LINDBERG GEOLOGIC CONSULTING
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RECEIVED
OCT 12 2022
Humboldt County
PLANNING

August 31, 2022

Project No: 0481.00

Mr. Erik Sordal
2248 Rundown Acres Lane
Bridgeville, California 95526

Subject: Hydrologic Isolation of Existing Well from Surface Waters, Well Number One
2238 Run Down Acres Lane, Bridgeville, APN: 210-054-008, WCR2022-005784

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. Tributaries in the vicinity of this well drain to Butte Creek (Figure 1). A California-Certified Engineering Geologist visited this site on June 10, 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 understand that the applicant hopes to use water from this well to irrigate cannabis. At the time of our visit this well was not in use. 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 the Humboldt County WebGIS and the Assessor's Parcel Map (Figure 2), parcel 210-054-008 (Figure 2) encompasses approximately 187 acres. Our GPS located the subject well at latitude 40.44203° north, and longitude 123.68485 west (±9'). This well is in Section 23, T1N, R4E, HB&M, and is 180 feet deep with the wellhead at an elevation of approximately 2,485 feet (Figure 1 and 2).

The Humboldt County WebGIS shows two ephemeral tributaries of Butte Creek, the nearest is more than 310 feet southeast of the well, while the other ephemeral stream is more than 640 feet northwest of the well (Figure 1). The property owner reported that both ephemeral streams are dry by mid-July. As stated, based on interpolation from the USGS "Larabee Valley, Calif." (1977), topographic quadrangle map (Figure 1), and the Humboldt County WebGIS, the well site elevation is 2,485 feet. The elevation of the ephemeral watercourse to the southeast is approximately 2,475 feet and the elevation of the ephemeral watercourse to the northwest is also approximately 2,475 feet. The well bottom elevation of the well is approximately 2,305 feet, making the nearest ephemeral watercourses 170 feet higher 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 May 2022, under Humboldt County well permit #20/21-1185. Fisch Drilling is a

licensed well-drilling contractor (C-57 #683865). They submitted their well completion report (DWR 188) on May 23, 2022 (attached). The driller estimated a yield of 8 gpm in May 2022, based on a 4-hour air lift pump test. Total drawdown during the pump test was 10 feet.

Again, total drilled depth of this well is 180 feet. The borehole diameter is 10-inches from grade to 180-feet. From the surface to 50 feet, a 6-inch diameter low carbon steel surface casing (unslotted) was installed. From 50- to 120-feet, 6-inch diameter low carbon steel well screen was installed. From 120-feet to total depth, 6.0-inch blank low carbon casing was installed. Per County requirements, a bentonite surface sanitary seal was installed from the surface to 20 feet; this makes the effective bottom of the well 120 feet below the ground surface (bgs). The driller filled the annulus with 3/8-inch pea gravel to total depth. The well is cased and sealed through any potential shallow subsurface aquifers. Depth to first water was reported to be at 21 feet below the surface, and depth to static water in the completed developed well was reported to be 20 feet bgs when the driller conducted the pump test on May 17, 2022.

From the well, the nearest spring is mapped in Section 26 (Figure 1), approximately 2,900 feet to the southwest across the western ephemeral tributary of Butte Creek, at an elevation of 2,580 feet. The Larabee Valley topographic map shows another spring in Section 23, approximately 3,990 feet northwest of the well at an estimated elevation of 2,520 feet, per the WebGIS.

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 broken formation of the Central Belt of the Franciscan Complex, as shown in Figure 4.

The near-surface soils are thin and gravelly and are composed predominantly of loam, or silty fine sand with gravel. The near-surface soils also contain a ~12 to 20 percent clay. Soils, based on our explorations, are interpreted to be uniformly distributed across the flat valley floor portion of the subject parcel. In the areas explored, the soil profile consisted of approximately 1 foot of topsoil. Beneath this thin topsoil, soils are sandy loam to a depth of approximately 4. 5 feet where they are underlain by coarse sandy gravel.

Materials reported on the geologic log of the driller's well completion report (attached) include a foot of "Top Soil" above 11-feet (1-foot to 12-feet) of "Brown Silty Clay". Beneath the brown silty clay lies 7-feet of "Brown Stick Clay" (12- to 19-feet), below which the driller logged 2-feet of "Brown Sand". The 2-foot brown sand overlies the water-bearing unit, the "Blue Sandstone Gravel" from 21-feet to 33-feet. From 33-feet to 52-feet 19-feet of "Shale Clay" was logged. The interval from 52-feet to 147-feet (95-feet) the driller logged "Grey Rock/Fractured Shale". In the final 33-feet, from 147- feet to 180 feet, "Franciscan Shale Clay' was logged.

We interpret the upper clayey section of the soil profile in this well, from grade to 19 feet, to be an aquitard, a material of low permeability and transmissivity. Sandy and gravelly materials below 19 feet are expected to be porous and permeable, and the blue sandstone gravel at 21 feet appears to be the first water-bearing aquifer material tapped by this well. From 52 feet to 147 feet, we interpret the gray rock and fractured shale unit to be another aquifer. Fractured shale and gray rock should have a higher transmissivity and permeability than would be typical of an unfractured shale interbedded with fine sandstone. At the location of the subject well, the elevation of the water-bearing aquifer unit is thus between approximately 2,464 feet and 2,338 feet, based on the reported lithologies, and the perforated zone, in the driller's report.

Below the surface soils and the underlying fluvial alluvium, the earth materials encountered in the boring are Broken Formation 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 constitute significant aquifers. We interpret the sequence of shale clay (etc.) described by the driller below 33 feet, as lithologies within the central belt broken formation (cb1) of the Franciscan Complex. The gray rock and fractured shale section of the boring, from 52 to 147 feet, apparently has a favorable hydraulic conductivity, making it, in our interpretation, the primary water bearing unit 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 fluvial alluvium 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 Complex from each other hydrologically and limiting groundwater flow between these 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 feet and rose to a static level at 20 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. In nearby test pits, excavated for another project, we found groundwater to be 8.5 feet bgs in January (2021). The bentonite-sealed surface casing isolates the well bore from surface and shallow subsurface water infiltration into the deeper water-bearing aquifers. 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 to 147 feet), as well as its position relative to the nearest adjacent ephemeral watercourses and surface waters in the vicinity, we conclude that the depth of the surface seal, combined with the 19 feet of blue clay, are sufficient to preclude the potential for hydraulic connectivity with surface waters, of which there

are none closer than 310 feet in the ephemeral tributary of Butte Creek. Thus, the water source from which this well draws appears to be a confined 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.

The driller estimated the yield of this well at 8 gallons per minute (gpm) on May 1, 2022. Total drawdown was reported to be 10 feet after Fisch Drilling's four-hour air-lift pump test. At 8 gpm, this well would potentially produce 11,520 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 the local ephemeral tributaries to Butte Creek, which only flow for a limited period during the winter and spring and then go dry. Nor does this well appear to be hydrologically connected to any local springs or ephemeral wetlands. 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, springs, and ponds, on-site the potential for significant hydrologic connectivity between surface waters and groundwater in the deeper alluvial and bedrock aquifers appears low. Further, given the apparently limiting condition of 19 feet of low-transmissivity brown silty and sticky clay above the water-bearing shale units, the aquifer is likely isolated from, and not significantly hydraulically connected to any other aquifer(s).

As mentioned, on the Larabee Valley USGS topographic quadrangle map, there is one spring mapped in the southeast quarter of the northwest quarter of Section 23, more than 3,990 feet northwest of the subject well. There is another mapped spring in the east half of the northwest quarter of Section 26, more than 2,880 feet southwest of the well at an estimated elevation of 2,580 feet. There do not appear to be any other significant springs or wetlands mapped within 1,000 feet of this subject well. The owner does have a legacy stock pond approximately 300 feet to the south of the well on APN 210-071-001. We interpret the pond to be sufficiently sealed to preclude significant seepage, and as such it would not be connected hydrologically to the confined aquifer tapped by well 005784.

We researched the California Department of Water Resources (DWR) database to determine if there were other wells within 1,000 feet of the subject well. Based on the information available at the present time, there are no wells which meet this criterion, however, WCR2018-011332 in Section 24, on APN 210-054-008, is 1,002 feet west of the subject well, so we consider it here. Well 011332 encountered similar stratigraphy, and is a 6-inch, 6 gpm well, 140 feet in depth, screened from 40 to 85 feet. Well 011332 first encountered water at 24 feet, and the static water level was 30 feet bgs on December 13, 2018. Both well WCR2022-005784 (subject well), and well WCR2018-011332, the nearest well (1,002' west of the subject well) are on the same parcel and are under the same ownership and control.

Wells WCR2022-005784 and WCR2018-011332 are situated across the groundwater gradient from each other. As groundwater mimics topography and responds to the force of gravity, in general it will flow down slope in a direction subparallel to topography. The ground surface slopes to the northeast and the groundwater surface does approximately the same and flows to the northeast, toward the axis of Little Larabee Valley. At the time of our visit the subject well was not in use.

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

The Natural Resources Conservation Service's (NRCS), online Web Soil Survey, shows the subject well within soils of the Frostvalley-Mulecreek complex, on slopes of 2 to 9 percent, (#1002, Figure 7), which the NRCS describes as well-drained. The site is also classified as "Farmland of statewide significance". The Web Soil Survey unit description is attached to this report. Mean annual precipitation in the area is listed by the NRCS as 64 to 76 inches per year. Capacity of the most limiting soil layer to transmit water (Ksat) is described as moderately high to high (0.57 to 2.00 in/hr) with a depth to the water table of greater than 80 inches. If, during the wet season, just ten percent of the "low end" 64 inches of precipitation is absorbed by the soils and does not flow across the surface and into local watercourses, then approximately 100 acre-feet, or 32.5 million gallons of water per year, may be expected to recharge the local aquifer below this 187-acre subject property.

