Appendix G:
Hydrology and Water Quality Supporting Information

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G.1 - Hydrology Analysis

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CIVIL ENGINEERS I SURVEYORS I PLANNERS

May 3, 2023
Revised January 24, 2024
Job No.: 3435-000

M E M O R A N D U M

TO: Steve Reilly; 330 Land Company, LLC

FROM: Lee Rosenblatt, PE **&** Megan Alferness, PE

SUBJECT: Arroyo Lago, Alameda County – Hydrology Analysis

Purpose

Carlson, Barbee, & Gibson, Inc. (CBG) has prepared a hydrology analysis memorandum for the proposed Arroyo Lago Project (Project). This Memo summarizes the existing site drainage patterns, proposed drainage patterns and design methodology for the proposed storm drain system.

Existing Conditions

The Project site is generally located northwest of the intersection of Busch Road and El Charro Road in Alameda County. The existing 26.6 acre Project site is currently an empty parcel with light vegetation and gently slopes towards the center of the parcel where storm water is conveyed via a small swale and into a larger earthen channel (see Attachment 1 – Existing Hydrology Map).

Per Attachment 1, the existing earthen channel, located southeast of the Project Site, conveys the storm water from the Project site (26.6 AC) in addition to storm water from a portion of the adjacent Parcel B site (67.6 AC) East to an existing 24" culvert under El Charro Road (existing southern culvert) for a total drainage area of 94.2 AC. The existing 24" storm drain pipe daylights and the water discharges on the east side of El Charro Road where the storm water continues East towards Cope Lake.

Proposed Conditions

Improvements to the 26.6 AC Project site include 194 single-family units, landscape areas and roadways. The proposed Project will collect all onsite stormwater through a new storm drain system and convey the stormwater via a new 48" storm drain pipe through Parcel B and a new 60"

storm drain pipe under El Charro Road and discharge via a new outfall on the east side of El Charro Road.

Low flows will be pumped into a bioretention treatment area which will be located either west of El Charro Road (Alt 1) or east of El Charro Road (Alt 2) as shown on Attachment 2. The location of the bioretention has no impact on the overall hydrology given flow will be distributed to the bioretention via a low flow pump in both alternatives. The proposed Project creates approximately 18.8 AC of new impervious surface, 100% of which is treated in the bioretention treatment area.

Within Parcel B (east of the project site) a berm and north/south drainage ditch will be constructed to intercept and convey the existing surface drainage from the adjacent Parcel B site. A new east/west drainage ditch will be constructed within Parcel B and stormwater will flow east via the new earthen channel to an existing culvert under El Charro Road where the storm water continues East towards Cope Lake.

Methodology

CBG has analyzed the existing 10-year storm water runoff and total capacity of the existing 24" culvert under El Charro Road as well as the proposed 10-year and 100-year storm water runoff and total capacity of the proposed 48" storm drain pipe and the capacity of the existing northern culvert under El Charro Road. The analysis used for these calculations is in accordance with Alameda County Flood Control District & Water Conservation District (ACFC & WCD). The values used in the following calculations are referenced from the ACFC & WCD Documents and Standards

Peak runoff was calculated using Rational Method.
$Q = CiA$

Where:
Q = Flow rate (cfs), C = Runoff coefficient,
i = Rainfall intensity (in/hr), A = Drainage area (ac)

Outfall Pipe Capacity was calculated using Mannings Equation with the Hydraflow Express software.

Proposed Drainage Areas

Drainage Area 1 (Proposed Project & Offsite Sewer Treatment Plant)
Drainage Area 1 comprises of the Arroyo Lago Project site and the offsite sewer treatment plant as proposed and depicted in Attachment 2 (Proposed Hydrology Map), Drainage Area 1 will collect in a proposed storm drain network and ultimately drain via a new 48" storm drain pipe to a new 60" culvert under El Charro Road where the storm water continues East towards Cope Lake.

Drainage Areas 2A & 2B (Offsite Parcel B)
Drainage Area 2A as depicted in Attachment 2 comprises of the majority offsite area (Parcel B) east of the proposed Project and west of El Charro Road that contains the drainage area collected by the new north/south and east/west earthen channel that ultimately discharges into the existing northern culvert under El Charro.

Drainage Area 2B as depicted in Attachment 2 comprises of the remainder of the offsite area (Parcel B) east of the proposed project that will continue to drain to the existing drainage channel and existing 24" culvert under El Charro just north of Busch Road.

Drainage Area 3 (Proposed Offsite Water Storage Facility)
Drainage Area 3 as depicted in Attachment 2 comprises of a 0.5 AC water storage facility. Storm runoff will be directed to and treated in the adjacent bioretention area. The bioretention area will be designed to contain and treat the low flows while high flows will release to the East via a high flow overflow spillway.

Results

Existing Southern El Charro Culvert Predevelopment Summary
The table below is a summary of the existing 10-year peak flows discharged by the existing 24" Culvert under El Charro:

DA EX	94.2 Acres
DA EX Runoff Coefficient	0.25 (Soil Group D-Undeveloped land)
Time of Concentration	60 Minutes
10-Year Rainfall Intensity	0.73 in/hr
10-Year Storm Peak Flow	17.2 cfs
24" Storm Drain Capacity (S=0.2%)	10.8 cfs

Existing Southern El Charro Culvert Postdevelopment Summary
The table below is a summary of the existing 10-year peak flows discharged by the existing 24" Culvert under El Charro:

DA 2B	14.8 Acres
DA EX Runoff Coefficient	0.25 (Soil Group D-Undeveloped land)
Time of Concentration	15 Minutes
10-Year Rainfall Intensity	1.60 in/hr
10-Year Storm Peak Flow	5.9 cfs
24" Storm Drain Capacity (S=0.2%)	10.8 cfs

Arroyo Lago (Project Site & Offsite Sewer Treatment Plant) Post Development Summary
The table below is a summary of the proposed 10-year peak flows & 100-year discharged by the proposed 48" Storm Drain pipe.

DA 1 Area	32.3 Acres
DA 1 Runoff Coefficient	0.43 (Soil Group D - Residential 3600-5000 sf lot)
Time of Concentration	23 Minutes
10-Year Rainfall Intensity	1.26 in/hr
100-Year Rainfall Intensity	1.88 in/hr
10-Year Storm Peak Flow	17.5 cfs
100-Year Storm Peak Flow	26.1 cfs
48" Storm Drain Capacity (S=0.1%)	45.4 cfs

Existing Northern El Charro Culvert (Overland) Postdevelopment Summary
The table below is a summary of the existing 10-year & 100-year peak flows discharged by the existing culvert under El Charro:

DA 2A Area	47.1 Acres
DA 2 Runoff Coefficient	0.25 (Soil Group D-Undeveloped land)
Time of Concentration	30 Minutes
10-Year Rainfall Intensity	1.08 in/hr
100-Year Rainfall Intensity	1.61 in/hr
10-Year Storm Peak Flow	12.7 cfs
100-Year Storm Peak Flow	19.0 cfs
Existing Culvert Capacity (S=0.2%)	260+/- cfs

Conclusion

In conclusion, the proposed and existing drainage systems for the three drainage areas have sufficient capacity to convey the flow from the proposed development and the offsite area east of the project site.

Attachments:

1. Existing Hydrology Map
2. Proposed Hydrology Map

PROJECT SITE
PARCEL A
PM 11230

PARCEL B
PM 11230

USL PLEASANTON LAKES
APN 946-4634-2

EX EARTHEN CH.
CHANNEL

DA EX
94.2 | 0.35

EX 24" SD

EL CHARRO RD

BUSCH ROAD

LEGEND

- SUBDIVISION BOUNDARY
- ADJOINER
- WATERSHED BOUNDARY
- FLOW DIRECTION
- EX 24" SD — EXISTING STORM DRAIN PIPE
- DA (1.0 | 0.35) — DRAINAGE AREA DESCRIPTION
- C VALUE
- DRAINAGE AREA

EXISTING HYDROLOGY MAP

ARROYO LAGO

ALAMEDA COUNTY CALIFORNIA

SCALE: 1" = 100' DATE: JANUARY 2024

0 100 200 300

cbg CIVIL ENGINEERS ▪ SURVEYORS ▪ PLANNERS
SAN RAMON ▪ (925) 866-0322
ROSEVILLE ▪ (916) 788-4456
WWW.CBANDG.COM

JOB NO.: 3435-000

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SEE DETAIL TO RIGHT
(1,700 LF TO NORTH)

BEGIN NEW BERM

PROPOSED EARTHEN CHANNEL

PROJECT SITE

DA 1

DA 2A

RECYCLED WATER STORAGE POND

BIORETENTION AREA (ALT 1)

DA 1

PROPOSED EARTHEN CHANNEL

48" SD

LOW FLOW WATER QUALITY PUMP (ALT 1)

DA 1
0.43 | 32.3

PARCEL B
PM 11230

USL PLEASANTON LAKES
APN 946-1250-6-4

LOW FLOW WATER QUALITY PUMP (ALT 2)

60" SD

PROPOSED OUTFALL

PROPOSED EARTHEN CHANNEL

DA 2A
0.43 | 47.1

EXISTING NORTHERN CULVERT

EL CHARRO RD

DA 2B

BIORETENTION AREA (ALT 2)

EX EARTEN CHANNEL TO BE REGRADED

DA 2B
14.8 | 0.25

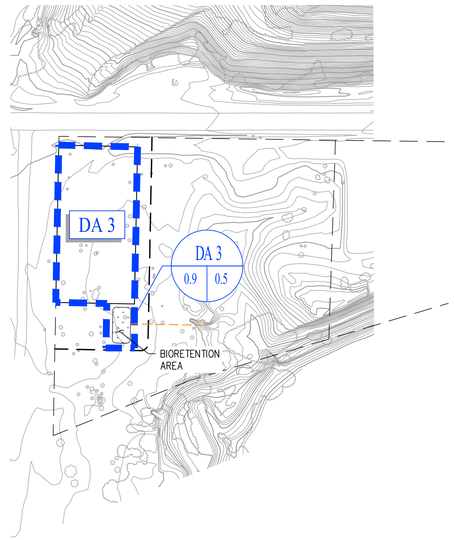
EXISTING SOUTHERN CULVERT

EX 24" SD

END NEW BERM

EX EARTHEN CHANNEL TO REMAIN

BUSCH ROAD



LEGEND

- SUBDIVISION BOUNDARY
- ADJOINER
- PROPOSED BERM
- WATERSHED BOUNDARY
- DAYLIGHT
- FLOW DIRECTION
- 18" SD — STORM DRAIN PIPE
- MANHOLE
- CATCH BASIN
- DA (1.0 | 0.35) — DRAINAGE AREA DESCRIPTION, C VALUE, DRAINAGE AREA

PROPOSED HYDROLOGY MAP

ARROYO LAGO

ALAMEDA COUNTY CALIFORNIA

SCALE: 1" = 100' DATE: JANUARY 2024

0 100 200 300

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SAN RAMON ▪ (925) 866-0322
ROSEVILLE ▪ (916) 788-4456
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G.2 - Water Supply Evaluation

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Water Supply Evaluation for the Arroyo Lago Residential Project

Alameda County, California

March 2024
EKI C30109.00

EKI ENVIRONMENT & WATER, INC.
www.ekiconsult.com
2001 Junipero Serra Blvd, Suite 300 • Daly City, CA 94014

Water Supply Evaluation

Arroyo Lago Residential Project
Alameda County, California

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APPENDICES

1 INTRODUCTION

Included herein is a water supply evaluation (WSE) in support of the proposed Arroyo Lago Residential Project (Proposed Project; **Figure 1**). The Proposed Project site is comprised of approximately 26.6 acres located in unincorporated Alameda County, directly east of the City of Pleasanton, California (330 Land Company, 2024a).

The Proposed Project includes the construction of 194 single-family residential (SFR) units, 49 Accessory Dwelling Units (ADUs), a 0.7-acre centrally located park, approximately 5.6 acres of associated landscaping, and approximately 0.5 miles of designated public walking trails (330 Land Company, 2024a; 2024b). A detailed site plan for the Proposed Project is included in **Appendix A**. The Proposed Project is located outside of the current California Water Service (Cal Water) Livermore District (District) service area (**Figure 2**). This WSE assumes that the Proposed Project will be added to the District's service area by the California Public Utilities Commission (CPUC) and will be supplied by the District's wholesaler, Zone 7 Water Agency (Zone 7); therefore, the water supply available for the Proposed Project is evaluated with respect to the supply reliability for the entire District.

The information provided in this WSE is generally parallel and consistent with the requirements for a Water Supply Assessment (WSA) per California Water Code (CWC) §10910 through §10915 and the California Department of Water Resources' (DWR's) *Guidebook for Implementation of Senate Bill 610 and Senate Bill 221 of 2001: To Assist Water Suppliers, Cities, and Counties in Integrating Water and Land Use Planning*, dated 8 October 2003. As discussed in Section 2, a WSA is not required for a project of this size and has not been requested by Alameda County, which is the land use planning agency. Nevertheless, it is desirable to follow the WSA requirements to consistently document the adequacy of the water supply available for the Proposed Project.

The purposed of this WSE is to evaluate whether the District has sufficient water supply to meet the current and planned water demands within its service area, including the demands associated with the Proposed Project (assuming addition to the District), during normal and dry hydrologic years over a 20-year time horizon. More specifically, this WSE evaluates supply and demand for the Proposed Project, as well as the for the entire District, under current and future (2045) normal and dry hydrologic scenarios. This estimate will reflect the recent changes to the UWMP regulations that require UWMPs to assess drought periods lasting five years.[1]

The information contained in this WSE is based primarily on the District's 2020 Urban Water Management Plan (UWMP), except where updated with relevant water demand and supply reliability and other information provided by Zone 7, City of Pleasanton, and DWR.

[1] Noting that the corresponding WSA regulations have not been updated, it is most conservative to include a five-year assessment of supply reliability in the WSE, in addition to the three-year multi-dry year period.

This WSE concludes that sufficient water supply is available to the District to meet all future demands within its existing service area and those associated with the Proposed Project, assuming successful addition of the Proposed Project to the District's service area.

Legend

Project Boundary

N

0 750 1,500

Feet

Project Site and Boundary

Abbreviations

"Zone 7" = Zone 7 Water Agency

Notes

1. All locations are approximate.

Sources

1. Basemap is ESRI's ArcGIS Online world aerial map, obtained 8 March 2024.

Arroyo Lago Residential Project
Alameda County, CA
March 2024
EKI C30109.00
Figure 1

eki environment & water

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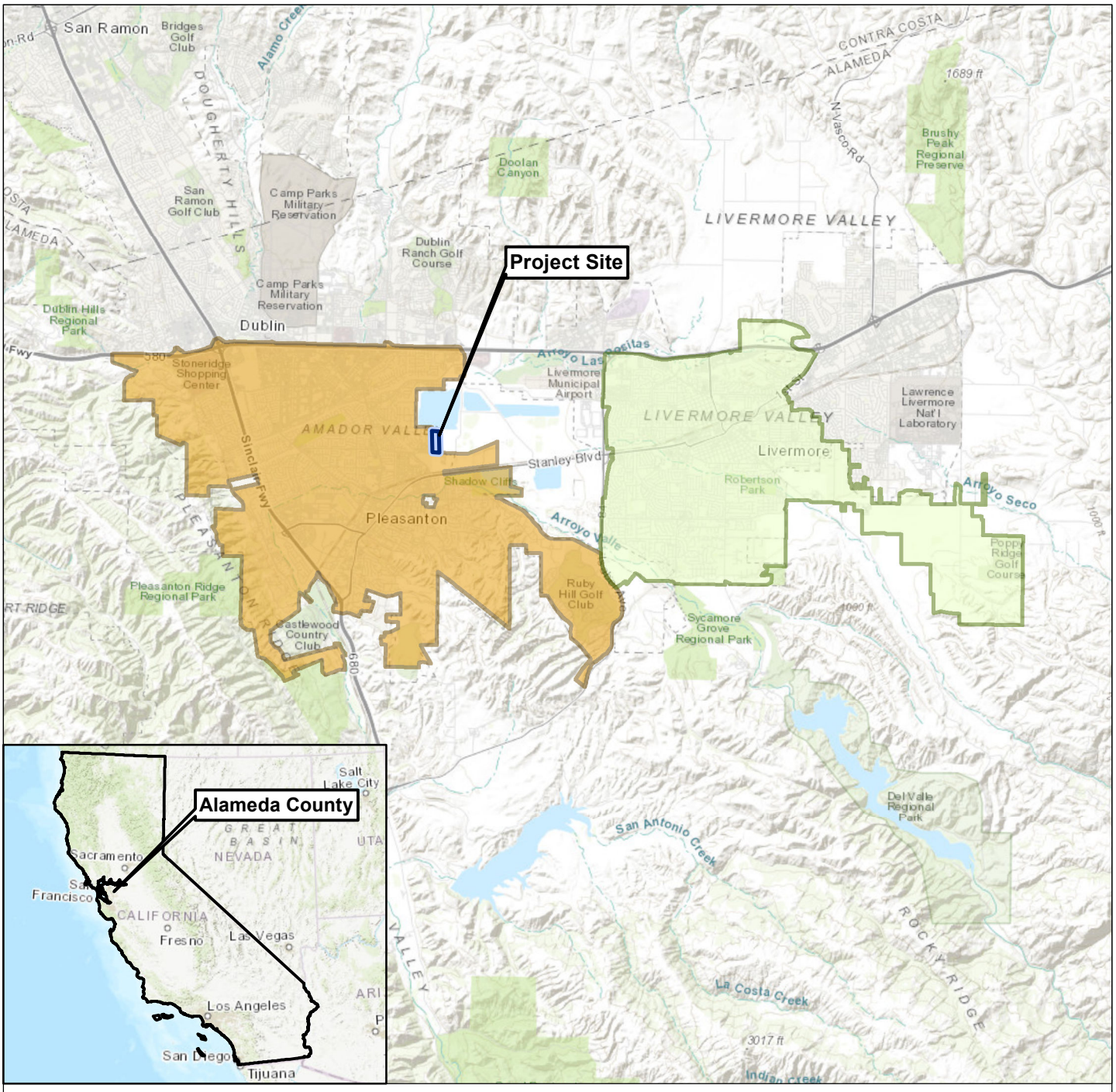

Legend

- Project Boundary
- Cal Water Livermore District
- City of Pleasanton

N

0 2.5 5

(Scale in Miles)

Project Location

Abbreviations

"Cal Water" = California Water Service Company

Notes

1. All locations are approximate.

Sources

1. Basemap is ESRI's ArcGIS Online world aerial map, obtained 8 March 2024.

Arroyo Lago Residential Project
Alameda County, CA
March 2024
EKI C30109.00

Figure 2

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2 GENERAL REQUIREMENTS FOR THE PREPARATION OF A WATER SUPPLY ASSESSMENT

The Proposed Project does not include more than 500 dwelling units, and therefore does not satisfy the definition of a "project" requiring a WSA pursuant to SB 610 (Water Code §10910(a) and 10912(a)(3)). However, since this WSE has been prepared to be generally consistent with WSA requirements, the components of a WSA, which are also included in this WSE, are summarized below.

