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Thomas N. Lippe
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329 Bryant Street, Suite 3D
San Francisco, CA 94107

Subject: Review of Draft EIR
Walt Ranch Project, Napa, CA

Dear Thomas:

I am a hydrologist with over twenty five years of technical and consulting experience in the fields of geology, hydrology, and hydrogeology. I have been providing professional hydrology services in California since 1991 and routinely manage projects in the areas of surface- and groundwater hydrology, water supply, water quality assessments, water resources management, and geomorphology. Most of my work is located in the Coast Range watersheds of California, including the Northern and Southern San Francisco Bay Counties. My areas of expertise include: characterizing and modeling watershed-scale hydrologic and geomorphic processes; evaluating surface- and ground-water resources/quality and their interaction; assessing hydrologic, geomorphic, and water quality responses to land-use changes in watersheds and causes of stream channel instability; and designing and implementing field investigations characterizing surface and subsurface hydrologic and water quality conditions. I co-own and operate the hydrology and engineering consulting firm Kamman Hydrology & Engineering, Inc. in San Rafael, California (established in 1997). I earned a Master of Science in Geology, specializing in Sedimentology and Hydrogeology as well as an A.B. in Geology from Miami University, Oxford, Ohio. I am a Certified Hydrogeologist (CHg) and a registered Professional Geologist (PG).

I have reviewed the Draft Environmental Impact Report, Walt Ranch Erosion Control Plan Application (No. P11-00205-ECA), prepared by Analytical Environmental Services (AES) County of Napa and dated July 2014. In addition to reviewing the DEIR, I have reviewed the following documents and rely on technical information contained in these documents to help formulate my opinions.

<u>DEIR and Appendices</u>

- Analytical Environmental Services (AES), 2014, Draft Environmental Impact Report, Walt Ranch Erosion Control Plan, Application No. P11-00205-ECA. Prepared for: Napa County Planning, Building and Environmental Services, July, 462p.
- Edwards Engineering, Walt Ranch Vineyard Development Project, preliminary water system master plan. Prepared for Hall Wines, LLC, November, 8p.
- Gilpin Geosciences, Inc., 2013, Engineering geologic investigation, Walt Ranch Vineyard Development, Hall Brambletree Associates LP, Monticello Road (Hwy 121) & Circle Oaks Drive, Napa, CA. Prepared for: Mr. Jim Bushey, PPI Engineering, Inc., March 6, 20p.
- Napa County RCD, 2013, Walt Ranch sedimentation and erosion potential evaluation. Prepared for PPI Engineering, February 11, 4p. with Appendix of USLE calculation results.

- PPI Engineering, 2013, Hall Brambletree Associates, LP, Walt Ranch Erosion Control Plan. Package 1 and 2, Revised February.
- Richard C. Slade & Associates (RCS), LLC, 2014, Second updated report on the results and analysis of 96-hour constant rate pumping test, Irrigation-supply well no. 3, Walt Ranch, Napa County, California. Prepared for: Hall Wines LLC, April, 56p.
- RiverSmith Engineering, 2013, Hydrologic analysis of proposed vineyard blocks within the Walt Ranch property, Napa County, California. Prepared for: PPI Engineering, March, 35p.
- WRA, 2007, Section 404 Jurisdicational wetland delineation, Walt Ranch, Napa County, CA. Prepared for: Hall Wines, LLC, December, 19p.

Professional Publications

- Clahan, K.B., Wagner, D.L., Saucedo, G.J., Randolph-Loar, C.E., and Sowers, J.M., 2004, Geologic map of the Napa 7.5’ Quadrangle, Napa County, California: A digital database (v. 1). California Geological Survey, scale 1:24,000.
- Delattre, M.P. and Sowers, J.M., 2006, Geologic map of the Capell Valley 7.5’ Quadrangle, Napa County, California: A digital database (v. 1). California Geological Survey, scale 1:24,000.
- Farrar, C.D. and Metzger, L.F., 2003, Ground-water resources in the Lower Milliken-Sarco-Tulucay Creeks area, Southeastern Napa County, California, 2000-2002. U.S. Geological Survey Water-Resources Investigations Report 03-4229, prepared in cooperation with the Napa County Department of Public Works, 106p.
- Faye, R.E., 1973, Ground-water hydrology of Northern Napa Valley. U.S. Geological Survey Water-Resources Investigations 13-73, prepared in cooperation with the Napa County Flood Control and Water Conservation District, November, 72p.
- Fox, K.F., Jr., Sims, J.D., Bartow, J.A., and Helley, E.J., 1973, Preliminary geologic map of Eastern Sonoma County and Western Napa County, California. U.S. Geological Survey Miscellaneous Field Studies Map MF-483, 1:62,500, 4 sheets.
- Fox, K.F., Jr., Fleck, R.J., Curtis, G.H., and Meyers, C.E., 1985, Potassium-argon and fission-track ages of the Sonoma Volcanics in an area North of San Pablo Bay, California. U.S. Geological Survey Miscellaneous Field Studies Map MF-1753, 1:125,000, 1 sheet with pamphlet (10p.).
- Fox, K.F., Jr., 1983, Tectonic setting of Late Miocene, Pliocene, and Pleistocene rocks in part of the Coast Ranges North of San Francisco, California. U.S. Geological Survey Professional Paper 1239, 38p.
- Johnson, M.J., 1977, Ground-water hydrology of the Lower Milliken-Sarco-Tulucay Creeks area, Napa County, California. U.S. Geological Survey Water Resource Investigations 77-82, Open file report, August, 40p.
- Kunkel, F. and Upson, J.E., 1960, Geology and ground water in Napa and Sonoma Valleys, Napa and Sonoma Counties, California. U.S. Geological Survey Water-Supply Paper 1495, prepared in cooperation with the California Department of Water Resources, 264p.
- Napa County, 2005, Napa County Baseline Data Report – Chapter 16 Groundwater Hydrology (Version 1). 13p.
- Napa County Department of Environmental Management, 2012, Milliken-Sarco-Tulocay (MST) groundwater deficient basin. Presentation to Napa County Groundwater Resources Advisory Committee (GRAC), April 26, 2012, 9 slides.
- Sarna-Wojcicki, A.M., 1976, Correlation of Late Cenozoic tuffs in the Central Coast Ranges of California by means of trace- and minor-element chemistry. U.S. Geological Survey Professional Paper 972, 38p.

