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February 21, 2023

Board of Directors Friends of Gualala River P.O. Box 1543 Gualala, CA 95445

# Subject:Review of Proposed Amendments to the Sonoma County Well OrdinanceProvisions for Evaluation of Impacts to Public Trust Resources

Dear Board of Directors:

I am a hydrologist with over thirty years of technical and consulting experience in the fields of geology, hydrology, and hydrogeology. I have been providing professional hydrology and geomorphology services in California since 1989 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 has been in the Coast Range watersheds of California. I have been conducting hydrologic and geologic research in the Gualala River watershed on a continual basis since 2001. 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; assisting and leading in the development of CEQA environmental compliance documents and project environmental permits; and designing and implementing field investigations characterizing surface and subsurface hydrologic and water quality conditions. I earned a Master of Science degree 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 #360) and a registered Professional Geologist (PG #5737) in the state of California. A copy of my resume is attached.

I have been retained by the Friends of the Gualala River (FOGR) to review the proposed amendments to the Sonoma County Well Ordinance to include provisions for evaluation of impacts to public trust resources. This review has focused on the applicability of the permit screening process to the Gualala River watershed. Information I have reviewed includes the following.

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- 1. Permit Sonoma's 8/9/2022 summary report
- 2. Draft Ordinance amendments to Chapter 25B
- 3. Notice of CEQA Categorical Exemption
- 4. Permit Sonoma staff's meeting presentation from August 9, 2022
- 5. Public comments to Draft Ordinance amendments received through August 8, 2022
- 6. Robert Pennington's presentation at the Well Ordinance Joint Working Group meeting on February 1, 2023
- 7. Agenda to Policy Working Group 5 meeting on February 8, 2023, and the following meeting materials:
  - a. Sonoma County Council's "Legal Backdrop Well Ordinance Policy Development" paper dated November 17, 2022
  - b. Jay Jasperse and Robert Pennington's paper entitled, "Preliminary Draft For Discussion Purposes Only, Potential Technical Workgroup Recommendations for Adaption on Technical Approach" dated February 7, 2023
  - c. Permit Screening Flow Chart (working and Rohde proposals).
  - d. Recommendations Report outline dated February 2, 2023
  - e. OEI's report entitled, "Draft Sonoma County Well Ordinance Public Trust Review Area Delineation", prepared for Permit Sonoma and dated February 2023

In addition, I have reviewed information at the following websites: County of Sonoma Well Ordinance Update Map<sup>1</sup> and The Nature Conservancy's California Natural Flows Database<sup>2</sup>.

Based on my review of these materials, it is my professional opinion that the "working proposal"<sup>3</sup> permit screening process that delineates Public Trust Review Areas (PTRA) is not protective of public trust resources in the Gualala River watershed because it does not consider or incorporate the current state of high streamflow depletions occurring in the watershed. Information indicates that the Gualala River is experiencing high streamflow depletions and even the low risk of relatively small increases in depletions predicted under the working proposal screening process would contribute to and exacerbate current cumulative impacts to flow and aquatic ecosystems in the watershed. Although I was not able to find documentation elaborating on the "Rohde proposal" permit screening process, based on review of the meeting flow chart, it is my opinion that it would be more applicable to the Gualala River watershed as it quantifies and considers the cumulative effects of proposed and existing well pumping on streamflow depletions and environmental flows. The technical rationale for these opinions is presented below.

### **Working Proposal Permit Screening Process**

It is my understanding that the current delineation of PTRA on the County's Sonoma Well Ordinance Update Map identify areas subject to the working proposal permit screening process. The methodology for determining PTRA river reaches, stream buffer widths, and risk of stream flow depletion is presented in the draft study report completed by OEI (February 2023). OEI report estimates the amount of

<sup>1</sup> <u>https://sonomacounty.maps.arcgis.com/apps/webappviewer/index.html?id=8baedfd50be640b0b11548537f89fee2</u>

<sup>&</sup>lt;sup>2</sup> <u>https://rivers.codefornature.org/#/home</u>

<sup>&</sup>lt;sup>3</sup> During the February 8, 2023 Public Working Group meeting a permit screening flow chart was presented for the "Working Proposal" and an alternative flow chart for the "Rohde Proposal".

groundwater usage and recharge in the Gualala River watershed to derive a groundwater pumping ratio (groundwater pumping volume/estimated recharge volume). They report a groundwater pumping ratio of <2.5% for most of the Gualala River watershed (Figure 6, pg. 13). The report describes the relationship between groundwater pumping ratio and summer stream flow depletion as follows (pg 14).