The primary purpose of a WSA and this WSE is to evaluate whether sufficient water supply is available to meet all future demands within the water supplier's service area, including those associated with the Proposed Project, during normal and dry hydrologic years for a 20-year planning horizon.[2] More specifically, this WSE evaluates supply and demand for the Proposed Project, as well as the for the entire District, under current and future (2045) normal and dry hydrologic scenarios.

[2] The Water Code specifies that a WSA must look at supplies and demand on a 20-year horizon (i.e., to 2043), but given the available data, this WSE looks beyond that to 2045.

3 PROJECT DESCRIPTION

The Proposed Project site is comprised of approximately 26.6 acres located in unincorporated Alameda County, directly east of the City of Pleasanton, California with an Assessor Parcel Number (APN) of 946-4634-1 (330 Land Company, 2024c). The Proposed Project site is bordered by Lake I of the Zone 7 Water Agency (Zone 7) Chain of Lakes to the north, residential and institutional development to the west, and Busch Road to the south (**Figure 1**).

The Proposed Project would construct 194 single-family homes with approximately 49 homes designed with junior ADUs for a total of 243 dwelling units, a 0.7-acre centrally located park, and approximately 5.6 acres of associated landscaping on an approximately 26.6-acre site. The Proposed Project would also include infrastructure to support off-site improvements, including internal roadways. Water service facilities associated with the Proposed Project would include a water storage and booster pump facility and two metering facilities (turnouts) to accept delivery of treated water from Zone 7 and a bioretention area located off-site (330 Land Company, 2024a). For wastewater services (not directly the subject of this WSE) the Proposed Project would include approximately 1-acre membrane-bioreactor sewer treatment plant, an additional 2.5-acre recycled water storage facility capable of holding approximately 31 acre-feet (AF), and approximately 8.5 acres of agricultural irrigation recycled water spray fields. EKI Environment & Water, Inc. (EKI) recently completed a Technical Memorandum for the Proposed Project summarizing the recycled water balance for the proposed production, storage, and disposal of recycled water associated with the Proposed Project (EKI, 2023). Recycled water will not be used for any demands associated with the Proposed Project discussed in this WSE (330 Land Company, 2024c). The buildout date for the Proposed Project is not precisely known; it is assumed to be fully completed by 2025 for purposes of this WSE.

The Proposed Project site and the surrounding areas have historically been used for sand and gravel mining. The Proposed Project site is currently undeveloped and there has been no historical municipal water use at the site (**Figure 1**).[3]

[3] The mining uses in this area were served by local groundwater wells; pumping and water use records are not available.

4 PROJECT WATER DEMAND

Alameda County has adopted green building standards and water efficient landscaping ordinances consistent with previous versions of the CalGreen building standards and the California Model Water Efficient Landscape Ordinance (MWELO) (DWR, 2015). As part of state requirements, all new developments must comply with these efficiency standards. As such, the Proposed Project development is expected to include a number of water-efficient features, including, but not limited to:

- Use of low-flow lavatory faucets, kitchen faucets, and toilets, in accordance with CalGreen Code; and
- Inclusion of low-water use landscaping and high-efficiency irrigation systems to minimize outdoor water use in accordance with MWELO.

As described below, the average annual water demand for the Proposed Project was estimated based on: (1) information provided by the Project Proponent (330 Land Company, 2024a; 2024b; 2024c); (2) 2020 Tri- Valley Municipal and Industrial Water Demand Study by Zone 7 (Zone 7, 2021a); (3) Cal Water Livermore District water loss audits (DWR, 2020; DWR, 2021a; DWR, 2021b; DWR, 2021c; DWR, 2022a); and (4) other literature sources, which provide number of persons per household and water factors for plants in landscaping.

Table 1 provides a summary of the land uses, unit demand factors, and respective water demands associated with each land use.

4.1 Residential Water Use

As described in Section 3, a total of 243 dwelling units are included in the Proposed Project, consisting of 194 SFR units and 49 ADUs. The capacities for the dwelling units are assumed to be 2.63 persons per household (pph) for single-family homes[4] and 1.5 pph for ADUs.[5] A residential indoor water use factor of 52.3 residential gallons per capita per day (R-GPCD) was used to estimate indoor water demands, which represents a rebound in demands post-2014 drought for the District as calculated in the 2020 Tri-Valley Municipal and Industrial Water Demand Study (Zone 7, 2021a).

Using the above pph and R-GPCD estimates, total SFR residential indoor water use is estimated to be 30 acre-feet per year (AFY) and total ADU residential water use is estimated to be 4.3 AFY at full buildout (**Table 1**) for a total residential water use of 34 AFY.

[4] A pph of 2.63 is used to calculate SFR water demands, which is the average pph for City of Pleasanton (2.64) and City of Livermore (2.62), per California Department of Finance (2023).
[5] Average of 1 to 2 persons per ADU (UC Berkeley Center for Community Innovation, 2021).

4.2 Irrigation Water Use

The Proposed Project outdoor water use includes irrigation of a 0.7-acre park, 1.4 acres of planter strips with trees, 0.66 acres of landscaping along the streets including the medians, and 2.8 acres of residential front yard area, for a total landscaped area of 5.6 acres (330 Land Company, 2024b). The total landscaping acreage will include 0.71 acres (13% of the total area) of high water use planting (HWUP), 1.5 acres (26% of the total area) of medium water use plantings (MWUP), and 3.4 acres (61% of the total area) of low water use plantings (LWUP; 330 Land Company, 2024c). Annual irrigation demand for the Proposed Project is estimated using the following formula:

$$Annual\ Demand = \sum_{January}^{December} \frac{ETo - Precipitation}{Plant\ Factor} * Irrigation\ Efficiency$$

in which the annual demand is equal to the sum of monthly irrigation demand, based on the regional reference evapotranspiration rate (ETo), effective precipitation, plant factor, and irrigation efficiency. For the Proposed Project's annual irrigation demand calculation, an ETo value of 46.2 inches (in) for the City of Pleasanton is used per DWR's California Irrigation Management Information System (CIMIS) Reference Evapotranspiration Zones (DWR, 2012) and an effective precipitation value of 5.2 in per CIMIS (CIMIS, 2023). A plant factor of 0.80 was used for HWUP, 0.50 for MWUP, and 0.30 for LWUP, per the MWELO (DWR, 2015). An irrigation efficiency of 75% was used for HWUP and 81% for MWUP and LWUP, representing the amount of water removed from the water source that is used by the plants, per the MWELO (DWR, 2015).

Using the above calculations and assumptions, the Proposed Project's total annual irrigation demand is estimated to be 9.9 AFY at full buildout (**Table 2**).

4.3 Distribution System Losses

Water distribution systems experience a degree of water loss over the course of transmission from the source to the customer. Although losses from the newly constructed portion of the system's infrastructure associated with the Proposed Project is expected to be minimal, it is conservatively assumed that distribution system losses associated with delivering water to the Proposed Project will be consistent with the 5-year average percentage of water losses (including real and apparent losses) for the District (i.e., 6.0% of Project demands; DWR, 2020; 2021a; 2021b; 2021c; 2022). It should be noted that while these losses represent a demand on the system, water lost through the distribution system returns to the underlying groundwater basin and thus is not a true demand on the groundwater supply. However, for purposes of this WSE, all water loss is conservatively considered a demand. **Table 1** shows the distribution system losses associated with the Proposed Project, which is estimated to be approximately 2.8 AFY at full buildout.

4.4 Existing Current Water Demand on the Proposed Project Site

The Proposed Project site is currently undeveloped and there has been no historical municipal water use at the site (**Figure 1**).[3] Given that there is no existing water demand, the Proposed Project will result in a net increase in water demand at the site.

4.5 Total Project Water Demand

Based on the above methodologies and assumptions, the incremental increase in water demand associated with the Proposed Project at full buildout and occupancy is estimated to be 47 AFY, as shown in **Table 1**.

Table 1
Summary of Estimated Incremental Annual Project Water Demand
Arroyo Lago Residential Project, Alameda County, California

Water Use (a)	Land Use at Full Buildout (b)	Land Use Units	Demand Factor (c)	Demand Factor Units	Persons per Household	Total Water Demand (AFY) (d)				
						2025	2030	2035	2040	2045
SFR	194	du	52.3	gpcd	2.63 (e)	30	30	30	30	30
ADUs	49	du	52.3	gpcd	1.5 (f)	4.3	4.3	4.3	4.3	4.3
Landscape Irrigation (g)	5.6	ac	--	--	--	9.9	9.9	9.9	9.9	9.9
Distribution System Water Loss (h)	--	--	6.0%	--	--	2.8	2.8	2.8	2.8	2.8
Net Annual Water Demand (i)						**47**	**47**	**47**	**47**	**47**

Abbreviations:

"ac" = acre
"ADU" = Associated Dwelling Unit
"AFY" = acre-feet per year
"Cal Water" = California Water Service
"CIMIS" = California Irrigation Management Information System
"du" = dwelling unit
"ET" = evapotranspiration
"gpcd" = gallons per day per capita
"pph" = persons per household
"SFR" = Single Family Residential
"sq ft" = square feet
"WSE" = Water Supply Evaluation

Notes:

(a) SFR and ADUs water demands include only indoor demands.
(b) SFR land use per Referene 1 and ADU land use per Reference 2.
(c) Demand factors for SFR and ADU per Reference 3.
(d) Since the estimated completion date is unknown at the time of writing this WSE, full buildout of the Proposed Project is conservatively assumed to be achieved by 2025.
(e) The pph for SFR units is an average of the values for the City of Pleasanton (2.64 pph) and the City of Livermore (2.62 pph) in 2023 per Reference 4.
(f) The pph for ADUs is an average of 1 to 2 persons per ADU per Reference 5.
(g) Irrigation demands are calculated using ET and precipitation data from CIMIS per Reference 6.
(h) Distribution system water loss is based on a rate of 6.0%, estimated as the average of annual water losses for the Cal Water Livermore District between 2017 and 2021, per References 7 through 11.
(i) Totals may not sum due to rounding.

Table 1

Summary of Estimated Incremental Annual Project Water Demand

Arroyo Lago Residential Project, Alameda County, California

References:

1. 330 Land Company, 2024a. Development Plan and Vesting Tentative Map Subdivision 8423, provided by 330 Land Company on 11 March 2024.
2. 330 Land Company, 2024b. Information provided by 330 Land Company on 13 March 2024.
3. Zone 7, 2021. 2020 Tri-Valley Municipal and Industrial Water Demand Study, dated July 2021, available at https://www.zone7water.com/sites/main/files/file-attachments/2020_tri-valley_demand_study.pdf?1627595774.
4. California Department of Finance, 2023. Report E-5 Population and Housing Estimates for Cities, Counties, and the State, January 1, 2021-2023, with 2020 Benchmark, released 1 May 2023.
5. UC Berkley Center for Community Innovation, 2021. Implementing the Backyard Revolution: Perspectives of CA's ADU Owners, dated 12 April 2021, available at https://www.aducalifornia.org/wp-content/uploads/2021/04/Implementing-the-Backyard-Revolution.pdf.
6. CIMIS, 2023. CIMIS Station Reports - Station 191 (Pleasanton), accessed 28 August 2023, available at https://cimis.water.ca.gov/WSNReportCriteria.aspx.
7. DWR, 2021. WUEdata – 2017 Water Audit Report: California Water Service Livermore District, updated 23 November 2021.
8. DWR, 2021. WUEdata – 2018 Water Audit Report: California Water Service Livermore District, updated 23 November 2021.
9. DWR, 2020. WUEdata – 2019 Water Audit Report: California Water Service Livermore District, uploaded 28 September 2020.
10. DWR, 2021. WUEdata – 2020 Water Audit Report: California Water Service Livermore District, uploaded 27 September 2021.
11. DWR, 2022. WUEdata – 2021 Water Audit Report: California Water Service Livermore District, uploaded 30 September 2022.

Table 2

Estimated Project Landscaping Water Demand

Arroyo Lago Residential Project, Alameda County, California

	Area of Land Use (ac) (a)	Effective Annual Precipitation (in) (b)	Average ETo (in) (c)	Plant Factor (d)	Irrigation Efficiency (e)	Annual Irrigation Requirement (AFY)
Private Park Landscaping		5.2	46.2			
MWUP	0.14			0.50	81%	0.30
LWUP	0.56			0.30	81%	0.71
Residential Yards (f)						
HWUP	0.71			0.80	75%	2.6
LWUP	2.1			0.30	81%	2.7
Medians and Buffers Landscaping						
MWUP	1.3			0.50	81%	2.8
LWUP	0.71			0.30	81%	0.90
Estimated Total Annual Irrigation Demand						**9.9**

Abbreviations:

"ac" = acre

"AFY" = acre-feet per year

"ETo" = evapotranspiration

"HWUP" = high water use plantings

"in" = inches

"LWUP" = low water use plantings

"MWUP" = medium water use plantings

Notes:

(a) Landscaping land use types and square footages are per Reference 1.

(b) Annual precipiation per Reference 2.

(c) Average ETo per Reference 3.

(d) Plant factor values per Reference 4.

(e) Spray irrigation is assumed for the MWUP and LWUP and drip irrigation for the HWUP. Irrigation efficiency values associated with spray and drip irrigation are per Reference 4.

(f) Area of land use for the residential yards includes impervious pathways and landscaping demands are thus conservatively estimated.

References:

1. 330 Land Company, 2024b. Information provided by 330 Land Company on 13 March 2024.
2. CIMIS, 2023. CIMIS Station Reports - Station 191 (Pleasanton), accessed 28 August 2023, available at https://cimis.water.ca.gov/WSNReportCriteria.aspx.
3. California Department of Water Resources, 2012. California Irrigation Management Information System Reference Evapotranspiration Zones, January 2012.
4. California Code of Regulations, Title 23, Division 2, Chapter 2.7, Model Water Efficient Landscape Ordinance, 29 November 2019.

5 CAL WATER LIVERMORE DISTRICT WATER DEMAND

Consistent with the UWMP Act (Water Code §10610-10656), the 2020 UWMP for the District presents estimates of projected future water demand for the District's service area in five-year increments, between the years 2025 and 2045 (Cal Water, 2021).

While the 2020 UWMP water demand projections account for a degree of growth within the District's current service area, the Proposed Project is located outside of the current service area and was not contemplated as a part of the 2020 UWMP process. Therefore, for purposes of this WSE, it is assumed that all of the water demand associated with the Proposed Project is additive to the water demands projected in the District's 2020 UWMP.

5.1 Current and Historical Water Demand Within the District Service Area

Historical water demand within the District service area from 2000 through 2022 is summarized in **Table 3**. Based on the average water use between 2018-2022, the majority of the water demand within the District service area is from the SFR sector, which represented 68% of the demand. The remainder of the demand was split between commercial (14% of overall demand), institutional/government (8.2% of overall demand), multi-family residential (4.6% of overall demand), non-revenue water (4.7% of overall demand), and other (4.9% of overall demand; Cal Water, 2023).

Water use from 2000 to 2008 within the District remained fairly consistent, at an average of approximately 11,801 AFY. A decrease in water use occurred from 2008 to 2011, which generally corresponds with the 2007-2009 drought and the economic downturn. Then, a significant drop in water demand occurred in 2014 through 2016, corresponding with a historic drought and mandatory state-wide water use restrictions and water conservation targets. Based on the data summarized in **Table 3**, total water demand for the District averaged 8,845 AFY from 2018 through 2022.

5.2 District Water Demand Projections

Projected water demands for the District are documented in the District's 2020 UWMP (Cal Water, 2021) and presented in **Table 4** in five-year increments. Taking into account historical water use, expected population increase and other growth, climatic variability, and other assumptions, water demand within the District is projected to increase to 9,632 AFY by 2045, an increase of approximately 14% over the 2018-2022 average.

5.3 Planned Development Projects within the District

The 2020 UWMP water demand projections incorporate current and historical water usage within the District service area through 2045 (Cal Water, 2021). As discussed above, the water demand associated with the Proposed Project is not within the growth anticipated within the District and is not accounted for in the 2020 UWMP demand projections. The 2020 UWMP water demand projections do not include any major developments which would necessitate a WSA.

Thus, the demand projections presented in Section 5.2 are inclusive of all identified and anticipated development.