- Sims, J.D., Fox, K.F., Jr., Bartow, J.A., and Helley, E.J., 1973, Preliminary geologic map of Solano County and parts of Napa, Contra Costa, Marin, and Yolo Counties, California. U.S. Geological Survey Miscellaneous Field Studies Map MF-484, 1:62,500, 5 sheets.
- Wagner, D.L. and Gutierrez, C.I., 2010, Geologic map of the Napa 30'x60' Quadrangle, Napa County, California. California Geological Survey, scale 1:24,000.

Based on my review of these materials and proposed mitigation measures, it is my professional opinion that the project has the potential to impart significant adverse impacts to vicinity groundwater supply, surface water flow and quality, and biological (vegetation and wildlife) in the Napa River and Capell Creek watersheds. The rationale for these opinions is provided below.

1. Walt Ranch Project is Located in the MST Groundwater Deficient Basin

The project does not acknowledge it lies in an important groundwater recharge area for the Milliken-Sarco-Tulucay groundwater basin (MST) and has not analyzed, let alone acknowledged, the project impact of groundwater withdrawals on the groundwater supply of the MST basin. The MST is the second largest groundwater basin in the County. It is located adjacent to the city of Napa along the eastern edge of the valley floor and covers an area of approximately 15 square miles. Because of acknowledged over-pumping from MST basin, the County has designated the MST as a "groundwater deficient area", as defined in the Groundwater Conservation Ordinance. As a result, the County has established MST groundwater use thresholds of 0.3 acre-feet per acre per year - groundwater use thresholds for the MST are defined in the County's Water Availability Analysis (WAA) Policy Report, dated August 2007. The WAA also states, "*The threshold for the Groundwater Deficient Areas was determined using data from the 1977 USGS report on the Hydrology of the Milliken Sarco Tulocay region. The value is calculated by dividing the "safe annual yield" (as determined by the USGS study of 1977) by the total acreage of the affected area (10,000 acres)*."

The County appears to delineate the MST basin as indicated in Figure 1 (Napa County Ordinance No. 1294, Chapter 13.15 Groundwater Conservation). The County's MST delineation likely comes from the "Study Area" designation presented in the 1977 USGS report (Johnson, 1977) cited in the WAA. The "Study Area" outlined in 1977 USGS report defines the downstream alluvial aquifer and underlying Sonoma Volcanic groundwater storage areas associated with known groundwater overdraft. This "Study Area" encompasses a 15-square mile area within the cumulative 42-squre mile drainage area for the Milliken, Sarco and Tulucay Creek watersheds (see Figure 2). However, here is where policy and science diverge with respect to defining a groundwater basin.

The 1977 USGS study, along with the more recent follow-up study completed by the USGS (Farrar and Metzger, 2003) clearly indicate that the 27-square mile higher elevation bedrock area lying to the east (and including a portion of the Walt Ranch Project area) are in direct hydraulic connection with and provide recharge to the 15-square mile MST groundwater storage "Study Area." The DEIR claims there is no hydraulic connection between the Walt Ranch project site and the MST "Study Area"/groundwater storage area. The USGS (2013) provides a graphical representation of the groundwater system underling the MST Creeks watershed, reproduced here in Figure 3. This conceptual groundwater flow model indicates that rainfall infiltrates and recharges the Sonoma Volcanic bedrock groundwater in the Howell Mountain uplands. The groundwater in the Sonoma Volcanic bedrock then migrates eastward over time towards the main alluvium and deeper Sonoma Volcanics storage area in the valley bottom, adjacent to the Napa River. The eastern boundary of the County's designated MST basin generally occurs where the foot of the Howell Mountains intersect the valley floor. The 2003 USGS report (Farrar and Metzger, 2003) provide the following statements regarding groundwater recharge to the MST.

