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Water Availability Analysis

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WATER AVAILABILITY ANALYSIS

3283 St. Helena Highway, St. Helena
County of Napa, APN 022-080-004

Prepared for

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Introduction

The objective of this study is to assess the availability of groundwater for a proposed 12,000 gallon per year winery to be located on the subject property in unincorporated Napa County north of St. Helena (Figure 1). This Water Availability Analysis (WAA) has been prepared using new guidelines adopted with approval of the Napa County Board of Supervisors May 12, 2015, for evaluating groundwater for discretionary projects requiring use permits such as new wineries. The guidelines were developed and disseminated by the Napa County Planning Building & Environmental Services Department (PBES).

The project site is located about three miles north of central St. Helena and just to the south of Bale Grist Mill State Park at the west edge of the Napa Valley. The 11.1 acre parcel lies at the foot of the mountain slope adjacent to State Highway 29 (St. Helena Highway), and at the highest location on its western boundary is about 140 ft above the valley floor. The parcel is located in the "Hillside" zone of the County with respect to the source of groundwater. Such Hillside parcels require a site-specific WAA to evaluate proposed project groundwater use in the context of local hydrogeologic conditions and in relation to estimated annual groundwater recharge.

The responsible professional for the WAA is Matt O'Connor, PhD, California Professional Geologist #6847 and Certified Engineering Geologist #2449, assisted by Michael Sherwood, BS, Professional Geologist #8839. O'Connor Environmental Inc. has conducted approximately 60 similar water availability analyses in bedrock aquifers of water-scarce zones of Sonoma County over the past 12 years, and has conducted a variety of hydrologic and geologic analyses in Napa and Lake County over the past 15 years.

Approach

The WAA procedure requires the applicant

> ...to estimate the average annual recharge occurring on the project parcels(s) and consider the amount of recharge relative to the estimation of project water use (e.g., all current and project water demands for the property on which the planned project is located). The estimate of annual recharge can be made by various methods including water balance methods. The selected method should be based on data from the parcel or watershed where the proposed project is located. The estimated project water use, including existing and proposed uses of water on the project parcel(s), shall include estimates for normal and dry water years.[1]

[1] Water Availability Analysis (WAA), Adopted May 12, 2015 by Board of Supervisors, County of Napa, p. 8.

The analytical tool used to estimate groundwater recharge is the water balance, the most fundamental means available to hydrogeologists. A recently-developed water balance for the Napa River watershed was prepared for the County of Napa (Luhdorff & Scalmanini, 2013), and is used to provide the analytical framework for this site-specific WAA. Prior to conducting a water balance analysis, the contributing area of the local aquifer where recharge is expected to occur must be determined. This requires development of a conceptual model of the local aquifer based on available hydrogeologic data.

The location of wells on the project parcel and neighboring parcels that could be affected by project groundwater use must be located to evaluate potential well interference per Tier 2 criteria of the WAA.

Organization of this WAA

This report is organized as follows. The first section describes the proposed project including land use and projected water use. The second section describes hydrogeologic conditions that define the probable groundwater recharge area in the vicinity of the project based on available maps and drillers' reports for wells on the project parcel. The third section presents the water balance analysis. The fourth section summarizes the Tier 1 WAA for the project. The fifth section addresses the Tier 2 component of the WAA.

Limitations

Groundwater systems of Napa County and the Coast Range are typically complex, and available data rarely allows for more than general assessment of groundwater conditions and delineation of aquifers. This analysis is based on limited available data and relies significantly on interpretation of data from disparate sources of disparate quality. Drillers' reports and water quality data available for this assessment were made available to us by the property owner.

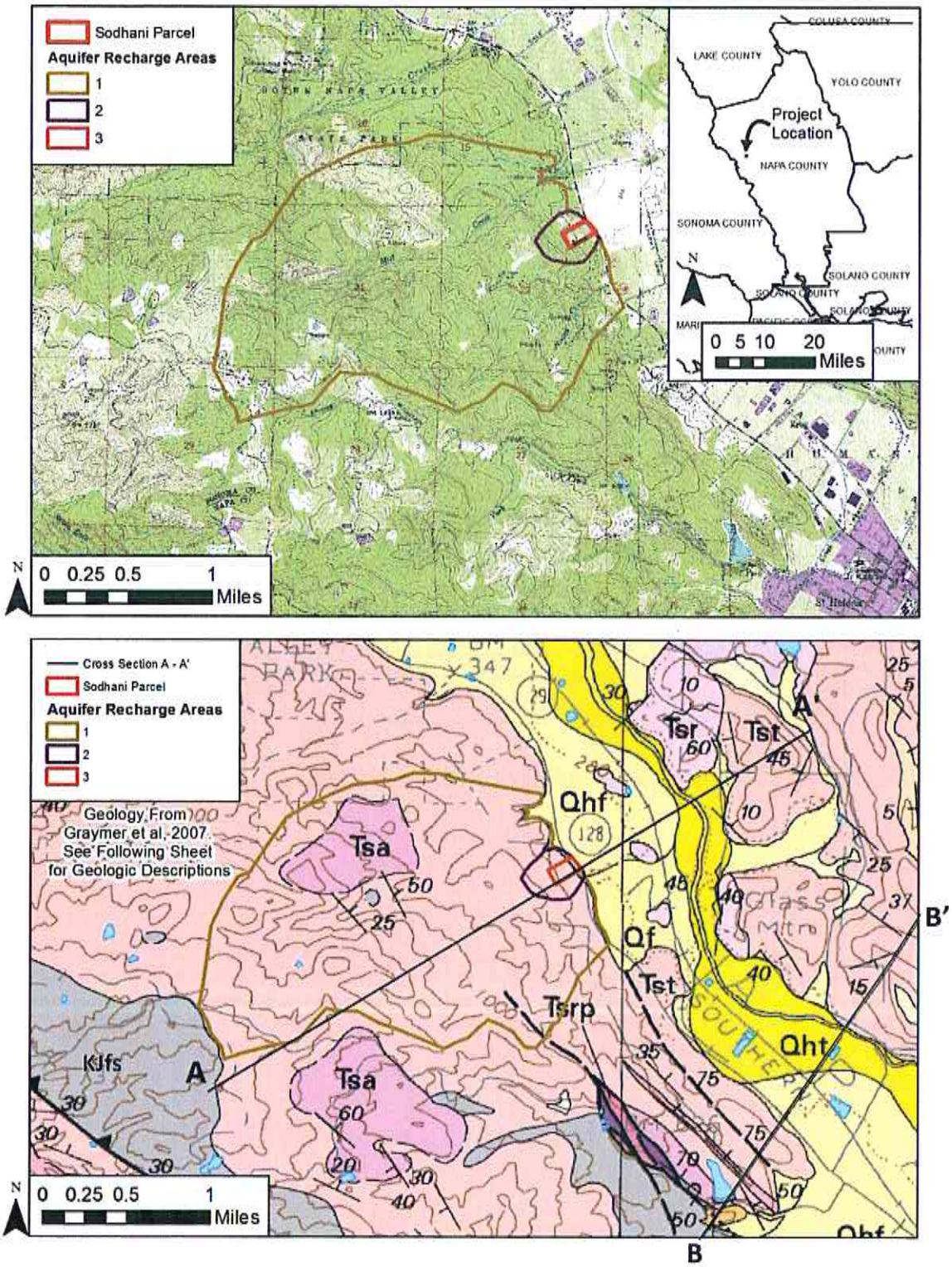
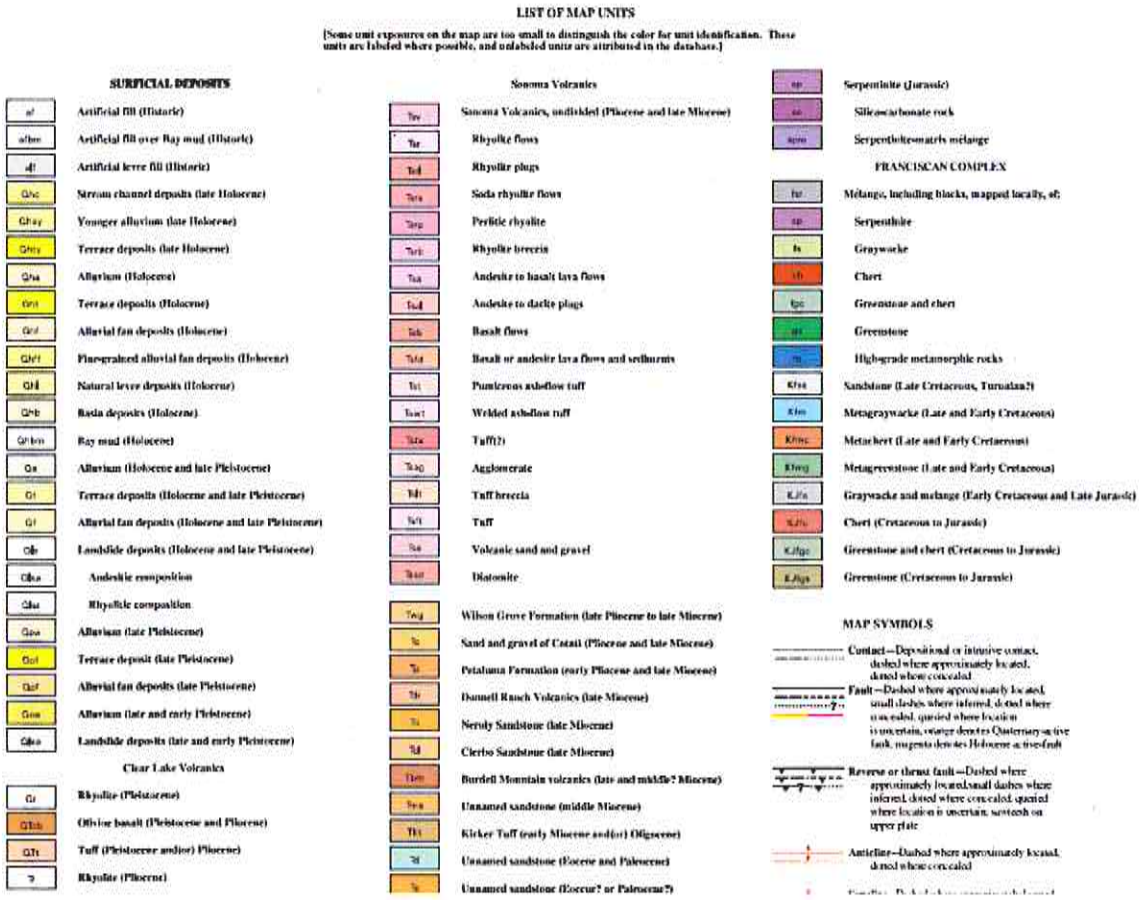


Figure 1. Topographic and geologic maps of project site and vicinity. Hypothesized aquifer recharge Area 1 represents maximum potential extent of drainage area affecting recharge; Area 2 represents likely minimum effective recharge area; Area 3 corresponds to the project parcel. Section B-B' is shown in Fig. 3; A-A' in Fig. 4.



Geology Map Units shown in Figure 1 (after Graymer et al. 2007)

Surficial Deposits

Qht-Terrace deposits (Holocene)

Qhf-Alluvial fan deposits (Holocene)

Qf-Alluvial fan deposits (Holocene and late Pleistocene)

Sonoma Volcanics

Tsr-Rhyolite flows

Tsrp-Perlitic rhyolite

Tsa-Anedesite to basalt lava flows

Tst-Pumiceous ash-flow tuff

Franciscan Complex

KJfs-Graywacke and mélange (Early Cretaceous and Late Jurassic)

Project Description and Water Use

The proposed winery would be built adjacent to the residence located on the upper elevations of the 11.1 acre parcel. A single-family residence and 6.3 acre vineyard comprise the current use of the parcel (Figure 2). The proposed 12,000 gallon per year winery would be the only new land use on the parcel that would require additional groundwater use.

Anticipated water use was documented in a Water Availability Analysis Phase One Study prepared by Michael Muelrath, PE No. 67435, dated December 5, 2014 (Appendix A) previously submitted to the Department of Public Works (DPW). At that time, the applicant was advised that new guidelines would apply, and that the Phase One Study submitted was no longer sufficient. Nevertheless, the water use calculations for existing and proposed conditions in the December 2014 Phase One Study remain valid and were adopted for this WAA, with one modification. For this WAA, to be conservative with respect to long-term groundwater use, we assumed annual water use of 0.5 acre-feet per acre of vineyard. There are 6.3 acres of vineyard, so the annual irrigation demand is 3.15 acre-feet. Existing and proposed water use on the subject parcel is summarized in Table 1. Refer to Appendix A for additional details regarding water use estimates.

