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# Water Availability Analysis and Groundwater Recharge Calculations

The Caves at Soda Canyon P16-00106
Planning Commission Hearing April 19, 2017

**CMP Civil Engineering & Land Surveying**
**1607 Capell Valley Road**
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# Water Availability Analysis Calculations
for the
# Caves at Soda Canyon Winery

Located at:
2275 Soda Canyon Road
Napa, CA 94558

Date: 12/18/2015
Rev: 6/2/2016

Project # 00102

| Legend |
|---|
| Requires Input |
| Automatically Calculates |
| Important Value Automatically Calculates |
| Important Value Requires Input |

Hit ctrl+alt+shift+F9 when finished to recalc a

# WATER AVAILABILITY ANALYSIS- PHASE ONE STUDY

## WATER USE CALCULATIONS FOR EXISTING USE

| RESIDENTIAL | # | FACTOR | AF/YR |
|---|---|---|---|
| PRIMARY RESIDENCES= | 0 | 0.5 | 0 |
| SECONDARY RESIDENCES= | 0 | 0.2 | 0 |
| FARM LBR DWELLING (# OF PPL) = | 0 | 0.06 | 0 |
| | | SUB TOTAL= | 0 |

## NON- RESIDENTIAL GUIDELINES

| AGRICULTURAL | # ACRE | FACTOR | AF/YR |
|---|---|---|---|
| VINEYARD IRRIGATION ONLY= | 0 | 0.2 | 0 |
| VINEYARD HEAT PROTECTION= | 0 | 0.25 | 0 |
| VINEYARD FROST PROTECTION= | 0 | 0.25 | 0 |
| IRRIGATED PASTURE= | 0 | 4 | 0 |
| ORCHARDS= | 0 | 4 | 0 |
| LIVESTOCK (SHEEP/COWS)= | 0 | 0.01 | 0 |
| | | SUB TOTAL= | 0 |
| **WINERY** | **# GAL** | **FACTOR** | **AF/YR** |
| PROCESS WATER= | 30000 | Measured | 0.54 |
| EVENT VISITORS= | 15600 | 0.000003069 | 0.05 |
| TASTING VISITORS= | 15612 | 0.000003069 | 0.05 |
| EMPLOYEES= | 21900 | 0.000003069 | 0.07 |
| | | SUB TOTAL= | 0.70 |
| **INDUSTRIAL** | **# EMPL** | **FACTOR** | **AF/YR** |
| FOOD PROCESSING= | 0 | 31 | 0 |
| PRINTING/ PUBLISHING= | 0 | 0.6 | 0 |
| | | SUB TOTAL= | 0 |
| **COMMERCIAL** | **# EMPL** | **FACTOR** | **AF/YR** |
| OFFICE SPACE= | 0 | 0.01 | 0 |
| WAREHOUSE= | 0 | 0.05 | 0 |
| | | SUB TOTAL= | 0 |

## EXISTING USE TOTALS

| | | |
|---|---|---|
| RESIDENTIAL= | 0.00 | AF/YR |
| AGRICULTURAL= | 0.00 | AF/YR |
| WINERY= | 0.70 | AF/YR |
| INDUSTRIAL= | 0.00 | AF/YR |
| COMMERCIAL= | 0.00 | AF/YR |
| OTHER USAGE (LIST BELOW) | | |
| | | AF/YR |
| | | AF/YR |
| | | AF/YR |
| | | AF/YR |
| | | AF/YR |
| | | |
| **TOTAL EXISTING WATER USE=** | **229060** | **G/YR** |
| **TOTAL EXISTING WATER USE=** | **0.70** | **AF/YR** |