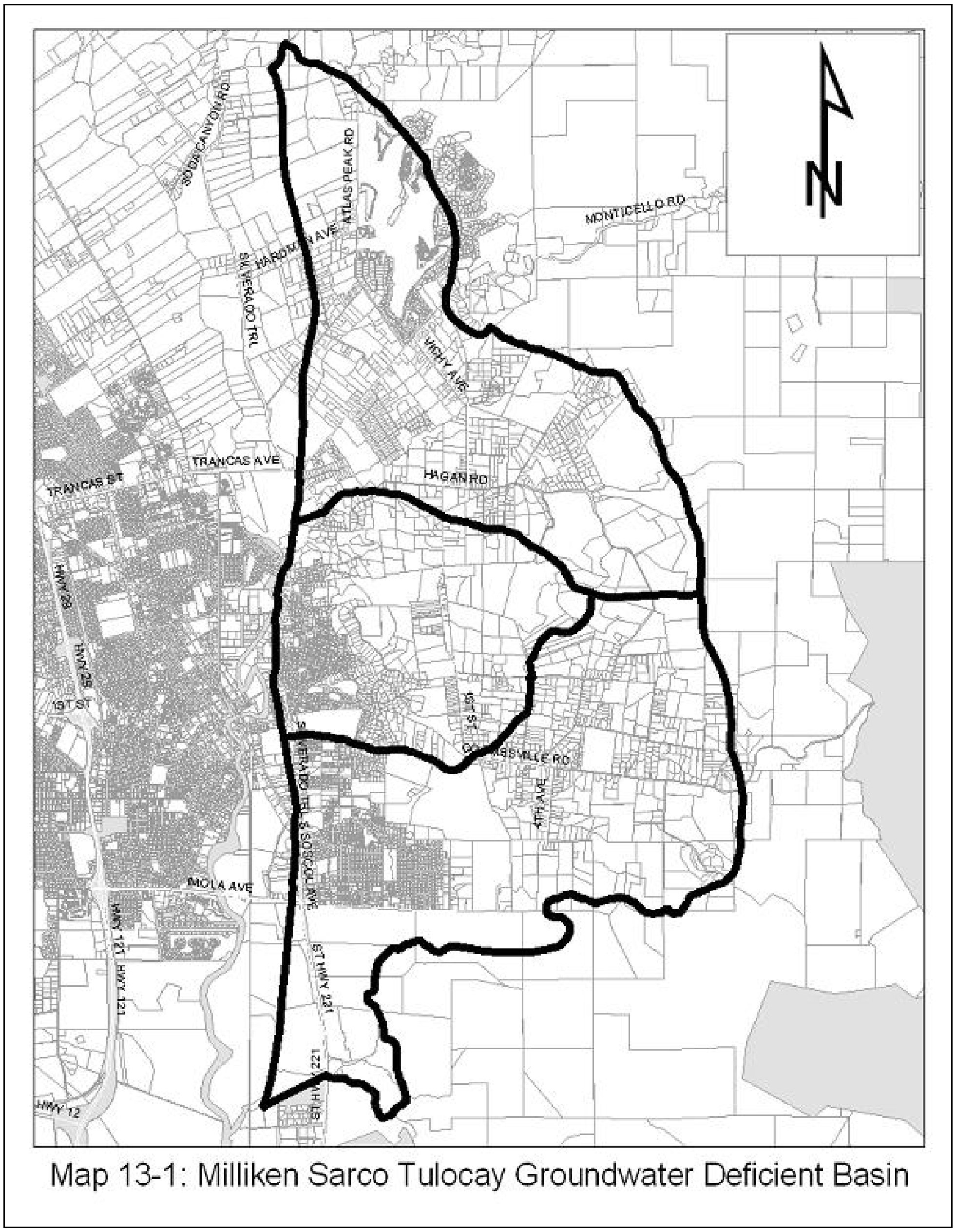

FIGURE 1: County designated MST groundwater basin (Source: Napa County Groundwater Ordinance).

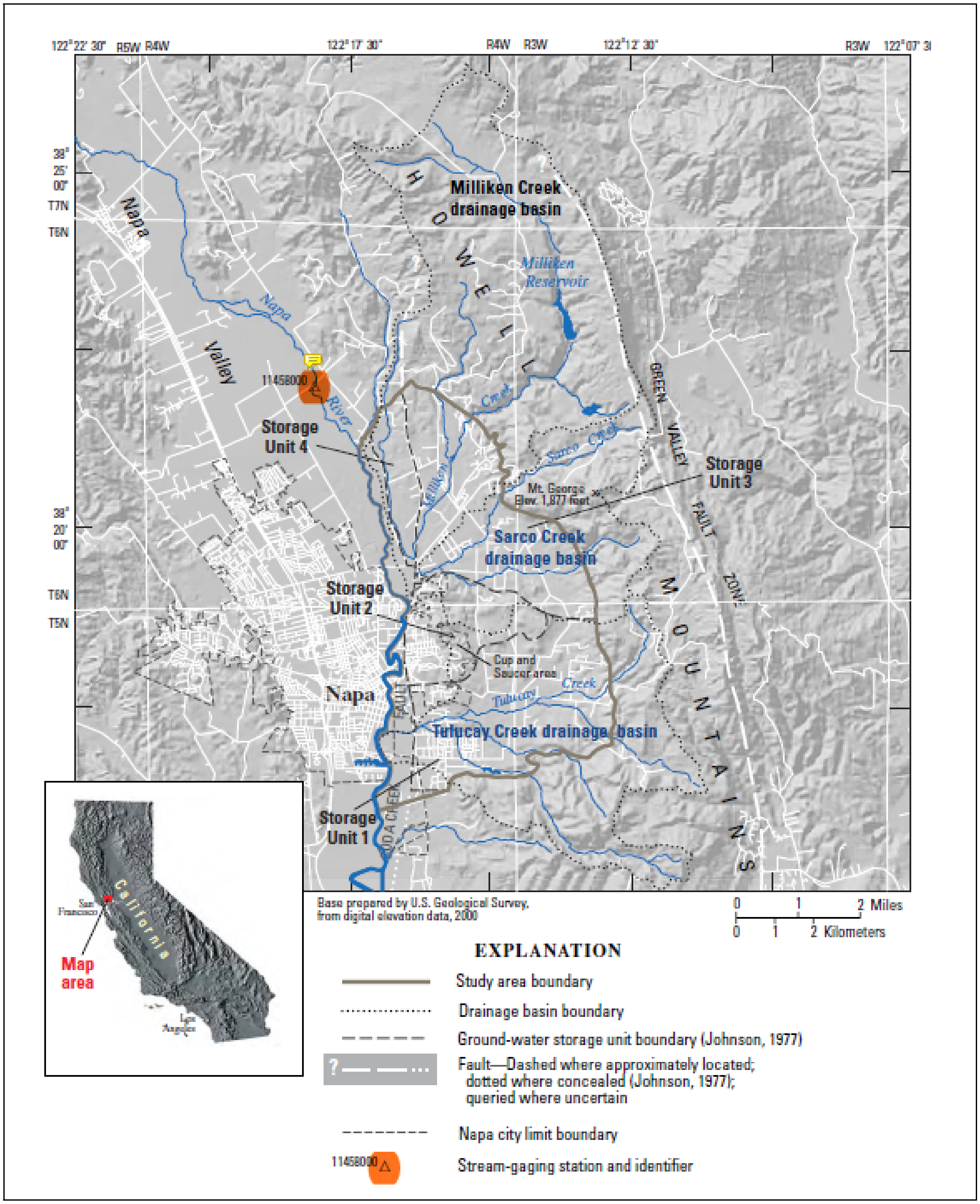

FIGURE 2: Location of 2003 USGS study area, differentiating between basin drainage area and “Study Area” boundaries (Source: Figure 1 in Farrar and Metzger, 2003).

