

**LINDBERG GEOLOGIC CONSULTING**  
David N. Lindberg, CEG  
Post Office Box 306  
Cuttan California 95534  
(707) 442-6000



June 30, 2022

Project No: 0455.00

Big River Farm, LLC  
Attention: Lesley Doyle, Elevated Solutions, LLC  
3900 Walnut Drive  
Eureka, California 95503

Subject: Hydrologic Isolation of Existing Well from Surface Waters  
Big River Farm, 9320 Wilder Ridge Road, Ettersburg, California  
APN: 108-023-008, WCR2018-009856  
Apps 11892

To Whom It May Concern:

As requested, Lindberg Geologic Consulting has assessed an existing permitted well on the above-referenced parcel to estimate its potential for hydrologic connectivity with any adjacent wetlands and or surface waters, and if pumping this well could affect surface waters in nearby water courses. Runoff in the vicinity of this well drains to ephemeral tributaries of Jewett Creek and thence to Bear Creek (Figure 1). The well location is shown approximately on the attached figures. A California-Certified Engineering Geologist visited this site on June 3, 2022, to observe the subject well and local site conditions. Based on our professional experience, our observations, and research, it is our opinion the subject well has a low likelihood of being hydrologically connected to nearby surface waters in any manner that could affect adjacent wetlands and or surface waters in the vicinity. We understand that the water from this well is to be used to irrigate cannabis. We are not aware of the volume of water to be extracted or what the pumping schedule might be but expect that the applicant can supply that information.

By the Humboldt County WebGIS website, parcel 108-023-008 (Figure 2) encompasses approximately 90 acres. Based on our on-site GPS measurements, the subject well is located approximately at latitude 40.15051° north, and longitude 124.05488° west ( $\pm 9'$ ). As reported by the driller, we confirmed this well is in Section 34, T3S, R1E, HB&M (Figures 1 and 2).

Based on the Humboldt County WebGIS mapping, this well is approximately 1,450 feet from the nearest mapped surface waters; ephemeral tributaries of Jewett Creek are located more than 1,400 feet to the northeast and southwest of the site well (Figure 1). Based on interpolation from the USGS Honeydew (1970), topographic quadrangle map (Figure 1), and the Humboldt County WebGIS, well elevation is approximately 1,840 feet above sea level. At the nearest point to this well, the elevation of the ephemeral Jewett Creek tributaries are 1,400 feet (SW) and 1,300 feet (NE) feet. The elevation of the bottom of the well is approximately 1,530 feet which is 130 feet to 230 feet higher than elevations of the ephemeral tributaries of Jewett Creek at their nearest points to this well, according to the Humboldt County WebGIS map.

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No springs are mapped in the northwest quarter of Section 34 on the USGS Honeydew topographic quadrangle map (Figure 1). From the well, the nearest mapped spring appears to be at least 1.5 miles to the northwest, at an elevation of approximately 1,800 on parcel 107-136-005 (3400 Fox Springs Road). We observed no other springs mapped within one mile of the subject well.

This well was drilled by Watson Well Drilling Inc., of Eureka, California, in October 2018, under county permit #17/18-1912. Watson Well Drilling is a licensed well-drilling contractor (C-57 #1014048). Watson Well submitted the well completion report (DWR 188) electronically on November 1, 2018 (attached). Based on a five-hour air lift pump test, Watson estimated the yield of this well to be 100 gallons per minute on November 30, 2018. The drawdown which presumably occurred, was not reported. As noted on the driller's report, 100 gallons per minute may not be representative of this well's long-term yield. A sustainable long-term pumping rate for this well has not been determined.

Borehole diameter as reported by the driller is 13-inches from the surface to 20 feet, and approximately 8-inches from 20 feet to 310 feet. Total drilled depth is 310 feet. From grade to 20 feet, 8.625-inch low carbon steel casing pipe was installed. A bentonite surface sanitary seal was installed to seal the annulus of the conductor casing. From the ground surface (bgs) to 300, 5-inch blank (unslotted) PVC casing was installed. From 120 feet to 300 feet, PVC well screen with 0.032-inch milled was installed, which then alternated with 20-foot sections of blank casing. This pattern of alternating slotted screen and blank casing continued to the 300-foot total depth. Below the surface seal at 20 feet, the annulus was not back filled (no annular fill). Depth to first water was reported to be 70 feet below grade. Depth to static water in the completed and developed well was reported as 73 feet when the driller conducted the pump test on October 30, 2018.

On the geologic map (Figure 4), by McLaughlin et al., (2000), this area is underlain by sedimentary, igneous, and metamorphic rocks of the Coastal terrane of the Franciscan Complex. The Coastal terrane is assigned an age of Pliocene to Late Cretaceous. "Predominantly sandstone, argillite and minor polymict conglomerate, that forms highly sheared *mélange* and broken formation and is highly folded locally. Sandstone locally is thin-bedded to massive, rhythmically interbedded with argillite, arkosic, rich in felsitic intermediate volcanic detritus; and commonly it is veined with calcite, laumontite, and quartz. Interbedded penetratively sheared sandstone and thin-bedded argillite sequences in the Coastal terrane contains carbonate concretions with fossil planktic foraminifers, dinoflagellates, and spores and pollen, mostly indicative of a middle to late Eocene age (McLaughlin and others, 1994). At one locality south of the map area, low-latitude foraminifers of Late Cretaceous (Maastrichtian to Campanian) age occur in argillite interbedded with basaltic rocks in a *mélange* (McLaughlin and others, 1994). Age of penetrative deformation of Coastal terrane *mélange* is late Eocene and younger. Along the coast between False Cape and Cape Mendocino, and along north fork of the Mattole River near Petrolia, penetrative deformation is very young, due to rapid uplift of the subduction margin. Here, *mélange* blocks with Pliocene

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bathyal foraminifers and bioclastic debris are incorporated into mélangé (McLaughlin and others, 1994; Aalto and others, 1995). The Pliocene strata are assigned to Marine and nonmarine overlap deposits (QTW). Sandstone and argillite of the Coastal terrane are divided into 4 subunits based principally on topographic expression on aerial photographs and outcrop data:"

- Mélangé (CO1): "Dominantly of highly folded argillite and abundant clayey, penetratively sheared rock that exhibits rounded, lumpy, and irregular, poorly incised topography."
- Mélangé (CO2): "Subequal amounts of shattered sandstone and argillite with much clayey, penetratively sheared rock that exhibits generally irregular topography lacking well-incised sidehill drainages."
- Broken sandstone and argillite (CO3): "Exhibits sharp-crested topography with a well-incised system of irregular sidehill drainage."
- Intact sandstone and argillite (CO4): "Exhibits sharp crested topography with a regular, well-incised system of sidehill drainage."

Materials reported on the geologic log of the driller's well completion report (attached) include four feet of "Brown/Black Topsoil" over 12 feet of "Tan clay". From a depth of 16 to 35 feet, the driller logged "Brown clay". Brown clay was in turn underlain by 75 feet (35' to 110') of "Blue Shale w/clay". In the final 200 feet (110' to 310') the driller logged "Blue Grey Shale".

We interpret the tan clay and brown clay section of this profile from 4 feet to 35 feet to be an aquitard; a material of low permeability and transmissivity. Shaley materials below approximately 70 feet, are apparently the water-bearing aquifer materials in this well and have higher transmissivity and permeability. At the location of the site well, the elevation of the water-bearing aquifer unit is thus between approximately 1,770 feet and 1,530 feet.

Below the four feet of top-soil, the earth materials encountered in the boring are likely the CO2 mapped by McLaughlin et al., (2000). In this well, shale appears to have a moderate to high hydraulic conductivity and constitute a significant aquifer. We interpret the underlying sequence of materials described by the driller (clay and shale), as lithologies within the Coastal Belt of the Franciscan Complex. Shaley rock materials may not typically be expected to have significant hydraulic conductivity, however, in our interpretation of this well, blue shale with clay and blue gray shale are the water bearing units at this location.

A geologic cross section of the area after McLaughlin et al. (2000) shows the structural and stratigraphic relationships between the local geologic units (Figure 5). The coastal belt mélangé unit CO2 is shown to be highly deformed by folding and faulting. To the southwest the coastal belt mélangé lies in thrust fault contact with the king range terrane. On-site, no dip of the rock units could be observed in the mélangé because it was mantled with soil and hillslope colluvium, and covered with vegetation. We interpret faults to be hydrologic boundaries of minimal permeability (due to grinding and shearing along the fault planes) which effectively separate portions of the coastal belt Franciscan mélangé units from each other, and limit groundwater flow between these fault-bound units.