5.4 Total Projected District Water Demand (Inclusive of the Proposed Project)

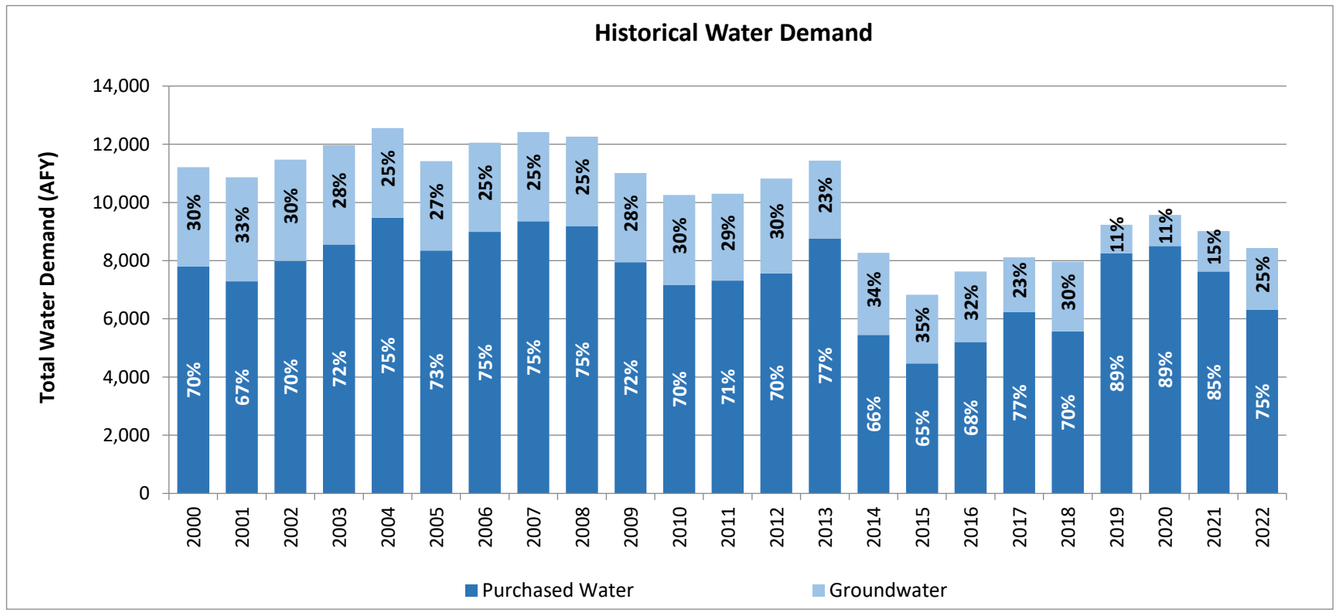
Table 4 shows the projected water demands for the District inclusive of the estimated Proposed Project water demands, assuming successful addition of the Proposed Project to the District's service area. As shown, the Proposed Project will increase the District's demand by 47 AFY at full buildout, for a total demand of 9,679 AFY by 2045.

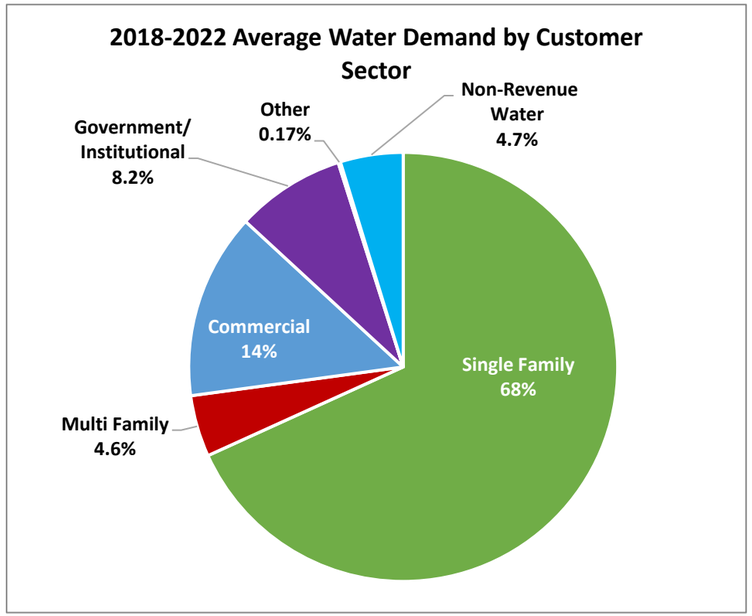
Table 3

Historical Water Demand for the Cal Water Livermore District

Arroyo Lago Residential Project, Alameda County, California

Source	Historical Annual Water Demand (AFY) (a)																						
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Purchased Water	7,804	7,291	7,991	8,558	9,474	8,343	8,988	9,350	9,186	7,949	7,162	7,310	7,569	8,767	5,447	4,463	5,203	6,233	5,571	8,253	8,505	7,625	6,315
Groundwater	3,403	3,570	3,483	3,408	3,082	3,072	3,067	3,067	3,074	3,065	3,098	2,987	3,250	2,667	2,821	2,361	2,422	1,877	2,398	979	1,066	1,389	2,122
Total Water Demand	**11,207**	**10,861**	**11,474**	**11,966**	**12,556**	**11,415**	**12,055**	**12,417**	**12,260**	**11,014**	**10,260**	**10,297**	**10,819**	**11,434**	**8,268**	**6,824**	**7,625**	**8,110**	**7,969**	**9,232**	**9,571**	**9,014**	**8,437**





Abbreviations:

"AFY" = acre feet per year

"Cal Water" = California Water Service

Notes:

(a) Historical water demands and 2018-2022 water use by customer sector per Reference 1.

References:

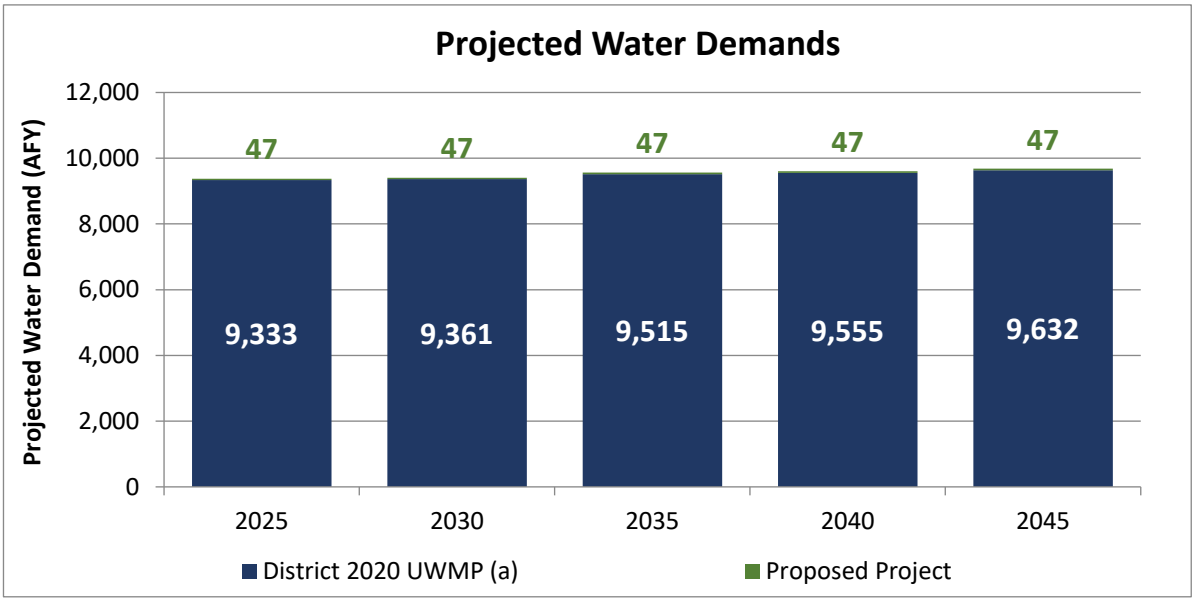
1. Cal Water, 2023. Historical Demand and Production Data Provided by Cal Water on 11 May 2023.

Table 4

Projected Future Water Demand for the Cal Water Livermore District

Arroyo Lago Residential Project, Alameda County, California

Water Demand	Projected Water Demands				
	2025	2030	2035	2040	2045
District 2020 UWMP (a)	9,333	9,361	9,515	9,555	9,632
Proposed Project	47	47	47	47	47
Total Water Demand	**9,380**	**9,408**	**9,562**	**9,602**	**9,679**



Abbreviations:

"AFY" = acre feet per year

"Cal Water" = California Water Service

"District" = Livermore District

"UWMP" = Urban Water Management Plan

Notes:

(a) Water demand projections for the District per Reference 1.

References:

1. Cal Water, 2021. 2020 Urban Water Management Plan, Livermore District, prepared by California Water Service, dated June 2021.

6 CAL WATER LIVERMORE DISTRICT WATER SUPPLY

This section identifies the District's water supplies and discusses the vulnerability of the various supplies to drought and other factors affecting water supply reliability. The District utilizes both groundwater supply from the Livermore Valley Basin and imported surface water supply purchased from Zone 7 (**Table 5**). The Proposed Project will be supplied through Cal Water's existing contract with Zone 7 for municipal and industrial water supply (Agreement), assuming successful addition of the Proposed Project in the District's service area. Two intertie locations would be installed, one along the Valley pipeline to the West of the Proposed Project and one on Zone 7's pipe that runs along private El Charro Road to the North East of the Proposed Project (330 Land Company, 2024a). Turnouts will be constructed according to Zone 7 standards.

6.1 Identification of Water Supply Rights

In accordance with Water Code §10910(d)(1), this WSE includes a summary of Cal Water's water supply sources in the District's service area and the agreements between Cal Water and its wholesale supplier, Zone 7.

6.1.1 Zone 7 Water Agency

6.1.1.1 Zone 7 Surface Water Supplies

The majority of the District's supply (approximately 70%) is purchased treated drinking water from its wholesale water supplier, Zone 7. Zone 7 imports water from the State Water Project (SWP), which is delivered to the area through the South Bay Aqueduct, an SWP facility owned and operated by the DWR. A portion of the District's purchased water deliveries come from Zone 7's local surface water supplies from the Arroyo Valle watershed. Zone 7 also uses both local storage (i.e., surface water reservoirs and the groundwater basin) and out-of-basin storage (i.e., water banking facilities in the Kern County Subbasin) to conjunctively manage water supplies in its service area.

In addition to importing water, Zone 7 provides regional water treatment and distribution of the wholesale water, along with management of the local groundwater supplies. The delivery of purchased water to the District is made through nine service connections to the Zone 7 distribution feeder network. Both the imported supplies and the local surface water supplies are treated in Zone 7's treatment facilities before being delivered to the District.

Cal Water purchases water from Zone 7 under the terms the Agreement, which is briefly described below and discussed in further in Section 6.1.1.5. The Agreement sets forth the terms and conditions that govern both the delivery of purchased water and use of groundwater (discussed below). Under the Agreement, the District agreed to accept a "groundwater pumping quota" (GPQ), which limits the amount of groundwater the District can pump from the Livermore Valley Basin without the payment of a rechange fee, and to purchase imported water from Zone

7 to meet all its remaining demand. In return, Zone 7 agreed to maintain an adequate supply to meet the District's demand.

As discussed in more detail in Section 6.1.1.5, the provisions of the Agreement with Zone 7 are such that Cal Water may not purchase or receive, with or without compensation either directly or indirectly, any water for use in its service area from any source other than purchase from Zone 7 or extraction of its GPQ.

Zone 7's current allocation from the SWP is 80,619 AFY (referred to as its Table A Entitlement). In practice, however, the actual amount of SWP water available to Zone 7 varies from year to year due to hydrologic conditions and other factors, and the actual deliveries of SWP can be reduced by DWR. DWR calculates that the SWP's projected long-term reliability is 56% of the sum of the Table A amounts for all DWR contractors, or equivalent to approximately 45,000 AFY for Zone 7 (DWR, 2022b). As a SWP contractor, Zone 7 has the option to store unused SWP water from one year to the next in SWP surface storage facilities (specifically, the San Luis Reservoir) when storage capacity is available (Zone 7, 2021b). This carryover may remain as long as storage capacity is available. For purposes of their 2020 UWMP, Zone 7 assumed 10,000 AF of SWP water is carried over each year (Zone 7, 2021b).

The remaining approximately 20% of Zone 7's surface water comes from the following water sources:

- Lower Yuba River Accord: Zone 7 may purchase additional water under the Lower Yuba River Accord, a contract with DWR entered into in 2008 and expiring in 2025. The quantity of water that Zone 7 may purchase under the Yuba River Accord varies based on drought conditions and the amount is highly variable: 400 AF in 2014, approximately 300 AF in 2015, and 3,000 AF in 2020. For planning purposes, Zone 7 currently does not assume any water supply yield specifically from the Yuba Accord, although water transfers could potentially include any supplies from the Yuba Accord (Zone 7, 2021b).
- Local Surface Water Runoff: Zone 7 has water rights to divert flows from the Arroyo del Valle via Permit 11319. Runoff from the Arroyo Del Valle Watershed is stored in Lake Del Valle, a 77,110 AF reservoir located in unincorporated Alameda County. For long-term planning purposes, Zone 7 has estimated an average normal year yield of 5,500 AFY (Zone 7, 2021b). Construction of the Chain of Lakes Arroyo Valle diversion structure and pipeline will allow Zone 7 to capture more of the storm releases from Lake Del Valle and will likely increase the effective yield from this water supply in the future.

Zone 7 operates two water treatment plants for treatment of surface water: the Del Valle Water Treatment Plant and the Patterson Pass Water Treatment Plant. The Del Valle Water Treatment Plant has an average capacity of 36 million gallons per day (MGD) and is permitted to treat up to 40.9 MGD. It can receive water either directly from the South Bay Aqueduct or from Lake Del

Valle. The Patterson Pass Water Treatment Plant was recently upgraded in Spring 2022 to produce up to 24 MGD[6]. This plant receives water from the South Bay Aqueduct.

Zone 7's surface supplies are treated to meet all federal and state drinking water standards at its treatment plants prior to delivery to its retailers. Delivery of purchased water to Cal Water is made through nine service connections (turnouts) to Zone 7. To increase water supply reliability, Zone 7 uses a portion of its SWP water and local surface runoff water stored in the Del Valle Reservoir to recharge the Main Basin[7] for the Livermore Valley Basin (DWR Basin No. 2-010) during wet years. Zone 7 considers the Main Basin to be a storage facility, and not a long-term water supply because Zone 7 does not have access to the naturally-recharged water (which is effectively allocated to the retailers, including Cal Water, as the GPQs of each retailer), and only pumps groundwater that has been artificially recharged with surface supplies. Zone 7 then accesses this stored water via ten municipal supply wells located in four well fields as needed to augment its supplies during dry years, as discussed further in Sections 6.1.1.4 and 6.1.2 below.

6.1.1.2 Non-Local Storage

In addition to local storage, Zone 7 also participates in two non-local (out-of-basin) groundwater banking programs located in Kern County: the Semitropic Water Storage District and the Cawelo Water District. These banking programs provide a water source during drought years, and represent water previously stored from Zone 7's surface water supplies during wet years (Zone 7, 2021b). Therefore, they are not considered a net contribution to Zone 7's water supply over the long-term and do result in some operational losses of water. While the out-of-basin groundwater banks significantly enhance system reliability, this banked water supply requires Banks Pumping Plant in the Delta and the South Bay Aqueduct to be operational; low SWP allocations (and generally low levels of water movement in the SWP system) can limit the return delivery of these banked supplies via exchange (Zone 7, 2021b).

Semitropic Water Storage District (Semitropic)

Zone 7 has been participating in the Semitropic groundwater banking program since 1998. Zone 7 currently has a total of 78,000 AF of groundwater banking storage capacity available in the Semitropic groundwater banking program to augment water supplies during drought and emergency conditions. During non-drought periods, Zone 7 can store up to 5,883 AFY in the Semitropic groundwater bank (Zone 7, 2021b). Under the contract terms, Zone 7 can request up to 9,100 AFY of pumpback and up to 8,645 AFY of exchange water (Zone 7, 2021b). Pumpback is water that is pumped out of the Semitropic aquifer and into the SWP system. Exchange water is water that is transferred between Zone 7 and Semitropic by adjusting the amounts of SWP contract water delivered to Zone 7 and Semitropic; the availability of this type of water depends

[6] Patterson Pass Water Treatment Plan Information Page, https://www.zone7water.com/post/patterson-pass-water-treatment-plant.

[7] The Main Basin is considered by Zone 7 to be the portion of the Livermore Valley Groundwater Basin (DWR Basin No.2-010) with the highest-yielding aquifers and the best groundwater quality.

on the projected SWP deliveries. Zone 7's agreement with the Semitropic Water Storage District is effective through December 2035 (Zone 7, 2021b). A 10% loss in volume is associated with water stored in the Semitropic groundwater bank.

Cawelo Water District

Zone 7 has 120,000 AF of groundwater banking storage capacity available with the Cawelo Water District (Cawelo), as executed in an agreement in 2006. During non-drought periods, Zone 7 can store up to 5,000 AFY in this bank. Per the agreement with Cawelo, Zone 7 gets a credit of 50% of the water provided to Cawelo – therefore, in order to receive a 5,000 AF storage credit, Zone 7 must provide 10,000 AF of water to Cawelo. Zone 7 has the ability to request up to 10,000 AFY of pumpback (or SWP exchange water) from Cawelo. Zone 7's agreement with Cawelo is effective through December 2035 (Zone 7, 2021b).

6.1.1.3 Planned Zone 7 Projects for New Water Supplies and Improved Supply Reliability

According to their 2020 UWMP, Zone 7 anticipates obtaining new supply sources or participating in projects to improve supply reliability within the planning horizon of this WSE, including (1) Bay Area Regional Desalination Project, (2) Delta Conveyance Project, (3) Los Vaqueros Reservoir Expansion Project, (4) Sites Reservoir, and (5) Potable Reuse. Each of these new supply sources and the supply volumes projected by Zone 7 in its 2020 UWMP are described below.

Bay Area Regional Desalination Project

The Bay Area Regional Desalination project (BARDP) is a partnership among Zone 7 and four other Bay Area water agencies (Contra Costa Water District [CCWD], East Bay Municipal Utility District [EBMUD], Santa Clara Valley Water District (Valley Water), and San Francisco Public Utilities Commission [SFPUC]) working together to investigate the feasibility of a regional Brackish water treatment facility in eastern Contra Costa County. Through the use of an existing water right license and a permit held by Contra Costa Water District and/or a new water right, the BARDP could provide the participating agencies with 22,400 AFY of new supply, of which Zone 7 could receive 5,600 AFY (Zone 7, 2023b).

