirement.

1.2 Definitions

For the purposes of this WSA, the following defined terms are used:

- **Groundwater production:** The amount of water produced from the Mojave River Basin groundwater supply sources and put into the District's distribution system based on metered flows at each well. The District provided annual groundwater production data for 2021 in addition to 2020 UWMP data.
- **Purchased water:** The amount of water purchased from the District's wholesale supply sources and put into the distribution system based on metered flows at each supply connection.
- **Consumption:** The amount of billed metered water consumed by customers.
- **Demand:** The amount of water distributed through the entire water system, which is the sum of groundwater production, purchased water, and recycled water. Demand includes non-revenue water, which is equal to the difference between water put into the distribution system and consumption.
- **Non-revenue water**: Unmetered water use and losses from the distribution system due to leaks, unauthorized connections, agency use (e.g., system flushing), or theft.
- **Water demand factor:** The calculated amount of water demand per unit (e.g., acre, dwelling unit, etc.) of a specific type of use (e.g., land use, development type, business type, etc.).
- **Free Production Allowance (FPA):** Amount of groundwater allowed to be pumped by the District in any year without buying replacement water.
- **Replacement Water Assessment (RWA):** Amount of groundwater pumped in excess of the District's FPA or transfer of unused FPA from another party for any year. Replacement water must be purchased for any excess groundwater pumped.

In this WSA, references are shown as [#] within text. See References section for reference material.

2.0 Public Water System Overview

The District is a subsidiary of the City and is located in the southwest region of San Bernardino County, California, and serves the City of Victorville and the surrounding areas that fall within the City's sphere of influence. In July of 2007, the District, a public water system as defined in CWC Section 10912, acquired both Victor Valley Water District and Baldy Mesa Water District.

The District's water service area encompasses approximately 85 square miles and is located approximately 90 miles northeast of Los Angeles. The District is bounded by the City of Adelanto to the west and the City of Hesperia to the south. The City of Apple Valley, Spring Valley Lake, and the Mojave Narrows Regional Park lie to the east. Figure 2-1 shows the District's service area.

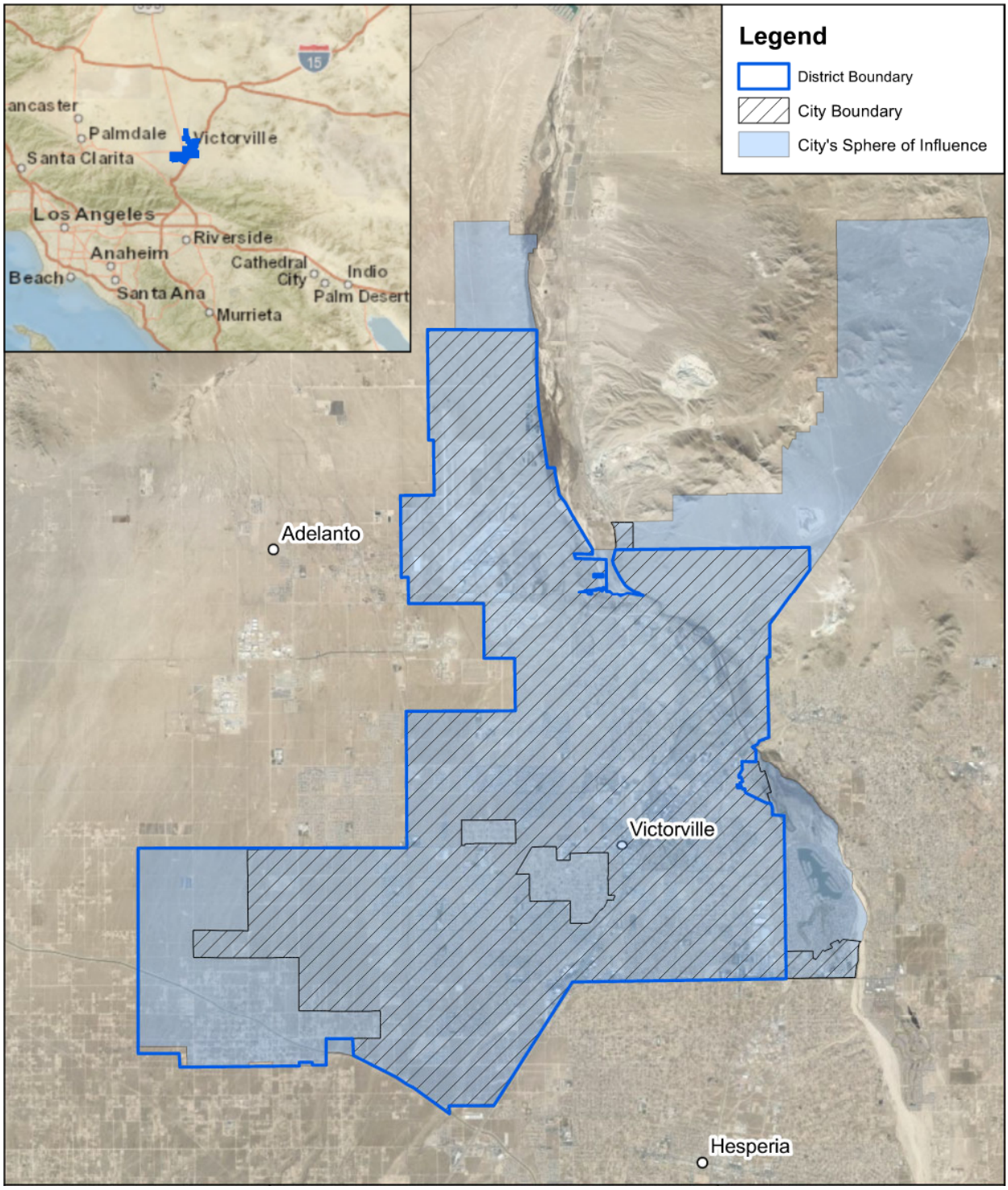

Figure 2-1. District's Water Service Areas [2]

2.1 Climate

The District's climate is characterized by warm summers and cool winters. Table 2-1 presents average climate data for the service area, including temperature, rainfall, and reference evapotranspiration (ET_o). As shown in Table 2-1, the warmest month of the year is July with an average temperature of 80 degrees Fahrenheit (°F), while the coldest months of the year are December and January with an average temperature of 44°F.

The annual average precipitation at the District is about 6 inches. As shown in Table 2-1, the majority of the rainfall occurs in the months November through March. December through February are the wettest months with an average rainfall of approximately 1 inch.

Table 2-1. Historical Temperature, Rainfall and Reference Evapotranspiration (ETo) Data

Month	Average Temperature (°F)[1]	Average Precipitation (in.)[1]	Average Standard ETo (in.)[2]
January	45.4	0.80	2.24
February	47.8	0.90	2.94
March	52.1	0.81	4.90
April	58.7	0.39	6.42
May	65.2	0.14	7.98
June	74.1	0.02	9.08
July	80.4	0.10	9.54
August	79.5	0.11	8.87
September	72.6	0.12	6.59
October	62.7	0.30	4.58
November	51.9	0.46	2.78
December	44.5	1.02	2.02

Notes:
[1]NOAA weather station 049325 in Victorville (data from 1917-2020) http://wrcc.dri.edu
[2]CIMIS weather station 117 in Victorville (2016-2020) http://wwwcimis.water.ca.gov/

2.2 Service Area Population

The historical, current, and projected populations for the District's water service area are shown in Figure 2-2. The population projections were prepared by University of California Riverside (UCR) School of Business Center for Economic Forecasting and Development (UCR Center) under contract with Mojave Water Agency (MWA) for the 2020 UWMP. Historical data used in the forecast of the incorporated cities were obtained from the California Department of Finance, which makes estimates available from 1970 forward on an annual basis. Based on these data, the UCR Center created an econometric and demographic time series model to capture the

historical correlations with countywide population growth. Future population growth was then estimated using the time series model.

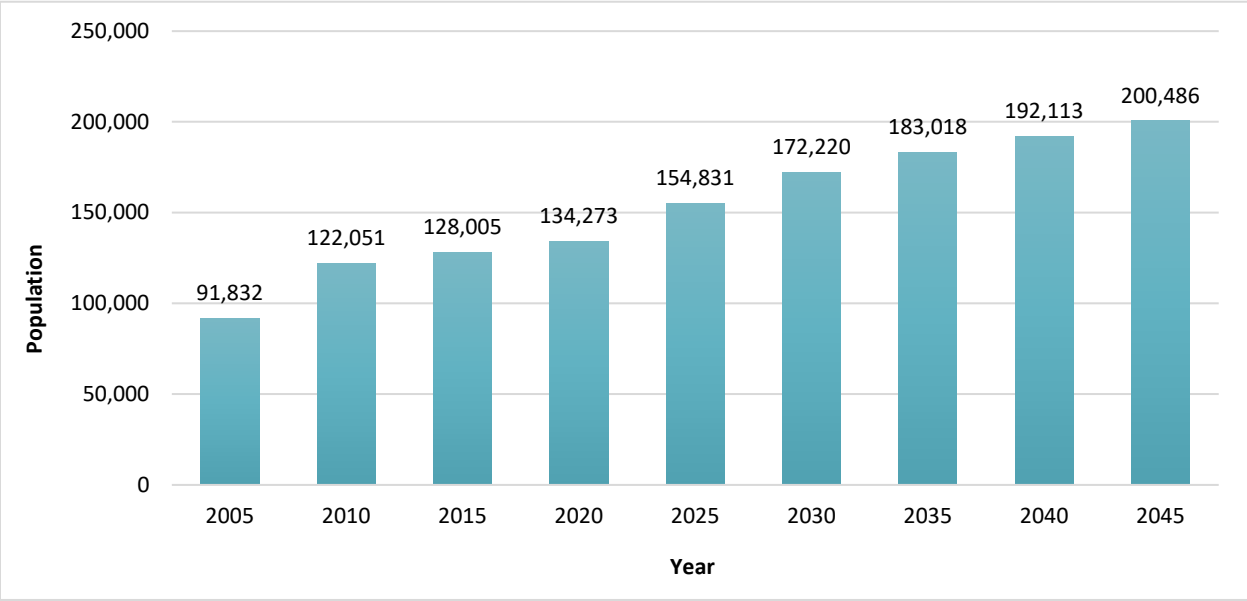

Figure 2-2. Historical, Current and Projected Population Trends [1]

2.2.1 Other Demographic Factors

The Project is located within the West City Planning Area as shown in Figure 2-3. Per the City's General Plan 2030, this area consists of mostly commercial, specific plan, and low density residential; along with very low density, medium density, high density, and mixed density residential; light and heavy industrial; office professional; and public institutional land uses. The Project area is located within the light industrial land use. [3]