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Based on our experience, observations, and review of pertinent and available information, it is our professional opinion that this well exhibits a low potential of having any direct connection to surface waters. First water was encountered at 70 feet. This well is sealed through the upper 20 feet of any potential unconfined, near-surface aquifers with which it might communicate hydraulically through the borehole because the bentonite-sealed surface casing isolates the topsoil, tan clay, and some of the brown clay materials from the deeper shaley aquifer materials. When considered with the stratigraphy and geologic structure, distances (horizontal and vertically) from the nearest surface waters, depth of the producing zone of this well (~73 - 300 feet), as well as this well's position relative to the nearest adjacent watercourses in the ephemeral tributaries of Jewett Creek, we conclude that the depth of the surface seal is sufficient to preclude the potential for hydraulic connectivity with surface waters. Thus, the water source from which this well draws appears to be a confined subsurface aquifer not connected significantly to any unconfined, near-surface aquifer(s). This well appears, in our professional opinion, likely to be hydraulically isolated from nearby wells, surface waters, springs or wetlands.

It appears, in our professional opinion, that the aquifer tapped by the subject well is likely recharged by water infiltrating from source areas proximal to and upslope of the site well. As noted, the "Water Level and Yield of Completed Well" section of the Well Completion Report estimated the yield of this well at 100 gallons per minute (gpm) on October 30, 2018, after Watson Well Drilling's five-hour air-lift pump test. At a rate of 100 gallons per minute, this well could potentially produce 144,000 gallons per day. As noted on the well completion report, this capacity may not be representative of this well's long-term yield. Additional pump testing would be necessary to estimate the long-term sustainable yield of this site well.

As discussed, in our opinion the subject well does not appear to be hydrologically connected to, or capable of influencing surface water flows in the nearby ephemeral tributaries of Jewett Creek. Nor does this well appear to be hydrologically connected to the local springs or ephemeral wetlands (if any). Given the horizontal distances involved, and the elevation differences between the water-producing zone in the subject well, and the surface waters of the nearest watercourses, the potential for hydrologic connectivity between surface waters and groundwater in this deep bedrock aquifer appears low. Further, given the apparently limiting condition of 31 feet of low-transmissivity clayey materials above the water-bearing shale units, the water-producing zone is considered hydrologically isolated from, and not demonstrably connected to any other aquifer(s) in the surrounding, coastal belt Franciscan deposits.

On the Honeydew USGS topographic quadrangle map the nearest mapped springs are shown to the northwest at an elevation of approximately 1,860 feet, and no closer than approximately 1.5 miles (Figure 1) on parcel 108-024-002. These springs are the nearest mapped springs to the subject well and are at an elevation higher than the well (1,840 feet). There do not appear to be any other mapped or unmapped natural springs or wetlands of significance within 1,000 feet of this subject well.

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We have researched the California Department of Water Resources (DWR) database to determine if there were other wells within 1,000 feet of the subject well on our client's property. Based on our review of the DWR database, there do not appear to be any wells with 1,000 feet of the subject site well. Nearest to the site well is well WCR 2017-003775, at 9225 Wilder Ridge Road, on assessor's parcel number 108-023-011. According to the Division of Water Resources database, well 003775 is a domestic well 210 feet in depth, with static water at 115 feet and an estimated yield of 10 gallons per minute. Well 003775 is approximately 1,370 feet northwest of the subject site well. The next nearest well is WCR2018-005151, at 9325 Wilder Ridge Road, on assessor's parcel 108-023-010. According to the Division of Water Resources database, well 005151 is an irrigation well 140 feet in depth, with static water at 38 feet and an estimated yield of 15 gallons per minute. Well 005151 is approximately 2,800 feet northwest of the subject site well.

The USDA Natural Resources Conservation Service's, online Web Soil Survey, shows the subject well to be located within the Wirefence-Windynip-Devilshole soil complex (#646, Figure 6), which is characterized as well-drained. The Web Soil Survey Unit description of the Wirefence-Windynip-Devilshole soil complex is attached to this report. Mean annual precipitation in the area is listed as 60 to 100 inches per year. Capacity of the most limiting layer to transmit water (Ksat) is described as moderately high to high (0.20 to 2.00 in/hr). If ten percent of 60 inches of precipitation is absorbed by the soils and does not flow across the surface and drain to local watercourses, then approximately 45 acre-feet, or 14.7 million gallons, of water per year may be expected to recharge the local aquifer below this 90-acre subject property.

On March 28, 2022, our governor issued an executive order (N-7-22) relating to the ongoing drought California is experiencing. In his executive order, the governor outlined several measures the state will undertake to avoid and ameliorate the negative impacts of the current drought. Among these measures, it was ordered that counties, cities, and other public agencies have been prohibited from approving permits for new groundwater wells (or alteration of existing wells) in basins *"subject to the Sustainable Groundwater Management Act and classified as medium- or high-priority without first obtaining written verification from a Groundwater Sustainability Agency managing the basin or area of the basin where the well is proposed"*. Your well at 9320 Wilder Ridge Road is not within a basin subject to the Act, and there has been no Groundwater Sustainability Agency established with authority over the area where your permitted well is sited.

Further, the Order states that counties, cities, and other public agencies have been prohibited from issuing permits for new groundwater wells (or alteration of existing wells) *"without first determining that extraction of groundwater from the proposed well is (1) not likely to interfere with the production and functioning of existing nearby wells, and (2) not likely to cause subsidence that would adversely impact or damage nearby infrastructure"*. Note that this Order, and that cited in the preceding paragraph, are not applicable to *"wells that provide less than two acre-feet per year of groundwater for individual domestic users, or that will exclusively provide groundwater to public water supply systems."*

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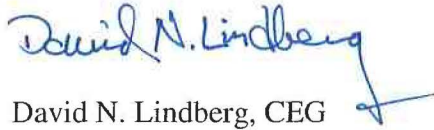
Project No: 0455.00

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Based on our observations, research, and professional experience, it is our opinion the well at 9320 Wilder Ridge Road has a low likelihood of being hydrologically connected to nearby surface waters or wells in a manner that might affect adjacent wetlands, wells, and or surface waters in the vicinity.

Please contact us if you have questions or concerns regarding our findings and conclusions.

Sincerely,



David N. Lindberg, CEG  
Lindberg Geologic Consulting



DNL:sll

Attachments:

- Figure 1: Topographic Well Site Location Map
- Figure 2: Humboldt County Assessor's Parcel Map
- Figure 3: Satellite Image of Well Site
- Figure 4: Geologic Map
- Figure 5: Geologic Cross Section
- Figure 6: Hydrogeologic Cross Section
- Figure 6a: Geologic Map Explanation
- Figure 7: Soils Map

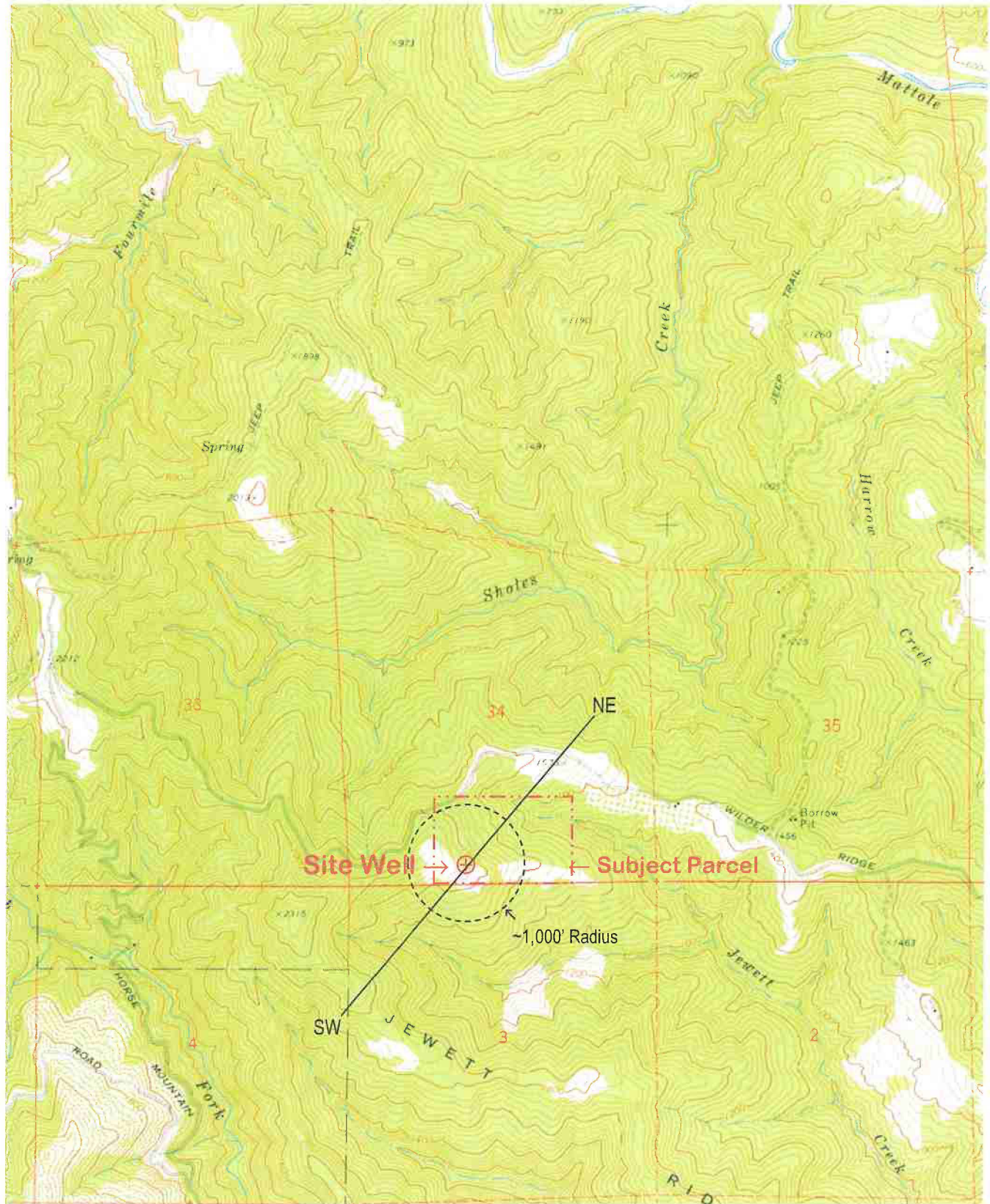
State of California Well Completion Reports:

- Subject Well: WCR2018-009856
- Well on APN 108-023-011: WCR2017-003775
- Well on APN 108-023-010: WCR2018-005151

Web Soil Survey, NRCS Unit Description:

Wirefence-Windynip-Devilshole complex, 5 to 30 percent slopes.

Lindberg Geologic Consulting	Engineering-Geologic Hydrogeologic Well Connectivity Report	Figure 1
Post Office Box 306	9320 Wilder Ridge Road, Etersburg, Humboldt County	June 30, 2022
Cutten, CA 95534	APN 108-023-008, Big River Farm, LLC, Lesley Doyle, Client	Project 0455.00
(707) 442-6000	Topographic Well Site Location Map (locations approximate)	1" ≈ 2,350'



Modified from: USGS "Honeydew Calif.," 7.5' Topographic Quadrangle Map, 1970. N ≈

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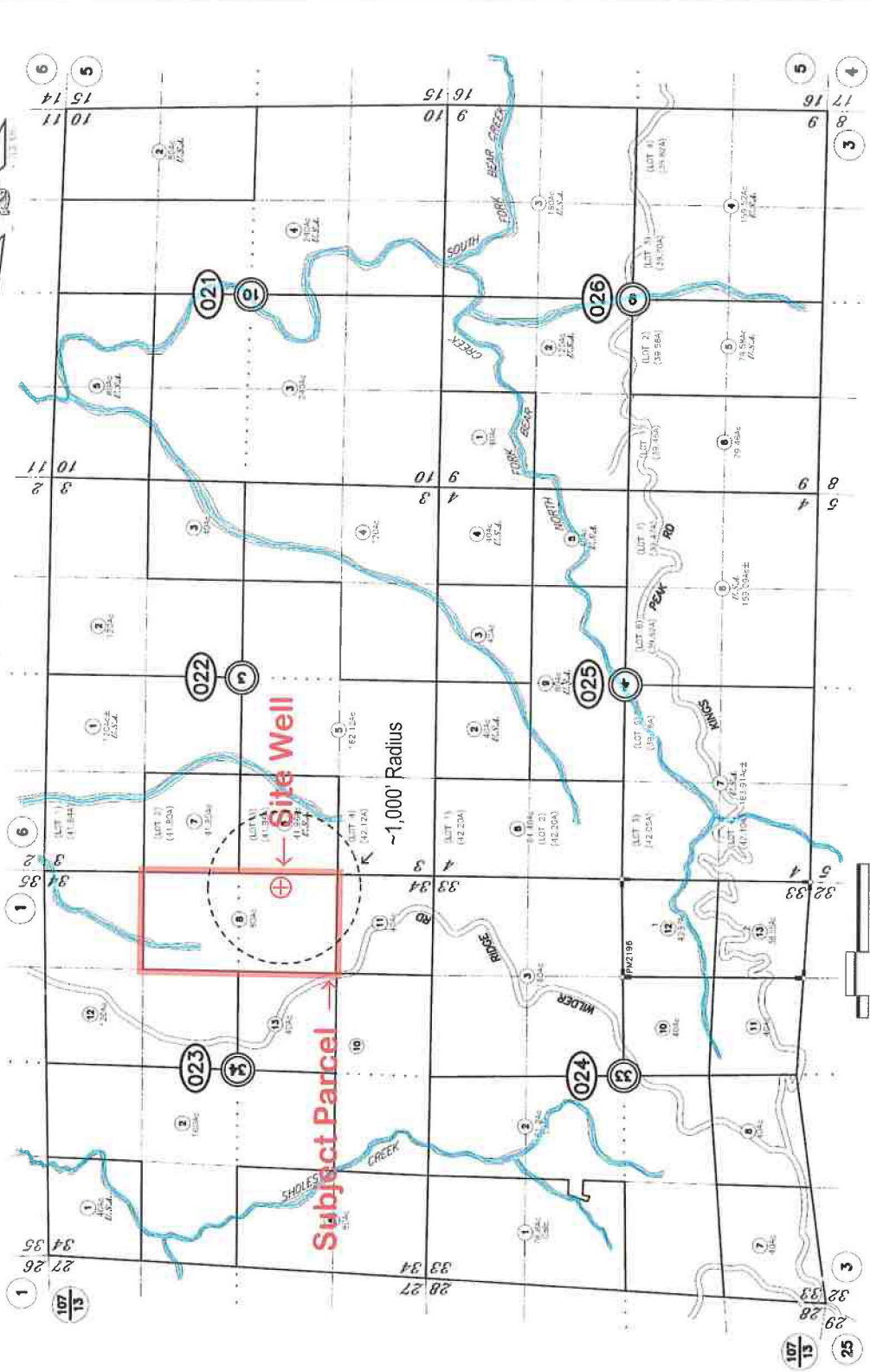
Engineering-Geologic Hydrogeologic Well Connectivity Report  
9320 Wilder Ridge Road, Etersburg, Humboldt County  
APN 108-023-008, Big River Farm, LLC, Lesley Doyle, Client  
Humboldt County Assessor's Parcel Map (locations approximate)

Figure 2  
June 30, 2022  
Project 0455.00  
Scale as Shown

Assessor's Map Bk. 108, Pg.02  
County of Humboldt, CA.

SECS 33 & 34, T3S R1E & SECS 3,4,9 & 10, T4S R1E  
H. B. & M.