There has been recent renewed interest in desalination as part of the Bay Area Regional Reliability Partnership, and there may be new developments in the near-term. The water yield of the project is being re-evaluated, and the participating agencies may change. The BARDP is still in the planning phase, and there is no formally approved project at this time. If a project is approved over the next few years, it could be in service by 2030, although that would be under an expedited or aggressive timeline.

Delta Conveyance Project

DWR's proposed Delta Conveyance Project would install a new tunnel to convey freshwater from north of the Delta to a point south of the Delta. The DCP will likely increase SWP reliability and

improve water quality, but an alternate conveyance system for the majority of Zone 7's water is the significant benefit as follows:

- A major Northern California earthquake could take out levees in the Delta. Experts suggest that fresh water supply through the Delta could be lost for months, if not a year or two. The DCP would provide an alternative conveyance of freshwater from north of the Delta (near Sacramento) to a point south of the Delta (near Byron) while levee repairs and other work are being completed.

- The South Delta is currently about 3 feet above sea level, while the North Delta is about 15 feet above sea level. Climate change projections call for sea level rise of 5 to 10 feet. This could render the South Delta unusable for portions of the year due to saltwater intrusion. The DCP would provide an alternative conveyance of freshwater from north of the Delta to a point south of the Delta when the Delta is too saline.

In January 2020, DWR released a Notice of Preparation (NOP) of an Environmental Impact Report (EIR) pursuant to CEQA for the DCP. In July 2022, DWR released the Draft EIR for the DCP. DWR's proposed DCP involves construction of two new intake facilities in the North Delta with a total capacity of 6,000 cubic feet per second (cfs) and a single below ground tunnel under the Delta to convey water from the new intakes to the existing Bethany Reservoir on the California Aqueduct.

Zone 7's current participation level in the DCP is based on its maximum Table A amount of 80,619 AF, constituting 2.2% of the project's participation after accounting for SWP contractors not participating in DCP (Zone 7, 2023b). The DCP will not increase the maximum Table A amounts for participating SWP Contractors but could help protect against declining SWP reliability. Based on the DCP Draft EIR, SWP's projected long-term reliability is 59% of contract amounts with Delta Conveyance Project (DCP), equivalent to approximately 47,500 AFY for Zone 7. For comparison, based on DWR's 2021 Delivery Capability Report (DCR), the SWP's projected long-term reliability is 56% without DCP, equivalent to approximately 45,000 AFY.[8]

Los Vaqueros Reservoir Expansion Project (LVE)

Constructed in 1997, the Los Vaqueros Reservoir is an off-stream reservoir owned by CCWD and located in southeastern Contra Costa County. It currently has a capacity of 160,000 AF following its expansion from 100,000 AF in 2012. CCWD is planning to further expand the reservoir to 275,000 AF and construct the Transfer-Bethany Pipeline, which would connect the reservoir to the South Bay Aqueduct and the California Aqueduct. The LVE's key objectives are to: 1) develop water supplies for environmental water management, and 2) increase water supply reliability for Bay Area water agencies. In addition, the LVE would improve water quality for municipal and

[8] The DCP EIR and DWR 2021 DCR both use CalSim 3 models, but San Luis Reservoir operations were modeled differently across the two models.

industrial customers in the San Francisco Bay Area while providing improved habitat and recreation and flood control benefits.

Water could be stored in Los Vaqueros Reservoir for later use or delivered directly to partners. Potential LVE participants envision different operational schemes for the reservoir and associated facilities, and these various scenarios are continuing to be evaluated through modeling by CCWD staff. While some new water supply may be available from LVE, Zone 7 is primarily evaluating the project as storage due to the uncertainty of the availability of such supplies given increasing Delta restrictions (Zone 7, 2021b). Zone 7's 2022 Water Supply Evaluation Update (2022 WSE Update) assumed emergency storage in Los Vaqueros Reservoir at 10,000 AF (Zone 7, 2023b).

Sites Reservoir

Sites Reservoir is a proposed new 1,500,000 AF off-stream storage reservoir in northern California near Maxwell. Sacramento River flows will be diverted during excess flow periods and stored in the off-stream reservoir and released for use in the drier periods. Sites Reservoir aims to supplement and optimize use of the State's existing storage and conveyance systems such as the Central Valley Project's Shasta Reservoir and the SWP's Oroville Reservoir, which collects much of the water for the SWP system.

In its 2022 WSE Update, Zone 7 anticipated 8,000 AFY of average yield from Sites Reservoir, after accounting for losses as the released water travels through the Delta. The availability of this supply was varied based on hydrology, with more water delivered to Zone 7 during dry years. At Zone 7's request, water would be released from Sites Reservoir annually to the Sacramento River, then conveyed by the SWP system through the Delta and to the South Bay Aqueduct. Based on model results, Sites Reservoir's key benefit is the availability of water during dry years when the shortage risk is greatest. Sites Reservoir is a good complement to the Delta Conveyance Project, which could potentially increase SWP yield during wet years. Because Sites Reservoir provides both storage and new supply, it adds flexibility to Zone 7's water supply system. For example, the timing of deliveries from Sites Reservoir could be modified to maximize yields from other water supplies and/or to accommodate delivery timing restrictions of other supplies. For Zone 7, water could be released from Sites Reservoir annually to the Sacramento River, generally during dry and critical years, then conveyed by the SWP system through the Delta and to the South Bay Aqueduct.

Potable Reuse

The use of highly treated wastewater (recycled water) is also being considered by Zone 7 as a future potable water supply, through either indirect potable reuse (IPR) or direct potable reuse (DPR). IPR generally consists of taking highly treated wastewater and returning it to the natural water cycle (e.g., by adding it to a reservoir or groundwater aquifer) and then diverting it to a drinking water treatment plant or a municipal groundwater supply well to meet potable demands.

In 2018, the Livermore-Amador Valley (Tri-Valley) Water Agencies completed the Joint Tri-Valley Potable Reuse Technical Feasibility Study (Potable Reuse Study). The Potable Reuse Study investigated three potential end uses for purified water in detail: 1) groundwater augmentation or recharge via injection wells, 2) groundwater recharge via Chain of Lakes surficial recharge, and 3) raw water augmentation to Zone 7's Del Valle Water Treatment Plant. In 2021, Zone 7 began the Desktop Groundwater Contaminant Mobilization Study, which was identified as a next step in the Potable Reuse Study, to characterize the potential for contaminant mobilization in the groundwater basin under recharge of purified water. This study is expected to be completed by 2023.

Average annual yield was estimated based on DSRSD's and the City of Livermore's projected wastewater availability and assumed a two-phase project that initially produces a lower yield of 8,800 AFY from 2030 to 2039 and reaches a maximum yield of 9,600 AFY beginning in 2040. Potable reuse operations were assumed to occur year-round with the City of Livermore providing year-round wastewater supplies and DSRSD providing seasonal wastewater supplies. The assumed yields do not account for the potential reduction of wastewater flows due to conservation regulations that have set statewide lower indoor water use targets. Zone 7 will work with DSRSD and the City of Livermore to monitor future expected yields for potable reuse (Zone 7, 2023b).

Zone 7, along with the retailers, are completing a number of technical studies over the next few years that will support continued evaluation of potable reuse options and their costs and benefits. For planning purposes, the 2020 UWMP assumes 5,000 AFY of future supply from the BARDP and/or potable reuse, with either or both systems online by 2030.

6.1.1.4 Zone 7 Groundwater Supply

In addition to the surface water supplies described above, Zone 7 manages and pumps groundwater. Zone 7 owns and operates 10 municipal supply wells located in four well fields, with a total combined pumping capacity of 39.0 MGD. Of the total pumping capacity, 10.8 MGD is intended primarily for use in emergency and drought conditions. Therefore, the total groundwater pumping capacity under normal operating conditions is approximately 28.2 MGD (Zone 7, 2021b). The Mocho Groundwater Demineralization Plant is located at the Mocho well field. Its purpose is to mitigate salt buildup in the "Main Basin" of the Livermore Valley Basin. It has the added benefit of improving delivered water quality. This facility can produce up to 6.1 MGD of demineralized water (Zone 7, 2021b).

Zone 7 is responsible for the sustainable management of the Livermore Valley Basin. Each of the Zone 7 customer retail agencies, including Cal Water, has a GPQ established through their respective supply agreements with Zone 7. Cal Water and the City of Pleasanton pump their own groundwater pursuant to their agreements and Zone 7 pumps groundwater for the Dublin San Ramon Services District. Although the City of Livermore has an established GPQ, Livermore has not had any groundwater pumping capability for many years. The GPQs were established based on the long-term sustainable yield of the Livermore Valley Basin, defined as the average amount

of groundwater replenished annually by natural recharge in the Main Basin through percolation of rainfall, natural stream flow, and irrigation waters, and inflow of subsurface waters.

The Main Basin is also replenished through artificial recharge by Zone 7 through addition of surface water supplies. Zone 7's groundwater extraction for its treated water system does not use the natural sustainable yield from the Main Basin. Instead, Zone 7 pumps only water that has been recharged as part of its artificial recharge program using its surface water supplies. For Zone 7's operations, groundwater is considered a storage facility and not a long-term water supply because Zone 7 only accesses the volume of water that has been artificially recharged with surface water supplies (Zone 7, 2021b).

The Main Basin's total sustainable yield is estimated as the sum of the two recharge components, natural and artificial recharge. According to the Updated 2021 Alternative Groundwater Sustainability Plan (discussed in more detail in Section 6.1.2.2), the sustainable averages for natural and artificial recharge are 13,400 AFY and 5,300 AFY, respectively. Therefore, the Main Basin's total sustainable yield is 18,700 AFY (Zone 7, 2021c).

Groundwater supply is discussed further in Section 6.1.2.

6.1.1.5 Zone 7 and Cal Water Supply Agreement

The business relationship between Zone 7 and Cal Water is largely defined by the Agreement entered into in November 1994. The Agreement, which has a 30-year term, allows for renegotiation of terms but not cessation of deliveries in 2024 upon its expiration, and both Zone 7 and Cal Water anticipate that it will be renewed in much the same form as the current Agreement.

The Agreement does not specify a specific quantity of water to be delivered to Cal Water by Zone 7, but states that:

> *[Cal Water] shall purchase from Zone 7 all water required by [Cal Water] for use within [Cal Water's] service area…except that [Cal Water] may extract groundwater as provided in the Groundwater Extraction Provisions herein or obtain water from Other Sources under the conditions in Section 5.*

The specific conditions specified in the Agreement upon which Cal Water may obtain supplies from other sources are excerpted and provided below:

> *(a) The water received is for fire flow or fire storage requirements or other emergency purposes;*
> *(b) The water delivered through Zone 7's turnout facility does not comply with drinking water requirements of California Department of Health Services, United States Environmental Protection Agency, or successor regulatory agencies. The quantity of water obtained shall be limited to that necessary to meet Contractor's treated water needs as a result of Zone 7's non-compliance with said drinking water requirements;*

(c) Zone 7 is unable to deliver the quantity of treated water necessary to satisfy the requirements of Contractor. Zone 7 shall specify the quantity of treated water that it cannot deliver and the time period for which it cannot satisfy the Contractor's requirements. Contractor is otherwise obligated to secure all water from Zone 7 to the extent Zone 7 can provide it;

(d) Zone 7 is able to meet Contractor's water delivery request, and Contractor has paid Zone 7 for obligated fixed costs of Zone 7 associated with the quantity of water the Contractor will obtain from Other Sources. These obligated fixed costs shall include but are not limited to water facility improvements, water contract obligations, and debt service thereto incurred by Zone 7 in supplying water that would have gone to the Contractor, and for which said costs would have been recovered through the sale of said water to Contractor. The Contractor shall obtain the prior written approval from the Board which- approval shall not be unreasonably withheld;

(e) The source of water is groundwater extracted within Zone 7's boundary but outside the Main Basin provided said extraction does not cause an adverse impact on the Main Basin; or

(f) The source of water is recycled water from Contractor's or Other Contractors' treated wastewater.

The Agreement provides for an expansion of Cal Water's service area, requiring that:

> *[Cal Water] promptly notify Zone 7 of changes in its service area, as may occur from time to time, by furnishing a map to Zone 7 showing any change in said service area so that Zone 7 can maintain a map indicating the most recent Zone 7 water service area. Said changes in service area shall be in accordance with the requirements of the Local Agency Formation Commission, Public Utility Commission or other agency having authority to set service areas.*

Per the Agreement, the amount of water available to Cal Water is subject to the terms and conditions of the contract between Zone 7 and the State of California for water service via the South Bay Aqueduct, and any other contracts that Zone 7 may enter into for water supply. The Agreement also states that:

> *In any year in which a shortage occurs due to drought or other cause in the supply of water available for delivery to Each Contractor such that the supply to Zone 7 is less than the total amount included in the approved delivery schedule of Each contractor for that year, Zone 7 shall reduce deliveries to Each Contractor in an amount that results in a reduction of total water used within Contractor's service area that is equal to the percent reduction for total water used within Zone 7's service area for that year, all as determined by Zone 7; provided, that Zone 7 may apportion on another basis if such is required to meet minimum demands for domestic supply, fire protection, or public health during the year.*

The Agreement also establishes a GPQ for Cal Water of 3,069 AF per calendar year to supplement water purchased from Zone 7. The Agreement authorizes year-to-year carryover of unused GPQ in an amount up to 20% of the annual GPQ (i.e., up approximately 614 AF). Cal Water may also

produce groundwater in excess of the GPQ provided that it pays Zone 7 a groundwater replenishment fee for the additional water. According to the Agreement, the GPQ is based on the annual safe yield (estimated in the Agreement to be 13,200 AFY in 1993) of the Livermore Valley Basin.

On 17 October 2012, Zone 7 adopted a Water Supply Reliability Policy (Resolution No. 13-4230), which adopts the following level of service goals for its municipal and industrial (M&I) customers (Zone 7, 2021b):

- **Goal 1:** Zone 7 will meet its treated water customers' water supply needs, in accordance with Zone 7's most current Agreements for M&I Water Supply, including existing and projected demands as specified in Zone 7's most recent UWMP, during normal, average, and drought conditions, as follows:
    - At least 85% of M&I water demands 99% of the time
    - 100% of M&I water demands 90% of the time
- **Goal 2:** Provide sufficient treated water production capacity and infrastructure to meet at least 80% of the maximum month M&I contractual demands should any one of Zone 7's major supply, production, or transmission facilities experience an extended unplanned outage of at least one week.

6.1.2 Groundwater Supply

Approximately 70% of the District's supply is purchased water supplied by Zone 7, as described above. The remaining 30% of the District's demands are met by groundwater up to the of 3,069 AFY, as established in its supply Agreement with Zone 7 (Section 6.1.1.5).

6.1.2.1 Basin Description

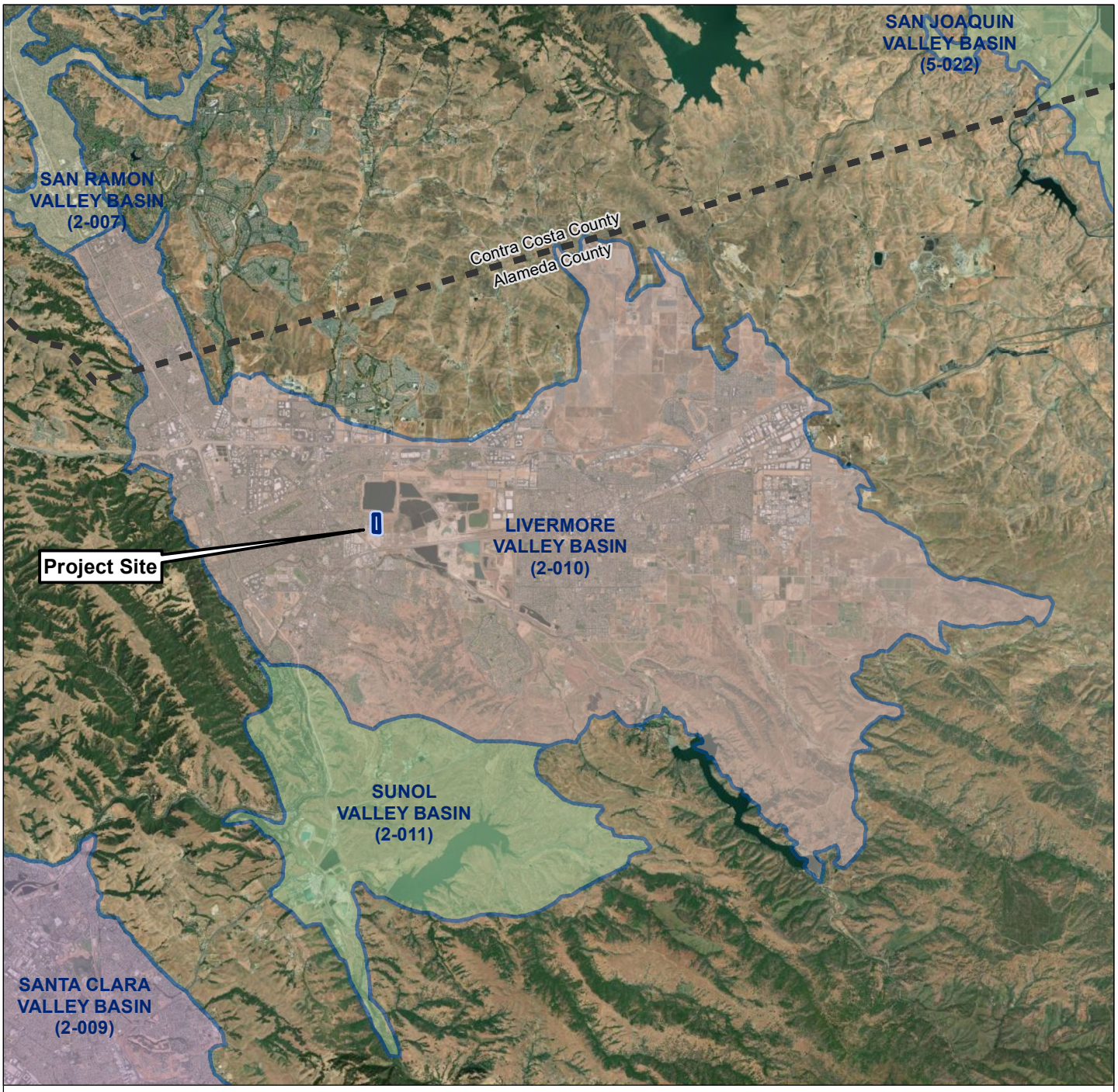
The Livermore Valley Basin underlies the Proposed Project and the District's service area, as shown on **Figure 3**. The Livermore Valley Basin covers an area of approximately 69,600 acres and includes both the Livermore Valley and the Livermore uplands. The Livermore Valley Basin generally extends from the Pleasanton Ridge east to the Altamont Hills and from the Livermore Upland north to the Orinda Upland. Surface drainage features of the Livermore Valley Basin include Arroyo Del Valle, Arroyo Mocho, and Arroyo Las Positas (collectively referred to as the Arroyos) as principal streams, with Alamo Creek, South San Ramon Creek and Tassajara Creek as minor streams. All streams converge on the west side of the Livermore Valley Basin forming Arroyo de la Laguna, which flows south and joins Alameda Creek in Sunol Valley. Some geologic

structures restrict the lateral movement of groundwater, but the general groundwater gradient is to the west, then south towards Arroyo de la Laguna (CalWater, 2021).

