LINDBERG GEOLOGIC CONSULTING
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Received by
HCPBD 3/20/2024

October 20, 2022

Project No: 0449.00

Mr. Kevin Borque
Post Office Box 610
Fortuna, California 95540

Subject: Hydrologic Isolation of Well WCR2016-002767 from Surface Waters
French Road, Near Bear Buttes, Miranda APN: 214-234-006

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 well -002767 might affect nearby surface waters. The nearest tributaries in the vicinity of this well are Coon Creek, Butte Creek, and Leggett Creek (Figure 1).

A California-Certified Engineering Geologist visited this site on June 3, 2022, to observe the subject well and local site conditions. Based on our research, observations, and our professional experience, 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 springs, wetlands and or surface waters in the vicinity. We define the "vicinity" as the area within a 1,000-foot radius of the subject well (Figure 1), an area of approximately 72 acres. The proposed use of this well is 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 that information is provided elsewhere in the application.

Based on Humboldt County's WebGIS and the Assessor's Parcel Map (Figure 2), parcel 214-234-006 (Figure 2,) encompasses approximately 120 acres. Our GPS located the subject well at latitude 40.1897° north, and longitude 123.82642° west (±9'). This well is in Section 22, T3S, R3E, and is 250 feet deep. The wellhead is at an elevation of approximately 2,000 feet (Figure 1) and the elevation of the bottom of the well is therefore 1,750 feet.

The Humboldt County WebGIS shows three streams within one mile of the well site. Coon Creek is over 1,600 feet to the east-southeast, Butte Creek is more than 2,300 feet to the west, and Leggett Creek is greater than 3,000 feet to the south-southwest of well -002767. As stated, based on interpolation from the USGS "Miranda, Calif." (1970), topographic quadrangle map (Figure 1), and the Humboldt County WebGIS, the well site elevation is 2,000 feet. The elevation of the nearest watercourse, Coon Creek at its upper end is 1,600 feet. The elevation of Butte Creek at its nearest point is approximately 1,275 feet. The elevation of Leggett Creek at its nearest point is approximately 2,010 feet. The well bottom elevation of the well is 1,750 feet, making the nearest watercourse, Coon Creek, 150 feet lower than the total depth of the well.

Well location is shown approximately on the attached figures, and was drilled by Fisch Drilling, of Hydesville, in March 2016, under Humboldt County well permit #15/16-0435. Fisch Drilling is a licensed well-drilling contractor (C-57 #683865). Fisch Drilling submitted their attached well completion report (DWR 188) on April 1, 2016. The driller estimated a yield of 6 gpm on March 30, 2016, based on a 4-hour air lift pump test. Total drawdown during the pump test was not reported; contact your driller for further information.

Again, total drilled depth of this well is 250 feet. The borehole diameter is 10-inches from grade to 250-feet. From the surface to 40 feet, a 5.563-inch diameter blank (unslotted) PVC casing was installed. From 40- to 250-feet, 5.563-inch diameter PVC, slotted (0.032-inch milled slots) well screen, was installed. Per County requirements, a bentonite surface sanitary seal was installed from the surface to 20 feet. Below the bentonite seal, the annulus was backfilled with 3/8-inch pea gravel to total depth. The well is cased and sealed through any potential shallow subsurface aquifers in the uppermost 20 feet as required by county regulation. Depth to first water was reported at 21.8 feet below the surface, and depth to static water in the completed developed well was reported to be 21.8 feet bgs when the driller conducted the pump test on March 30, 2016.

There are no springs mapped on the USGS topographic map within 5,000 feet of this well. The nearest mapped spring is more than 5,100 feet east-southeast in Section 23 at an elevation of 1,560 feet, in the Hooker Creek headwaters. The next closest spring is more than 5,800 south-southwest at an elevation of 1,400 feet, in Section 27 (Figures 1 and 2). There are no mapped springs within one mile of this well that are higher in elevation than the bottom of the well at 1,750 feet. There is a small pond (0.3ac.), more than 900 feet to the southeast of the site well. This pond appears to only contain water in the 2019 Google Earth satellite imagery (Figure 3).

This parcel is located within California's Coast Range Geomorphic Province, in the Central Belt of the Franciscan Complex (McLaughlin et at., 2000), a seismically active region in which large earthquakes are expected to occur during the economic life span (70 years) of any developments on the subject property. Geologic mapping by McLaughlin, shows that the site is underlain by mélange (cm2) of the Central Belt of the Franciscan Complex, as shown in Figure 4.

According to the NRCS Web Soil Survey, the near-surface soils consist of gravelly loam to a depth of 8-inches, very gravelly loam to 37-inches,and extremely gravelly sandy loam to 79-inches. Soils are interpreted to be uniformly distributed across that portion of the subject parcel underlain by the Central Belt mélange.

Materials reported on the geologic log of the driller's well completion report (attached) include 2-feet of "top soil" above 248-feet (2-feet to 250-feet) of "Franciscan Formation". At the location of the subject well, the elevation of the first water-bearing aquifer unit is thus at an elevation of approximately 1,978.2 feet, based on the driller's report.

Below the surface, the earth materials encountered in the boring are likely mélange of the Central Belt Franciscan Complex, as mapped by McLaughlin et al., (2000). Sheared, fractured, and folded metasedimentary rock materials can have variable hydraulic conductivity, but can also, under the right conditions, constitute significant aquifers. We interpret the sequence "Franciscan Formation" as described by the driller, to be within the central belt mélange (cm2) of the Franciscan Complex. Sections of the profile apparently have favorable hydraulic conductivity, making them, in our interpretation, the primary water bearing unit(s) in this well.

A geologic cross section of the area after McLaughlin et al., (2000) shows the structural and stratigraphic relationships between the regional geologic units (Figure 5). The central belt mélange is shown dipping east and bounded by thrust fault plane contacts. On-site, no dip of the rock units could be observed because they are mantled with soil and colluvium and obscured by vegetation. We interpret the faults in the subsurface to be hydrologic boundaries of reduced permeability (due to grinding and shearing along the fault planes), effectively separating units of the Franciscan from each other hydrologically, and limiting groundwater flow between the fault-bound units.

