McClenagan, Laura

From: Jason Holder <jason@holderecolaw.com>
Sent: Wednesday, November 03, 2021 7:18 PM
To: Planning Clerk; Ford, John; Richardson, Michael
Cc: robie tenorio; Larry Glass
Subject: Comments Concerning Reliance on Insufficient Investigations of Groundwater Hydrologic Connectivity
Attachments: Letter to Planning Commission Commenting on GW Hydrologic Connectivity Issues 110321 w Exh A.pdf

Good evening,

Please see the attached comments, respectfully submitted on behalf of our clients to the Planning Commission, Director Ford, and a senior planner for their general consideration in connection with cannabis project groundwater supply and related impact issues.

Warm regards,
-Jason

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November 3, 2021

<u>VIA EMAIL ONLY (PLEASE CONFIRM RECEIPT</u>

County of Humboldt
Humboldt County Planning Commission
Hon. Alan Bongio, Chair
Planningclerk@co.humboldt.ca.us

Humboldt County Planning Department
Attn: John Ford, Planning Director
Michael Richardson, Supervising Planner
Email: jford@co.humboldt.ca.us; mrichardson@co.humboldt.ca.us

Re: **Comments Concerning Widespread Improper Reliance on Inadequate Analysis Concerning Hydrologic Connectivity of Groundwater Wells**
(Commercial Cannabis Permitting Program Under the CMMLUO and CCLUO)

Dear Chairman Bongio, Honorable Members of the Humboldt County Planning Commission, Director Ford, and Mr. Richardson:

On behalf of Citizens for a Sustainable Humboldt ("CSH") and the Northcoast Environmental Center ("NEC"), we are writing to comment generally on an issue of pressing concern: the heavy reliance on groundwater by the rapidly growing commercial cannabis industry within the County of Humboldt ("County") and the potential for acute direct and widespread cumulative impacts such reliance may cause to the extent project wells are hydrologically connected to surface waters.

These comments supplement the attached technical comments of Mr. Barry Hecht, a certified hydrogeologist with Balance Hydrologics.[1] By providing these supported and substantiated comments concerning the requirements for adequate investigation of groundwater hydrologic connectivity, CSH and NEC intend to meaningfully participate in the ongoing dialogue concerning this import issue.

[1] *See* <u>Exh. A</u> – Hecht, <u>Review of Hydrogeologic Connection Investigation Memorandum Prepared for Platinum King Commercial Cannabis Project</u> (Humboldt County, PLN-2018-15196), incorporated herein by reference.

After reviewing the Rinehart Memorandum addressed in the attached analysis and the analysis accompanying the staff reports for many commercial cannabis projects, CSH and NEC conclude that the Planning Commission should not rely upon this level of insufficient investigation and explanation as evidence that a groundwater well for a proposed commercial cannabis project is not hydrologically connected to surface waters. This deficient analysis is simply insufficient under the California Environmental Quality Act ("CEQA").

I. Introduction: Potentially Interconnected Groundwater and Permitted Cannabis Cultivation.

As everyone is well aware, for the last several years, cannabis project permitting under both Ordinance 1.0 (the CMMLUO) and Ordinance 2.0 (the CCLUO) has dominated the Planning Commission's meeting agendas. We have reviewed the staff reports for many of these projects and have confirmed that (1) many projects rely upon groundwater wells for their project's sole or primary water supply and (2) the staff reports and accompanying materials provide scant evidence and analysis, if any, concerning the potential for project wells to be hydrologically connected to surface waters.[2] This lack of analysis and supporting evidence is despite the fact that a hydrologic connection between groundwater and surface waters has potential implications for water rights and permitting, environmental impacts, and sustainable cultivation, among other things. Because so many commercial cannabis projects are located outside of regulated groundwater basins,[3] the cumulative impacts of groundwater withdrawals is an acknowledged but unstudied problem.

The Platinum King project that was the subject of the Rinehart Engineering memo at issue in the attached analysis is typical of so many projects in the County. CSH and NEC identified this project, and its accompanying deficient analysis of groundwater connectivity, as an illustrative example. In part, this project and its analysis were selected as an example because it is one of the few projects for which any expert analysis was prepared and the Planning Commissioners and the Planning Director appeared to conclude that this analyses was adequate. Mr. Hecht's analysis of the deficiencies of the Rinehart Engineering memo and his recommendations for improved analysis are intended to provide useful information for project applicants, County planners, and decisionmakers.

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[2] The staff reports for many of these projects do not include any investigation concerning groundwater hydrologic connectivity and those that do only provide cryptic report without accompanying geologic maps, descriptions of proximity to surface water features such as seeps, springs, wetlands, streams, and rivers and other important information. As Mr. Hecht explains, much more can be done to satisfy this requirement.

[3] *See* Christopher Dillis, et. Al., 2021, Cannabis farms in California rely on wells outside of regulated groundwater basins (Environ. Res. Commun. 2021 3 075005), available at: https://iopscience.iop.org/article/10.1088/2515-7620/ac1124, accessed 11/03/21.

II. Discussion: More Information and Qualified Analysis is Necessary to Establish a Lack of Hydrologic Connectivity Between Groundwater Wells and Surface Waters.

A. The County Should Incorporate Recommended Approaches for Analyzing Project-Level Groundwater Connectivity and Watershed-Level Impacts from Groundwater Pumping.

For several months, both the Board of Supervisors and the Planning Commission have been discussing water supply issues in the context of the ongoing drought and the effects of climate change. For example, at the Board of Supervisors meeting yesterday (November 2nd), Board members and Director Ford discussed the need for a hydrogeologist to be retained to conduct a "watershed analysis" for 12 watersheds in the County that can be used to help assess well impacts and where best to locate wells.

In the attached analysis, Mr. Hecht recommends eight approaches for investigating hydrologic connectivity of a project's groundwater wells that can be used in combination, depending on the setting.[4] Utilizing these approaches as the conditions require will result in more sound and transparent analyses at the project level and can help inform a watershed level assessment.

B. If Groundwater Is Hydrologically Connected to Surface Waters, It May Be Uncertain as an Identified Water Source, Requiring Identification of Alternative Water Supplies.

Because connected groundwater from a project's wells may be considered "surface water underflow" for which an applicant may not have a right to divert and because the groundwater supply itself may be depleted over time, the identified groundwater supply may be uncertain. In *Vineyard Area Citizens for Responsible Growth, Inc. v. City of Rancho Cordova* (2007) 40 Cal.4th 412 (*Vineyard Area Citizens*), the California Supreme Court set forth a set of principles, derived from over a decade of Court of Appeal case law, governing the manner in which lead agencies must address water-related issues in land use EIRs. Among other principles, the Court stated that:

> If the uncertainties inherent in long-term land use and water planning make it impossible to confidently identify the future water sources, an EIR may satisfy CEQA if it acknowledges the degree of uncertainty involved, discusses the reasonably foreseeable alternatives—including alternative water sources and the option of curtailing the development if sufficient water is not available for later

4 *See* Exh. A, pp. 9-10.

> phases—and discloses the significant foreseeable environmental effects of each alternative, as well as mitigation measures to minimize each adverse impact.[5]

Among the staff reports for commercial cannabis projects that we have reviewed, no report acknowledges any uncertainties concerning a proposed project's sole groundwater supply, nor do these reports (or often the frequently accompanying Addendum to the CCLUO EIR or the CMMLUO IS/MND) include the required analysis that would follow from this acknowledgment. Instead, staff and project consultants simply assume that sufficient groundwater would be available for the Project in perpetuity and that if this sole water supply proved insufficient, the Project could curtail water use.

According to *Vineyard Area Citizens*, in light of an uncertain water supply, the environmental review document (e.g., EIR) must acknowledge the uncertainties inherent in a project's sole groundwater supply, identify secondary/alternative sources of water for cultivation and other needs, and analyze the impacts of obtaining the required water from those sources.

For many projects, the most likely potential secondary/alternative sources are: (1) increased groundwater pumping from additional wells, (2) increased rainwater capture, or (3) diversions of surface water under currently nonexistent appropriative rights. Yet, for both hydrological and legal reasons, any claims regarding the availability of these secondary/ alternative sources to serve as a water supply for these projects may themselves be highly uncertain and problematic.

To the extent that the project applicants propose increased groundwater pumping from new wells as a secondary/alternative water supply to make up for uncertain or unavailable groundwater from existing wells or from surface water, CEQA would require assessment of the actual availability of and environmental impacts associated with such groundwater resources, and such assessment cannot be undertaken without first providing up to date information on baseline groundwater conditions and any hydrologic connection between groundwater underlying the Project site and any surface waters.