Table 1. Existing and Proposed Water Use

Land Use	Existing Water Use (ac-ft/yr)	Proposed Water Use (ac-ft/yr)
Residential	0.75	0.75
Vineyard	3.15	3.15
Winery	--	0.26
Winery Landscaping	--	0.25
Winery Employees	--	0.04
Total Water Use	3.9	4.45

Groundwater use for the proposed winery project, including winery production, landscaping and winery employees would total 0.55 acre-feet per year, increasing annual groundwater use to 4.45 acre-feet per year. This represents an 14% increase in groundwater use relative to existing conditions. Under existing conditions, water use is 0.35 ac-ft per acre on the parcel. With expanded water use associated with the proposed winery, water use would be 0.40 ac-ft per acre.

There are two wells located on the project parcel (Figure 2). One well lies near the southeast corner of the parcel at the downhill edge of the vineyard and is referred to as "Vineyard Well" and Well #2 in Figure 2. This well has high concentrations of arsenic (130 ug/L) and is not potable but is suitable for vineyard irrigation (see water quality data, Appendix B). The second well is located near the southwest corner of the parcel and near the high spot on the parcel is referred to as the "House Well" and Well #1 in Figure 2. It provides potable water for domestic use in the residence on the property and is the only existing source of potable water for the

proposed winery (see water quality analysis data, Appendix C). Because of the unsuitability of water from the Vineyard Well for use in the winery, this analysis focuses primarily on the House Well which is the project well.

Bedrock Geology

The recent U.S. Geological Survey map "Geologic Map and Map Database of Eastern Sonoma and Western Napa Counties, California" (Graymer et al. 2007) was used for interpretation of the project area geology, supplemented by the recent Napa County report "Update Hydrogeologic Conceptualization and Characterization of Conditions" (Luhdorff & Scalmanini, 2013).

Figure 1 shows the project parcel, topography, and surface geology for the vicinity north of St. Helena. The project parcel is located just to the west of the Napa Valley floor north of St. Helena (Figure 1) about 0.8 mile west of the Napa River and about 0.4 mile south of Mill Creek. The surficial geology at the project parcel is the tuffaceous member of the Sonoma Volcanics (map unit Tst), which mantles most of the mountain slopes on the west side of Napa Valley from St. Helena north to Calistoga and beyond. The Sonoma Volcanics consist of a thick and highly variable series of volcanic rocks including basalt, andesite, and rhyolite lava flows, tuff, tuff breccia, agglomerate, scoria, and their sedimentary derivatives (Kunkel and Upson, 1960). The tuffaceous, scoriaceous, and sedimentary units are the principle water-bearing units whereas the lava flows generally yield little to no water (Kunkel and Upson, 1960; Faye, 1973). The tuff underlying the project site and the likely aquifer and recharge area (map unit Tst) is described by Graymer et al. as:

> Pumiceous ash-flow tuff—Pumiceous tuff, locally welded, and aglomeratic tuff, andesite and basalt flow rocks, tuff breccia, and bedded tuff.

Normal (vertical) faults trending parallel to the orientation of Napa Valley are mapped in the vicinity of the boundary between the valley floor and the hillsides between the project site and St. Helena (Figure 1). Where mapped, the faults dip 75 degrees to the east. These faults have not been mapped as far north as the project site, but it should be assumed that these or similar faults are present at or near the project site. The hydrogeologic investigation for Napa Valley (Luhdorff & Scalmanini, 2013, Figure 5-3, Cross Section A-A') also found evidence suggesting the presence of normal faults in the bedrock underlying the valley floor.

Bedding planes mapped within the tuff in the vicinity of the project site on the west side of the valley north of St. Helena (Figure 1) strike parallel to the fault and valley orientation and dip 25 to 50 degrees to the northeast.

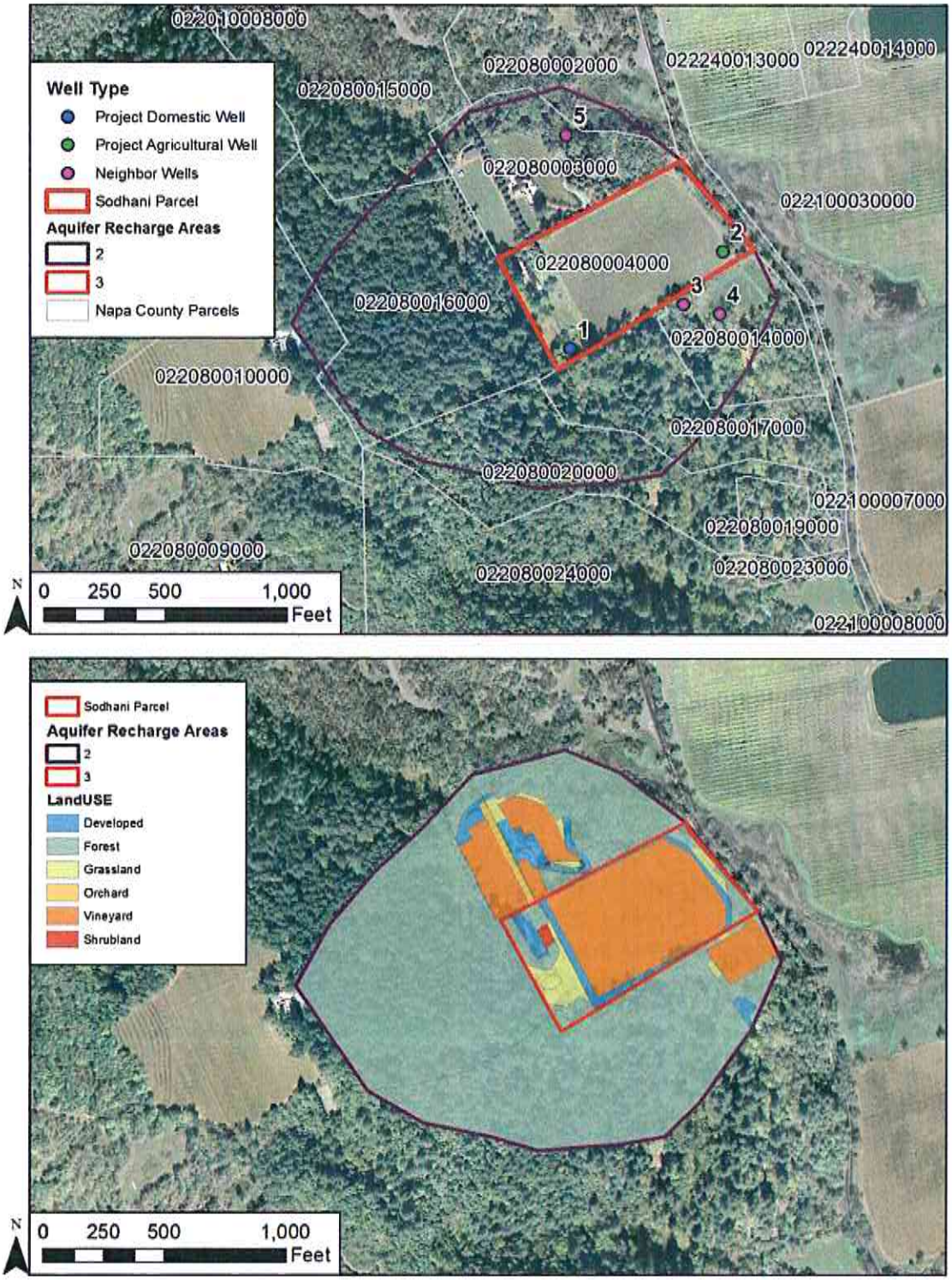


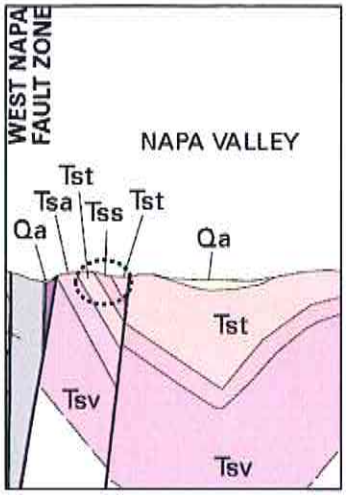
Figure 2. Local area parcel map and well locations (top) and recharge area land use map used in water balance evapotranspiration estimate (bottom). Well 1 is the project well. Well 3 is the nearest well on a neighboring parcel.

Hydrogeologic Conditions

The hydrogeology of the project site is influenced by the foregoing geologic characteristics. The tuff is generally a water-bearing unit of the Sonoma Volcanics, but it includes a variety of layered rocks, some of which are not considered water bearing (e.g. andesite flows). This creates the potential for confined aquifer units where aquitards formed by andesite (or other relatively impermeable volcanic materials) separate strata of more permeable rocks. The orientation of rock layers is variable, but dips in the range 25 to 50 degree to the northeast. Consequently, it is possible that confined aquifer rock units underlying the project site extend to the surface on the hillslopes above and west of the project site. In addition, normal faults (vertical or near-vertical orientation) could be present that affect groundwater flow in the aquifer rocks within the tuff. Faults may or may not affect groundwater flow, but can act as barriers to groundwater flow as well as conduits of groundwater flow.

Regardless of the rock types and structures that may affect the hydrogeologic conditions in the local aquifer, it is expected that the elevation of the potentiometric water surface underlying the mountain slopes west of the valley floor will lie more or less parallel to the ground surface. Consequently, it is expected that there would be a relatively steep hydraulic gradient extending from the project site (located at the base of the mountain front) to a point near the ridge crest about two miles to the west. It is possible that the groundwater flow to the project site originates high on the ridge to the west, infiltrated as rainfall on the ground surface and from stream channels into aquifer rocks, and flowing down-gradient across and through various aquifer rocks in complex flow paths before reaching the well at the project site. This conceptualization of a relatively large confined or semi-confined aquifer gives rise to the drainage area boundary referenced as Area 1 in Figure 1. Although this conceptualization is not unrealistic, it is based on relatively broad assumptions that would be difficult to confirm or constrain.

A more conservative conceptualization of the site aquifer hydrogeology can be inferred from hydrogeologic cross-sections, taking into account the limited structural information on geologic strata and information on aquifer materials from on-site wells. Data describing the geologic materials logged during well construction and well construction details were obtained from Well Completion Reports or County well permits (Appendix D).



The regional geologic cross-section prepared by Graymer et al. (2007)[2] is oriented southwest to northeast perpendicular to Napa Valley and crosses the west edge of the Napa Valley Floor about two miles south of the project site. Figure 3 shows the portion of that geologic sections shown as B-B' in Figure 1. The circled portion of Figure 3 indicates the portion of the section that corresponds most closely to the position of the project site and portrays steeply dipping geologic contacts presumed approximately parallel to bedding planes. About one mile west of the project site bedding planes in the tuff (map unit Tst) were mapped with dips of 25 and 50 degrees to the northeast, and about one mile southeast a bedding plane in Tst dips 35 degrees to the northeast.

Figure 3. Geologic cross-section from regional geology map.

Based on the foregoing indications regarding the orientation of geologic strata within the tuff unit of the Sonoma Volcanics underlying the project site, it is possible to hypothesize the geometry of the aquifer rocks at the project site using the depths of water bearing strata identified in the well logs (Appendix D). As shown in Figure 4, we determined the depth of the top of geologic strata corresponding to the perforated sections of Well #1 (the project and "House" well) and projected them with a 25 degree northeast dip on the cross-section line A-A' (Figure 1) constructed approximately perpendicular to strike. The lower-most of the water-bearing strata in the project well (#1) reaches the ground surface to the west of a hill crest about 1,000 ft west of the project well (Figure 4). We also considered a 50 degree northeast dip, and found the lower-most water bearing strata reaching the ground surface about 300 ft west of the project well. The projection of the 25 degree dip coincides approximately with a subsidiary ridge crest above the project site that forms a topographic divide and a local drainage area that encompasses the project site parcels as well as adjacent parcels to the north, west and south and shown as Area 2 in Figure 1.

Area 2 represents a conservative conceptualization of the rainfall-recharge area for the project aquifer, and is considered the primary zone of recharge for the project aquifer for purposes of this WAA. As noted above, however, the complex character of groundwater in volcanic rocks, the position of the project well at the base of the mountain front west of Napa Valley, and the likely hydraulic gradient of groundwater underlying the mountain hillslopes to the west suggest that groundwater recharge for the project aquifer is likely to include a portion of Area 1.