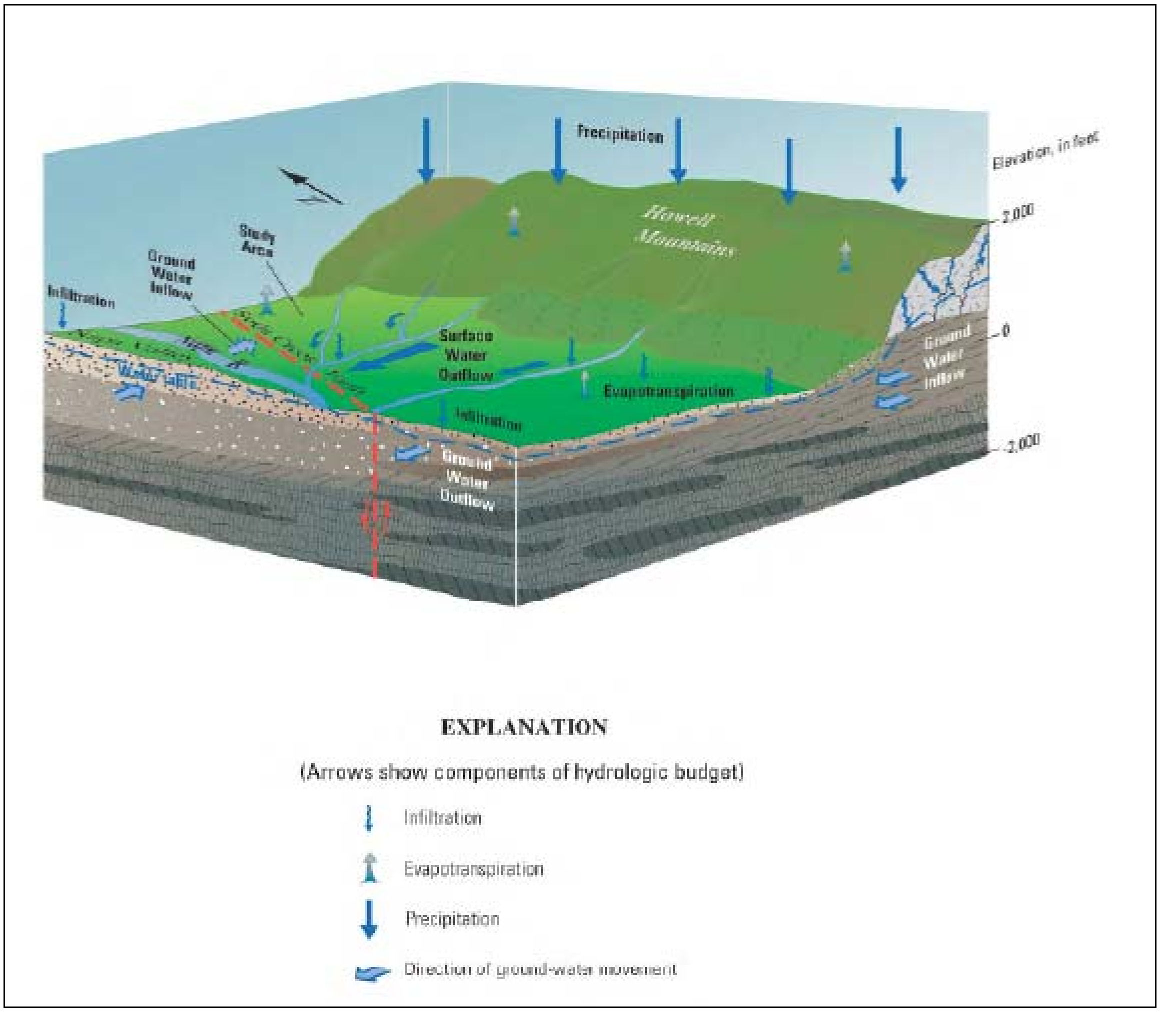

FIGURE 3: Conceptual model of groundwater flow system in the lower Milliken-Sarco-Tulucay Creeks area (Source: Figure 9 in Farrar and Metzger, 2003).

- On page 59 – "*The principal source of ground-water replenishment to the study area is lateral flow of ground water that is recharged in the Howell Mountains to the east of the study area.*"

- On Page 5 – "*The average total amount of precipitation received in the Milliken, Sarco, and Tulucay Creeks drainage basins is about 69,000 acre-ft/yr based on the isohyetal map (fig. 4). Of this amount, about 29,000 acre-ft/yr leaves the watershed as runoff in local streams to the Napa River. This estimate is based on streamflow records for stations on the Napa River and Tulucay Creek and is consistent with estimated unit runoff for this area given in Rantz (1968). Johnson (1977) estimated that evapotranspiration in the basins consumes about 30,500 acre-ft/yr. An estimate of about 34,000 acre-ft/yr is* *obtained when Johnson's estimate is adjusted for the slightly larger area mapped for this study. Using these estimates, it is clear that most of the water entering the basins leaves as runoff or evapotranspiration. Potential ground-water recharge can be calculated as the residual of total precipitation minus runoff and evapotranspiration, assuming no other inflows or outflows. Using this method, a residual of 6,000 acre-ft/yr is calculated based on the estimates made in this study. However, because of the uncertainty in the estimates of precipitation, runoff, and evapotranspiration, this value is not a precise estimate of potential ground-water recharge and should not be construed as the safe yield for the study area."*

- On Page 21 – "*Johnson (1977) estimated that the average annual recharge in the area of this study in 1975 was 5,400 acre-ft/yr: 3,050 acre-ft/yr from streamflow infiltration; 2,100 acre-ft/yr from subsurface inflow from the Howell Mountain block; and about 250 acre-ft/yr from direct infiltration of precipitation.*

- On Page 19 – "*Although recharge from excess irrigation sometimes can be a significant part of total recharge within some basins, within this study area it is considered minor because the predominant crop is wine grapes and local growers use highly efficient drip systems.*"

I believe that the 1977 and 2003 USGS studies provide conclusive information that that the project area lies in an important recharge area to the MST groundwater basin and a part of the Walt Ranch project site is hydraulically connected to the lower MST groundwater storage area. Further, based on Johnson's work in 1977, groundwater inflow from the Howell Mountain uplands provides around 39% (2,100 AF/yr) of average annual recharge to the Lower "Study Area" aquifer storage unit regulated by County Codes. Thus, any withdrawals from the Sonoma Volcanics within the Walt Project site will directly reduce the groundwater inflow and supply to the MST basin.

Based on conclusions in the RCS hydrogeology report, the DEIR states that the Project lies outside of the Milliken-Sarco-Tulucay (MST) groundwater basin, however based on my review of available geology maps and USGS reports, the southwest 1/3rd of the project property clearly falls within the upper recharge area of the MST basin. Of the Walt Ranch project area, 512-acres fall within the Milliken Creek watershed and MST groundwater basin and the remaining 1791-acreas fall within the Capell Creek watershed, which drains to Lake Berryessa. The project proposes to install 299-acres of vineyard in the Milliken Creek watershed and 208-acres of vineyard in the Capell Creek watershed – total water demand for the project is 213.5-AF. All proposed project groundwater wells are located in the MST basin. The WAA indicates that MST groundwater withdrawals are limited to 0.3-acre-feet (AF) per year per acre of property in the MST. Based on this policy, the project is only entitled to 154-AF. By claiming to be outside of the MST, the project avoids complying with the County's MST groundwater use thresholds.