Based on observations, review of pertinent and available information, and our experience, it is our professional opinion that this well has a low potential of having any direct or significant connection to proximal surface waters. First water was reportedly encountered at 21.8 feet and remained static at 21.8 feet bgs. 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.

When considered with the stratigraphy, and the underlying geologic structure, plus the distances (horizontal and vertically) from the nearest surface waters, and the depth of the producing zone of this well (~21.8- to 250-feet), as well as the position of the well relative to the nearest surface waters in the vicinity, we conclude that the depth of the surface seal, is sufficient to preclude the potential for hydraulic connectivity with perennial surface waters, of which there are none closer than 1,650 feet in Coon Creek at an elevation of 1,600 feet. Thus, the water source from which this well draws appears to be a subsurface aquifer not demonstrably connected to any surface waters or 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.

According to the driller, the estimated the yield of this well was 6 gallons per minute (gpm) on March 30, 2016. Drawdown was not reported after Fisch Drilling's four-hour air-lift pump test. At 6 gpm, this well would potentially produce 8,640 gallons per day. As noted on the well completion report, this capacity may not be representative of this well's long-term yield. Additional drawdown and recovery testing would be necessary to estimate a sustainable long-term yield of the site well.

This subject well does not appear to be hydrologically connected to, or capable of influencing surface water flows in Coon Creek, Butte Creek, or Leggett Creek. Nor does this well appear likely to be hydrologically connected to any local springs or ephemeral wetlands. Given the horizontal distances involved, and the elevation differences between the subject well, and the surface waters

of the nearest watercourses, springs, and ponds on-site, the potential for significant hydrologic connectivity between surface water and groundwater in the Franciscan aquifer(s) appears unlikely.

As mentioned, on the Miranda USGS topographic quadrangle map, there are no springs mapped in Section 22. There is one spring mapped in the Section 23, more than 5,100 feet east-southeast of the subject well at an elevation below 1,560 feet. The second-nearest spring is mapped in Section 27, more than a mile south-southwest of the subject well, at an estimated elevation of 1,400 feet. There are no other significant (mapped) springs or wetlands in the vicinity of this subject well.

We researched the California Department of Water Resources' database to find permitted wells within 1,000 feet of the subject well. Based on the information available at the present time, there is one well which meets this criterion. Well number WCR2017-004824 in Section 22, is also on parcel number APN 214-234-006 (Figure 3); the well driller's report is attached. Well -004824 is more than 1,200 feet south of the subject well at an elevation of 1,980 feet. Well -004824 is across gradient and encountered Franciscan stratigraphy. Well -004842 is a 6-inch, 15 gpm well, 180 feet in depth. It is screened from 40 to 160 feet and encountered first water at 65 feet. Static water level was 58 feet bgs on September 25, 2017. Both the subject well (WCR2016-002767), and well -004824, the nearest well south of the subject well, are under the same ownership and control.

As groundwater mimics topography and responds to the force of gravity, in general any near surface unconfined aquifer will flow down slope in a direction subparallel to topography. Based on topography, well 004824 does not appear to be situated downgradient of well 002767. Groundwater flow in the aquifer in the mélange aquifer is likely far more complex. The ground surface slopes primarily to the north; thus, the near surface unconfined aquifer flows to the north, toward Coon Creek and Butte Creek. When we visited, a pump was installed in the subject well.

In our professional opinion, it appears that the aquifer tapped by the subject well is recharged by water infiltrating through the soil and mélange bedrock from upslope source areas both proximal and distal to the well site. Ephemeral streams in the vicinity of the well may also contribute recharge when they flow during runoff generating storm events.

The United States Department of Agriculture's (USDA), Natural Resources Conservation Service's (NRCS), online Web Soil Survey, shows the subject well within soils of the Canoecreek-Coyoterock-Sproulish complex, on slopes of 15 to 50 percent, (#5508, Figure 7), which the NRCS describes as a well-drained soil. The Web Soil Survey's unit description is attached to this report. Mean annual precipitation is listed by the NRCS as 49 to 100 inches per year. Capacity of the most limiting soil layer to transmit water (Ksat) is described as moderately high to high (0.60 to 2.00 in/hr) with a depth to the water table of greater than 80 inches.

If during the wet season, only ten percent of the "low end" precipitation estimation of 49 inches is absorbed by the soils/bedrock and does not flow across the ground surface and into local watercourses (or be lost to evapotranspiration), then approximately 49 acre-feet, or more than 15.9

million gallons of water per year (MGPY), may be expected to recharge the local aquifers below this 120-acre subject property. Given the same amount of precipitation (49") and the same 10 percent partitioned to recharge, then within a 1,000-foot radius of the subject well, recharge can be estimated. Recharge within the 72 acres enclosed by a circle having a 1,000-foot radius, would be 28 acre-feet, and more than 9.3 MGPY. Our estimates are conservative; United States Geological Survey (USGS) researchers estimate that in northwest California, approximately 33 percent of precipitation goes to recharge (Flint, et al., 2103).

On March 28, 2022, Governor Newsom issued an executive order (N-7-22) relating to the ongoing drought in California. In executive order N-7-22, the governor outlined 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*". This well on French Road, near Bear Buttes and Miranda, is not within a basin subject to the Act, and there has been no Groundwater Sustainability Agency established with authority over the area where this permitted well is sited.

The Governor's order states that counties, cities, and other public agencies are prohibited from issuing permits for new groundwater wells (or altering 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*". The conditions in the Order 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.*"

Based on our observations, research, and experience, it is our professional opinion that the well WCR2016-002767, located on French Road, on APN 214-234-006, has a low likelihood of being hydrologically connected to nearby surface waters or neighboring wells in any manner that might significantly have a negative impact or effect on proximal wetlands, wells, and or surface waters.