[2] Graymer, R.W. et. al., 2007. Geologic Map and Map Database of Eastern Sonoma and Western Napa Counties, California. Pamphlet to accompany SCIENTIFIC INVESTIGATIONS MAP 2956. U.S.Department of the Interior U.S. Geological Survey.

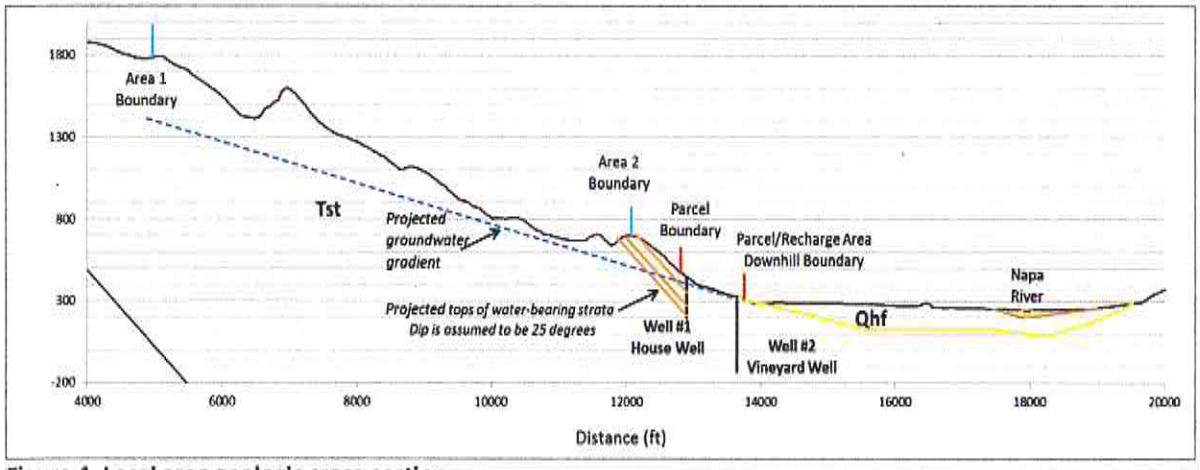


Figure 4. Local area geologic cross-section.

The conceptualization of the aquifer recharge zone for the project well congruent with the project parcel boundary is that represented as Area 3 (Figure 1). Given the likely groundwater hydraulic gradient extending up slope to the west (Figure 4), substantial groundwater flow originating from uphill beyond the parcel boundary likely reaches the project well. Furthermore, the upper 40 to 50 feet of the earth materials overlying the project site is comprised of gravel and boulder deposits likely to represent alluvial fan deposits (Qhf, Qf) mapped in adjacent areas to the east (Figure 1). There are several strata containing significant quantities of clay described in the well logs (project well-Appendix D; Sodhani irrigation well-Appendix E) interspersed with fractured volcanic rock, ash and sands, including a clay-rich strata at the base of the alluvial fan deposits. Although these clay-rich strata do not necessarily prevent downward movement of groundwater, they are likely to inhibit it, suggesting that vertical flow paths from the surface of the project parcel may not be the primary means of recharging water-bearing strata found at depths of 85 to 250 ft below ground surface in Well #1. Preferential flow paths parallel to the dip of rock strata in more permeable rocks separated by clay-rich strata would convey infiltrating groundwater from upslope. Such circumstances suggest that the primary recharge zone for the project well extends uphill to the west of the project parcel, and that conceptualizing the recharge area for the project well as the project parcel would substantially misrepresent local hydrogeologic conditions.

Chemical analyses of water samples from Wells #1 and #2 (Appendices B and C, respectively) indicate some significant differences between the water from these wells. In particular, Well #2 has very high levels of arsenic that render it unfit for human consumption and domestic use, and elevated levels of copper and lead relative to Well #1. Other differences of note are that Well #2 also has high turbidity, low nitrate, and low pH relative to Well #1. These differences, along with the greater depth (200+ feet) and potential effects of faults near or between Wells #1 and #2, suggest that these wells are utilizing distinct aquifers. Furthermore, it suggests that neighboring domestic wells to the south would not be utilizing the same aquifer as Well #2 owing to the high arsenic concentration.

Water Balance

A water balance analysis for Area 2 (Figure 2) to estimate the aquifer annual recharge rate is summarized in this section. The water balance for this WAA adapts the water balance analysis conducted for the Napa River watershed by Luhdorff and Scalmanini (2013) to account for site-specific conditions and hydrologic processes in Area 2.

The watershed-wide water balance was conducted on a monthly time-step at sub-watershed scales corresponding to stream gauging stations; the project site lies within the Napa River at St. Helena sub-watershed. For this sub-watershed, the water balance analysis spanned the period 1940 to 1994. The principal components of the watershed-wide water balance (referred to hereafter as the "L&SWB") are area-weighted precipitation, stream flow of the Napa River at the sub-watershed gauging station, estimated infiltration to the soil (taken as the difference between precipitation and runoff), and estimated evapotranspiration (ET) for a series of land cover types. Estimated groundwater recharge is represented by the difference between estimated infiltration and estimated ET modulated by soil moisture storage. Annual recharge varies with the amount and timing of rainfall, and with soil moisture storage estimated based on USDA NRCS soil survey data.

For the Napa River at St. Helena sub-watershed, the L&SWB estimated mean annual recharge of 22,000 acre-feet[3]; for the 78.8 square mile drainage area, this is equivalent to average annual recharge of 0.436 acre-feet per acre. Mean annual recharge is equivalent of 14% of mean annual precipitation. Variation in estimated annual recharge over time is induced by variation in annual precipitation, timing of precipitation, and availability of soil moisture in relation to ET. Estimated annual recharge ranged from a low of 0.05 acre-feet per acre to a high of 1.21 acre-feet per acre.

The simplest estimate of annual recharge for the local aquifer recharge zone (Area 2; 52.2 acres) is the recharge rate for the St. Helena sub-watershed estimated in the L&SWB of 0.436 acre-feet per acre times the recharge area: 52.2 acres x 0.436 acre-feet/acre = 22.8 acre-feet. While this estimate is not unreasonable, it is averaged over a large area with substantial variability in water balance parameters. In the following paragraph, readily available site-specific data and observations for Area 2 are described in relation to the average values for the St. Helena sub-watershed from the L&SWB to semi-quantitatively adjust the L&SWB estimate to the project site.

The project site recharge zone (Area 2) is not drained by any defined streams based on field observations and review of available topographic data. This strongly suggests that the proportion of annual precipitation that is subtracted from water available for infiltration is substantially lower in the project site recharge zone than in the L&SWB analysis where 41.5% of annual precipitation is accounted for as runoff. Mean annual precipitation for Area 2 from the

[3] Luhdorff and Scalmanini Consulting Engineers and MBK Engineers, 2013. Updated hydrogeologic conceptualization and characterization of conditions. Prepared for Napa County. Table 8-9, p. 97.

PRISM data referenced in L&SWB is 38.5 inches compared to 38.4 inches for the St. Helena sub-watershed overall.

Soils data for Area 2 are tabulated in Appendix F and compared to the spatially-averaged soils for the St. Helena sub-basin, soil hydrologic factors are nearly uniform within Area 2 in that all soil types are in hydrologic Group B, which have moderate infiltration rates and moderate rates of water transmission; these soils are considered moderately well-drained to well-drained. In contrast, the hydrologic soil groups in the St. Helena sub-watershed are 56% Group C and 16% Group D, which have slow to very slow infiltration rates and slow to very slow rates of water transmission, respectively, and have varying degrees of clay and impeding soil horizons that limit downward movement of water. Taken together, the foregoing comparisons strongly suggest that infiltration rates of precipitation to the soil are likely to be substantially higher in Area 2 (the local aquifer recharge area) than the spatially-averaged infiltration rates in the St. Helena sub-watershed estimated by the L&SWB.

Average annual evapotranspiration (ET) for Area 2 was also compared to ET for the St. Helena sub-watershed estimated by the L&SWB. We classified land use and vegetation cover types in Area 2 from a 2007 Napa County aerial photograph according to the classification scheme used in the L&SWB[4] as shown in Figure 2. Based on these cover types, we estimated mean annual potential evapotranspiration (PET) for Area 2 (Appendix G) to be 80.6 acre-feet, equal to 1.54 feet per year. For the St. Helena sub-watershed, the L&SWB estimated average ET of 1.44 feet per year. By definition PET must by greater than or equal to ET and in a Mediterranean climate with extended summer drought during the growing season, PET is typically substantially greater than ET. Consequently, ET for Area 2 is probably substantially lower than 1.54 ft, and probably not greater than the 1.44 ft ET estimated for the St. Helena sub-watershed in the L&SWB.

In summary, the foregoing comparison of water balance parameters between the project aquifer recharge area (Area 2) and the L&SWB St. Helena sub-watershed suggests that recharge in Area 2 is greater than that estimated by the L&SWB. Local soils in Area 2 are significantly more permeable than average for the St. Helena sub-watershed, and Area 2 is not drained by stream channels, consequently it would be expected that a substantially higher proportion of precipitation infiltrates to the soil and drains to the water table. ET in Area 2 is probably less than average for the St. Helena sub-watershed, also suggesting higher groundwater recharge in Area 2 than average for the St. Helena sub-watershed. Consequently, the mean annual groundwater recharge rate for the St. Helena sub-watershed of 0.436 acre-feet per acre should be considered a minimum estimate for Area 2, the project area groundwater recharge zone.

The calculation of mean annual recharge takes dry year and wet year precipitation and climate variation into account. Potential drawdown of water elevation in dry years is modulated by redistribution of groundwater in the aquifer, and would be expected to recover in normal and

[4] IBID, Table 8-8, p. 87.

wet years. Water availability in the Sodhani wells for normal use has not been significantly affected by recent drought conditions.[5]

Well Interference Potential

The project well, also referred to as Well #1 and the "House Well", is located 504 feet (horizontal distance) from the nearest off-site neighboring well (Figure 5). The distance was determined by measuring the ground distance from Well #1 with a fiberglass tape the southwest corner of the vineyard, and along the southernmost vine row to a point due north of the neighboring well. This distance to the fence line on the property boundary was measured, and the remaining distance from the fence to the neighboring well was visually estimated to be 25 ft. These measurements were used to plot the well location in our project GIS map, and the distance from the project well to the nearest neighbor's well was measured using the GIS measuring tool. Mr. Arvind Sodhani used an iPhone 6 with the application GPS Tour to geo-locate Wells 1, 2 and 3 (Figure 2) as described in Appendix H. That method indicated that Wells 1 and 3 were separated by a distance of about 509 feet.

The WAA guidance document regarding well interference states that "...the Tier 2 well interference criterion is presumptively met if there are no non-project wells located within 500 feet of the existing or proposed project well(s)[6]..." Given the location of the project well 504 to 508 feet from the nearest neighboring well, no further evaluation of potential well interference is required.

For reference with respect to Tier 3 WAA considerations, Figure 5 shows stream channels within a 1,500 foot radius of the project well.

Conclusion

Mean annual groundwater recharge in Area 2 is estimated to be not less than 22.8 acre-feet. The minimum estimate of mean annual recharge in Area 2 pro-rated for the project parcel area of 11.1 acres is 4.85 acre-feet (11.1 acre parcel/52.2 acre recharge zone x 22. 8 acre-feet).

The proposed winery project, together with existing uses, would require 4.45 acre-feet per year, or about 92% of recharge in Area 2 pro-rated for the project parcel. This affirms the availability of groundwater sufficient for the proposed project.

The nearest neighbor's well is located 504 feet from the proposed project well, indicating that potential well interference is negligible and requiring no further evaluation per the WAA procedures.

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[5] Pers. comm., Arvind Sodhani.

[6] Water Availability Analysis (WAA), Adopted May 12, 2015 by Board of Supervisors, County of Napa, p. 8.