For management purposes, the most productive portion of the Livermore Valley Basin (considered to have the highest yielding aquifers and best quality water) is identified as the "Main Basin". The Main Basin covers approximately 19,809 acres, and is bounded on the:

- west by the uplift of the California Coast Ranges (including Pleasanton Ridge) and the Calaveras Fault;
- north by relatively shallow bedrock and thin, clay-rich deposits of the lower Tassajara Formation;
- east by bedrock outcrops, thin alluvial deposits, and upland areas of the Livermore Valley Basin; and
- south by outcrops of the lower Livermore Formation (Zone 7, 2021c).

Well fields operated by Cal Water and Zone 7 and Zone 7-operated groundwater recharge facilities are located in the Main Basin (Zone 7, 2021c). The Main Basin is comprised of the Castle, Bernal, Amador, and Mocho II sub-basins and have an estimated total storage capacity of 254,000 AF (Zone 7, 2021b).



Legend

- Project Boundary
- County Boundary

Groundwater Basins

- Livermore Valley Basin
- San Joaquin Valley Basin
- San Ramon Valley Basin
- Santa Clara Valley Basin
- Sunol Valley Basin

Abbreviations

"DWR" = California Department of Water Resources

Notes

1. All locations are approximate.

N

0 3 6

(Scale in Miles)

Sources

1. Basemap is ESRI's ArcGIS Online world aerial map, obtained 8 March 2024.
2. DWR groundwater basins are based on the boundaries defined in California's Groundwater, Bulletin 118-2016 Update.

Regional Setting and Groundwater Basin

Arroyo Lago Residential Project
Alameda County, CA
March 2024
EKI C30109.00

Figure 3

eki environment & water

Path: X:\C30109\.00\Maps\Fig3_DWRGWBasinLocation_2024_03_08.mxd

6.1.2.2 SMGA Designations and Requirements

In January 2017, Zone 7 submitted a notification letter to DWR, establishing Zone 7 as the exclusive Groundwater Sustainability Agency (GSA) for the Livermore Valley Basin under the Sustainable Groundwater Management Act (SGMA; Zone 7, 2021b).

SGMA further requires that all high- and medium-priority basins be managed under a Groundwater Sustainability Plan (GSP). However, submittal of an "Alternative" was allowed provided that the Alternative was "functionally equivalent" to a GSP as specified in Title 23 of the California Code of Regulations, and it could be demonstrated that the Livermore Valley Basin has been managed sustainably for at least the last ten years. Zone 7 submitted an Alternative GSP to DWR in December 2016 which was approved in July 2019 (Zone 7, 2021c). Per the mandatory five-year updates required under SGMA regulations, Zone 7 revised and resubmitted the Alternative GSP in December 2021. The Updated 2021 Alternative GSP is currently under DWR review.

6.1.2.3 Groundwater Management

The Livermore Valley Basin is not adjudicated and, in its recent evaluation of California groundwater basins, DWR determined that the basin was not in a condition of critical overdraft and designated the Livermore Valley Basin as medium priority (DWR, 2019). In its recent evaluation of California groundwater basins, DWR determined that the Livermore Valley Basin is not in a condition of critical overdraft.[9]

The Livermore Valley Basin has historically been managed pursuant to the Groundwater Management Plan for Livermore-Amador Valley Groundwater Basin developed in 2005 by Jones & Stokes for Zone 7 (2005 GWMP, Jones & Stokes, 2005). The 2005 GWMP documented all of the Zone 7's then-current groundwater management policies and programs and was developed to satisfy the requirements set forth in the California Groundwater Management Planning Act (Water Code Sections 10750, et seq.; Zone 7, 2016b). The 2005 GWMP also incorporated a Salt Management Plan (SMP) to address the historic increases in total dissolved solids (TDS) and hardness in the Livermore Valley Basin (Zone 7, 2021).

Per the Updated 2021 Alternative GSP, Zone 7 has continued to sustainably manage water levels, groundwater storage, groundwater quality, land subsidence, and interconnected surface water systems in the Livermore Valley Basin, including over three major droughts (Zone 7, 2021c). Zone 7 prepares annual reports that summarize the results of the groundwater monitoring, evaluation, and management efforts by water year; the most recently prepared report is for the 2022 Water Year (Zone 7, 2023a).

[9] DWR, 2019. Sustainable Groundwater Management Act 2018 Basin Prioritization, State of California, dated January 2019.

Zone 7 established historic low groundwater levels based on the lowest measured groundwater elevations in wells in the Main Basin. The difference between water surface elevations when the Main Basin is full and water surface elevations when the Main Basin is at historical lows defines Zone 7's operational storage. Of the estimated total storage capacity of 254,000 AF, the operational storage is approximately 126,000 AF, with the remaining 128,000 AF considered emergency reserve storage (Zone 7, 2021c).

The average natural sustainable yield of the Main Basin is 13,400 AFY and is broken down into the following demand components (Zone 7, 2021b; 2021c):

- Municipal pumping water retail agencies (GPQs) – 7,214 AFY
- Other groundwater pumping for drinking water supply – 1,186 AFY
- Agricultural pumping – 400 AFY
- Mining area losses (evaporation, discharges that are diverted to arroyos and flow out of the Main Basin area, and losses incurred during gravel production and export) – 4,600 AFY

As discussed in Section 6.1.1.4 above, Cal Water and three other retail water agencies each have GPQs established by their respective water supply agreements with Zone 7, which were established based on the annual safe yield for the Main Basin. Cal Water pumps its GPQ from its own well field located in the eastern portion of the Main Basin and the City of Pleasanton and Zone 7 pump groundwater from well fields located in the western portion of the Main Basin (Jones & Stokes, 2005; Zone 7, 2021b).

6.1.2.4 Groundwater Use

Zone 7, Cal Water, and the City of Pleasanton pump groundwater from the Livermore Valley Basin for municipal supply purposes.[10] Historical groundwater pumping from 2011 through 2022 and projected groundwater pumping through 2045, as reported in their respective 2020 UWMPs are shown in **Table 6**. From 2018 through 2022, the three agencies pumped an average of 16,775 AFY, ranging from 11,558 AF in 2018 to 20,979 in 2021.[11] Based on the three agencies' 2020 UWMPs, the agencies project pumping a total of 15,769 AFY from 2025 through 2045.

6.2 Total Potable Supply in Normal, Single Dry, and Multiple Dry Years

The projected potable water supply sources for the District, as described above, are purchased water from Zone 7 and groundwater. Historical supplies for the District from 2016 through 2020 and projected normal year supplies through 2045 for each source are shown in **Table 7. Table 8** shows the projected demand of the District, as well as demands of the Proposed Project, and the total available supply through 2045. In its 2020 UWMP, the District projected that water demands would be equal to supplies for all hydrologic scenarios. These projections only considered

[10] Zone 7 pumps groundwater on behalf of the Dublin San Ramon Services District (Zone 7, 2021b).
[11] Historical pumping data for Zone 7, Cal Water, and the City of Pleasanton are reported in Calendar Years, except for Zone 7 pumping data for the years 2021 and 2022, which are reported in Water Years.

demands within the District's current service area. The Proposed Project demands are additive to the District's 2020 UWMP demand projections and would be met with purchased supplies provided by Zone 7 to the District, assuming successful addition of the Proposed Project to the District's service area.[12]

Zone 7's 2020 UWMP compares its projected water supplies to the projected water demands for its four customer retail agencies, including the District. Zone 7's water supply projections include the addition of new water sources, as discussed in Section 6.1.1.3. Including these new supply sources, Zone 7 projects that its available water supplies will exceed the demands of its four retailers under normal year, single-dry year, and multiple dry year hydrologic conditions through 2050. It should be noted that Zone 7's supply projections include anticipated supplies from new water sources. The new source supplies amount to 15,000 AFY in 2030 and beyond during normal hydrologic years. In single-dry years, the assumption of new source supplies is increased to 19,200 AFY in 2025 and 20,100 AFY for 2045. In multiple dry years the new source supply assumptions are increased to 20,800 AFY for 2025 and 20,700 AFY for 2045.[13]

Given the water supply projections under normal, single dry, and multiple dry year conditions, as well as the additional planned sources of water as described in Zone 7's 2020 UWMP, supplies are anticipated to be sufficient to meet the demands of the District as well as the Proposed Project, assuming successful addition of the Proposed Project to the District's service area. Projected supplies and demands for the District, inclusive of the Proposed Project, are shown in **Table 8** through **Table 10**.

[12] To serve water to the Proposed Project, Cal Water will need to expand its service area beyond what was anticipated in the 2020 UWMP. Based on the supply Agreement between Cal Water and Zone 7, Cal Water need only notify Zone 7 of its intent to expand its service area, given that the Proposed Project is within Zone 7's current service area. Cal Water must also apply for and receive a Certificate of Public Convenience and Necessity from the CPUC to approve the service area expansion.

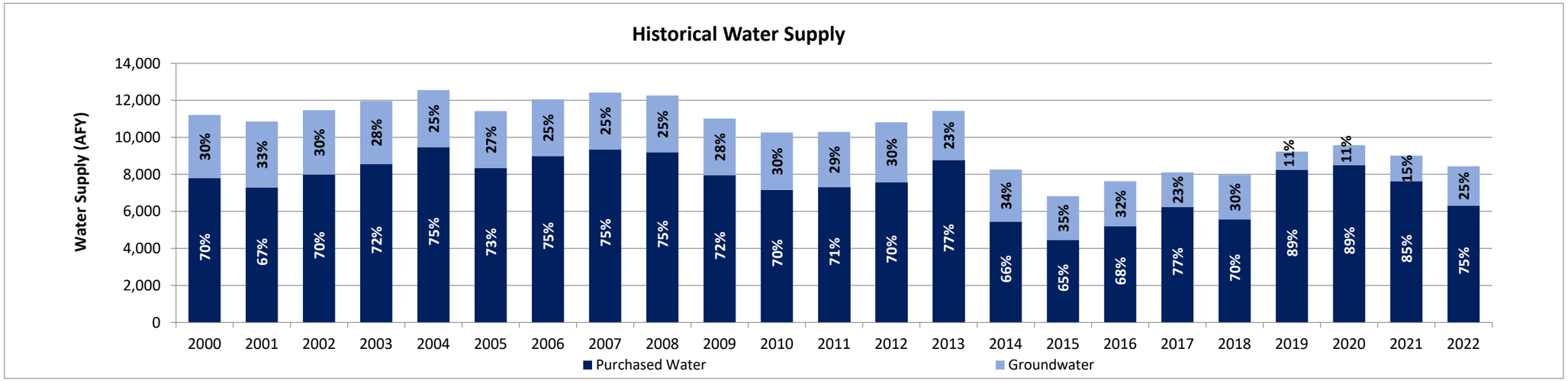
[13] Since completion of Zone 7's 2020 UWMP, the supply projections associated with the potential new supply projects have been updated and slightly increased per the 2022 WSE Update; however, changes to the supply surplus are minimal and thus will not affect the conclusions made in this WSE.

Table 5

Historical Water Supply for the Cal Water Livermore District

Arroyo Lago Residential Project, Alameda County, California

Source	Historical Water Supply (AFY) (a)																						
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Purchased Water	7,804	7,291	7,991	8,558	9,474	8,343	8,988	9,350	9,186	7,949	7,162	7,310	7,569	8,767	5,447	4,463	5,203	6,233	5,571	8,253	8,505	7,625	6,315
Groundwater	3,403	3,570	3,483	3,408	3,082	3,072	3,067	3,067	3,074	3,065	3,098	2,987	3,250	2,667	2,821	2,361	2,422	1,877	2,398	979	1,066	1,389	2,122
Total Water Supply	**11,207**	**10,861**	**11,474**	**11,966**	**12,556**	**11,415**	**12,055**	**12,417**	**12,260**	**11,014**	**10,260**	**10,297**	**10,819**	**11,434**	**8,268**	**6,824**	**7,625**	**8,110**	**7,969**	**9,232**	**9,571**	**9,014**	**8,437**



Abbreviations:

"AFY" = acre feet per year

"Cal Water" = California Water Service

Notes:

(a) Historical water supply per Reference 1.

References:

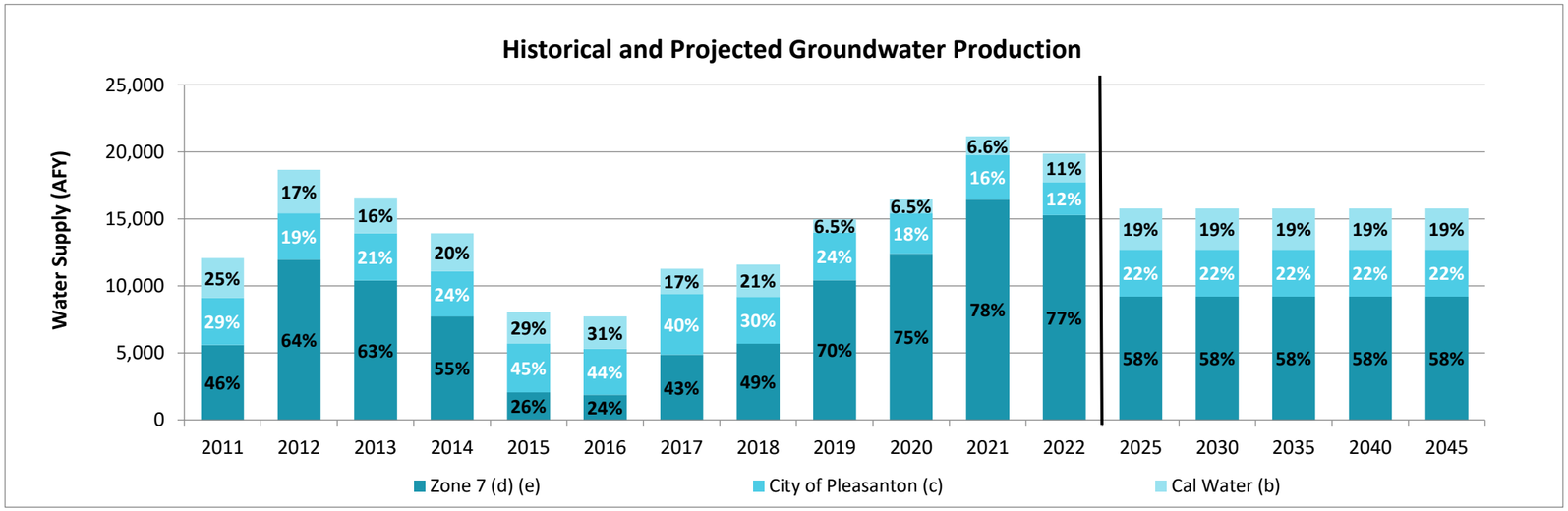
1. Cal Water, 2023. Historical Demand and Production Data Provided by Cal Water on 11 May 2023.

Table 6

Historical and Projected Groundwater Pumping from the Livermore Valley Basin

Arroyo Lago Residential Project, Alameda County, California

Water Supplier	Historical Groundwater Production (a)												Projected Groundwater Production (AFY)				
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2025	2030	2035	2040	2045
Cal Water (b)	2,987	3,250	2,667	2,821	2,361	2,422	1,877	2,398	979	1,066	1,389	2,124	3,069	3,069	3,069	3,069	3,069
City of Pleasanton (c)	3,503	3,459	3,516	3,381	3,629	3,426	4,541	3,499	3,549	3,027	3,331	2,458	3,500	3,500	3,500	3,500	3,500
Zone 7 (d) (e)	5,585	11,959	10,404	7,717	2,056	1,871	4,859	5,691	10,433	12,400	16,440	15,286	9,200	9,200	9,200	9,200	9,200
Total Groundwater Supply	**12,075**	**18,668**	**16,587**	**13,919**	**8,046**	**7,719**	**11,277**	**11,588**	**14,961**	**16,493**	**21,160**	**19,868**	**15,769**	**15,769**	**15,769**	**15,769**	**15,769**



Abbreviations:

"AFY" = acre-feet per year

"Cal Water" = California Water Service

"Zone 7" = Zone 7 Water Agency

Notes:

(a) Historical pumping data for Zone 7, Cal Water, and the City of Pleasanton are reported in Calendar Years, except for Zone 7 pumping data for the years 2021 and 2022, which are reported in Water Years.

(b) Historical groundwater pumping for Cal Water from 2011-2015 per Reference 1, 2016-2020 per Reference 2, 2021 per Reference 3, and 2022 per Reference 4. Projected groundwater pumping per Reference 2.