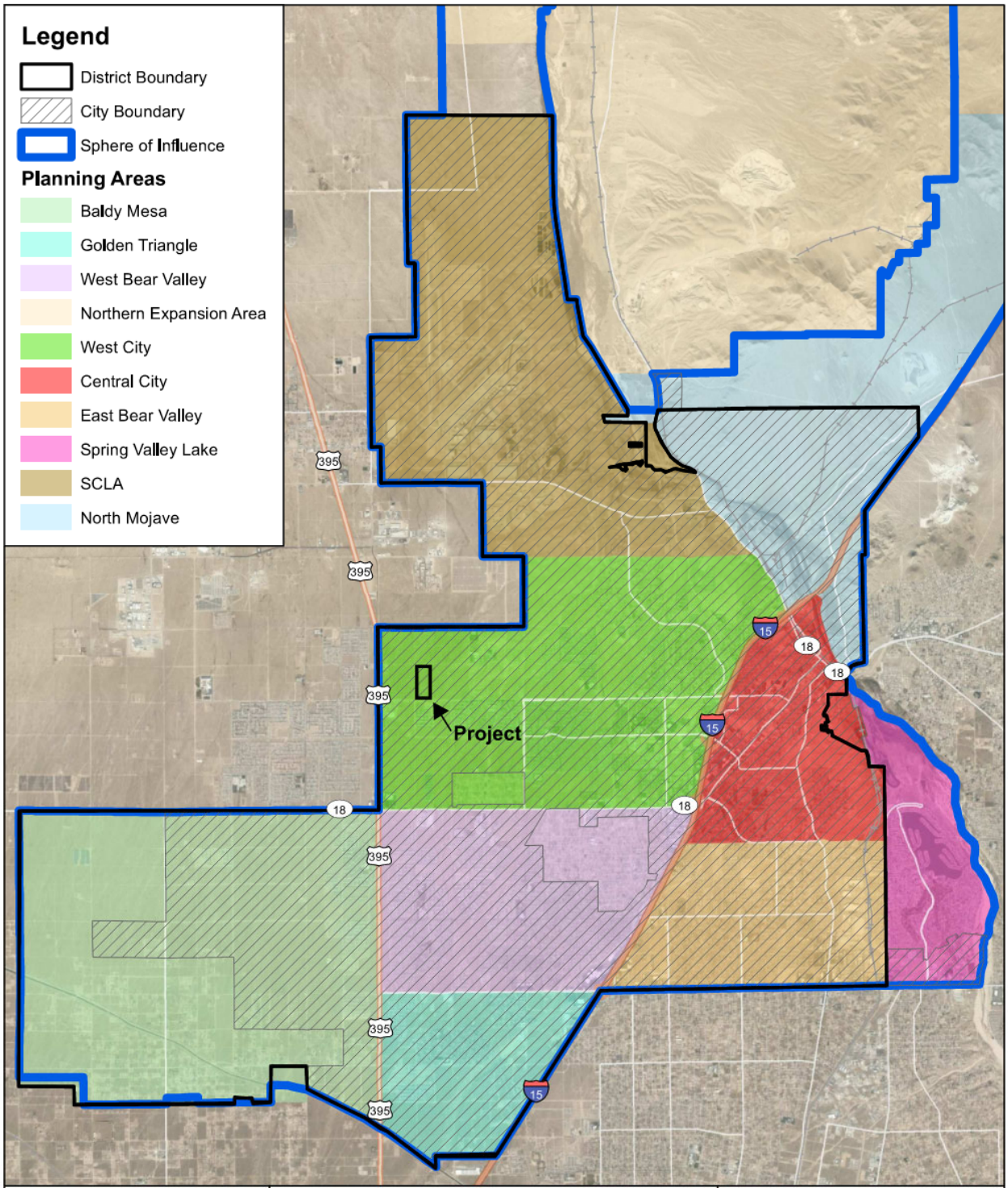

Figure 2-3. Planning Areas identified in the 2021 Water Master Plan

2.3 District's Water Demand

Figure 2-4 summarizes baseline, historical and projected gallons per day per capita (GPCD) for the District. The GPCD metric provides a way to evaluate historic water use trends and incorporate expected future reductions in water use. The District expects GPCD to continue to decline slightly in the future due to ongoing conservation efforts with existing customers and more efficient water use standards for new development. As described in detail in the 2020 UWMP, future demands were projected using future GPCD estimates and population projections.

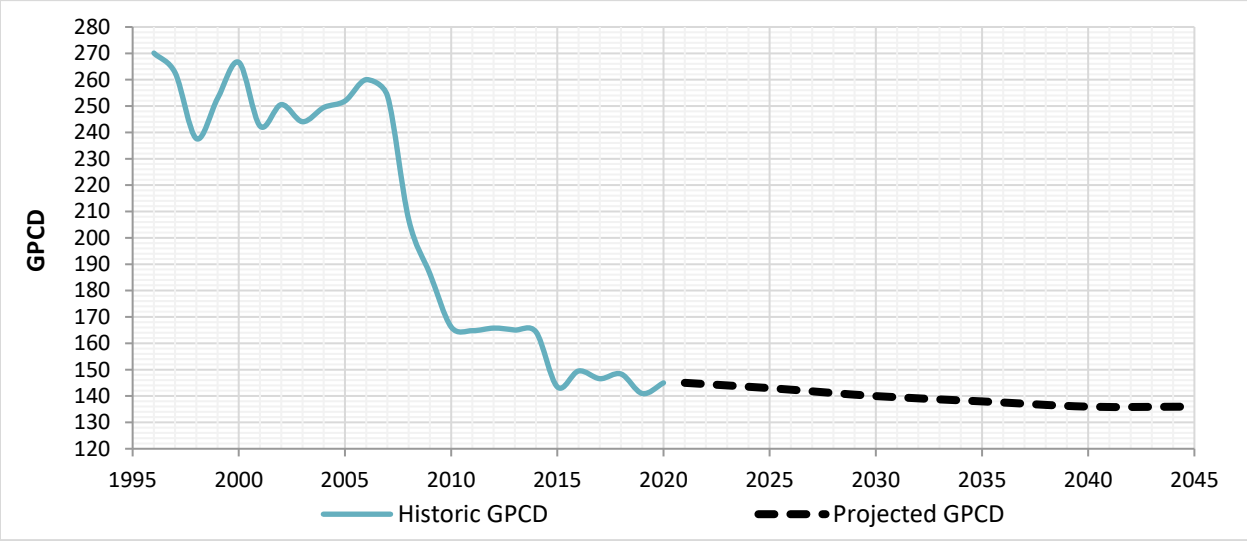

Figure 2-4. Baseline, Historic, and Projected GPCD

The 2020 UWMP Section 4 describes the District's historical and projected demand and provides projected water demand by customer class. Table 2-2 presents historical and projected water demands by customer class from 2020 through 2045 [1].

Table 2-2. Historical and Projected Water Demands

Customer Class	2020	2025	2030	2035	2040	2045
Single-Family Residential	12,208	13,744	15,061	15,673	16,262	16,946
Multi-Family Residential	1,848	2,081	2,280	2,373	2,462	2,565
Commercial[1]	5,487	6,177	6,770	7,044	7,309	7,617
Landscape	1,097	1,235	1,354	1,409	1,462	1,523
Demand Subtotal	**20,640**	**23,237**	**25,465**	**26,499**	**27,495**	**28,651**
Water Loss	1,225	1,483	1,625	1,691	1,755	1,829
Sales to Other Agencies	865	900	900	900	900	900
Total Demands	**22,730**	**25,620**	**27,990**	**29,090**	**30,150**	**31,380**

1. Commercial customer class includes industrial and institutional water use types.

3.0 Project Description

The Project area consists of approximately 66.4 acres in the northwestern portion of the District's boundary, north of Mojave Drive, east of Mesa Linda Avenue, south of Cactus Road and west of Onyx Road. The Project site lies within the District's Zone 3170 and consists of a 1,111,360 square foot industrial warehouse which includes 20,000 square feet of office space. Figure 3-1 depicts the Project's proposed site plan. The Project is assumed to be constructed within the next five-year period from 2023-2028. Figure 3-2 depicts the Project location relative to the District's service area.

This Project replaces a previously planned storage facility, EWTR20-00114. The City had previously conducted a water feasibility study for the storage facility that was approved in 2020; however, this Project replaces EWTR20-00114.

