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February 9, 2022 0420.01

Mr. John Ford
Director of Planning and Building
3015 H Street
Eureka, California
95501

Subject: Hydrogeologic Isolation of Groundwater Well WCR2017-003624
Humboldt's Own, 702 Chambers Road, Petrolia, California

Dear Director Ford:

At the request of our client, Humboldt's Own, we are providing clarifying information regarding our conclusion that the well on this property (APN 105-071-006) is hydrogeologically isolated from surface waters and wetlands. Apparently, there was a question raised at the Supervisor's meeting of February 1st, as to whether this well is drawing water from the Mattole River which is some 3,200 feet to the south. Note the water surface of the river is approximately equivalent to the depth of the well. See our report of October 2021, for more detailed information, and maps. Our previous analysis concluded that the well in question is drawing water from a deep bedrock aquifer, and not from the uppermost, near-surface groundwater aquifer, which may be more likely to be hydrogeologically connected to the Mattole River.

Strata in the lower Mattole Valley are complex; the sediments and bedrock geology are neither homogeneous nor isotropic. Humboldt's Own well is on an alluvial terrace (Qal) associated with the ancient, ancestral Mattole River. The uppermost 58 feet of stratigraphy is composed of that quaternary alluvium (Qal); which consist of old river deposits. Relatively speaking, the Qal may be considered to be generally flat-lying and not folded. At the base or bottom of the blue rounded gravel on the driller's log is a geologic contact referred to as an unconformity, meaning rocks of diverse types, attitudes, or ages are in contact with each other. In this case, the contact is an ancient erosional surface. Underlying the alluvium are rocks of the "Coastal Belt" of the older and more-deformed Franciscan Complex. These Franciscan rocks are significantly older, more variable and are often complexly folded and faulted. Groundwater in the upper, near-surface alluvial aquifer flows along this contact, generally parallel to the topography.

The well is completed in fractured sandstone of the Franciscan Complex at a depth of 142 to 157 feet. This is well below the base of the Qal alluvial (blue rounded gravel) deposits recorded by the driller from ground surface to 58 feet. These upper alluvial materials we have interpreted to consist of ancestral Mattole River stream deposits. Below the basal unconformity at the bottom of the rounded blue gravel at -58 feet, and the fractured Franciscan sandstone of the production zone of this well, the driller reported 84 feet of shale. We interpret the shale to be part of the Franciscan Complex. Shale is a rock type of lower permeability compared to the Qal alluvial materials, and effectively seals the fractured sandstone aquifer from the upper aquifer with the water-bearing rounded blue gravel above.

Thus, there are two aquifers in the strata penetrated by this well; an upper aquifer in the Qal alluvial section, and a deeper fractured Franciscan sandstone aquifer which is isolated from the upper aquifer by the 84 feet of low-permeability Franciscan shale. Humboldt's Own well is

cased through the upper, shallow groundwater aquifer. The well is completed in, and draws water primarily from, the deep fractured Franciscan sandstone aquifer. The proximal neighboring wells that we reviewed in our research appeared to have been completed in the upper, shallow groundwater aquifer.

The underflow of the Mattole River occurs in the riverbed alluvial gravels, and not in the bedrock below. From the drillers log of the well, one can infer that the "blue rounded gravel" from 37 to 58 feet represents the lowermost alluvial deposit of the ancient ancestral Mattole River (Qal) and are therefore separate and distinct from the recent gravels below the riverbed. The unconformity at the base of the blue rounded gravel is approximately 142 feet above sea level and approximately 67 feet higher than the river. Underflow is the water that flows in the riverbed alluvial gravels beneath the bed of the river. The underflow of the Mattole River is the water flowing in the alluvial gravel deposits below the active channel of the river.

Please contact our office if you have any questions or concerns.

Sincerely,

David N. Lindberg

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