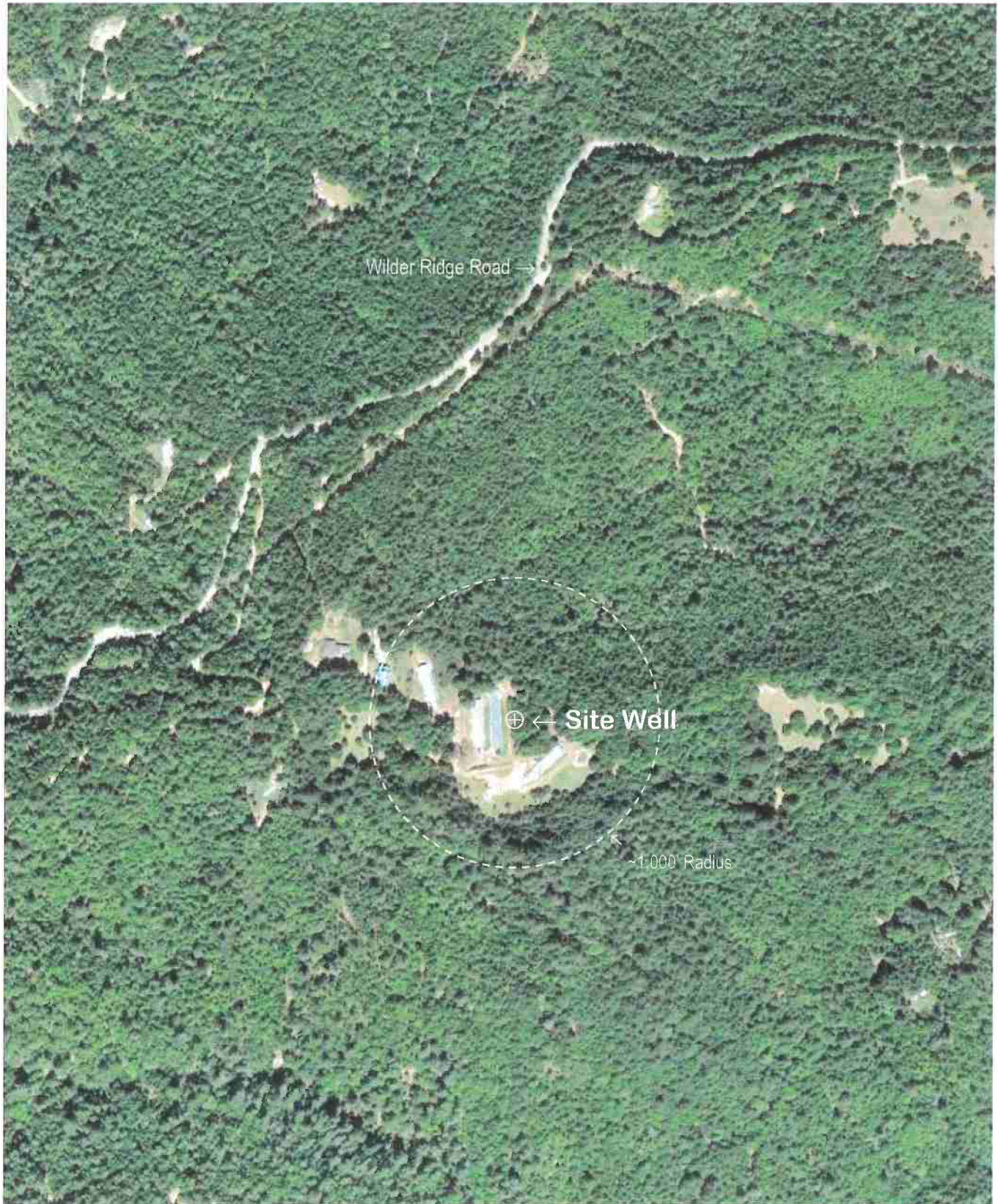
108-02



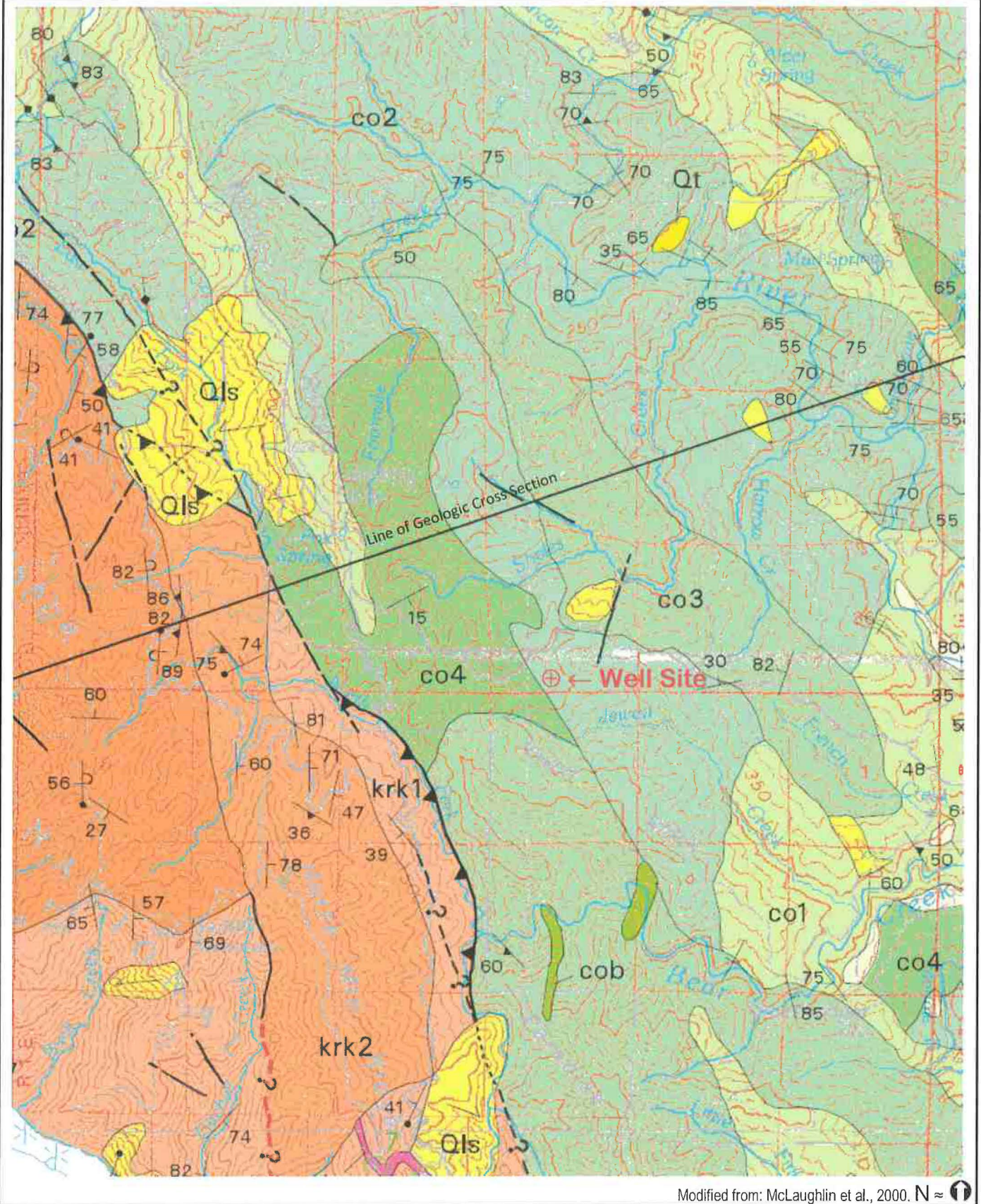
NOTE - Assessor's Block Numbers Shown in Ellipses  
Assessor's Parcel Numbers Shown in Small Circles



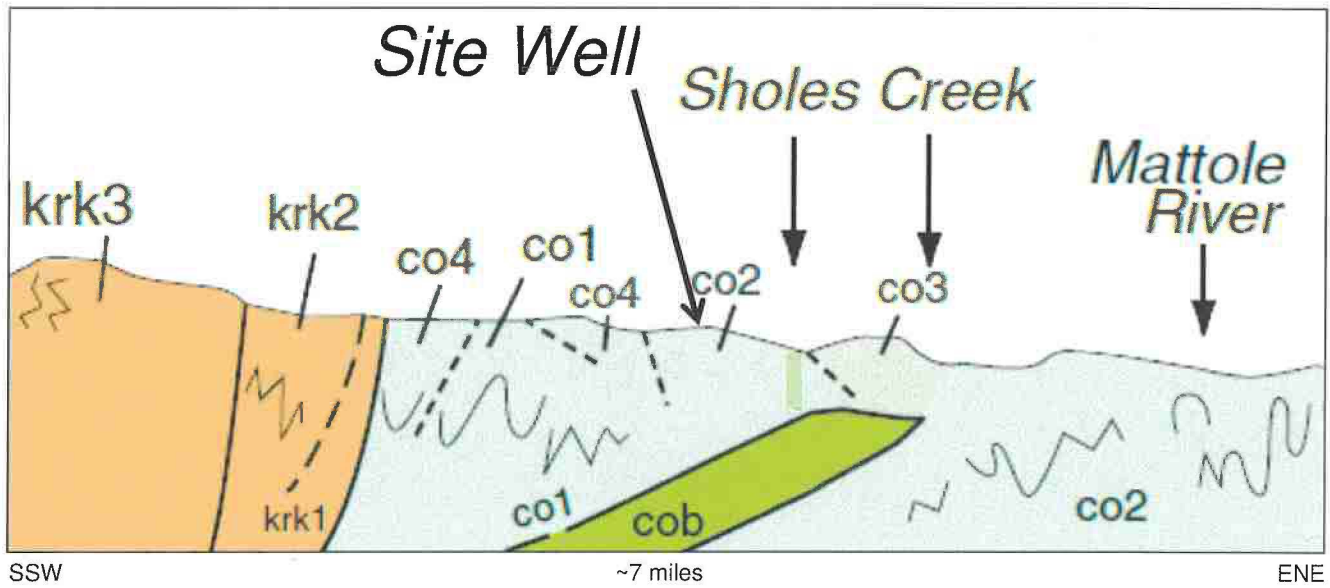
Lindberg Geologic Consulting	Engineering-Geologic Hydrogeologic Well Connectivity Report	Figure 3
Post Office Box 306	9320 Wilder Ridge Road, Ettersburg, Humboldt County	June 30, 2022
Cutten, CA 95534	APN 108-023-008, Big River Farm, LLC, Lesley Doyle, Client	Project 0455.00
(707) 442-6000	Satellite Image of Well Site (Locations approximate)	1" ≈ 475'