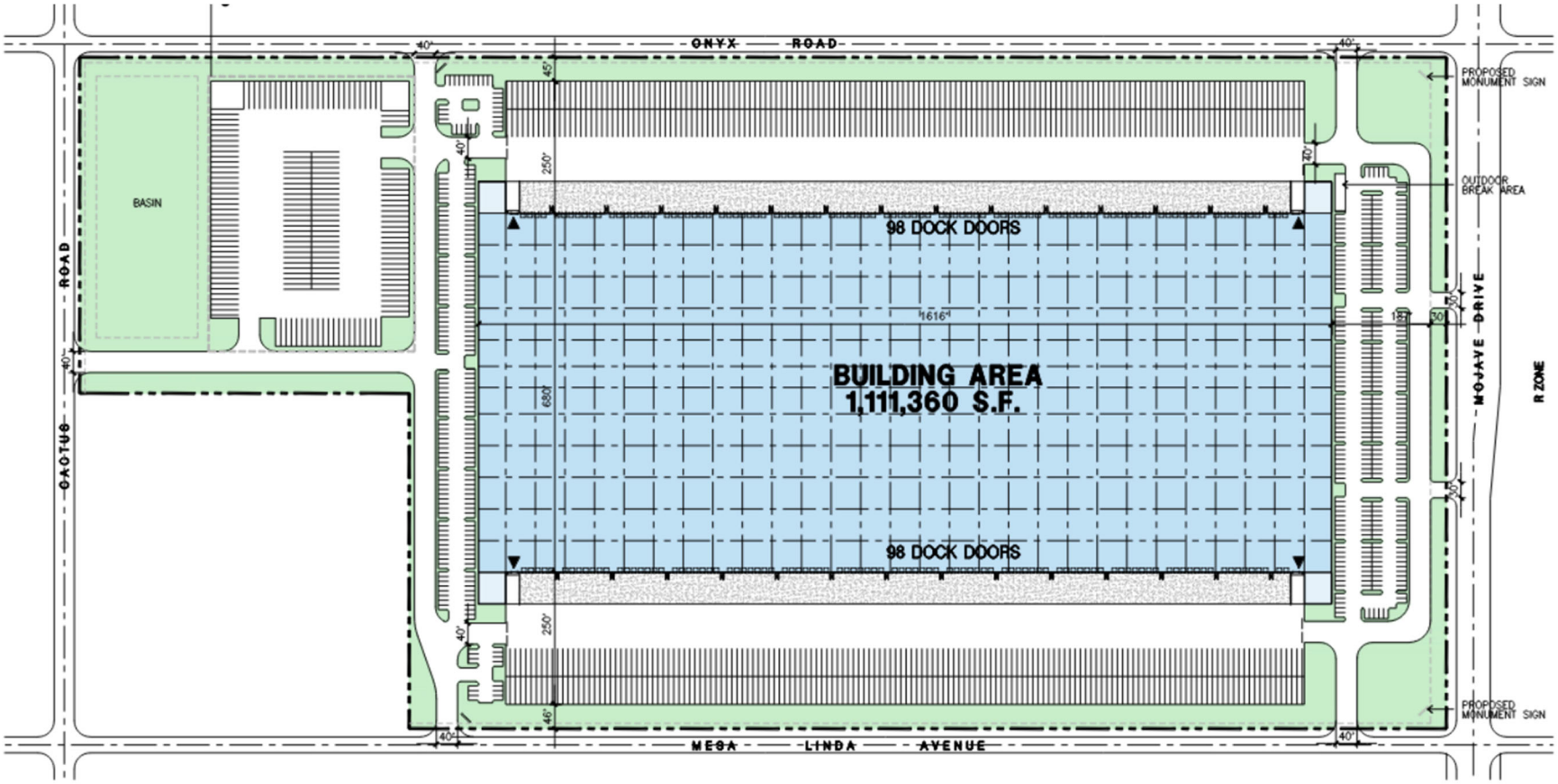

Figure 3-1. Project Site Plan

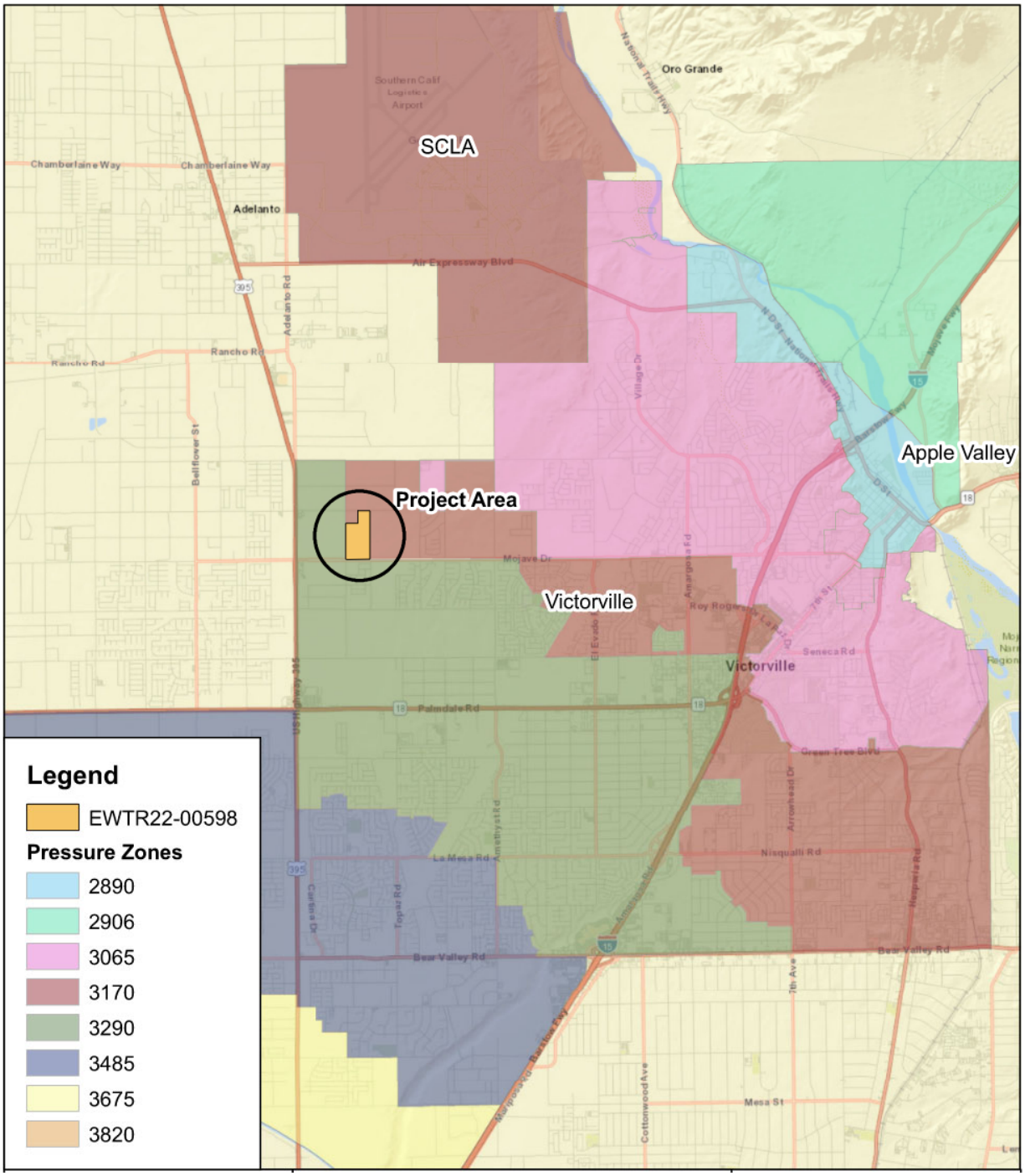

Figure 3-2. Project Vicinity

4.0 Project Water Demand

The District's 2020 UWMP water demand projections were based on the population forecast and a GPCD water demand factor [1], which accounts for future increases in both residential and non-residential water use. The water demands for the proposed Project were not explicitly accounted for in the 2020 UWMP but fall within the expected demand growth accounted for in the 2020 UWMP, as described further in this section.

4.1 Project Water Demand Projections

The Project consist of industrial and landscape area; therefore, water demands were calculated for each of these water use types. The following section descriptions how the industrial and irrigation water demands were calculated.

4.1.1 Industrial Water Demand Projections

The Project's estimated water demand was calculated by applying the industrial water demand factor from the City of Victorville's 2021 Water Master Plan (2021 WMP) to the development's projected acreage. This factor was developed based on the average usage for all commercial and industrial developments in the District and is expected to be conservative for a warehouse use type. Table 4-1 shows the estimated demand for the Project.

Table 4-1. Industrial Estimated Demands

Industrial Water Demand Factor (gpd/ac)[1]	1,000
Acreage	66.4
Estimated Project Demand (gpd)	66,400
Estimated Project Demand (gpm)	46
Estimated Project Demand (AFY)	74

[1]Source: 2021 WMP Table 4-4
[2]Gallons per minute – gpm, acre – ac, gpd – gallons per day, AFY – acre feet per year

4.1.2 Irrigation Water Demand Projections

Based on developer estimates, irrigated landscape will be approximately 15% (approximately 10 acres) of the total Project acreage. Irrigation water use was estimated using the irrigation demand factor from the District's Recycled Water Master Plan (RWMP) of 3.3 acre-feet per year per acre (AFY/acre). To determine the irrigation water use, this irrigation demand factor was

applied to the estimate irrigation acreage. Table 4-2 shows the estimated demand for the irrigation portion of the Project.

Table 4-2. Irrigation Estimated Demands

Irrigation Water Demand Factor (AFY/acre)[1]	3.3
Assumed Acreage to be Irrigated[2]	10
Irrigation Demands (AFY)	33
Irrigation Demands (gpd)	29,500
Irrigation Demands (gpm)	20

[1]Source: Victorville Water District Final Draft Recycled Water Master Plan.
[2]Source: Developer's estimate of 15% of Project acreage will be irrigated landscape.

4.1.3 Project Total Demands

Table 4-3 presents the total water demand for the Project.

Table 4-3. Project Estimated Demands

Project Estimated Demands = Industrial + Irrigation Demand (AFY)	107
Project Estimated Demands (gpd)	95,900
Project Estimated Demands (gpm)	66

As stated in Section 3, this Project is assumed to be completed in one phase starting in 2023. Therefore, the total demand for the Project is 107-acre feet (AF) and is assumed to begin in 2023 for the purposes of this WSA.

As presented in Table 2-2, the 2020 UWMP estimated that commercial demands, which include industrial water use types, would increase by 690 AFY from 2020 to 2025. There have been several commercial and industrial projects that have approved water feasibility studies and water supply assessments (including the EWTR22-00135 WSA) since the completion of the 2020 UWMP and the 2021 WMP. The total projected demand for these approved projects is 890 AFY. As shown in Table 4-4, total proposed commercial/industrial demand from this Project, the previously approved and the approved commercial/industrial projects is 965 AFY by 2025. This is 275 AFY less than the projected commercial/industrial demand increase in the 2020 UWMP. However, the 2020 UWMP projected a total demand increase of 2,597 AFY from 2020 to 2025. The total projected demand for all projects with approved WFS or WSA and this Project is 2,427 AFY. This is 170 AFY more than projected total demand increase in the 2020 UWMP, as presented in Table 4-5. Therefore, it was determined that the Project's projected

demands were included in the 2020 UWMP demand projections. In addition, the City has the ability to pump additional groundwater to meet demands.

Table 4-4. Demand Comparison with Proposed Demands (AFY)

	Commercial AFY[1]	Landscape AFY
Projected 2020-2025 Demand Increase in 2020 UWMP (from Table 2-2)	**690**	**138**
Project Demands	74	33
Approved Projects[2]	890	9
Total Proposed Demand Increase from 2020-2025	**965**	**42**
Surplus 2020-2025 Demand Projection accounting for Total Proposed Demands	**-275**	**96**

[1]Includes commercial and industrial demands.
[2]Includes previously approved commercial and industrial projects since the 2021 WMP.

Table 4-5. System Wide Demand Comparison with Proposed Demands (AFY)

	Total AFY
Projected 2020-2025 Demand Increase in 2020 UWMP (from Table 2-2)	**2,597**
Project Demands	107
Approved Projects[1]	2,320
Total Proposed Demand Increase from 2020-2025	**2,427**
Surplus 2020-2025 Demand Projection accounting for Total Proposed Demands	**170**

[1]Includes all previously approved since the 2021 WMP.

5.0 Water Supply Analysis

5.1 Water Sources

Groundwater is the District's primary source of supply and a small amount of recycled water is used at Southern California Logistics Airport (SCLA). The current and future groundwater supplies for the District are from the Mojave Groundwater Basin and groundwater purchases from MWA's Regional Recharge and Recovery Project (R^3), when available. The following sections describe each water source in more detail.

5.1.1 Purchased Water

The District purchases groundwater from the R^3 project when it is available but does not rely on purchased or imported water as a future potable water supply. Through R^3, MWA delivers State Water Project (SWP) water to recharge sites located along the Mojave River in Hesperia and southern Apple Valley. MWA recovers stored groundwater at wells downstream and then delivers it through pipelines directly to retail water agencies. This project provides an alternate source of groundwater supply that allows agencies to reduce local pumping and maintain groundwater levels in the vicinity of their wells. The project enables MWA to use SWP water beneficially by recharging the water when supplies exceed demand. The District began receiving water from R^3 in 2013 and has a contract to purchase up to 6,800 AFY, when available.

Water supply from R^3 is interruptible because it depends on the amount of groundwater in storage as well as other operational constraints. The District intends to continue maximizing purchases of water from R^3 when available; however, since this is an interruptible source of supply, the District does not rely on this source to meet its demands. For the purposes of this Project, it is assumed that the District will meet all demands through their own groundwater sources.

5.1.2 Groundwater

The District has 34 active groundwater wells within its distribution system that are used to pump groundwater from the Mojave River Groundwater Basin that lies beneath Victor Valley.

5.1.2.1 Mojave River Basin

The Mojave River Groundwater Basin, the largest in the Region, encompasses 1,400 square miles, and has an estimated total water storage capacity of nearly 5 million AF. The Mojave River Groundwater Basin Area is essentially a closed basin which means that very little groundwater enters or exits the basin. However, within the basin, groundwater moves between the different subareas; groundwater-surface water and groundwater-atmosphere interchanges also occur. Approximately 80 percent of the basin's natural recharge is through infiltration from

the Mojave River. Other sources of recharge include infiltration of storm runoff from the mountains and recharge from human activities such as irrigation return flows, wastewater discharge, and enhanced recharge with imported water. Over 90 percent of the basin groundwater recharge originates in the San Gabriel and San Bernardino Mountains. Groundwater is discharged from the basin primarily by well pumping, evaporation through soil, transpiration by plants, seepage into dry lakes where accumulated water evaporates, and seepage into the Mojave River. The Mojave Basin Area is shown in Figure 5-1.