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 2238 Run Down Acres Lane, Bridgeville, 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 order states that counties, cities, and other public agencies are 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*

(650,000+ gallons) *of groundwater for individual domestic users, or that will exclusively provide groundwater to public water supply systems.*"

Based on our observations, research, and professional experience, it is our professional opinion that the well on APN 210-054-008, on 2238 Run Down Acres Lane, has a minimal likelihood of being hydrologically connected to nearby surface waters or wells in any manner that might significantly impact or 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

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

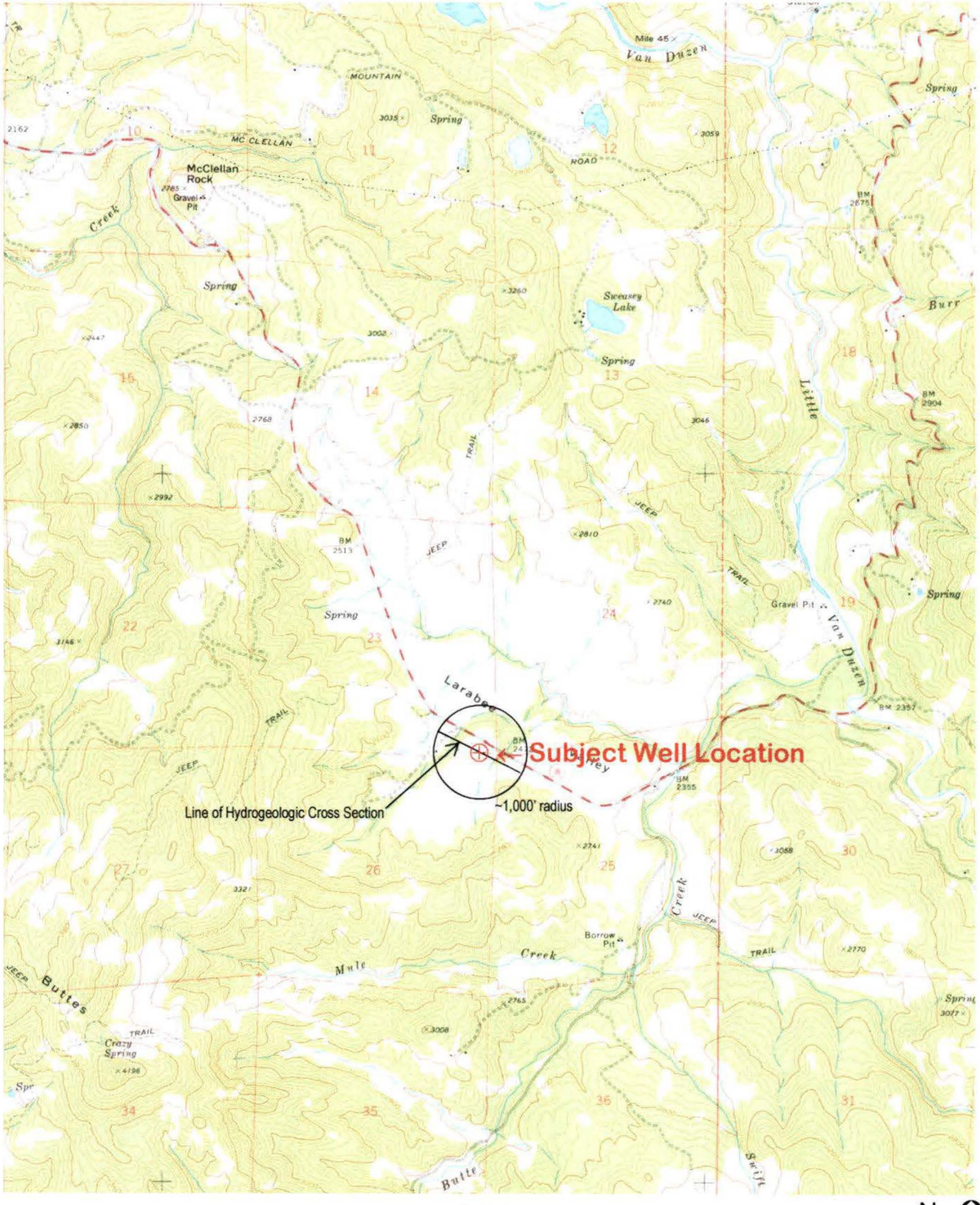
Attachments:

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:
WCR2022-005784, APN: 210-054-008 (Subject Well)
WCR2018-011332, APN: 210-054-008 (1,005 feet to northwest)

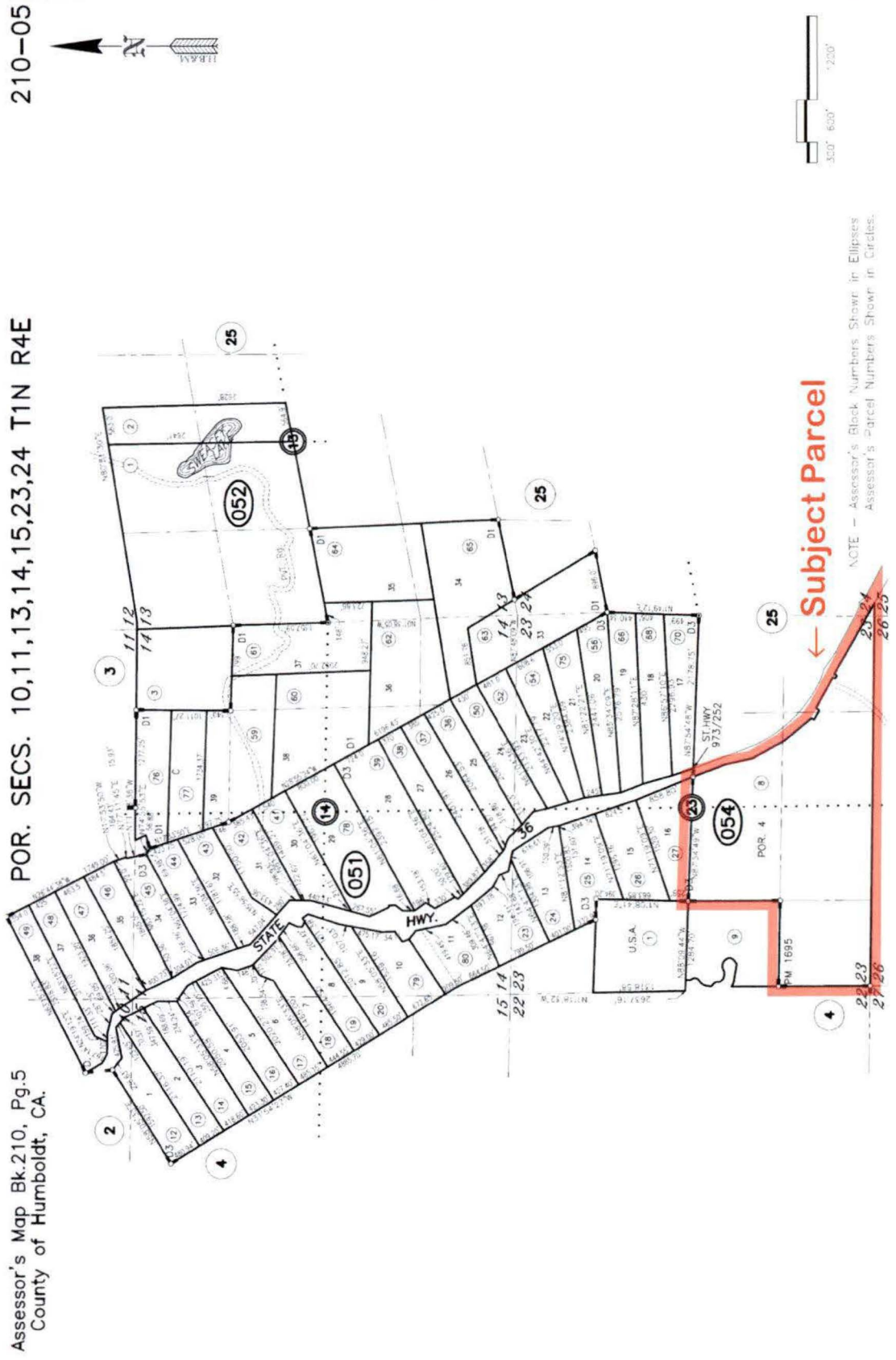
Web Soil Survey, NRCS Map Unit Description:
Frostvalley-Mulecreek complex, #1002, 2 to 9 percent slopes.

Lindberg Geologic Consulting	Engineering-Geologic Well Connectivity Assessment Report	Figure 1
Post Office Box 306	2238 Run Down Acres Lane, Bridgeville, California	August 31, 2022
Cutten, CA 95534	APN 210-054-008, Mr. Erik Sordal, Client	Project 0481.00
(707) 442-6000	Topographic Well Location Map (locations approximate)	1" ≈ 2,900'



Modified from: USGS "Larabee Valley, Calif." 7.5' Quadrangle Map (1977). N ≡

Lindberg Geologic Consulting	Engineering-Geologic Well Connectivity Assessment Report	Figure 2
Post Office Box 306	2238 Run Down Acres Lane, Bridgeville, California	August 31, 2022
Cutten, CA 95534	APN 210-054-008, Mr. Erik Sordal, Client	Project 0481.00
(707) 442-6000	Humboldt County Assessor's Parcel Map (locations approximate)	Scale as Shown

