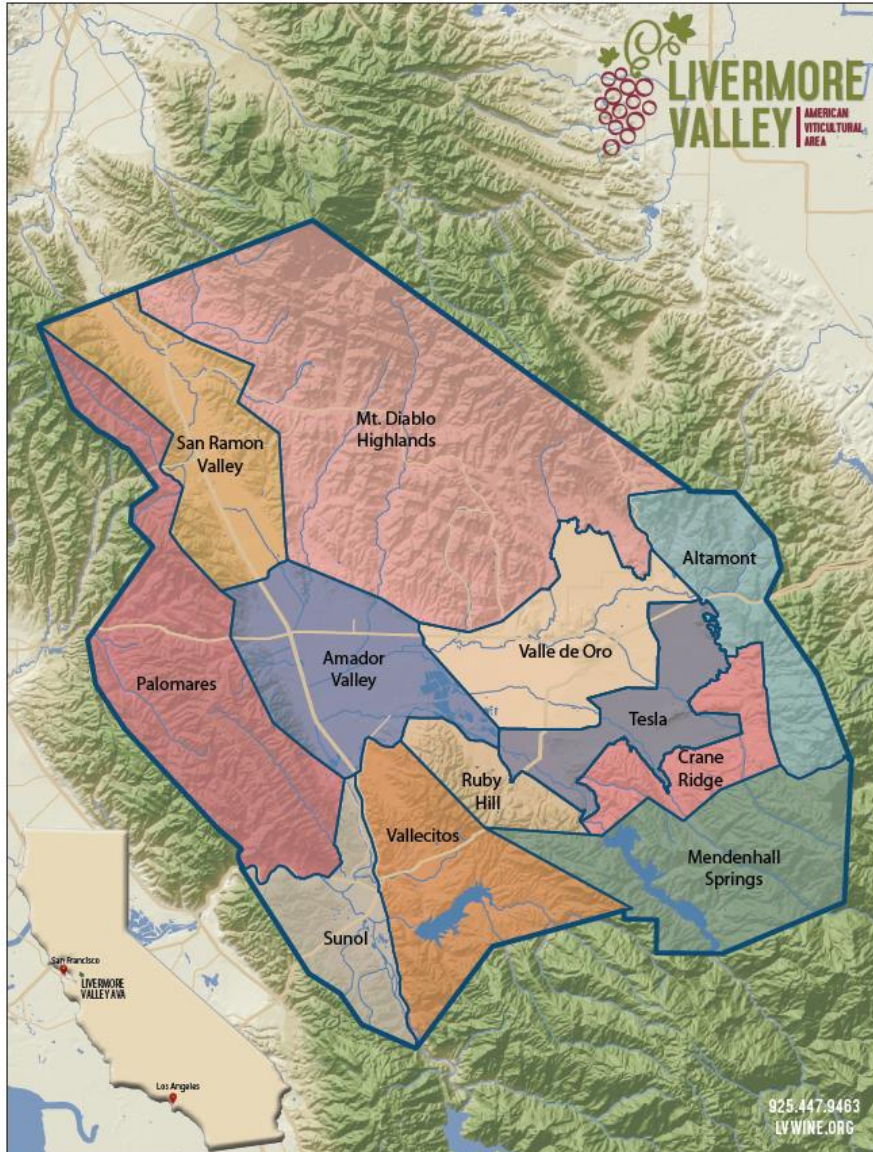


# The Viticultural Districts of the Livermore Valley AVA



by Patrick L Shabram

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## The Viticultural Districts of the Livermore Valley AVA

### **Summary**

The Livermore Valley AVA is diverse in topography, soil, and as a result of Pacific airflow into the region, climate. The Livermore Valley Winegrowers Association has commissioned a soils report and a climate report to better understand this diversity. Utilizing the results of the climate and soils reports, this report outlines twelve viticultural districts within the Livermore Valley AVA.

### **Background**

The Livermore Valley AVA (27 CFR Part 9 §9.46) was created in 1982 and amended in 2006 to recognize the unique viticulture of the inland East Bay area of the San Francisco Bay Area. The AVA occupies sections of the Diablo Range in southern Contra Costa and eastern Alameda counties, including the Amador, Livermore, and San Ramon valleys (often referred to as the Tri-Valley area). The Diablo Range is a subset of the greater Coastal Ranges.

The AVA is characterized by a combination of diverse topography and transitional climate, which creates diverse growing conditions within the AVA. Despite its inland location, which is not adjacent to any bodies of water, the climate of the Livermore Valley AVA is greatly influenced by Pacific airflow that moderates temperatures relative to warmer inland locations to the east. This airflow enters the AVA in several locations, complicating the temperature patterns in the AVA. Further complicating the climate is elevation, which ranges from approximately 160 feet to 3,848 feet in the area. Tectonic and geomorphic processes have created both Mt. Diablo, the highest peak in the area, and the broad alluvium-filled Livermore Valley. As would be expected, vegetation varies both by the climate and the availability of water. Hence, the combination of climatic variation, topography, geology, and subsequent vegetation work to create diverse soil types. Finally, urban centers, in close proximity to much of the existing viticulture, add to the diversity to the region.

To better define the unique growing districts within the Livermore Valley AVA, the Livermore Valley Winegrowers Association, with the support of a grant from the California Department of Food and Agriculture, has commissioned this report, in order to take an objective look at geographic variations within the Livermore Valley AVA, with the goal of defining the viticultural districts within the AVA. This report relies on the findings of two reports, also prepared with funding from this same grant. The first report, “An Overview of Soils, Terrains, and Climates in the Livermore AVA” by Coastal Viticultural Consultants, Inc., is hereafter referred to as the Soils Report. The second report, “Mesoclimate Patterns of the Livermore Valley AVA,” by Patrick L. Shabram, hereafter referred to as the Climate Report, looks at the climate variations that exist within the AVA. The author of this report is the same as the author of the Climate Report.

### **Soils Report**

The Soils Report was prepared in order to “a) research and identify, to the extent possible, differentiations in soil characteristics and climates within the AVA that are

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salient to viticulture, b) spatially present those areas with differences and commonalities on maps, c) provide a narrative elaborating on and explaining soil and climate characteristics as they pertain to growing high quality wine grapes, and d) provide the use of this study some details on the predominant (AVA) characteristics for context and referencing pertaining to viticulture.” While the report notes climate, the primary focus of the study was on soil characteristics throughout the AVA. The study did not attempt to make qualitative comparisons, but rather focused on spatial changes that occur within the Livermore Valley AVA.

The report focused on existing available data. Soils were compared by water holding capacities, salt content (electrical conductivity), pH, and soil texture. Further, the Soils Report mapped slope, soil orders, and soil series. Soil orders are based on the soil taxonomy system developed by the National Cooperative Soil Survey through the United States Department of Agriculture. At a much more micro level of the hierarchal system are soil series. As soil series are very diverse, soil associations, referred to in the Soils Report as “soil series map units,” have been reviewed for this analysis. These associations are from the Soil Survey Geographic Database (SSURGO) from the National Resources Conservations (NRCS) of the USDA. The report utilizes the STATSGO2 database, showing units that can be reasonably mapped at a 1:250,000 scale, which is appropriate to an area covered by the Livermore Valley AVA.

### **Climate Report**

The Climate Report focusses specifically on climatic variation within the Livermore Valley AVA. The focus of the report was not to define climate, but to identify different climatic regions within the AVA. To achieve this, the study assessed temperatures, precipitation, and wind for the analysis. Temperature was assessed using different methodologies for heat summations during the traditionally defined growing season of April 1 to October 31. Annual precipitation is based on the October 1 to September 30 hydrologic cycle. Wind focused on growing season wind speed.

One challenge to the climatic assessment was limited coverage of available data. As the objective of the study was to define climatic subregions, wider coverage would present better results. Unfortunately, the greatest amount of observational data covered a shorter period of time. Ideally, climate is taken over a series of years. Further, data were still not complete. As such, a secondary analysis was conducted using the PRISM climate model. Vestra, a GIS consulting firm, was retained to put the PRISM datasets into a query application. This second analysis included an analysis of temperatures and precipitation.

As a result of the climatic analysis, seven mesoclimatic regions were identified. These include:

- Mt. Diablo
- Mt. Diablo foothills
- East Bay Hills
- Tri-valley junction

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- Livermore Valley Urban Landscape
- Southern/eastern Livermore Valley
- Sunol/Vallecitos Valley/southern highlands

### **Defining Districts**

When defining viticultural districts within the Livermore Valley AVA, an important note is that climatic, soil, and topographic variations are commonly interrelated. Variations in climate are often related to topography. Topography is often related to weathering and bedrock, which, along with slope, impact soil development. Further, climate impacts soil development through a combination of weathering, vegetation, expansion and contraction, and horizon development. Soil, meanwhile, may have subtle impacts on microclimates by impacting vegetation and heat absorption.

To further refine the various viticultural districts within the Livermore Valley AVA, the seven climatic districts were compared to soil and slope. Elevation was also assessed, which impacts climatic patterns that may not have been discernable in the Climate Report given the availability of weather stations. Approximate boundaries were drawn using features on U.S.G.S topographic maps. These boundaries were simplified, given the number of districts. The observer of such districts should remember that geographic change is gradual, unlike the definitive boundaries created for this report. Finally, a justification and brief description were provided for each district. The districts are loosely organized, starting with the district with the greatest commercial viticulture activity, then moving around the edges of the Livermore Valley AVA in a clockwise direction before moving into the center of the AVA.