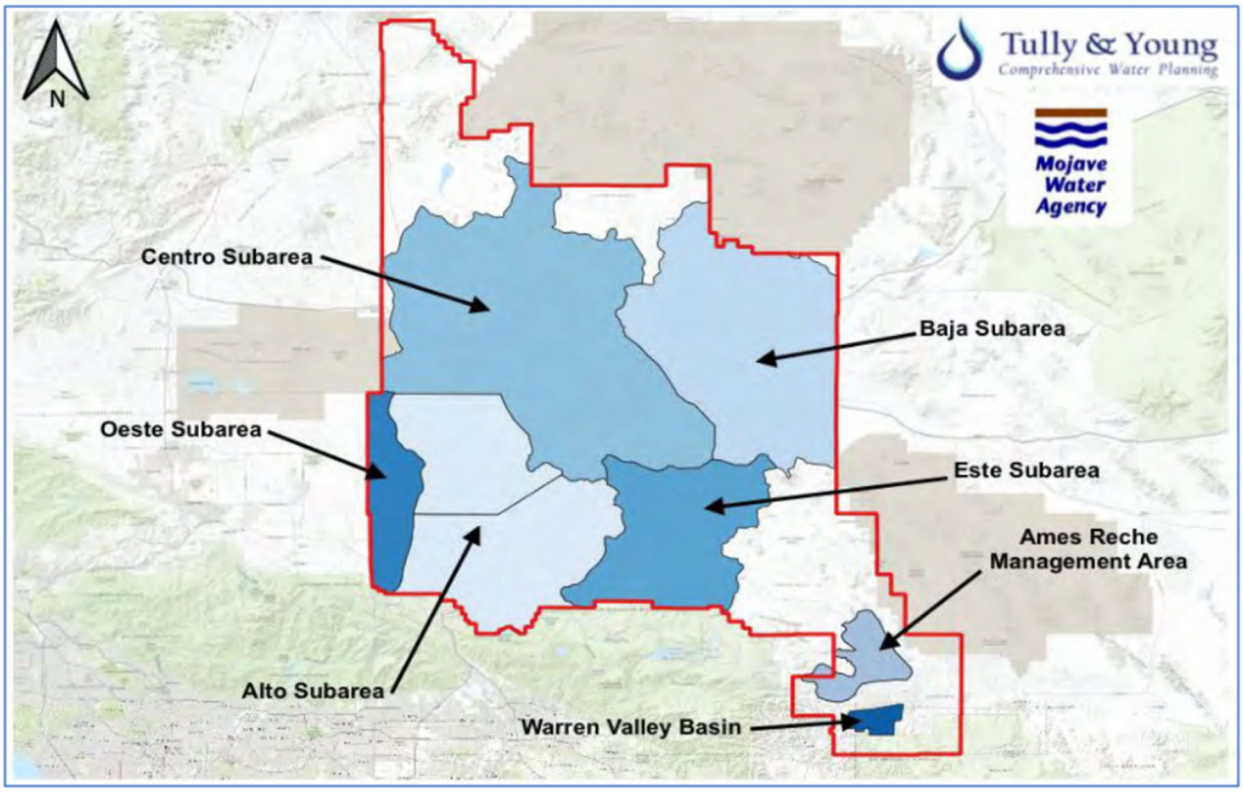

Figure 5-1. Mojave Basin Area within MWA's Service Area [6]

Recent investigations by MWA, the US Geological Survey (USGS), and others have resulted in an improved understanding of the geology and hydrogeology of the Mojave Basin Area. Specifically, a more refined examination of the hydrostratigraphy has allowed for differentiation between the more permeable Floodplain Aquifer that has a limited extent along the Mojave River and the more extensive but less permeable Regional Aquifer. In the Mojave Basin Area, Alto, Centro, and Baja subareas contain both the Floodplain Aquifer and the Regional Aquifer while Oeste and Este subareas only contain the Regional Aquifer.

The MWA Integrated Regional Water Management Plan (IRWM Plan) established the framework for managing future water supplies within MWA's service area which encompasses 4,900 square miles. Water rights within the Mojave River Basin have been the subject of

litigation since the early 1990's. Riverside County Superior Court's stipulated Mojave Basin Area Judgment (Judgment) for the adjudication of the Mojave River groundwater basin identified MWA as the Watermaster. The Judgment stipulated that MWA has both the authority and obligation to secure supplemental supplies as part of the solution to overdraft within the Mojave River Basin. While the increased groundwater pumping in excess of natural supplies over the last 50 years has resulted in a decline in groundwater elevations, the groundwater basins remain capable of meeting annual water demands through dry years and consecutive multiple dry years. The Judgment and IRWM Plan are intended to bring all basins into long term hydrologic balance. Projects and water management actions are needed to continue to recharge the groundwater basins to maintain groundwater levels and protect quality. A copy of the Mojave Basin Area Judgement is included in as Appendix G of the 2020 UWMP [1].

To maintain proper water balance within each subarea, any producer, such as the District, who produces in any year an amount of water in excess of that producer's share (Free Production Allowance or FPA) for a subarea must buy replacement water (Replacement Water Assessment or RWA). Replacement obligations can be met by buying additional water rights, buying imported water from MWA, or leasing groundwater rights for one year from other water rights holders. The RWA is equal to the number of AF of excess production by the producer multiplied by the RWA rate per AF as adopted annually by the 2020Mojave Basin Area Watermaster. The District's 2019-2020 FPA is 14,274 AFY and is subject to further ramp down. The 14,274 AFY FPA is used as the available supply for the District without RWA. Use over this quantity is subject to replacement obligations adopted by the Watermaster and paid to the Watermaster. When water is available, the District can also lease water from agencies that pump less than their FPA, which can offset the amount of water in their RWA.

Producers in the Mojave Basin Area are allowed to produce as much water as they need annually to meet their requirements, according to the Mojave Basin Area Judgment. An underlying assumption of the Judgment is that sufficient water will be made available to meet the needs of the Basin in the future from a combination of natural supply, imported water, water conservation, water reuse and transfers of FPA among parties. MWA is actively operating recharge sites for conjunctive use along the Mojave River Pipeline, Oro Grande Wash Pipeline, Morongo Basin Pipeline, and Silverwood Dam. Recharge sites provide MWA with the ability to recharge SWP water into the Subareas where replacement water is purchased. These sites also provide MWA with the ability to bank excess SWP water when available in wet year for storage to be used in dry years. R^3 facilities allow MWA to manage the groundwater basins surrounding the District by creating additional groundwater storage near the upper Mojave River recharge areas and delivering stored water to purveyors who can then reduce pumping from their own wells and allow partial recovery of any local pumping depressions.

The District will continue aggressive water conservation efforts and increased use of recycled water to offset potable water demand in an effort to balance supplies and demands into the future. Pumping beyond the FPA is anticipated to continue as needed to meet water demands and will require the District to continue to pay replenishment fees to support additional water

supply projects being implemented by MWA or purchase of water rights from other agencies in the subbasin.

5.1.3 Surface Water

The District does not utilize surface water supplies.

5.2 Transfer Opportunities

Regional water transfer and exchange opportunities are described in MWA's 2020 UWMP [7].

The District frequently executes temporary transfers of FPA or carryover water from other parties in the Alto subarea to offset a portion of excess groundwater production.

5.3 Future Water Projects

At the time of this WSA, no potable water supply projects are planned.

5.4 Recycled Water

The wastewater that is generated within the service boundary of the District is collected via a gravity sewer system owned and operated by the City of Victorville. A portion of the collection system conveys wastewater to the Industrial Wastewater Treatment Plant (IWTP) that is owned and operated by the District. A portion of the collection system discharges to a regional interceptor, which conveys the wastewater flows to a regional wastewater treatment plant (WWTP) that is owned and operated by the Victor Valley Wastewater Reclamation Authority (VVWRA).

In 2010, the District began operation of the IWTP, a domestic and industrial wastewater treatment plant at the SCLA with a capacity of 2.5 million gallons per day (MGD). The IWTP is designed to treat wastewater using anaerobic (for high strength industrial wastewater) and aerobic (for sanitary wastewater) treatment processes. The combined flows undergo complete-mix activated-sludge (CMAS) and clarification in a membrane bioreactor (MBR) in the next treatment steps. The final process is ultraviolet (UV) disinfection, resulting in tertiary treated recycled water (RW) that meets Title 22 requirements. Sludge from the facility is discharged to the VVWRA's WWTP for treatment and disposal. In 2017, Woodard and Curran conducted a study evaluating options to increase the capacity to treat the projected flows and loads through 2040, as projected in the 2016 Sewer Master Plan [8]. The evaluation considered maximizing the biological and hydraulic capacity of the existing treatment train using additional MBR cassettes. This option requires only installation of additional equipment within existing tanks at the IWTP and provided a relatively low-cost method to increase the capacity to 3.5 MGD in the near term. To accommodate 2040 flows, the evaluation conducted that two additional treatment

trains, similar to the current train, would need to be constructed to increase the capacity to 7.55 MGD. The 2020 annual average flow treated at the IWTP was 1.86 MGD, or 2,084 AFY; all of this water is available as a RW supply to the District. With the District's current California Regional Water Quality Control Board Lahontan Region Board Order R6V-2014-0002, the District can serve RW to the following uses:

- Cooling water at High Desert Power Project (HDPP)
- Irrigation for the Westwinds Golf Course for irrigation
- Firefighting water for the fire pump deluge system at SCLA
- Irrigation for parks, greenbelts, etc. at the SCLA Industrial Park
- Construction water for future projects
- Dust Control for the SCLA runways

Currently, the District serves RW to HDPP for cooling water and irrigation and serves RW to Schmidt Park and the Westwinds Sports Center Baseball Field for irrigation use. RW was historically applied at the Westwinds Golf Course for irrigation; however, the golf course is now closed, and this use has been discontinued. The District currently has temporary authorization by the Regional Board to discharge into VVWRA's lower ponds and is pursuing a permanent permit amendment for this activity. The District also has RW fill stations to provide water for dust control at the SCLA airfield and construction sites located at SCLA and High Desert Solar site. The District is not currently serving RW from its RW fill stations but can issue permits and begin doing so when the demand arises. VVWRA is a Joint Powers Authority consisting of the Town of Apple Valley, City of Hesperia, City of Victorville, City of Adelanto, and County Service Areas of Oro Grande (Number 42) and Spring Valley Lake (Number 64). The regional plant has a current capacity of 14 MGD and is located approximately 7 miles north of the City of Victorville, between SCLA and the Mojave River. VVWRA's regional WWTP discharges disinfected tertiary effluent to the Mojave River and supplies recycled water to the District. In 2003, VVWRA executed a Memorandum of Understanding (MOU) with the California Department of Fish and Game (now California Department of Fish and Wildlife or "CDFW") which requires VVWRA to discharge 9,000 AFY of available recycled water to the Mojave River. The MOU includes a provision to allow reduced discharges as long as a minimum flow of 15,000 AFY is measured at the Lower Narrows gage. In 2005, VVWRA and the City of Victorville executed a Second Amended and Restated Agreement for Reclaimed Water Service with a perpetual term that entitles the City to take delivery of all the treated effluent from VVWRA's WWTP in excess of the amount required to be discharged under the MOU. Treated effluent which is not discharged to the Mojave River or purchased by the City is disposed of via onsite percolation ponds. In 2020, the average treated flow at the VVWRA WWTP was 10.5 MGD or approximately 11,753 AFY.