| WATER AVAILABILTY CALCULATIONS FOR EXISTING USE | | | |
|---|---|---|---|
| WELL NUMBER | Q - GPM | AF/YR | |
| 1 | 48 | 77.424 | |
| 2 | 0 | 0.000 | |
| 3 | 0 | 0.000 | |
| 4 | 0 | 0.000 | |
| 5 | 0 | 0.000 | |
| TOTAL= | 48 | 77.424 | |
| SPRING NUMBER | Q - GPM | AF/YR | |
| 1 | 0 | 0.000 | |
| 2 | 0 | 0.000 | |
| 3 | 0 | 0.000 | |
| 4 | 0 | 0.000 | |
| 5 | 0 | 0.000 | |
| TOTAL= | 0 | 0.000 | |
| TANK # | GAL | AF | |
| 1 | 10500 | 0.032 | |
| 2 | 10500 | 0.032 | |
| 3 | 10500 | 0.032 | |
| 4 | 10500 | 0.032 | |
| 5 | 0 | 0.000 | |
| TOTAL= | 42000 | 0.129 | |
| RESERVOIR # | GAL | AF | |
| 1 | 0.000 | 0 | |
| 2 | 0.000 | 0 | |
| 3 | 0.000 | 0 | |
| 4 | 0.000 | 0 | |
| 5 | 0.000 | 0 | |
| TOTAL= | 0.000 | 0 | |
| GROUND WATER RECHARGE | AF/YR/ACRE | PARCEL AC | AF/YR |
| Recharge rate = | 0.67 | 41.35 | 27.70 |
| | | | |
| **TOTAL AVAILABLE WATER =** | **9026923.99** | **G/YR** | |
| **TOTAL AVAILABLE WATER =** | **27.70** | **AF/YR** | |
| **TOTAL EXISTING WATER USE=** | **0.70** | **AF/YR** | |
| **REMAINING AVAILABLE WATER =** | **27.00** | **AF/YR** | |

| WATER USE CALCULATIONS FOR PROPOSED USE | | | | |
|---|---|---|---|---|
| **RESIDENTIAL** | **#** | **FACTOR** | **AF/YR** | |
| PRIMARY RESIDENCES= | 0 | 0.5 | 0 | |
| SECONDARY RESIDENCES= | 0 | 0.2 | 0 | |
| FARM LBR DWELLING (# OF PPL) = | 0 | 0.06 | 0 | |
| | | SUB TOTAL= | 0 | |
| **NON- RESIDENTIAL GUIDELINES** | | | | |
| **AGRICULTURAL** | **# ACRE** | **FACTOR** | **AF/YR** | |
| VINEYARD IRRIGATION ONLY= | 0 | 0.2 | 0 | |
| VINEYARD HEAT PROTECTION= | 0 | 0.25 | 0 | |
| VINEYARD FROST PROTECTION= | 0 | 0.25 | 0 | |
| IRRIGATED PASTURE= | 0 | 4 | 0 | |
| ORCHARDS= | 0 | 4 | 0 | |
| LIVESTOCK (SHEEP/COWS)= | 0 | 0.01 | 0 | |
| | | SUB TOTAL= | 0 | |
| **WINERY** | **# GAL** | **FACTOR** | **AF/YR** | |
| PROCESS WATER= | 60000 | See WW Calc | 0.92 | |
| EVENT VISITORS= | 15600 | 0.000003069 | 0.05 | |
| TASTING VISITORS= | 15612 | 0.000003069 | 0.05 | |
| EMPLOYEES= | 21900 | 0.000003069 | 0.07 | |
| | | SUB TOTAL= | 1.08 | |
| **INDUSTRIAL** | **# EMPL** | **FACTOR** | **AF/YR** | |
| FOOD PROCESSING= | 0 | 31 | 0 | |
| PRINTING/ PUBLISHING= | 0 | 0.6 | 0 | |
| | | SUB TOTAL= | 0 | |
| **COMMERCIAL** | **# EMPL** | **FACTOR** | **AF/YR** | |
| OFFICE SPACE= | 0 | 0.01 | 0 | |
| WAREHOUSE= | 0 | 0.05 | 0 | |
| | | SUB TOTAL= | 0 | |
| **PROPOSED USE TOTALS** | | | | |
| RESIDENTIAL= | 0.00 | AF/YR | | |
| AGRICULTURAL= | 0.00 | AF/YR | | |
| WINERY= | 1.08 | AF/YR | | |
| INDUSTRIAL= | 0.00 | AF/YR | | |
| COMMERCIAL= | 0.00 | AF/YR | | |
| OTHER USAGE (LIST BELOW) | | | | |
| | | AF/YR | | |
| | | AF/YR | | |
| | | AF/YR | | |
| | | AF/YR | | |
| | | AF/YR | | |
| | | | | |
| **TOTAL PROPOSED WATER USE=** | **352874** | **G/YR** | | |
| **TOTAL PROPOSED WATER USE=** | **1.08** | **AF/YR** | | |