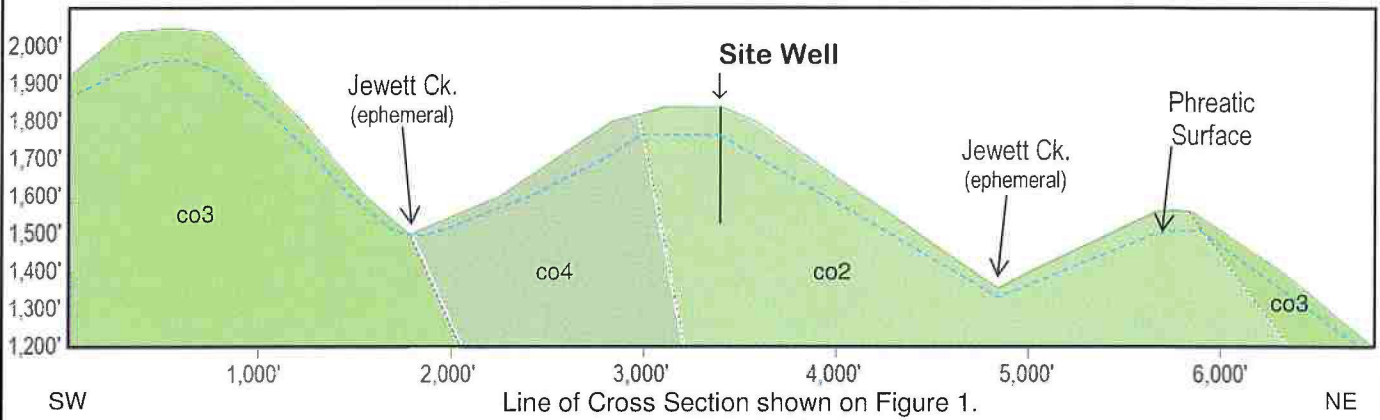
Lindberg Geologic Consulting	Engineering-Geologic Hydrogeologic Well Connectivity Report	Figure 4
Post Office Box 306	9320 Wilder Ridge Road, Etersburg, Humboldt County	June 30, 2022
Cutten, CA 95534	APN 108-023-008, Big River Farm, LLC, Lesley Doyle, Client	Project 0455.00
(707) 442-6000	Geologic Map (locations approximate)	1" ≈ 4,700'



Lindberg Geologic Consulting	Engineering-Geologic Hydrogeologic Well Connectivity Report	Figure 5
Post Office Box 306	9320 Wilder Ridge Road, Etersburg, Humboldt County	June 30, 2022
Cutten, CA 95534	APN 108-023-008, Big River Farm, LLC, Lesley Doyle, Client	Project 0455.00
(707) 442-6000	Geologic Cross Section (locations approximate)	Not to Scale



Lindberg Geologic Consulting	Engineering-Geologic Hydrogeologic Well Connectivity Report	Figure 6
Post Office Box 306	9320 Wilder Ridge Road, Etersburg, Humboldt County	June 30, 2022
Cutten, CA 95534	APN 108-023-008, Big River Farm, LLC, Lesley Doyle, Client	Project 0455.00
(707) 442-6000	Hydrogeologic Cross Section (locations approximate)	Not to Scale



Line of Cross Section shown on Figure 1.

Lindberg Geologic Consulting	Engineering-Geologic Hydrogeologic Well Connectivity Report	Figure 6a
P. O. Box 306	9320 Wilder Ridge Road, Etnersburg, Humboldt County	June 30, 2022
Cutten, CA 95534	APN 108-023-008, Big River Farm, LLC, Lesley Doyle, Client	Project 0455.00
(707) 442-6000	Geologic Map Explanation	No Scale

### DESCRIPTION OF MAP UNITS

GREAT VALLEY SEQUENCE OVERLAP ASSEMBLAGE

#### QUATERNARY AND TERTIARY OVERLAP DEPOSITS

- Qal** Alluvial deposits (Holocene and late Pleistocene?)
- Qm** Undeformed marine shoreline and aeolian deposits (Holocene and late Pleistocene)
- Qt** Undifferentiated nonmarine terrace deposits (Holocene and Pleistocene)
- Qls** Landslide deposits (Holocene and Pleistocene)
- QTog** Older alluvium (Pleistocene and (or) Pliocene)
- QTw** Marine and nonmarine overlap deposits (late Pleistocene to middle Miocene)
- Tt** Volcanic rocks of Fiddle Hill (Oligocene)

#### COAST RANGES PROVINCE

FRANCISCAN COMPLEX

-- Coastal Belt --

Coastal terrane (Pliocene to Late Cretaceous)

Sedimentary, igneous, and metamorphic rocks of the Coastal terrane (Pliocene to Late Cretaceous).

- co1** Melange
  - co2** Melange
  - co3** Broken sandstone and argillite
  - co4** Intact sandstone and argillite
  - cob** Basaltic Rocks (Late Cretaceous)
  - col** Limestone (Late Cretaceous)
  - cb** Undivided blueschist (Jurassic?)
- King Range terrane (Miocene to Late Cretaceous)
- kcp** Igneous and sedimentary rocks of Point Delgada (Late Cretaceous)
  - km** Undivided blueschist blocks (Jurassic?)
  - Sandstone and argillite of King Peak (middle Miocene to Paleocene?)
  - krk1** Melange and (or) folded argillite
  - krk2** Highly folded broken formation
  - krk3** Highly folded, largely unbroken rocks
  - kri** Limestone
  - krc** Chert
  - krb** Basalt
- False Cape terrane (Miocene? to Oligocene?)
- fc** Sedimentary rocks of the False Cape terrane (Miocene? to Oligocene?)

Yager terrane (Eocene to Paleocene?)

Sedimentary rocks of the Yager terrane (Eocene to Paleocene?):

- y1** Sheared and highly folded mudstone
- y2** Highly folded broken mudstone, sandstone, and conglomeratic sandstone
- y3** Highly folded, little-broken sandstone, conglomerate, and mudstone
- Ycgl** Conglomerate

-- Central belt --

Melange of the Central belt (early Tertiary to Late Cretaceous).

Unnamed Metasandstone and meta-argillite (Late Cretaceous to Late Jurassic):

- cm1** Melange
- cm2** Melange
- cb1** Broken formation
- cb2** Broken formation
- cwr** White Rock metasandstone of Jayko and others (1989) (Paleogene and (or) Late Cretaceous)
- chr** Haman Ridge graywacke of Jayko and others (1989) (Cretaceous?)
- cfs** Fort Seward metasandstone (age unknown)
- cls** Limestone (Late to Early Cretaceous)

- c** Chert (Late Cretaceous to Early Jurassic)
- bs** Basaltic rocks (Cretaceous and Jurassic)
- m** Undivided blueschist blocks (Jurassic?)
- gs** Greenstone
- c** Metachert
- yb** Metasandstone of Yolla Bolly terrane, undivided
- b** Melange block, lithology unknown

-- Eastern Belt --

Pickett Peak terrane (Early Cretaceous or older)

Metasedimentary and metavolcanic rocks of the Pickett Peak terrane (Early Cretaceous or older):

- ppsm** South Fork Mountain Schist
- mb** Chiniquapin Metabasalt Member (Irwin and others, 1974)
- ptv** Valentine Springs Formation
- mv** Metabasalt and minor metachert

Yolla Bolly terrane (Early Cretaceous to Middle Jurassic?)

Metasedimentary and metaigneous rocks of the Yolla Bolly terrane (Early Cretaceous to Middle Jurassic?):

- ybt** Talaferrero Metamorphic Complex of Suppe and Armstrong (1972) (Early Cretaceous to Middle Jurassic?)
- ybc** Chicago Rock melange of Blake and Jayko (1983) (Early Cretaceous to Middle Jurassic)
- gs** Greenstone
- c** Metachert
- ybn** Metagraywacke of Hammehorn Ridge (Late Jurassic to Middle Jurassic)
- c** Metachert
- gs** Greenstone
- sp** Serpentinized
- ybd** Devils Hole Ridge broken formation of Blake and Jayko (1983) (Early Cretaceous to Middle Jurassic)
- r** Radiolarian chert
- ybi** Little Indian Valley argillite of McLaughlin and Ohlin (1984) (Early Cretaceous to Late Jurassic)

Yolla Bolly terrane

Rocks of the Yolla Bolly terrane, undivided

- yb**

GREAT VALLEY SEQUENCE AND COAST RANGE OPHIOLITE

Fisher Creek (?) terrane

- ecms** Mudstone (Early Cretaceous)
- Coast Range ophiolite (Middle and Late Jurassic):
- ecj** Layered gabbro
- ecsp** Serpentine melange

Del Puerto (?) terrane

- Rocks of the Del Puerto (?) terrane:
- dpm** Mudstone (Late Jurassic)
- Coast Range ophiolite (Middle and Late Jurassic):
- dpt** Tuffaceous chert (Late Jurassic)
- dpb** Basaltic flows and keratophytic tuff (Jurassic?)
- dps** Diabase (Jurassic?)
- dpsp** Serpentine melange (Jurassic?)
- sp** Undivided Serpentinized peridotite (Jurassic?)