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

Sincerely,

David N. Lindberg

CERTIFIED ENGINEERING GEOLOGIST
DAVID N. LINDBERG
No. 1895
EXP. 02/29/24
DNL
STATE OF CALIFORNIA

David N. Lindberg, CEG
Lindberg Geologic Consulting

DNL:sll

Attachments:

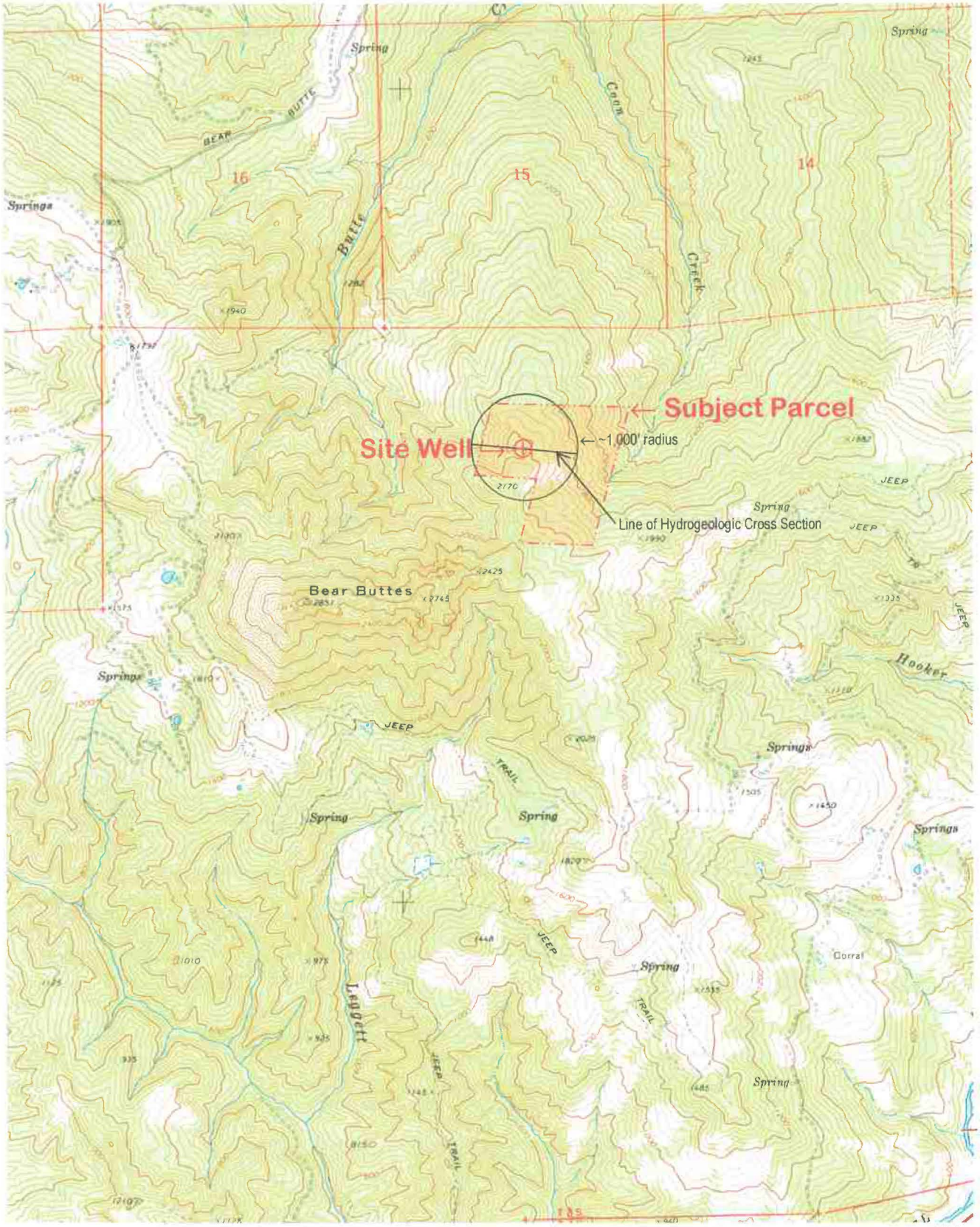
Figure 1: Topographic Well Location Map
Figure 2: Humboldt County Assessor's Parcel Map
Figure 3: Satellite Image of Well location
Figure 4: Geologic Map
Figure 4a: Geologic Map Explanation
Figure 5: Generalized Geologic Cross Section
Figure 6: Hydrogeologic Cross Section
Figure 7: USDA-NRCS Soils Map

State of California Well Completion Report:
WCR2016-002767, APN: 214-234-006 (Subject Well)
WCR2017-004824, APN: 214-234-006 (>1,200 feet to south)

Web Soil Survey, NRCS Map Unit Description:
Canoecreek-Coyotecreek-Sproulish complex, #5508, 15 to 50 percent slopes.