| WATER AVAILABILTY CALCULATIONS FOR PROPOSED USE | | | |
|---|---|---|---|
| WELL NUMBER | Q - GPM | AF/YR | |
| 1 | 48 | 77.424 | |
| 2 | 0 | 0 | |
| 3 | 0 | 0 | |
| 4 | 0 | 0 | |
| 5 | 0 | 0 | |
| TOTAL= | 48 | 77.424 | |
| SPRING NUMBER | Q - GPM | AF/YR | |
| 1 | 0 | 0 | |
| 2 | 0 | 0 | |
| 3 | 0 | 0 | |
| 4 | 0 | 0 | |
| 5 | 0 | 0 | |
| TOTAL= | 0 | 0 | |
| TANK # | GAL | AF | |
| 1 | 10500 | 0.032 | |
| 2 | 10500 | 0.032 | |
| 3 | 10500 | 0.032 | |
| 4 | 10500 | 0.032 | |
| 5 | 0 | 0.000 | |
| TOTAL= | 42000 | 0.129 | |
| RESERVOIR # | GAL | AF | |
| 1 | 0 | 0 | |
| 2 | 0 | 0 | |
| 3 | 0 | 0 | |
| 4 | 0 | 0 | |
| 5 | 0 | 0 | |
| TOTAL= | 0 | 0 | |
| GROUND WATER RECHARGE | AF/YR/ACRE | PARCEL AC | AF/YR |
| Recharge rate = | 0.67 | 41.35 | 27.70 |
| | | | |
| **TOTAL WATER AVAILABLE =** | **9026923.99** | **G/YR** | |
| **TOTAL WATER AVAILABLE =** | **27.70** | **AF/YR** | |
| **TOTAL PROPOSED WATER USE=** | **1.08** | **AF/YR** | |
| **REMAINING AVAILABLE WATER =** | **26.62** | **AF/YR** | |

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# Ground Water Recharge Calculations
for the
# Caves at Soda Canyon Winery