Rooftop rainwater capture water source can be exempt from the requirement for a water right permit, pursuant to the Rainwater Capture Act of 2012.[6] However, any proposed increase in the capture of rainwater as a secondary/alternative water supply source, unless also (and exclusively) from greenhouse or other project <u>rooftops</u>, would be subject to the water right permit requirement.

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5 *Vineyard*, *supra*, 40 Cal.4th at p. 434.

6 *See* Water Code, §§ 10571(c), (d), 10573(d), 10574.

Any appropriative diversions of surface water as a secondary/alternative source would require a permit application to the California State Water Resource Control Board ("SWRCB"). In light of increasing water scarcity and high demand, it is highly uncertain that such an appropriative water right application would be approved. In any event, this would need to be explained, together with an analysis of the impacts of diverting surface water.

Again, when a transparent and scientifically sound analysis of the groundwater supply reveals uncertainty of the planned groundwater supply in the long-term, the required analysis under CEQA must identify secondary/alternative sources of water, identify any permits that would be required for such sources, and analyze the environmental effects that would stem from utilizing those sources.

C. The County has a Duty to Independently Assess Water Supply Information.

The County has a statutory obligation under CEQA, PRC section 21082.1 to "independently" review and analyze the legal adequacy of the environmental impact assessment performed for land use development projects. This duty includes the duty to undertake an independent assessment by the County of the claimed entitlements to water supply, the claimed sufficiency of the identified groundwater supply, and the environmental impacts of utilizing that identified water source. For the reasons discussed above, groundwater supplies may be uncertain and utilizing those supplies may cause impacts. The County must independently review and analyze the water supply for all proposed projects and may not merely rely upon opinions or bald assertions of advocates for the proposed development.

Furthermore, because groundwater extraction for commercial cannabis projects may cause cumulative impacts to navigable surface waters, including major rivers, the Public Trust Doctrine is implicated.[7] The County has an independent responsibility, under this doctrine, to ensure these projects do not cause impacts to surface waters and the species that depend on them. Unfortunately, in many of the staff reports that we have reviewed, County staff appear to simply accept scantly supported representations made by the applicant's consultants concerning the lack of a hydrological connection between a project's groundwater source and surface waters.

III. Conclusion: to Improve Analyses Concerning Groundwater Connectivity, County Planning Staff and County Decisionmakers Should Carefully Consider and Incorporate the Approaches Recommended by Mr. Hecht.

CSH and NEC appreciate the opportunity to provide these comments to County staff, the Planning Commission, and others. We sincerely hope the attached expert analysis provides useful insight into an adequate scientific investigation and transparent explanation of

[7] *See Environmental Law Found. v. State Water Resources Control Bd.* (2018) 26 Cal.App.5th 844, 867-68.

groundwater hydrologic connectivity. Please contact us with any questions or concerns you may have concerning these comments.

Very Truly Yours,

Jason Holder

cc: (Via e-mail only)
Client contacts

Exhibit A: Barry Hecht letter, dated Nov. 2, 2021, re: Review of Hydrogeologic Connection Investigation Memorandum Prepared for Platinum King Commercial Cannabis Project (Humboldt County, PLN-2018-15196).

Exhibit A

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November 2, 2021

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Re: Review of Hydrogeologic Connection Investigation Memorandum Prepared for Platinum King Commercial Cannabis Project (Humboldt County, PLN-2018-15196)

Dear David and Jason,

You have asked for a technical review of a memorandum prepared by Rinehart Engineering interpreting groundwater conditions beneath the Platinum King holdings off of Petrolia Road, and how groundwater at this project site might be connected to streams, seeps, springs, wetlands and other surface-water bodies. The Rinehart Engineering memo is appended to the letter as Attachment A.

As you explained, this memo was attached to a staff report presented to the Humboldt County Planning Commission on September 2, 2021, in connection with the Platinum King, LLC application for a Special Permit for an existing commercial cannabis project. Relying in part on the Rinehart Engineering memo analysis of potential groundwater hydrologic connectivity, the Planning Commission unanimously approved the project. The critical question is whether the analysis and information presented in the Rinehart Engineering memo is sufficient to determine and establish a lack of hydrologic connectivity between the project wells and surface waters.

The Reinhart memo is based on the premise that the potential surface water connections can be described entirely on information contained in Well Completion Reports (‘well logs’) signed by the licensed drilling contractor who drilled the wells. I have been provided only with a 2-page memo, without materials which frequently accompany a well log intended for agency review, such as a geologic map, a well test report (“flow test/inspection report”) noting the water levels during the development testing required for new wells, and, for wells to be used for irrigation, basic water-quality report (“irrigation suitability analysis”), if available. I do not know whether these materials were originally submitted, then separated from the memo; there is no specific reference to such materials in the memo, nor are they cited as attachments or enclosures. As fully set forth below, that information is directly relevant to assessing potential effects of groundwater withdrawals and sufficiently vital to the intended hydrogeologic interpretation. We would be more than willing to re-interpret the findings below if shown that a more complete package had been relied upon in reaching the conclusions made in the memo.

The memo is primarily based upon the geologic logs in the well completion reports (WCRs) for two wells drilled on slopes of bedrock knobs on either side of Reynolds Road. Their location is also identified as 37773 Mattole Road, shown in other documents to be somewhat more than a mile south of the Mattole River, and at least several dozens of feet above the river. The WCRs (as yet unnumbered but bearing owners' designation as wells 1 and 2) indicate the wells were drilled by mud-rotary methods during May and July 2017, respectively, to depths of 185 and 120 feet, yielding 3 and 10 gallons per minute (gpm) as measured by air lift, a conventional quick-and-dirty approximation appropriately used for interim evaluation of newly completed wells.

Drilling was conducted by Mitchell Drilling, a state-licensed C-57 contractor, under approved Humboldt County Environmental Health Department domestic well-drilling permits. The geologic logs discussed in the Rinehart memo were prepared by the driller. They were filed with the state through the WCR process as required by state law. The logs appear to have been carefully prepared, noteworthy because 2017 was the wettest rainy season of the past 10 years, so access and drilling conditions may have been challenging. Further information on the wells can be found in the staff report prepared by the Humboldt County Planning Department for the Planning Commission hearing of September 2, 2021. Excerpts from the staff report related directly to the wells are appended as Attachment B.

The Rinehart memo does not discuss the nature or location of the wetlands, springs, seeps or streams which may potentially be affected by pumping the wells. No site visits seem to have been made in preparing the memo. It might be noted that the Humboldt County staff report does mention several nearby features considered as habitat for yellow-legged frogs but does not cite their position or distance from either well. This could be important because, *if the aquifer(s) are confined as the memo concludes*, drawing water from the wells could deplete such water bodies at much greater distances (as described below) than from an unconfined water-table aquifer, which is more familiar to most people.

Aquifer Mechanics

Wells work by drawing water out of saturated rock. A cone of depression drained water-bearing rock (aquifer) develops when a well is pumped, much as a depression forms on the surface of a large milkshake when sucked through a straw. The size of the cone of drained water depends on how quickly the fluid is withdrawn. If the cone extends below a river or pond, the water in the waterbody can drain – often quickly – into the cone, with the water level falling and eventually not available to support ecological values in the affected streams, springs, seeps, and wetlands. The volume of the cone (depth and distance from a well) depends upon (1) how quickly the fluid is drawn from the aquifer, (2) the distance from a water body, and (3) how long the well is to be pumped. At a technical level, it is also affected by the permeability of the aquifer integrated over the saturated depth of the aquifer (Transmissivity, or "T"), the storage coefficient ("S"), and the depth and slope of the water table, as well as the degree of confinement (if any) and whether the aquifer is being appreciably (a) recharged by recent rains, or (b) depleted by pumping in nearby wells. None of these factors need to be known exactly to assess effects of pumping on nearby surface-water bodies; approximations can be developed by suitably qualified individuals, with the needed precision of the estimates varying with the intended purpose of the evaluation. In this case, approximations may be sufficient, but the size and depth of the cone should be roughly known. If the cone does not extend outward as far as the water bodies, it will not directly affect them. Such steps are further discussed in the last section of this letter.

Quandaries in the Rinehart Engineering memo.

Several positions or interpretations put forth in the memo are simply confusing and/or illogical.

1. The memo states that there is no confining layer, but it states the two wells both draw nonetheless upon confined groundwater, presumably connected. The condition of confinement in groundwater is measured by a difference in pressure (or 'head'), generally of some appreciable magnitude. There must be a mechanism – a geologic bed or unit, or a durable membrane of some kind – to maintain that pressure difference. In virtually all cases I know of, confinement is maintained by a confining bed on top of the confined water body, something impermeable below it – either intact bedrock or another confining bed. But since the memo puts forth the notion of (presumably significant) groundwater confinement, it is not clear how pumping these wells would affect the local groundwater system or the surficial water bodies. If so, there is no structure or support for any confinement, the opinion with which the memo concludes.