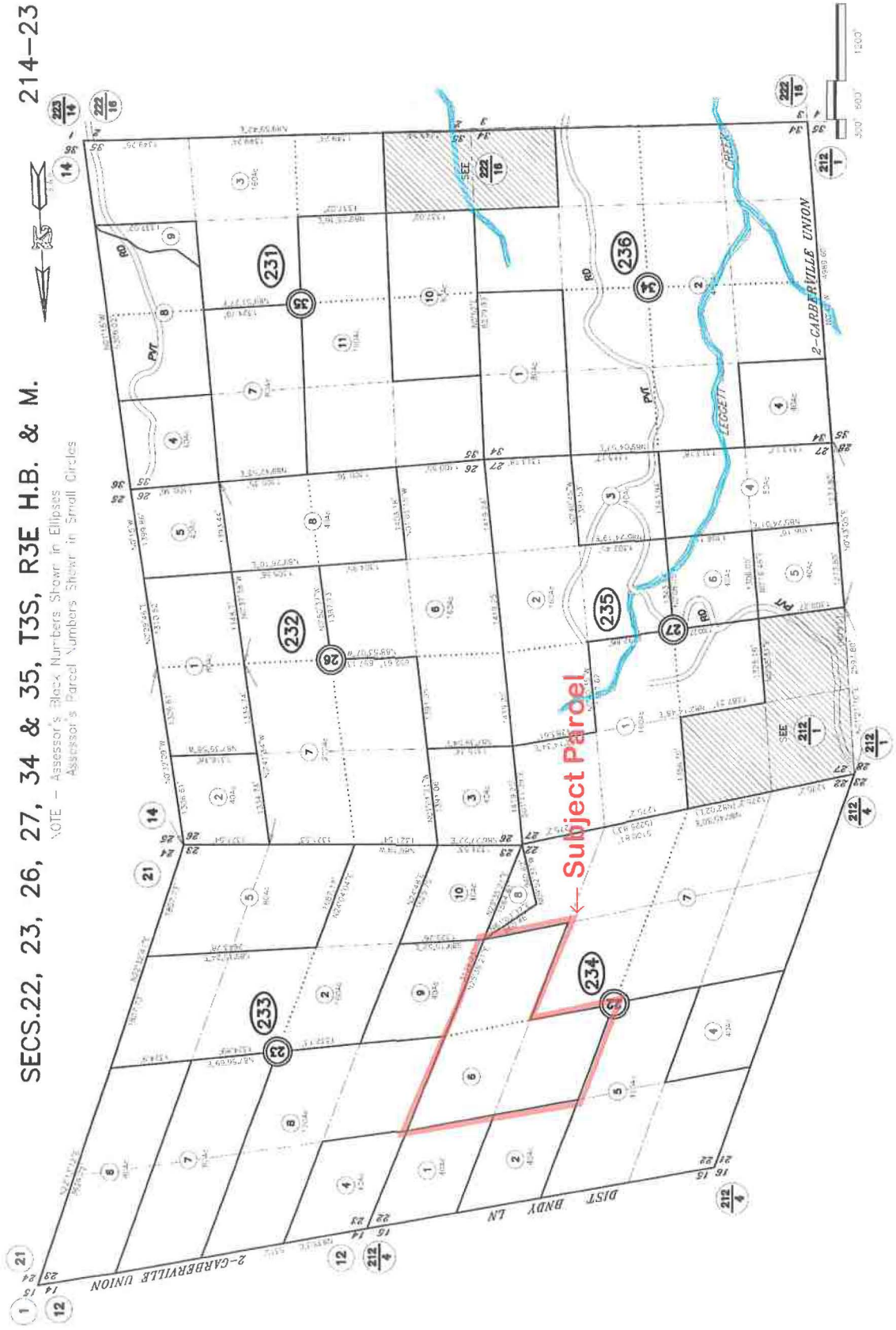
Reference:
Flint et al.: Fine-scale hydrologic modeling for regional landscape applications: the California Basin Characterization Model development and performance. Ecological Process, 2013, 2:25. (doi:10.1186/2192-1709-2-25)

Lindberg Geologic Consulting	Engineering-Geologic Well Connectivity Assessment Report	Figure 1
Post Office Box 306	Bear Buttes, Miranda, California, DWR2016-002767	October 20, 2022
Cutten, CA 95534	APN 214-234-006, Mr. Kevin Borque, Client	Project 0449.00
(707) 442-6000	Topographic Well Location Map (locations approximate)	1" = 2,600'



Modified from: USGS "Miranda, Calif.", 7.5' Quadrangle Map (1970). N

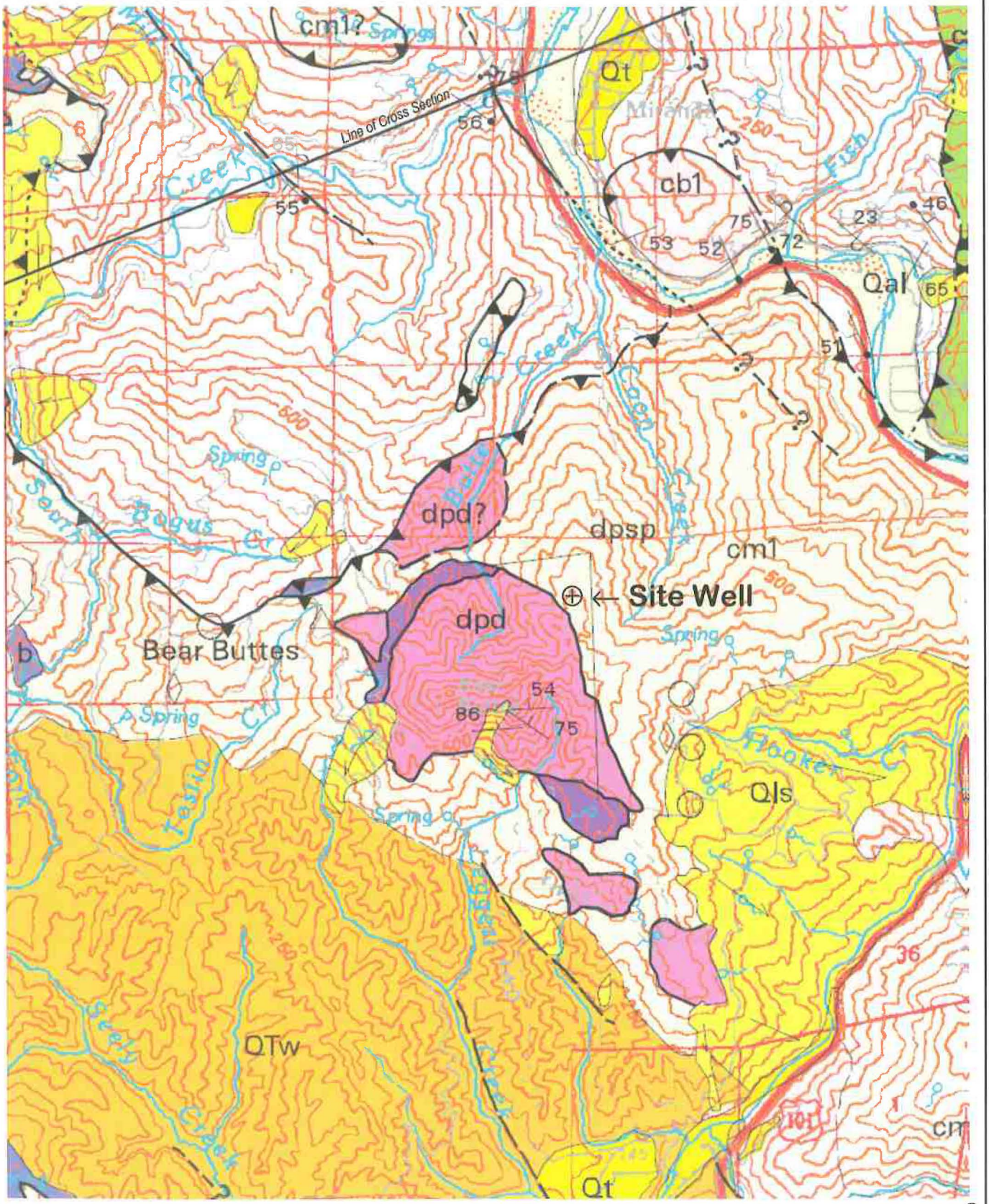
Lindberg Geologic Consulting	Engineering-Geologic Well Connectivity Assessment Report	Figure 2
Post Office Box 306	Bear Buttes, Miranda, California, DWR2016-002767	October 20, 2022
Cutten, CA 95534	APN 214-234-006, Mr. Kevin Borque, Client	Project 0449.00
(707) 442-6000	Humboldt County Assessor's Parcel Map (locations approximate)	Scale as Shown