As climate is dynamic and common models for comparison do not always take into account subtle variations in daily temperatures, temperatures and precipitation are given as comparative statements. With the greatest concentration of Livermore Valley AVA viticulture currently found within the Tesla district, other districts are compared to a standard established by this district. The normal growing degree day heat summations (GDD) based on the PRISM climate model utilized in the Climate Report demonstrate temperatures in the Tesla district generally in the 3000-3500°F range (1670-1950°C), placing the area in Region III of the Winkler Scale for winegrowing regions, although a greater range of temperatures was observed in the Climate Report. The area experiences average precipitation in the 15 to 20 inch range (380mm to 510mm). Other winegrowing areas typically associated with Region III heat summations include the Sonoma Valley and the Napa Valley south of St. Helena but north of Carneros.

### **Viticultural Districts**

The following districts are defined by a combination of climate, soil, geology, and slope. Boundary descriptions are limited to recognizable features on United States Geological Society (USGS) topographic maps utilizing the National Map through the USGS's National Geospatial Program. Distances are approximations. No consideration is given to the current location of existing vineyards. Any effort to more formally recognize the

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viticultural districts of the Livermore Valley AVA (e.g., petition for sub-AVAs) may want to take into consideration existing viticulture in defining these boundaries. All boundary descriptions are given in a clockwise direction starting in the northeastern-most position.

This project has attempted to classify all of the Livermore Valley AVA. As such, boundaries are described to match existing Livermore Valley AVA boundaries. Recent USGS maps no longer show township, range, and section boundaries. So too, are benchmarks no longer on USGS maps utilizing the National Map project. Hence, common boundaries between the following districts and the existing Livermore Valley AVA boundaries are not possible on the most recent USGS maps. All boundary descriptions based on previous USGS maps are italicized, but they have been updated to match more recent description formats standardized by the Alcohol and Tobacco Tax and Trade Bureau. Further, more recent USGS maps include Universal Transverse Mercator (UTM) coordinates. Boundary descriptions using the recent USGS maps include UTM descriptors. While most of the boundary descriptions are taken from the modern USGS maps, they have been created in such a way as to be locatable on either the most recent USGS maps or on the previous editions of these maps.

The following USGS 7.5' Quadrangles are utilized for the boundary descriptions. All recent maps are dated 2015, while dates of previous quadrangle maps are provided in parentheses:

- Altamont, CA (1953, photorevised 1981)
- Byron Hot Springs, CA (1953, photorevised 1968)
- Clayton, CA (1953, photorevised 1980, minor revision 1994)
- Cedar Mtn., CA (1956, photorevised 1971, minor revision 1994)
- Diablo, CA (1953, photorevised 1980)
- Dublin, CA (1961, photorevised 1980)
- Hayward, CA (1993)
- La Costa Valley, CA (1996)
- Las Trampas Ridge, CA (1995)
- Livermore, CA
- Mendenhall Springs, CA (1996)
- Midway, CA (1953, photorevised 1980)
- Niles, CA (1961, photorevised 1980)
- Tassajara, CA (1996)

### *Tesla*

The Tesla district is currently the most viticulturally active location within the Livermore Valley AVA. This area includes the valley floor of the southern Livermore Valley, as well as some of the lowest rolling hills. As a general rule, elevations are below 700 feet, the area has modest slope, and the soils are predominantly alluvial in nature. Climate in the area is cooler than temperatures to the north, a result of cool Pacific air flowing in through the Vallecitos pass and air drainage off higher elevations mixing with other airflow onto the Livermore Valley.

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**Climate:** Located in what is called the Southern/Eastern Livermore Valley in the Climate Report, this area has traditionally been thought of as Region III (3000-3500°F GDD) or even Region II (2500-3000°F GDD). Given that much of the Livermore Valley AVA viticulture comes from this area, Region III is often associated with the entire AVA, although the Climate Report has shown greater variation. Analysis also suggests that the Tesla district has on average been on the lower half of the Region III index. Further, high temperatures are seldom sustained for long. Nevertheless, common grape varieties are typical of the Region III climates, with Cabernet Sauvignon being among the most common grapes. Growers within the region report that harvest is typically later than other regions with similar heat summations. In terms of temperature relative to other viticultural districts within the Livermore Valley AVA, the Tesla district is among the moderate locations within the AVA.

**Soils:** Occupying the Livermore Valley floor, the area is dominated by alluvium, material deposited by streams flowing out of higher elevations to the south. Specifically, most of the soils are of the Yolo-Tehama-Pleasanton-Mocho complex with silty to sandy loams that are deep and well drained. Some soils with sedimentary parent material, specifically deep Positas soils of clay loam to sandy loam that are commonly moderately well drained, also are common in the district. San Ysidro-Ricon soils are found in the northwestern section. Like the other soil series, these soils are deep, with silty to fine sandy loam. Hence, a general soils characteristic is varying loams of deep alluvial soils. These soils are generally well to moderately-well drained.

**Slope:** The area is relatively flat, with areas of gradual to moderate slope. Elevations range from just under 420 feet to just over 840 feet, but the majority of the district is within the 500 to 700 foot range.

### Boundary Descriptions

From the starting point at Interstate 580 and the 700 ft. elevation line just west of 615000m E north of 4175000m N on the Altamont map,

- 1) Proceed in a southerly direction along the 700 ft. elevation line approximately 8.3 miles to its intersection with Arroyo Seco southwest of 615000m E 4170000m N; then
- 2) Proceed east-northeast 0.3 mile to the intersection of the 740 ft. elevation line and Jerrold Road just south of 4170000m N east of 615000m E; then
- 3) Proceed east in a straight line 1.1 miles to the intersection of Cross Road and the 840 ft. elevation line just southeast of 617000m E 4170000m N; then
- 4) Proceed south-southeast in a straight line 0.6 mile to the intersection of Tesla Road and Reuss Road east of 617000m E just north of 4169000m N; then
- 5) Proceed southwest in a straight line 1.5 miles to the intersection of Cedar Mountain Road and Greenville Road northwest of 615000m E 4168000m N; then
- 6) Proceed west along Cedar Mountain Road 0.5 mile to its second intersection with an unnamed intermittent stream northeast of 614000m E 4168000m N; then
- 7) Proceed north-northwest along the intermittent stream 0.1 mile to its intersection with S Bay Aqueduct northeast of 614000m 4168000m N; then

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- 8) Proceed along S. Bay Aqueduct in a southwesterly direction 1.1 miles to its intersection with the 700 ft. elevation line northeast of 613000m E 4167000m N; then
- 9) Proceed in a straight line southeast 0.2 mile the 720 ft. elevation line at 4167000m N east of 613000m E; then
- 10) Proceed in a southerly direction along the 720 ft. elevation line 1.0 miles to its intersection with Arroyo Mocho west of 614000m E at 4166000m N; then
- 11) Proceed north-northwest along Arroyo Mocho 0.3 mile to its intersection with the 700 ft. elevation line northeast of 613000m E 4166000m N; then
- 12) Proceed in a northwesterly direction along the 700 ft. elevation line 2.8 miles to its intersection with the S Bay Aqueduct northwest of 611000m E 4168000m N; then
- 13) Proceed west along the S Bay Aqueduct 740 feet to the 620 ft. elevation line at 611000m E 4168000m N; then
- 14) Proceed southwest in a straight line 1.3 miles onto the Livermore map to the intersection of Dry Creek and the 540 ft. elevation line southeast of 609000m E 4167000m N; then
- 15) Proceed in a southwesterly then southeasterly direction along the 540 ft. elevation line 0.8 mile to its intersection with 4166000m N just west of 610000m E; then
- 16) Proceed east in a straight line along 4166000m N approximately 150 feet to its intersection with the 600 ft. elevation line at 610000m E; then
- 17) Proceed in a southerly direction along the 600 ft. elevation line 0.8 miles moving to the edge of the Livermore map at 37°37'30"N; then
- 18) Proceed southwest in a straight line 0.2 mile onto the La Costa Valley map to the intersection of the 600 ft. elevation line and 610000m E; then
- 19) Proceed southwest in a straight line 0.4 mile to the intersection of Arroyo Road and Arroyo Valle northeast of 609000m E 4164000m N; then
- 20) Proceed north along Arroyo Valle 0.4 mile onto the Livermore map to the intersection of Palm Drive, also known as Veterans Road, southwest of 610000m E 4165000m N; then
- 21) Proceed west along Palm Drive, also known as Veterans Road, 0.2 mile to the 560 ft. elevation line southeast of 609000m E 4165000m N; then
- 22) Proceed northwest in a straight line 1.8 miles to the intersection of the 500 ft. elevation line and Foley Road (E. Vineyard Road) southeast of 607000m E 4167000m N; then
- 23) Proceed northwest is a straight line 0.4 mile to the intersection of E Vallecitos Road and the 480 ft. elevation line southeast of 606000m E 4167000m N; then
- 24) Proceed in a southwesterly direction along E Vallecitos Road 0.5 mile to its intersection with State Highway 84 at 606000m E just north of 4166000m N; then
- 25) Proceed north along State Highway 84 1.7 miles to its intersection with Concannon Boulevard southeast of 605000m E 4169000m N; then
- 26) Proceed east, then north along Concannon Boulevard 3.6 miles onto the Altamont map to its intersection with S Livermore Avenue southwest of 610000m E 4170000m N; then

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- 27) Proceed northwest along S Livermore Avenue 0.5 mile onto the Livermore map to its intersection with College Avenue northwest of 610000m E 4170000m N; then
- 28) Proceed east-northeast in a straight line 1.2 mile onto the Altamont map to the intersection of Buena Vista Avenue and E Avenue east of 611000m E just north of 4171000m N; then
- 29) Proceed east along E Avenue 0.9 mile to its intersection with Vasco Road just west of 613000m E north of 4171000m N; then
- 30) Proceed north along Vasco Road 2.6 miles to its intersection with Scenic Avenue 612000m E 4175000m N;
- 31) Proceed east in a straight line 1.3 miles to the intersection of Interstate 580 and Greenville Road northeast of 614000m E 4175000m N; then
- 32) Proceed east-northeast along Interstate 580 0.3 mile to the starting point.