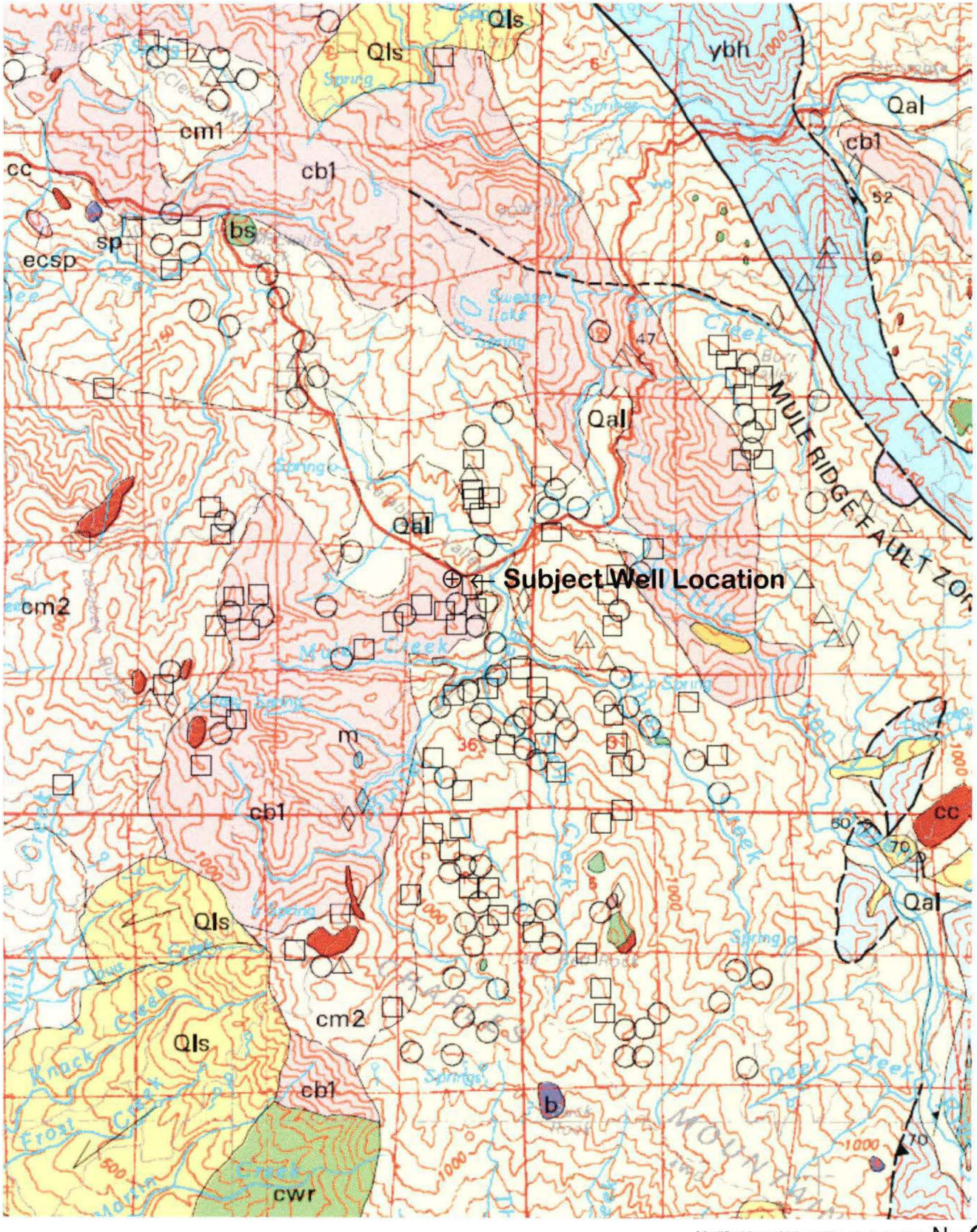


Lindberg Geologic Consulting	Engineering-Geologic Well Connectivity Assessment Report	Figure 3
Post Office Box 306	2238 Run Down Acres Lane, Bridgeville, California	August 31, 2022
Cutten, CA 95534	APN 210-054-008, Mr. Erik Sordal, Client	Project 0481.00
(707) 442-6000	Satellite Image of Well Location (locations approximate)	1" ≈ 830'



Modified from: Google Earth Imagery of April 30, 2019. N ≈

Lindberg Geologic Consulting	Engineering-Geologic Well Connectivity Assessment Report	Figure 4
Post Office Box 306	2238 Run Down Acres Lane, Bridgeville, California	August 31, 2022
Cutten, CA 95534	APN 210-054-008, Mr. Erik Sordal, Client	Project 0481.00
(707) 442-6000	Geologic Map (locations approximate)	1" ≈ 4,750'



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

Lindberg Geologic Consulting	Engineering-Geologic Well Connectivity Assessment Report	Figure 4a
P. O. Box 306	2238 Run Down Acres Lane, Bridgeville, California	August 31, 2022
Cutten, CA 95534	APN 210-054-008, Mr. Erik Sordal, Client	Project 0481.00
(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)
- Ti — 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)
- m — Undivided blueschist (Jurassic?)

King Range terrane (Miocene to Late Cretaceous)

- Krp — Igneous and sedimentary rocks of Point Delgada (Late Cretaceous)
- m — 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)
- 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 — 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 — Taliaferro 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
- whji — 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:

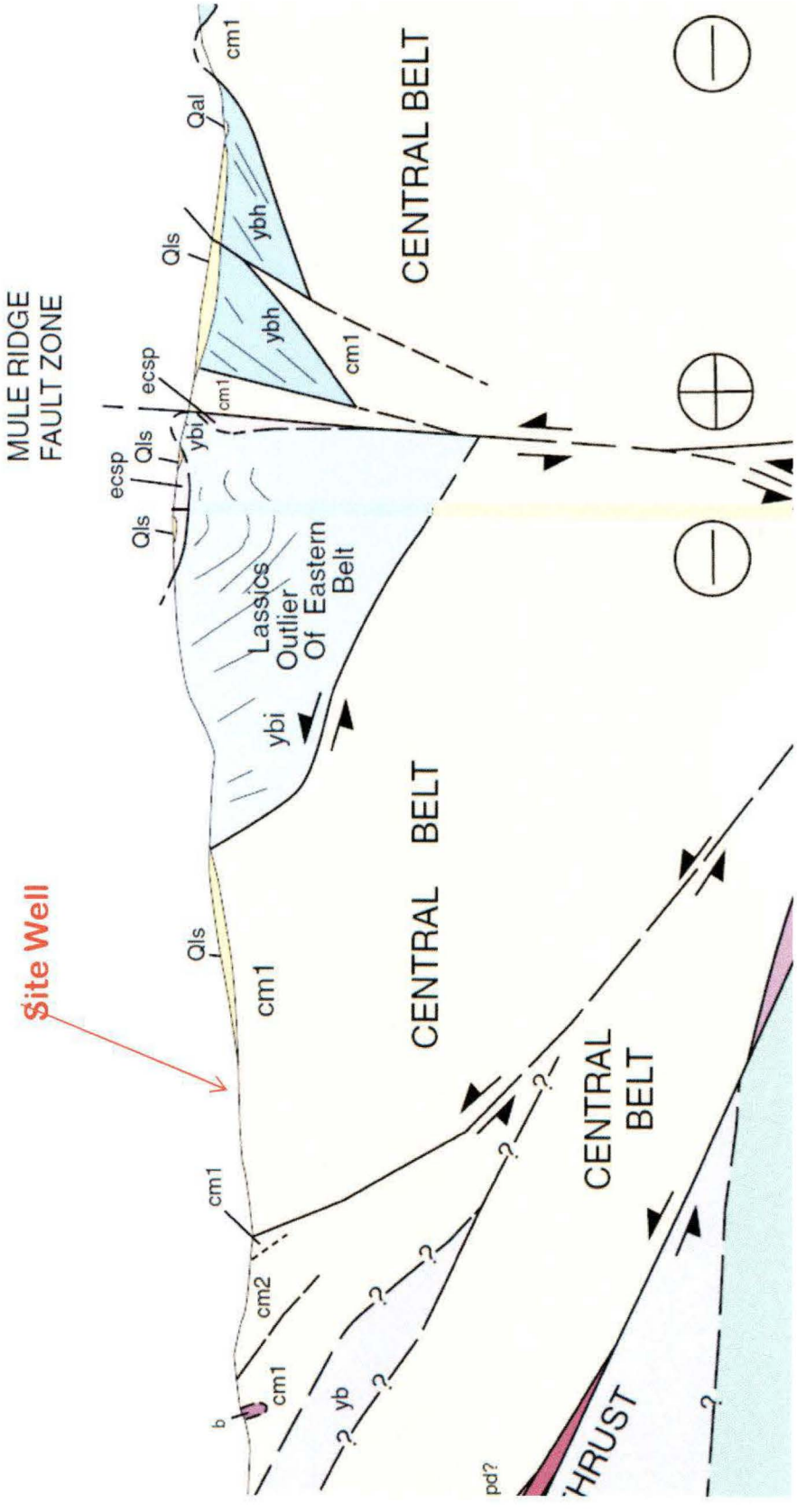
- Inclined
- Vertical

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	2238 Run Down Acres Lane, Bridgeville, California	August 31, 2022
Cutten, CA 95534	APN 210-054-008, Mr. Erik Sordal, Client	Project 0481.00
(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 down slope toward the northeast. Groundwater flow in the 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 southwest, to the northeast toward Larabee Valley and the unnamed tributary of Butte Creek. Bedrock subgrade is presumed to be composed of abundantly fractured Broken Formation (cb1) of the Central Belt of the Franciscan Complex. These deposits are one of several components of the Central Belt Franciscan Complex. Groundwater is envisioned as flowing through fractured zones in the Broken Formation. Fractures are interpreted to be the primary preferential flow paths for groundwater in this area.

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Engineering-Geologic Well Connectivity Assessment Report
2238 Run Down Acres Lane, Bridgeville, California
APN 210-054-008, Mr. Erik Sordal, Client
Hydrogeologic Cross Section (locations approximate)

Figure 6
August 31, 2022
Project 0481.00
V. E. ≈ 2

Lindberg Geologic Consulting	Engineering-Geologic Well Connectivity Assessment Report	Figure 7
Post Office Box 306	2238 Run Down Acres Lane, Bridgeville, California	August 31, 2022
Cutten, CA 95534	APN 210-054-008, Mr. Erik Sordal, Client	Project 0481.00
(707) 442-6000	USDA-NRCS Soils Map (locations approximate)	Not Determined



Modified from: USG-NRCS Web Soil Survey, August 31, 2022 N ≈

State of California

Well Completion Report

Form DWR 188 Submitted 5/23/2022

WCR2022-005784

Owner's Well Number | Date Work Began 05/16/2022 | Date Work Ended 05/19/2022

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

Secondary Permit Agency | Permit Number 20/21-1185 | Permit Date 09/20/2021

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

Name 4 WHEEL PROPERTIES,

Mailing Address P.O Box 202

City Carlotta State CA Zip 95528

Planned Use and Activity

Activity New Well

Planned Use Water Supply Domestic

Well Location

Address 2238 Run Down Acres RD

City Bridgeville Zip 95526 County Humboldt

Latitude 40 Deg. 26 Min. 31.3439 Sec. N Longitude -123 Deg. 41 Min. 5.388 Sec. W

Dec. Lat. 40.44204 Dec. Long. -123.68463

Vertical Datum | Horizontal Datum WGS84

Location Accuracy | Location Determination Method

APN 210-054-008

Township 01 N

Range 04 E

Section 23

Baseline Meridian Humboldt

Ground Surface Elevation

Elevation Accuracy

Elevation Determination Method

Borehole Information

Orientation Vertical Specify

Drilling Method Downhole 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 21 (Feet below surface)