In my opinion, the County has incorrectly drawn the boundary for the MST basin. To fully satisfy the intent of the fair share policy in the MST, the County needs to consider and incorporate the entire hydrologic basin, not just a portion that happens to be where water is stored and over-pumped. Perhaps a surface water analogy would better articulate this point. For example, if a community is experiencing a drought and a governing entity is charged with protecting and fairly managing the resource, one management strategy would be to set minimum withdrawal volumes for property owners around the reservoir. The "safe yield" and "fair share" intent of this policy assumed only those lake-front residents would be removing water from the reservoir. However, the governing entity then allows properties on the streams tributary to the reservoir to draw water out of the river at a higher rate/volume than the residents on the reservoir. Such a management strategy defeats the purpose of protecting the limited water resources and allocating those resources equally among all users. The main point here is that the County's resource management policy in the MST is tied to an arbitrary socioeconomic basin boundary, not a scientifically based, watershed scale boundary.

The project proposes to use MST basin water to irrigate out-of-basin vineyard in the Capell Creek watershed. Based on my review, it is unclear if out-of-basin transfers of MST water are acceptable/permissible per current County regulations and "fair use" policy. The bedrock and soil underlying the 2/3rds of the project area within the Capell Creek watershed does not yield significant quantities of water to wells.

2. Project Estimate of Available Groundwater Storage is Unsubstantiated

Project studies assume that all the Sonoma Volcanics (SVs) underlying the site can hold water. This is not the case as only specific units (most notably tuffaceous layers) within the SVs provide sufficient storage and permeability to provide water to wells. Review of published and project geologic maps, cross-sections and well completion information indicate that water-bearing units of the SV are limited under the project property. Johnson (1977) and Farrar and Metzger (2003) indicate that Sonoma Volcanics bedrock in the MST can be generally divided into five members: the lower andesitic member, the middle tuffaceous member, and the upper rhyolitic member, separated by two subaqueous deposits: diatomaceous deposits and sedimentary deposits, interbedded between the volcanic units. This five layer model is a useful simplification for some purposes, but it ignores the true complexity in the distribution of the various lithologies found in the Sonoma Volcanics. Many lithologic units in the Sonoma Volcanics lack wide areal extent and some units have a lenticular geometry or have interfingering contacts with adjacent lithologic units. The Gilpin Geosciences (2013) geologic map of the project site indicates rhyolite flows and andesite outcrop within the southwest portion of the site. Numerous studies (Kunkel and Upson, 1960; Johnson, 1977; and Farrar and Metzger, 2003) indicate that the principal water bearing unit of the SVs is the tuffaceous member. Farrar and Metzger (2003) report that the andesite member of the SVs has little primary permeability but, fracture zones associated with faulting and folding provides some secondary permeability, which yield small amounts of water to wells. They also report that the rhyolite member consists of low-permeability, banded rhyolitic lava interbedded with rhyolitic tuff, some densely welded, which reduces permeability. The RCS hydrogeology report (2014) also states that the SVs rock-types and their water bearing capacity is highly variable.

Information in the RCS hydrogeology report (2014) indicates that only selected horizons of the study wells[1] are screened. This suggests to me that the well driller identified and selected specific water-bearing horizons, which were preferentially screened in order to draw water. I assume the remaining lithologies encountered that were not screened are poor water-bearing materials within the Sonoma Volcanics. Therefore, understanding the thickness and extent of different rock types and their potential water bearing capacity under the site would help inform available groundwater supply.

The RCS hydrogeology report does not provide a detailed description or information regarding the specific rock types that make up the Sonoma Volcanics that lie beneath the Walt Ranch project site. The report's geologic map only illustrates the different Sonoma Volcanic units at the ground surface.

[1] Much of the water yield information reported in the RCS hydrogeology report (2014) comes from the testing, monitoring and analysis of wells on and around the project site (see page 2, 22-29, Tables 1A through 3B, and Figure 1 of the RCS 2014 report, provided in Appendix D to the DEIR), including: a) Walt Ranch wells (WR-1 through WR-5); b) the adjacent parcel Circle S Ranch wells (CS-1 through CS-4); and; c) a private well located on a parcel immediately southwest of Walt Ranch known as the Gale well.

Typically, I rely on driller's boring logs and cross-sectional profiles of geologic conditions to better understand the subsurface hydrogeology of a site. This information is lacking in the RCS hydrogeology report and DEIR. Thus, in order to gain a more complete understanding of the underlying geology/hydrogeology conditions at the site and fully review/evaluate RCS's hydrogeology study, it's necessary for me to obtain and review the drillers boring logs for the wells reference above. Treating the entire saturated thickness of Sonoma Volcanics as a single homogeneous layer (as completed in the RCS study) does not recognize and suitably address the likely water-bearing variability of these rocks. This added level of detail and understanding would benefit from review of the rock types encountered during drilling and well installation and reported in the associated drillers boring logs.

RCS also uses different saturated thickness values in their hydrogeology study. A saturated thickness value of 275-feet is used in the groundwater storage analysis (page 41 of RCS report), which is significantly greater than the 230-feet saturated thickness value used in the pump-test analysis to determine aquifer parameters (top of page 30). Using the smaller value of 230-feet in the groundwater storage analysis would result in less local groundwater storage.

It's also important to point out that the Hydrogeology study contains considerable presentation and discussion of aquifer tests and data analysis methods (e.g., theoretical drawdown calculations/modeling, theoretical cumulative impacts of pumping, calculation of aquifer parameters) but results do not reflect reality. Calculated values of aquifer transmissivity and storage coefficients by various models are discarded (although similar in magnitude) and inexplicably replaced with empirically derived values. Tables (2A and 2B; cited in text on page 27) don't exist in the report and cited values for hydraulic parameters in text don't agree with values in existing tables. Simulated drawdown at adjacent wells do not reflect actual conditions. Underlying assumptions of software and analytical solutions do not apply to heterogeneous and anisotropic conditions such as volcanic bedrock aquifers. In short, a lot of time and effort was spent on analyses that provide results that aren't realistic. This indicates the inadequacy of the solutions in providing realistic insight into the potential impacts of groundwater pumping.

3. Misleading Conclusion Regarding Available Groundwater Storage

RCS provides what they refer to as a "conservative" estimate of total groundwater storage that is very large. The DEIR claims that this magnitude of storage will mitigate any potential impacts of overdraft associated with annual groundwater withdrawals that exceed average annual recharge. However the useable groundwater storage capacity is typically considerably less. Of all the water in the storage spaces which can be pumped, not all will be removed due to the dispersed aquifer area and limited pumping radius of influence. The current well spacing, presence of fault segregated aquifers, and non-uniform distribution of groundwater in the Sonoma Volcanics make is difficult, if not impossible, to dewater the saturated material. In Johnson's 1977 study of groundwater conditions in the MST, he estimated that only 10% of the Sonoma Volcanic groundwater storage capacity is useable (accessible) storage. Thus, assuming a 2% specific yield and 10% useable storage capacity of the estimated 4301 AF of total storage, yields only 430 AF of groundwater storage beneath the project site – a value much closer to the 213.5 AF/yr project groundwater demands.

