To: Ron Kopf, rondkopf@aol.com-- September 17, 2024

Re: Proposed Long Gulch 13 Lot Development

I have reviewed the concerns expressed by CSERC in their comments on the proposed Long Gulch development that are contained in letters dated February 15, 2024 and March 18, 2024, signed by Chelsea Lewandowski, Conservation Coordinator, and have the following comments with regard to the proposed Long Gulch development:

First, as a California Registered Professional Geologist and Certified Hydrogeologist, I confirm and stand behind the contents and conclusions contained in my Long Gulch Hydrogeologic Report, dated February 23, 2021. This report confirmed that an adequate ground water resource was available for normal domestic use beneath each proposed parcel in the development. Furthermore, the report concluded that there would be an adequate recharge of ground water by infiltration so that there would be no adverse effect on ground water supplies on the proposed Long Gulch development or adjacent parcels. Subsequently, the proposed minimum lot size was increased from three to five acres, allowing an even greater volume of infiltration that was considered in the February 2021 report.

I also confirm my conclusions on specific issues that were addressed in my letter to Natalie Rizzi, Tuolumne County Senior Planner, dated May 15, 2023, with regard specific CEQA concerns. This letter report demonstrated that there would be no significant ground water impacts of discharges from septic systems. Also, the report confirmed that there would be adequate ground water infiltration for each five acre parcel, even in drought years.

In the February 13, 2024, CSERC letter, a recommendation is made to require annual testing of wells for a period of five years. Tuolumne County regulations currently require specific new domestic well testing requirements. The proposed CSERC requirement is unreasonable and would demand that every new water supply well be subject to the same expanded testing regime.

A second CSERC recommendation with regard to certification of septic systems for “tiny homes” does not appear to apply to the proposed Long Gulch development. In any event the current Tuolumne County regulations with regard to the construction of septic systems are believed to be adequate to address any concerns.

The March 18, 2024, CSERC letter compares the writer’s Long Gulch report to a “tiny house” report. The location of the “tiny house” development is not specified and it is unlikely that these two projects could be compared.

The issue of concern regarding the operation of septic systems is repeated here and, as stated above, the concerns are mitigated by proper design and installation of these systems as required by current Tuolumne County regulations.

Best Regards,

Ross R. Grunwald, Ph.D.

California Professional Geologist #3948

California Certified Hydrogeologist #269

GeoResource Management

May 15, 2023
Natalie Rizzi, Senior Planner
Tuolumne County Community Development Department
2 S. Green Street
Sonora, California 95370

Dear Ms. Rizzi,

In a letter dated April 12, 2023, you listed four items from the CEQA Appendix G Checklist that had to be addressed before the project was considered for approval by Tuolumne County. They were:

1. Would the project violate any waste quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?

2. Would the project substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?

3. Would the project conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?

4. Would the project have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry, and multiple dry years?

Item 1

Would the project violate any waste quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?

Ground Water

The concern regarding any potential impacts on ground water quality would be related to waste water percolating from household septic tanks on each of the proposed parcels. Robertson (2021), addressed effects related to conventional septic drain field discharges and studied the fate of constituents in the septic discharge waste stream. The effects were studied in sites with ground water depths of 15-20 feet below ground surface. The water

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table beneath the Long Gulch site is estimated to be at least 80 to 100 feet below ground surface.

While there is obvious concern for ground water contamination from household waste flowing into septic tanks, the harmful environmental impacts are eliminated or greatly reduced by a proper septic tank and drain field design which the county controls through environmental health and building department permitting requirements.

The ground water plumes in Robertson's studies were defined by attenuated sodium concentration. The potential contaminants of concern and their fates in septic effluent consist of the following constituents:

- Bacteria and Viruses

Fecal bacteria are largely removed within typical unsaturated soils above the water table and were almost entirely absent in the attenuated ground water plume. Robertson also found that viruses were almost completely removed within only 21 to 51 feet the drain field. Attachment to soil particles appears to be the most important depletion factor for viruses. Viruses can only transport freely if waste water is injected directly into ground water.

- Major ion constituents—i.e.: Cl^-, Na^+, NO_3^-, SO_4^{-2}, NH_4^+, hydrocarbons, HPO_4^{-2}

Anaerobic conditions are present in household septic tanks that convert the major ion constituents to forms that are removed.