Depth to Static Water Level 20 (Feet) Date Measured 05/17/2022

Estimated Yield* 8 (GPM) Test Type Air Lift

Test Length 4 (Hours) Total Drawdown 10 (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	12	Brown Silty Clay
12	19	Brown Sticky Clay
19	21	Brown Sand
21	33	Blue Sandstone Gravel
33	52	Shale Clay
52	147	Grey Rock/Fractured Shale
147	180	Franciscan Shale Clay

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	50	Blank	Low Carbon Steel	Grade: ASTM A53	0.188	6			
1	50	120	Screen	Low Carbon Steel	Grade: ASTM A53	0.188	6	Milled Slots	0.05	
1	120	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
0	180	Filter Pack	Other Gravel Pack	3/8 inch	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 | HYDESVILLE | CA | 95547
Address | City | State | Zip

Signed: *electronic signature received* | 05/23/2022 | 683865
C-57 Licensed Water Well Contractor | Date Signed | C-57 License Number

Attachments

Location Map.jpg - 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:

State of California

Well Completion Report

Form DWR 188 Submitted 12/13/2018

WCR2018-011332

Owner's Well Number | Date Work Began 12/06/2018 | Date Work Ended 12/13/2018

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

Secondary Permit Agency | Permit Number 18/19-0191 | Permit Date 09/04/2018

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

Name 4 WHEEL PROPERTIES, LLC, Eric Sordal

Mailing Address P.O. Box 202

City Carlotta State CA Zip 95528

Planned Use and Activity

Activity New Well

Planned Use Water Supply Irrigation - Agriculture

Well Location

Address 2248 Run Down Acres RD

City Bridgeville Zip 95526 County Humboldt

Latitude 40 Deg. 26 Min. 33 Sec. N Longitude -123 Deg. 41 Min. 18.24 Sec. W

Dec. Lat. 40.4425 Dec. Long. -123.6884

Vertical Datum | Horizontal Datum WGS84

Location Accuracy | Location Determination Method

APN 210-054-008

Township 01 N

Range 04 E

Section 23

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 140 Feet

Total Depth of Completed Well 140 Feet

Water Level and Yield of Completed Well

Depth to first water 24 (Feet below surface)

Depth to Static Water Level 30 (Feet) Date Measured 12/13/2018

Estimated Yield* 6 (GPM) Test Type Air Lift

Test Length 4 (Hours) Total Drawdown 110 (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	9	brown silty clay
9	18	brown silt
18	28	brown fractured sandstone
28	58	blue fractured young sandstone
58	63	blue clay
63	78	blue fractured sandstone and red chirt
78	109	shale clay
109	140	blue clay and shale clay mix and serpintine

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	85	Screen	Low Carbon Steel	Grade: ASTM A53	0.188	6	Milled Slots	0.05	
1	85	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	30	Bentonite	Other Bentonite		Sanitary Seal
30	140	Filter Pack	Other Gravel Pack	3/8"	Pea Grave

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 | HYDESVILLE | CA | 95547
Address | City | State | Zip

Signed: *electronic signature received* | 12/13/2018 | 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						W

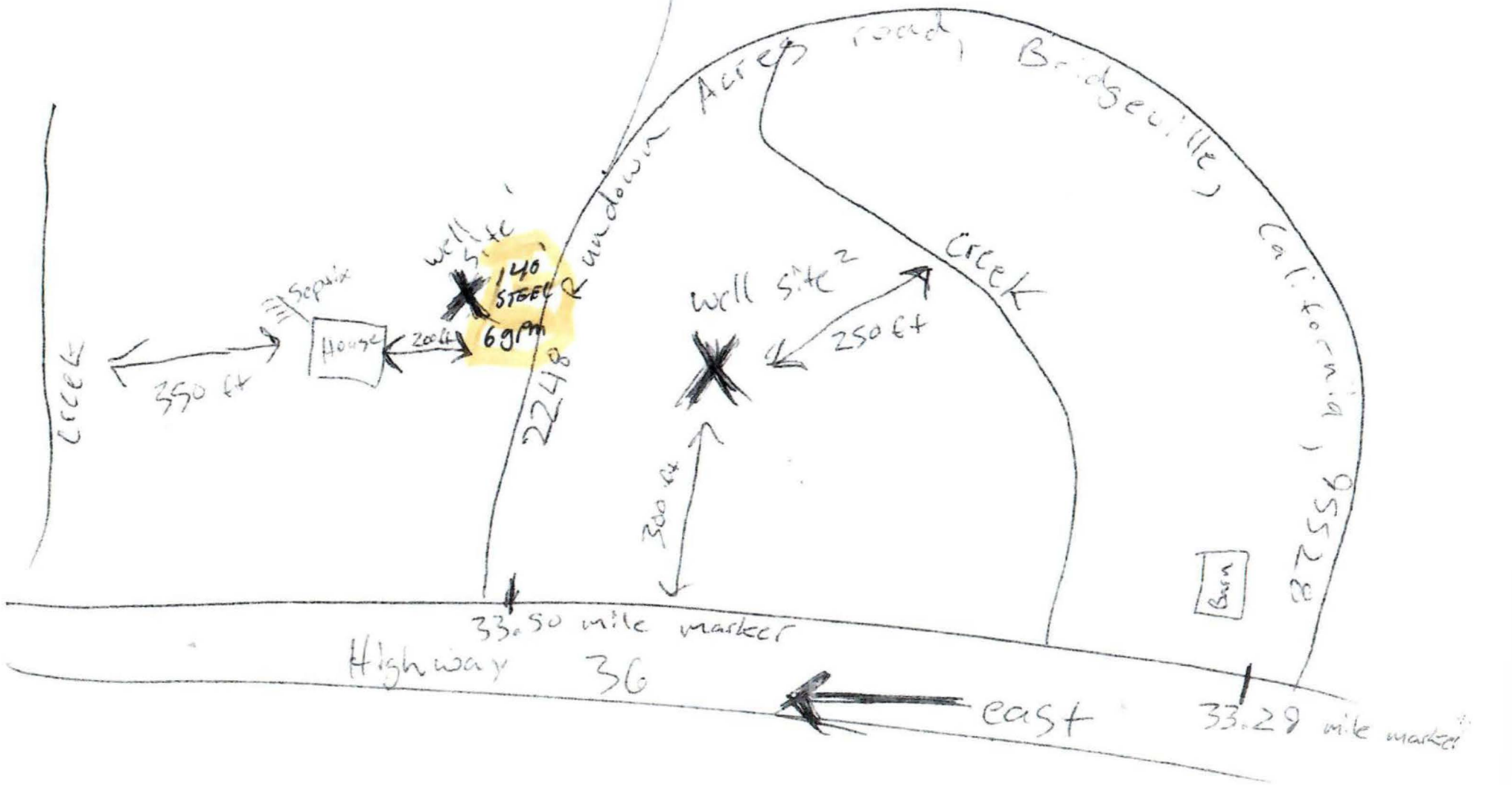
Latitude Deg/Min/Sec | Longitude Deg/Min/Sec

TRS:

APN:

2248 Run Down Acres

APN # 210-054-008. Driving east on Highway 36. on the right hand side. well① is to be 300 ft away from nearest leach lines, and 250 away from house, nearest property line 700 feet away which is Highway 36 well② is to be in the middle of a field 200 +ft away from any creek for both 1 and 2.



Humboldt County, Central Part, California

1002—Frostvalley-Mulecreek complex, 2 to 9 percent slopes

Map Unit Setting

National map unit symbol: 2sx6d
Elevation: 2,300 to 3,610 feet
Mean annual precipitation: 64 to 76 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 60 to 120 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Frostvalley and similar soils: 48 percent
Mulecreek and similar soils: 42 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Frostvalley

Setting

Landform: Terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from metasedimentary rock

Typical profile

Ap - 0 to 3 inches: loam
A - 3 to 20 inches: loam
AB - 20 to 35 inches: loam
Bw - 35 to 47 inches: gravelly loam
C - 47 to 79 inches: very gravelly loamy sand

Properties and qualities

Slope: 2 to 9 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 (0.57 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 9.9 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 3e

Hydrologic Soil Group: B
Ecological site: F005XZ003CA - Terraces
Hydric soil rating: No

Description of Mulecreek

Setting

Landform: Terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Parent material: Alluvium derived from metasedimentary rock

Typical profile

Ap - 0 to 4 inches: loam
A - 4 to 22 inches: loam
Bt1 - 22 to 30 inches: clay loam
Bt2 - 30 to 37 inches: clay loam
Bt3 - 37 to 55 inches: clay loam
BCt - 55 to 79 inches: clay loam

Properties and qualities

Slope: 2 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 20 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 11.1 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: F005XZ003CA - Terraces
Hydric soil rating: No

Minor Components

Pasturerock, dry

Percent of map unit: 5 percent
Landform: Mountain slopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave, convex, linear
Across-slope shape: Linear, concave, convex
Hydric soil rating: No

Rockyglen

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: Convex
Across-slope shape: Linear
Hydric soil rating: No

Data Source Information

Soil Survey Area: Humboldt County, Central Part, California
Survey Area Data: Version 7, Sep 6, 2021

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

September 19, 2022 Project No: 0481.00

Mr. Erik Sordal
2248 Rundown Acres Lane
Bridgeville, California 95526

Subject: Hydrologic Isolation of Existing Well from Surface Waters, Well Three
2248 Run Down Acres Lane, Bridgeville, APN: 210-071-001, WCR2019-011143

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. Tributaries in the vicinity of this well drain to Butte Creek (Figure 1). A California-Certified Engineering Geologist visited this site on June 10, 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 understand that the applicant hopes to use water from this well 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 the Humboldt County WebGIS and the Assessor's Parcel Map (Figure 2), parcel 210071-001 (Figure 2) encompasses approximately 341 acres. GPS located the subject well at latitude 40.43614° north, and longitude 123.69398 west (±9'). As reported by the driller, and as found by our office, this well is in Section 26, T1N, R4E, HB&M (Figure 1 and 2).

The Humboldt County WebGIS shows this well 290 feet southeast of an unnamed ephemeral stream of Butte Creek (Figure 1). The property owner reported that this ephemeral stream is typically dry by mid-July. Based on interpolation from the USGS "Larabee Valley, Calif." (1977), topographic quadrangle map (Figure 1), and the Humboldt County WebGIS, the elevation of this well site is 2,600 feet. At its nearest point, 290 feet northwest of this well, the elevation of this ephemeral stream of Butte Creek is estimated to be 2,580 feet. Elevation of the bottom of the well is 2,380 feet, making the nearest ephemeral watercourse to the northwest 200 feet higher than the bottom of this well.