(c) Historical groundwater pumping for the City of Pleasanton from 2011- 2015 per Reference 5, 2016-2020 per Reference 6, 2021 per Reference 3, and 2022 per Reference 4. Projected groundwater pumping per Reference 6.

(d) Historical groundwater pumping for Zone 7 from 2011-2015 per Reference 7, 2016-2020 per Reference 8, 2021 per Reference 3, and 2022 per Reference 4. Projected groundwater pumping per Reference 8. Zone 7 does not use the Main Basin's natural sustainable yield, so it only pumps what it artificially recharges.

(e) Zone 7 pumps groundwater on behalf of the Dublin San Ramon Services District, per Reference 8.

Table 6

Historical and Projected Groundwater Pumping from the Livermore Valley Basin

Arroyo Lago Residential Project, Alameda County, California

References:

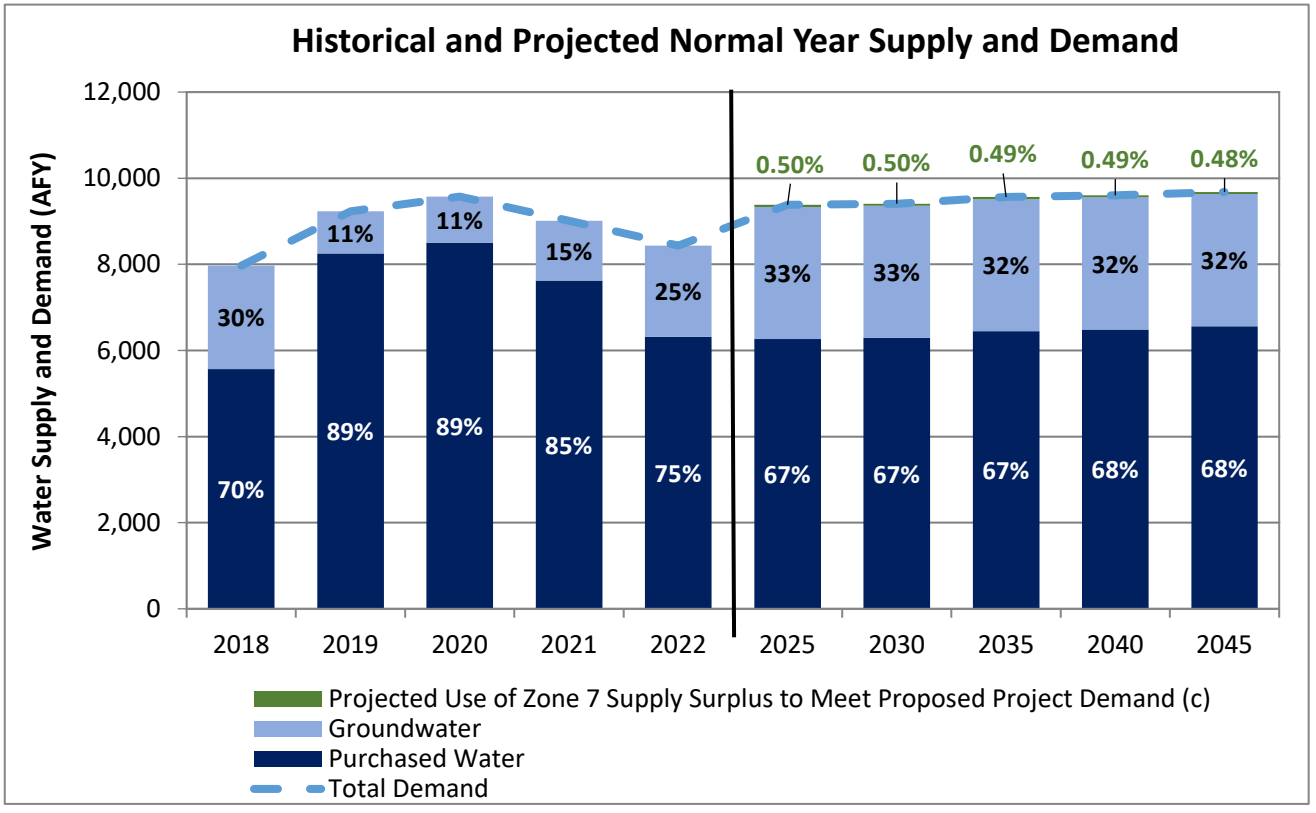
1. Cal Water, 2016. 2015 Urban Water Management Plan, Livermore District, prepared by Cal Water, dated June 2016.
2. Cal Water, 2021. 2020 Urban Water Management Plan, Livermore District, prepared by Cal Water, dated June 2021.
3. Zone 7, 2022. Annual Report for the Groundwater Management Program 2021 Water Year (October 2020 – September 2021), Livermore Valley Groundwater Basin, prepared by the Zone 7 Water Agency, dated March 2022.
4. Zone 7, 2023. Annual Report for the Groundwater Management Program 2022 Water Year (October 2021 – September 2022), Livermore Valley Groundwater Basin, prepared by the Zone 7 Water Agency, dated March 2023.
5. City of Pleasanton, 2016. 2015 Urban Water Management Plan, prepared by the City of Pleasanton, dated June 2016.
6. City of Pleasanton, 2021. 2020 Urban Water Management Plan, prepared by the City of Pleasanton, dated June 2021.
7. Zone 7, 2016. 2015 Urban Water Management Plan, prepared by Zone 7, dated March 2016.
8. Zone 7, 2021. 2020 Urban Water Management Plan, prepared by Zone 7, dated June 2021.

Table 7

Historical and Projected Water Supply and Demand by Source

Arroyo Lago Residential Project, Alameda County, California

Supply and Demand	Historical Supply and Demand (AFY)					Projected Supply and Demand (AFY)				
	2018	2019	2020	2021	2022	2025	2030	2035	2040	2045
Historical and Projected Demand										
District (a)	7,969	9,232	9,571	9,014	8,437	9,333	9,361	9,515	9,555	9,632
Proposed Project	--	--	--	--	--	47	47	47	47	47
Total Demand	**7,969**	**9,232**	**9,571**	**9,014**	**8,437**	**9,380**	**9,408**	**9,562**	**9,602**	**9,679**
Historical and Projected Supply (b)										
Purchased Water	5,571	8,253	8,505	7,625	6,315	6,264	6,292	6,446	6,486	6,563
Groundwater	2,398	979	1,066	1,389	2,122	3,069	3,069	3,069	3,069	3,069
Projected Use of Zone 7 Supply Surplus to Meet Proposed Project Demand (c)	--	--	--	--	--	47	47	47	47	47
Total Supply	**7,969**	**9,232**	**9,571**	**9,014**	**8,437**	**9,380**	**9,408**	**9,562**	**9,602**	**9,679**
Supply Minus Demand	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***



Abbreviations:

"AFY" = acre-feet per year

"Cal Water" = California Water Service

"District" = Livermore District

"Proposed Project" = Arroyo Lago Residential Project

"UWMP" = Urban Water Management Plan

"WSE" = Water Supply Evaluation

"Zone 7" = Zone 7 Water Agency

Table 7

Historical and Projected Water Supply and Demand by Source

Arroyo Lago Residential Project, Alameda County, California

Notes:

(a) 2018-2020 historical and all projected demand for the District per Reference 1, 2021-2022 historical demand per Reference 2.

(b) 2018-2020 historical and all projected supplies per Reference 1, 2021-2022 historical supplies per Reference 2.

(c) Table 7-12 of Zone 7's 2020 UWMP (Reference 3) shows a supply surplus (projected water supplies in excess of projected demands) under normal hydraulic year conditions, of 26,400 AFY, 37,900 AFY, 30,900 AFY, 27,900 AFY, and 27,900 AFY for years 2025, 2030, 2035, 2040, and 2045. It is anticipated that Cal Water would purchase a portion of this supply surplus in order to meet the projected demands associated with the Proposed Project, assuming annexation, in excess of demands associated with Cal Water's current service area. It should be noted that Zone 7's supply projections have been updated since the agency's 2020 UWMP per References 4 and 5; however, the changes to the supply surplus are minimal and thus will not affect the conclusions made in this WSE.

References:

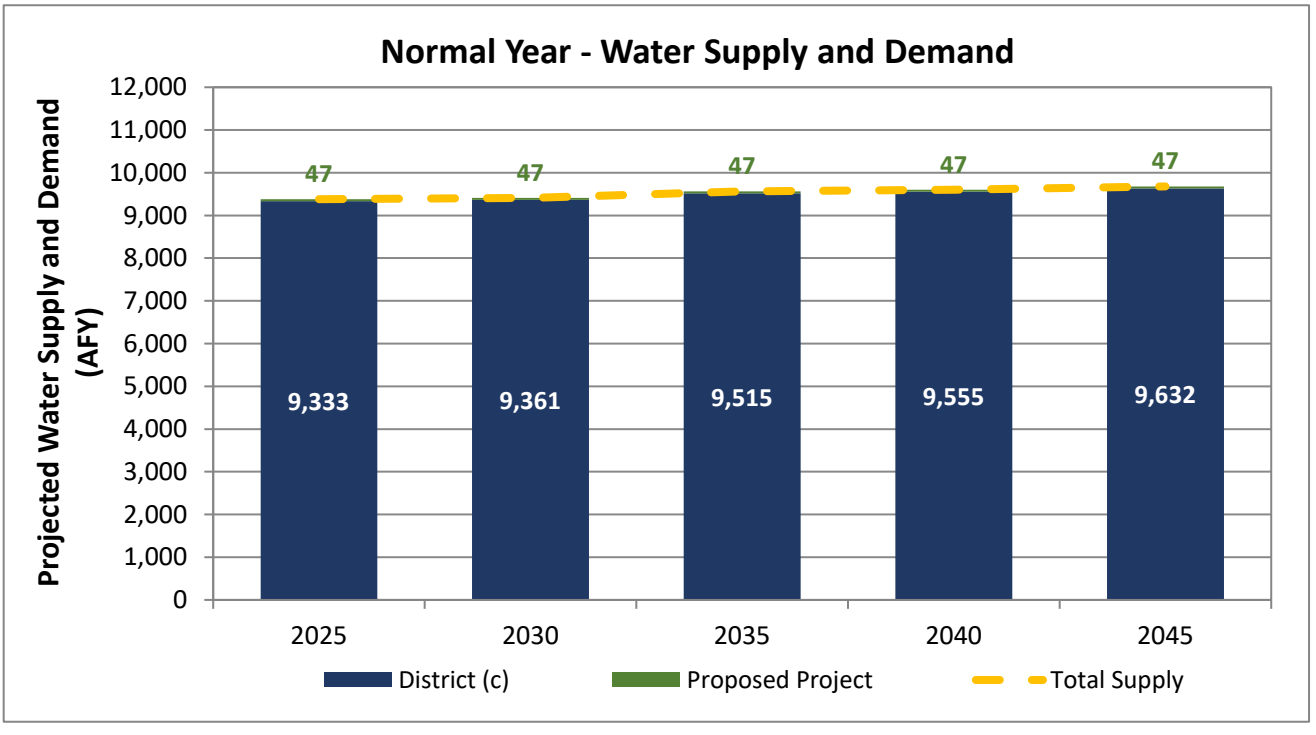
1. Cal Water, 2021. 2020 Urban Water Management Plan, Livermore District, prepared by California Water Service, dated June 2021.
2. Cal Water, 2023. Historical Demand and Production Data Provided by Cal Water on 11 May 2023.
3. Zone 7, 2021b. 2020 Urban Water Management Plan, Zone 7 Water Agency, prepared by Zone 7 Water Agency, dated June 2021.
4. Zone 7, 2021a. Alternative Groundwater Sustainability Plan for the Livermore Valley Groundwater Basin, dated December 2021.
5. Zone 7, 2023b. 2022 Water Supply Evaluation Update, dated May 2023.

Table 8

Projected Normal Year Water Supply and Demand

Arroyo Lago Residential Project, Alameda County, California

Supply and Demand	Projected Normal Year Supply and Demand (AFY)				
	2025	2030	2035	2040	2045
Supply					
District UWMP Supply (a)	9,333	9,361	9,515	9,555	9,632
Projected Use of Zone 7 Supply Surplus to Meet Proposed Project Demand (b)	47	47	47	47	47
Total Supply	9,380	9,408	9,562	9,602	9,679
Demand					
District (c)	9,333	9,361	9,515	9,555	9,632
Proposed Project	47	47	47	47	47
Total Water Demand Inclusive of the Proposed Project	**9,380**	**9,408**	**9,562**	**9,602**	**9,679**
Supply Shortfall (% demand)	***None***	***None***	***None***	***None***	***None***



Abbreviations:

"AFY" = acre-feet per year
"Cal Water" = California Water Service
"District" = Livermore District
"Proposed Project" = Arroyo Lago Residential Project
"UWMP" = Urban Water Management Plan
"WSE" = Water Supply Evaluation
"Zone 7" = Zone 7 Water Agency

Table 8

Projected Normal Year Water Supply and Demand

Arroyo Lago Residential Project, Alameda County, California

Notes:

(a) Projected supplies available to the District per Table 7-2 in Reference 1.

(b) Table 7-12 of Zone 7's 2020 UWMP (Reference 4) shows a supply surplus (projected water supplies in excess of projected demands) under normal hydraulic year conditions, of 26,400 AFY in 2025 and 27,900 AFY in 2045. It is anticipated that Cal Water would purchase a portion of this supply surplus in order to meet the projected demands associated with the Proposed Project, assuming annexation, in excess of demands associated with Cal Water's current service area. It should be noted that Zone 7's supply projections have been updated since the agency's 2020 UWMP per References 2 and 3; however, the changes to the supply surplus are minimal and thus will not affect the conclusions made in this WSE.

(c) Projected District demand per Table 4-2 in Reference 1.

References:

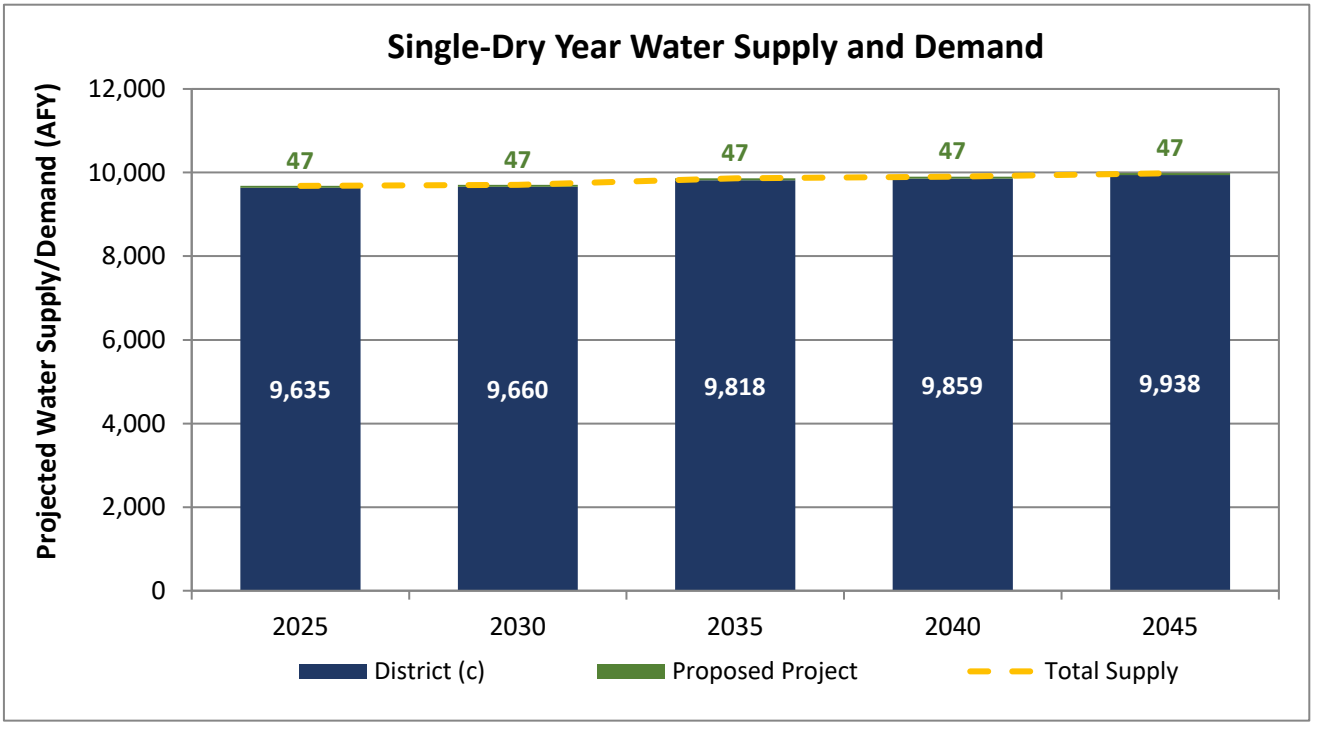
1. Cal Water, 2021. 2020 Urban Water Management Plan, Livermore District, prepared by California Water Service, dated June 2021.
2. Zone 7, 2023b. 2022 Water Supply Evaluation Update, dated May 2023.
3. Zone 7, 2021a. Alternative Groundwater Sustainability Plan for the Livermore Valley Groundwater Basin, dated December 2021.
4. Zone 7, 2021. 2020 Urban Water Management Plan, Zone 7 Water Agency, prepared by Zone 7 Water Agency, dated June 2021.

Table 9

Projected Single Dry Year Water Supply and Demand

Arroyo Lago Residential Project, Alameda County, California

Supply and Demand	Projected Dry Year Supply and Demand (AFY)				
	2025	**2030**	**2035**	**2040**	**2045**
Supply					
District UWMP Supply (a)	9,635	9,660	9,818	9,859	9,938
Projected Use of Zone 7 Supply Surplus to Meet Proposed Project Demand (b)	47	47	47	47	47
Total Supply	9,682	9,707	9,865	9,906	9,985
Demand					
District (c)	9,635	9,660	9,818	9,859	9,938
Proposed Project	47	47	47	47	47
Total Water Demand Inclusive of the Proposed Project	**9,682**	**9,707**	**9,865**	**9,906**	**9,985**
Supply Shortfall (% demand)	***None***	***None***	***None***	***None***	***None***



Abbreviations:

"AFY" = acre-feet per year

"Cal Water" = California Water Service

"District" = Livermore District

"Proposed Project" = Arroyo Lago Residential Project

"UWMP" = Urban Water Management Plan

"WSE" = Water Supply Evaluation

"Zone 7" = Zone 7 Water Agency

Table 9

Projected Single Dry Year Water Supply and Demand

Arroyo Lago Residential Project, Alameda County, California

Notes:

(a) Projected supplies available to the District per Table 7-3 in Reference 1.