4. Project Overestimates Groundwater Recharge – No Assessment of Cumulative Impacts

The RCS hydrogeology report (pages 48-49) presents estimates of deep groundwater recharge assuming 7- to 9-percent of annual rainfall goes to deep percolation. These estimates yield average annual recharge rates of 2.59- to 3.15-inches/yr and volumes of 161- to 207-AF/yr, assuming an average annual precipitation total of 35 inches. In either case, average annual recharge rates are less than the annual water project demands. The 7% of annual rainfall deep groundwater recharge value is based on RCS staff professional experience, while the 9% recharge estimate comes from the 1977 USGS report for the entire

MST Creeks drainage basin. The problem with applying the 9% recharge rate to the Walt Ranch project site is that it reflects a watershed-wide average, incorporating the high stream and volcanic tuff infiltration rates in the lower elevations of the eastern hills with much lower infiltration rates representative of the higher elevation volcanic terrain, including a portion of the Walt Ranch Project site. The 1977 and 2003 USGS studies indicate that of the total 5,400 AF of average annual recharge to the MST, 3,050 AF/yr is supplied by stream flow infiltration along the eastern margin of 15-square MST storage area, 2,100 AF/yr comes as subsurface inflow from the 27-square mile Howell Mountain block (higher elevation volcanic terrain), and 250 AF/yr is direct infiltration of precipitation to the 15 square mile lower MST storage area on the valley floor. Assuming the Howell Mountain block covers 27 square miles in area (Johnson, 1977, suggests this area may be up to 33 square miles) and the 2,100 AF/yr of groundwater inflow from the block reflects the annual deep groundwater recharge rate, the annual deep groundwater recharge rate for the higher elevation volcanic terrain, including the Walt Ranch project site is only 1.46 in/yr (4% of average annual precipitation). Applying this recharge rate to the project area covered with Sonoma Volcanics (790-acres) yields an average annual deep groundwater recharge volume of 96 AF/yr, a value less than half (45%) of the estimated maximum annual project groundwater demand. Clearly the project has the potential to lead to localized groundwater overdraft, especially if the groundwater storage volume discussed above is less than estimated.

5. Insufficient Site Specific and Cumulative Impact Assessments of Groundwater Withdrawals

Regardless of which deep groundwater recharge rate is applied, all rates presented in the DEIR and above indicate groundwater withdrawals will exceed groundwater recharge. Under Impact 4.6-4, the DEIR states that increased groundwater pumping would not impact groundwater supplies in the project region and pumping would be a less than significant impact, even knowing that pumping rates exceed deep groundwater recharge rates. The justification that this will not be a significant impact is that there is more than enough existing storage in the underlying aquifer to absorb the imbalance. However, as discussed above, there has not been adequate or accurate quantification of existing groundwater storage in the bedrock aquifer underlying the site. Therefore, no conclusions on potential impacts are substantiated.

The hydrologic analyses supporting the DEIR have only looked at interference of pumping on local wells. There is clear admission that the DEIR has not done a regional impact analysis on groundwater supply due to heterogeneous nature of geology (pg. 4.6-47). The DEIR also claims it is infeasible to predict long-term impacts associated with groundwater extractions (pg. 4.6-49). The lack of analysis or inability to complete an impact assessment does not constitute the conclusion of “no potential impact.” The impact should be considered potentially significant until demonstrated otherwise.

As explained above, proposed project groundwater withdrawals will reduce deep groundwater recharge to the main valley-bottom MST aquifer storage area. The RCS hydrogeology study does not provide any assessment of project impacts of groundwater resources in the water deficient MST basin. Therefore, this impact is still potentially, if no likely, significant.

6. Invalid Mitigation Measure Associated with Potential Impacts from Groundwater Pumping

Groundwater monitoring is listed as Mitigation Measure 4.6-4 in the DEIR. From a scientific perspective, monitoring in itself is not a mitigation. Monitoring is used as a way to identify triggers that define an impact (e.g., lower groundwater levels). Specific triggers that identify an impact and the resulting management changes implemented to mitigate the impact are the “Mitigation Measure”. These triggers and corresponding management/operational changes have not been developed/defined in the DEIR. Therefore, it is my opinion that a Mitigation Measure does not exist for the potential impact(s) associated with groundwater pumping.

7. Incomplete Hydrology Assessments of Potential Impacts to Ecosystem and Water Supply

The DEIR does not provide adequate assessment on the potential project-induced changes in the volume and timing of water supplies to wetlands, riparian corridors and the associated biological habitats. Nor does the DEIR provide an assessment on how changes in land-use, vegetative cover and installation of drainage systems affect groundwater recharge rates.

Hydrologic analyses supporting the DEIR are somewhat compartmentalized – there is no comprehensive monthly or seasonal water budget to fully quantify runoff or groundwater recharge through the year. The seasonal distribution and duration of surface water flow rates are an integral variable in the support of existing wetland and riparian vegetation and wildlife. There is no hydrologic evaluation on how the project elements will impact the volume and timing of water movement in and through the site and associated ecological habitats. Of particular emphasis at the Walt Ranch site are groundwater dependant wetlands mapped by WRA (2007), including: 0.42 acres of freshwater seeps; 1.49 acres of seasonal volcanic seeps; small portions of perennial flow in Milliken Creek; and a number of intermittent streams. Project elements that affect site hydrology include: changes in land use; changes in vegetation types; tree clearing; grading and filling that changes site topography; rock filling; facility construction; and installation of a variety of surface water and groundwater drainage systems. Any one of these project elements can have a profound effect on the timing and volume of surface water and shallow groundwater movement through the site. A standard analysis to evaluate project impacts on hydrology is the development of a comprehensive and integrated water budget. Important water budget variables for the Walt Ranch project include: rainfall, runoff, evapotranspiration, open water evaporation, soil moisture storage, infiltration, surface water storage, groundwater recharge, groundwater flow, and groundwater storage. A comparison of existing and project condition water budgets should be used to address project changes to site ecosystems such as: seasonal volumes, rates and duration of water supply to on- and off-site riparian and wetlands and associated wildlife; shallow groundwater supply to local wetlands that are documented (WRA, 2007) to rely on groundwater, including freshwater seeps, seasonal volcanic seeps and perennial/intermittent creek channels; and deeper groundwater recharge that supplies creek flow that supports aquatic habitats in the lower elevations of the MST basin, including known seeps and intermittent creeks at the adjacent Circle S property as well as flow in lower Milliken Creek, even potentially downstream of the reservoir. This project analysis is warranted given the presence of California red-legged frog, Foothill yellow-legged frog, and Western pond turtle at the site, which depend on the preservation of suitable water supply to creeks, wetlands and riparian corridors on site, as well as potential off-site impacts to salmonids in Milliken Creek.