This well is shown approximately located on the attached figures. This well was drilled by Fisch Drilling, of Hydesville, California, in July and August 2019, under Humboldt County well permit #19/20-0026. Fisch Drilling is a licensed well-drilling contractor (C-57 #683865). They submitted their well completion report (DWR 188) on August 8, 2019 (attached). The driller estimated a yield of 15 gpm in August 2019, based on a 4-hour air lift pump test, total drawdown was reported to be 135 feet.

Total drilled depth of this well is 220 feet. The borehole diameter is reported as 10-inches from the surface to total depth. From the surface to 40 feet 5.563-inch in diameter, blank PVC casing was installed. From 40-feet to 220-feet screened PVC casing, 5.563-inch in diameter, with milled slots (0.032-inches), was installed. Per County requirements, a bentonite surface sanitary seal was installed from the surface to 20 feet. From 20-feet to 220-feet the driller installed 3/8-inch pea gravel in the annulus. The well is thus cased and sealed through any potential shallow subsurface aquifers. Depth to first water while drilling was reported as 85 feet below grade, and depth to static water in the completed and developed well was reported to be 17 feet bgs when the driller conducted the pump test on August 8, 2019, indicating this the aquifer in this well is under some artesian pressure.

There is one spring mapped in Section 26 on the Larabee Valley topographic quadrangle map (Figure 1). From the well, the nearest mapped spring is approximately 880 feet to the north, and it flows to the ephemeral tributary of Butte Creek which then drains to the northeast , away from the subject well. Another spring is mapped more than a mile to the north, across two ephemeral tributaries of Butte Creek in Section 23. There are also two springs mapped in Section 34, southwest of the subject well; Crazy Spring is 1.4 miles to the southwest at an elevation of 3,900 feet. The other mapped spring in Section 34 is at an estimated elevation of 3,400 feet, across a divide, in the drainage of Mill Creek and Larabee Creek.

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 of the Central Belt of the Franciscan Complex, as presented in Figure 4.

The near-surface soils are thin and rocky and are composed predominantly of broken rock (gravel) with a silty fine sand matrix. The near-surface soils also appear to contain a significant percentage of clay. Soils, based on our explorations, are interpreted to be uniformly distributed across this portion of the subject parcel. In the areas explored, the soil profile consisted of approximately 6 to 12 inches (maximum) of gravelly topsoil. Beneath the topsoil, soils became increasingly rocky and clayey.

Materials reported on the geologic log of the driller's well completion report (attached) include 04-feet of "top soil", followed by 14-feet (4 to 18-feet) of "blue clay". Beneath the blue clay is 53feet (18 to 71-feet) of "soft shale" followed by 64-feet (71 to 135 feet) of "blue sandstone", which is the apparent water-bearing unit in this well and is therefore probably fractured. From 135-feet to 172-feet the driller logged "sandstone shale mix". In the last 48-feet, from 172-feet to 220-feet, "basalt" was logged.

We interpret the blue clay section of this profile, from four feet to 18 feet to be an aquitard, a material of low permeability and transmissivity. The soft shale materials from 18 feet to 71 feet

also appear to be an aquitard because water was not encountered until 85 feet, and when water was encountered it rose to 17 feet in the well suggesting the aquifer is confined by the soft shale unit. The water-bearing sandstone, and sandstone shale mix, units are probably fractured, providing them a higher transmissivity and permeability than would be typical of a shale. In the subject well, the elevation of the water-bearing aquifer unit is thus approximately 2,515 feet, based on the lithologies cited in the driller's report.

Below the surface soils, the earth materials encountered in the boring are central belt broken formation (cb1) of the Franciscan Complex, as mapped by McLaughlin et al (2000). McLaughlin described the broken formation (cb1) as consisting of "of bedded to massive, locally folded, rarely conglomeratic metasandstone and meta-argillite, with only minor amounts of highly sheared rocks. Exhibits sharp-crested topography with regular, well incised sidehill drainages." Folded, sheared, and fractured metasandstone rock materials can constitute significant aquifers. We interpret the underlying sequence of materials described by the driller (clay, shale, and sandstone), as lithologies of the central belt of the Franciscan Complex. The shale apparently has a low hydraulic conductivity, making it an aquitard, while the blue sandstone is, in our interpretation, the primary water bearing (aquifer) unit 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 hillslope colluvium and obscured by vegetation. We interpret the faults to be hydrologic boundaries of minimal permeability (due to grinding and shearing along the fault planes) which effectively separate units of the Franciscan Complex from each other, and limit groundwater flow between these 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 reported at 85 feet bgs (elevation 2,515'); the water level then rose to a static level of 17 feet bgs (elev. 2,583'). 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. The bentonite-sealed surface casing seals the well from surface and shallow subsurface water infiltration into the deeper aquifer(s). When considered with the stratigraphy and northeasterly plunge of the geologic structure, plus the distances (horizontal and vertically) from the nearest surface waters, and the depth of the producing zone of this well (~85 to 220 feet), as well as its position relative to the nearest adjacent watercourses and surface waters in Section 26, we conclude that the depth of the surface seal, combined with the 14-feet of blue clay, are sufficient to preclude the potential for hydraulic connectivity with surface waters, of which there are none closer than 290 feet in the ephemeral tributary of Butte Creek. Thus, the water source from which this well draws appears to be an artesian aquifer not connected to any surface

waters or unconfined, near-surface aquifer(s). This well appears, in our professional opinion, likely to be hydrologically isolated from nearby wells, surface waters, springs or wetlands.

The driller estimated the yield of this well at 15 gallons per minute (gpm) on August 8, 2019. Drawdown was reported as 135-feet after Fisch Drilling's four-hour air-lift pump test. At 15 gallons per minute, this well could potentially produce 21,600 gallons per day. As noted on the well completion report, this capacity may not be representative of this well's long-term yield. Additional testing would be necessary to estimate the sustainable long-term yield of the site well, however, estimating this well's sustainable long-term yield is beyond our scope of work.

This subject well does not appear to be hydrologically connected to, or capable of influencing surface water flows in the local ephemeral tributary of Butte Creek which only flows for a limited period during the wet season. This well does not appear to be hydrologically connected to any local springs or ephemeral wetlands. 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 springs and watercourses, the on-site the potential for significant hydrologic connectivity between surface waters and groundwater in the deeper artesian bedrock aquifer appears low. Further, given the apparently limiting condition of 67 feet of low-transmissivity blue clay and soft shale above the water-bearing metasandstone units, the aquifer appears isolated from and not hydraulically connected to other aquifer(s).

There do not appear to be any significant springs or wetlands mapped within 2,000 feet of this subject well. As discussed above, on the Larabee Valley USGS topographic quadrangle map, there is one spring mapped in Section 26, approximately 880 feet north of the subject well. Another spring is in the southeastern quarter of the northwest quarter of Section 23, more than one mile north of the subject well. Springs in Section 34 are more than 1.4 miles from the subject well.

We researched the California Department of Water Resources (DWR) database to determine if there were other wells within 1,000 feet of the subject well. Based on the information available at the present time, there is one well on the subject property in Section 26 which is within 1,000 feet of the subject well. WCR2017-005364 is more than 780 feet to the north-northeast on parcel 210071-001. This well site is owned by the same owner as 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 bedrock from source areas both proximal and distal to the well site. When flowing, the ephemeral streams in the vicinity of the will also contribute recharge.

The Natural Resources Conservation Service's (NRCS), online Web Soil Survey, shows the subject well within the Pasturerock-Coyoterock-Maneze complex, on slopes of 15 to 50 percent, (#4426, Figure 7), which is described as well-drained. The Web Soil Survey unit description is attached to this report. Mean annual precipitation in the area is listed by the NRCS as 56 to 80 inches per year. Capacity of the most limiting soil layer to transmit water (Ksat) is described as

moderately high (0.20 to 0.60 in/hr). If, during the wet season, ten percent of the "low end" 56 inches of precipitation is absorbed by the soils and does not flow across the surface and into local watercourses, then approximately 159 acre-feet, or 51.8 million gallons of water per year, may be expected to recharge the local aquifer below this 341-acre subject property. USGS research by the (Flint et al., 2013) partitions 33 percent of precipitation to recharge in northwestern California.

On March 28, 2022, Governor Newsom issued an executive order (N-7-22) relating to the ongoing drought in California. In his executive order, 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 2248 Run Down Acres Lane, Bridgeville, 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 Order further states that counties, cities, and other public agencies are 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* (~650,000 gallons) *of groundwater for individual domestic users, or that will exclusively provide groundwater to public water supply systems*."

Based on our observations, research, and professional experience, it is our professional opinion that well WCR2019-011143 on APN 210-071-001, at 2248 Run Down Acres Lane, has a low likelihood of being hydrologically connected to nearby surface waters or wells in any manner that might significantly impact or 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:

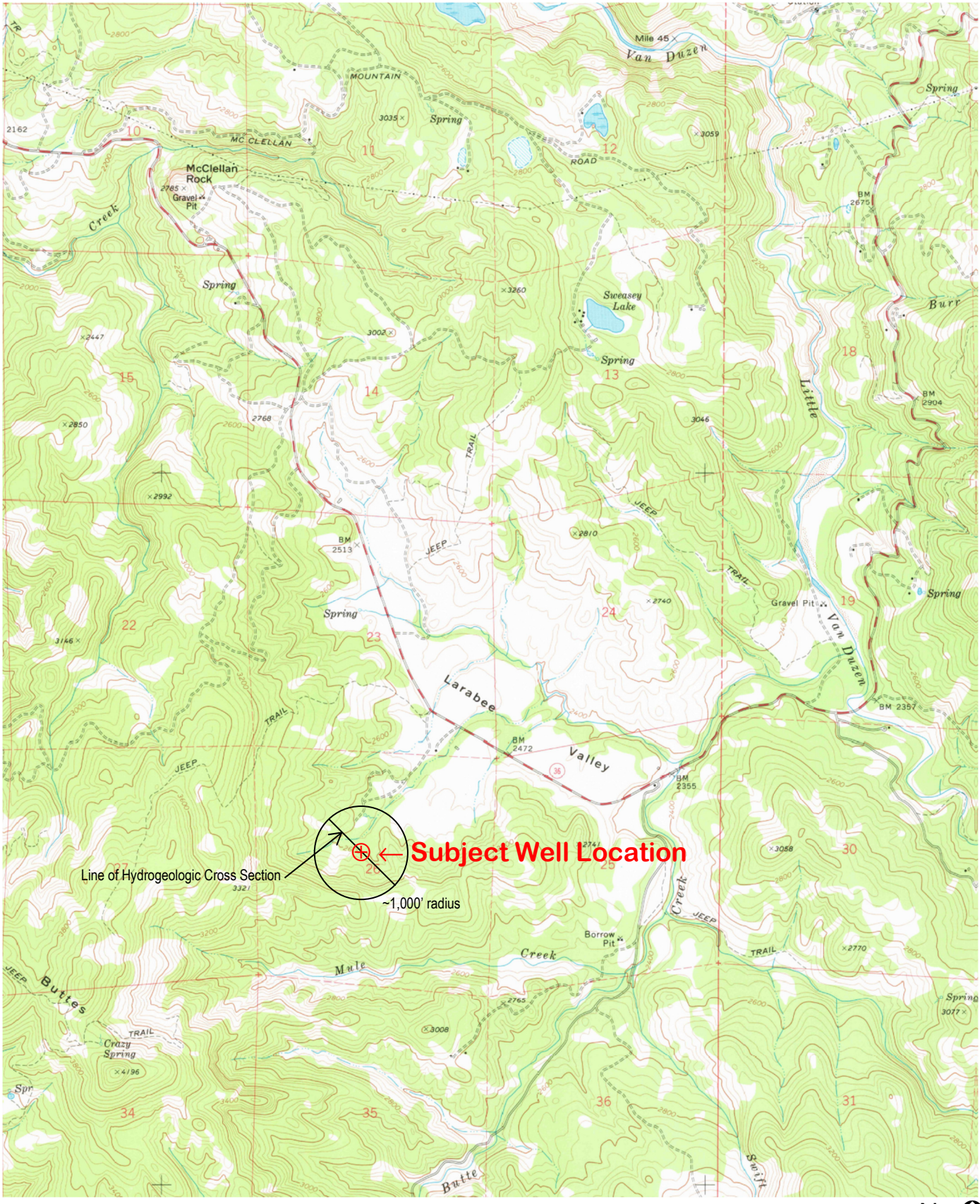
Figure 1: Topographic Well Location Map
Figure 2: Humboldt County Assessor's Parcel Map
Figure 3: Satellite Image of Well Locations
Figure 4: Geologic Map
Figure 4a: Geologic Map Explanation
Figure 5: Geologic Cross Section
Figure 6: Hydrogeologic Cross Section
Figure 7: USDA-NRCS Soil Map

State of California Well Completion Report:
WCR2019-011143, APN: 210-071-001 (Subject Well)
WCR2017-005364, APN: 210-071-001 (780+ feet to northeast)

Web Soil Survey, NRCS Map Unit Description:
Pasturerock-Coyoterock-Maneze complex, 15 to 50 percent slopes, dry; #4426

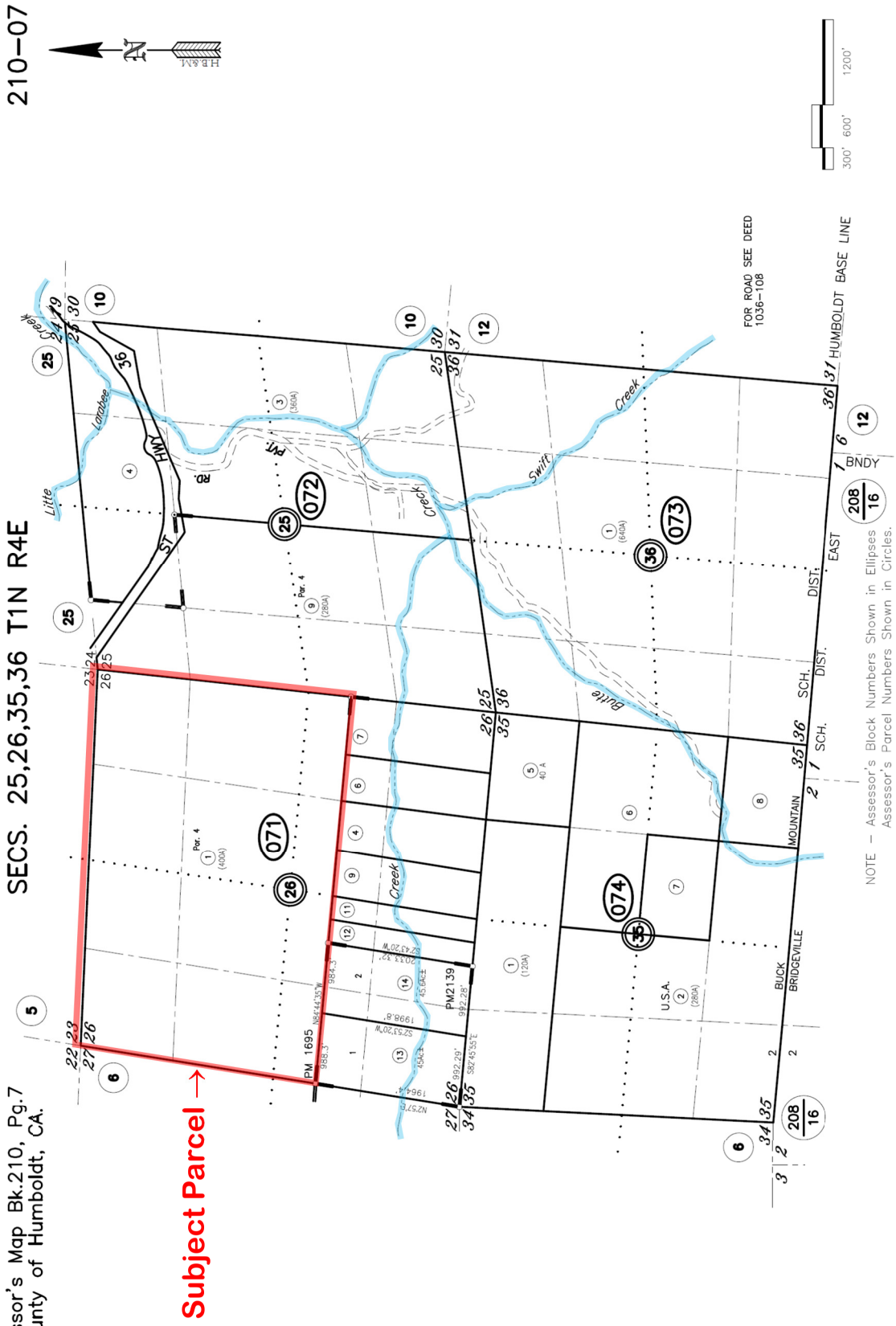
Reference:
Flint et al.: Fine-scale hydrologic modeling for regional landscape applications: the California Basin Characterization Model development and performic. Ecological Process, 2013, 2:25. (doi:10.1186/2192-1709-2-25)

Lindberg Geologic Consulting	Engineering-Geologic Well Connectivity Assessment Report	Figure 1
Post Office Box 306	2248 Run Down Acres Lane, Bridgeville, California	September 19, 2022
Cutten, CA 95534	DWR Well 2019-011143, APN 210-071-001, Mr. Erik Sordal, Client	Project 0481.00
(707) 442-6000	Topographic Well Location Map (locations approximate)	1" ≈ 2,900'

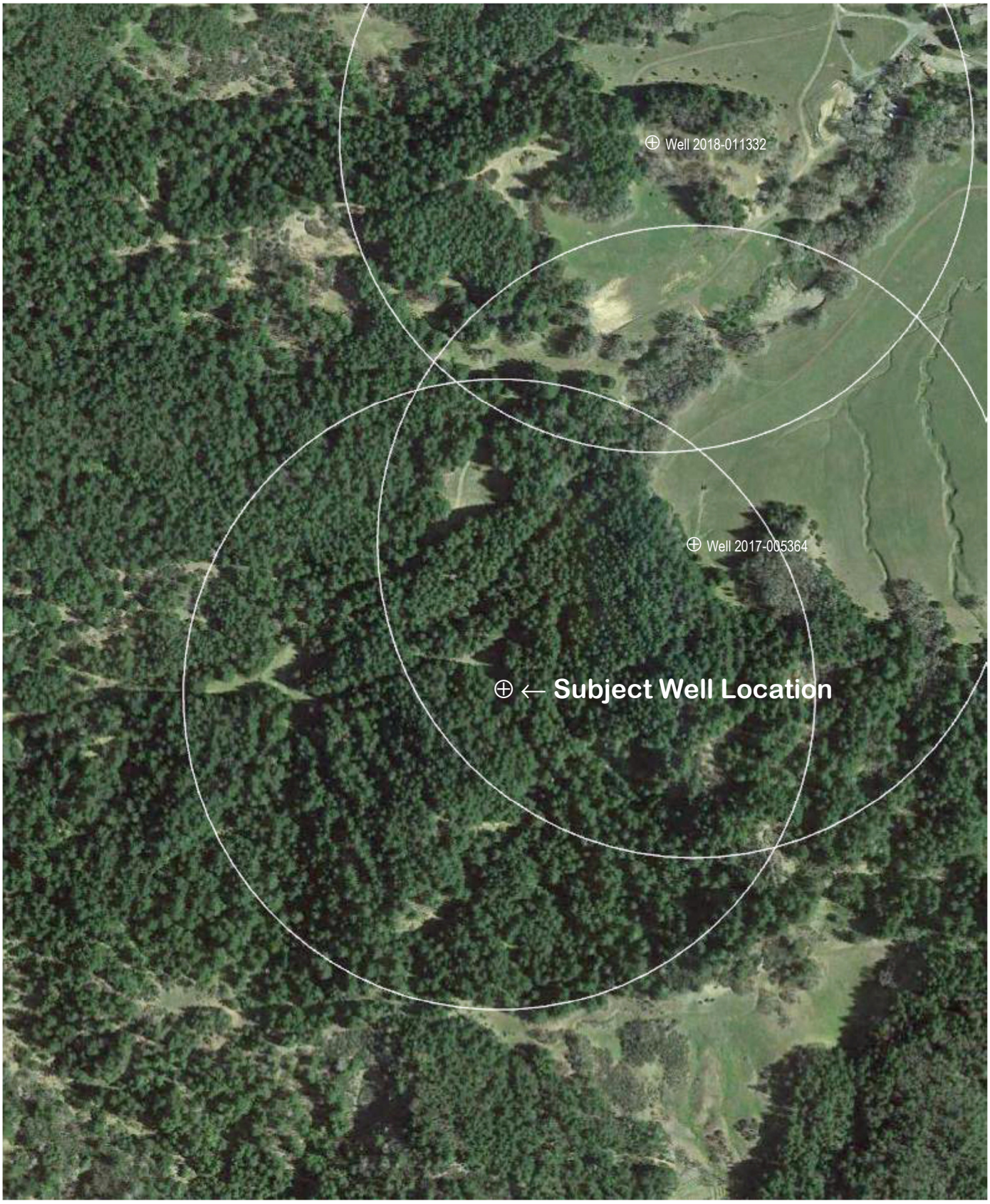


Modified from: USGS "Larabee Valley, Calif." 7.5' Quadrangle Map (1977). N ≅

Lindberg Geologic Consulting	Engineering-Geologic Well Connectivity Assessment Report	Figure 2
Post Office Box 306	2248 Run Down Acres Lane, Bridgeville, California	September 19, 2022
Cutten, CA 95534	DWR Well 2019-011143, APN 210-071-001, Mr. Erik Sordal, Client	Project 0481.00
(707) 442-6000	Humboldt County Assessor's Parcel Map (locations approximate)	Scale as Shown