To classify each subwatershed as having a Low, Medium, or High level of streamflow depletion we utilized the findings of Richter et al. (2012) who proposed presumptive standards for environmental flow protection in the absence of detailed studies evaluating site -specific environmental flow needs. A high level of ecological protection is presumed to be provided when flow alterations are no greater than 10% and a moderate level of protection is provided when flow alterations are in the 11-20% range (Richter et al., 2012). The distributed model scenarios indicate that streamflow depletion of 10% or less occurs when the groundwater pumping ratio remains below ~5% and streamflow depletion of 11-20% occurs when the groundwater pumping ratio remains below ~10%. Based on these findings, subwatersheds with a groundwater pumping ratio of less than 5% were coded as Low for streamflow depletion, subwatersheds with a groundwater pumping ratio of between 5 and 10% were coded as Medium, and subwatersheds with a pumping ratio in excess of 10% were coded as High for streamflow depletion.

Based on the estimated groundwater pumping ratio (<2.5%) for the Gualala River watershed, there is a low risk for streamflow depletion. But, since the Gualala River and tributaries are considered to have high habitat value (potential coho summer rearing), many reaches are mapped as PTRA with a medium risk for stream flow depletion. However, based on review of the California Natural Flows Database, it appears that the Gualala River is already experiencing severe streamflow depletions more severe than that estimated in the OEI report.

### **Current Streamflow Depletions on Gualala River**

The California Natural Flows Database are predicted natural flows statewide expressed as monthly and functional flow metrics. A primary purpose for developing these predictions is to understand how alterations in natural flow patterns impact human uses and native species habitat. The functional flow metric predictions are part of the California Environmental Flows Framework (CEFF), a statewide approach to develop stream segment-scale ecological flow criteria that protect native aquatic species and communities. In the Gualala River watershed, Functional Flow metric predictions are derived using the reference gauge on the South Fork Gualala River near the Sea Ranch. No other Functional Flow metrices are provided for other watershed flow gauges, likely due to an insufficient period of record. A summary of estimated natural flows versus observed average monthly flows on the South Fork for approximately one mile downstream of the reference gauge is provided in Table 1 and Figure 1. The amount of stream flow depletion occurring along this reach is summarized in Figure 2.

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FLOW METRIC	10th pctl	50th pctl	90th pctl	Observed Med.
Dry-season baseflow	5.63 CFS	9.55 CFS	18.5 CFS	5.08 CFS
Dry-season high baseflow	29.7 CFS	57.8 CFS	114 CFS	37.9 CFS
Dry-season start	Apr. 28	May. 27	Jun. 17	<u>May. 22</u>
Dry-season duration	149 DAYS	189 DAYS	231 DAYS	198 DAYS

Table 1: Dry-season flow metrics for South Fork Gualala River (Source: California Natural Flows Database - see footnote 2)



Figure 1: Hydrographs of observed and estimate natural average monthly flows by water year-type (Source: California Natural Flows Database – see footnote 2).



Figure 2: Estimated flow alterations for South Fork Gualala River; streamflow depletions expressed by red bars (Source: California Natural Flows Database – see footnote 2)

The data in Table 1 indicate that current average dry-season baseflow rates have declined by nearly 50 percent and the duration of the dry-season has increased by 9 days. Figure 2 indicates that flow rates during the months of July through September have declined by 41-, 59-, and 47-percent, respectively, with higher declines (65 percent) in October and lesser declines during the rest of the year. The estimated declines in natural stream flow rates on the South Fork Gualala River are an indicator of the current impacted state of the upstream watershed.