#### KLAMATH MOUNTAINS PROVINCE

- Undivided Great Valley Sequence:
- ks** Sedimentary rocks (Lower Cretaceous)

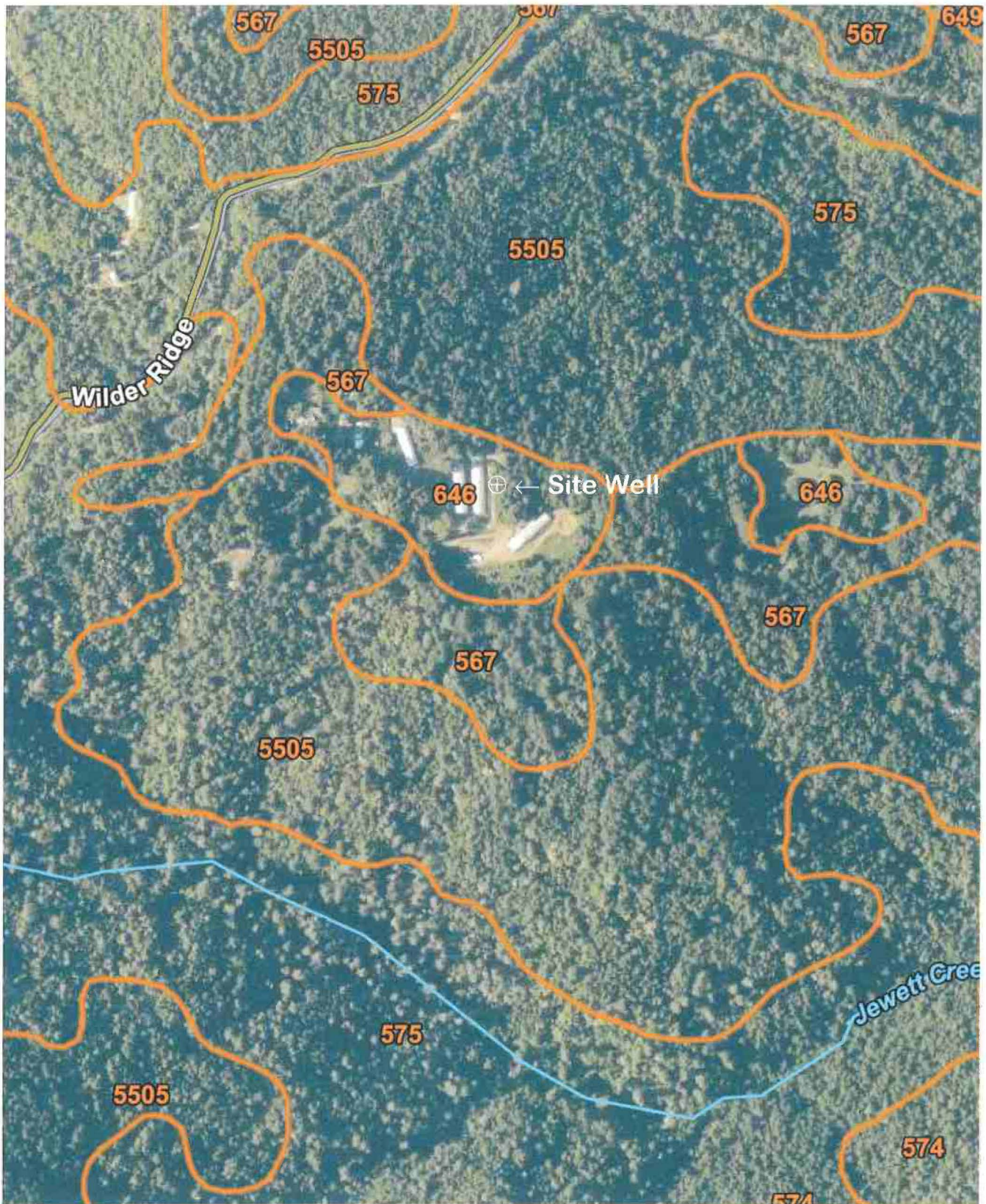
- Hayfork terrane
- Eastern Hayfork subterrane:
- eh** Melange and broken formation (early? Middle Jurassic)
  - ehls** Limestone
  - ehsp** Serpentinized
- Western Hayfork subterrane:
- whu** Hayfork Bolly Meta-andesite of Irwin (1985), undivided (Middle Jurassic)
  - whwg** Wildwood (Chanelhella Peak of Wright and Fahan, 1988) pluton (Middle Jurassic)
  - whwp** Clinopyroxenite
  - whji** Diorite and gabbro plutons (Middle? Jurassic)
- Battlesnake Creek terrane
- rcm** Melange (Jurassic and older)
  - rcs** Limestone
  - rcr** Radiolarian chert
  - rcb** Volcanic Rocks (Jurassic or Triassic)
  - rcic** Intrusive complex (Early Jurassic or Late Triassic)
  - rcp** Plutonic rocks (Early Jurassic or Late Triassic)
  - rcum** Ultramafic rocks (age uncertain)
  - rcpd** Ilfite peridotite
- Western Klamath terrane
- Smith River subterrane:
- scs** Galice? formation (Late Jurassic)
  - srv** Pyroclastic andesite
  - srjb** Glen Creek gabbro-ultramafic complex of Irwin and others (1974)
  - srpd** Serpentinized peridotite

#### MAP SYMBOLS

- Contact
- Fault
- Thrust fault
- Trace of the San Andreas fault associated with 1906 earthquake rupture
- Strike and dip of bedding:
- 10° 20° / Inclined
- 10° 20° / Vertical
- ⊕ / Horizontal
- 10° 20° / Overturned
- 10° 20° / Approximate
- 10° 20° / Joint
- 10° 20° / Strike and dip of cleavage
- 10° / Shear foliation
- 10° / Inclined
- 10° / Vertical
- Folds:
- ← / Synclinal or synformal axis
- ← / Anticlinal or antiformal axis
- ← / Overturned syncline
- ⊕ / Landslide
- ⊕ / Melange Blocks:
- △ / Serpentinized
- / Chert
- ◇ / Blueschist
- / Greenstone
- / Fossil locality and number

**GEOLOGY OF THE CAPE MENDOCINO, EUREKA, GARBERVILLE, AND SOUTHWESTERN PART OF THE HAYFORK 30 X 60 MINUTE QUADRANGLES AND ADJACENT OFFSHORE AREA, NORTHERN CALIFORNIA (McLaughlin et al., 2000)**

Lindberg Geologic Consulting	Engineering-Geologic Hydrogeologic Well Connectivity Report	Figure 7
Post Office Box 306	9320 Wilder Ridge Road, Etersburg, Humboldt County	June 30, 2022
Cutten, CA 95534	APN 108-023-008, Big River Farm, LLC, Lesley Doyle, Client	Project 0455.00
(707) 442-6000	Soils Map (locations approximate)	Not to Scale



Modified from: USDA-NRCS Web Soil Survey, 2022. N ≈ 

State of California  
**Well Completion Report**  
 Form DWR 188 Complete 12/17/2018  
 WCR2018-009856

Owner's Well Number Well #1 Date Work Began 10/30/2018 Date Work Ended 10/30/2018  
 Local Permit Agency Humboldt County Department of Health & Human Services - Land Use Program  
 Secondary Permit Agency \_\_\_\_\_ Permit Number 17/18-1912 Permit Date 06/05/2018

Well Owner (must remain confidential pursuant to Water Code 13752)	Planned Use and Activity
Name <u>XXXXXXXXXXXXXXXXXXXX</u>	Activity <u>New Well</u>
Mailing Address <u>XXXXXXXXXXXXXXXXXXXX</u> <u>XXXXXXXXXXXXXXXXXXXX</u>	Planned Use <u>Other</u>
City <u>XXXXXXXXXXXXXXXXXXXX</u> State <u>XX</u> Zip <u>XXXXX</u>	Specify <u>20' Seal</u>

Well Location	
Address <u>9320 Wilder Ridge RD</u>	APN <u>108-023-008</u>
City <u>Garberville</u> Zip <u>95542</u> County <u>Humboldt</u>	Township <u>03 S</u>
Latitude <u>40</u> <u>9</u> <u>3.9599</u> N Longitude <u>-124</u> <u>3</u> <u>28.44</u> W	Range <u>01 E</u>
Deg. Min. Sec. Deg. Min. Sec.	Section <u>34</u>
Dec. Lat. <u>40.1511</u> Dec. Long. <u>-124.0579</u>	Baseline Meridian <u>Humboldt</u>
Vertical Datum _____ Horizontal Datum <u>WGS84</u>	Ground Surface Elevation _____
Location Accuracy _____ Location Determination Method _____	Elevation Accuracy _____
	Elevation Determination Method _____

Borehole Information	
Orientation <u>Vertical</u>	Specify _____
Drilling Method <u>Downhole Rotary Hammer</u>	Drilling Fluid <u>Air</u>
Total Depth of Boring <u>310</u> Feet	
Total Depth of Completed Well <u>300</u> Feet	

Water Level and Yield of Completed Well	
Depth to first water <u>70</u> (Feet below surface)	
Depth to Static _____	
Water Level <u>73</u> (Feet) Date Measured <u>10/30/2018</u>	
Estimated Yield* <u>100</u> (GPM) Test Type <u>Air Lift</u>	
Test Length <u>5</u> (Hours) Total Drawdown _____ (feet)	
*May not be representative of a well's long term yield.	