Lindberg Geologic Consulting	Engineering-Geologic Well Connectivity Assessment Report	Figure 3
Post Office Box 306	Bear Buttes, Miranda, California, DWR2016-002767	October 20, 2022
Cutten, CA 95534	APN 214-234-006, Mr. Kevin Borque, Client	Project 0449.00
(707) 442-6000	Satellite Image of Well Location (locations approximate)	1" ≈ 300'

Modified from: Google Earth Imagery of April 21, 2019. N ≈

Lindberg Geologic Consulting	Engineering-Geologic Well Connectivity Assessment Report	Figure 4
Post Office Box 306	Bear Buttes, Miranda, California, DWR2016-002767	October 20, 2022
Cutten, CA 95534	APN 214-234-006, Mr. Kevin Borque, Client	Project 0449.00
(707) 442-6000	Geologic Map (locations approximate)	1" = 4,050'



Modified from: McLaughlin, et al., (2,000). N ≈

Lindberg Geologic Consulting	Engineering-Geologic Well Connectivity Assessment Report	Figure 4a
P. O. Box 306	Bear Buttes, Miranda, California, DWR2016-002767	October 20, 2022
Cutten, CA 95534	APN 214-234-006, Mr. Kevin Borque, Client	Project 0449.00
(707) 442-6000	Geologic Map Explanation	No Scale

DESCRIPTION OF MAP UNITS

QUATERNARY AND TERTIARY OVERLAP DEPOSITS

- Qal — Alluvial deposits (Holocene and late Pleistocene?)
- Qm — Undeformed marine shoreline and aolian 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)
- Tl — Volcanic rocks of Fickle 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)
- cols — Limestone (Late Cretaceous)
- cu — Undivided blueschist (Jurassic?)

King Range terrane (Miocene to Late Cretaceous)

- Krp — Igneous and sedimentary rocks of Point Delgada (Late Cretaceous)
- bu — 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
- krl — 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)
- cc — Chert (Late Cretaceous to Early Jurassic)
- bs — Basaltic rocks (Cretaceous and Jurassic)
- u — 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 — Chinquapin Metabasalt Member (Irwin and others, 1974)
- ppv — 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 — Tallaferro 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
- ybh — Metagraywacke of Hammerhorn Ridge (Late Jurassic to Middle Jurassic)
- c — Metachert
- gs — Greenstone
- sp — Serpentinite
- ybd — Devils Hole Ridge broken formation of Blake and Jayko (1983) (Early Cretaceous to Middle Jurassic)
- c — Radiolarian chert
- ybi — Little Indian Valley argillite of McLaughlin and Ohlin (1984) (Early Cretaceous to Late Jurassic)

Yolla Bolly terrane

- yb — Rocks of the Yolla Bolly terrane, undivided

GREAT VALLEY SEQUENCE AND COAST RANGE OPHIOLITE

Elder Creek(?) terrane

- ecms — Mudstone (Early Cretaceous)

Coast Range ophiolite (Middle and Late Jurassic)

- ecg — Layered gabbro
- ecsp — Serpentinite melange

Del Puerto(?) terrane

Rocks of the Del Puerto(?) terrane:

- dpms — Mudstone (Late Jurassic)

Coast Range ophiolite (Middle and Late Jurassic):

- dpt — Tuffaceous chert (Late Jurassic)
- dpb — Basaltic flows and keratophyric tuff (Jurassic?)
- dpd — Diabase (Jurassic?)
- dpsp — Serpentinite melange (Jurassic?)
- sp — Undivided Serpentinized peridotite (Jurassic?)