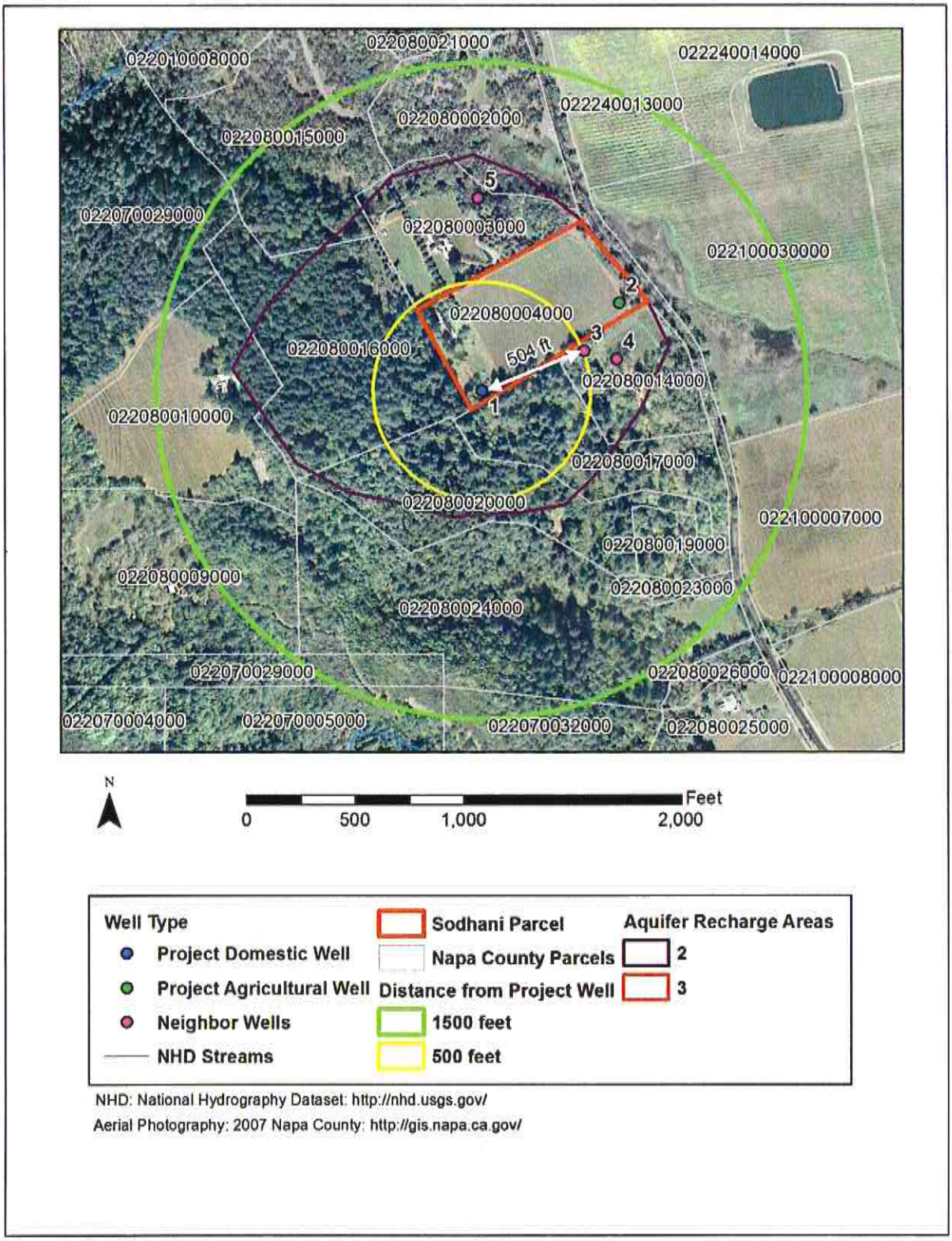

Figure 5. Location of wells and streams in relation to project well.

Appendix A-Phase 1 Water Availability Assessment, December 2014

A Tradition of Stewardship
A Commitment to Service

Department of Public Works

1195 Third Street, Suite 201
Napa, CA 94559-3092
www.co.napa.ca.us/publicworks

Main: (707) 253-4351
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Donald G. Ridenhour, P.E.
Director

WATER AVAILABILITY ANALYSIS - PHASE ONE STUDY

Introduction: As an applicant for a permit with Napa County, It has been determined that Chapter 13.15 of the Napa County Code is applicable to approval of your permit. One step of the permit process is to adequately evaluate the amount of water your project will use and the potential impact your application might have on the static groundwater levels within your neighborhood. The public works department requires that a Phase 1 Water Availability Analysis (WAA) be included with your application. The purpose of this form is to assist you in the preparation of this analysis. You may present the analysis in an alternative form so long as it substantially includes the information required below. Please include any calculations you may have to support your estimates.

The reason for the WAA is for you, the applicant, to inform us, to the best of your ability, what changes in water use will occur on your property as a result of an approval of your permit application. By examining the attached guidelines and filling in the blanks, you will provide the information we require to evaluate potential impacts to static water levels of neighboring wells.

Step #1:

Provide a map and site plan of your parcel(s). The map should be an 8-1/2"x11" reproduction of a USGS quad sheet (1:24,000 scale) with your parcel outlined on the map. Include on the map the nearest neighboring well. The site plan should be an 8-1/2"x11" site plan of your parcel(s) with the locations of all structures, gardens, vineyards, etc in which well water will be used. If more than one water source is available, indicate the interconnecting piping from the subject well to the areas of use. Attach these two sheets to your application. If multiple parcels are involved, clearly show the parcels from which the fair share calculation will be based and properly identify the assessor's parcel numbers for these parcels. Identify all existing or proposed wells

Step #2: Determine total parcel acreage and water allotment factor. If your project spans multiple parcels, please fill a separate form for each parcel.

Determine the allowable water allotment for your parcels:

Parcel Location Factors

The allowable allotment of water is based on the location of your parcel. There are 3 different location classifications. Valley floor areas include all locations that are within the Napa Valley, Pope Valley and Carneros Region, except for areas specified as groundwater deficient areas. Groundwater deficient areas are areas that have been determined by the public works department as having a history of problems with groundwater. All other areas are classified as Mountain Areas.

Please underline your location classification below (Public Works can assist you in determining your classification if necessary):

Valley Floor	**1.0 acre feet per acre per year**
Mountain Areas	**0.5 acre feet per acre per year**
MST Groundwater Deficient Area	**0.3 acre feet per acre per year**

Assessor's Parcel Number(s)	Parcel Size (A)	Parcel Location Factor (B)	Allowable Water Allotment (A) X (B)
022-080-004	11.1	.5	5.5

Step #3:

Using the guidelines in Attachment A, tabulate the existing and projected future water usage on the parcel(s) in acre-feet per year (af/yr). Transfer the information from the guidelines to the table below.

EXISTING USE:		PROPOSED USE:	
Residential	.75 af/yr	Residential	.75 af/yr
Farm Labor Dwelling	_____ af/yr	Farm Labor Dwelling	_____ af/yr
Winery	_____ af/yr	Winery	.26 af/yr
Commercial	_____ af/yr	Commercial	_____ f/yr
Vineyard*	2.3 af/yr	Vineyard*	2.3 af/yr
Other Agriculture	_____ af/yr	Other Agriculture	_____ af/yr
Landscaping	_____ af/yr	Landscaping	.25 af/yr
Other Usage (List Separately):		Other Usage (List Separately):	
_____	_____ af/yr	Winery Emp	.04 af/yr
_____	_____ af/yr	_____	_____ af/yr
_____	_____ af/yr	_____	_____ af/yr
TOTAL:	3.05 af/yr	**TOTAL:**	3.60 af/yr **TOTAL:**
	0.99 M gallons**	**TOTAL:**	1.17 M gallons**

Is the proposed use less than the existing usage? ☐ **Yes** ☑ **No** ☐ **Equal**

Step #4:

Provide any other information that may be significant to this analysis. For example, any calculations supporting your estimates, well test information including draw down over time, historical water data, visual observations of water levels, well drilling information, changes in neighboring land uses, the usage if other water sources such as city water or reservoirs, the timing of the development, etc. Use additional sheets if necessary.

Residential = 0.75 af/yr per County Guidelines and includes landscaping
Winery = 12,000 gallons x 2.15 af/yr per 100,000 gallons of wine per County Guidelines (production only)
Vineyard = 6.3 acres x 0.365 ac-ft/ac/r per County Guidelines and Vineyard Manager
Landscaping = 0.3 acres low water use landscaping around winery per landscape design and water estimates
Employees = 4 employees x 0.01 ac-ft/yr per employee per County Guidelines

Conclusion: Congratulations! Just sign the form and you are done! Public works staff will now compare your projected future water usage with a threshold of use as determined for your parcel(s) size, location, topography, rainfall, soil types, historical water data for your area, and other hydrogeologic information. They will use the above information to evaluate if your proposed project will have a detrimental effect on groundwater levels and/or neighboring well levels. Should that evaluation result in a determination that your project may adversely impact neighboring water levels, a Phase two water analysis may be required. You will be advised of such a decision.

REGISTERED PROFESSIONAL ENGINEER
MICHAEL R. MUELRATH
NO. 67435
Exp. 12/31/2014
CIVIL
STATE OF CALIFORNIA

Signature: _____ **Date:** 12/5/2014 **Phone:** (707) 320-4968

Attachment A: Estimated Water Use Guidelines

Typical Water Use Guidelines:

Primary Residence	0.5 to 0.75 acre-feet per year (includes some landscaping)
Secondary Residence	0.20 to 0.30 acre-feet per year
Farm Labor Dwelling	0.06 to 0.10 acre-feet per person per year

Non-Residential Guidelines:

Agricultural:	
Vineyards	
Irrigation only	0.2 to 0.5 acre-feet per acre per year
Heat Protection	0.25 acre feet per acre per year
Frost Protection	0.25 acre feet per acre per year
Farm Labor Dwelling	0.06 to 0.10 acre-feet per person per year
Irrigated Pasture	4.0 acre-feet per acre per year
Orchards	4.0 acre-feet per acre per year
Livestock (sheep or cows)	0.01 acre-feet per acre per year
Winery:	
Process Water	2.15 acre-feet per 100,000 gal. of wine
Domestic and Landscaping	0.50 acre-feet per 100,000 gal. of wine
Industrial:	
Food Processing	31.0 acre-feet per employee per year
Printing/Publishing	0.60 acre-feet per employee per year
Commercial:	
Office Space	0.01 acre-feet per employee per year
Warehouse	0.05 acre-feet per employee per year

Appendix B-Water Quality Analysis, Project Well

David W Bess
David W Bess
1115 Mt George Ave
Napa, California 94558
Tel: 707-226-2539
Email: dave@dbesspumpandwell.com

RE: WaterQ Basic (Well Water for Dave Bess)

Work Order No.: DWQ1306008-A

Dear David W Bess:

Torrent Laboratory, Inc. received 1 sample(s) on June 13, 2013 for the analyses presented in the following Report.

All data for associated QC met EPA or laboratory specification(s) except where noted in the case narrative.

Torrent Laboratory, Inc. is certified by the State of California, ELAP #1991. If you have any questions regarding these test results, please feel free to contact the Project Management Team at (408)263-5258; ext 204.

Patti Sandrock
QA Officer

June 18, 2013
Date

Torrent LABORATORY, INC.

Date: 6/18/2013

Client: David W Bess

Project: WaterQ Basic (Well Water for Dave Bess)

Work Order: DWQ1306008-A

CASE NARRATIVE

No issues encountered with the receiving, preparation, analysis or reporting of the results associated with this work order.

Observations:

Primary Contaminants- (Health)

No primary contaminants in the scope of analysis presented in this report were found to be outside of the EPA Federally established Maximum Contaminant Level (MCL) guidelines.

Secondary Contaminant - (Water Aesthetics)

No secondary contaminants in the scope of analysis presented in this report were found to be outside of the EPA Federally established Maximum Contaminant Level (MCL) guidelines (or recommended level where no MCLs exist).

This report is for House Well Sample only and is labeled and stored as DWQ-1306008-A.

The Irrigation Well sample will be reported separately as DWQ-1306008-B.

Torrent LABORATORY, INC.

Sample Result Summary

Report prepared for: David W Bess
David W Bess

Date Received: 06/13/13
Date Reported: 06/18/13

House well DWQ1306008-001

Parameters:	Analysis Method	DF	MDL	PQL	Results	Unit
Boron	E200.7	1	0.001	0.020	0.048	mg/L
Copper	E200.8	1	0.077	0.50	0.52	ug/L
Lead	E200.8	1	0.018	0.10	0.11	ug/L
Arsenic	E200.8	1	0.11	0.30	1.9	ug/L
Total Hardness (As CaCO3)	SM2340B	1	0.0830	1.0	95	mg/L
Calcium Hardness (as CaCO3)	SM2340B	1	0.0830	0.50	54	mg/L
Nitrate as NO3	E300.0	1	0.077	0.50	4.8	mg/L
pH	SM4500HB	1	0.10	2.00	7.90	S.U.
Total Dissolved Solids	SM2540C	1	1	10	180	mg/L
Turbidity	E180.1	1	0.10	0.20	0.81	NTU

Torrent LABORATORY, INC.