8. Inaccurate Quantification of Project Storm Water Runoff Estimates

The project contends that development activities will reduce runoff rates from vineyard areas. One way the project contends to achieve this goal is by ripping soil in targeted areas to increase infiltration rates and reduce runoff rates. While this is likely a short-term result of soil-ripping, my professional experience is that the increased infiltration rate associated with ripping is short-lived, and soil will recompact over a relatively short period (single years), resulting in soil with infiltration rates similar (or lower) than pre-project conditions. Thus, the reduced runoff associated with the project will be temporary. RiverSmith Engineering's hydrology report (2013) has only analyzed storm runoff rates for this short-term condition, not the long-term return to pre-project soil properties. A return toward pre-project soil properties will increase the magnitude of estimated project peak flows.

The project proposes a number of surface drains, subdrains and utility corridors that will intentionally and unintentionally concentrate and accelerate runoff off through proposed vineyard blocks. A primary runoff treatment strategy recommended in the RiverSmith Engineering hydrology study is to "detain water" onsite as a means to reduce peak flows. However, this is contrary to intent of the project drainage plan, which will effectively concentrate and accelerated storm water runoff. The hydrology storm runoff analysis does not incorporate these drainage elements into the storm water runoff calculations, where applicable. Both the likely reduction in infiltration capacity of ripped soil areas and project drainage elements will lead to significant increases in the estimated runoff rates, both on- and off-site. Thus, the peak flow rates for project conditions are underestimated, which means the potential impacts associated with high storm flows have not been accurately identified and evaluated.

9. Incomplete Erosion Potential Analysis: Potential Surface Erosion vs. Channel Erosion

For purposes of the following discussion, surface erosion is defined as that process by which rainfall and non-concentrated (sheet flow) rainfall-runoff erode and transport sediment off of relatively flat upland surfaces. In contrast, channel erosion refers to the erosion (down cutting and side cutting) in swales, ditches and channels by concentrated runoff and flow.

The project sedimentation and erosion potential evaluation for the site was completed by PPI and Napa RCD utilizing the empirically-based Universal Soil Loss Equation (USLE) to determine changes in annual erosion rates between existing and project conditions. The erosion potential assessment using the USLE only addresses surface erosion from individual vineyard blocks. The project erosion potential analysis does not consider or evaluate the potential for channel erosion within intervening or downstream receiving slopes, swales, and creeks outside of the vineyard blocks. This is a significant omission of potential erosion and sediment sources, especially in light of the fact that the project is underestimating the peak runoff from vineyard blocks. Thus, without considering the increase in channel runoff and associated channel erosion due to project development, the erosion potential analysis should be considered incomplete.

10. Presentation of Cumulative Erosion Potential Impacts Obscure Potential On-Site Impacts

The DEIR conclusions regarding project-induced changes in erosion potential are based on summing vineyard block soil loss subtotals within the Milliken and Capell Creek watersheds and presenting the total (net) change for each watershed (Milliken and Capell). The net results indicate that there are 44- and 13-percent reductions in potential soil loss from the Milliken and Capell Creek watersheds, respectively. However, this type of lumping of results masks localized impacts, which when considered alone, could be considered a significant impact. A more thorough review of changes in modeled soil loss results indicates localized increases in erosion potential from multiple vineyard blocks that contribute drainage and sediment to onsite Corps designated waters and wetlands located downstream of the proposed vineyards. These downstream creek, riparian and wetland areas host potentially sensitive biological resources, which would be potentially adversely impacted by increases in water and sediment runoff. Localized "hot spots" of anticipated increased sediment loading reported in the DEIR include: a) Corp wetlands receiving runoff from blocks 16B1, 16B2 and 16C1; b) Corp waters receiving drainage from blocks 17A-17C; c) Corp waters receiving runoff from blocks 34A3, 34C, and 49; d) Corp waters receiving drainage from blocks 36A and 36B; e) Corp wetlands receiving drainage from blocks 37D and 37E; f) Corp waters receiving drainage from blocks 38 and 53; g) Corp waters and wetlands receiving drainage from blocks 19A4, 19B, and 18A1-18A4; h) Corp waters receiving drainage from blocks 31A and 31B; and i) Corp waters receiving drainage from blocks 29, 29A1, 29A2, and 29B2. As indicated in the DEIR, increases in sediment delivery to any Corps designated water or wetland should be considered a significant potential impact.

11. Suitability of Project Erosion Control Measures
Review of project erosion control plans indicate that proposed vineyard block erosion control treatments include one or more of the following: straw wattle; rock check dams; overflow structures; and various types of energy dissipaters. No sediment basins are proposed at these locations. Although cover crops are listed as a project erosion control measure, they are incorporated into the USLE computations, including those vineyard blocks where erosion potential is anticipated to increase over existing conditions.

Straw wattle is a temporary surface erosion control measure and will degrade over time. This appear to be the only erosion control measures at many vineyard blocks and ability for straw wattle to provide long-term mitigation is highly limited.

Rock check dams are designed to dissipate concentrated flow energy and trap sediment. They reduce channel erosion potential and trap sediment from both surface and channel erosion. The potential for rock check dams to function properly over the long-term is mixed. They will require constant long-term maintenance to function as desired. If sediment built up behind rock check dams is not removed, they will lose their ability to dissipate energy and trap sediment allowing the unimpeded passage of high flows, leading to increased downstream channel erosion potential. Based on my experience, during very wet winters and/or extreme storms, rock vanes can be overwhelmed, buried and cease to function very quickly.