Geologic Log - Free Form		
Depth from Surface	Feet to Feet	Description
0	4	Brown / Black Topsoil
4	16	Tan clay
16	35	Brown clay
35	110	Blue Shale w/clay
110	310	Blue Grey Shale

### Casings

Casing #	Depth from Surface Feet to Feet		Casing Type	Material	Casings Specificatons	Wall Thickness (inches)	Outside Diameter (inches)	Screen Type	Slot Size if any (inches)	Description
1	0	20	Blank	Low Carbon Steel	N/A	0.188	8.625			*
2	0	120	Blank	PVC	N/A	0.291	4.95			*
2	120	140	Screen	PVC	N/A	0.291	4.95	Milled Slots	0.032	*
2	140	160	Blank	PVC	N/A	0.291	4.95			*
2	160	180	Screen	PVC	N/A	0.291	4.95	Milled Slots	0.032	*
2	180	200	Blank	PVC	N/A	0.291	4.95			*
2	200	220	Screen	PVC	N/A	0.291	4.95	Milled Slots	0.032	*
2	220	240	Blank	PVC	N/A	0.291	4.95			*
2	240	260	Screen	PVC	N/A	0.291	4.95	Milled Slots	0.032	*
2	260	280	Blank	PVC	N/A	0.291	4.95			*
2	280	300	Screen	PVC	N/A	0.291	4.95	Milled Slots	0.032	*

### Annular Material

Depth from Surface Feet to Feet		Fill	Fill Type Details	Filter Pack Size	Description
0	20	Bentonite	Non Hydrated Bentonite		3/8 hole plug
20	300	Other Fill	See description.		No annular fill

Other Observations:

### Borehole Specifications

Depth from Surface Feet to Feet		Borehole Diameter (inches)
0	20	13
20	310	7.875

### Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name WATSON WELL DRILLING INC  
 Person, Firm or Corporation

500 SUMMER STREET EUREKA CA 95501  
 Address City State Zip

Signed electronic signature received 11/01/2018 1014048  
 C-57 Licensed Water Well Contractor Date Signed C-57 License Number

### DWR Use Only

CSG #	State Well Number	Site Code	Local Well Number

N	W
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Latitude Deg/Min/Sec

Longitude Deg/Min/Sec

TRS:

APN:



State of California  
**Well Completion Report**  
WCR Form - DWR 188 Complete 09/01/2017  
WCR2017-003775

Owner's Well Number 1 Date Work Began 08/17/2017 Date Work Ended 08/17/2017  
Local Permit Agency Humboldt County Department of Health & Human Services - Land Use Program  
Secondary Permit Agency \_\_\_\_\_ Permit Number 16/17-0242 Permit Date 09/09/2016

**Well Owner (must remain confidential pursuant to Water Code 13752)**

Name XXXXXXXXXXXXXXXXXXXX  
Mailing Address XXXXXXXXXXXXXXXXXXXX  
XXXXXXXXXXXXXXXXXXXX  
City XXXXXXXXXXXXXXXXXXXX State XX Zip XXXXX

**Planned Use and Activity**

Activity New Well  
Planned Use Water Supply Domestic

**Well Location**

Address 9225 Wilder Ridge RD APN 108-023-011  
City Garberville Zip 95510 County Humboldt Township 04 S  
Latitude \_\_\_\_\_ N Longitude \_\_\_\_\_ W  
Deg. Min. Sec. Deg. Min. Sec. Range 01 E  
Section 34  
Dec. Lat. \_\_\_\_\_ Dec. Long. \_\_\_\_\_ Baseline Meridian Humboldt  
Vertical Datum \_\_\_\_\_ Horizontal Datum WGS84 Ground Surface Elevation \_\_\_\_\_  
Location Accuracy \_\_\_\_\_ Location Determination Method \_\_\_\_\_ Elevation Accuracy \_\_\_\_\_  
Elevation Determination Method \_\_\_\_\_

**Borehole Information**

Orientation Vertical Specify \_\_\_\_\_  
Drilling Method Downhole Hammer Drilling Fluid Air  
Total Depth of Boring 210 Feet  
Total Depth of Completed Well 210 Feet

**Water Level and Yield of Completed Well**

Depth to first water 150 (Feet below surface)  
Depth to Static \_\_\_\_\_  
Water Level 115 (Feet) Date Measured 08/17/2017  
Estimated Yield\* 10 (GPM) Test Type Air Lift  
Test Length 4 (Hours) Total Drawdown \_\_\_\_\_ (Feet)  
\*May not be representative of a well's long term yield.

**Geologic Log - Free Form**

Depth from Surface Feet to Feet	Description
0   25	Brown Clay
25   210	Blue Sandstone with Quartz

**Casings**

Casing #	Depth from Surface Feet to Feet	Casing Type	Material	Casings Specifications	Wall Thickness (inches)	Outside Diameter (inches)	Screen Type	Slot Size if any (inches)	Description
1	0   20	Blank	Low Carbon Steel	N/A	0.188	8.625			
2	0   130	Blank	PVC	N/A	0.291	4.95			
2	130   170	Screen	PVC	N/A	0.291	4.95	Milled Slots	0.035	
2	170   190	Blank	PVC	N/A	0.291	4.95			
2	190   210	Screen	PVC	N/A	0.291	4.95	Milled Slots	0.035	

**Annular Material**

Depth from Surface Feet to Feet	Fill	Fill Type Details	Filter Pack Size	Description
0   20	Bentonite	Non Hydrated Bentonite		3/8 Hole Plug
20   210	Other Fill	See description.		No Annular Fill

**Other Observations:**

### Borehole Specifications

Depth from Surface Feet to Feet		Borehole Diameter (inches)
0	20	13
20	210	7.875

### Attachments

WellReport\_05222017\_1\_20170901\_162221.pdf - WCR Final

### Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name WATSON WELL DRILLING, INC.  
 Person, Firm or Corporation  
500 Summer Street Eureka CA 95501  
 Address City State Zip

Signed electronic signature received 08/24/2017 1014048  
 C-57 Licensed Water Well Contractor Date Signed C-57 License Number

### DWR Use Only

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#### Site Number / State Well Number

					N
--	--	--	--	--	---

Latitude Deg/Min/Sec

								W
--	--	--	--	--	--	--	--	---

Longitude Deg/Min/Sec

TRS:

APN:

State of California  
**Well Completion Report**  
 Form DWR 188 Complete 7/31/2018  
 WCR2018-005151

Owner's Well Number \_\_\_\_\_ Date Work Began 06/22/2018 Date Work Ended 06/28/2018  
 Local Permit Agency Humboldt County Department of Health & Human Services - Land Use Program  
 Secondary Permit Agency \_\_\_\_\_ Permit Number 17/18-1669 Permit Date 04/12/2018

Well Owner (must remain confidential pursuant to Water Code 13752)	Planned Use and Activity
Name <u>XXXXXXXXXXXXXXXXXXXXXX</u>	Activity <u>New Well</u>
Mailing Address <u>XXXXXXXXXXXXXXXXXXXXXX</u> <u>XXXXXXXXXXXXXXXXXXXXXX</u>	Planned Use <u>Water Supply Irrigation - Agriculture</u>
City <u>XXXXXXXXXXXXXXXXXXXXXX</u> State <u>XX</u> Zip <u>XXXXX</u>	

Well Location	
Address <u>9325 Wilder Ridge RD</u>	APN <u>108-023-010</u>
City <u>Garberville</u> Zip <u>95542</u> County <u>Humboldt</u>	Township <u>03 S</u>
Latitude _____ N Longitude _____ W	Range <u>01 E</u>
Deg. Min. Sec. Deg. Min. Sec.	Section <u>34</u>
Dec. Lat. <u>40.1564930</u> Dec. Long. <u>-124.0610550</u>	Baseline Meridian <u>Humboldt</u>
Vertical Datum _____ Horizontal Datum <u>WGS84</u>	Ground Surface Elevation _____
Location Accuracy _____ Location Determination Method _____	Elevation Accuracy _____
	Elevation Determination Method _____

Borehole Information	
Orientation <u>Vertical</u> Specify _____	
Drilling Method <u>Other - Under-Ream Down-Hole Hammer</u> Drilling Fluid <u>Air</u>	
Total Depth of Boring <u>140</u> Feet	
Total Depth of Completed Well <u>140</u> Feet	

Water Level and Yield of Completed Well	
Depth to first water <u>36</u> (Feet below surface)	
Depth to Static _____	
Water Level <u>38</u> (Feet) Date Measured <u>06/28/2018</u>	
Estimated Yield* <u>15</u> (GPM) Test Type <u>Air Lift</u>	
Test Length <u>4</u> (Hours) Total Drawdown <u>102</u> (feet)	
*May not be representative of a well's long term yield.	