SAMPLE RESULTS

Report prepared for: David W Bess
David W Bess

Date Received: 06/13/13
Date Reported: 06/18/13

Client Sample ID:	House well	**Lab Sample ID:**	DWQ1306008-A-001A
Project Name/Location:	WaterQ Basic (Well Water for Dave Bess)	**Sample Matrix:**	Drinking Water
Project Number:			
Date/Time Sampled:	06/12/13 / 11:00		
Tag Number:	Drinking Water Sample for Dave Bess		

Parameters:	Analysis Method	Prep Date	Date Analyzed	DF	MDL	PQL	Results	Lab Qualifier	Unit	Analytical Batch	Prep Batch
Iron	E200.7	6/13/13	06/13/13	1	0.002	0.10	ND		mg/L	416020	8945
Manganese	E200.7	6/13/13	06/13/13	1	0.003	0.050	ND		mg/L	416020	8945
Boron	E200.7	6/13/13	06/13/13	1	0.001	0.020	0.048		mg/L	416020	8945

Parameters:	Analysis Method	Prep Date	Date Analyzed	DF	MDL	PQL	Results	Lab Qualifier	Unit	Analytical Batch	Prep Batch
Copper	E200.8	6/13/13	06/17/13	1	0.077	0.50	0.52		ug/L	416049	8962
Lead	E200.8	6/13/13	06/17/13	1	0.018	0.10	0.11		ug/L	416049	8962
Arsenic	E200.8	6/13/13	06/17/13	1	0.11	0.30	1.9		ug/L	416049	8962

Parameters:	Analysis Method	Prep Date	Date Analyzed	DF	MDL	PQL	Results	Lab Qualifier	Unit	Analytical Batch	Prep Batch
Total Hardness (As CaCO3)	SM2340B	6/13/13	06/13/13	1	0.0830	1.0	95		mg/L	416019	8943
Calcium Hardness (as CaCO3)	SM2340B	6/13/13	06/13/13	1	0.0830	0.50	54		mg/L	416019	8943

Torrent LABORATORY, INC.

SAMPLE RESULTS

Report prepared for: David W Bess
David W Bess

Date Received: 06/13/13
Date Reported: 06/18/13

Client Sample ID:	House well	**Lab Sample ID:**	DWQ1306008-A-001B
Project Name/Location:	WaterQ Basic (Well Water for Dave Bess)	**Sample Matrix:**	Drinking Water
Project Number:			
Date/Time Sampled:	06/12/13 / 11:00		
Tag Number:	Drinking Water Sample for Dave Bess		

Parameters:	Analysis Method	Prep Date	Date Analyzed	DF	MDL	PQL	Results	Lab Qualifier	Unit	Analytical Batch	Prep Batch
Nitrite as N	E300.0	NA	06/13/13	1	0.095	0.50	ND		mg/L	416072	NA
Nitrate as NO3	E300.0	NA	06/13/13	1	0.077	0.50	4.8		mg/L	416072	NA

Parameters:	Analysis Method	Prep Date	Date Analyzed	DF	MDL	PQL	Results	Lab Qualifier	Unit	Analytical Batch	Prep Batch
pH	SM4500HB	NA	06/13/13	1	0.10	2.00	7.90		S.U.	416060	NA

Parameters:	Analysis Method	Prep Date	Date Analyzed	DF	MDL	PQL	Results	Lab Qualifier	Unit	Analytical Batch	Prep Batch
Total Dissolved Solids	SM2540C	NA	06/14/13	1	1	10	180		mg/L	416058	NA

Parameters:	Analysis Method	Prep Date	Date Analyzed	DF	MDL	PQL	Results	Lab Qualifier	Unit	Analytical Batch	Prep Batch
Turbidity	E180.1	NA	06/13/13	1	0.10	0.20	0.81		NTU	416059	NA

Torrent LABORATORY, INC.

SAMPLE RESULTS

Report prepared for: David W Bess
David W Bess

Date Received: 06/13/13
Date Reported: 06/18/13

Client Sample ID:	House well	**Lab Sample ID:**	DWQ1306008-A-001C
Project Name/Location:	WaterQ Basic (Well Water for Dave Bess)	**Sample Matrix:**	Drinking Water
Project Number:			
Date/Time Sampled:	06/12/13 / 11:00		
Tag Number:	Drinking Water Sample for Dave Bess		

Parameters:	Analysis Method	Prep Date	Date Analyzed	DF	MDL	PQL	Results	Lab Qualifier	Unit	Analytical Batch	Prep Batch
Sulfide, Total	E376.1	NA	06/17/13	1	2	2.0	ND		mg/L	416062	NA

Torrent LABORATORY, INC.

Laboratory Qualifiers and Definitions

DEFINITIONS:

Accuracy/Bias (% Recovery) - The closeness of agreement between an observed value and an accepted reference value.
Blank (Method/Preparation Blank) -MB/PB - An analyte-free matrix to which all reagents are added in the same volumes/proportions as used in sample processing. The method blank is used to document contamination resulting from the analytical process.
Duplicate - a field sample and/or laboratory QC sample prepared in duplicate following all of the same processes and procedures used on the original sample (sample duplicate, LCSD, MSD)
Laboratory Control Sample (LCS ad LCSD) - A known matrix spiked with compounds representative of the target analyte(s). This is used to document laboratory performance.
Matrix - the component or substrate that contains the analyte of interest (e.g., - groundwater, sediment, soil, waste water, etc)
Matrix Spike (MS/MSD) - Client sample spiked with identical concentrations of target analyte (s). The spiking occurs prior to the sample preparation and analysis. They are used to document the precision and bias of a method in a given sample matrix.
Method Detection Limit (MDL) - the minimum concentration of a substance that can be measured and reported with a 99% confidence that the analyte concentration is greater than zero
Practical Quantitation Limit (PQL) - a laboratory determined value at 2 to 5 times above the MDL that can be reproduced in a manner that results in a 99% confidence level that the result is both accurate and precise. PQLs reflect all preparation factors and/or dilution factors that have been applied to the sample during the preparation and/or analytical processes.
Precision (%RPD) - The agreement among a set of replicate/duplicate measurements without regard to known value of the replicates
Surrogate (S) or (Surr) - An organic compound which is similar to the target analyte(s) in chemical composition and behavior in the analytical process, but which is not normally found in environmental samples. Surrogates are used in most organic analysis to demonstrate matrix compatibility with the chosen method of analysis
Tentatively Identified Compound (TIC) - A compound not contained within the analytical calibration standards but present in the GCMS library of defined compounds. When the library is searched for an unknown compound, it can frequently give a tentative identification to the compound based on retention time and primary and secondary ion match. TICs are reported as estimates and are candidates for further investigation.
Units: the unit of measure used to express the reported result - **mg/L** and ***mg/Kg*** (equivalent to PPM - parts per million in **liquid** and ***solid***), **ug/L** and ***ug/Kg*** (equivalent to PPB - parts per billion in **liquid** and ***solid***), **ug/m3**, ***mg.m3***, **ppbv** and ***ppmv*** (all units of measure for reporting concentrations in air), **%** (equivalent to 10000 ppm or 1,000,000 ppb), **ug/Wipe** (concentration found on the surface of a single Wipe usually taken over a 100cm2 surface)

LABORATORY QUALIFIERS:

B - Indicates when the anlayte is found in the associated method or preparation blank
D - Surrogate is not recoverable due to the necessary dilution of the sample
E - Indicates the reportable value is outside of the calibration range of the instrument but within the linear range of the instrument (unless otherwise noted) Values reported with an E qualifier should be considered as estimated.
H- Indicates that the recommended holding time for the analyte or compound has been exceeded
J- Indicates a value between the method MDL and PQL and that the reported concentration should be considered as estimated rather the quantitative
NA - Not Analyzed
N/A - Not Applicable
NR - Not recoverable - a matrix spike concentration is not recoverable due to a concentration within the original sample that is greater than four times the spike concentration added
R- The % RPD between a duplicate set of samples is outside of the absolute values established by laboratory control charts
S- Spike recovery is outside of established method and/or laboratory control limits. Further explanation of the use of this qualifier should be included within a case narrative
X -Used to indicate that a value based on pattern identification is within the pattern range but not typical of the pattern found in standards. Further explanation may or may not be provided within the sample footnote and/or the case narrative.

Torrent LABORATORY, INC.

Sample Receipt Checklist

Client Name: David W Bess

Project Name: WaterQ Basic (Well Water for Dave Bess)

Work Order No.: DWQ1306008

Date and Time Received: 6/13/2013 10:30

Received By: ng

Physically Logged By: ng

Checklist Completed By: ng

Carrier Name: FedEx

Chain of Custody (COC) Information

Chain of custody present?	No
Chain of custody signed when relinquished and received?	No
Chain of custody agrees with sample labels?	No
Custody seals intact on sample bottles?	Not Present

Sample Receipt Information

Custody seals intact on shipping container/cooler?	Not Present
Shipping Container/Cooler In Good Condition?	Yes
Samples in proper container/bottle?	Yes
Samples containers intact?	Yes
Sufficient sample volume for indicated test?	Yes

Sample Preservation and Hold Time (HT) Information

All samples received within holding time?	Yes
Container/Temp Blank temperature in compliance?	No Temperature: 15 °C
Water-VOA vials have zero headspace?	No VOA vials submitted
Water-pH acceptable upon receipt?	N/A

pH Checked by: n/a

pH Adjusted by: n/a

Samples received in a cooler at 15 deg C.

Torrent LABORATORY, INC.

Login Summary Report

Client ID: TL5834 David W Bess
QC Level:
Project Name: WaterQ Basic (Well Water for Dave Bess)
TAT Requested: 3 day:25
Project # :
Date Received: 6/13/2013
Report Due Date: 6/18/2013
Time Received: 10:30

Comments: 3day TAT! Metals (Cu,Pb, B, Mn, As and Fe), Anions (NO2, NO3), pH, Turb, TDS, Hardness.

Client did not fill out the CoC, and has been contacted by email for sampling date/time, and for a CoC with a signature on it. --KB 6/13/13.

Work Order # : ***DWQ1306008***

WO Sample ID	Client Sample ID	Collection Date/Time	Matrix	Scheduled Disposal	Sample On Hold	Test On Hold	Requested Tests	Subbed
DWQ1306008-001A	House well	06/12/13 11:00	Drinking Water				DWQ_200.8 DWQ_200.7 DWQ_Hardness	
Sample Note:	3day TAT! Metals (Cu, Pb, B, Mn, As and Fe)							
DWQ1306008-001B	House well	06/12/13 11:00	Drinking Water				DWQ_Anions DWQ_TDS DWQ_Turb DWQ_pH	
Sample Note:	Anions (NO2, NO3), pH, Turb, TDS.							
DWQ1306008-001C	House well	06/12/13 11:00	Drinking Water				DWQ_Sulfide	
Sample Note:	Sulfide.							
DWQ1306008-002A	Irrigation well	06/12/13 11:50	Drinking Water				DWQ_200.8 DWQ_200.7 DWQ_Hardness	
DWQ1306008-002B	Irrigation well	06/12/13 11:50	Drinking Water				DWQ_Anions DWQ_pH DWQ_Turb DWQ_TDS	
DWQ1306008-002C	Irrigation well	06/12/13 11:50	Drinking Water				DWQ_Sulfide	

Torrent LABORATORY, INC.

Torrent LABORATORY, INC. REQUEST FORM

Rush Turnaround Services

Torrent Express™

Confirmation Number | TR13

Date | 6/13/13

Company | Dave Bess

Ordered By |

Email | xxxxxxxxxxxxxxxxxxxx
(for Rush report)

For Torrent Lab Use Only

Project Name | xxxxxxxxxxxxxx

Project Number | xxxxxxxxxxxxx

Order ID | DWQ1306008

Order Taken By | xxxxxxxxxxxxxx

Accounting |

Project Details

TAT Requested
(please check one)

- ☐ Same Day (2-8 Hours)
- ☐ One Day ☐ Noon
- ☐ 2 Day ☐ Noon
- ☑ 3 Day ☐ Noon
- ☐ 4 Day ☐ Noon

Number of Samples | 2

Matrix | Water
(i.e., sample type: Is your sample soil, water, etc?)

Analysis | Basic Well - no bacT, plus Fe

☐ Weekend work required (refer to chart below for respective surcharge)

This request form may be a courtesy notice which reflects the rush services requested on the chain-of-custody. Please contact *Torrent Express*™ project management immediately at pm@torrentlab.com with the subject line "Rush TAT Cancellation" if you do not want the analysis(es) to proceed. **Cancellation of a *Torrent Express*™ service may be subject to a cancellation fee.**

In order to facilitate processing and scheduling, please notify Torrent Laboratory at least 24 hours in advance for any *Torrent Express*™ service.