The runoff overflow and energy dissipation measures proposed in association with vineyard block drainage are designed to armor or dissipate flows at vineyard drainage outfalls in order to eliminate or reduce both surface and channel erosion potential - they are not designed to capture and retain sediment carried in runoff. These erosion control measures also require constant long-term maintenance to function and provide the necessary surface erosion protection at outfalls. However, many of these erosion control elements are located on steep slopes and water draining through them can become re-concentrated in swales and channels a short distance down-slope. It's important to restate that the RiverSmith Engineering storm runoff calculations did not take into account the drainage systems proposed in the vineyard blocks. Based on my review of vineyard drainage plans, these systems will collect and accelerate runoff through the vineyards, leading to higher project flow rates than those predicted in the RiverSmith Engineering hydrology study. These increased flows won't be detained by the proposed overflow energy dissipation structures, especially on steep slopes. This will lead to increased channel erosion potential in downslope receiving swales, channels and ditches and may adversely impact associated waters, wetlands and wildlife habitat.

The suitability of the pipe level spreader erosion control measure deserves further mention here. Based on review of standard pipe level spread design criteria, this erosion control measure seems poorly suited to the project site. In 2002, Caltrans completed an evaluation on the effectiveness of level spreaders[2]. Their report includes the following information:

- *Level spreaders are structures that are installed at points of concentrated storm water discharge. Level spreaders disperse the concentrated storm water over wide, relatively flat slopes so that erosion from concentrated runoff is minimized.*

- *Level spreaders are hydraulic conveyance systems that are constructed at a uniform elevation (zero grade) across a slope. The level spreader consists of a vegetated or mechanical lip or weir installed at surface grade that disperses (spreads) the water flow*

[2] Caltrans, 2002, Final Report – level spreader effectiveness evaluation. CTSW-RT-02-020, Caltrans Environmental Program, Office of Environmental Engineering, Sacramento, CA, 16p.

across a gentle slope. For construction applications, use of a mechanical lip constructed of timber, asphalt, or concrete would be preferred because those materials are likely to be durable. The structure must be installed in an undisturbed or finished area, should be level, and should disperse onto a vegetated slope that has a gradient of less than 1:10 (V:H). At a minimum, the final 6 meters (20 feet) of the conveyance structure entering the level spreader should have a finished gradient of less than 1:100. The lip can be constructed of either stabilized grass for low flows, or timber/concrete for higher flows. Typically, the minimum length for the level spreader lip is 2 meters (6 feet). The length of the level spreader lip is dependent on the volume of water that must be discharged. Typical rules-of-thumb are that storm water passing over the weir should be limited to a depth of approximately 0.15 meters (6 inches) and a velocity of approximately 0.3 meters per second (1 foot/sec).

- *For proper operation, runoff entering the level spreader must not contain significant amounts of sediment. Therefore, an upstream sediment removal BMP may be required in addition to the level spreader.*

- *The tributary area for the storm water should be less than two hectares.*

Based on the Caltrans design criteria, level spreaders are designed to be installed on very flat slopes and discharge onto similarly flat, vegetated slopes. Review of project erosion control plans indicate pipe level spreaders occupy relatively steep slopes, exceeding design criteria. Thus, these erosion control measures will not fully mitigate potential project impacts.

12. Project Potential to Active Dormant Landslides

The Gilpin Geosciences engineering geologic evaluation (2013) for the project states (page 17), "*We have reviewed the details shown for storm water drainage outlets and other water diversion facilities. These have appropriate armored, erosion-resistant surfaces that do not direct surface or subsurface runoff into slopes susceptible to landslide failure.*" They also state on page 13, "*Deep-seated landslides may be activated by undercutting of the toe, by adding significant weight to the top or body of the deposit, or by significantly altering the groundwater conditions which in turn increases the level of groundwater and pore water pressure. The rates of movement of deep-seated landslides are responsive to extended periods (multiple years of above average precipitation) of rainfall unlike shallow landslide that react to relatively short (single storm) bursts of intense storm activity (Iverson, 2000). Therefore any significant change in the regional groundwater regime could potentially affect the landslide stability*."

I've cross-referenced the proposed vineyard drainage outfall locations on the project Erosion Control Plans against Gilpin's landslide maps to determine if any vineyard runoff would be directed onto mapped landslides. Contrary to the statement contained in the Gilpin report, there are a number of vineyard block drainage outfalls directed above or onto mapped landslides, including vineyard blocks: 4E; 4H; 4I; 5A3; 19A; 31A; 31B; 36A; 36B; 62A; and 62B. Undoubtedly, the drainage discharge will increase the local infiltration and soil water content of the receiving landslide areas over existing levels. Based on the Gilpin text cited above, it is assumed that this may increase the potential to activate landslides – an increased potential adverse impact not acknowledged in the DEIR.

13. Invalid Analysis of On-Site and Cumulative Impacts

From my perspective, the DEIR failed at completing hydrologic and erosion assessments that evaluate potential impacts on surface water supply, groundwater supply, erosion and sediment transport to the on-site or surrounding environment. Runoff and erosion potential analyses were completed in a compartmentalized fashion, without regard to findings and potential impacts from their mutual effect and recommendations. Specific deficiencies of these analyses included:

- Erosion control measures designed to reduce sedimentation lead to increased magnitude of stormwater runoff;
- Stormwater runoff estimates did not consider the vineyard drainage systems proposed as erosion control measures, which will lead to high magnitude flows and increased erosion potential to downstream drainages;
- No comprehensive water budget of the project site was developed to look at project-induced changes in the way surface and groundwater move through and interact with the site and each other;
- The erosion potential assessment only addressed vineyard blocks, not the intervening or downstream receiving slopes, swales, creeks and wetlands;
- Potential changes in surface and groundwater supply to wetlands, riparian corridors and associated habitats, both on-site and off-site were not evaluated; and
- Regardless of whether Walt Ranch lies within the formal MST designated area, the site provides groundwater recharge to the basin. The DEIR does not evaluate how long-term withdrawals from the project site, combined with all recent and planned vineyards and developments in the basin will affect the groundwater deficient MST basin.

Without having properly quantified the water flow and sediment volumes moving through and off-site, the project has not fully evaluated potential impacts to the associated environments. As such, no cumulative impact assessments are possible. Without completing these assessments, the DEIR has not demonstrated that the project will not impart impacts to flooding, erosion, wetland/riparian water supply and habitats, and other sensitive aquatic habitats.

Please feel free to contact me with any questions regarding the material and conclusions contained in this letter report.

Sincerely,

Greg Kamman, PG, CHG
Principal Hydrologist