Located at:
2275 Soda Canyon Road
Napa, CA 94558

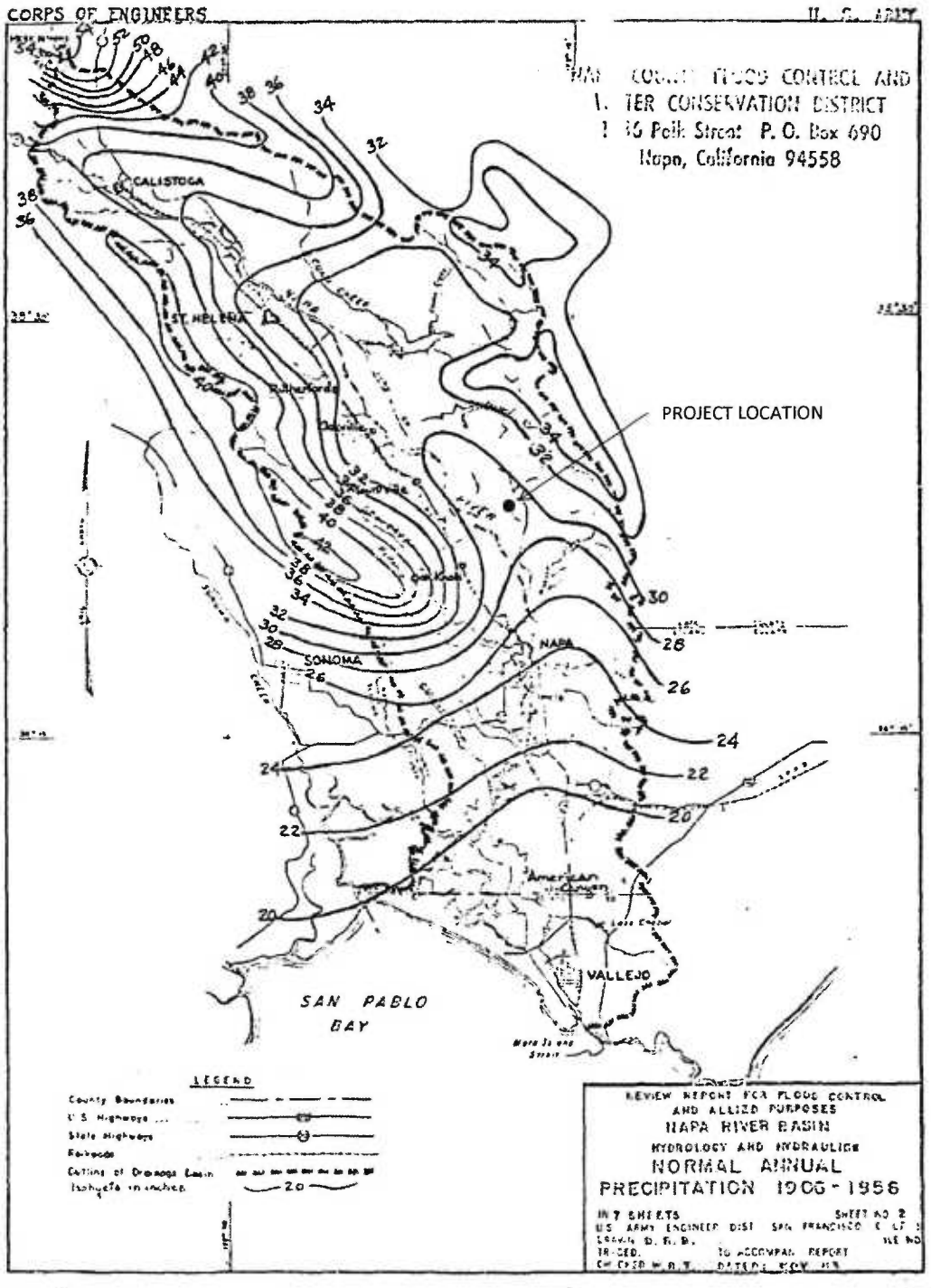
Date: 6/2/2015

Project # 00102

| Legend |
|---|
| Requires Input |
| Automatically Calculates |
| Important Value Automatically Calculates |
| Important Value Requires Input |

Hit ctrl+alt+shift+F9 when finished.

| GROUND WATER RECHARGE CALCULATIONS | | | |
|---|---|---|---|
| **PARCEL VARIABLES** | | | |
| Parcel size = | 41.35 | ac | |
| Average annual rainfall (P) = | 29.00 | in (from napa county RSS) | |
| Total parcel average rainfall volume = | 99.93 | ac-ft/yr | |
| | | | |
| **EVAPOTRANSPIRATION (E)** | | | |
| Crop Type | Area (ac) | E (ac-ft) | |
| Vineyard = | 0.00 | 0.00 | From Water Availibility Analysis Calc |
| Orchard = | 0.00 | 0.00 | From Water Availibility Analysis Calc |
| | | | |
| | | | |
| | | | |
| | | | |
| Totals = | 0.00 | 0.00 | |
| | | | |
| Native plants area = | 41.35 | ac | |
| Native plants estimated coefficient = | 0.35 | | |
| Plant density = | 40% | % | |
| Grass refernce ETo = | 45.34 | in (from Zone 8 ITRC value typ yr) | |
| Native plant ETc = | 15.87 | in | |
| | | | |
| Total annual native plant E = | 21.87 | ac-ft | |
| | | | |
| **Total annual E for parcel =** | **21.87** | **ac- ft** | |
| | | | |
| **RUNOFF (R)** | | | |
| Average runoff relief coefficient = | 30% | % | |
| Average runoff soil coefficient = | 12% | % | |
| Average runoff vegitation coefficient = | 11% | % | |
| Average runoff surface coefficient = | 10% | % | |
| | | | |
| Total Runoff Coefficient = | 63% | % | |
| Average annual rainfall = | 99.93 | ac-ft | |
| Runoff producing rainfall = | 80% | % | |
| | | | |
| **Total Annual Runoff (R) =** | **50.36** | **ac-ft** | |
| | | | |
| **ANNUAL GROUND WATER RECHARGE STORAGE (S) = P-(R+E)** | | | |
| Total Annaul Precipitation (P) = | 99.93 | ac-ft | |
| Total Annual Runoff (R) = | 50.36 | ac-ft | |
| Total Annual Evapotranpiration (E) = | 21.87 | ac-ft | |
| | | | |
| Total Annual Ground Recharge (S) = | **27.69** | ac-ft | |
| | | | |
| **Annual Recharge Rate Per Acre =** | **0.67** | **ac-ft / yr / ac** | |