Sample(s) must be received or scheduled for pick-up before 5:00 pm in order to be processed that day; all samples received after 5:00 pm will be processed the following day.

All *Torrent Express*™ Same Day and Next Day rush services will be charged a $250.00 minimum (excluding certain fees) plus the respective surcharge(s); all other *Torrent Express*™ rush services will be charged a $150.00 minimum (excluding certain fees) plus the respective surcharge(s).

The following table briefly describes Torrent Laboratory's *Torrent Express*™ surcharge pricing structure, please refer to your company specific price list for the precise surcharges.

	Same Day	Next Day*	2 Day*	3 Day*	4 Day*
Regular Rush	300%	150%	75%	50%	37.5%
Noon	–	200%	100%	62.5%	50%
Weekend	300%	300%	–	–	–

*business day(s)

483 Sinclair Frontage Rd., Milpitas, CA 95035 | tel: 408.263.5258 | fax: 408.263.8293 | www.torrentlab.com

Torrent LABORATORY, INC.

Torrent LABORATORY, INC.
483 Sinclair Frontage Road
Milpitas, CA 95035
Phone: 408.263.5258
FAX: 408.263.8293
www.torrentlab.com

RESET

CHAIN OF CUSTODY

NOTE: SHADED AREAS ARE FOR TORRENT LAB USE ONLY.

LAB WORK ORDER NO: 13060008

Company Name: Dave W. Bess	Location of Sampling:
Address: 1115 Mt George Ave	Purpose: Drinking Water - WaterQ-Basic (Well Water)
City: Napa / State: CA / Zip Code: 94558	Special Instructions / Comments: INCLUDE IRON IN THE METALS LIST. 3 DAY TAT!
Telephone: 707.226.2539 / FAX:	
REPORT TO: Dave Bess / SAMPLER:	P.O. #: / EMAIL: dave@dbesspumpandwell.com

TURNAROUND TIME: ☐ 10 Work Days ☑ 3 Work Days ☐ Noon - Nxt Day ☐ 7 Work Days ☐ 2 Work Days ☐ 2 - 8 Hours ☐ 5 Work Days ☐ 1 Work Day ☐ Other

SAMPLE TYPE: ☐ Storm Water ☐ Air ☐ Waste Water ☑ Other ☐ Ground Water ☐ Soil

REPORT FORMAT: ☐ QC Level IV ☐ EDF ☐ Excel / EDD

ANALYSIS REQUESTED

LAB ID	CLIENT'S SAMPLE I.D.	DATE / TIME SAMPLED	MATRIX	# OF CONT	CONT TYPE	Cu, Pb, B, Mn, As,e	Hardness		TDS,pH,Turb,	Anions (NO2, NO3)	Sulfide				REMARKS
001A/B/C			DW			✓	✓		✓	✓	✓				
002A/B/C						✓	✓		✓	✓	✓				

RUSH 3 DAYS

	Relinquished By:	Print:	Date:	Time:	Received By:	Print:	Date:	Time:
1								10:30 AM
2	Relinquished By:	Print:	Date:	Time:	Received By:	Print:	Date:	Time:

Were Samples Received in Good Condition? ☑ Yes ☐ NO Samples on Ice? ☑ Yes ☐ NO Method of Shipment: Fed Ex Sample seals intact? ☐ Yes ☐ NO ☑ N/A

NOTE: Samples are discarded by the laboratory 30 days from date of receipt unless other arrangements are made. Page 1 of 1

Log In By: KB Date: 6/13/13 Log In Reviewed By: Date:

Appendix C-Water Quality Analysis, Sodhani Irrigation Well

Torrent
LABORATORY, INC.

David W Bess
David W Bess
1115 Mt George Ave
Napa, California 94558
Tel: 707-226-2539
Email: dave@dbesspumpandwell.com

RE: WaterQ Basic (Well Water for Dave Bess)

Work Order No.: DWQ1306008-B

Dear David W Bess:

Torrent Laboratory, Inc. received 1 sample(s) on June 13, 2013 for the analyses presented in the following Report.

All data for associated QC met EPA or laboratory specification(s) except where noted in the case narrative.

Torrent Laboratory, Inc. is certified by the State of California, ELAP #1991. If you have any questions regarding these test results, please feel free to contact the Project Management Team at (408)263-5258; ext 204.

Patti Sandrock
QA Officer

June 18, 2013
Date

Torrent LABORATORY, INC.

Date: 6/18/2013

Client: David W Bess

Project: WaterQ Basic (Well Water for Dave Bess)

Work Order: DWQ1306008-B

CASE NARRATIVE

No issues encountered with the receiving, preparation, analysis or reporting of the results associated with this work order.

Observations:

Primary Contaminants- (Health)

The following constituents in the scope of analysis presented in this report were found to be outside of the EPA Federally established Maximum Contaminant Level (MCL) guidelines.
Corrective action must be taken to control the failed constituents in order to ensure corrected levels will be below the MCLs.

Turbidity 57 NTU (MCL is 5.0)
Arsenic 130 ug/L (MCL is 10)

THIS WATER SHOULD NOT BE USED FOR DRINKING, BATHING or COOKING!

Secondary Contaminant - (Water Aesthetics)

No secondary contaminants in the scope of analysis presented in this report were found to be outside of the EPA Federally established Maximum Contaminant Level (MCL) guidelines (or recommended level where no MCLs exist).

This report is for Irrigation Well sample only and is labeled and stored as DWQ-1306008-B.

The House Well sample will be reported separately as DWQ-1306008-A.

Torrent LABORATORY, INC

Sample Result Summary

Report prepared for: David W Bess
David W Bess

Date Received: 06/13/13
Date Reported: 06/18/13

Irrigation well DWQ1306008-002

Parameters:	Analysis Method	DF	MDL	PQL	Results	Unit
Iron	E200.7	1	0.002	0.10	1.6	mg/L
Manganese	E200.7	1	0.003	0.050	0.10	mg/L
Boron	E200.7	1	0.001	0.020	0.057	mg/L
Copper	E200.8	1	0.077	0.50	5.9	ug/L
Lead	E200.8	1	0.018	0.10	3.0	ug/L
Arsenic	E200.8	1	0.11	0.30	130	ug/L
Total Hardness (As CaCO3)	SM2340B	1	0.0830	1.0	80	mg/L
Calcium Hardness (as CaCO3)	SM2340B	1	0.0830	0.50	41	mg/L
pH	SM4500HB	1	0.10	2.00	7.57	S.U.
Total Dissolved Solids	SM2540C	1	1	10	180	mg/L
Turbidity	E180.1	10	1.0	2.0	57	NTU

Torrent LABORATORY, INC.

SAMPLE RESULTS

Report prepared for: David W Bess
David W Bess

Date Received: 06/13/13
Date Reported: 06/18/13

Client Sample ID:	Irrigation well	**Lab Sample ID:**	DWQ1306008-B-002A
Project Name/Location:	WaterQ Basic (Well Water for Dave Bess)	**Sample Matrix:**	Drinking Water
Project Number:			
Date/Time Sampled:	06/12/13 / 11:50		
Tag Number:	Drinking Water Sample for Dave Bess		

Parameters:	Analysis Method	Prep Date	Date Analyzed	DF	MDL	PQL	Results	Lab Qualifier	Unit	Analytical Batch	Prep Batch
Iron	E200.7	6/13/13	06/13/13	1	0.002	0.10	1.6		mg/L	416020	8945
Manganese	E200.7	6/13/13	06/13/13	1	0.003	0.050	0.10		mg/L	416020	8945
Boron	E200.7	6/13/13	06/13/13	1	0.001	0.020	0.057		mg/L	416020	8945

Parameters:	Analysis Method	Prep Date	Date Analyzed	DF	MDL	PQL	Results	Lab Qualifier	Unit	Analytical Batch	Prep Batch
Copper	E200.8	6/13/13	06/17/13	1	0.077	0.50	5.9		ug/L	416049	8962
Lead	E200.8	6/13/13	06/17/13	1	0.018	0.10	3.0		ug/L	416049	8962
Arsenic	E200.8	6/13/13	06/17/13	1	0.11	0.30	130		ug/L	416049	8962

Parameters:	Analysis Method	Prep Date	Date Analyzed	DF	MDL	PQL	Results	Lab Qualifier	Unit	Analytical Batch	Prep Batch
Total Hardness (As CaCO3)	SM2340B	6/13/13	06/13/13	1	0.0830	1.0	80		mg/L	416019	8943
Calcium Hardness (as CaCO3)	SM2340B	6/13/13	06/13/13	1	0.0830	0.50	41		mg/L	416019	8943

Torrent LABORATORY, INC.

SAMPLE RESULTS

Report prepared for: David W Bess
David W Bess

Date Received: 06/13/13
Date Reported: 06/18/13

Client Sample ID:	Irrigation well	**Lab Sample ID:**	DWQ1306008-B-002B
Project Name/Location:	WaterQ Basic (Well Water for Dave Bess)	**Sample Matrix:**	Drinking Water
Project Number:			
Date/Time Sampled:	06/12/13 / 11:50		
Tag Number:	Drinking Water Sample for Dave Bess		

Parameters:	Analysis Method	Prep Date	Date Analyzed	DF	MDL	PQL	Results	Lab Qualifier	Unit	Analytical Batch	Prep Batch
Nitrite as N	E300.0	NA	06/13/13	1	0.095	0.50	ND		mg/L	416072	NA
Nitrate as NO3	E300.0	NA	06/13/13	1	0.077	0.50	ND		mg/L	416072	NA

Parameters:	Analysis Method	Prep Date	Date Analyzed	DF	MDL	PQL	Results	Lab Qualifier	Unit	Analytical Batch	Prep Batch
pH	SM4500HB	NA	06/13/13	1	0.10	2.00	7.57		S.U.	416060	NA

Parameters:	Analysis Method	Prep Date	Date Analyzed	DF	MDL	PQL	Results	Lab Qualifier	Unit	Analytical Batch	Prep Batch
Total Dissolved Solids	SM2540C	NA	06/14/13	1	1	10	180		mg/L	416058	NA

Parameters:	Analysis Method	Prep Date	Date Analyzed	DF	MDL	PQL	Results	Lab Qualifier	Unit	Analytical Batch	Prep Batch
Turbidity	E180.1	NA	06/13/13	10	1.0	2.0	57		NTU	416059	NA

Torrent LABORATORY, INC.

SAMPLE RESULTS

Report prepared for: David W Bess
David W Bess

Date Received: 06/13/13
Date Reported: 06/18/13

Client Sample ID:	Irrigation well	**Lab Sample ID:**	DWQ1306008-B-002C
Project Name/Location:	WaterQ Basic (Well Water for Dave Bess)	**Sample Matrix:**	Drinking Water
Project Number:			
Date/Time Sampled:	06/12/13 / 11:50		
Tag Number:	Drinking Water Sample for Dave Bess		

Parameters:	Analysis Method	Prep Date	Date Analyzed	DF	MDL	PQL	Results	Lab Qualifier	Unit	Analytical Batch	Prep Batch
Sulfide, Total	E376.1	NA	06/17/13	1	2	2.0	ND		mg/L	416062	NA

Torrent LABORATORY, INC.