### ***Crane Ridge***

This district represents a narrow band above the Tesla district, but generally lower than higher elevations of the Altamont Hills and ridgelines to the south. This area sits above the alluvial soils of the valley floor, but within a zone influenced by marine and air drainage inversions. The soil parent material is primarily sandstone. In general, this area is above 700 feet, but below 1000 feet in elevation. As microclimates vary greatly in this area due to topography, the boundary is simplified to approximate the first line of hills at or below 1000 feet in elevation. The Crane Ridge district is similar in elevation, slope, and soil to the Ruby Hill district, but has more west facing slopes leading to more afternoon exposure. Crane Ridge also has a higher percentage of Positas associated soils.

**Climate:** Also identified as within the southern/eastern Livermore Valley in the Climate Report, this area's position above the valley floor reduces air drainage, and subsequently reduces the need for frost protection. The exposed hillsides, however, put the area in the path of invading winds and the cooler Pacific air they carry. The area also is likely influenced by cooler nocturnal air collecting at lower elevations. Hence, heat summations are similar to those found in the Tesla district. So too have later harvest times than those found at regions with similar GDD been reported within the Crane Ridge district. The western orientation of the Crane Ridge district relative to the Ruby Hill district offers greater afternoon exposure.

**Soils:** At the scale soils were studied, the most common soils of this area are Positas soils. Positas soils are commonly found in alluvial terraces, hence are depositional in nature despite the raised position off the valley floor. Although often of mixed parent material, many Positas soils are derived from sandstone or shale. Other soil units include Yolo-Tehama-Pleasanton-Mocho associated soils and Fontana-Diablo-Altamont associated soils. Fontana-Diablo-Altamont soils are typically clay loam to silty clay overlying shale or sandstone.

**Slope:** This district has slope generally greater than 5%, with slopes of 10% to 20% common. Although variations in slope exist, a greater percentage of slopes are oriented to



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the north or west. Elevations generally range between 700 to 1000 feet, but both higher and lower elevations are found in the district.

### Boundary Descriptions

From the starting point at the intersection of Flynn Road and the 1000 ft. elevation line on the Altamont map just east of 618000m E north of 4173000m N:

- 1) Proceed south-southeast in a straight line 1.1 miles to the intersection of Patterson Pass Road and Cross Road southeast of 618000m E 4172000m N; then
- 2) Proceed south along Cross Road 0.7 mile to its first intersection with the 1000 ft. elevation line at 618000m E 4171000m N; then
- 3) Proceed south-southeast in a straight line 1.1 miles to the intersection of Reuss Road and the 980 ft. elevation line northwest of 619000m E 4169000m N; then
- 4) Proceed southeast in a straight line 1.0 mile to the intersection of Tesla Road and the 1000 ft. elevation line southeast of 619000m E 4168000m N; then
- 5) Proceed southwest in a straight line 2.0 miles to the intersection of Crane Ridge Road and the 1000 ft. elevation line northeast of 616000m E 4166000m N; then
- 6) Proceed southwest in a straight line 1.4 miles onto the Mendenhall Springs map to the intersection of Mines Road and Del Valle Road southeast of 514000m E 4165000m N; then
- 7) Proceed northwest in a straight line 1.3 miles onto the Altamont map to the western edge of a dam on Dry Creek southwest of 613000m E 4167000m N; then
- 8) Proceed southwest in a straight line 1.7 miles onto the Mendenhall Springs map to the northwest corner of the dam on Arroyo Valle southwest of 611000m E 4164000m N; then
- 9) Proceed west-northwest in a straight line 0.3 mile onto the La Costa Valley map to the intersection of 610000m E and the 880 ft. elevation line south of 4164000m N; then
- 10) Proceed northwest in a straight line 0.5 mile to the intersection of Arroyo Valle and Arroyo Road northeast of 609000m E 4164000m N; then
- 11) Proceed northeast in a straight line 0.4 mile to the intersection of the 600 ft. elevation line and 610000m E; then
- 12) Proceed northeast in a straight line 0.2 mile to the edge of the map at the 600 ft. elevation line at 37°37'30"N, just west of 121°45'00"; then
- 13) Proceed in a northerly direction along the 600 ft. elevation line 1.6 miles onto the Livermore map to its intersection with 4166000m N at 610000m E; then
- 14) Proceed west along 4166000m N approximately 150 feet to its intersection the 540 ft. elevation line just west of 610000m E; then
- 15) Proceed in northwesterly then northeasterly direction along 540 ft. elevation line to its intersection with Dry Creek southeast of 609000m E 4716700m N; then
- 16) Proceed northeast in a straight line 1.3 miles onto the Altamont map to the intersection of S Bay Aqueduct and the 620 ft. elevation line northwest of 611000m E 4168000m N; then
- 17) Proceed east along the S Bay Aqueduct 740 feet to its intersection with the 700 ft. elevation line northwest of 611000m E 4168000; then

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- 18) Proceed in a southeasterly direction along the 700 ft. elevation line approximately 2.8 miles to its intersection with Arroyo Mocho southeast of 613000m E 4167000m N; then
- 19) Proceed south-southeast along Arroyo Mocho 0.3 mile its intersection with the 720 ft. elevation line northwest of 612000m E 4166000m N; then
- 20) Proceed in a northerly direction along the 720 ft. elevation line 1.0 mile to 4167000m N east of 613000m E; then
- 21) Proceed northwest in a straight line 0.2 mile to the intersection of the 700 ft. elevation line and the S Bay Aqueduct northeast of 613000m E 4167000m N; then
- 22) Proceed in a northeasterly direction along the S Bay Aqueduct 1.1 miles to its intersection with an unnamed intermittent stream northeast of 614000m E 4168000m N; then
- 23) Proceed in a southerly direction along this unnamed intermittent stream 0.1 mile to its intersection with with Cedar Mountain Road northeast of 614000m E 4166000m N; then
- 24) Proceed east along Cedar Mountain Road 0.5 mile to its intersection with Greenville Road just east of 615000m E north of 4168000m N; then
- 25) Proceed northeast in a straight line 0.5 mile to the intersection of Tesla Road and Reuss Road east of 617000m E 4169000m N; then
- 26) Proceed north-northwest in a straight line 0.6 mile to the intersection of Cross Road and the 840 ft. elevation line just southeast of 617000m E 4170000m N; then
- 27) Proceed west in a straight line 1.1 miles to the intersection of the Jerrold Road and the 740 ft. elevation line just south of 4170000m N and east of 615000 m E; then
- 28) Proceed southwest in a straight line 0.3 mile to the intersection of the 700 ft. elevation line and Arroyo Seco southwest of 615000m E 4170000m N; then
- 29) Proceed in a northerly direction along the 700 ft. elevation line 3.3 miles to its intersection with Patterson Pass Road southeast of 616000m E 4173000m N; then
- 30) Proceed east along Patterson Pass Road 0.3 mile to its intersection with Flynn Road southwest of 617000m E 4173000m N; then
- 31) Proceed north, then east along Flynn Road 1.1 miles to the starting point.

### ***Ruby Hill***

Like the Crane Ridge district, this district represents a narrow band above the Livermore Valley floor, but with elevations generally lower than higher elevations of the Vallecitos and Mendenhall Springs districts to the south. Although off the valley floor, this area is still influenced by marine and air drainage inversions. In general, this area is above 700 feet, but below 1000 feet in elevation. The orientation of the Ruby Hill district is more towards the northeast, however, offering a greater number of slopes with eastern exposure, hence greater exposure during morning hours. Ruby Hill also has a greater percent of Yolo-Tehama-Pleasanton-Mocho soils compared to the Crane Ridge district.

**Climate:** This area's position above the valley floor reduces air drainage, and subsequently reduces the need for frost protection, but the area is in the path of the cooling Pacific airflow through the Vallocitos Valley. Heat summations are similar to

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those found in the Tesla and Crane Ridge districts. Also similar to Crane Ridge and Tesla, the area commonly experiences later harvest times than what are found at many regions with similar GDD.