## **Opinion on Current Streamflow Depletions**

The current depletion in stream flows on the Gualala River are likely due to a combination of processes occurring in the watershed, including land-use change (e.g., timberland conversion to agriculture) and timber harvest, associated increases in water demand, and climate change. These processes lead to reduced groundwater recharge and supply that sustain dry-season creek flows.

Vineyards occupy a large percentage of the ridge top lands laying between the Wheatfield Fork and Buckeye Creek in the vicinity of Annapolis. Much of this area drains to the California Natural Flows reference gauge located on the South Fork. Based on my review of CEQA documents for some of these vineyard developments, I'm aware that they include drainage and reservoir systems that capture and store runoff for irrigation that otherwise would be available for groundwater recharge. Many also rely on groundwater pumping for domestic, processing, and irrigation uses. Although not located in Sonoma County, my prior research indicates a historic decline in summer baseflows on the North Fork Gualala River like that occurring on the South Fork. This is further evidence of anthropogenic impacts on stream flow and aquatic ecosystems occurring in the watershed. It is also important to point out that the streamflow depletions occurring on the mainstem South Fork of the Gualala River are influenced by changes in recharge and groundwater supply occurring in the headwater regions of the watershed far outside the designated PTRA buffer zones.

There are data gaps in the working proposal permit screening process that call into question its suitability in the Gualala River watershed. For example, the Policy Working Group have determined that the pumping ratio (i.e., groundwater pumping/estimated recharge) developed for the watershed is highly uncertain "since geology was not used in recharge estimates." This calls into question the suitability of the denominator variable of the pumping ratio equation.

I am also critical of the numerator side of the pumping ratio used for the Gualala River watershed (i.e., estimate of groundwater demand/pumping). The OEI (2023) report states that groundwater pumping estimates in the watershed are based on rate and fee studies prepared for the three Groundwater Sustainability Agencies that service the Petaluma, Sonoma and Santa Rosa groundwater basins. I am suspect at how well these data reflect the groundwater demands in the Gualala River watershed. The report also states that estimates of groundwater demands (pumping) are reduced through implementation of surface water rights that are fully exercised for domestic and irrigation uses. It is unclear how this is handled during dry years when there is not enough surface water to exercise a full water right – is the difference made up through increased groundwater pumping ala the Central Valley?

Based on working knowledge of the Gualala River watershed geology, hydrology, and land use, it is my opinion that the recharge estimates (denominator) used to derive the pumping ratio are overestimated and the groundwater pumping/demand estimates (numerator) are underestimated, which taken independently or in combination will tend to reduce the risk level for stream depletions. The <2.5 percent pumping ratio estimate and associated low risk of stream flow depletion determined under the working proposal screening process for the Gualala River does not capture or agree with the current high stream flow depletion rate of 49 percent for the July through September period as derived from the California Natural Flows Database. This can be illustrated using the OEI report graphic (Figure 7, page

14) that compares the relationship between groundwater pumping ratio and mean July through September percent stream flow depletion, represented here as Figure 3. Based on this figure, a stream experiencing a 49 percent decline in streamflow for this period would have a pumping ratio more than 20 percent. This graphic also indicates that, based on the California Natural Flows Database, the South Fork Gualala River is already in the high-risk zone for streamflow depletion.



Figure 3: Relationship between the groundwater pumping ratio and summer streamflow depletion (Source: Figure 7, OEI 2023 report)

Because the likely causes for stream flow depletions on the Gualala River does not fit with the working proposal methodology for delineation of PTRA on the Gualala River and tributaries, it is my opinion that a watershed-scale analysis that evaluates the existing and proposed cumulative impacts from pumping and changes in recharge is warranted to determine areas that are protective of streamflow depletion. Therefore, I support abandoning the working proposal permit screening approach for the Rohde Proposal or something similar.

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

Sincerely,

Dungy R. Kamm

Greg Kamman, PG, CHG Senior Ecohydrologist