The annual volume of recycled water supply available to the District from VVWRA is equal to the total treated effluent less the volume required to be discharged to the Mojave River under the MOU with CDFW. In 2020, the District did not receive RW from VVWRA to support RW demands. VVWRA operates two sub-regional treatment plants in Hesperia and Apple Valley that began operation in 2018 and have capacities of 1.0 MGD each. The sub-regionals are

scalping plants and reduce the flows received at the VVWRA WWTP. The District, VVWRA, HDPP, and CDFW are in ongoing discussions regarding changes in available RW from the VVWRA WWTP and increased RW use by HDPP. The District's 2020 UWMP presents the 2020 RW use was 722 AFY, in comparison to the 2015 projected 2020 RW use of 2,930 AFY.

The District plans to continue to pursue opportunities to expand RW use at SCLA. The SCLA Specific Plan is currently under development and proposes development with a variety of land uses, including for business park, industrial, and public open space. RW could be used at future developments throughout the SCLA for irrigation of landscaped areas. Some developments may also be able to use RW for cooling or other industrial uses; however, demands for industrial uses are highly dependent on the specific process and water quality needs. Any projections of future industrial demands would be particularly uncertain, so the District decided to limit the evaluation of future RW demands to landscape uses throughout SCLA. The District will continue to coordinate with new developments at SCLA to identify additional RW uses and will make RW available for suitable industrial purposes whenever possible.

Some areas within the District's service area are not connected to the sewer system, especially within Zones 3485, 3675 and 3820. The customers in these areas are currently connected to septic tanks for wastewater disposal but are likely to be connected to the collection system in the future as facilities are extended into these areas, and the flows will be conveyed to either the District's IWTP or VVWRA's WWTP for treatment. Both plants are located at the far north end of the City and the nearest RW facilities to the project are over 6 miles away.

The District provides RW to limited facilities at SCLA and is looking to expand RW outside of the SCLA area. To be conservative, future RW supplies are not evaluated as part of this WSA.

5.5 Water Supply Summary

According to the Mojave Basin Area Judgement, producers in the Mojave Basin Area are allowed to produce as much water as they need annually to meet their demand requirements. An underlying assumption of the Judgment is that sufficient water will be made available to meet the needs of the Basin in the future from a combination of natural supply, imported water, water conservation, water reuse and transfers of FPA among parties. The District only purchases groundwater from the R^3 project when it is available and does not rely on purchased water as a future potable water supply; therefore, purchased water is not included as projected water supply. Therefore, groundwater supplies are based on projected demands established in the 2020 UWMP. As discussed in Section 4, the Project demands were not included in the 2020 UWMP demand estimates specifically, but analysis of commercial/industrial and landscape demands from this Project and approved commercial/industrial and landscape projects result in demands less than the projected commercial/industrial growth projected in the 2020 UWMP. Therefore, the District's historical and projected water supplies per the 2020 UWMP are summarized in Table 5-1.

Table 5-1. Water Supplies - Historical, Current, and Projected (AFY)

Water Supply	2010	2015	2020	2025	2030	2035	2040	2045
Groundwater	22,729	17,340	18,978	25,620	27,990	29,090	30,150	31,380
Purchased Water – R^3	0	3,503	3,752	0	0	0	0	0
Total	**22,729**	**20,843**	**22,730**	**25,620**	**27,990**	**29,090**	**30,150**	**31,380**

6.0 Water Supply and Demand Analysis

In general, groundwater supply is less vulnerable to seasonal and climatic changes than surface water (e.g. local and imported supplies). Natural groundwater supply estimates are based on long-term averages, which account for inconsistency in natural supplies (e.g. historic periods of drought are included in the long-term average). Therefore, the District does not have any inconsistent water sources that result in reduced supplies in dry or multiple dry years. MWA is actively operating recharge sites for conjunctive use along the Mojave River Pipeline, Oro Grande Wash Pipeline, Morongo Basin Pipeline, and Silverwood Dam. Recharge sites provide MWA with the ability to recharge SWP water into the Subareas where replacement water is purchased. These sites also provide MWA with the ability to bank excess SWP water when available in wet year for storage to be used in dry years. R^3 facilities allow MWA to manage the groundwater basins surrounding the District by delivering imported SWP water stored in upper Mojave River recharge areas to purveyors that can reduce pumping from their wells when taking R^3 water which allows partial recovery of local pumping depressions. For these reasons, supplies are considered to be unchanged in normal, dry, and multiple dry years.

The basis for the “year type” is determined from the single-driest and multiple-driest years using precipitation data (1940-2020) from National Ocean and Atmospheric Administration Station 049325 in Victorville. Even though precipitation is variable, groundwater supply estimates are based on long-term averages, which account for these variabilities so that groundwater is assumed to be 100% available in single-dry and multiple-dry year conditions.

Per UWMP requirements, the District has evaluated reliability for an average year, single-dry year, and five-consecutive-dry-years period. The UWMP Act defines these years as:

- **Average Year.** This condition represents the water supplies a supplier considers available during normal conditions. This could be a single year or averaged range of years that most closely represents the average water supply available.
- **Single-Dry Year.** The single dry year is recommended to be the year that represents the lowest water supply available. The single lowest year of precipitation was 1953, with 1.3 inches per year.
- **Five-Consecutive-Years Drought.** The driest five-year historical sequence for the supplier, which may be the lowest average water supply available for five years in a row. The lowest five years of precipitation was 2013 to 2017, with an average of 3.5 inches per year.

According to the MWA 2020 UWMP, MWA has adequate supplies to meet the region’s demands and replacement water needs during average, single-dry year, and five consecutive

dry years from 2020 to 2065. The District's demand projections were provided to MWA for inclusion in its analysis; therefore, it is concluded that the District has adequate supplies to meet demands during average, single-dry year, and five consecutive dry years throughout the 25-year planning period. The District will continue aggressive water conservation efforts, increased use of RW to offset potable water demand, and participation in new water supply projects with MWA to ensure that it has enough supply to continue to meet demands. Table 6-1 summarizes the historical base years and the percentage of average groundwater supplied during those years.

Table 6-1. Basis of Water Year Data

Year Type	Base Year[1]	% of Average Supply
Average Year	2020	100
Single-Dry Year	1953	100
Consecutive Dry Years 1st Year	2013	100
Consecutive Dry Years 2nd Year	2014	100
Consecutive Dry Years 3rd Year	2015	100
Consecutive Dry Years 4th Year	2016	100
Consecutive Dry Years 5th Year	2017	100

[1] Based on 1940 – 2020 precipitation data from NOAA Station 049325; http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca9325

Demand during dry years was assumed to remain constant because of ongoing state and local conservation programs. Groundwater supply is assumed to remain 100% available because the long-term average of the groundwater basin includes dry periods, and no single or multiple-year dry cycle affects the long-term yield of the basin. Supplies are sufficient to meet average, single-dry year, and multiple-dry years demands through year 2045, as shown in Table 6-2.

Table 6-2. Supply and Demand Comparison, AFY

Totals	2020	2025	2030	2035	2040	2045
Supply Totals	22,730	25,620	27,990	29,090	30,150	31,380
Demand Totals	22,730	25,620	27,990	29,090	30,150	31,380
Difference	0	0	0	0	0	0

6.1 Water Supply Reliability

Per the Mojave Basin Area Judgment, producers in the Mojave Basin Area are allowed to produce as much water as they need annually to meet their requirements. An underlying assumption of the Judgment is that sufficient water will be made available to meet the needs of the Basin in the future from a combination of natural supply, imported water, water conservation, water reuse and transfers of FPA among parties. According to MWA's 2020 UWMP, MWA has adequate supplies to meet the region's demands and replacement water needs during average, single-dry year and five consecutive years from 2020 to 2065.

7.0 Determination of Water Supply Sufficiency

With the Project demands and the approved projects demands, there is a surplus of estimated demands based on the 2020 UWMP demand growth from 2020 and 2025. Even with the additional demands, the total demands would be lower than the projected demands evaluated in the 2020 UWMP. Even with the additional demands, the total demands would be lower than the projected demands evaluated in the 2020 UWMP. Therefore, it is concluded that the District has adequate supplies to meet demands for existing customers and the proposed demands of the Project during average, single dry and five consecutive dry years throughout the 25-year planning period.

The District will continue aggressive water conservation efforts, pursue increased use of recycled water to offset potable water demand when available, and participate in new water supply projects with MWA to ensure they have enough supply to continue to meet their demands.

8.0 Water Feasibility Analysis

As part of this WSA, a Water Feasibility Study (WFS) was completed for this Project on behalf of the Victorville Water District (District).

Key objectives for this WFS are to:

- Estimate the water demands associated with the development of the Project (see Section 4), including fire flow demands;
- Assess whether the District's existing water storage is sufficient to serve the Project in addition to existing customers;
- Assess whether the District's existing water supply sources are sufficient to serve the Project in addition to existing customers (see Section 6);
- Determine the size and approximate location of pipeline improvements needed to provide adequate service pressure and fire flow to the Project. This includes improvements within the Project, as well as offsite, and may include an evaluation of connecting to an alternative pressure zone if needed;
- Identify coordination needs or opportunities with other improvements planned by the City.

This study incorporates data from the District's 2020 UWMP, 2021 WMP, facility inventory data, and water production data. The District's hydraulic model was used to determine the fire flow availability, pipeline velocities, and pipeline pressures in the Project area.

8.1 Project Requirements

Water demand factors, required fire flow, and storage requirements for the Project were determined using historic water use by similar customers and evaluation criteria presented in the 2021 WMP. This section summarizes the potable water demands, fire flow requirements, and storage requirements for the Project.

8.1.1 Water Demands

Average Day Demands (ADD) for the Project were estimated, as described in Section 4 of this WSA, using water demand factors presented in the 2021 WMP. Peaking factors presented in the 2021 WMP for Zone 3170 were used to calculate maximum day demand (MDD) and peak hour demand (PHD). Table 8-1 shows the ADD, MDD and PHD demand conditions for the Project. Peaking factors presented in the RWMP were used to calculate the MDD and PHD for the irrigation water use. Table 8-2 shows the ADD, MDD, and PHD demand conditions for irrigation water use. The Project's demands are presented in Table 8-3.

Table 8-1. Industrial ADD, MDD and PHD Demand Calculations

ADD (gpd)[1]	66,400
ADD (gpm)	46
MDD Peaking Factor[2]	1.4
MDD = ADD x MDD Peaking Factor, gpd	93,000
MDD (gpm)	65
PHD Peaking Factor[2]	1.7
PHD = ADD x PHD Peaking Factor (gpm)	78

[1]Source: ADD for industrial use was calculated in Table 4-1.
[2]Source: 2021 Victorville Water District Water Master Plan Update Table 4-10.