Geologic Log - Free Form		
Depth from Surface	Feet to Feet	Description
0	1	top soil
1	3	large broken brown sandstone
3	23	brown silty sand & sandstone
23	49	large fractured sandstone
49	57	shale
57	91	blue fractured sandstone
91	140	shale mulache

### Casings

Casing #	Depth from Surface Feet to Feet		Casing Type	Material	Casings Specificatons	Wall Thickness (inches)	Outside Diameter (inches)	Screen Type	Slot Size if any (inches)	Description
1	0	40	Blank	Low Carbon Steel	Grade: ASTM A53	0.188	6			
1	40	90	Screen	Low Carbon Steel	Grade: ASTM A53	0.188	6	Milled Slots	0.05	
1	90	140	Blank	Low Carbon Steel	Grade: ASTM A53	0.188	6			

### Annular Material

Depth from Surface Feet to Feet		Fill	Fill Type Details	Filter Pack Size	Description
0	20	Bentonite	Other Bentonite		Sanitary Seal
20	140	Filter Pack	Other Gravel Pack	3/8 Inch	Pea Gravel

### Other Observations:

### Borehole Specifications

Depth from Surface Feet to Feet		Borehole Diameter (inches)
0	140	10

### Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name FISCH DRILLING  
Person, Firm or Corporation

3150 JOHNSON ROAD                      HYDEVILLE                      CA                      95547  
Address    City    State                      Zip

Signed *electronic signature received*                      06/29/2018                      683865  
C-57 Licensed Water Well Contractor                      Date Signed                      C-57 License Number

### Attachments

scan.pdf - Location Map

### DWR Use Only

CSG #	State Well Number	Site Code	Local Well Number

										N
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Latitude Deg/Min/Sec

Longitude Deg/Min/Sec

TRS:

APN:

## Humboldt County, South Part, California

### 646—Wirefence-Windynip-Devilshole complex, 5 to 30 percent slopes

#### Map Unit Setting

*National map unit symbol:* 1lpq7  
*Elevation:* 200 to 3,280 feet  
*Mean annual precipitation:* 60 to 100 inches  
*Mean annual air temperature:* 48 to 57 degrees F  
*Frost-free period:* 240 to 300 days  
*Farmland classification:* Not prime farmland

#### Map Unit Composition

*Wirefence and similar soils:* 35 percent  
*Windynip and similar soils:* 30 percent  
*Devilshole and similar soils:* 20 percent  
*Minor components:* 15 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

#### Description of Wirefence

##### Setting

*Landform:* Ridges  
*Landform position (two-dimensional):* Summit, backslope  
*Landform position (three-dimensional):* Mountaintop  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Parent material:* Colluvium and residuum derived from sandstone

##### Typical profile

*A1 - 0 to 11 inches:* loam  
*A2 - 11 to 21 inches:* loam  
*A3 - 21 to 33 inches:* gravelly loam  
*AB - 33 to 46 inches:* gravelly loam  
*Bw - 46 to 63 inches:* very gravelly fine sandy loam  
*C - 63 to 79 inches:* very gravelly fine sandy loam

##### Properties and qualities

*Slope:* 5 to 30 percent  
*Depth to restrictive feature:* More than 80 inches  
*Drainage class:* Well drained  
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.60 to 2.00 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Maximum salinity:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)  
*Available water supply, 0 to 60 inches:* High (about 9.1 inches)

### Interpretive groups

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 4e  
*Hydrologic Soil Group:* B  
*Ecological site:* F004B1106CA - High precipitation mountain slopes  
*Hydric soil rating:* No

### Description of Windynip

#### Setting

*Landform:* Ridges  
*Landform position (two-dimensional):* Summit, shoulder  
*Landform position (three-dimensional):* Mountaintop  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Parent material:* Colluvium and residuum derived from sandstone  
and mudstone

#### Typical profile

*A1 - 0 to 5 inches:* loam  
*A2 - 5 to 12 inches:* clay loam  
*A3 - 12 to 20 inches:* clay loam  
*AB - 20 to 33 inches:* clay loam  
*Bt1 - 33 to 59 inches:* gravelly clay loam  
*Bt2 - 59 to 79 inches:* very gravelly clay loam

#### Properties and qualities

*Slope:* 5 to 30 percent  
*Surface area covered with cobbles, stones or boulders:* 0.0 percent  
*Depth to restrictive feature:* More than 80 inches  
*Drainage class:* Well drained  
*Capacity of the most limiting layer to transmit water*  
*(Ksat):* Moderately low to moderately high (0.06 to 0.60 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Maximum salinity:* Nonsaline to very slightly saline (0.0 to 2.0  
mmhos/cm)  
*Available water supply, 0 to 60 inches:* Moderate (about 8.3  
inches)

### Interpretive groups

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 4e  
*Hydrologic Soil Group:* C  
*Ecological site:* R004B1202CA - Loamy Uplands  
*Hydric soil rating:* No

### Description of Devilshole

#### Setting

*Landform:* Ridges  
*Landform position (two-dimensional):* Summit, shoulder

*Landform position (three-dimensional):* Mountaintop  
*Down-slope shape:* Convex, linear  
*Across-slope shape:* Linear, convex  
*Parent material:* Residuum weathered from sandstone and/or  
mudstone

#### **Typical profile**

*A - 0 to 4 inches:* gravelly loam  
*ABt - 4 to 16 inches:* very gravelly loam  
*Bt - 16 to 28 inches:* very gravelly loam  
*BCt - 28 to 47 inches:* extremely gravelly loam  
*C - 47 to 61 inches:* gravel

#### **Properties and qualities**

*Slope:* 5 to 30 percent  
*Surface area covered with cobbles, stones or boulders:* 0.0 percent  
*Depth to restrictive feature:* 39 to 59 inches to strongly contrasting  
textural stratification  
*Drainage class:* Well drained  
*Capacity of the most limiting layer to transmit water*  
*(Ksat):* Moderately low to moderately high (0.14 to 1.42 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Maximum salinity:* Nonsaline to very slightly saline (0.0 to 2.0  
mmhos/cm)  
*Available water supply, 0 to 60 inches:* Low (about 4.3 inches)

#### **Interpretive groups**

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 4e  
*Hydrologic Soil Group:* B  
*Ecological site:* R004BI203CA - Loamy-skeletal Uplands  
*Hydric soil rating:* No

#### **Minor Components**

##### **Yorknorth, moist**

*Percent of map unit:* 6 percent  
*Landform:* Mountain slopes  
*Landform position (two-dimensional):* Backslope, footslope  
*Landform position (three-dimensional):* Mountainflank  
*Down-slope shape:* Concave, linear  
*Across-slope shape:* Concave, linear  
*Hydric soil rating:* No

##### **Crazycoyote**

*Percent of map unit:* 5 percent  
*Landform:* Mountain slopes  
*Landform position (two-dimensional):* Backslope  
*Landform position (three-dimensional):* Center third of  
mountainflank  
*Down-slope shape:* Concave, convex, linear  
*Across-slope shape:* Linear

*Hydric soil rating:* No

**Rainbear**

*Percent of map unit:* 4 percent

*Landform:* Mountain slopes, ridges

*Landform position (two-dimensional):* Shoulder

*Landform position (three-dimensional):* Mountainflank

*Down-slope shape:* Convex

*Across-slope shape:* Linear

*Hydric soil rating:* No

## Data Source Information

Soil Survey Area: Humboldt County, South Part, California

Survey Area Data: Version 10, Sep 6, 2021