**Soils:** The most common soils of this area are Yolo-Tehama-Pleasanton-Mocho soils with Positas soils present at slightly higher elevations. Also present are Millsolm-Los Osos-Los Gatos-Lodo associated soils and Fontana-Diablo-Altamont associated soils.

**Slope:** Slopes in this district are not as great as the Crane Ridge district but still generally greater than 5%. Slopes of 10% to 20% are common in the southern part of the district. Elevations generally range between 700 to 1000 feet, but both higher and lower elevations are found in the district.

### Boundary Descriptions

Form the starting point on the Livermore map at the intersection with State Highway 84 and Vineyard Avenue southeast of 605000m E 4168000m N; then

- 1) Proceed south along State Highway 84 1.1 miles to its intersection with E Vallecitos Road just west of 606000m E north of 4166000m N; then
- 2) Proceed in a northeasterly direction along E Vallecitos Road 0.5 mile to its intersection with the 480 ft. elevation line southeast of 606000m E 4167000m N; then
- 3) Proceed southeast in a straight line 0.4 mile to the intersection of the 500 ft. elevation line and Foley Road southeast of 607000m E 4167000m N; then
- 4) Proceed southeast in a straight line 1.8 miles to the intersection of Palm Drive, also known as Veterans Road, and the 560 ft. elevation line southeast of 609000m E 4165000m N; then
- 5) Proceed east on Palm Drive, also known as Veterans Road, 0.2 mile to its intersection with Arroyo Valle southwest of 608000m E 4165000m N; then
- 6) Proceed south along Arroyo Valle 0.4 mile onto the La Costa Valley map to its intersection with Arroyo Road northwest of 609000m E 4164000m N; then
- 7) Proceed southeast in a straight line 0.5 mile to the intersection of 610000m E and the 880 foot elevation line south of 4164000m N;
- 8) Proceed west-northwest in a straight line 3.3 miles to the northern-most intersection of State Highway 84 and the 860 ft. elevation line just west of 605000m E north of 4164000m N; then
- 9) Proceed northwest in a straight line 3.7 miles onto the Livermore map to the intersection of Bernal Avenue and Hearst Drive northwest of 601000m E 4168000m N; then
- 10) Proceed north along Bernal Avenue 0.7 mile to its intersection with Vineyard Avenue northwest of 601000m E 4169000m N; then
- 11) Proceed east, then southeast along Vineyard Avenue 3.1 miles the starting point.

### ***Mendenhall Springs***

The terrain south of the Livermore Valley is more mountainous, with greater slopes than the lower hills just off the valley floor. Relative to the Livermore Valley, slopes are predominantly north-facing, hence home to lower evapotranspiration rates and greater

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vegetation. Parent material is primarily sandstone, with thin soils, due to steeper slopes. Entisols, vertisols, and some alfisols are the primary soil orders. The dominant soil series are diverse, ranging from the Fontana-Diablo-Altamont association of soils, to the Vallecitos-Parrish-Los Gatos-Gaviota association, to the Millsholm-Los Osos-Los Gatos-Lodo association, to Positas soils. The area shows some consistency in parent material, with sandstone and mélange, including sandstone, the dominant rock type.

**Climate:** An absence of weather stations makes temperatures analysis difficult, but the climate model utilized in the Climate Report suggests temperatures slightly cooler within the area due to higher elevations. The cooler mean temperatures are a result of lower maximum temperatures. Precipitation is also slightly higher within the higher elevations. Increasing the availability of moisture is the northern exposure. The overall orientation is along the east-west running Livermore Valley, while many of the streams run in a northwest direction, creating a higher frequency of northwest-southeast running ridgelines.

**Soils:** The eastern and a small section of the western part of the district host Fontana-Diablo-Altamont soils. More of the western part of the district is home to Millsholm-Los Osos-Los Gatos-Lodo complex. These soils are typically thinner soils that are well-drained to excessively well-drained and derived of sandstone and shale parent material. The southeastern part of the district is home to Vallecitos-Parrish-Los Gatos-Gaviota soils. These soils are mixed loams, slightly deeper and more developed than Millsholm-Los Osos-Los Gatos-Lodo soils areas, with shale and sandstone parent material. Positas soils are also common in the northern part of the district. While home to many Alfisols, younger Entisols are common.

**Slope:** Slopes range from lower than 5% in some of the fluvial valleys to well over 30%. This is one of three mostly mountainous districts within the Livermore Valley AVA. Elevations are typically above 1000 feet, achieving 2960 feet at Crane Ridge.

### Boundary Descriptions

*From the starting point at BM1600 adjacent to Tesla Road, section 26, T3S, R3E on the Midway map;*

- 1) Proceed south in a straight line approximately 4.2 miles onto the Cedar Mtn. map to BM 1878, 40 feet north of Mines Road, Section 14, T4S, R3E; then*
- 2) Proceed west-southwest in a straight line 4.2 miles onto the Mendenhall Springs map to the southeast corner of section 19, T4S, R3E; then*
- 3) Proceed west in a straight line 2.0 miles along the southern boundary of section 19 T4S, R3E and section 24 T4S, R2E to the southwest corner of section 24 T4S, R2E; then*
- 4) Proceed north along the western boundary of section 24 T4S, R2E 1.0 mile north to the southeast corner of section 14 T4S, R2E; then*
- 5) Proceed west, then north along the southern, then western boundary of section 14 T4S, R2E 1.2 miles to its intersection with the Hetch Hetchy Aqueduct, T4S, R2E; then*

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- 6) Proceed east-northeast 0.2 mile along the Hetch Hetchy Aqueduct to the 1880 ft. elevation line just west of 612000m E north of 4160000m N; then
- 7) Proceed northwest in a straight line 5.0 miles onto the La Costa Valley map to the northern-most intersection of the 860 ft. elevation line and Highway 84 just west of 605000m E north of 4164000m N; then
- 8) Proceed east in a straight line 3.6 miles onto the Mendenhall Springs map to the northwest corner of the dam on Arroyo Valley southwest of 611000m E 4164000m N; then
- 9) Proceed northeast in a straight line 1.7 miles onto the Altamont map to the western edge of a dam on Dry Creek southwest of 613000m E 4167000m N; then
- 10) Proceed southeast in a straight line 1.3 miles onto the Mendenhall Springs map to the intersection of Mines Road and Del Valle Road southeast of 614000m E 4165000m N; then
- 11) Proceed northeast in a straight line 1.4 miles onto the Altamont map to the intersection of Crane Ridge Road and the 1000 ft. elevation line northeast of 616000m E 4166000m N; then
- 12) Proceed northeast in a straight line 2.0 miles to the intersection of Tesla Road and the 1000 ft. elevation line southeast of 619000m E 4168000m N; then
- 13) Proceed east along Tesla Road 2.9 miles onto the Midland map to the starting point.

### ***Vallecitos***

The Vallecitos district represents the highlands east of Sunol and south of Pleasanton, including the Vallecitos Valley and La Costa Valley. The area is influenced by airflow through the Vallecitos Valley and is dominated by Positas and Millsholm-Los Osos-Los Gatos-Lodo associated soils, with a large pocket of Fontana-Diablo-Altamont associated soils, but excludes, for the most part, Yolo-Tehama-Pleasanton-Mocho Mollisols.

**Climate:** Airflow through Mission Pass has a moderating effect on this region, making it cooler than the Valle de Oro district. Air passing through this district also plays a role in cooling the Crane Ridge and Tesla districts. Its position farther from the Pacific Ocean and San Francisco Bay, however, leads to slightly warmer temperatures and drier conditions than what its position in line with a Pacific air gap would suggest.

**Soils:** Vallecitos is dominated by the deeper Positas soils in and around much of the Vallecitos Valley, but also the thin Millsholm-Los Osos-Los Gatos-Lodo soils in the southern part of the district. A large pocket of Fontana-Diablo-Altamont soils exists northeast of the Vallecitos Valley. Sandstone parent materials dominate.

**Slope:** This district includes relatively broader valleys perched on the highlands of the southern Livermore Valley AVA. The Vallecitos Valley is generally above 400 feet, while the La Costa Valley is generally above 500 feet, both similar to elevations of the Livermore Valley but higher than the Sunol Valley floor to the west. The valleys are flanked by steeper more mountainous terrain to the north and south. Elevations exceeding 1200 feet are found to the north and south.

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### Boundary Descriptions

From the starting point at the intersection of Bernal Avenue and Hearst Drive on the Livermore map northwest of 601000m E 4168000m N;

- 1) Proceed southeast in a straight line 3.7 miles onto the La Costa Valley map to the northern-most intersection of the 880 ft. elevation line and Highway 84 just west of 605000m E north of 4164000m N; then
- 2) Proceed southeast in a straight line 5.0 miles onto the Mendenhall Springs map to the intersection of the Hetch Hetchy Aqueduct and the 1880 ft. elevation line just west of 612000m E north of 4160000m N; then
- 3) *Proceed west-southwest along the Hetch Hetchy Aqueduct 4.3 miles onto the La Costa Valley map to the R1E/R2E range line; then*
- 4) *Proceed southwest in a straight line 3.9 miles to BM 533 at Calaveras Road, Section 10, T5S, R1E; then*
- 5) Proceed north along Calaveras Road 5.1 miles to its intersection with Interstate 680 southwest of 600000m E 4161000m N; then
- 6) Proceed north along Interstate 680 3.7 miles onto the Niles map then Dublin map to its intersection with Sunol Boulevard northeast of 598000m E 4166000m N; then
- 7) Proceed northeast along Sunol Boulevard 1.4 miles to Bernal Avenue at 599000m E north of 4168000m N; then
- 8) Proceed east, then northeast along Bernal Avenue 1.1 miles onto the Livermore map to the starting point.