NH_4^+ is converted to NH_3 gas, SO_4^{-2} is converted to H_2S gas, and hydrocarbons are converted to CO_2 and methane. Gases generated as a result of these processes are usually removed using ventilation stacks in the drain field. In the event that the drain field is not vented, the gases are conveyed to the drain field where they migrate upward through the soil and vent to the surface.

The fate of phosphorus in the drain field is complex. However, HPO_4^{-2} forms various insoluble compounds by reacting with various minerals in the soil and, thus, is removed from the waste water stream.

Cl^- and Na^+ are not typically removed or otherwise treated in septic drain fields and will likely eventually migrate to the water table, but Roberson emphasizes that sodium and chlorine are common constituents that derive from other sources in ground water and any plume resulting from the septic drain field is often masked by contribution from natural sources.

The degradation of major ion constituents is dependent upon character of the soil which must be fine-grained. It is believed that the soil beneath the Long Gulch property will be

suitable for proper remediation of septic effluent when evaluated in accordance with Tuolumne County standards.

- Surface Water

Any potential effects on surface water from the development will be influenced by installation of access roads and house sites that must be addressed and approved by the county for the site development and building plans. These changes are regulated by Tuolumne County permits that are established to prevent changes in off-site drainage of surface water.

Based on the above discussion, the Long Gulch development will have a **less than significant impact** on the surface and ground water quality.

Item 2

Would the project substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin Water availability

As stated in the February 2021 report, Tuolumne Utilities District estimated that the average water usage per household in Tuolumne County is 377 gallons per day and 60% of this volume (226 gallons per day) is consumed (not discharged to the sewage treatment plant). Some of this consumption was attributed by TUD to transmission losses. However, probably the greatest deficit could be explained by external uses such as lawn and garden watering.

The California Department of Water Resources (November 30, 2021) notes that the average indoor residential water use is 48 gallons per day. Thus, a family of four would use approximately 200 gallons per day. However, the Legislative Analyst's Office (March 8, 2017) estimates the residential use is 85 gallons per day per person. This second figure probably includes external use of water explained above. Using this estimate for a household of four, the calculated total usage would be 340 gallons per day that would approximate the TUD estimate

Since, septic systems are proposed for each of the parcels in the proposed Long Gulch subdivision, a portion of the volume of water used is returned to the ground water system through the septic system drain field percolation. Using the consumption reported by TUD, it is estimated that the daily volume discharged to each septic drain field would be 151 gallons per day. Most of this drain field discharge infiltrates into the soil and ultimately to ground water.

With a 40.52 inch rainfall average (https://www.usclimatedata.com/, https://www.climate.gov/maps-data/dataset/past-weather-zip-code-data-table) and no, or very little, overland flow most either lost to evapotranspiration or infiltration into the soil and, ultimately reaching groundwater.

The USGS estimates that, nationwide, 25% of rainfall infiltrates to ground water. With this minimal estimate, the total annual recharge for the smallest five acre parcel would be 0.844 acre feet per acre for a minimum total of 4.22 acre feet (1,375,362 gallons) for the lot. Or, an average of 3,768 gallons per day, exceeding the rate of net consumption by ten times (with the TUD estimate). If an additional average 150 gallons per day of infiltration from each septic system is added to ground water recharge and resultant decrease in consumption, it would decrease the net consumption to 227 gallons per day, approximately seven percent of the recharge for each lot.

It is significant to note that the proposed lot size in the Long Gulch development ranges up to ten acres, with the total acreage of the site of 82.2 acres. Again, assuming that 25% of the precipitation falling on the entire site infiltrates to ground water, the recharge to the entire site would be: 0.844 acre feet X 82.2 acres = 69.38 acre feet, or, 22,607,542 gallons, which equals an average of 61,938 gallons per day. Assuming one residence for each of the thirteen lots, the total indoor daily usage of water by all of the residences (at the TUD estimate of 377 gallons/day each) would be 4,901 gallons (8%). Again, adding the septic recharge of 150 gallons per day, the net daily consumption for the site would be 2,951 gallons. This results in a total net consumption of less than 5%. These calculations do not account for any infiltration that may occur from external uses such as lawn and garden watering.

Based on this evaluation, it is clear that the Long Gulch Development will have a **less than significant impact** on ground water recharge.

Item 3

Also, based on the above calculations, it is obvious that the project would have a **less than significant impact** on a water quality control plan or sustainable ground water management of the basin.