2. Confined groundwater bodies (or "aquifers") have several well-documented attributes. First, they transmit pressure quickly. Wells developed in confined aquifers can affect water levels in wells developed in the same geologic unit at distances of some thousands of feet or even miles, with the effects being almost instantaneous. There are many widely-known accounts of water levels suddenly rising in wells at some distance from a railroad station as a train approaches a station, then quickly dropping as the train departs and the pressure in the aquifer returns to the pre-existing state; one such case describes a well near the Eureka train station (see Evenson, 1956) from back in the days when there were actual trains at that station.[1] Second, the storage factor (or storativity, commonly symbolized as 'S' in the groundwater literature) is generally much lower in confined aquifers of all types. In unconfined aquifers, S usually ranges from 1 to 25 percent, most commonly 5 or 10 percent. Conversely, in confined aquifers S values typically fall in the range of 0.00005 and 0.005 (or 0.005 and 0.5 percent)[2]. Therefore, when the well if operated, and the pumping cone or funnel described above is being drained to yield water to wells, much less water is produced from a confined aquifer. Draining a cubic foot of aquifer within the cone may produce 5 or 10 percent of a cubic foot of water in a typical unconfined or 'water table' aquifer but might produce only 0.5 to 0.005 cubic feet of water from a confined aquifer. Pumping a confined aquifer to irrigate a crop may dewater many times as much volume in a confined aquifer than in an unconfined aquifer. Cumulatively, pumping a confined aquifer can result in cutting off the supply of water flowing to springs, seeps, streams, and wetlands much more quickly and over a much broader area than would occur when pumping a similarly situated unconfined aquifer.

[1] The weight of train adds pressure to a confined aquifer, causing a rise in water level; pumping such a well causes the reverse effect – it diminishes pressure, causing the water level to fall. Adding pressure causes water levels to rise in a confined aquifer by the same distance that pumping (or lowering pressure) would call water levels to fall in the same well under similar conditions.

[2] Values for confined aquifers from David Keith Todd's textbook (1963), p.31

3. The memo finds definitive meaning in reported differences between static water levels and the water level at which first water was reported to be encountered. This conclusion lacks evidentiary support. The following might be noted:

    a. If a static water level has been established while drilling at shallow depth, and the level in the well rises *above* that level when lower beds are penetrated, yes that does indicate a special kind of confined aquifer, commonly known as an artesian system. But that is not what the memo is stating *("Positive pore pressures were not observed in a borehole when it was drilled.")*

    b. Rather, the memo, though, seems to argue the opposite: *"If the depth to the first encountered water is greater than the depth to the static water after the well has been completed, developed and pumped, this is a* ***determinative indicator*** *that the well has been completed in a confined aquifer." (Emphasis added).* This position is not supported and, in our experience, is counter to well behavior in a confined aquifer setting. It would be helpful if a citation to a groundwater text, article, manual or ordinance were provided.

    c. In that light, we are not aware of any statutory requirement to note in the WCRs where "first water" is encountered, and no established method of doing so. Depth to first water or the difference between static water level and the depth at which saturated aquifer was first perceived is not recorded on many WCRs ('drillers' logs'). And, as noted below, the observations can mean vastly different things depending upon the drilling methods used for a given well or boring, and whether the static water level is measured before or after the drilling muds are washed out of the gravel pack and the immediately adjacent aquifer clogged by the 'mud cake' associated with drilling with muds. So how can a metric which is estimated (seldom measured) differently by multiple individuals who use different criteria and varies substantially with method of drilling – not to mention that it is not required – be used to define and quantify confinement in the real-world hydrologic environments? The next section explores this further.

It is difficult to distinguish the depth at which water is first encountered during drilling when the drilling method is mud rotary. Mud rotary entails pumping hundreds of gallons of water and 'mud' down the borehole during drilling. To estimate the depth of 'first water' the driller or his helper must have a look at the mud-coated cuttings washed out of the hole to detect whether they are saturated. In the real world, many drillers who use mud must legitimately focus on safety and often don't have time to do that as they face the very real challenges posed when drilling through the water table; rather, they simply note when enough water from the upper portion of the saturated aquifer has entered the bore such that the drilling mud is becoming thinner. This condition may not be discernible until long after the 'first water' level has been drilled through, at which point the noted first water depth may be dozens of feet lower than when the water table was first penetrated.[3] In Franciscan formation rocks, such in as those in the Mattole watershed, recognition of saturated rock tends to be further delayed (meaning that the driller reports first water to be deeper than actually might be) because the drilling muds tend to have the same grey coloration as the saturated aquifer. As a result, depth to reported first water is often, or even usually, considerably deeper when drilling with muds. We are not aware of a formal protocol or standard of care for measuring depth to first water. Therefore, many groundwater professionals who need reasonably accurate depths to first water for shallow-water-table, landslide-causation, or contamination investigations (among others) are focused on the level at which first water is encountered do **not** drill with mud, typically specifying "air" or auger methods.

Geologic Context

We concur with the unsurprising observation in the Reinhart memo that "It is essential to fully understand the geologic context at each of these well sites before asserting whether a hydrogeologic connection [to surface waters, including streams, springs, seeps, and wetlands] is likely to exist." But the memo contradicts this principle by not investigating and explain the Platinum King site's geologic context. Because we were unable to find an attached geologic map (or any reference to one), we went to the most widely used published map and produced a copy of the area around these wells (attached). We also checked the geological mapping and literature, just to be sure that the regional mapping was still current and relevant to hydrologic connections. We then posed a few basic questions which geologists and other groundwater professionals typically ask when major re-interpretations have been put forward. These questions and inferred answers are presented below:

Can these wells produce enough water from the screened zone to supply the intended volumes? (NO)

The Rinehart Engineering memo and related discussions with staff seem to be the primary source for the finding in the Planning Department staff report considering the firm yield of the project's water-supply system. Water supply is characterized as 2.5 million gallons per year of ponded surface runoff collection[4] and 1.032 million gallons of groundwater pumped on a 24/7 basis. The arithmetic computation of well yield is correct, but the value is not usable because:

(a) It is based on using air-lift measurements for purpose for which they are not appropriate. They are very approximate short-term pumping tests which the State notes "may not be representative of a well's long-term yield", a statement printed on the well log (WCR) for good reason. Once a well is completed and a pump installed, well yields seldom match airlift tests. Further, both yields and water levels often quickly fall as the cone of depression expands as the well is pumped for sustained periods, and the limits of water-yielding rock are encountered.

[3] Water diluting the muds is drawn into the bore largely by gravity. The deeper the drill may be below the water table, the more water flows into the bore, making the dilution more noticeable. Especially in low-permeability aquifers (such as those at Platinum King), dilution may not be noticeable for tens of feet.
[4] Not considered in this letter.

(b) The tests for well 1 and well 2 were conducted during May and July 2017, the wettest year of the past decade and are not likely reflective of drought conditions, one logical basis for planning an industrial water supply in a remote area.

(c) The wells are not built for 24/7 operation. They were permitted and built as basic domestic wells. When permits for the wells were obtained, the owner had the option of checking boxes which identified them as either "irrigation wells" or "industrial wells" in which heavier-duty materials, construction techniques, pumps, controls, and gravel pack might have been installed.[5]

For estimating reliable annual contributions to the firm of this facility, expectations of available groundwater supplies should reasonably be throttled way down.

Is the hypothesis of an intact confining bed consistent with the local geologic evidence (NO, it is not.)

The memo gives an impression of near-flat-lying confined aquifer overlain by confining layer (seemingly called "aquitard" in the memo), with the well(s) drawing solely from an extensive zone sealed from any hydrogeologic flow above the aquitard.

Site-specific geologic and hydrogeologic conditions:

The wells are located near the Mendocino Triple Junction, probably the most seismically active portion of Humboldt County over the past several million years and counting. The local aquifers are heavily deformed, tightly folded, and physically torn apart. Groundwater conditions in the vicinity of the wells have been fundamentally affected. The geologic deformation – and how inconsistent with the memo's assumption of an extensive confined aquifer -- is not recognized in the Reinhart memo.