### ***Sunol***

This district includes the area around Sunol including the Sunol Grade and the Sunol Valley. Temperatures vary by elevation, but the area's temperatures are moderated by Pacific air flowing through Mission Pass over the Sunol Grade. Soils are dominated by Millsholm-Los Osos-Las Gatos-Lodo associated soils in the higher elevations with Yolo-Tehama-Pleasanton-Mocho associations on the Sunol Valley floor. Sandstone is the primary parent material.

**Climate:** Despite representing one of the wind gaps along the highlands east of the San Francisco Bay, the region is also more removed from the Pacific Ocean than wind gaps to the north. Several protected pockets are found within the district, leading to overall warmer temperatures than the western highlands found to the north. The area is also drier than the highlands and valleys to the north. Nevertheless, temperatures in Sunol are cooler than those found on the Livermore Valley floor or in the warmer locations of Altamont to the east. As noted below, a greater percent of slopes has eastern or northern exposure. Slopes with eastern exposure experience greater insolation during earlier diurnal hours when temperatures are cooler, while northern exposure slopes receive less direct sunlight hence experiencing lower evapotranspiration rates. Slopes with some southeastern exposure receive greater insolation throughout the day but are still subject to earlier morning exposure than west facing slopes.

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**Soils:** Soils are dominated by alluvial Yolo-Tehama-Pleasanton-Mocho soils to the thin Millsholm-Los Osos-Los Gatos-Lodo soils. A thin band of Positas are found north of Sunol. Sandstone, and to a lesser extent shale and mudstone are primary parent materials.

**Slope:** Sunol Valley runs north/south widening along Interstate 680. The Sunol Valley floor sits about about 250 feet. Elevations increase to the west into the Niles Canyon, Sunol Grade, and towards Mission Peak. Although notable exceptions exist, most slopes have eastern/southeastern exposure towards Sunol Valley or northern exposure towards the Niles Canyon or Mission Pass.

### Boundary Descriptions

From the starting points at the intersection of Interstate 680 and Sunol Boulevard on the Dublin map northeast of 598000m E 4166000m N;

- 1) Proceed south along Interstate 680 3.7 miles onto the Niles map then Las Costa Valley map to its intersection with Calaveras Road southwest of 600000m E 4161000m N; then
- 2) *Proceed south along Calaveras Road 5.1 miles to BM 533, Section 10, T5S, R1E; then*
- 3) *Proceed west-northwest in a straight line 1.8 miles onto the Niles map to the intersection of section 5, T5S, R1E and the Fremont city boundary; then*
- 4) *Proceed northwest in a straight line 1.1 miles to an unnamed peak of 1291 ft., section 32, T4S, R1E; then*
- 5) *Proceed northwest in a straight line 1.1 miles to an unnamed peak of 1058 ft., section 30, T4S, R1E; then*
- 6) *Proceed northwest in a straight line 3.8 miles to BM161 at Niles Canyon Road; then*
- 7) Proceed east along Niles Canyon Road 3.5 miles to its intersection with the 240 ft. elevation line northeast of 597000m E 4161000m N; then,
- 8) Proceed northeast in a straight line 0.5 mile to the intersection of Kilkare Road and the 320 ft. elevation line northwest of 598000m E 4162000m N; then
- 9) Proceed north along Kilkare Road 0.6 mile to its intersection with the 400 ft. elevation line west of 598000m E just south of 4163000m N; then
- 10) Proceed north-northeast in a straight line 2.0 miles onto the Dublin map to the intersection of an unnamed road known locally as Castlewood Drive east of its intersection with Foothill Road and west of its intersection with Sunol Boulevard/Pleasanton Sunol Road, at its intersection with Arroyo de la Laguna northwest of 598000m E 4166000m N; then
- 11) Proceed east-northeast along this unnamed road known locally as Castlewood Drive 0.2 mile to its starting point.

### ***Palomares***

This district includes the highlands between Dublin/San Ramon and Hayward/San Leandro, specifically the highlands along and around Palomares Road and Bollinger Canyon. This district is the coolest in the Livermore Valley AVA, with Pacific air flow having its greatest impact. Parent material is primarily sedimentary rock, with sandstone common in the north and mudstone common in the south. Millsholm-Los Osos-Los

## The Viticultural Districts of the Livermore Valley AVA

Gatos-Lodo soils dominate. Existing viticulture is currently concentrated along Palomares Road.

**Climate:** The climate of Palomares is the coolest in the Livermore Valley AVA, with the climate model utilized in Climate Report suggesting GDD accumulations 800°F to 1000°F lower than the Livermore Valley floor. Not only is this area closer to San Francisco Bay, but most of the Pacific airflow moving into the Livermore Valley travels through this district. While the Livermore Valley may have traditionally been seen as a Region III climate type, normal temperatures in Palomares better reflect a Region II climate type. As the first line of ridges that air traveling through the Golden Gate reaches, air rising over these highlands is more likely to experience condensation, making the area wetter, with greater precipitation than the rest of the Livermore Valley AVA.

**Soils:** The area is recognized almost exclusively by the Millsholm-Los Osos-Los Gatos-Lodo associated soils. The northern section of the of the Palomares district surrounding Bollinger Canyon is underlain with sandstone. Much of the section south of Interstate 580 is home to mudstone, a further distinction from other districts within the Livermore Valley AVA, as this is the only location within the AVA where mudstone is the most common underlying rock.

**Slope:** This district is dominated by steep upland ridges. Elevations are not as high as Mt. Diablo or Mendenhall Springs. Sunol Ridge exceeds 2160 feet in elevation, although most of the viticulture along Palomares Road is found in the 800 to 1200 feet range. Slopes in the district are commonly above 30%. Slopes above 40% are not uncommon.

### Boundary Descriptions

Starting at the summit of Las Trampas Peak, *section 22, T1S, R2W* on the Las Trampas Ridge southeast of 582000m E 4188000m N;

- 1) Proceed southeast in a straight line 1.8 miles to an unnamed mountain with a summit at just over 1560 feet northeast of 584000m E 4186000m N; then
- 2) Proceed southeast in a straight line 0.9 mile to a summit on Las Trampas Ridge at just over 1720 feet northwest of 586000m E 41875000m N; then
- 3) Proceed southeast in a straight line 2.8 miles onto the Diablo map to the terminus of Peters Ranch Road just east of 589000m E south of 4183000m N; then
- 4) Proceed southwest in a straight line 1.0 mile to the intersection of Bollinger Canyon Road and Crow Canyon Road west of 589000m E north of 4181000m N; then
- 5) Proceed southeast along Bollinger Canyon Road 1.0 mile to its intersection with Norris Canyon Road northwest of 590000m E 4180000m N; then
- 6) Proceed south-southwest in a straight line 1.4 miles onto the Dublin map to the intersection of Ashbourne Circle and Hawkshead Circle just east of 589000m E south of 4178000m N; then
- 7) Proceed southeast in a straight line 0.6 mile to the summit of Harlan Hill west of 590000m E just north of 41177000m N; then
- 8) Proceed southeast in a straight line 1.7 miles to where the Contra Costa County-Alameda County line turns from a northeast/southwest direction to a



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- northwest/southeast direction at the 920 elevation line northwest of 592000m E 4175000m N; then
- 9) Proceed southeast in a straight line 0.5 mile to the western-most intersection of Creekside Drive with an unnamed road known locally as Brittany Drive southeast of 592000m E 4175000m N; then
  - 10) Proceed south-southwest in a straight line 1.1 miles to the intersection of Inspiration Drive and Dublin Boulevard southeast of 592000m E 4173000m N; then
  - 11) Proceed southeast in a straight line 3.2 miles to the terminus of Santos Ranch Road southwest of 595000m E 4169000m N; then
  - 12) Proceed southeast in a straight line 1.2 miles to the intersection of Longview Drive and Twelve Oaks Drive northeast of 596000m E 4167000m N; then
  - 13) Proceed southeast in a straight line 1.2 miles to the intersection of an unnamed road known locally as Castlewood Drive east of its intersection with Foothill Road and west of its intersection with Sunol Blvd/Pleasanton Sunol Road, at its intersection with Arroyo de la Laguna northwest of 598000m E 4166000m N; then
  - 14) Proceed south-southwest in a straight line 2.0 miles onto the Niles map to the intersection of Kilkare Road and the 400 ft. elevation line west of 598000m E 4163000m N; then
  - 15) Proceed south along Kilkare Road to the 320 ft. elevation line northwest of 598000m E 4162000m N; then
  - 16) Proceed southwest in a straight line 0.5 mile to the intersection of Niles Canyon Road and the 240 ft. elevation line northeast of 597000m E 4161000m N; then
  - 17) *Proceed west along Niles Canyon Road 3.5 miles west to BM161; then*
  - 18) Proceed northwest in a straight line a short distance to Palomares Road southwest of 593000m E 4162000m N; then
  - 19) *Proceed north along Palomares Road 0.6 mile<sup>1</sup> to its intersection with a power transition line, section 11, T4S, R1W; then*
  - 20) *Proceed northwest along the power transmission line 6.7 miles<sup>2</sup> onto the Dublin map, then onto the Hayward map to the point where the transmission line turns nearly west, approximately 500 feet south of an unnamed summit of 891 feet, T3S, R2W; then*
  - 21) *Proceed north-northwest in a straight line 1.4 miles to unnamed summit of 840 feet, T3S, R2W; then*
  - 22) *Proceed north-northeast in a straight line 3.4 miles to the point where the Contra Costa County-Alameda County line turns to the northwest, approximately 0.4 mile west of Wiedemann Hill, section 20, T2S, R1W<sup>3</sup>; then*
  - 23) *Proceed northwest along the meandering Contra Costa County-Alameda County line 6.0 miles onto the Las Trampas Ridge map. then the Diablo map, then back*

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<sup>1</sup> The official boundary description has this intersection occurring at 0.7 mile, but this analysis has the distance at 0.64 mile, or 0.6 when rounded to the nearest tenth of a mile.