(b) Table 7-13 of Zone 7's 2020 UWMP (Reference 4) shows a supply surplus (projected water supplies in excess of projected demands) under single dry year conditions, of 15,300 AFY, 39,300 AFY, 40,400 AFY, 37,200 AFY, and 37,000 AFY for years 2025, 2030, 2035, 2040, and 2045. It is anticipated that Cal Water would purchase a portion of this supply surplus in order to meet the projected demands associated with the Proposed Project, assuming annexation, in excess of demands associated with Cal Water's current service area. It should be noted that Zone 7's supply projections have been updated since the agency's 2020 UWMP per References 2 and 3; however, the changes to the supply surplus are minimal and thus will not affect the conclusions made in this WSE.

(c) Projected District demand per Table 7-3 in Reference 1.

References:

1. Cal Water, 2021. 2020 Urban Water Management Plan, Livermore District, prepared by California Water Service, dated June 2021.
2. Zone 7, 2023b. 2022 Water Supply Evaluation Update, dated May 2023.
3. Zone 7, 2021a. Alternative Groundwater Sustainability Plan for the Livermore Valley Groundwater Basin, dated December 2021.
4. Zone 7, 2021. 2020 Urban Water Management Plan, Zone 7 Water Agency, prepared by Zone 7 Water Agency, dated June 2021.

Table 10

Projected Multiple Dry Year Water Supply and Demand

Arroyo Lago Residential Project, Alameda County, California

Supply and Demand	Projected Water Supply and Demand During Multiple Dry Years (AFY)																									
	2025					2030					2035					2040					2045				
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 1	Year 2	Year 3	Year 4	Year 5	Year 1	Year 2	Year 3	Year 4	Year 5	Year 1	Year 2	Year 3	Year 4	Year 5	Year 1	Year 2	Year 3	Year 4	Year 5
Supply																									
District UWMP Supply (a)	9,822	9,822	9,822	9,822	9,822	9,846	9,846	9,846	9,846	9,846	10,006	10,006	10,006	10,006	10,006	10,047	10,047	10,047	10,047	10,047	10,128	10,128	10,128	10,128	10,128
Projected Use of Zone 7 Supply Surplus to Meet Proposed Project Demand (b)	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47
Total Supply	9,869	9,869	9,869	9,869	9,869	9,893	9,893	9,893	9,893	9,893	10,053	10,053	10,053	10,053	10,053	10,094	10,094	10,094	10,094	10,094	10,175	10,175	10,175	10,175	10,175
Demand																									
District (c)	9,822	9,822	9,822	9,822	9,822	9,846	9,846	9,846	9,846	9,846	10,006	10,006	10,006	10,006	10,006	10,047	10,047	10,047	10,047	10,047	10,128	10,128	10,128	10,128	10,128
Proposed Project	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47
Total Water Demand Inclusive of the Proposed Project	**9,869**	**9,869**	**9,869**	**9,869**	**9,869**	**9,893**	**9,893**	**9,893**	**9,893**	**9,893**	**10,053**	**10,053**	**10,053**	**10,053**	**10,053**	**10,094**	**10,094**	**10,094**	**10,094**	**10,094**	**10,175**	**10,175**	**10,175**	**10,175**	**10,175**
Supply Shortfall (% demand)	***None***	***None***	***None***	***None***	***None***	***None***	***None***	***None***	***None***	***None***	***None***	***None***	***None***	***None***	***None***	***None***	***None***	***None***	***None***	***None***	***None***	***None***	***None***	***None***	***None***

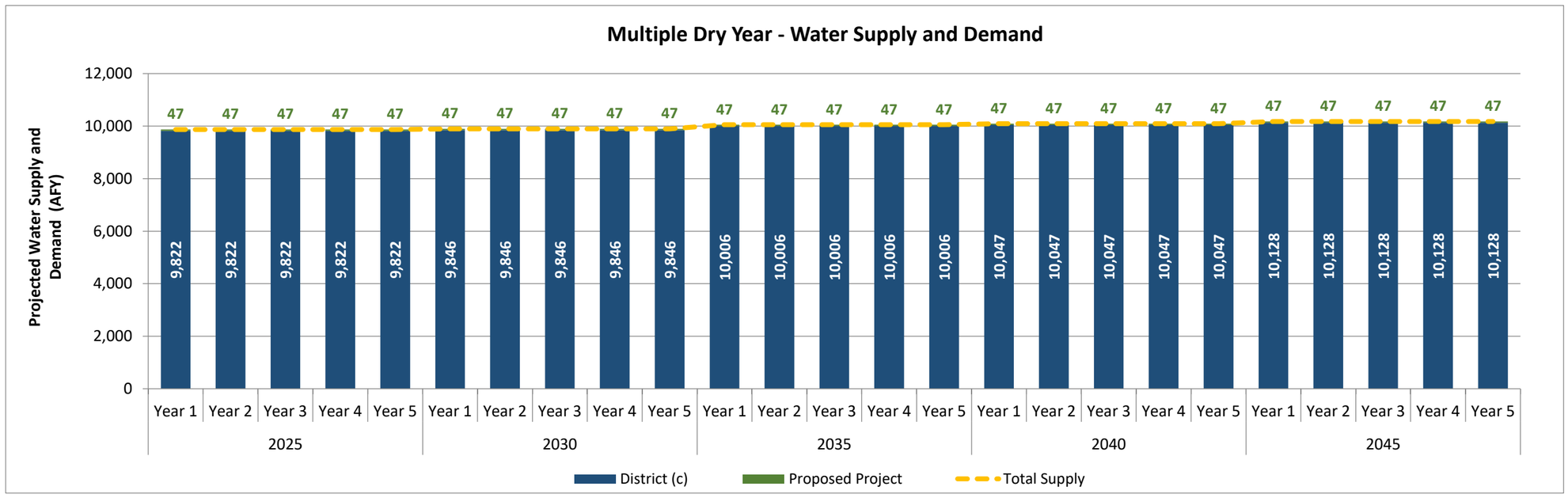


Table 10

Projected Multiple Dry Year Water Supply and Demand

Arroyo Lago Residential Project, Alameda County, California

Abbreviations:

"AFY" = acre-feet per year
"Cal Water" = California Water Service
"District" = Livermore District
"Proposed Project" = Arroyo Lago Residential Project
"UWMP" = Urban Water Management Plan
"WSE" = Water Supply Evaluation
"Zone 7" = Zone 7 Water Agency

Notes:

(a) Projected supplies available to the District per Table 7-4 in Reference 1.

(b) Table 7-14 through Table 7-19 of Zone 7's 2020 UWMP (Reference 4) show a supply surplus (projected water supplies in excess of projected demands) under multiple dry year conditions ranging from 38,900 AFY in the first dry year of 2025 to 40,800 AFY in the fifth dry year of 2045. It is anticipated that Cal Water would purchase a portion of this supply surplus in order to meet the projected demands associated with the Proposed Project, assuming annexation, in excess of demands associated with Cal Water's current service area. It should be noted that Zone 7's supply projections have been updated since the agency's 2020 UWMP per References 2 and 3; however, the changes to the supply surplus are minimal and thus will not affect the conclusions made in this WSE.

(c) Projected District demand per Table 7-4 in Reference 1.

References:

1. Cal Water, 2021. 2020 Urban Water Management Plan, Livermore District, prepared by California Water Service, dated June 2021.
2. Zone 7, 2023b. 2022 Water Supply Evaluation Update, dated May 2023.
3. Zone 7, 2021a. Alternative Groundwater Sustainability Plan for the Livermore Valley Groundwater Basin, dated December 2021.
4. Zone 7, 2021. 2020 Urban Water Management Plan, Zone 7 Water Agency, prepared by Zone 7 Water Agency, dated June 2021.

7 COMPARISON OF SUPPLY AND DEMAND

Pursuant to CWC §10910(c)(3), this WSE includes an estimate of the projected water supplies available to the District under normal, single dry, and multiple dry years, and a discussion of whether those supplies will meet the projected demand associated with the Proposed Project, in addition to the water system's existing and planned future uses.

Table 8 through **Table 10** provide a comparison of the demands and supplies in normal year, single-dry year, and multiple dry year hydrologic scenarios for the District. It is projected that available water supplies will be sufficient to meet the demands, inclusive of the Proposed Project, under all hydrologic conditions through 2045.

In all hydrologic scenarios, the projected potable supplies are sufficient to meet projected demands for the District's existing service area and the Projected Project demands. The amount of potable demand estimated to be generated by the Project at buildout (47 AFY) constitutes an increase of less than 0.49% over the demands projected by the District to meet the needs of its existing service area through 2045. While this increase in demand was not anticipated in the District's 2020 UWMP, inclusion of the Proposed Project in the District's service area amounts to a de minimis increase of demands on the existing potable water system.

While supply shortfalls are not projected, any shortfalls that could occur would be met through the implementation of the District's Water Shortage Contingency Plan (WSCP). Under Rule 14.1, the District could enact its WSCP, which includes Mandatory Staged Restrictions of Water Use. The WSCP systematically identifies ways in which the District can reduce water demand during dry years. The overall reduction goals in the WSCP are established for six drought stages and address water demand reductions of over 50%. The WSCP for the District was revised as part of the 2020 UWMP update process and includes detailed information about how drought risks are evaluated by the District on an annual basis to determine the potential need for reductions.

As a customer within the District's service area, assuming successful addition of the Proposed Project to the District, the Proposed Project would be obligated to comply with the demand reduction efforts imposed by the District through implementation of the WSCP. Therefore, the Proposed Project would contribute a proportionate share of the reduction in water demands during dry years.

8 CONCLUSIONS

The primary purpose of this WSE is to evaluate whether sufficient water supply is available to meet all future water demands within the water supplier's service area, including those associated with the Proposed Project, during normal and dry hydrologic years for a 20-year time horizon.

As described in Section 4, the net water demand of the Proposed Project (i.e., estimated at 47 AFY at buildout) has been conservatively estimated. Even with these conservative estimates of demand, based on the results of this WSE, the District will have sufficient water supply to meet its planned demands, plus the demands of the Proposed Project, provided that its service area is expanded to include the Proposed Project. **Therefore, this WSE concludes that sufficient water supply is available to the District to meet all future demands within its existing service area and those associated with the Proposed Project, assuming successful addition of the Proposed Project to the District's service area.**

9 REFERENCES

330 Land Company, 2024a. Development Plan and Vesting Tentative Map Subdivision 8423, provided by 330 Land Company on 11 March 2024.

330 Land Company, 2024b. Information provided by 330 Land Company on 13 March 2024.

330 Land Company, 2024c. Information provided by 330 Land Company on 14 March 2024.

Cal Water, 2021. 2020 Urban Water Management Plan, Livermore District, prepared by California Water Service, dated June 2021.

Cal Water, 2023. Historical Demand and Production Data Provided by Cal Water on 11 May 2023.

California Department of Finance, 2023. Report E-5 Population and Housing Estimates for Cities, Counties, and the State, January 1, 2021-2023, with 2020 Benchmark, released 1 May 2023.

CIMIS, 2023. CIMIS Station Reports - Station 191 (Pleasanton), accessed 28 August 2023. https://cimis.water.ca.gov/WSNReportCriteria.aspx

California Department of Water Resources (DWR), 2012. California Irrigation Management Information System Reference Evapotranspiration Zones, January 2012.

DWR, 2015. California Code of Regulations, Title 23, Division 2, Chapter 2.7, Model Water Efficient Landscape Ordinance, effective 1 December 2015.

DWR, 2019. Sustainable Groundwater Management Act 2018 Basin Prioritization, State of California, dated January 2019.

DWR, 2020. WUEdata – 2019 Water Audit Report: California Water Service Livermore District, uploaded 28 September 2020.

DWR, 2021a. WUEdata – 2017 Water Audit Report: California Water Service Livermore District, updated 23 November 2021.

DWR, 2021b. WUEdata – 2018 Water Audit Report: California Water Service Livermore District, updated 23 November 2021.

DWR, 2021c. WUEdata – 2020 Water Audit Report: California Water Service Livermore District, uploaded 27 September 2021.

DWR, 2022a. WUEdata – 2021 Water Audit Report: California Water Service Livermore District, uploaded 30 September 2022.

DWR, 2022b. 2021 State Water Project Final Delivery Capability Report, dated September 2022.

EKI, 2023. Updated Recycled Water Balance for Arroyo Lago, Pleasanton, CA, dated 7 August 2023.

Jones & Stokes, 2005. Groundwater Management Plan for Livermore-Amador Valley Groundwater Basin, Zone 7, dated September 2005.

UC Berkeley Center for Community Innovation, 2021. Implementing the Backyard Revolution: Perspectives of CA's ADU Owners, dated 12 April 2021. https://www.aducalifornia.org/wp-content/uploads/2021/04/Implementing-the-Backyard-Revolution.pdf

Zone 7, 2021a. 2020 Tri- Valley Municipal and Industrial Water Demand Study by Zone 7, dated July 2021.

Zone 7, 2021b. 2020 Urban Water Management Plan, prepared by Zone 7, dated June 2021.

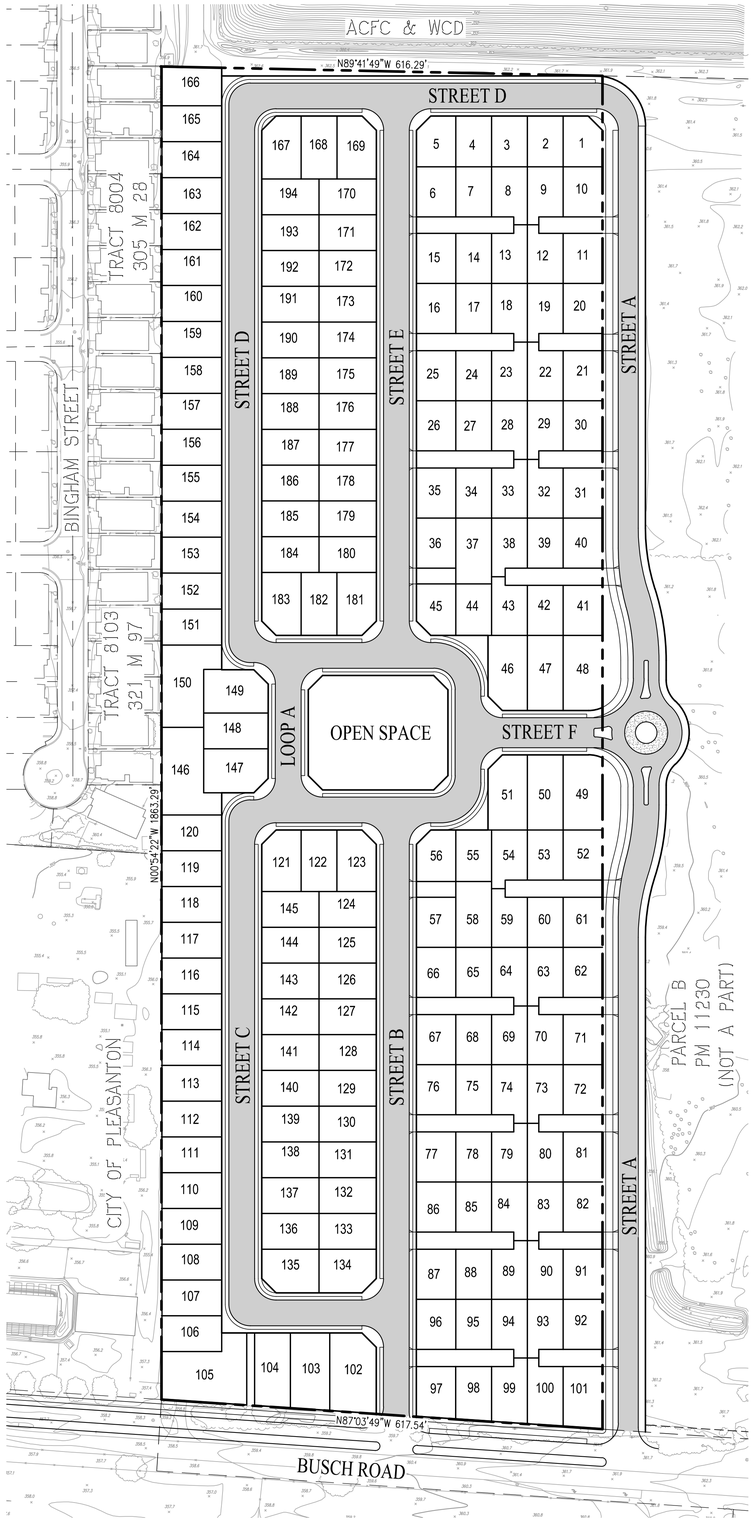
Zone 7, 2021c. Alternative Groundwater Sustainability Plan for the Livermore Valley Groundwater Basin, dated December 2021.

Zone 7, 2023a. Annual Report for the Groundwater Management Program 2022 Water Year (October 2021 – September 2022), Livermore Valley Groundwater Basin, prepared by the Zone 7 Water Agency, dated March 2023.

Zone 7, 2023b. 2022 Water Supply Evaluation Update, dated May 2023.