Table 8-2. Irrigation ADD, MDD, and PHD Demand Calculations

ADD (gpd)[1]	29,500
ADD (gpm)	20
MDD Peaking Factor[2]	2.2
MDD = ADD x MDD Peaking Factor (gpd)	64,900
MDD (gpm)	44
PHD Peaking Factor[2]	6.6
PHD (gpm)	132

[1]Source: ADD for irrigation was calculated in Table 4-2.
[2]Source: Victorville Water District Final Draft Recycled Water Master Plan Table 4-5.

Table 8-3. Project Total ADD, MDD, and PHD Demands

Project ADD (gpd)	95,900
Project ADD (gpm)	66
Project MDD (gpd)	157,900
Project MDD (gpm)	109
Project PHD (gpm)	210

8.1.2 Fire Flow Requirements

The land use associated with the project is industrial; therefore, based on Table 3-3 of the 2021 WMP, there is a minimum fire flow requirement of 4,000 gpm for a 4-hour duration. The minimum residual pressure in water systems during fire flow conditions is 20 pounds per square inch (psi), in accordance with the California Waterworks Standards. Table 3-6 of the 2021 WMP identifies a maximum desired pipeline velocity of 15 feet per second (fps) during fire flow conditions. Both the 20-psi pressure minimum and the 15-fps velocity limit were used in the hydraulic model to determine the available fire flow for the Project.

8.1.3 Storage Requirements

The storage criteria established in the 2021 WMP were used to determine whether the District's existing storage facilities are adequate to provide the Project and the existing customers with

sufficient water for operational, firefighting, and emergency demands. Table 3-4 of the 2021 WMP specifies the storage criteria used for this analysis. Storage is calculated separately for each pressure zone. Table 8-4 provides a summary of the storage requirements for the Project. The total required storage volume is comprised of the following three components:

- Operational storage, which relates to the daily variance in demand on the potable water system. Adequate storage is needed to supply water during peak hours when the system demand exceeds production capacity. Once production capacity becomes greater than system demands, the storage facilities are refilled, replenishing operational storage. Operational storage is calculated as 25% of MDD.
- Emergency storage is required to provide water during supply emergencies, unplanned system interruptions and/or planned system interruptions such as maintenance or construction events. Emergency storage is calculated as 50% of MDD.
- Firefighting storage requirements correspond to the volume of water needed to supply fire flow for a specified duration. The single largest fire flow requirement within each pressure zone is used to calculate the firefighting storage volume. For the Project, a demand of 4,000 gpm for four hours was used for an industrial development.

Table 8-4. Storage Requirements for Project

Storage	Requirement[1]	Volume, MG
Operational	25% of MDD	0.04
Emergency	50% of MDD	0.08
Firefighting	4,000 gpm x 4 hours	0.96
Total Storage Required for Project		**1.08**

[1] Source: 2021 Victorville Water District Water Master Plan Table 3-4

8.2 Project Water Feasibility Analysis

This section presents the supply, storage, and distribution system analysis results of the Project water feasibility study. The water feasibility study analysis was performed using the criteria outlined in Chapter 3 of the 2021 WMP. The City provided an inventory of storage and supply facilities and system wide production data for calendar year 2020, which was used to determine 2020 ADD. The data used for this analysis is summarized in Appendix A.

8.2.1 Supply

As stated in Section 6, the District has adequate supply to support the Project. The analysis in this section evaluates whether the District has sufficient production facilities to extract and deliver the available water supply to the Project location. The District's current water supply consists of 34 active wells, which pump from the Upper Mojave Groundwater Basin, and two turnouts from the Mojave Water Agency's R^{3}project.

Available supply for the Project was evaluated on the basis of total system firm capacity. The 2021 WMP calculated firm capacity with the two largest wells and the R3 supply being out of service. With these facilities out of service, the firm capacity of the system is 31,903 gpm. The 2021 WMP supply criteria state that firm capacity should be greater than MDD. The current system MDD as of 2020 is 26,835 gpm; this includes estimated demands for proposed projects which have been previously evaluated based on the City of Victorville 2010 Water Master Plan (2010 WMP) and the 2021 WMP and approved, but not yet constructed. Note that projects evaluated prior to the adoption of the 2010 WMP are not included in this total. Therefore, there is a current system wide firm capacity surplus of 5,068 gpm. The addition of the Project would decrease this surplus to 4,964 gpm. The firm capacity analysis shows that the system currently has sufficient firm capacity to meet the MDD. Table 8-5 outlines the supply analysis for serving the Project.

Table 8-5. Project Supply Analysis Summary

Proposed Project MDD, gpm	109
Firm Capacity[2], gpm	31,903
Current MDD[1], gpm	26,835
MDD Supply Required for Approved Projects[3], gpm	5,202
Current Surplus/Deficit, gpm	5,068
Proposed System Surplus/Deficit + Project MDD, gpm	4,959
Is Available System Wide Supply Sufficient?	YES

[1] Based on 2020 MDD; includes MDD for previously approved projects.
[2] See Appendix A for firm capacity calculations.
[3] See Appendix B for Approved Projects since the 2010 WMP.

8.2.2 Storage

An inventory of the City's water storage facilities is included in Appendix A. Based on this inventory, Zone 3170 currently has a total storage capacity of 12.5 million gallons (MG). As discussed previously, the fire flow storage requirement for each zone is based on the single largest fire flow requirement in the zone. The 2021 WMP based fire flow storage for Zone 3170 on a fire flow requirement of 6,000 gpm for four hours. This equates to a fire storage need of 1.40 MG for Zone 3170, leaving 11.10 MG of existing storage capacity to meet the operational and emergency (O & E) storage needs for the zone.

A summary of the estimated water demands in each pressure zone is included in Appendix A. Based on the 2020 demands plus the storage needs for projects that were evaluated based on the 2010 WMP or 2021 WMP and approved but not constructed, the current O & E storage requirements for the zone totals 8.29 MG, which results in a current surplus of 2.81 MG of storage capacity in Zone 3170 for existing and approved projects.

As outlined in Section 8.1.3, the total storage required to serve the Project is 1.08 MG (0.96 MG for fire flow and 0.12 MG for O & E). Table 8-6 provides a summary of the storage analysis performed for the Project. There is currently sufficient available storage in Zone 3170 to serve the Project.

Table 8-6. Project Storage Analysis Summary

Current Storage Capacity, MG	12.50
Allocated FF Storage Capacity, MG	1.40
Remaining Storage Capacity for O & E, MG	11.10
O & E Storage Required for Existing and Proposed Demands[1], MG	8.29
O & E Storage Available for Future Demands, MG	2.81
Proposed Project FF Storage Requirement, MG	0.96
Proposed Project O & E Storage Requirement, MG	0.12
Is Available FF Storage Sufficient?	YES
Is Available Zone O & E Storage Sufficient?	YES

[1] Includes O & E Storage allocated to previously approved projects since the 2021 WMP

8.2.3 Distribution Pipelines

The proposed project was added to the City's existing InfoWater hydraulic model to determine fire flow availability, pipeline velocities, and system pressures in the Project area. The current hydraulic model was updated as a component of the 2021 WMP and has been maintained to reflect the current water system.

A fire flow simulation was performed in the model to predict available fire flow within the Project under MDD conditions. Fire flow analysis was performed with initial tank level settings at 50 percent of maximum levels and all supply sources off. The model predicted that the fire flow requirement of 4,000 gpm could be met with installation of 12-inch and 8-inch watermains and construction of a pressure reducing valve (PRV) at the southwest corner of the project. Figure 8-1 depicts the proposed new pipelines and PRV and the layout of the Project in relation to the existing water system. Residual pressures in the Project area during the fire flow simulation range between 25 and 45 psi. Appendix C provides a summary of the available fire flow for the Project.

The Project shall make two connections to the existing system: one connection to the existing Zone 3170 12-inch pipeline in Mojave Drive at Diamond Road and one connection to the existing Zone 3290 12-inch pipeline in Mojave Drive at Mesa Linda Avenue with a PRV. The purpose of the PRV is to provide the required fire flow and to provide a second connection for service reliability to the Project. The existing 12-inch line in Mojave Drive is a Zone 3290 pipeline so the Project cannot connect to it directly.. The Developer shall coordinate with the City on the number and location of potable water, irrigation, and fire service connections.

The hydraulic model indicated that static pressures at the Project will range between 50 and 65 psi. Model results indicate that under MDD conditions, velocities within the Project area do not exceed the maximum velocity of 10 feet per second (fps). Similarly, at PHD conditions, system pressures at all junctions within the Project are above 50 psi and pipeline velocities remained below 5 fps. Model results indicate that the system pressures and velocities meet the criteria established in the 2021 WMP.

8.2.4 Coordination with Other Projects

There are several other proposed projects in the same pressure zone as the Project that have approved Water Feasibility Studies but have not yet been developed. The location of these developments are shown in Figure 8-2. In the hydraulic model, this Project was analyzed with and without the demands and the pipeline improvements proposed by these approved developments to assess whether this Project is dependent upon the development of these nearby projects. The hydraulic analysis showed that this Project meets all the requirements from the 2021 WMP with and without the demands and pipeline improvements proposed by the approved developments listed above. Therefore, this Project is not dependent upon the pipeline improvements proposed by these developments.

8.3 Conclusions and Recommendations

The feasibility study analysis concluded that adequate storage is available to serve the Project and the water system has sufficient firm capacity to meet the MDD conditions. **The Project shall make two connections to the existing system: one connection to the existing Zone 3170 12-inch pipeline in Mojave Drive at Diamond Road and one connection to the existing Zone 3290 12-inch pipeline in Mojave Drive at Mesa Linda Avenue with a PRV. The purpose of the PRV is to provide the required fire flow and to provide a second connection for service reliability to the Project. .The Developer shall coordinate with the City on the number and location of potable water, irrigation, and fire service connections. The Project shall install 7,930 feet of 12-inch pipeline and 2,420 ft of 8-inch pipeline and a PRV, as shown in Figure 8-1.** The hydraulic analysis indicated that, with the installation of the improvements identified in Figure 8-1, the system pressures, velocities, and fire flow capacities will meet the criteria identified in the 2021 WMP.

The analysis presented in this WFS is based on the configuration of the water system as of the date of this report and the 2021 WMP and the 2020 UWMP, which are the most current water planning documents available. If a newer planning document becomes available prior to the time the Project develops, or if the District determines there have been significant changes in the water system that may impact the recommendations for this Project, the District may require re-evaluation of the Project based upon such new information.