<sup>2</sup> The official boundary description has this distance at 6.4 miles, but this analysis has the distance at 6.65 miles, or 6.7 miles when rounded to the nearest tenth of a mile.

<sup>3</sup> This point was originally on the Dublin map, but is now on the Hayward map.

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*onto the Las Trampas Ridge map to a point where the Contra Costa County-Alameda County map turns to the west-northwest, section 35, T1S, R2W; then*  
24) Follow a straight line north-northwest 2.7 miles to the starting point.

### ***San Ramon Valley***

This district represents the protected sections of the San Ramon Valley around Danville and the city of San Ramon. Of the districts studied for this analysis, this district is perhaps the least understood, despite being well-populated. Climate likely varies by elevation, with cooler temperatures in valley floors or on north-facing slopes and warmer temperatures on exposed south-facing slopes. Viticulture is primarily limited to small plots on larger residential lots, not unlike viticulture found in the Lamorinda AVA to the northwest. Soils on the valley floor, representing much of the area, are alluvial, dominated by the Clear Lake series. Soils along the valley walls have sandstone parent material, with Millsholm-Los Osos-Los Gatos-Lodo soils found along the western valley wall and Fontana-Diablo-Altamont soils along the eastern wall.

**Climate:** Reliable, long-term climatic data were not available for this region (the closest weather stations, with three years of data assessed, are located in Alamo to the north and Dublin to the south), but the PRISM climate model utilized suggests temperatures are somewhat consistent with the Tesla and Crane Ridge districts. The San Ramon Valley likely has greater climate variability, however, as the area should be subject to greater air drainage off higher elevations to the east and west. Bollinger Canyon to the west is decidedly cooler, as are the higher elevations of Mt. Diablo further to the east. The Mt. Diablo Highlands district have even greater climatic variability, with the sections of the Mt. Diablo Highlands immediately adjacent to the San Ramon Valley district mostly warmer than the San Ramon Valley. The climate model does, however, suggest higher average precipitation totals than those found in the viticulturally active districts in south Livermore, with possibly 3-5 more inches of precipitation on average. Hence, the San Ramon Valley could be thought of as similar in temperature to, but wetter than, the Tesla district.

**Soils:** The valley floor is primarily alluvium, with Clear Lake soils the most common association. Pockets of Fontana-Diablo-Altamont soil units dominate the eastern valley wall. Millsholm-Los Osos-Los Gatos-Lodo soils are common to the western valley wall.

**Slope:** The San Ramon Valley is well-defined by a broad alluvial valley floor (0%-5%), with steeper slopes to the west (mostly 10% to 30%) and modestly steeper slopes on the eastern valley wall (mostly 5% to 15%). The valley floor mostly sits at an elevation of 480 feet while the western wall approaches 1800 feet and the eastern wall is typically 600 to 1000 feet.

### **Boundary Description**

From the starting point at the intersection of Valley Oaks Drive and the 360 ft., elevation line on the Las Trampas Ridge map at 587000m E south of 4190000m N;

- 1) Proceed south-southeast in a straight line 0.7 mile to the intersection of El Alamo and El Pintado Road southeast of 587000m E 4189000m N; then

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- 2) Proceed southeast in a straight line 1.8 miles onto the Diablo map to the terminus of an unnamed road known locally as Santiago Road/Lane on Boon Hill northwest of 590000m E 4187000m N; then
- 3) Proceed southeast in a straight line 2.0 miles to the terminus of Shadewell Drive northwest of 593000m E 4186000m N; then
- 4) Proceed south-southwest in a straight line 1.2 miles to the terminus of Shurburne Hills Road northeast of 592000m E 4184000m N; then
- 5) Proceed southeast in a straight line 1.6 miles to the southwestern intersection of Reedland Circle and Crow Canyon Road southeast of 594000m E 4183000m N; then
- 6) Proceed south in a straight line 3.5 miles onto the Dublin map the intersection of Alcosta Boulevard and Old Ranch Road northwest of 595000m E 4177000m N; then
- 7) Proceed south then southwest along Alcosta Boulevard 1.5 miles onto the Dublin map to its intersection with Interstate 680 and the Contra Costa County-Alameda County line just east of 595000m E north of 4173000m N; then
- 8) Proceed west-southwest along the Contra Costa County-Alameda County line 1.2 miles to where the county line turns from a northeast/southwest direction to a northwest/southeast direct at the 920 ft. elevation line northwest of 592000m E 4175000m N; then
- 9) Proceed northwest in a straight line 1.7 miles to the summit of Harlan Hill northwest of 590000m E 4177000m N; then
- 10) Proceed northwest in a straight line to the intersection of Hawkshead Circle and Ashbourne Circle at the 1200 ft. elevation line just east of 589000m E south of 4178000m N; then
- 11) Proceed north-northeast in a straight line 1.4 miles onto the Diablo map to the intersection of Bollinger Canyon road and Norris Canyon Road west of 590000m E north of 4180000m N; then
- 12) Proceed northwest along Bollinger Canyon Road 1.0 mile to its intersection with Crow Canyon Road west of 589000m E just north of 4181000m N; then
- 13) Proceed northeast in a straight line 1.0 mile to the terminus of Peters Ranch Road just east of 589000m E south of 4183000m N; then
- 14) Proceed northwest in a straight line 2.8 miles onto the Las Trampas Ridge map to a summit on Las Trampas Ridge at just over 1720 feet northwest of 586000m E 4185000m N; then
- 15) Proceed northwest in a straight line 0.9 mile to an unnamed mountain with a summit at just over 1560 feet northeast of 584000m E 4186000m N; then
- 16) Proceed northwest in a straight line 1.8 miles to the summit of Las Trampas Peak, section 22, T1S, R2W on Las Trampas Ridge southeast of 582000m E 4188000m N; then
- 17) Proceed northeast in a straight line 3.2 miles to the starting point.

### ***Mt. Diablo Highlands***

This area is dominated by ridgelines and hills over 600 feet, including the summit and southern slopes of Mt. Diablo and the Black Hills. The ridges are interspersed with relatively broad valleys dominated by Clear Lake alluvium, with ridgelines of

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sedimentary parent material. Fontana-Diablo-Altamont soils are common, with thin Millsolm-Los Osos-Los Gatos-Lodo association soils dominating the higher elevations. Viticulture is limited in the area, but significant potential exists, especially on south facing slopes.

**Climate:** Like the San Ramon Valley, a lack of long-term data complicates the assessment of climate in the Mt. Diablo Highlands. At lower elevations, temperatures appear similar to those found in the Tesla district, but perhaps slightly warmer than the Crane Ridge district. The one station below 1000 feet asl with some usable data for 2016-2015 showed similar GDD to stations found in the Tesla district, supporting the climate model showing this similarity. High elevations, however, are subject to standard cooling with elevation, with the summit of Mt. Diablo being one of the coolest locations within the Livermore Valley AVA. Hence, with greater variability in elevations and alternating valleys and ridgelines, the district likely has greater climatic variability than what is found in the Tesla district. Further, the area experiences greater rainfall, a result of uplift and cooling of air moving inland over the higher elevations.

**Soils:** For most of the district south of Mt. Diablo, soils are predominantly Fontana-Diablo-Altamont associated soils in the uplands, with Clear Lake soils in the valleys. A large number of vertisol clays and mollisol clay loams cover the area. The underlying geology is almost exclusively sandstone material, with some alluvial deposits at lower elevations. The higher elevations of Mt. Diablo and the Black Hills are dominated by Millsolm-Los Osos-Los Gatos-Lodo soils also with sandstone, and a pocket of mudstone, parent material.

**Slope:** Upturned sedimentary rock creates a pattern of northwest-southeast running ridgelines. A trellis stream pattern through the alternating layers of more resistant rock creates a number of smaller northeast-southwest running streams and corresponding ridge spurs. Several broader stream valleys cut either along the ridgelines or generally perpendicular to the ridgelines, leaving slopes ranging from 0% to greater than 30%, facing generally northeast, northwest, southwest, and southeast. The terrain becomes increasingly mountainous moving north, commonly exceeding 30% closer to the summit of Mt. Diablo. For most of the southern parts of the district, elevations are typically 500 to 1200 feet, but increase moving north. The summit of Mt. Diablo is at 3865 feet.