The following four points describe why the highly deformed, faulted and fine-grained underlying geology of Franciscan sediments make it unlikely that a confined aquifer isolated from surface waters would occur in the Reynolds Road area. For more background, readers can seek out the U. S. Geological Survey's regional geologic overview by McLaughlin and others (2000) and some of the narrower context of hydrologic response at this site to seismic activity is documented in part in McPherson and Dengler's (1992) article in California Geology.

a. **Confinement of groundwater conditions require continuity of the affected aquifer, which the local geology does not provide:** The memo claims that confinement is the mechanism by which surface water bodies can be isolated from groundwater pumped at the two wells, which the memo implies may be interconnected. Any confining geologic unit must logically extend at least the distance (seemingly several hundred yards) between the two wells, and substantially beyond them. The geologic conditions at the site do not provide for such continuity. But there is nothing gentle, flat, or continuous about the local geologic structure. Figure 1 (Attachment C) shows geologic units which dip steeply and in almost every direction, chaotically folded. And the map shows that Coastal-Belt Franciscan deposits underlying the Reynolds Road area, even if not fragmented by the chaotic folding, are mélanges -- so fine-grained, squeezed, having peanut-

[5] Not that any well should be operated on this schedule. Maximum pumping of 14 to 16 hours per day are the standard of care.

butter-like plasticity with minimal permeability, such that a connection of either pressure or water within the sediment is so unlikely that it approaches impossible. The two main geologic units under this site are described as violently sheared clayey, sticky, incoherent rock, plainly incapable of forming a nearly flat continuous confined aquifer as more extensive than the distance between the two wells (McLaughlin and others, 2000):

> "**Co1 Mélange –** Dominantly of highly folded argillite and abundant clayey penetratively sheared rock that exhibits rounded, lumpy, and irregular poorly incised topography
>
> **Co2 Mélange –** Subequal amounts of shattered sandstone and argillite with much clayey, penetratively sheared rock that exhibits generally irregular topography lacking well-incised sidehill drainages."

The likelihood of continuous aquifers or aquitards in the Reynolds Road area is vanishingly small.

b. Confinement requires an extensive, rigid, or near-rigid layer with minimal permeability: While the memo states that no confining layer exists, the only logical means of creating confinement is by a layer capable of maintaining a potentially significant pressure differential, with essentially no permeability and with no gaps, holes, or tears which would permit interconnection. The individual beds in these units are too thin, too contorted and convoluted, and transected by faults and fractures to prevent leakage of water or pressure between the zones in which the wells are developed and those which support the streams, springs, seeps and wetlands. The U.S. Geological Survey cross section through this area[6] shows beds so contorted to depths of at least 700 meters (more than 2200 feet, or far deeper than the wells) that the agency uses a series of dense pinwheels cartoons rather than conventional geologic symbology, which is not capable of showing how densely deformed and folded these beds are, and the unlikelihood that any layer capable of groundwater or pressure isolation might exist. Not to mention the ruptures from faulting (see Figure 1) or deep fractures (see below) which characterize this immediate area.

In reality, two such layers would probably be needed to confine water in this area – one above the confined waters and one below to maintain confinement. "Impermeable" bedrock serves as the lower boundary confining pressure and waters in most geologic settings. Given the local contorted folding and the absence of a continuous underlying bedrock, a lower confining unit of some type would be needed to maintain a pressure differential. The memo does not identify one, let alone two, such units.

c. The Reynolds Road area is typical of areas drained of groundwater following the Honeydew earthquake of August 1991 and the Petrolia earthquake of April 1992; raising the question of when else does water move to the Mattole River, its tributaries, and springs and seeps? So it is known that under at least some extreme conditions that groundwater moves to the streams (and presumably seeps, springs, and wetlands). Following the Honeydew earthquake, streamflow

[6] The cross section is located along the thin line trending northeastward through Figure 1.

in the Mattole River increased by 5 to 8 times, with flows only gradually dim? shing to pre-quake levels after 60 to 90 days[7]:

The geology under the Reynolds Road area is typical of the hydrogeologic environment which contributed to these post-event significant and persistent flows. The memo does not envision any barrier which would have isolated water from this area during the regional post-event drainage. While post-quake conditions may not be the benchmark for defining surface/groundwater connection relevant to the Humboldt County regulations, it does raise the question of when else does water move to the streams from beneath this area.

d. **"Well technology" and "impermeable well seals" cannot isolate surface and groundwaters in this area, as claimed in the memo.** Local seismic events in the Triple Junction Area tend to be unusually violent and grinding for their size. For example, Petrolia earthquake of 1992 accelerated the whole region surrounding Reynolds Road by a measured rate of 2.2 times gravity, enough to launch unanchored items (such as pumps or concrete pads surrounding wells) in the air, and one of the most abrupt seismic shaking events ever recorded in the country. Hydrogeologists know that even more-routine earthquakes are sufficient to shatter well seals, rupture casings, and destroy wells. To give some idea of the types of stresses to which wells are subjected in this area, the entire region was thrown upward by more than a yard during the Petrolia event.

Similarly, the smaller Honeydew event left cracks in the rock extending to great depths through the multiple groundwater-bearing zones throughout the Reynolds Road and surrounding (described by McPherson and Dengler, 1992), further casting doubt on the ability of "well technology" to create a well seal capable of lasting the life of the proposed project.

Natural geologic barriers capable of causing confined conditions are similarly unlikely to survive events of this type without rupturing, especially since they have been shaken by literally dozens of comparable events over recent geologic time.

In summary, the Rinehart memo proposes confinement as a mechanism precluding connection between the wells and surface waters, but states that no confining layer exists. No alternate mechanism for confinement is proposed. Confinement requires geologic conditions which can maintain significant pressure differences over areas at least as far apart as the two wells, but the memo offers no evidence or even indications for it. If confinement indeed exists, pumping of these wells must result in a much more extensive and more rapid dewatering of the aquifer per volume of water pumped than would be true in an unconfined or 'water table' condition, because of the much lower storativity ("S") that is integral to confinement. In all likelihood, any well will be drawn down further when a given volume is pumped out of the well if the aquifer is unconfined. These are known relationships and are to be expected if the aquifer(s) are in fact confined. It would have been useful to include in the memo some indication that the effects of pumping were likely to propagate further –perhaps onto adjoining properties – or more rapidly

[7] A similar response was documented in many watersheds in the Santa Cruz Mountains following the Loma Prieta earthquake (1989) in a region where very few confined aquifers are reported.

extend to the bottom of the usable aquifer, that such information might belong in the memo, and be available to guide evaluation of the project.

The memo states that "well technology" can isolate these wells. Water can and does go around the type of unperforated ("blank") casing described, as well as the 'impermeable concrete grout' well seals discussed in the memo.[8] Water does so by percolating into the soil and infiltrating to the water table and flowing into the well, completely bypassing the so-called impermeable well seal when drawn into the well by the forces within the well's cone of depression. That is why wells with perfect seals still produce contaminated water when they are situated in areas where groundwater has been (or is being) contaminated. And if water did not move to the water table from which the two wells draw, where are they being recharged each year to meet the annual production anticipated?

Perhaps there is a better way?

The memo does not consider other ways of exploring and documenting connection(s) with other surface waters that were and are available to its writer. We make several suggestions of ways to assess this set of questions in which the public process might be more usefully informed. These alternate approaches are in keeping with standard practice statewide. They would provide the County with greater assurance of protecting the public resources that are so valued in Humboldt. And they are not unduly costly relative to other standard methods used to assess or monitor as part of the CEQA process. Among accepted approaches are:

1. Show the locations and extents of seeps, springs, wetlands, or wetted reaches of streams which could possibly be linked to the aquifer within which the well(s) is developed, preferably on a map also showing the cone from which the wells will draw.

2. Compare similarities and differences in basic water quality measures, such as salinity (measured either as total dissolved solids or the field index of specific conductance), or individual major ions, simple measures which comparisons of water to quantify whether they come from common source(s). If the sources may be significantly different, there is a good chance that extracting water from the well(s) may not directly affect the surface water body; strong similarities suggest the possibility of a strong connection.

3. Evaluate the well(s) by pumping, which can be done in many ways and levels of accuracy, but it is essential to estimate the sustained yield of the wells) and the properties of their target aquifer, such that effects of pumping the well(s) can be knowledgeably estimated.

[8] The memo indicates that both wells will not affect other local waters because they are sealed with concrete grout. However, the promised well technology does not apply here, since the WCRs ('driller's logs) show that both wells are sealed with field-hydrated bentonite pellets, not concrete grout. The pellets may actually be a suitable idea, as they may provide a seal likely to flex rather than shatter during the unusually forceful seismic events which affect this particular area – with deep geologic cracks (observed after the Honeydew earthquake of 1991) and vertical acceleration exceeding 2g, plus tectonic uplift of more than a meter (during the Petrolia earthquake of 1992) -- provided that County so allows it.

4. Assess the water levels in the wells relative to the surface water bodies, including field visits, if warranted, such that adjustments can be made for wet year/drought year and seasonal water-level fluctuations.

5. Use historical and recent aerial photography to identify where vegetation supported by a surface-water body or elsewhere may be drawing on groundwater, including the use of commonly available false-color infrared imagery and other remote-sensing applications can be incorporated, if and where useful.