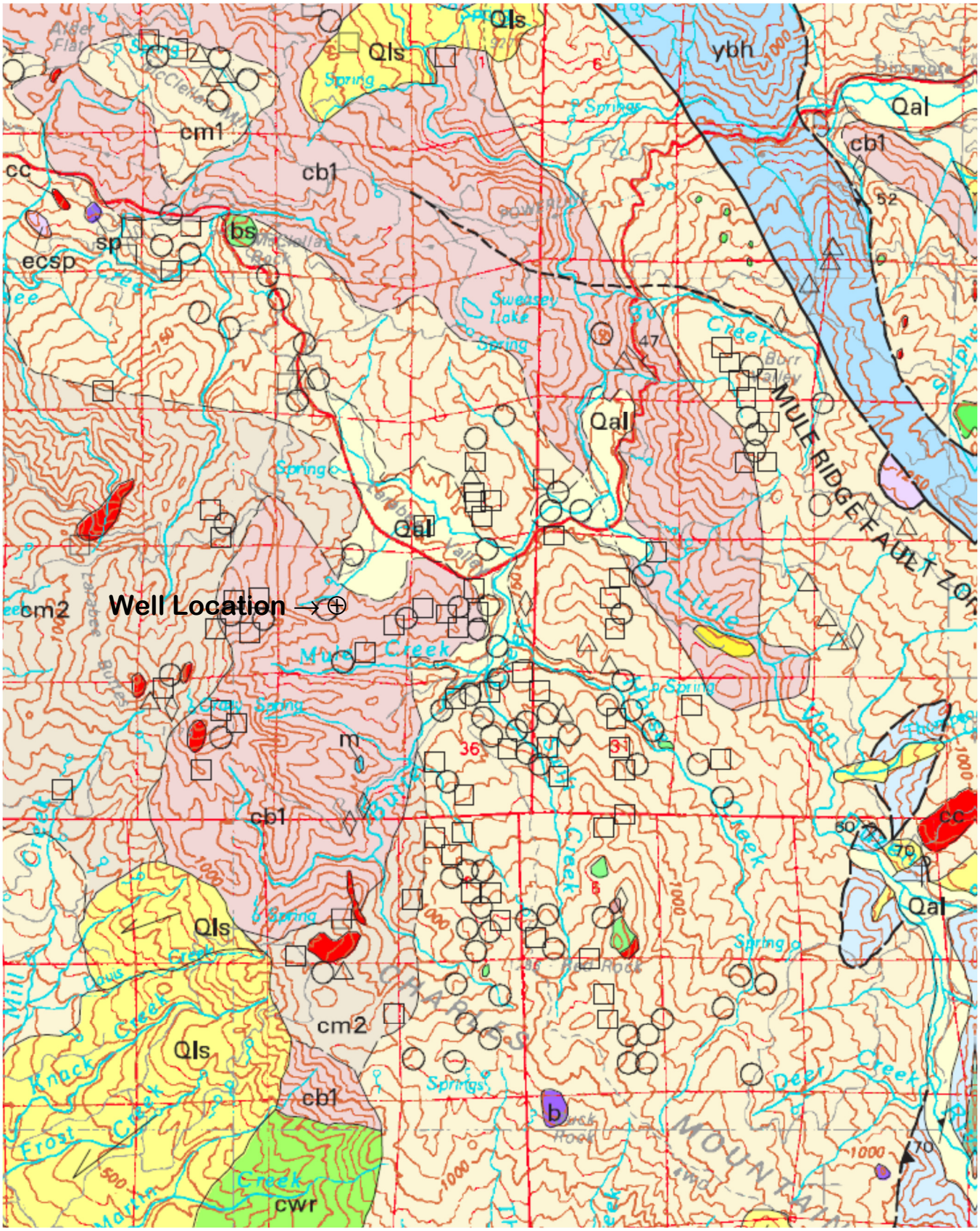


Lindberg Geologic Consulting	Engineering-Geologic Well Connectivity Assessment Report	Figure 3
Post Office Box 306	2248 Run Down Acres Lane, Bridgeville, California	September 19, 2022
Cutten, CA 95534	DWR Well 2019-011143, APN 210-071-001, Mr. Erik Sordal, Client	Project 0481.00
(707) 442-6000	Satellite Image of Well Locations (locations approximate)	1" ≈ 830'



Modified from: Google Earth Imagery of April 30, 2019. N ≈

Lindberg Geologic Consulting	Engineering-Geologic Well Connectivity Assessment Report	Figure 4
Post Office Box 306	2248 Run Down Acres Lane, Bridgeville, California	September 19, 2022
Cutten, CA 95534	DWR Well 2019-011143, APN 210-071-001, Mr. Erik Sordal, Client	Project 0481.00
(707) 442-6000	Geologic Map (locations approximate)	1" ≈ 4,750'



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

Lindberg Geologic Consulting	Engineering-Geologic Well Connectivity Assessment Report	Figure 4a
P. O. Box 306	2248 Run Down Acres Lane, Bridgeville, California	September 19, 2022
Cutten, CA 95534	DWR Well 2019-011143, APN 210-071-001, Mr. Erik Sordal, Client	Project 0481.00
(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)
- Ti — 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)
- m — Undivided blueschist (Jurassic?)

King Range terrane (Miocene to Late Cretaceous)

- Krp — Igneous and sedimentary rocks of Point Delgada (Late Cretaceous)
- m — 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)
- 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 — 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 — Taliaferro 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
- whji — 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:

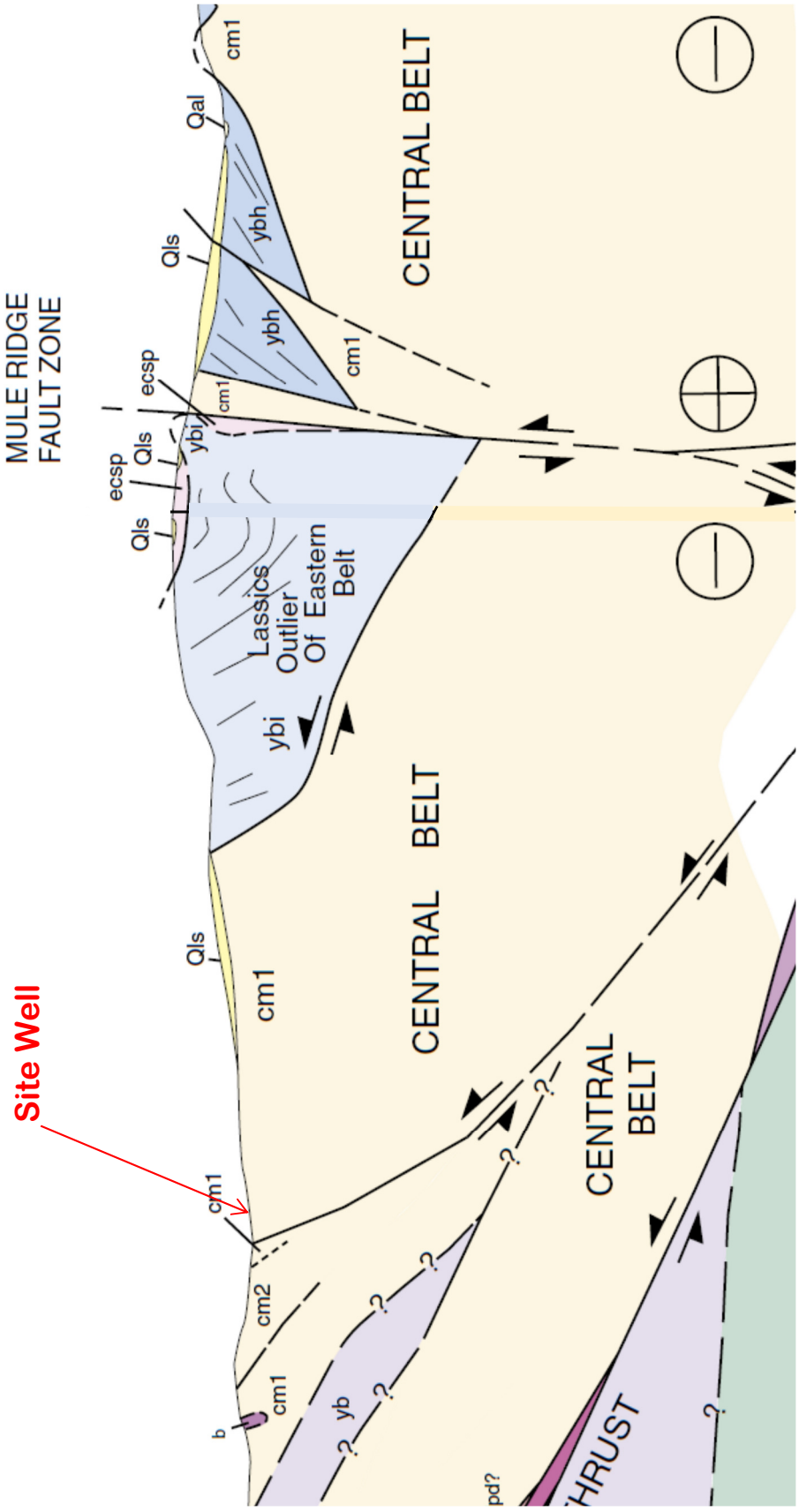
- Synclinal or synformal axis
- Anticlinal or antiformal axis
- Overturned syncline
- Landslide (Qls)