Item 4

Would the project have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry, and multiple dry years?

Your letter stated that one of the concerns the County has is that eleven wells have failed in the area and that the failures were due to the recent drought conditions experienced in the area. Based on the county map none of the failed wells are located anywhere near the project. It is also not possible to assess the severity and long-term cause of this issue since the failures first must be compared to the total number of wells in the area and the

density of the wells within other developments. Also, one must carefully evaluate the specific situation of each well—i.e. what is the nature of the aquifer in which the well was completed. And what are the completion details of the wells.

It is true that drought conditions affect the elevation of the water table. However, the overall potential water supply may not be seriously affected. The writer is aware of wells in Tuolumne County that had been completed at a depth that was too shallow to allow for anticipated drought cycles. And, when they were deepened, the wells were able to provide consistent water supply through a number of drought cycles.

Nonetheless, it is productive to evaluate the water availability for the Long Gulch site, using the perspective of recharge characteristics through historic drought cycles. Accordingly, data was obtained for precipitation at nearby Groveland (https://www.usclimatedata.com/, https://www.climate.gov/maps-data/dataset/past-weather-zip-code-data-table). Data was reviewed from years 2001 through 2022 (2013 and 2021 were missing from the dataset). The records show a cyclic pattern of rainfall totals, with dry cycles ranging from two to five years. For the eighteen years of precipitation reported, the annual totals ranged from a low of 19.79 inches (2020) to a high of 55.10 inches (2010).

Notwithstanding the above, it was believed useful to calculate the water availability using a year of low precipitation to provide a baseline, even though the dry year may be bracketed by higher rainfall years.

Using the 2020 precipitation of 19.79 inches during the drought, water usage for the site was recalculated. Assuming that 25% of this precipitation falling on the site infiltrates to ground water, the recharge for the entire site would be 0.412 acre feet X 82.2 acres = 33.89 acre feet or 11,043,212 gallons, or 30,255 gallons per day. Assuming one residence for each of the thirteen lots, the total indoor daily usage of water by all of the residences (at the TUD estimate of 377 gallons/day each) would be 4,901 gallons (16%). Again, adding the septic recharge of 150 gallons per day, the net daily consumption for the site would be 2,951 gallons. This results in a total net consumption of 10%.

It is worthwhile mentioning that two wells were drilled, by Tanko Brothers, Inc., in August and September 2022 on property immediately north of the proposed 83 acre Long Gulch 5-10 acre lot development. The area where these wells were drilled were, at one time a part of the Long Gulch Master Plan. Both wells were successful in developing adequate ground water yields. One well, 400 feet deep, with a static water level of 200 feet, produced 60 gallons per minute by air lift and a second, 500 feet deep, with a static water level of 80 feet, produced 8 gallons per minute by air lift.

From the foregoing analysis, it is apparent that the proposed Long Gulch development would have adequate water available even in periods of drought. Consequently, the

development would have **less than significant impact on ground water** even in dry years.

References:

California Department of Water Resources, November 30, 2021, "State Agencies Recommend Indoor Residential Water Use Standards to Legislature, 1 p.

https://www.climate.gov/maps-data/dataset/past-weather-zip-code-data-table

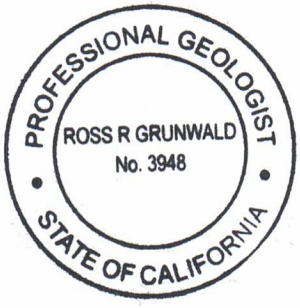
ESA, February 2007, "Tuolumne Water Quality Plan", 106 p.

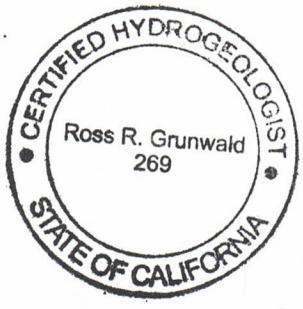
Legislative Analyst's Office, March 8, 2017, Residential Water Use Trends and Implications for Conservation Policy, 6 p.

Robertson, William, 2021, "Septic System Impacts on Groundwater Quality", THE GROUNDWATER PROJECT, 37 p.

https://www.usclimatedata.com/, "Groveland Rainfall History 2008-2019".

Respectfully submitted,





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cc: Ron Kopf