KLAMATH MOUNTAINS PROVINCE

Undivided Great Valley Sequence:

- Ks — Sedimentary rocks (Lower Cretaceous)

GREAT VALLEY SEQUENCE OVERLAP ASSEMBLAGE

Hayfork terrane

Eastern Hayfork subterrane:

- eh — Melange and broken formation (early? Middle Jurassic)
- ehls — Limestone
- ehsp — Serpentinite

Western Hayfork subterrane:

- whu — Hayfork Bally Meta-andesite of Irwin (1985), undivided (Middle Jurassic)
- whwg — Wildwood (Chanchelulla Peak of Wright and Fahan, 1988) pluton (Middle Jurassic)
- whwp — Clinopyroxenite
- whjl — Diorite and gabbro plutons (Middle? Jurassic)

Rattlesnake Creek terrane

- rcm — Melange (Jurassic and older)
- rcls — Limestone
- rcc — Radiolarian chert
- rcis — 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 — Blocky peridotite

Western Klamath terrane

Smith River subterrane:

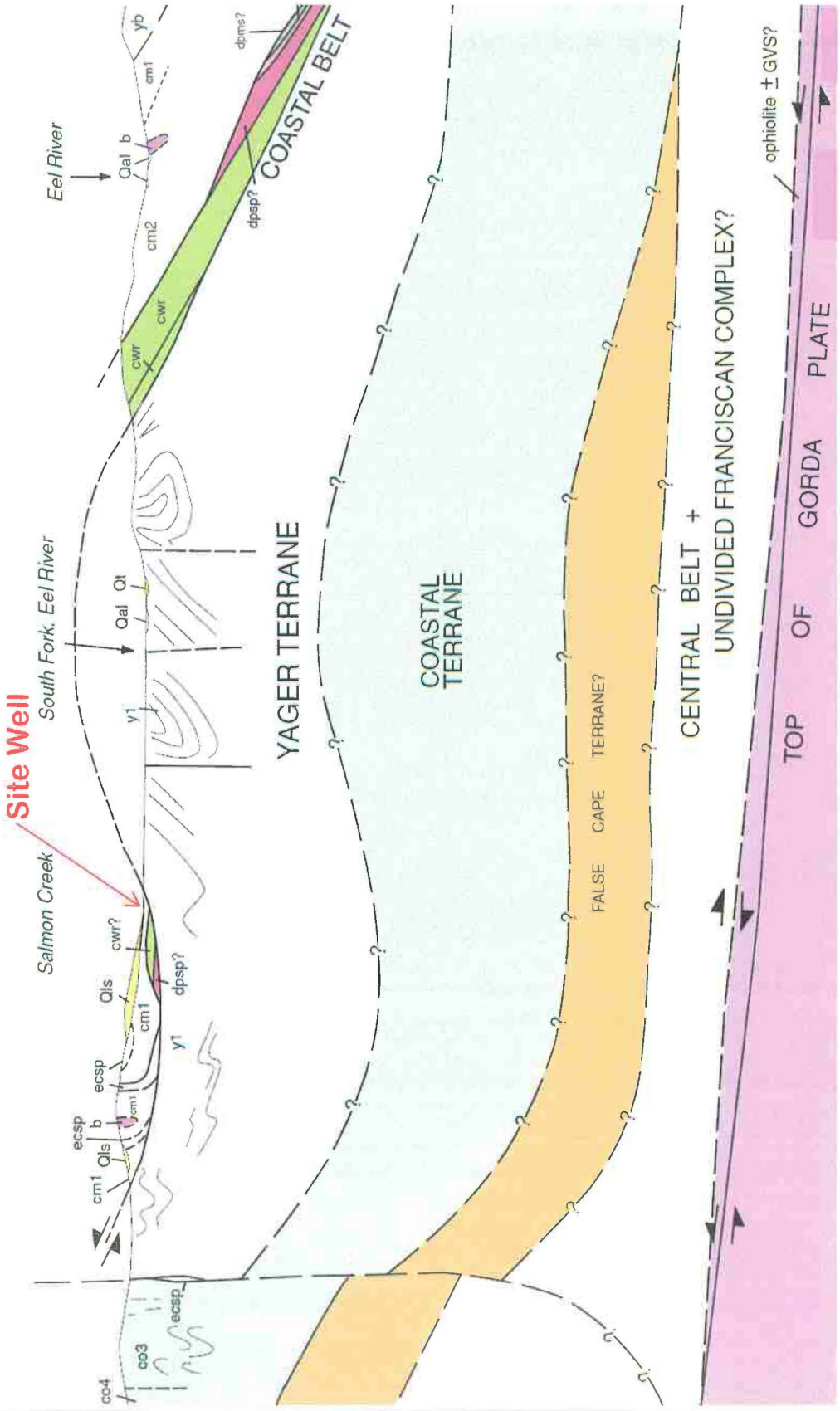
- srs — Galice? formation (Late Jurassic)
- srv — Pyroclastic andesite
- srgb — Glen Creek gabbro-ultramafic complex of Irwin and others (1974)
- srpd — Serpentinized peridotite