6. Inquire of knowledgeable local observers as to where and when springs, seeps, and streams flow or when wetlands pond, and inquiring about factors possibly contributing to identified changes.

7. Evaluate water levels in waterbodies (and/or other local wells) relative to the water level in the well(s) of interest to calculate groundwater slopes and flow paths; and

8. Measure any visually connected flows (using approved methods), then adjust for evapotranspiration to compute whether the flows are being depleted or augmented by local groundwater pumping or recharge.

These approaches can be combined, conducted concurrently, and can be checked and validated with results of each other approaches. Many or most would not be needed in all settings, or even the majority of settings, as the right set of approaches for each site should be tailored to local conditions and constraints. Other approaches (such as geophysical investigations) can be added in special situations. In the specific instance of the Reynolds Road wells and aquifers, it is likely for example, that the eighth method would not be appropriate, and the information needed to assess the utility of 1, 2, and 3 such as basic well-development records or water-quality data are not currently available in the public forum. Generally, though, the most valid, cost-effective, and reproducible answers will likely result from assessing effects on other bodies by applying this "supported by multiple, independent lines of evidence set of approaches" (SMILES).

The practice of evaluating the effects of pumping wells on springs, seeps, streams, and wetlands is now rapidly evolving in California. Partly, this is a secular change as practitioners become increasingly interested in protecting sensitive habitat, often in conjunction with managing Waters of the U.S. or Waters of the State. In our opinion, three distinct other resource-management trends are also catalyzing this evolution. First, the State Division of Water Rights is increasingly conditioning all projects to consider, conserve, and monitor springs, seeps, and wetlands. Second, water conservation efforts statewide such as measures encouraging lining of ponds, ditches, and canals are now requiring assessment of their effects on seeps, springs, wetlands, and in-channel flows. Finally, the California Department of Water Resources and the State Water Resource Control Board are implementing the State Groundwater Management Act (SGMA), which requires all regulated entities to demonstrate that they are not adversely affecting such waterbodies, known as Groundwater Dependent Ecosystems (GDEs). Consequences under SGMA of not being able to demonstrate affirmative efforts to show no adverse effects on GDEs and to do so with hydrologically rigorous methods are very real and very substantial. While Platinum King is not within a specified jurisdiction subject to SGMA, the state-wide professional standards are rapidly shifting toward a quantitative standard. It may serve Humboldt County well to draw upon the methods outlined above, staying in step with at least the basic elements of the statewide state of the art. Once again, I remain available to modify this review as additional information becomes available.

I appreciate the questions you have asked and look forward to helping find sound answers.

BALANCE HYDROLOGICS, Inc.

Barry Hecht, Senior Principal
PG 3664, Ch 50, CEG 1245

Literature Cited

Evenson, R., 1956, Geology and groundwater features of the Eureka area, Humboldt County, California: U.S. Geological Survey Water Supply Paper 1470.

McLaughlin, R.J., and others, 2000, Geology of the Cape Mendocino, Eureka, Garberville, and southwestern part of the Hayfork 30 x 60-minute quadrangles and adjacent offshore area, Northern California: U.S. Geological Survey miscellaneous field studies MF-2336. Figures (geologic maps, cross sections, seismic event epicenters) and pamphlet (28 p.)

McPherson, R.C., and Dengler, L.A., 1992, The Honeydew Earthquake, August 17, 1991: California Geology, v.45, no. 2, p. 31-39

Attachments:
A. Rinehart Engineering memo
B. Materials from the Sept. 2, 2021 Planning Commission public hearing
C. Geologic map of the area surrounding Reynolds Road.

ATTACHMENT A:

MEMORANDUM FROM RINEHART ENGINEERING
JULY 20, 2021

As noted in our Nov. 2, letter, we do not know if this memo included the well completion reports (WCRs or driller's logs), Flow-Test Report (Well-Development log) or analytical results of water quality testing. All three shed important light on the memorandum, but are not cited as being attached.

RINEHART ENGINEERING
559 Howard Heights Road Eureka, CA 95503
(707) 498-3414
rinehartengineering@gmail.com

To:	Platinum King Farms, LLC
From:	Bret Rinehart, PE
Date:	July 20, 2021
Subject	Well Hydrogeologic Analysis
Location:	37773 Mattole Road, Petrolia CA 95558 APN 104-071-004

RECEIVED
JUL 2 0 2021
Humboldt County
Cannabis Svcs.

I have reviewed the attached Well Completion Reports for the existing 6" diameter 180 ft deep well (Well #1) and existing 4" diameter 120 ft deep well (Well #2) at 37773 Mattole Road, Petrolia CA 95558 (APN 107-071-004) to assess the likelihood of a direct hydrologic connection between the well as completed and surface waters.

I evaluated the well log for the following specific evidence of a potential surface water connection:

1. The presence of a stratum of alluvium within the screened interval(s). The presence of rounded rocks or gravels is a strong indicator that the well intersected an area that was formerly a stream channel. While not conclusive proof that an individual well is hydrologically connected to surface water, alluvium is a strong indicator that such a connection could exist. Lenses or stringers of course sand, gravel, and cobbles provide a preferential pathway for groundwater to discharge to surface water or for surface water to be depleted by pumping from a well. However, even if alluvium is encountered in the borehole, well completion techniques typically preclude the shallow groundwater from the borehole. This is most often accomplished by installation of blank casing and a sanitary seal (impermeable grout) or a conductor casing completed to the depth of the aquitard.

2. Positive pore pressures were not observed in a borehole when it was drilled. If the depth to the first encountered water is greater than the depth to the static water level after the well has been completed, developed, and pumped, this is a determinative indicator that the well has been completed in a confined aquifer. The presence of observable positive pore pressure in an aquifer precludes a direct connection to surface water. If a direct connection did exist, pore pressures would be in equilibrium with the ambient atmospheric pressure.

3. A confining layer is not present. In the geologic logs, the screened interval for the well lies below a substantial aquitard. In order for a confined aquifer to exist, there must be an aquitard that allows some level of positive pore pressure to exist in an aquifer.

4. Screened well interval(s) do not intersect shallow water tables or geologic units with very high hydraulic conductivity or porosity. The geology of north western California does not have extensive bedrock units that have high hydraulic conductivity and effective porosity (such as karst). The colluvial soils derived from bedrock in this area tend to be relatively fine-grained, do not yield significant groundwater, and tend to form competent aquitards.

5. It is essential to fully understand the geologic context at each of these well sites before asserting whether a hydrologic connection is likely to exist. For instance, wells in deep Franciscan bedrock units are unlikely to have a hydrologic connection to surface water unless extreme topographic relief and a deeply incised stream channel results in a nearby surface exposure of that same bedrock unit.

Conclusion

I have concluded that the existing wells at 37773 Mattole Road are not hydrologically connected because of the geology, the distance to nearby surface waters and the construction technique.

At Well #1, approximately 75 feet of overburden ("top soil" and "brown clay, silty clay, sandy clay and silty sandy clay") overlies about 85 feet of "grey shale" followed by 20 feet of "greyish sand and gravel". Based on the depth to first water, the primary water bearing unit is the "grey shale" layer from 75 to 160 feet deep. The depth to the first observed water was 35 feet bgs and the static water level after the well was completed and developed was 20 feet bgs, meaning that this well is screened in a confined aquifer. The upper 40 feet is blank well casing and cannot yield shallow groundwater. The screened interval extends from 40 to 180 feet bgs and groundwater from intervals shallower than 40 feet cannot be produced from this well.

At Well #2, approximately 40 feet of overburden ("topsoil" and "brown clay, brown silty clay, brown sandy clay") overlies about 60 ft of "rock & shale, grey shale, grey silty sand, rock & gravel". Below that lies "greyish sandy sandstone". Based on the depth to first water, the primary water bearing unit is the "rock & shale" layer from 40 to 100 ft deep. The depth to the first observed water was 30 feet bgs and the static water level after the well was completed and developed was 20 feet bgs, meaning that this well is screened in a confined aquifer. The upper 30 feet is blank well casing and cannot yield shallow groundwater. The screened interval extends from 30 to 120 feet bgs and groundwater from intervals shallower than 30 feet cannot be produced from this well.

Please feel free to contact me if you have any questions at (707) 498-3414.

REGISTERED PROFESSIONAL ENGINEER
BRET R. RINEHART
No. 70375
EXP. 9/30/22
CIVIL
STATE OF CALIFORNIA

7/20/21

Bret Rinehart, PE
Rinehart Engineering

ATTACHMENT B:

MATERIALS FROM HUMBOLDT COUNTY PLANNING COMMISSION SEPTEMBER 2, 2021 AGENDA PACKET

*The free Adobe Reader may be used to view and complete this form. However, software must be purchased to complete, save, and reuse a saved form.