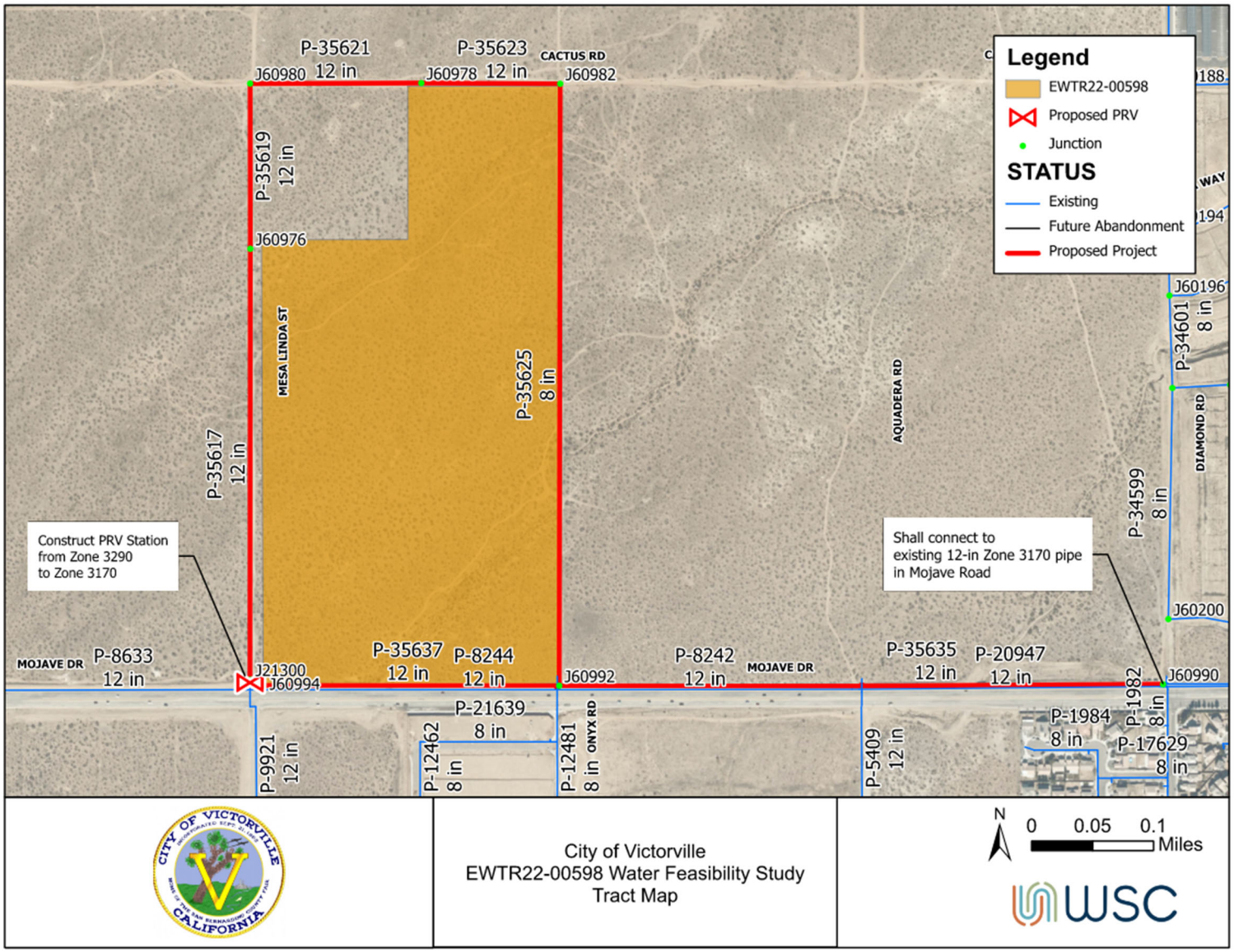

Figure 8-1. Existing and Proposed Water System

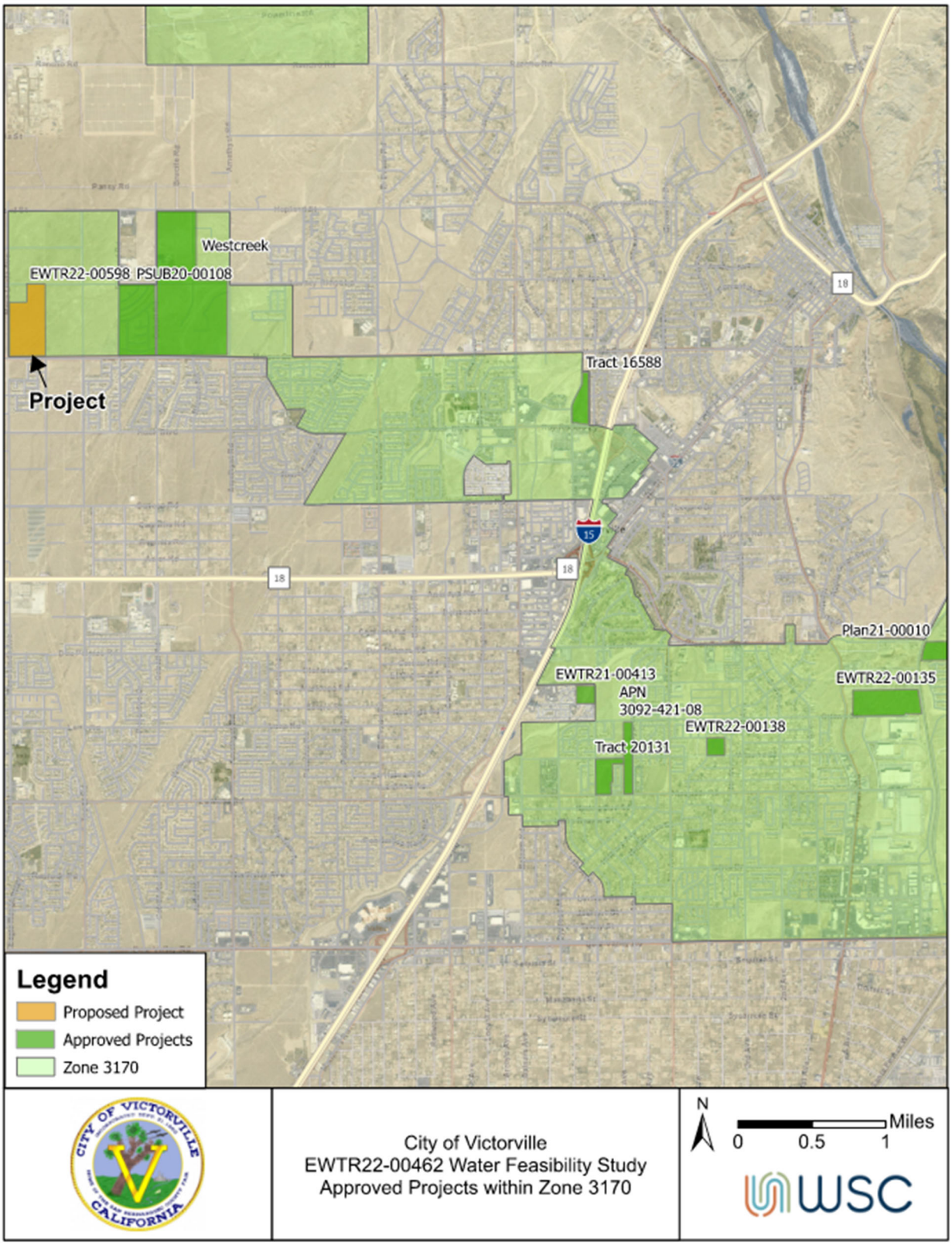

Figure 8-2. Approved Projects within Zone 3170

References

[1] Water Systems Consulting, Inc., "2020 Urban Water Management Plan Prepared for Victorville Water District," Adopted June 15, 2020.

[2] Water Systems Consulting, Inc, "2021 Water Master Plan Update Prepared for Victorville Water District," 2021.

[3] City of Victorville, "General Plan 2030," City of Victorville, Victorville, 2008.

[4] Water Systems Consulting, Inc. , "Final Water Supply Assessment for the SCLA Specific Plan," 2020.

[5] Water Systems Consulting, Inc, "Final Water Supply Assestment for ESUB20-00007 (EWTR18-00057)".

[6] Kennedy/Jenks Consultants, "Final 2015 Urban Water Management Plan for Mojave Water Agency," June 2016.

[7] Tully & Young, "2020 Urban Water Management Plan for Mojave Water Agency," May 2021.

[8] David Evans and Associates, Inc. , "City of Victorville Sewer Master Plan," December 2016.

Appendix A System Storage, Supply, and Demand Summaries

Existing Water Supply and Firm Capacity.

Supply Source	Pressure Zone	Status	Well Capacity (gpm)[1]	Total Capacity (MGD)
Well 133	2890	Active	994	1.43
Well 135	2890	Active	660	0.95
Well 102	2890	Inactive	0	0
Well 147	2890	Inactive	0	0
Well 118	2906	Active	737	1.06
Well 119	2906	Active	552	0.79
Well 105	3065	Destroyed	0	0
Well 116	3065	Active	863	1.24
Well 121 (4)	3065	Inactive	0	0
Well 127	3065	Active	915	1.32
Well 130	3065	Active	857	1.23
Well 132	3065	Active	781	1.12
Well 136	3065	Active	381	0.55
Well 139	3065	Active	2,944	4.24
Well 141	3065	Active	1,692	2.44
Well 143	3065	Active	1,149	1.65
Well 146(3)	3065	Inactive	0	0.00
Well 120	3170	Active	1,835	2.64
Well 122	3170	Active	1,789	2.58
Well 140	3170	Active/Largest	3,266	4.70
Well 145(3)	3170	Inactive	0	0
R3 Turnout 3(6)	3170	Active/Not Guaranteed	2,107	3.03
Well 109	3290	Active	838	1.21
Well 123	3290	Active	890	1.28
Well 126	3290	Active	857	1.23
Well 128	3290	Active	609	0.88
Well 131	3290	Active	1,357	1.95
Well 134	3290	Active	709	1.02
Well 137	3290	Active	1075	1.55
Well 138	3290	Active	778	1.12

Supply Source	Pressure Zone	Status	Well Capacity (gpm)[1]	Total Capacity (MGD)
Well 142[(3)]	3290	Inactive	0	0
Well 144[(5)]	3290	Active/Largest	4,600	6.62
Well 129	3485	Active	800	1.15
Well 201	3485	Active	903	1.30
Well 203	3485	Active	864	1.24
Well 204	3485	Active	997	1.44
Well 205	3485	Active	916	1.32
Well 206	3485	Active	876	1.26
Well 207	3485	Active	448	0.65
Well 208	3485	Active	858	1.24
Well 209	3485	Active	616	0.89
Well 212[(5)]	3485	Active	1,363	1.96
R3 Turnout 6[(6)]	3485	Active/Not Guaranteed	2,106	3.03
Total System Supply Capacity			43,982	63.3
Total System Firm Capacity[(2)]			31,903	45.9

[1]Current well capacities were provided to WSC by the City in October 2017.
[2]The firm capacity is the total supply capacity without the largest well in each Improvement District and R[3].
[3]Well is drilled but not equipped.
[4]Taken offline in 2014 due to levels of Chromium-6 approaching the new MCL established in 2014. May be returned to service if Chromium-6 levels decline.
[5]Two largest wells are not included in firm capacity.
[6]The City of Victorville receives a total of 6.06 MGD and can be used at either R[3] turnout. R[3]supply is not included in firm capacity due to non-guaranteed supply.

Finished Water Storage Reservoirs. Table was adapted from Table 2-4 in 2021 WMP.