### Boundary Description

*Starting on the Clayton map at the summit of Mt. Diablo VABM 3849 on the intersection of the Mt. Diablo Baseline and Mt. Diablo Meridian;*

- 1) Proceed southeast in a straight line 14 miles onto the Diablo map, then Tassajara map, then Byron Hot Springs map to the summit of Brushy Peak southeast of 614000m E 4181000m N; then
- 2) Proceed southeast in a straight line 2.6 miles onto the Byron Hot Springs map to the intersection of Vasco Road and the 920 ft. elevation line southeast of 611000m E 4180000m N; then

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- 3) Proceed south along Vasco Road 2.3 miles onto the Altamont map to its intersection with the 540 ft. elevation line southeast of 612000m E 4177000m N; then
- 4) Proceed in a westerly direction along the 540 ft. elevation line approximately 1.4 miles to 4177000m N just east of 611000m E; then
- 5) Proceed northwest in a straight line 1.1 miles to the intersection of Dagnino Road and the 600 ft. elevation line northwest of 611000m E 4178000m N; then
- 6) Proceed in a westerly direction along the 600 ft. elevation line 2.3 miles onto the Livermore map, then Tassajara map, then Livermore map, then Tassajara map to its intersection with Livermore Avenue east of 608000m E just south of 4179000m N; then
- 7) Proceed north along Livermore Avenue 0.1 mile to its intersection with Manning Road east of 608000m E just north of 4179000m N; then
- 8) Proceed west along Manning Road 0.3 mile to its intersection with Cayetano Creek just northwest of 608000m E 4179000m N; then
- 9) Proceed south along Cayetano Creek 2.4 miles onto the Livermore map to its intersection with Hartman Road southwest of 608000m E 4176000m N; then
- 10) Proceed west along Hartman Road 0.3 mile to its first intersection with the 560 ft. elevation line southeast of 607000m E 4176000m N; then
- 11) Proceed southwest in a straight line 1.4 miles to the intersection of Collier Canyon Road and Heligan Lane northeast of 605000m E 4174000m N; then
- 12) Proceed southwest in a straight line 1.1 miles to the intersection of N Canyons Parkway and Doolan Road northwest of 604000m E 4173000m N; then
- 13) Proceed west-northwest in a straight line 1.5 miles to the intersection of Dublin Boulevard and Fallon Road southeast of 601000m E 4174000m N; then
- 14) Proceed northwest in a straight line 1.4 miles to the intersection of Tassajara Road and S Dublin Ranch Drive west of 600000m E just south of 4175000m N; then
- 15) Proceed northwest in a straight line 3.1 miles onto the Dublin map to the intersection of Alcosta Boulevard and Stagecoach Road southwest of 595000m E 4177000m N; then
- 16) Proceed north-northwest along Alcosta Boulevard 0.4 mile to its intersection with Old Ranch Road northwest of 595000m E 4177000m N; then
- 17) Proceed north in a straight line 3.5 miles onto the Diablo map to the southwestern intersection of Crow Canyon Road Reedland Circle southeast of 594000m E 4183000m N; then
- 18) Proceed northwest in a straight line 1.6 miles to the terminus of Shurburne Hills Road northeast of 592000m E 4184000m N; then
- 19) Proceed northeast in a straight line 1.2 miles to the terminus of Shadewell Drive northwest of 593000m E 4186000m N; then
- 20) Proceed northwest in a straight line 2.0 miles to the terminus of an unnamed road known locally as Santiago Road/Lane on Boon Hill northwest of 590000m E 4187000m N; then
- 21) Proceed northwest in a straight line 1.8 miles onto the Las Trampas map to the intersection of El Alamo and El Pintado Road southeast of 587000m E 4189000m N; then

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- 22) Proceed north-northeast in a straight line 0.7 mile to the intersection of Valley Oaks Drive and the 360 ft., elevation line on the Las Trampas Ridge map at 587000m E south of 4190000m N;
- 23) Proceed northeast in a straight line 5.7 miles onto the Diablo map to the starting point.

### ***Altamont***

The hills of the Altamont district are the driest and, excluding areas on the valley floor impacted by the urban heat island, warmest part of the Livermore Valley AVA. The area is the farthest removed from the coastal influences, reducing moderating influences of temperature and coastal fog. Air moving farther inland doesn't experience enough uplift to create greater precipitation. The expanding and cracking Vertisol soils are common, with Fontana-Diablo-Altamont soils series most common. Elevations are generally above 1000 feet.

**Climate:** The Altamont district sits in a position of transition from the climate of the Livermore Valley and the climate of the San Joaquin Valley to the east. As temperatures are both warmer and drier on the leeward side of the Altamont hills, the Altamont district would be expected to be the warmest and driest district within the Livermore Valley AVA. The elevated position should allow for cooler temperatures at the higher elevations and some uplift of moist air, which may allow for greater precipitation. Interpolations between weather station observations and the climate model do not necessarily agree on these points. Observations just west of Altamont provide some of the lowest average annual precipitation totals in the Livermore Valley AVA. The lack of vegetation offers further clues to the drier conditions, which may be in part due to increased potential evapotranspiration. Overall, both the model and observations of existing stations agree that the Altamont district is warmer than the viticultural districts of the Tesla district with less available moisture, and a safe assumption would be that the Altamont district is one of the driest in the AVA.

**Soils:** Altamont soils are predominantly of the Fontana-Diablo-Altamont association. Altamont series soils are typically well drained clay loam to loam derived from sandstone and shale. The nature of Vertisols allows for good drainage with slow permeability.

**Slope:** Although elevations below 600 feet and above 2100 feet exist, the general elevation range is between 700 and 2000 feet.

### Boundary Descriptions

Starting at the northeast corner of section 18, T2S, R3E on the Byron Hot Springs map;

- 1) *Proceed southeast in a straight line 1.8 miles onto the Altamont map to BM720, section 21, T2S, R3E; then*
- 2) *Proceed south-southeast in a straight line 0.9 mile<sup>4</sup> to an unnamed peak of 1,147 feet, section 28, T2S, R3E; then*

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<sup>4</sup> The official boundary description has this boundary at approximately 1 mile, but this review has the boundary length at 0.94 mile, or 0.9 mile when rounded to the nearest tenth of a mile.

## The Viticultural Districts of the Livermore Valley AVA

- 3) *Proceed south-southwest a straight line 1.1 miles to the intersection of the eastern boundary of section 32, T2S, R3E and Interstate 580; then*
- 4) *Proceed in a straight line southeast 2.7 miles to BM1602 in Patterson Pass, section 10, T3S, R3E; then*
- 5) *Proceed south-southeast in a straight line onto the Midway map to BM1600 adjacent to Tesla Road, section 26, T3S, R3E; then*
- 6) *Proceed west along Tesla Road 2.9 miles onto the Altamont map to its intersection with the 1000 ft. elevation line southeast of 619000m E 4168000m N; then*
- 7) *Proceed northwest in a straight line 1.0 mile to the intersection of Ruess Road and the 980 ft. elevation line northwest of 619000m E 4169000m N; then*
- 8) *Proceed northwest in a straight line 1.1 miles to the intersection of Cross Road and its southern intersection with the 1000 ft. elevation line southeast of 618000m E 4171000m N; then*
- 9) *Proceed north along Cross Road 0.7 mile to its intersection with Patterson Pass Road southeast of 618000m E 4172000m N; then*
- 10) *Proceed north in a straight line 1.1 mile to the intersection of Flynn Road and the 1000 ft. elevation line just east of 618000m E north of 4173000m N; then*
- 11) *Proceed west, then south along Flynn Road 1.1 miles to its intersection with Patterson Pass Road southwest of 617000m E 4173000m N; then*
- 12) *Proceed west along Patterson Pass Road 0.3 mile to its intersection with the 700 ft. elevation line southeast of 6161000m E 4173000m N; then*
- 13) *Proceed in a northerly direction along the 700 ft. elevation line 5.0 miles to its intersection with Interstate 580 at 615000m E north of 4175000m N; then*
- 14) *Proceed northwest in a straight line 2.2 miles to the intersection of Vasco Road and the 600 ft. elevation line; then*
- 15) *Proceed north along Vasco Road 1.8 miles onto the Byron Hot Springs map to its intersection with the 920 ft. elevation line; then*
- 16) *Proceed east-northeast in a straight line 1.8 miles to the summit of Brushy Peak southeast of 614000m E 4181000m N; then*
- 17) *Proceed due south in a straight line 400 feet to the northern boundary of section 13, T2S, R2E; then*
- 18) *Proceed east along the northern boundary of section 13 and section 18, T2RS, R2E 1.4 miles to the starting point.*

### ***Valle de Oro***

The urban corridor along Interstate 580, including much of Livermore, eastern Dublin, and eastern Pleasanton, is impacted by the urban heat island effect (UHI), which usually impacts low temperatures and helps offset the need for frost protection. The U.S. Environmental Protection Agency estimates temperatures increases of between 1.8°F and 5.4°F per million people. While the urban centers of Livermore, Pleasanton, and Dublin collectively do not approach a population of one million, research has shown that much smaller population centers can still have a heat island effect.<sup>5</sup> This area is primarily on the Livermore Valley floor south of the Mt. Diablo foothills. The urban centers of western

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<sup>5</sup> Magee, N., Curtis, J., and Wendler, G., "The Urban Heat Island Effect at Fairbanks, Alaska," *Theoretical and Applied Climatology*, Vol 64, Issue 1, 1999, pp. 39-47.