Laboratory Qualifiers and Definitions

DEFINITIONS:

Accuracy/Bias (% Recovery) - The closeness of agreement between an observed value and an accepted reference value.
Blank (Method/Preparation Blank) -MB/PB - An analyte-free matrix to which all reagents are added in the same volumes/proportions as used in sample processing. The method blank is used to document contamination resulting from the analytical process.
Duplicate - a field sample and/or laboratory QC sample prepared in duplicate following all of the same processes and procedures used on the original sample (sample duplicate, LCSD, MSD)
Laboratory Control Sample (LCS ad LCSD) - A known matrix spiked with compounds representative of the target analyte(s). This is used to document laboratory performance.
Matrix - the component or substrate that contains the analyte of interest (e.g., - groundwater, sediment, soil, waste water, etc)
Matrix Spike (MS/MSD) - Client sample spiked with identical concentrations of target analyte (s). The spiking occurs prior to the sample preparation and analysis. They are used to document the precision and bias of a method in a given sample matrix.
Method Detection Limit (MDL) - the minimum concentration of a substance that can be measured and reported with a 99% confidence that the analyte concentration is greater than zero
Practical Quantitation Limit (PQL) - a laboratory determined value at 2 to 5 times above the MDL that can be reproduced in a manner that results in a 99% confidence level that the result is both accurate and precise. PQLs reflect all preparation factors and/or dilution factors that have been applied to the sample during the preparation and/or analytical processes.
Precision (%RPD) - The agreement among a set of replicate/duplicate measurements without regard to known value of the replicates
Surrogate (S) or (Surr) - An organic compound which is similar to the target analyte(s) in chemical composition and behavior in the analytical process, but which is not normally found in environmental samples. Surrogates are used in most organic analysis to demonstrate matrix compatibility with the chosen method of analysis
Tentatively Identified Compound (TIC) - A compound not contained within the analytical calibration standards but present in the GCMS library of defined compounds. When the library is searched for an unknown compound, it can frequently give a tentative identification to the compound based on retention time and primary and secondary ion match. TICs are reported as estimates and are candidates for further investigation.
Units: the unit of measure used to express the reported result - **mg/L** and ***mg/Kg*** (equivalent to PPM - parts per million in **liquid** and ***solid***), **ug/L** and ***ug/Kg*** (equivalent to PPB - parts per billion in **liquid** and ***solid***), **ug/m3**, ***mg.m3***, **ppbv** and ***ppmv*** (all units of measure for reporting concentrations in air), **%** (equivalent to 10000 ppm or 1,000,000 ppb), **ug/Wipe** (concentration found on the surface of a single Wipe usually taken over a 100cm2 surface)

LABORATORY QUALIFIERS:

B - Indicates when the anlayte is found in the associated method or preparation blank
D - Surrogate is not recoverable due to the necessary dilution of the sample
E - Indicates the reportable value is outside of the calibration range of the instrument but within the linear range of the instrument (unless otherwise noted) Values reported with an E qualifier should be considered as estimated.
H- Indicates that the recommended holding time for the analyte or compound has been exceeded
J- Indicates a value between the method MDL and PQL and that the reported concentration should be considered as estimated rather the quantitative
NA - Not Analyzed
N/A - Not Applicable
NR - Not recoverable - a matrix spike concentration is not recoverable due to a concentration within the original sample that is greater than four times the spike concentration added
R- The % RPD between a duplicate set of samples is outside of the absolute values established by laboratory control charts
S- Spike recovery is outside of established method and/or laboratory control limits. Further explanation of the use of this qualifier should be included within a case narrative
X -Used to indicate that a value based on pattern identification is within the pattern range but not typical of the pattern found in standards. Further explanation may or may not be provided within the sample footnote and/or the case narrative.

Torrent LABORATORY, INC.

Sample Receipt Checklist

Client Name: David W Bess

Project Name: WaterQ Basic (Well Water for Dave Bess)

Work Order No.: DWQ1306008

Date and Time Received: 6/13/2013 10:30

Received By: ng

Physically Logged By: ng

Checklist Completed By: ng

Carrier Name: FedEx

Chain of Custody (COC) Information

Chain of custody present?	No
Chain of custody signed when relinquished and received?	No
Chain of custody agrees with sample labels?	No
Custody seals intact on sample bottles?	Not Present

Sample Receipt Information

Custody seals intact on shipping container/cooler?	Not Present
Shipping Container/Cooler In Good Condition?	Yes
Samples in proper container/bottle?	Yes
Samples containers intact?	Yes
Sufficient sample volume for indicated test?	Yes

Sample Preservation and Hold Time (HT) Information

All samples received within holding time?	Yes			
Container/Temp Blank temperature in compliance?	No	Temperature:	15	°C
Water-VOA vials have zero headspace?	No VOA vials submitted			
Water-pH acceptable upon receipt?	N/A			

pH Checked by: n/a

pH Adjusted by: n/a

Samples received in a cooler at 15 deg C.

Torrent LABORATORY, INC.

Login Summary Report

Client ID:	TL5834 David W Bess	**QC Level:**	
Project Name:	WaterQ Basic (Well Water for Dave Bess)	**TAT Requested:**	3 day:25
Project # :		**Date Received:**	6/13/2013
Report Due Date:	6/18/2013	**Time Received:**	10:30

Comments: 3day TAT! Metals (Cu,Pb, B, Mn, As and Fe), Anions (NO2, NO3), pH, Turb, TDS, Hardness.

Client did not fill out the CoC, and has been contacted by email for sampling date/time, and for a CoC with a signature on it. --KB 6/13/13.

Work Order # : ***DWQ1306008***

WO Sample ID	Client Sample ID	Collection Date/Time	Matrix	Scheduled Disposal	Sample On Hold	Test On Hold	Requested Tests	Subbed
DWQ1306008-001A	House well	06/12/13 11:00	Drinking Water				DWQ_200.8 DWQ_200.7 DWQ_Hardness	
Sample Note:	3day TAT! Metals (Cu, Pb, B, Mn, As and Fe)							
DWQ1306008-001B	House well	06/12/13 11:00	Drinking Water				DWQ_Anions DWQ_pH DWQ_TDS DWQ_Turb	
Sample Note:	Anions (NO2, NO3), pH, Turb, TDS.							
DWQ1306008-001C	House well	06/12/13 11:00	Drinking Water				DWQ_Sulfide	
Sample Note:	Sulfide.							
DWQ1306008-002A	Irrigation well	06/12/13 11:50	Drinking Water				DWQ_200.8 DWQ_200.7 DWQ_Hardness	
DWQ1306008-002B	Irrigation well	06/12/13 11:50	Drinking Water				DWQ_Anions DWQ_pH DWQ_Turb DWQ_TDS	
DWQ1306008-002C	Irrigation well	06/12/13 11:50	Drinking Water				DWQ_Sulfide	

Torrent
LABORATORY, INC.

Torrent LABORATORY, INC. REQUEST FORM

Rush Turnaround Services

Same Day • 24 Hrs • 48 Hrs • 72 Hrs
Torrent Express™

Confirmation Number | TR13

Date | 6/13/13

Company | Dave Bess

Ordered By |

Email | xxxxxxxxxxxxxxxxxxxx
(for Rush report)

For Torrent Lab Use Only

Project Name | xxxxxxxxxxxxxxx

Project Number | xxxxxxxxxxxxxx

Order ID | DWQ1306008

Order Taken By | xxxxxxxxxxxxxx

Accounting |

Project Details

TAT Requested
(please check one)

- ☐ Same Day (2-8 Hours)
- ☐ One Day ☐ Noon
- ☐ 2 Day ☐ Noon
- ☑ 3 Day ☐ Noon
- ☐ 4 Day ☐ Noon

Number of Samples | 2

Matrix | Water
(i.e., sample type: Is your sample soil, water, etc?)

Analysis | Basic Well - no bacT, plus Fe

☐ Weekend work required (refer to chart below for respective surcharge)

This request form may be a courtesy notice which reflects the rush services requested on the chain-of-custody. Please contact *Torrent Express*™ project management immediately at pm@torrentlab.com with the subject line "Rush TAT Cancellation" if you do not want the analysis(es) to proceed. **Cancellation of a *Torrent Express*™ service may be subject to a cancellation fee.**

In order to facilitate processing and scheduling, please notify Torrent Laboratory at least 24 hours in advance for any *Torrent Express*™ service.

Sample(s) must be received or scheduled for pick-up before 5:00 pm in order to be processed that day; all samples received after 5:00 pm will be processed the following day.

All *Torrent Express*™ Same Day and Next Day rush services will be charged a $250.00 minimum (excluding certain fees) plus the respective surcharge(s); all other *Torrent Express*™ rush services will be charged a $150.00 minimum (excluding certain fees) plus the respective surcharge(s).

The following table briefly describes Torrent Laboratory's *Torrent Express*™ surcharge pricing structure, please refer to your company specific price list for the precise surcharges.

	Same Day	Next Day*	2 Day*	3 Day*	4 Day*
Regular Rush	300%	150%	75%	50%	37.5%
Noon	–	200%	100%	62.5%	50%
Weekend	300%	300%	–	–	–

*business day(s)

Torrent LABORATORY, INC.

Torrent LABORATORY, INC.
483 Sinclair Frontage Road
Milpitas, CA 95035
Phone: 408.263.5258
FAX: 408.263.8293
www.torrentlab.com

RESET

CHAIN OF CUSTODY

NOTE: SHADED AREAS ARE FOR TORRENT LAB USE ONLY.

LAB WORK ORDER NO: 13Q0008

Company Name: Dave W. Bess		Location of Sampling:
Address: 1115 Mt George Ave		Purpose: Drinking Water - WaterQ-Basic (Well Water)
City: Napa	State: CA	Zip Code: 94558
Telephone: 707.226.2539	FAX:	Special Instructions / Comments: INCLUDE IRON IN THE METALS LIST. 3 DAY TAT!
REPORT TO: Dave Bess	SAMPLER:	P.O. #: EMAIL: dave@dbesspumpandwell.com

TURNAROUND TIME:
☐ 10 Work Days ☑ 3 Work Days ☐ Noon - Nxt Day
☐ 7 Work Days ☐ 2 Work Days ☐ 2 - 8 Hours
☐ 5 Work Days ☐ 1 Work Day ☐ Other

SAMPLE TYPE:
☐ Storm Water ☐ Air
☐ Waste Water ☑ Other
☐ Ground Water
☐ Soil

REPORT FORMAT:
☐ QC Level IV
☐ EDF
☐ Excel / EDD

ANALYSIS REQUESTED

LAB ID	CLIENT'S SAMPLE I.D.	DATE / TIME SAMPLED	MATRIX	# OF CONT	CONT TYPE	Cu, Pb, B, Mn, As,e	Hardness		TDS,pH,Turb,	Anions (NO2, NO3)	Sulfide				REMARKS
001A/B/C			DW			✓	✓		✓	✓	✓				
002A/B/C						✓	✓		✓	✓	✓				

RUSH 3 DAYS

	Relinquished By:	Print:	Date:	Time:	Received By:	Print:	Date:	Time:
1								10:30 AM
2	Relinquished By:	Print:	Date:	Time:	Received By:	Print:	Date:	Time:

Were Samples Received in Good Condition? ☑ Yes ☐ NO Samples on Ice? ☑ Yes ☐ NO Method of Shipment: Fed Ex Sample seals intact? ☐ Yes ☐ NO ☑ N/A

NOTE: Samples are discarded by the laboratory 30 days from date of receipt unless other arrange-ments are made. Page 1 of 1

Log In By: KB Date: 6/13/13 Log In Reviewed By: Date:

Appendix D-Napa County Well Permit, Project Well

HEALTH DEPT. USE ONLY
FEE: 12.00
DATE: 2-20-74
RECEIPT NO: 0900
BY: N. Ettel

RECEIVED
MAY 7 1974
DIVISION OF ENVIRONMENTAL HEALTH

A.P. # 22-080-04

NAPA COUNTY HEALTH DEPARTMENT
DIVISION OF ENVIRONMENTAL HEALTH

APPLICATION & PERMIT TO CONSTRUCT
A WATER WELL
(ORDINANCE #)

NAME Calloy (Owner) ADDRESS St. Helena Hwy N (Job Location) DATE 2-20-74

NAME Walter Rattila (Well Driller) ADDRESS 1541 Mark West Springs Rd. Santa Rosa,

TYPE OF WORK
NEW WELL ✓ RECONDITIONING ___ DEEPENING ___
TEST HOLES ___ DESTROYING ___ OTHER ___
TYPE I PERMIT ✓ TYPE II PERMIT ___ FEE ___

PROPOSED USE
DOMESTIC ✓ IRRIGATION ✓ INDUSTRIAL ___ MUNICIPAL ___
TEST WELL ___ OTHER ___

Sewage Disposal On Site (Existing or Proposed) Public ___ Individual ✓ Private ___
Distance from well to any part of nearest sewage disposal system 100+ feet.
(Sketch of site to accompany application.

TYPE OF EQUIPMENT TO BE USED
Rotary ___ Cable ✓ Hand Dug ___ Other ___

CONSTRUCTION PROPOSED
Diameter of casing 8" Material steel Annular Space: Size 2"
Sealed with: Concrete ___ Grout ✓ Neat Cement ___ Puddled Clay ___ Other ___
Conductor Casing: Yes ___ No ✓ Material ___
Chlorination By: Owner ✓ Pump Co ___ Driller ___

Walter Rattila
(SIGNATURE OF APPLICANT)

2-20-74
(DATE)

NOTICE TO DRILLER: COMPLETE THIS PORTION AND PROVIDE OWNER WITH THIS COPY.