MAP SYMBOLS

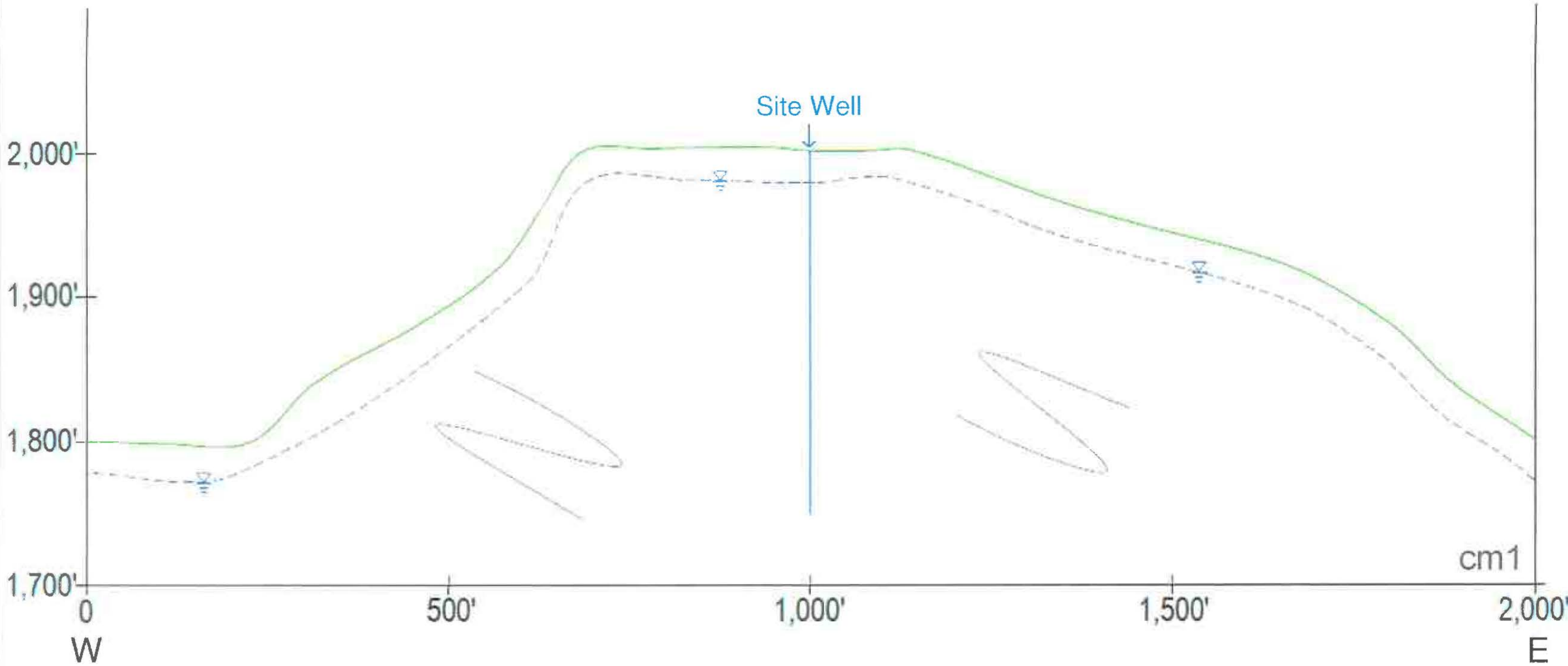
- Contact
- Fault
- Thrust fault
- Trace of the San Andreas fault associated with 1906 earthquake rupture
- Strike and dip of bedding
- Inclined
- Vertical
- Horizontal
- Overturned
- Approximate
- Joint
- Strike and dip of cleavage
- Shear foliation
- Inclined
- Vertical
- Folds:
- Synclinal or synformal axis
- Anticlinal or antiformal axis
- Overturned syncline
- Landslide
- Melange Blocks
- Serpentinite
- 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 Well Connectivity Assessment Report	Figure 5
Post Office Box 306	Bear Buttes, Miranda, California, DWR2016-002767	October 20, 2022
Cutten, CA 95534	APN 214-234-006, Mr. Kevin Borque, Client	Project 0449.00
(707) 442-6000	Generalized Geologic Cross Section (locations approximate)	Not to Scale



Modified from: McLaughlin, et al., (2,000).



In this vertically exaggerated (~2x) cross section, the view is looking north and downslope to the north toward South Fork Eel River at Coon Creek and Miranda. Groundwater flow in this cross section is away from the viewer, or into the page. Groundwater is presumed to flow from recharge areas in the higher ground to the south, to the north toward South Fork Eel River. Bedrock subgrade is mapped by McLaughlin et al. (2000) as composed of Mélange (cm1) of the Central Belt of the Franciscan Complex. Mélange is one of several components of the Central Belt Franciscan Complex. Groundwater is envisioned as flowing through fractured zones in metasandstone. Fractures are interpreted to be the primary permeability and providing preferential flow paths for groundwater in this area.

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Engineering-Geologic Well Connectivity Assessment Report
Bear Buttes, Miranda, California, DWR2016-002767
APN 214-234-006, Mr. Kevin Borque, Client
Hydrogeologic Cross Section (locations approximate)

Figure 6
October 20, 2022
Project 0449.00
2x V.E.

Lindberg Geologic Consulting	Engineering-Geologic Well Connectivity Assessment Report	Figure 7
Post Office Box 306	Bear Buttes, Miranda, California, DWR2016-002767	October 20, 2022
Cutten, CA 95534	APN 214-234-006, Mr. Kevin Borque, Client	Project 0449.00
(707) 442-6000	USDA-NRCS Soils Map (locations approximate)	Scale Not Determined

Modified from: USGS-NRCS Web Soil Survey, October 17, 2022 N ≈

State of California

Well Completion Report

Form DWR 188 Complete 4/14/2016

WCR2016-002767

Owner's Well Number 1 | Date Work Began 03/30/2016 | Date Work Ended 03/30/2016

Local Permit Agency Humboldt County Department of Health & Human Services - Land Use Program

Secondary Permit Agency | Permit Number 15/16-0435 | Permit Date 02/22/2016

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

Name XXXXXXXXXXXXXXXXXXX

Mailing Address XXXXXXXXXXXXXXXXXXX

XXXXXXXXXXXXXXXXXXX

City XXXXXXXXXXXXXXXXXXX State XX Zip XXXXX

Planned Use and Activity

Activity New Well

Planned Use Water Supply Domestic

Well Location

Address 0 French RD

City Miranda Zip 95553 County Humboldt

Latitude N Longitude W

Deg. Min. Sec. Deg. Min. Sec.

Dec. Lat. 40.1897700 Dec. Long. -123.8265460

Vertical Datum Horizontal Datum WGS84

Location Accuracy Location Determination Method

APN 214-234-06

Township 03 S

Range 03 E

Section 22

Baseline Meridian Humboldt

Ground Surface Elevation

Elevation Accuracy

Elevation Determination Method

Borehole Information

Orientation Vertical Specify

Drilling Method Direct Rotary Drilling Fluid Air

Total Depth of Boring 250 Feet

Total Depth of Completed Well 250 Feet

Water Level and Yield of Completed Well

Depth to first water 21.8 (Feet below surface)

Depth to Static Water Level 21.8 (Feet) Date Measured 03/30/2016

Estimated Yield* 6 (GPM) Test Type Air Lift

Test Length 4.0 (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	2	Top Soil
2	250	Franciscan Formation