## The Viticultural Districts of the Livermore Valley AVA

Dublin and downtown Pleasanton, while contributing to UHI, have greater moderating influences from Pacific airflow. The Climate Report, however, suggests the impact of this UHI may be moving west.

**Climate:** The Valle de Oro is the area most impacted by the urban heat island impact. Heat summations over the last ten years show GDD several hundred degree days greater than weather station observations to the east and to the west. The climate model shows warmer temperatures, but with lower distinctions in totals, than observations at local weather stations suggest, especially when analyzing temperature normals. Recent population growth may explain the discrepancies in the size of the temperature differentials. Precipitation, meanwhile, is consistent with totals found in much of the Livermore Valley, excluding the locations farther to the east.

**Soils:** With its position on the Livermore Valley floor, this region is dominated by alluvium. The most significant soils are Yolo-Tehama-Pleasanton-Mocho associated soils. Pleasanton series soils are deep and well drained gravelly fine sandy loams. Clear Lake and San Ysidro-Rincon soils are more common in the northern part of the district. Clear Lake soils are especially common northeast of the city of Livermore.

**Slope:** Most of the area is between 400 and 560 feet, with areas below 400 feet in the western part the district. Further, a few rolling hills with elevations exceeding 700 feet are found in the district.

### Boundary Descriptions

From the starting point at the intersection of Vasco Road and the 600 ft. elevation line on the Altamont map east of 612000m E just south of 4178000m N;

- 1) Proceed southeast in a straight line to the intersection of Interstate 580 and the 700 ft. elevation line; then
- 2) Proceed west along Interstate 580 0.3 mile to its intersection with Greenville Road northeast of 614000m E 4175000m N; then
- 3) Proceed west in a straight line 1.3 miles to the intersection of Scenic Avenue and Vasco Road northeast of 612000m E 4175000m N; then
- 4) Proceed south along Vasco Road 2.6 miles to E Avenue 613000m E 4171000m N; then
- 5) Proceed west along E Avenue 0.9 mile to its intersection with Buena Vista Avenue west of 612000m E just north of 4171000m N; then
- 6) Proceed west-southwest in a straight line 1.2 miles onto the Livermore map to the intersection of College Avenue and S Livermore Avenue northwest of 610000m E 4170000m N; then
- 7) Proceed southeast along S Livermore Avenue 0.5 mile onto the Altamont map to its intersection with Concannon Boulevard west of 611000m E south of 4170000m N; then
- 8) Proceed south, then west along Concannon Boulevard 3.6 miles onto the Livermore map to its intersection with State Highway 84 southeast of 605000m E 4169000m N; then



## The Viticultural Districts of the Livermore Valley AVA

- 9) Proceed northwest in a straight line 3.4 miles to the intersection of El Charro Road and W Jack London Boulevards west of 602000m E south of 4173000m N; then
- 10) Proceed north along El Charro Road becoming Fallon Road 0.6 mile to its intersection with Dublin Boulevard southeast of 601000m E 4174000m N; then
- 11) Proceed east-southeast in a straight line 1.5 miles to the intersection of N Canyons Parkway and Doolan Road southwest of 604000m E 4171000m N; then
- 12) Proceed northeast in a straight line 1.1 miles to the intersection of Collier Canyon Road and Heligan Lane northeast of 605000m E 4174000m N; then
- 13) Proceed northeast in a straight line 1.4 miles to the eastern intersection of the 560 ft. elevation line and Hartman Road southeast of 607000m E 4176000m N; then
- 14) Proceed east along Hartman Road 0.3 mile to its intersection with Cayetano Creek southwest of 608000m E 4176000m N; then
- 15) Proceed north along Cayetana Creek 2.4 miles onto the Tassajara map to its intersection with Manning Road just northwest of 608000m E 4179000m N; then
- 16) Proceed east along Manning Road 0.3 mile to its intersection with N Livermore Avenue east of 608000m E just north of 4179000m N; then
- 17) Proceed south along N Livermore Avenue 0.1 mile to its intersection with the 600 ft. elevation line east of 608000m E just south of 4179000m N; then
- 18) Proceed in an easterly direction along the 600 ft. elevation line approximately 2.3 miles onto the Livermore map, then Tassajara map, then Livermore map, then Altamont map to its intersection with Dagnino Road northwest of 61100m E 4178000m N; then
- 19) Proceed southeast in a straight line 1.1 miles to the intersection of the 540 ft. elevation line and 4177000m N just east of 611000m E; then
- 20) Proceed in an easterly direction along the 540 ft. elevation line approximately 0.8 mile to its intersection with Vasco Road northeast of 612000m E 4176000m N; then
- 21) Proceed north along Vasco Road 0.8 mile to the starting point.

### ***Amador Valley***

The Amador Valley district includes the junction of the San Ramon, Amador and Livermore Valleys, approximately around the Interstate 580 and Interstate 680 junction. Airflow over the Dublin Grade, Sunol Grade, and up the canyons west of the San Ramon Valley converge, moderating temperatures. More recently, the UHI appears to be having some impact on temperatures in this district, but it remains cooler than areas to the north and east and the protected portions of the Amador Valley to the south. A dominant soil unit is the Clear Lake soil, with some Positas soils located along the western edge of the area off the valley floors.

**Climate:** While also subject to the heat island influence, the area is near the confluence of Pacific airflow patterns into Livermore Valley, moderating temperatures. Recent models suggest that recent temperatures may be higher with more recent population growth along Interstate 580. Ten-year temperatures observations, however, show cooler temperatures at Pleasanton than at Livermore.

## The Viticultural Districts of the Livermore Valley AVA

**Soils:** Soils are predominantly Clear Lake, with Yolo-Tehama-Pleasanton-Mocho soils in the southern part of the district. Some of the higher elevations are home to Positas associated soils, with Millsholm-Los Osos-Los Gatos-Lodo soils found in the higher elevations along the western edge of the district.

**Slope:** Most of the area is below 400 feet, but exceeds 1700 feet along its western edge at Harlan Hill. Slopes range from less than 5% on the valley floors to over 40% on the western edge of the district.

### Boundary Descriptions

Starting at the intersection of S Dublin Ranch Drive and Tassajara Road on the Livermore map west of 60000m E just south of 4175000m N;

- 1) Proceed southeast in a straight line 1.4 miles to the intersection of Dublin Boulevard and Fallon Road southeast of 601000m E 4174000m N; then
- 2) Proceed south along Fallon Road becoming El Charro Road 0.6 mile to its intersection with W Jack London Boulevard west of 602000m E south of 4173000m N; then
- 3) Proceed southeast in a straight line 3.4 miles to the intersection of State Highway 84 and Concannon Boulevard southeast of 605000m E 4169000m N; then
- 4) Proceed south along State Highway 84 0.6 mile to Vineyard Avenue southeast of 605000m E 4169000m N; then
- 5) Proceed west along Vineyard Avenue 3.1 miles onto the Dublin map to its intersection with Bernal Avenue northwest of 601000m E 4169000m N; then
- 6) Proceed south, then west along Bernal Avenue 1.8 miles to its intersection with Sunol Boulevard at 599000m E north of 4168000m N; then
- 7) Proceed southwest along Sunol Boulevard 1.4 miles to the intersection with an unnamed road known locally as Castlewood Road, just west of Pleasanton Sunol Road, just west of Interstate 680 northeast of 598000m E 4166000m N; then
- 8) Proceed southwest along this unnamed road known locally as Castlewood Road 0.2 mile to the intersection with Arroyo de la Laguna northwest of 598000m E 4166000m N; then
- 9) Proceed northwest in a straight line 1.2 miles to the intersection of Longview Drive and Twelve Oaks Drive northeast of 596000m E 4167000m N; then
- 10) Proceed northwest in a straight line 1.2 miles to the terminus of Santos Ranch Road southwest of 595000m E 4169000m N; then
- 11) Proceed northwest in a straight line 3.2 miles to the intersection of Inspiration Drive and Dublin Boulevard southeast of 592000 E 4173000m N; then
- 12) Proceed north-northeast in a straight line 1.1 miles to the western-most intersection of Creekside Drive with an unnamed road known locally as Brittany Drive, southeast of 592000m E 4175000m N; then
- 13) Proceed northwest in a straight line 0.5 mile to where the Contra Costa County-Alameda County line turns from a northeast/southwest direction to a northwest/southeast direction at the 920 ft. elevation line northwest of 592000m E 4175000m N; then

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- 14) Proceed east-northeast along the Contra Costa County-Alameda County Line 1.2 miles to its intersection with Interstate 680 and Alcosta Boulevard east of 595000m E north of 4173000m N; then
- 15) Proceed northeast along Alcosta Boulevard 1.2 miles to its intersection with Stagecoach Road southwest of 595000m E 4177000m N; then
- 16) Proceed southeast in a straight line 3.1 miles onto the Livermore map to the starting point.

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