CONSTRUCTION

CASING
250 – 8"

Total Depth 250 Ft.
Surface Seal to 25 Ft.
Any Stratas sealed: Yes ___ No X
If yes, depth of Stratas
From ___ Ft. to ___ Feet
From ___ Ft. to ___ Feet
Perforations
From 87 Ft. to 130 Feet
From 160 Ft. to 190 Feet
From 210 Ft. to 250 Feet

WATER LEVELS
First water at 70 Feet
Static level at 45 Feet

WELL TESTS
How performed Bailer
Yield 30 GPM with 80 Feet
Drawdown ___ Ft. after 1 Hrs.

WELL LOG
(Formation; describe by color, size of material, structure)

Ft.	to	Ft.	
0	20	Red clay	
20	30	Clay & small boulders	
30	40	Loose boulders	
40	47	Clay.	
47	60	broken basalt	
60	85	Clay.	
85	95	broken basalt	
95	110	brown ash	
110	125	broken basalt	
125	145	Brown ash.	
145	160	Hard clay & gravel	
160	180	ash & gravel	
180	188	clay.	
188	200	Brown rock.	
200	210	Clay & boulders	
210	240	Brown rock	
240	245	Brown rock.	
245	250	Brown rock.	

Signed: Walter L Rattila
License # 228649

Appendix E-Well Completion Report, Sodhani Irrigation Well

TRIPLICATE
Owner's Copy

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. 719746

STATE WELL NO./STATION NO.

LATITUDE LONGITUDE APN/TRS/OTHER

Page 1 of 2
Owner's Well No.
Date Work Began 7/2/99 Ended 7/14/99
Local Permit Agency NAPA CO. ENVIRONMENTAL MANAGEMENT
Permit No. 96-10399 Permit Date 10/8/99

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DRILLING METHOD MUD ROTARY FLUID Bentonite

DEPTH FROM SURFACE ft. to ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0 – 3	Clay
3 – 10	Boulders
10 – 26	Gravels
26 – 48	HARD Cobbles
48 – 59	Coarse sand
59 – 76	Clayey sand
76 – 85	Hard multi-colored volcanic rock
85 – 94	Loose volcanic rock & some clay
94 – 96	Clay
96 – 105	Coarse sand & volcanic rock with small amount of clay
105 – 111	Hard & fractured volcanic rock
111 – 117	Sandy clayey ash
117 – 121	Hard fractured volcanic rock
121 – 124	Clay and ash
124 – 128	Hard fractured volcanic rock
128 – 130	Clay & ash
130 – 142	Hard fractured volcanic rock
142 – 148	Dry ash
148 – 162	Hard fractured volcanic rock
162 – 164	Clay and ash
164 – 167	Hard fractured volcanic rock
167 – 196	Clay and ash
196 – 198	Hard fractured volcanic rock
198 – 214	Clay and ash
214 – 218	Hard fractured volcanic rock
218 – 251	Volcanic conglomerate

TOTAL DEPTH OF BORING 458 (Feet)
TOTAL DEPTH OF COMPLETED WELL 458 (Feet)

WELL OWNER

Name HAROLD & CAROL GREEN
Mailing Address 3283 St. Helena Hwy
City St. Helena, State CA Zip

WELL LOCATION

Address 3283 St. Helena Hwy
City St. Helena, CA
County NAPA
APN Book 22 Page 080 Parcel 04
Township ___ Range ___ Section ___
Latitude ___ DEG ___ MIN ___ SEC. NORTH Longitude ___ DEG ___ MIN ___ SEC. WEST

LOCATION SKETCH

NORTH / WEST / EAST / SOUTH

Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

X NEW WELL
MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)
___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USES (✓)

WATER SUPPLY
___ Domestic ___ Public
X Irrigation ___ Industrial
MONITORING ___
TEST WELL ___
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER ___ (Ft.) BELOW SURFACE
DEPTH OF STATIC WATER LEVEL 21 (Ft.) & DATE MEASURED 7/14/99
ESTIMATED YIELD * 18 (GPM) & TEST TYPE BAIL
TEST LENGTH 1½ (Hrs.) TOTAL DRAWDOWN 97 (Ft.)
** May not be representative of a well's long-term yield.*

CASING(S)

DEPTH FROM SURFACE ft. to ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	TYPE (✓) SCREEN	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0 – 316	12¼						
316 – 458	10 5/8						
+2 – 458		X		PVC/F480	6"	CL200	
78 – 98			X				.032
138 – 158			X				.032

SEE NEXT PAGE TO CONTINUE MICR PERFORATIONS

ANNULAR MATERIAL

DEPTH FROM SURFACE ft. to ft.	TYPE: CEMENT (✓)	BENTONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0 – 26	X			
26 – 458			X	3/8 PEA GR

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
___ Other ___

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME WEEKS DRILLING AND PUMP COMPANY by Ward Thompson (PERSON, FIRM, OR GOVERNMENTAL AGENCY) (TYPED OR PRINTED)

ADDRESS P.O. Box 176 CITY SEBASTOPOL, CA STATE 95473 Zip

Signed [signature] (WELL DRILLER/AUTHORIZED REPRESENTATIVE) DATE SIGNED 7/15/99

C-57 LICENSE NUMBER 573681

DWR 188 REV. 11-92

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

Owner's Copy

Page 2 of 2

Owner's Well No.

Date Work Began 7/2/99 , Ended 7/14/99

Local Permit Agency NAPA CO. ENVIRONMENTAL MANAGEMENT

Permit No. 96-10399 Permit Date 10/8/99

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. 719747

STATE WELL NO./STATION NO.

LATITUDE LONGITUDE

APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DRILLING METHOD MUD ROTARY FLUID Bent.

DEPTH FROM SURFACE ft.	to ft.	DESCRIPTION Describe material, grain size, color, etc.
251	262	Hard fractured volcanic rock
262	271	Volcanic conglomerate
271	274	HARD volcanic rock
274	283	Clay and ash
283	288	Hard fractured volcanic rock
288	293	Coarse sand
293	369	Hard multi-colored volcanic rock with seams of clay
369	382	Clayee ash
382	388	Hard and very fractured black and red volcanic rock
388	392	Clay and ash
392	412	Coarse sands & rock ledges
412	420	Clay and ash
420	449	Coarse sand and rock ledges
449	458	Stiff clay

TOTAL DEPTH OF BORING 458 (Feet)

TOTAL DEPTH OF COMPLETED WELL 458 (Feet)

WELL OWNER

Name HAROLD & CAROL GREEN

Mailing Address 3283 St. Helena Hwy

City St. Helena, STATE CA ZIP

WELL LOCATION

Address 3283 St. Helena Hwy

City St. Helena, CA

County NAPA

APN Book 22 Page 080 Parcel 04

Township ___ Range ___ Section ___

Latitude ___ DEG ___ MIN ___ SEC. NORTH

Longitude ___ DEG ___ MIN ___ SEC. WEST

LOCATION SKETCH

NORTH

WEST EAST

SOUTH

Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

X NEW WELL

MODIFICATION/REPAIR

___ Deepen

___ Other (Specify)

___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USES (✓)

WATER SUPPLY

___ Domestic ___ Public

X Irrigation ___ Industrial

___ MONITORING

___ TEST WELL

___ CATHODIC PROTECTION

___ HEAT EXCHANGE

___ DIRECT PUSH

___ INJECTION

___ VAPOR EXTRACTION

___ SPARGING

___ REMEDIATION

___ OTHER (SPECIFY)

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER ___ (Ft.) BELOW SURFACE

DEPTH OF STATIC WATER LEVEL SEE PAGE 1 (Ft.) & DATE MEASURED ___

ESTIMATED YIELD * ___ (GPM) & TEST TYPE ___

TEST LENGTH ___ (Hrs.) TOTAL DRAWDOWN ___ (Ft.)

* May not be representative of a well's long-term yield.

CASING(S)

DEPTH FROM SURFACE ft.	to ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	TYPE (✓) SCREEN	TYPE (✓) CONDUCTOR	TYPE (✓) BLANK FULL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
218	238			X						.032
278	298			X						.032
338	358			X						.032
398	418			X						.032
438	458			X						.032
(See Page 1 for other information)										

ANNULAR MATERIAL

DEPTH FROM SURFACE ft.	to ft.	TYPE CEMENT (✓)	TYPE BENTONITE (✓)	TYPE FILL (✓)	FILTER PACK (TYPE/SIZE)
SEE PREVIOUS PAGE 1					

ATTACHMENTS (✓)

___ Geologic Log

___ Well Construction Diagram

___ Geophysical Log(s)

___ Soil/Water Chemical Analyses

___ Other ___

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME WEEKS DRILLING AND PUMP COMPANY by Ward Thompson (PERSON, FIRM OR CORPORATION) (TYPED OR PRINTED)

ADDRESS P.O. Box 176 CITY Sebastopol, CA STATE 95473 ZIP

Signed Ward Thompson (WELL DRILLER/AUTHORIZED REPRESENTATIVE) DATE SIGNED 7/15/99

C-57 LICENSE NUMBER 177681

DWR 188 REV. 11-92

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

Appendix F-Soil Data for Project Recharge Zone

Map Unit Symbol	Hydrologic Group	Soil Name	Area (acres)
110	B	Boomer-Forward-Felta complex, 30 to 50 percent slopes	1.33
109	B	Boomer gravelly loam, 30 to 50 percent slopes	16.57
108	B	Boomer gravelly loam, 15 to 30 percent slopes	31.12
100	B	Aiken loam, 2 to 15 percent slopes	3.10
139	C	Forward gravelly loam, 9 to 30 percent slopes	0.03

Appendix G-Estimated Annual PET for Project Recharge Zone

Land use acreage for Area 2

Area 52.2

FID	Land uSE	Area (acres)	Total acres Land use	Percent Total Recharge Area	Annual PET from L&S Water Balance (inches)	Area-Weighted PET (inches)
7	Forest	16.16				
14	Forest	0.32	16.48	32%	19.9	6.29
1	Forest Mix	5.30				
17	Forest Mix	0.45				
22	Forest Mix	0.59				
27	Forest Mix	14.64				
9	Oak/Forest	0.61	21.59	41%	19.9	8.23
11	Grassland	0.66				
12	Grassland	0.01				
13	Grassland	0.08				
16	Grassland	0.19				
26	Grassland	0.05				
29	Grassland	0.05				
30	Grassland	0.12				
31	Grassland	0.06				
32	Grassland	0.04	1.26	2%	10.6	0.26
3	Orchard	0.30	0.30	1%	39.2	0.22
10	shrubland	0.10				
28	Shrubland	0.06	0.16	0%	14.9	0.05
0	Urban/Developed	0.17				
5	Urban/Developed	0.46				
8	Urban/Developed	0.26				
15	Urban/Developed	0.34				
19	Urban/Developed	0.57				
23	Urban/Developed	0.14				
24	Urban/Developed	0.24				
25	Urban/Developed	0.15				
33	Urban/Developed	0.10	2.43	5%	12.4	0.58
2	Vineyard	0.25				
4	Vineyard	0.92				
6	Vineyard	1.30				
18	Vineyard	6.50				
21	Vineyard	0.98	9.95	19%	22.5	4.29
	Total	52.2		100%		19.92
					PET (acre-feet)	86.60

Appendix H-Supplemental Estimate of Distance Between Wells

To assist in documenting the project domestic well location relative to the neighboring well to the south GPS data points were taken by the Project property owner on May 25th 2015 using the "GPS Tour" application on his iPhone 6 Plus. The average RMSE in horizontal accuracy for the GPS system installed in a 3G iPhone is stated to be 9 m (Zandbergen, 2009). The latitude and longitude in decimal degrees for each well was recorded and then plotted in the GCS_WGS_1984 coordinate system using simple methods in ArcGIS (see Figure below). The points were then projected into NAD_1983_StatePlane_California_II_FIPS_0402_Feet coordinate system to match the exact coordinate system of the ArcMap document being used to ensure the most accurate georeferencing of the points. Well locations do not match exactly to the locations shown on the 2007 aerial photo and to those mapped in the field; nevertheless, the relative distances between the points are similar to those mapped using field techniques mentioned earlier in this analysis. This discrepancy can be attributed to the relatively large horizontal accuracy of the iPhone GPS. The measured distance between the two well points taken with the iPhone was 508.7 feet, quite close to the 504 ft determined by previous methods.

Zandbergen, P. A., 2009. Accuracy of iPhone Locations: A Comparison of Assisted GPS, WiFi and Cellular Positioning. *Transactions in GIS*, 2009, 13(s1): 5–26. Blackwell Publishing Ltd.