File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. xxxxxxx

Page ______ of ______

Owner's Well Number #1

Date Work Began 05/01/2017 Date Work Ended 5/31/2017

Local Permit Agency Humboldt County Environmental Health Dept.

Permit Number 16/17-0047 Permit Date 12/30/16

DWR Use Only – Do Not Fill In

State Well Number/Site Number

N Latitude W Longitude

APN/TRS/Other

Geologic Log

Orientation ⦿ Vertical ○ Horizontal ○ Angle Specify ______

Drilling Method Direct Rotary Drilling Fluid Bentonite mu

Depth from Surface Feet	to Feet	Description (Describe material, grain size, color, etc)
0	3	Topsoil
3	10	Brown Clay
10	15	Brown Silty Clay
15	23	Brown Clay
23	35	Brown Silty Clay
35	45	Brown Sandy Clay
45	58	Grey Silty Clay
58	75	Greyish Silty Sandy Clay
75	85	Grey Shale
85	95	Grey Shaley Silt
95	100	Grey Shale
100	125	Grey Silty Shale
125	145	Brittle Grey Shale
145	160	Grey Sandy Shale
160	180	Greyish Sand & Gravel
180	185	Grey Clay

RECEIVED [illegible] HUMBOLDT CO. DIVISION OF ENVIRONMENTAL HEALTH

Total Depth of Boring 185 Feet

Total Depth of Completed Well 180 Feet

Well Owner

Name [redacted]

Mailing Address [redacted]

City [redacted]

Well Location

Address [redacted]

City Petrolia County Humboldt

Latitude ____ Deg. ____ Min. ____ Sec. N Longitude ____ Deg. ____ Min. ____ Sec. W

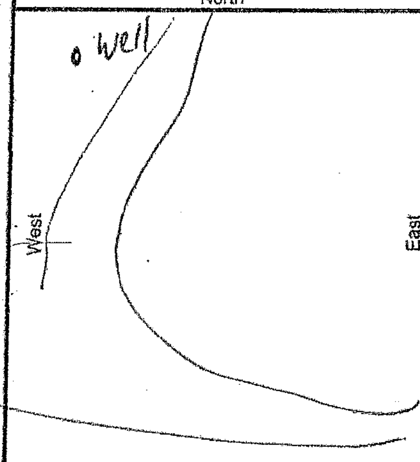
Datum ______ Dec. Lat. ______ Dec. Long. ______

APN Book 104 Page 071 Parcel 004

Township ______ Range ______ Section ______

Location Sketch

(Sketch must be drawn by hand after form is printed.)



Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

⦿ New Well
○ Modification/Repair
 ○ Deepen
 ○ Other ______
○ Destroy
Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

⦿ Water Supply
 ☑ Domestic ☐ Public
 ☐ Irrigation ☐ Industrial
○ Cathodic Protection
○ Dewatering
○ Heat Exchange
○ Injection
○ Monitoring
○ Remediation
○ Sparging
○ Test Well
○ Vapor Extraction
○ Other ______

Water Level and Yield of Completed Well

Depth to first water 35 (Feet below surface)

Depth to Static Water Level 20 (Feet) Date Measured 05/31/2017

Estimated Yield * 3 (GPM) Test Type Air Lift

Test Length 8.0 (Hours) Total Drawdown ______ (Feet)

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

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
0	40	11"	Blank	PVC Sch. 40	SDR-21	6"		
40	180	11"	Screen	PVC Sch. 40	SDR-21	6"	Milled Slo	0.032

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	30	Bentonite	Bentonite Chips
30	180	Filter Pack	Pea Gravel

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 Edward Mitchell Water Well Drilling
(Person, Firm or Corporation)

7900 Myrtle Ave. (Address) Eureka (City) CA (State) 95503 (Zip)

Signed [signature] (C-57 Licensed Water Well Contractor) 9/29/17 (Date Signed) 303670 (C-57 License Number)

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

Humboldt County Department of Health & Human Services

Division of Environmental Health
100 H Street - Suite 100 - Eureka, CA 95501
Phone: 707-445-6215 - Toll Free: 800-963-9241
Fax: 707-441-5699
envhealth@co.humboldt.ca.us

RECEIVED
DEC 30 2016

16/17-0647

WATER WELL APPLICATION
CONSTRUCTION – REPAIR – DESTRUCTION

The Well Permit will be returned to the property owner when approved by Humboldt County Division of Environmental Health (DEH)

Instructions:

1. Complete both sides and submit the Water Well Application with required fee. Include Well Driller's signature and property owner's signature.
2. Work on a well shall not be started prior to approval of the Water Well Application by DEH.
3. Any changes made to the location of a new well shall be approved by DEH prior to commencement of drilling.
4. Well Driller shall notify DEH a minimum of 24 hours prior to sealing the annular space.

Site Address: 37773 Mattole Rd. APN: 104-071-004
City/State/Zip: Petrolia CA 95558
Directions to Site:

Applicant: Edward Mitchell Water Well Drilling Contact: Ed Mitchell
Mailing Address: 7900 Myrtle Ave. Work Phone: (707) 502-0636
City/State/Zip: Eureka, CA 95503 Cell Phone: (707) 502-0221

Property Owner: Freerange Holdings, LLC Home Phone: (707) 601-9225
Mailing Address: 3144 Broadway Suite 4-313 Work Phone:
City/State/Zip: Eureka, CA 95501 Cell Phone:

I hereby grant 'right-of-entry' for inspection purposes [signature]

Drilling Contractor: Edward Mitchell C-57 License #: 303670

I hereby agree to comply with all laws and regulations of the County of Humboldt and the State of California Department of Water Resources Bulletin 74 pertaining to water well construction. I will contact Humboldt County Division of Environmental Health (DEH) when I commence work. Within 30 days after completion of work, I will furnish DEH a report of the work performed.

Well Driller Signature: [signature]

Would driller like a copy of approved application? ☒ Yes ☐ No

☒ U.S. Mail address: 7900 Myrtle Ave. Eureka, CA 95503

☒ Email address: Eddy2112@gmail.com

Type of Application:	Construction:		Intended Use:
☒ Construction	Estimated Depth (ft.)	150'	☒ Domestic - private
☐ Destruction	Diameter (in.)	5"	☐ Community Supply
☐ Repair/Modification	Depth of Seal (ft.)	20'	☐ Irrigation
	Sealing Material	Bentonite Chips	☐ Other ______

Well #1

PE Code 2722

Estimated Work Dates:

Start ______

Completion ______

Casing:

Diameter (in.) 5"

Material PVC

Type of Sewage System:

☐ Community Sewer

☐ OWTS (Septic)

Distance from well site to OWTS ______

Special Requirements/Comments:

PLOT PLAN

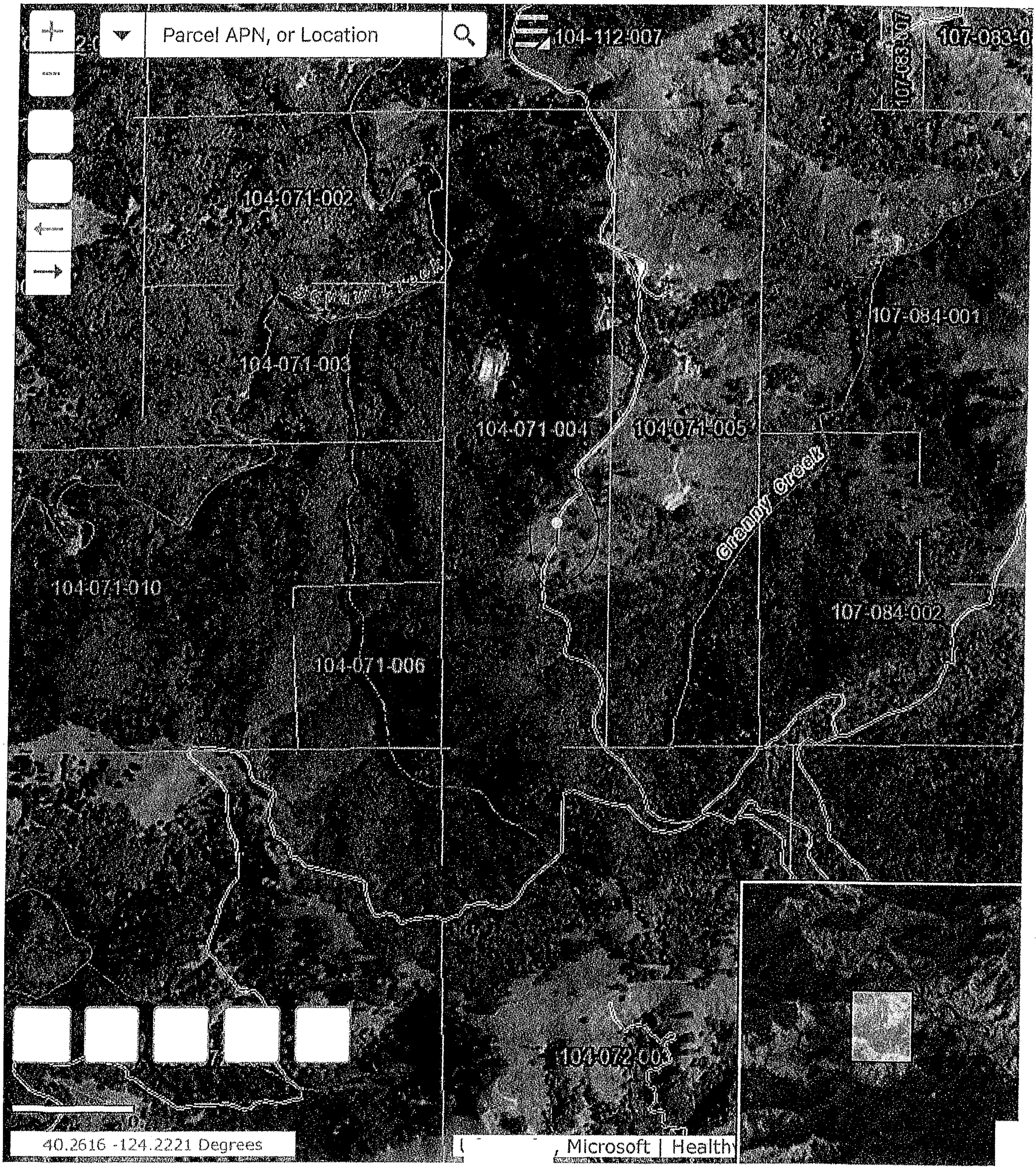
Well #1

Coastal Zone: ☐ Yes ☒ No

FOR OFFICE USE ONLY

Fee:	373	Site Approved by:	[signature]
Date:	12-30-16	Site Approved Date:	1/10/17
Receipt:	760394	Sealed to Depth of:	30 ft
Project #:	16/17-0647	Seal observed:	☐ Yes ☒ No
Paid by:	Mitchell Well Drilling	Final Approved Date:	2/15/18 [signature]

Humboldt County Web GIS Planning & Building Department



*The free Adobe Reader may be used to view and complete this form. However, software must be purchased to complete, save, and reuse a saved form.

File Original with DWR

State of California
Well Completion Report
Refer to Instruction Pamphlet

No. xxxxxxx

Page ______ of ______

Owner's Well Number 2

Date Work Began 07/01/2017 Date Work Ended 7/31/2017

Local Permit Agency Humboldt County Environmental Health Dept.

Permit Number 16/17-0648 Permit Date 12/30/16

DWR Use Only – Do Not Fill In

State Well Number/Site Number

Latitude N Longitude W

APN/TRS/Other

Geologic Log

Orientation ⦿ Vertical ○ Horizontal ○ Angle Specify ______

Drilling Method Direct Rotary Drilling Fluid Bentonite mu

Depth from Surface Feet	to Feet	Description (Describe material, grain size, color, etc)
0	3	Topsoil
3	10	Brown Clay
10	25	Brown Silty Clay
25	40	Brown Sandy Clay
40	50	Rock & Shale
50	65	Grey Shale
65	78	Hard Grey Shale
78	85	Grey Silty Sand
85	100	Rock & Gravel
100	120	Greyish Sandy Sandstone

RECEIVED

FEB 01 2018

HUMBOLDT CO. DIVISION OF ENVIRONMENTAL HEALTH

Total Depth of Boring 120 Feet

Total Depth of Completed Well 120 Feet

Well Owner

Name [redacted]

Mailing [redacted]

City [redacted]

Well Location

Address [redacted]

City Petrolia County Humboldt

Latitude ____ Deg. ____ Min. ____ Sec. N Longitude ____ Deg. ____ Min. ____ Sec. W

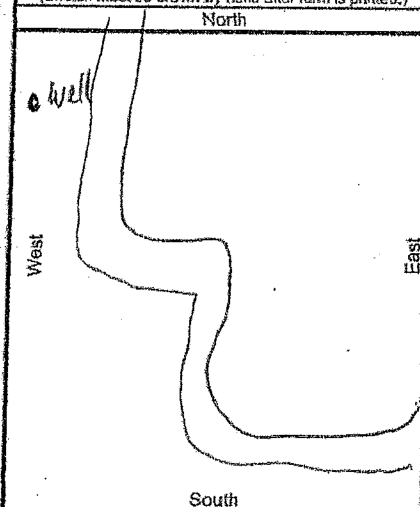
Datum ______ Dec. Lat. ______ Dec. Long. ______

APN Book 104 Page 071 Parcel 004

Township ______ Range ______ Section ______

Location Sketch

(Sketch must be drawn by hand after form is printed.)



Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

⦿ New Well
○ Modification/Repair
○ Deepen
○ Other ______
○ Destroy
Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

⦿ Water Supply
☑ Domestic ☐ Public
☐ Irrigation ☐ Industrial
○ Cathodic Protection
○ Dewatering
○ Heat Exchange
○ Injection
○ Monitoring
○ Remediation
○ Sparging
○ Test Well
○ Vapor Extraction
○ Other ______

Water Level and Yield of Completed Well

Depth to first water 30 (Feet below surface)

Depth to Static Water Level 20 (Feet) Date Measured 07/30/2017

Estimated Yield * 10 (GPM) Test Type Air Lift

Test Length 6.0 (Hours) Total Drawdown ______ (Feet)

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

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
0	30	9"	Blank	PVC Sch. 40	SDR-21	4"		
30	120	9"	Screen	PVC Sch. 40	SDR-21	4"	Milled Slo	0.050

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	25	Bentonite	Bentonite Chips
25	120	Filter Pack	Pea Gravel

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 Edward Mitchell Water Well Drilling
Person, Firm or Corporation

7900 Myrtle Ave. Eureka CA 95503
Address City State Zip

Signed [signature] 9/30/17 303670
C-57 Licensed Water Well Contractor Date Signed C-57 License Number

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

Humboldt County
Department of Health & Human Services

Division of Environmental Health
100 H Street - Suite 100 - Eureka, CA 95501
Phone: 707-445-6215 - Toll Free: 800-963-9241
Fax: 707-441-5699
envhealth@co.humboldt.ca.us

RECEIVED
DEC 30 2016
HUMBOLDT DIVISION OF ENVIRONMENTAL HEALTH

16/17-0018

WATER WELL APPLICATION
CONSTRUCTION – REPAIR – DESTRUCTION

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Instructions:

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4. Well Driller shall notify DEH a minimum of 24 hours prior to sealing the annular space.

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City/State/Zip: Petrolia CA 95558
Directions to Site:

Applicant: Edward Mitchell Water Well Drilling Contact: Ed Mitchell
Mailing Address: 7900 Myrtle Ave. Work Phone (707) 502-8636
City/State/Zip: Eureka, CA 95503 Cell Phone (707) 502-8221

Property Owner: Freerange Holdings LLC. Home Phone (707) 601-9225
Mailing Address: 3144 Broadway Suite 4-313 Work Phone:
City/State/Zip: Eureka, CA 95501 Cell Phone:

I hereby grant 'right-of-entry' for inspection purposes [signature]

Drilling Contractor: Edward Mitchell C-57 License # 303670

I hereby agree to comply with all laws and regulations of the County of Humboldt and the State of California Department of Water Resources Bulletin 74 pertaining to water well construction. I will contact Humboldt County Division of Environmental Health (DEH) when I commence work. Within 30 days after completion of work, I will furnish DEH a report of the work performed.