CORPS OF ENGINEERS
U. S. ARMY
NAPA COUNTY FLOOD CONTROL AND
WATER CONSERVATION DISTRICT
1195 Polk Street P. O. Box 690
Napa, California 94558
PROJECT LOCATION
CALISTOGA
ST. HELENA
SONOMA
NAPA
VALLEJO
SAN PABLO
BAY
LEGEND
County Boundaries
U.S. Highways
State Highways
Railroads
Outline of Drainage Basin
Isohyets in inches
REVIEW REPORT FOR FLOOD CONTROL
AND ALLIED PURPOSES
NAPA RIVER BASIN
HYDROLOGY AND HYDRAULICS
NORMAL ANNUAL
PRECIPITATION 1906-1956

## RUN-OFF PRODUCING CHARCTERISTICS OF WATERSHEDS SHOWING FACTORS FOR EACH CHARACTERISTIC FOR VARIOUS WATERSHED TYPES

| WATERSHED TYPES AND FACTORS | | | | |
|---|---|---|---|---|
| **Run-off Producing Features** | **Extreme** | **High** | **Normal** | **Low** |
| **Relief** | 0.28-0.36<br>Steep, rugged terain, with average slopes above 30%. | 0.20 - 0.28<br>Rolling, with average slopes of 10 to 30%. | 0.14 - 0.20<br>Rolling, with average slopes of 5 to 10%. | 0.08 - 0.14<br>Relatively flat land, with average slopes of 0 to 5%. |
| **Soil Infiltration** | 0.12 - 0.16<br>No effective soil cover either rock or thin soil mantle of negligible infiltration capacity. | 0.08 - 0.12<br>Slow to take up water; clay or shallow loam soils of low infiltration capacity imperfectly or poorly drained. | 0.06 - 0.08<br>Normal; well drained light and medium textured soils sandy loams, silt, and silt loams. | 0.04 - 0.06<br>High; deep sand or other soil that takes up water readily; very light, well drained soils. |
| **Vegtal Cover** | 0.12-0.16<br>No effective plant cover; bare or very sparse cover. | 0.08-0.12<br>Poor to fair; clean cultivation crops or poor natural cover; less than 20% of drainage area under good cover. | 0.06-0.08<br>Fair to good; about 50% of area in good grassland or woodland; not more than 50% of area in cultivated crops. | 0.04-0.06<br>Good to excellent; about 90% of drainage area in good grassland, woodland, or equivalent crop. |
| **Surface** | 0.10-0.12<br>Negligible; surface depressions, few and shallow; drainageways steep and small; no marshes. | 0.08 - 0.10<br>Low; well-defined system of small drainageways; no ponds or marsh. | 0.06 - 0.08<br>Normal; considerable surface depression storage; lakes, ponds, and marshes | 0.04 - 0.06<br>High; surface storage high; drainage system not sharply defined; large floodplain storage or large number of ponds or marshes. |

THE RUNOFF FACTOR IS DETERMINED BY THE SUM OF THE FACTORS FOR RELIEF INFILTRATION, COVER, AND SURFACE. NOT APPLICABLE TO BUILT UP AREAS.

FIGURE 3