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	PVC	OD: 5.563 in. | SDR: 21 | Thickness: 0.265 in.	0.265	5.563			
1	40	250	Screen	PVC	OD: 5.563 in. | SDR: 21 | Thickness: 0.265 in.	0.265	5.563	Milled Slots	0.032	

Annular Material

Depth from Surface Feet to Feet		Fill	Fill Type Details	Filter Pack Size	Description
0	20	Bentonite	Other Bentonite		Sanitary Seal
20	250	Filter Pack	Other Gravel Pack	3/8 in	Pea Gravel

Other Observations:

Borehole Specifications

Depth from Surface Feet to Feet		Borehole Diameter (inches)
0	250	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 (Address) | HYDESVILLE (City) | CA (State) | 95547 (Zip)

Signed: *electronic signature received* (C-57 Licensed Water Well Contractor) | 04/01/2016 (Date Signed) | 683865 (C-57 License Number)

Attachments

SiteMap.pdf - Location Map

SiteMap_Redacted.pdf - Location Map - Redacted

DWR Use Only

CSG #	State Well Number	Site Code	Local Well Number

N — Latitude Deg/Min/Sec

W — Longitude Deg/Min/Sec

TRS:

APN:

State of California

Well Completion Report

Form DWR 188 Complete 11/9/2017

WCR2017-004824

Owner's Well Number 2 | Date Work Began 09/19/2017 | Date Work Ended 09/25/2017

Local Permit Agency Humboldt County Department of Health & Human Services - Land Use Program

Secondary Permit Agency | Permit Number 15/16-0857 | Permit Date 07/21/2016

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

Name XXXXXXXXXXXXXXXXXXX

Mailing Address XXXXXXXXXXXXXXXXXXX

XXXXXXXXXXXXXXXXXXX

City XXXXXXXXXXXXXXXXXXX State XX Zip XXXXX

Planned Use and Activity

Activity New Well

Planned Use Water Supply Irrigation - Agriculture

Well Location

Address 0 French RD

City Miranda Zip 95553 County Humboldt

Latitude N Longitude W

	Deg.	Min.	Sec.
Latitude			
Longitude			

Dec. Lat. 40.1865100 Dec. Long. -123.8251400

Vertical Datum Horizontal Datum WGS84

Location Accuracy Location Determination Method

APN 214-234-006

Township 03 S

Range 03 E

Section 22

Baseline Meridian Humboldt

Ground Surface Elevation

Elevation Accuracy

Elevation Determination Method

Borehole Information

Orientation Vertical Specify

Drilling Method Other - under-ream down-hole hammer Drilling Fluid Air

Total Depth of Boring 180 Feet

Total Depth of Completed Well 180 Feet

Water Level and Yield of Completed Well

Depth to first water 65 (Feet below surface)

Depth to Static Water Level 58 (Feet) Date Measured 09/25/2017

Estimated Yield* 15 (GPM) Test Type Air Lift

Test Length 4 (Hours) Total Drawdown 122 (feet)

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

Geologic Log - Free Form

Depth from Surface Feet to Feet		Description
0	5	top soil
5	44	brown fractured sandstone
44	61	shale
61	164	hard serpintine sandstone mix
164	180	soft 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	40	Blank	Low Carbon Steel	Grade: ASTM A53	0.188	6			
1	40	160	Screen	Low Carbon Steel	Grade: ASTM A53	0.188	6	Milled Slots	0.05	
1	160	180	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	180	Filter Pack	Other Gravel Pack	3/8"	Pea Gravel

Other Observations:

Borehole Specifications

Depth from Surface Feet to Feet		Borehole Diameter (inches)
0	180	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 (Address) | HYDESVILLE (City) | CA (State) | 95547 (Zip)

Signed: *electronic signature received* (C-57 Licensed Water Well Contractor) | 10/24/2017 (Date Signed) | 683865 (C-57 License Number)

Attachments

/WellReport_20171109_131419.pdf - WCR Final

Scan.pdf - Location Map

DWR Use Only

CSG #	State Well Number	Site Code	Local Well Number

N — Latitude Deg/Min/Sec

W — Longitude Deg/Min/Sec

TRS:

APN:

Humboldt County, South Part, California

5508—Canoecreek-Coyoterock-Sproulish complex, 15 to 50 percent slopes

Map Unit Setting

National map unit symbol: 2qds2
Elevation: 200 to 2,790 feet
Mean annual precipitation: 49 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

Canoecreek and similar soils: 35 percent
Sproulish and similar soils: 25 percent
Coyoterock and similar soils: 25 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Canoecreek

Setting

Landform: Ridges, mountain slopes
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Mountaintop, mountainflank
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Colluvium derived from sandstone and/or mudstone and/or residuum weathered from mudstone and/or sandstone

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A1 - 1 to 4 inches: gravelly loam
A2 - 4 to 8 inches: gravelly loam
Bt1 - 8 to 16 inches: very gravelly loam
Bt2 - 16 to 37 inches: very gravelly loam
C - 37 to 79 inches: extremely gravelly sandy loam

Properties and qualities

Slope: 15 to 50 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: High
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

Description of Coyoterock

Setting

Landform: Mountain slopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Colluvium derived from mudstone and/or sandstone

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A1 - 1 to 7 inches: loam
A2 - 7 to 11 inches: loam
Bt1 - 11 to 22 inches: clay loam
Bt2 - 22 to 35 inches: clay loam
Bt3 - 35 to 51 inches: clay loam
BCt - 51 to 71 inches: paragravelly clay loam

Properties and qualities

Slope: 15 to 50 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 28 to 39 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 9.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: F004BI106CA - High precipitation mountain slopes
Hydric soil rating: No

Minor Components

Yorknorth, moist

Percent of map unit: 7 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

Kingrange

Percent of map unit: 5 percent
Landform: Mountain slopes
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Rock outcrop

Percent of map unit: 3 percent
Landform: Mountain slopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Center third of mountainflank
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Data Source Information

Soil Survey Area: Humboldt County, South Part, California
Survey Area Data: Version 12, Sep 2, 2022