Reservoir Number	Status	Material	Base Elevation (ft-msl)	Diameter (ft)	Depth (ft)	HWL (ft-msl)	Pressure Zone	Capacity (MG)
102	Active	Steel	2874	95	32	2906	2890	1.5
104	Active	Steel	2874	95	32	2906	2890	1.5
105	Active	Steel	3049	104	32	3081	3065	2.0
107	Active	Steel	3269	105	40	3309	3290	2.5
108	Active	Steel	3269	104	40	3309	3290	2.5
109	Active	Steel	2894	60	24	2918	2906	0.5
110	Active	Steel	3150	110	39	3189	3170	2.5
111	Active	Steel	3150	104	39	3189	3170	2.5
112	Active	Steel	3268	150	38	3306	3290	5.0
113	Active	Steel	3050	129	31	3081	3065	3.0
114	Active	Steel	3268	150	38	3306	3290	5.0
115	Active	Steel	3050	165	31	3081	3065	5.0
116	Active	Steel	3150	150	39	3189	3170	5.0
117	Active	Steel	3150	104	39	3189	3170	2.5
118	Active	Steel	3050	129	31	3081	3065	3.0
119	Active	Steel	3050	165	31	3081	3065	5.0
120	Active	Steel	3055	182	27	3081	3065	5.0
121	Active	Steel	2894	60	24	2918	2906	0.5
202	Active	Steel	3469	105	30.8	3500	3485	2.0
205	Active	Steel	3809	60	24	3832	3820	0.5
207	Active	Steel	3469	120	32.4	3501	3485	2.7
208	Active	Steel	3657	120	37.5	3694	3675	3.1
209	Active	Steel	3657	96	37.5	3694	3675	2.0
210	Active	Steel	3809	122	23.8	3832	3820	2.0
211	R[3](2)	Steel	3465	165	32	3497	3485	5.0
					Active Storage Capacity			**66.8**
201	Inactive(1)	Steel	3469	105	30.8	3500	3485	2.0
203	Inactive(1)	Steel	3475	27		3499	3485	0.1
204	Inactive(1)	Steel	3475	38		3499	3485	0.2

[1]Reservoir 201 is currently disconnected from the system and is not included in active storage capacity. May be reconnected in the future. Reservoirs 203 and 204 are disconnected from the system due to lining issues and are not included in active storage capacity.

[2]Reservoir 211 has been incorporated into the R³ Project and is no longer a component of the active storage capacity. However, it is still hydraulically connected to the Zone 3485 distribution system and effectively increases the storage capacity in Zone 3485.

Demand Data. Table was adapted from Table 4-11 of the 2021 WMP.

Pressure Zone	2020 ADD (MGD)[1]	2020 MDD (MGD)[2]	2020 MDD (gpm)[2]
3820	0.20	0.28	198
3675	0.32	0.75	517
3485	3.48	5.57	3,869
3290	5.53	7.18	4,988
3170	5.96	8.34	5,793
3065	4.39	8.33	5,785
2906	0.08	0.22	152
2890	0.32	0.48	331
Total	**20.20**	**30.94**	**21,633**

[1] Based on calendar year 2020 water production data provided by the City. Water served to the City of Adelanto and Phelan Pinon Hills Community Services District through intertie agreements is not included. 2020 pressure zone demands were estimated by multiplying the 2020 total ADD by the zone's proportional amount of demand shown in Table 4-11 of the 2021 WMP.

[2] Pressure zone MDD was calculated by multiplying 2020 ADD by the 2021 WMP ADD to MDD peaking factors shown in Table 4-10.

2020 System Storage. Table was adapted from Table 6-2 of the 2021 WMP. Table includes updated required storage and supply balance figures.

		Required Storage (MG)			Storage Balance (MG)	
Pressure Zone	2020 MDD (MGD)	Operational & Emergency Storage	Fire Flow Storage	Total Storage	Available Storage	Storage Surplus/(Deficit)
2890	0.28	0.36	1.0	1.36	3.0	1.64
2906[1]	0.75	0.16	1.0	1.16	1.0	(0.16)
3065	5.57	6.25	1.0	7.25	23.0	15.75
3170	7.18	6.26	1.4	7.66	12.5	4.84
3290	8.34	5.39	1.0	6.39	15.0	8.61
3485	8.33	4.18	1.0	5.18	4.7	(0.48)
3675	0.22	0.56	1.0	1.56	5.1	3.54
3820	0.48	0.21	1.0	1.21	2.5	1.29
Total	**30.94**	**23.37**	**8.4**	**31.77**	**66.8**	**35.03**

[1]The existing Stoddard Wells Pipeline enables Zone 2906 to utilize excess storage in other zones.

Appendix B Water Feasibility Studies Approved But Not Constructed

This list includes only projects with approved water feasibility studies based on the 2010 WMP and 2021 WMP. Previously approved studies which were based on the prior 1995 Water Master Plan are subject to re-evaluation based on the most current system condition and evaluation criteria in place at the time of development.

Project Name	Additional Project Names		Final Water Feasibility Study Date	Project's Pressure Zone	Project MDD (gpm)	Project O&E Storage Allocation (MG)
Tract 17033[3]	-	-	January 2012	3485	-	-
Tract 17541	-	-	January 2012	3485	110	0.12
Tract 17199	-	-	January 2012	3485	204	0.22
St. Mary's	-	-	March 2012	3675	335	0.36
Tract 18087	-	-	6/3/2014	3485	222	0.24
Tract 16588	WTR14-00074	-	11/17/2014	3170	43	0.05
Tract 17046[1]	WTR14-00081	-	1/14/2015	3485	-	-
Tract 16805[2]	WTR15-00047	-	2/5/2016	3485	-	-
Westcreek	-	-	11/17/2016	3170	431	0.47
Tract 17486[5]	WTR16-00049	-	11/30/2016	3485	-	-
Tract 20064	WTR16-00015	-	1/30/2017	3485	143	0.15
Tract 20037	WTR16-00051	-	3/23/2017	3485	38	0.04
Tract 15297[4]	WTR17-00008	-	4/12/2017	3675	162	0.17
Tract 18487	WTR17-00046	-	8/1/2017	3485	31	0.03
Tract 20131	WTR17-00078	-	11/13/2017	3170	58	0.06
Tract 20088	WTR17-00011	-	12/12/2017	3290	33	0.03

Project Name	Additional Project Names		Final Water Feasibility Study Date	Project's Pressure Zone	Project MDD (gpm)	Project O&E Storage Allocation (MG)
EWTR18-00052	APN 3092-421-08	-	1/22/2018	3170	35	0.04
EWTR18-00270	APN3039-211-01	-	3/28/2019	3290	8	0.01
EWTR18-00307	PSUB18-00057	Desert Grove	6/6/2019	3485	30	0.03
EWTR19-00093	APN 0459-192-50	-	7/15/2019	3170	186	0.21
EWTR19-00086	Tentative Tract 20280	-	9/5/2019	3065	41	0.04
EWTR19-00172	Tract 20274	-	9/17/2019	3485	79	0.08
EWTR19-00181	Tract 20275	-	9/24/2019	3485	64	0.07
EWTR19-00302	PSUB19-00061	-	2/3/2020	3170	35	0.04
EWTR20-00114[6]	PSUB20-00014	-	7/30/2020	3290	-	-
EWTR20-00226	PSUB20-00226	Hampton by Hilton	1/5/2021	3290	12	0.01
EWTR21-00070	PSUB20-00130	Tract 16774	2/24/2021	3485	70	0.08
EWTR18-00057	PSUB18-00044	Vista del Valle	3/9/2021	3675	404	0.44
EWTR21-00089	Tract 18100	-	3/29/2021	3675	51	0.06
PSUB20-00039	-	-	4/26/2021	3170	174	0.19
TMM 20341	-	-	5/6/2021	3675	208	0.22
Project Loki	-	-	6/4/2021	3170	44	0.05
PSUB20-00108	Tract 13816 & 16463		6/4/2021	3170	113	0.12
EWTR21-00008	PSUB21-00028	Seneca Villas Apartment	7/1/2021	3290	49	0.06
PSUB21-00051	Lot 43	Iron Mountain	7/23/2021	3170	20	0.02
PSUB21-00010	Tentative Tract 18005	-	7/1/2021	3170	46	0.05
EWTR21-00196	PLAN21-00011	Tentative Tract 20368	7/23/2021	3675	33	0.03
EWTR21-00257	Tract 16828	Diamond Ridge IV	8/13/2021	3065	16	0.02
EWTR21-00413	PLAN18-00020	APN 3092-381-03	10/27/2021	3170	12	0.01
EWTR19-00019	Tentative Tract 20262	-	11/1/2021	3485	113	0.12

Project Name	Additional Project Names		Final Water Feasibility Study Date	Project's Pressure Zone	Project MDD (gpm)	Project O&E Storage Allocation (MG)
EWTR21-00537	PLAN21-00033	Tract 20454	12/16/2021	3485	39	0.04
ADMN21-00162	Project Faring	-	12/22/2021	3170	18	0.02
EWTR21-00569	PSUB21-00096	Wyndham Garden Hotel	1/26/2022	3485	13	0.02
EWTR21-00554	PSUB21-00075	Tentative Tract 16681	1/21/2022	3290	63	0.07
EWTR21-00646	PSUB21-00208	Stoddard Wells Industrial Park	3/10/2022	2906	78	0.09
EWTR21-00648	Tentative Tract 14525	-	3/16/2022	2906	198	0.21
EWTR22-00138	Tract 14627	-	3/31/2022	3170	13	0.02
EWTR21-00135	PLAN21-00031	-	5/23/2022	3170	51	0.03
EWTR22-00213	PLAN21-00019	-	6/17/2022	3290	17	0.02
EWTR22-00182	Tract 20482	-	5/5/2022	3485	17	0.02
EWTR22-00378	PLAN 22-00011	Tract 20484	6/9/2022	3290	38	0.04
EWTR22-00425	Tract 16504	-	6/13/2022	3675	26	0.03
EWTR22-00450	Tract 16489	-	8/17/2022	3290	25	0.03
EWTR22-00417	C&D Plant Expansion	-	6/2/2022	3170	498	0.54
EWTR21-00062	Victorville Connection	-	7/18/2022	3170	76	0.08
EWTR18-00230	PLAN18-00039	Tract 20188	7/18/2022	3675	99	0.11
EWTR22-00520	Tract 20547	-	9/15/2022	3485	19	0.02
EWTR22-00514	Rancho Tierra	-	10/14/2022	3065	423	0.45
				Total MDD	**5,202**	

[1]Tract 17046 replaced with Tract 20274.
[2]Tract 16805 replaced with Tract 20275.
[3]Tract 17033 replaced with Tract 16774.
[4]Tract 15297 replaced with TMM 20341.
[5]Tract 17486 replaced with EWTR21-00537.
[6]EWTR20-00114 replaced with EWTR22-00598.

Appendix C Hydraulic Mode Outputs

EWTR22-00598: *Available fire flow*

Junction ID	Static Pressure (psi)	Fire Flow Demand (gpm)	Available Fire Flow at 20 psi Residual Pressure or 15 fps Max Velocity (gpm)	Residual Pressure at Required Fire Flow Demand (psi)
J60994	50	4,000	6,159	44
J21300	50	4,000	5,745	45
J60976	53	4,000	5,086	29
J60978	58	4,000	4,522	26
J60980	57	4,000	4,836	29
J60982	60	4,000	4,345	25
J60992	54	4,000	7,021	40

EWTR22-00598: *Project Pipeline Properties*

ID	Length (ft)	Diameter (in)	Roughness	Velocity at Peak Hour (ft/s)
P-35641	13	12	130	0.00
P-35637	1,320	12	130	0.42
P-35639	51	12	130	0.42
P-35617	1,868	12	130	0.42
P-35619	716	12	130	0.13
P-35621	742	12	130	0.13
P-35623	602	12	130	0.17
P-35625	2,417	8	130	0.39
P-35635	2,622	12	130	0.60