Well Driller Signature: Edward M. Mitchell

Would driller like a copy of approved application? ☒ Yes ☐ No
☒ U.S. Mail address: 7900 Myrtle Ave. Eureka, CA 95503
☒ Email address: Eddy2120@Gmail.com

Type of Application:	Construction:		Intended Use:
☒ Construction	Estimated Depth (ft.)	150'	☒ Domestic - private
☐ Destruction	Diameter (in.)	5"	☐ Community Supply
☐ Repair/Modification	Depth of Seal (ft.)	20'	☐ Irrigation
	Sealing Material	Bentonite Chips	☐ Other

Well #2

PE Code 2722

Estimated Work Dates:	Casing:	Type of Sewage System:
Start ______	Diameter (in.) 5"	☐ Community Sewer
Completion ______	Material PVC	☐ OWTS (Septic)
		Distance from well site to OWTS ______

Special Requirements/Comments:

PLOT PLAN

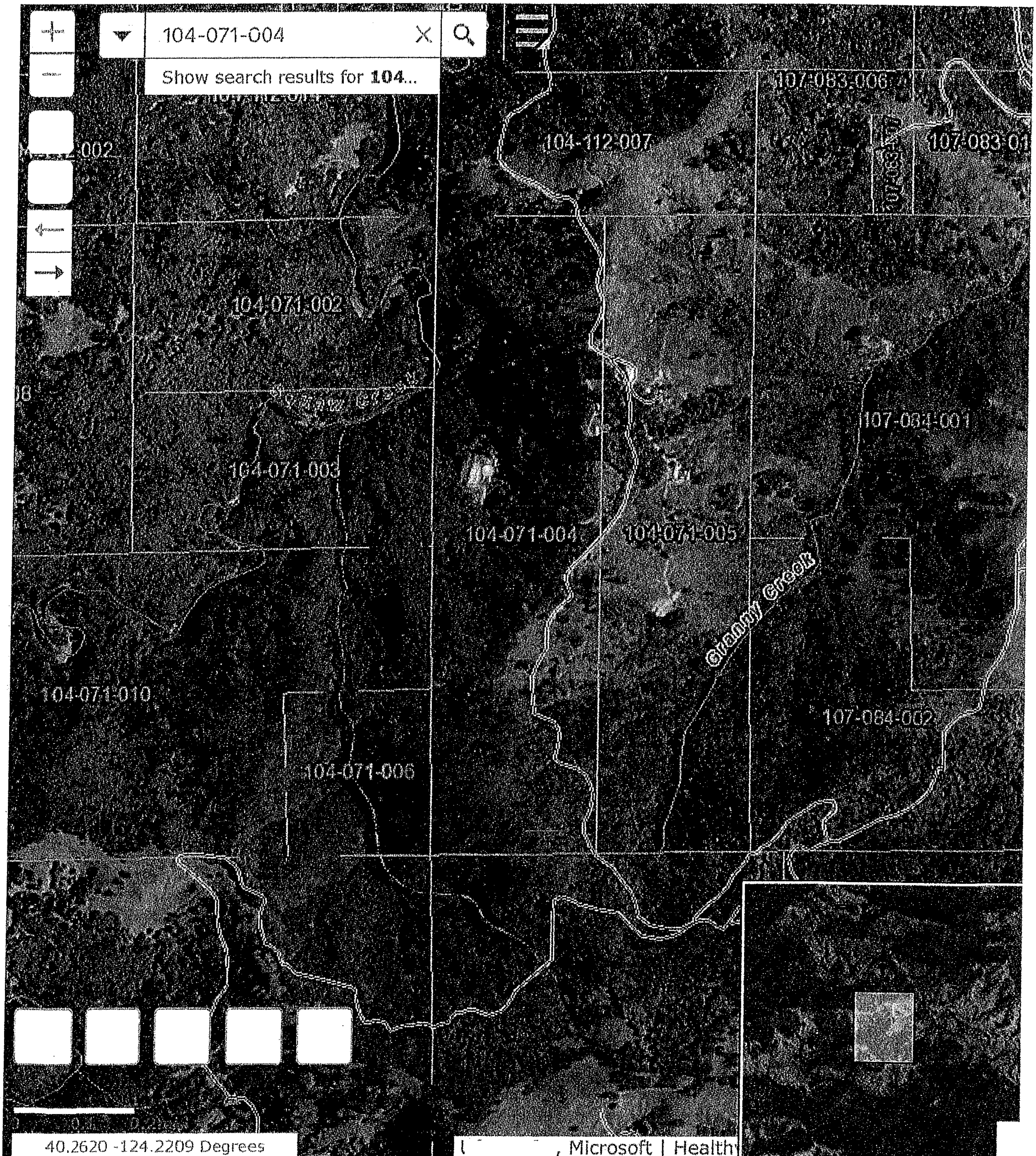
Well #2

Coastal Zone: ☐ Yes ☒ No

FOR OFFICE USE ONLY

Fee:	373 -	Site Approved by:	[signature]
Date:	12-30-16	Site Approved Date:	1/11/17
Receipt:	760395	Sealed to Depth of:	25ft
Project #:	16/17-0648	Seal observed:	☐ Yes ☒ No
Paid by:	Mitchell Well Drilling	Final Approved Date:	2/15/18 [signature]

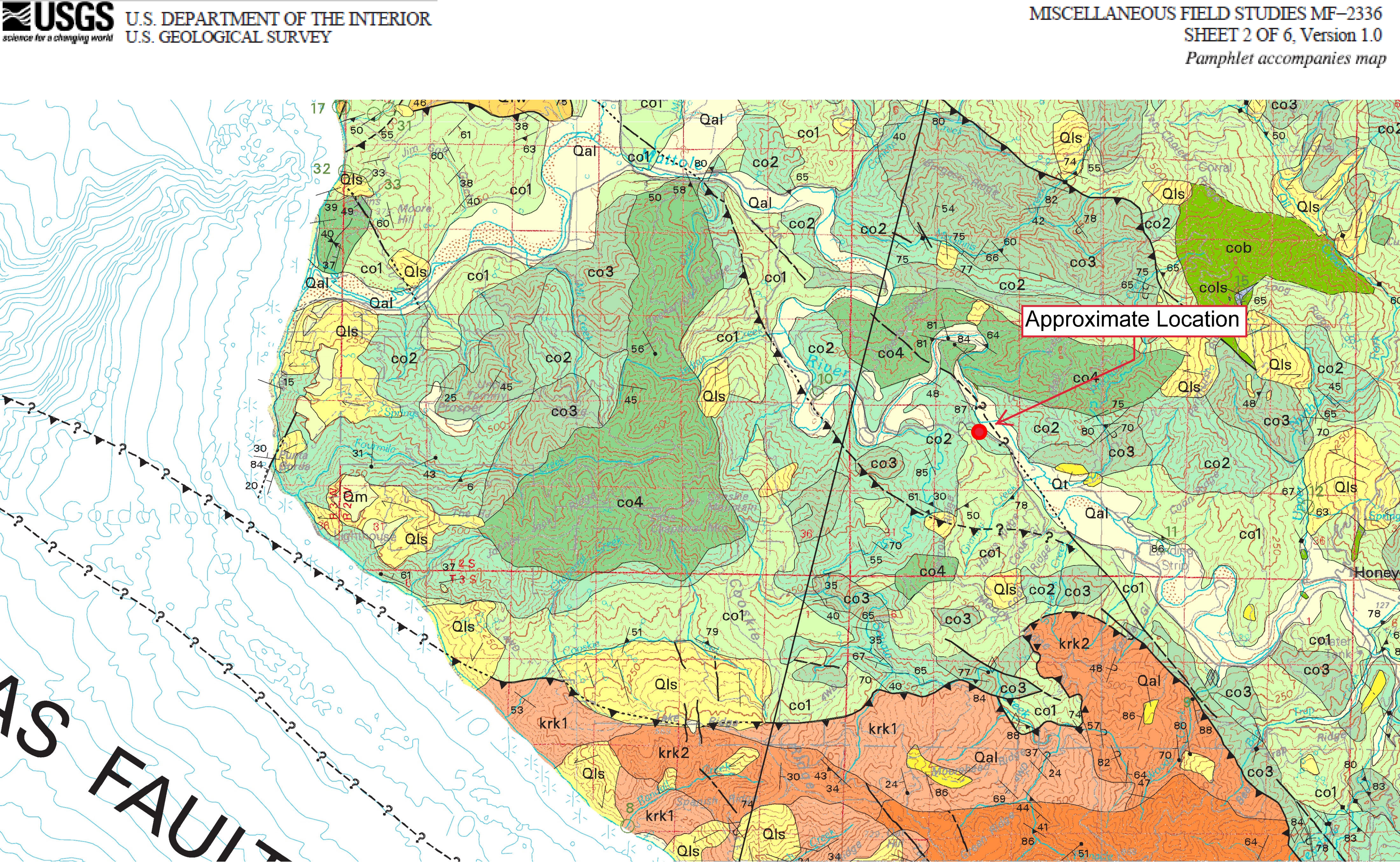
Humboldt County Web GIS Planning & Building Department



ATTACHMENT C

FIGURE 1: GEOLOGICAL MAP OF REGION SURROUNDING PLATINUM KING HOLDINGS, PETROLIA, CA

(Excerpt From Mclaughlin And Others, 2000)



Source: McLaughlin and others, 2000 (USGS)

Balance Hydrologics

Figure 1. Geologic map of the Petrolia-Honeydew area of Humboldt County, California. Note the convoluted bedding, steep dips, and widespread faulting.