Appendix A

Vesting Tentative Map

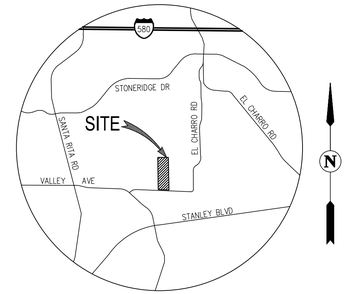


GENERAL NOTES

1.	DEVELOPER:	330 LAND COMPANY, LLC 16381 SCIENTIFIC WAY IRVINE, CA 92618 (925) 368-3128 STEVE REILLY
2.	CIVIL ENGINEER:	CARLSON, BARBEE & GIBSON, INC. 2633 CAMINO RAMON, SUITE 350 SAN RAMON, CA 94583 (925) 866-0322 LEE ROSENBLATT, R.C.E 65469
3.	GEOTECHNICAL ENGINEER	ENGEO 2010 CROW CANYON PLACE, SUITE 250 SAN RAMON, CA 94583 (925) 866-9000 BROOKS RAMSDELL, CEG
4.	ASSESSORS PARCEL NO.:	946-1250-006-04 (PORTION)
5.	SITE ADDRESS:	BUSCH ROAD
6.	SITE AREA:	26.6± ACRES
7.	EXISTING GENERAL PLAN:	EAST COUNTY AREA PLAN – MEDIUM DENSITY RESIDENTIAL
8.	PROPOSED GENERAL PLAN:	EAST COUNTY AREA PLAN – MEDIUM DENSITY RESIDENTIAL
9.	EXISTING ZONING:	AGRICULTURE
10.	PROPOSED ZONING:	AGRICULTURE
11.	BENCHMARK:	AN NGS BRASS DISK SET IN BRIDGE SIDEWALK, DESIGNATION P 929 RESET, PID AJ8711, HAVING AN NGVD29 PUBLISHED ELEVATION OF 361.6 FEET.
12.	STREETS:	ALL STREETS WITHIN THE SUBDIVISION INCLUDING STREET A (ADJACENT N/S STREET) WILL BE PUBLIC STREETS MAINTAINED BY ALAMEDA COUNTY. DRIVE AISLES WILL BE PRIVATE AND MAINTAINED BY THE HOA.
13.	FLOOD ZONE:	ZONE X: AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN. SOURCE: FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) FLOOD INSURANCE RATE MAP, MAP NUMBER 06001C0336G. DATED: AUGUST 3, 2009
14.	WATER:	CAL WATER COMPANY
15.	SANITARY SEWER:	CAL WATER COMPANY
16.	STORM DRAIN:	PUBLIC
17.	GAS & ELECTRIC:	PG&E
18.	TELEPHONE:	AT&T / COMCAST
19.	DIMENSIONS:	ALL DIMENSIONS SHOWN ARE PRELIMINARY AND SUBJECT TO FINAL DESIGN AND MAPPING.
20.	PHASING:	THIS SUBDIVISION IS EXPECTED TO BE CONSTRUCTED IN MULTIPLE PHASES. MULTIPLE FINAL MAPS MAY BE FILED ON THE LANDS SHOWN ON THIS MAP PURSUANT TO THE SUBDIVISION MAP ACT SECTION 66456.1.

ABBREVIATIONS

CL	CENTERLINE
BNDY	BOUNDARY
EX	EXISTING
FC	FACE OF CURB
FL	FLOW LINE
INV	INVERT
HP	HIGH POINT
L	LENGTH
LF	LINEAR FEET
LP	LOW POINT
LS	LANDSCAPE
PL	PROPERTY LINE
PUE	PUBLIC UTILITY EASEMENT
R	RADIUS
R/W	RIGHT-OF-WAY
S	SLOPE
SD	STORM DRAIN
SS	SANITARY SEWER
SW	SIDEWALK
TC	TOP OF CURB
W	WATER



VICINITY MAP

NOT TO SCALE

LEGEND

EXISTING	PROPOSED	DESCRIPTION
		PROJECT BOUNDARY
		CURB, GUTTER AND SIDEWALK
		CENTERLINE
		RIGHT OF WAY
		LOT LINE
x 165.0	x 165.0	SPOT ELEVATIONS
EX SD	SD	STORM DRAIN LINE (PUBLIC)
EX SS	SS	SANITARY SEWER (PUBLIC)
EX W	W	WATER (PUBLIC)
		SANITARY SEWER MANHOLE
		STORM DRAIN MANHOLE
		CURB INLET
		FIELD INLET
		FIRE HYDRANT
		STREETLIGHT
	20 / PARCEL A	LOT NUMBER / PARCEL NUMBER
	P	PAD ELEVATION
	0.50%	APPROXIMATE STREET SLOPE

Sheet List Table	
Sheet Number	Sheet Title
C0.0	TITLE SHEET
C1.0	EXISTING CONDITIONS
C2.1	SITE PLAN
C2.2	SITE PLAN
C3.1	GRADING PLAN
C3.2	GRADING PLAN
C4.1	UTILITY PLAN
C4.2	UTILITY PLAN
C5.1	OFFSITE UTILITY PLAN – SANITARY SEWER & WATER
C5.2	OFFSITE UTILITY PLAN – STORM DRAIN

VESTING TENTATIVE MAP

TITLE SHEET

ARROYO LAGO

ALAMEDA COUNTY CALIFORNIA

SCALE: 1" = 100' DATE: AUGUST 2022

0 100 200 300

cbg CIVIL ENGINEERS ▪ SURVEYORS ▪ PLANNERS
SAN RAMON ▪ (925) 866-0322
ROSEVILLE ▪ (916) 788-4456
WWW.CBANDG.COM

JOB NO.: 3435-000

SHEET NO. C0.0 OF 10SHEETS

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G.3 - Off-site Utility Flood Study

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Schaaf & Wheeler

CONSULTING CIVIL ENGINEERS

870 Market Street, Suite 1278
San Francisco, CA 94102-2906
415-271-3443

March 13, 2024

Steve Reilly
330 Land Company, LLC
16381 Scientific Way - Irvine, CA 92618

Subject: Arroyo Lago Offsite Utility Flood Study

Dear Ms. Metz:

This memo has been prepared to summarize potential flood risk at the Arroyo Lago development in Alameda County. This letter summarizes local knowledge and recent modeling efforts that have been conducted on the Arroyo Mocho and how they compare to the effective FEMA Flood Insurance Rate Map (FIRM).

The Arroyo Lago development site is mostly outside of the FEMA effective floodplain. However, the development is proposing offsite utilities in the red square location in Figure 1 that are within the FEMA effective floodplain Zone AE with a depth of 361-ft NAVD.

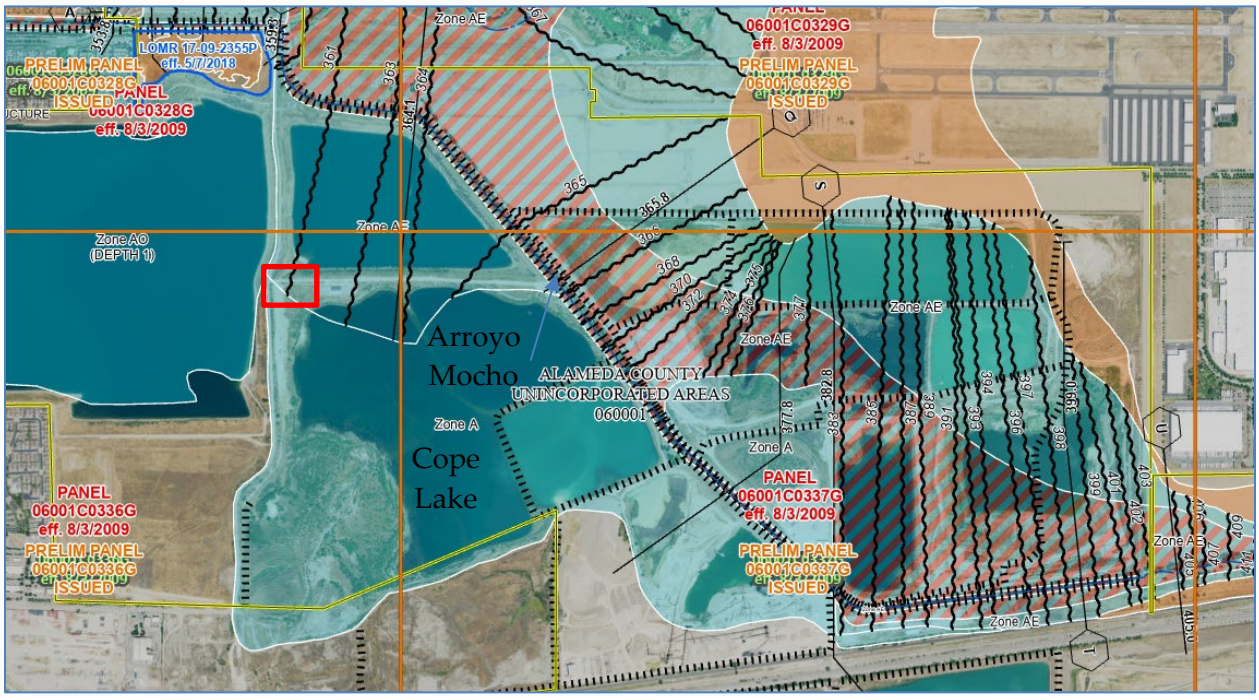

Figure 1. Effective Flood Insurance Rate Map

FEMA Study of Arroyo Mocho

The effective FEMA Flood Insurance Rate Maps (FIRMs) for the Arroyo Mocho are based on hydrologic and hydraulic studies that date back to 1976. The effective maps are drawn based on the results from the 1970s modeling and do not match existing conditions.

It is unclear if the 1970s modeling analysis accounted for Cope Lake and the surrounding quarry ponds at all. Figure 2 shows a historical topography map from USGS that dates back to 1961. The maps shows that some quarry pits existed, but not the ones adjacent to the Arroyo Lago Site.

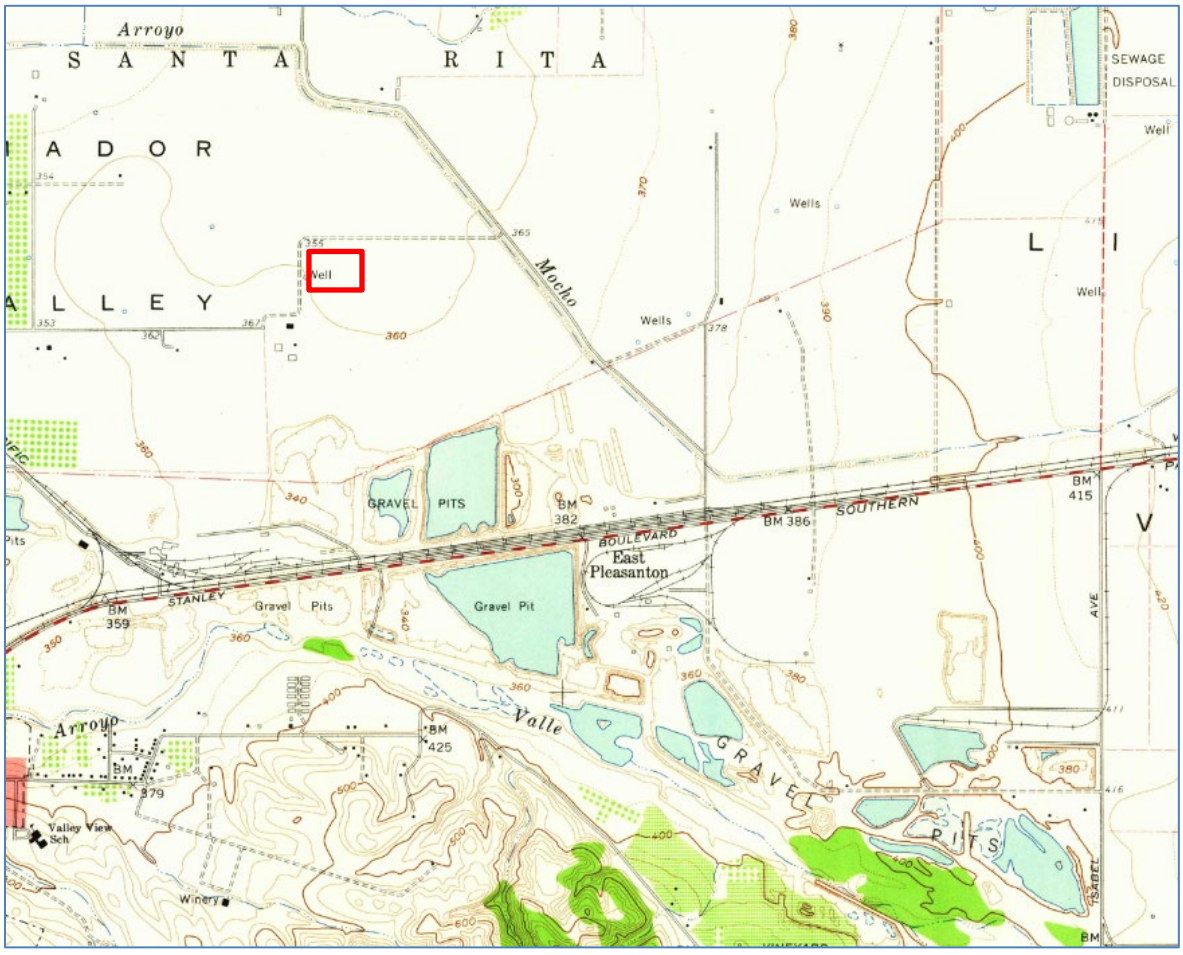

Figure 2. 1961 USGS Topography (proposed utility location red square)

Zone 7 Hydrologic and Hydraulic Study 2017

Zone 7 has more recently studied the Alameda Creek Watershed which includes the Arroyo Mocho. This effort was part of the Stream Management Master Plan (SMMP). Models are developed in HEC-HMS and HEC-RAS software using current conditions. The models are developed at a level of detail sufficient to support planning level analysis focused on the 100-year flood event. Figure 3 shows the results of the recent modeling effort on the Arroyo Mocho near the subject development. Results show that the majority of the water spills upstream of the site, and not at the site where the proposed utilities are to be located (red square).

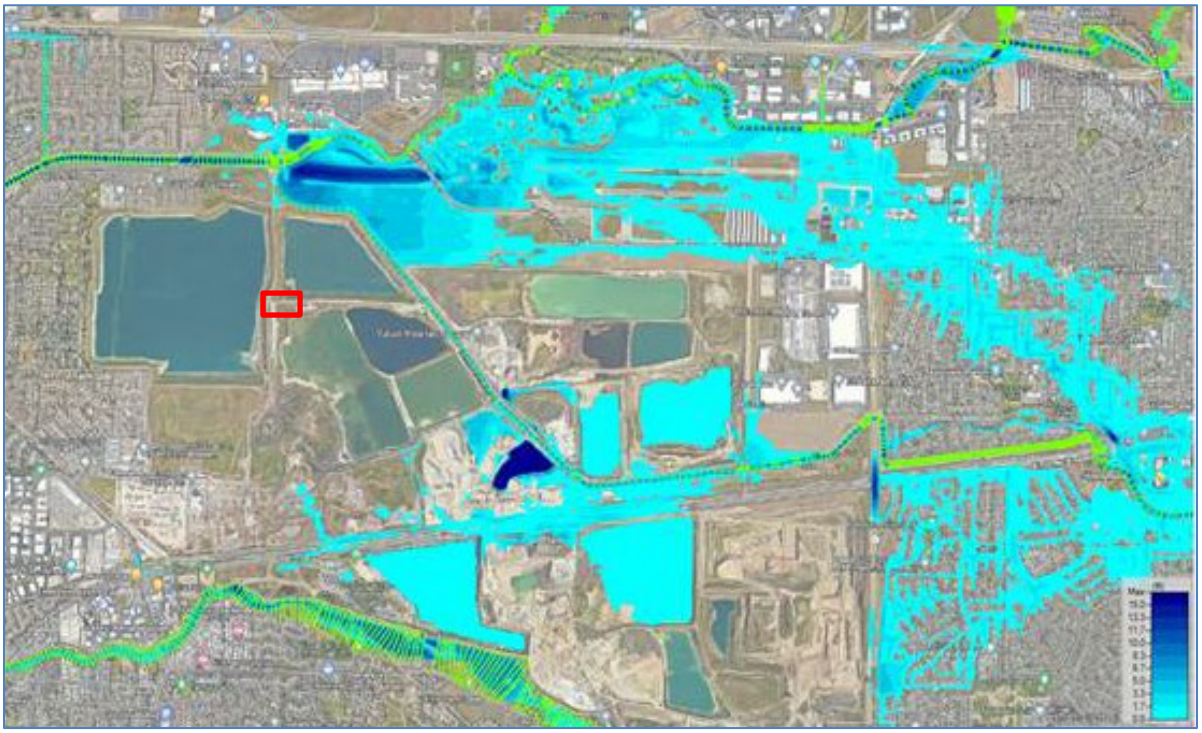

Figure 3. Zone 7 Hydraulic Study 100-yr Results 2017

Recommendations

It is unlikely that the 100-yr water surface elevation is above ground at the location where offsite utilities are to be located. Furthermore, any spills that occur from the Mocho would be contained into the quarry ponds.

The threat of flooding at the utility location is low. However, building code requires developments design buildings to be safe from flooding using the flood depths shown on the effective FEMA map. This includes utilities that serve residential units. There is the possibility of revising the FEMA map through the LOMR process which would entail modeling in more detail than what is shown in Figure 3. The Arroyo Mocho has uncertified levees that contain the flows within the creek. Most likely, FEMA will require a levee failure analysis and mapping of the spills, which would likely be contained into Cope Lake. It is not clear whether Zone 7 has done this analysis.

Regardless, it is unlikely that the proposed offsite utilities would be inundated during a 100-yr storm event. If the FEMA map is not revised, the utility systems should be designed following the FEMA published guidelines called *Protecting Building Utility Systems from Flood Damage*, 2017 which can be downloaded at the following link:

https://www.fema.gov/sites/default/files/2020-07/fema_p-348_protecting_building_utility_systems_from_flood_damage_2017.pdf

Sincerely,

Schaaf & Wheeler

Robin J. Lee, P.E.
Senior Engineer
RCE 70040