Melange Blocks:

- Serpentinite
- Chert
- Blueschist
- Greenstone
- Fossil locality and number

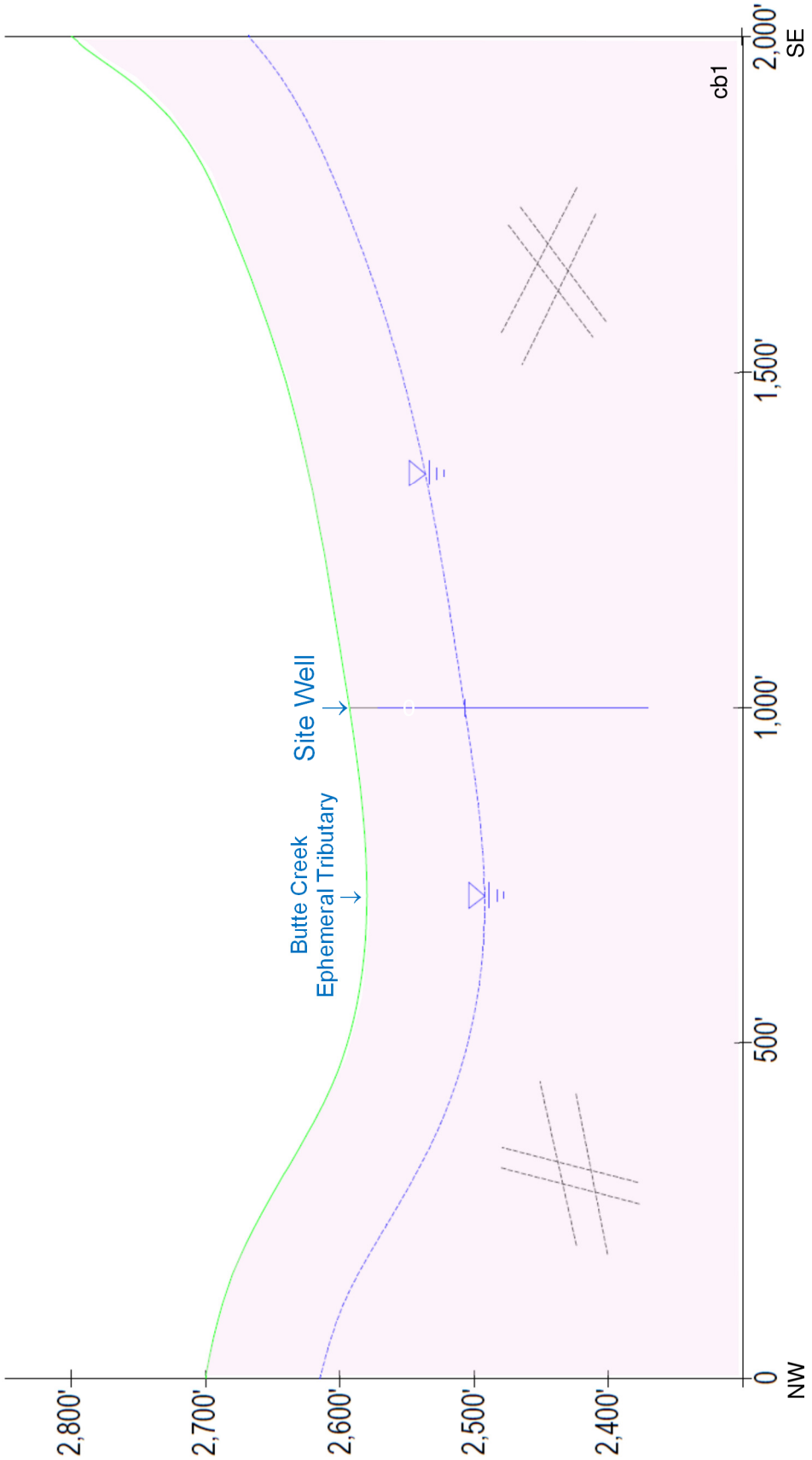
GEOLOGY OF THE CAPE MENDOCINO, EUREKA, GARBERVILLE, AND SOUTHWESTERN PART OF THE HAYFORK 30 X 60 MINUTE QUADRANGLES AND ADJACENT OFFSHORE AREA, NORTHERN CALIFORNIA (McLaughlin et al., 2000)

Lindberg Geologic Consulting	Engineering-Geologic Well Connectivity Assessment Report	Figure 5
Post Office Box 306	2248 Run Down Acres Lane, Bridgeville, California	September 19, 2022
Cutten, CA 95534	DWR Well 2019-011143, APN 210-071-001, Mr. Erik Sordal, Client	Project 0481.00
(707) 442-6000	Generalized Geologic Cross Section (locations approximate)	Not to Scale



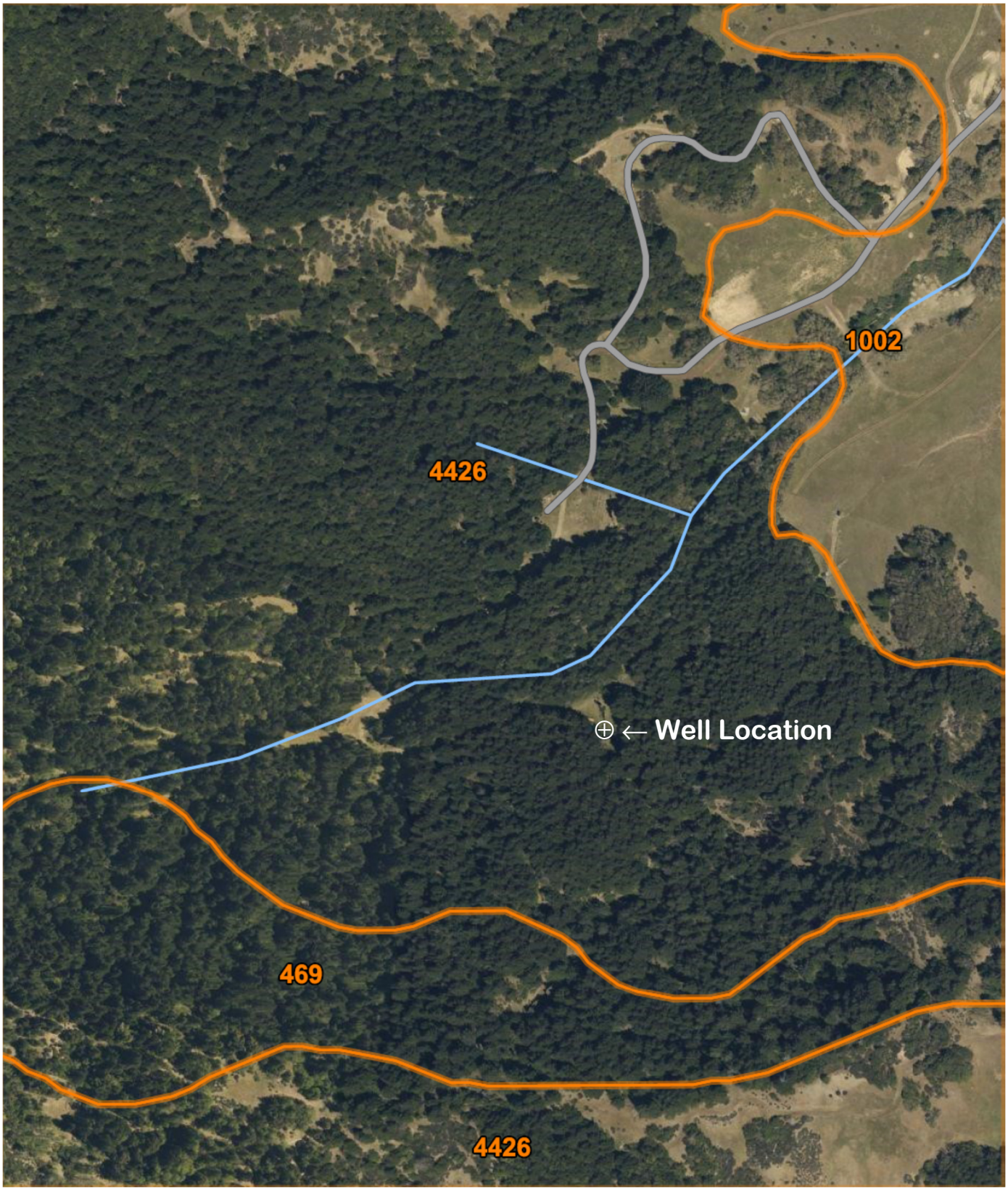
Modified from: McLaughlin, et al., (2,000).

Lindberg Geologic Consulting	Engineering-Geologic Well Connectivity Assessment Report	Figure 6
Post Office Box 306	2248 Run Down Acres Lane, Bridgeville, California	September 19, 2022
Cutten, CA 95534	DWR Well 2019-011143, APN 210-071-001, Mr. Erik Sordal, Client	Project 0481.00
(707) 442-6000	Hydrogeologic Cross Section (locations approximate)	2 x V.E.



In this vertically exaggerated (~2x) cross section, the view is looking down slope and toward the northeast. Groundwater flow in the 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 southwest, to the northeast toward Larabee Valley and the unnamed tributaries of Butte Creek. Bedrock subgrade is mapped by McLaughlin et al. (2000) as composed of abundantly fractured Broken Formation (cb1) of the Central Belt of the Franciscan Complex. Broken Formation is one of several components of the Central Belt Franciscan Complex. Groundwater is envisioned as flowing through fractured zones in the Broken Formation. Fractures are interpreted to be the primary permeability and providing preferential flow paths for groundwater in this area.

Lindberg Geologic Consulting	Engineering-Geologic Well Connectivity Assessment Report	Figure 7
Post Office Box 306	2248 Run Down Acres Lane, Bridgeville, California	September 19, 2022
Cutten, CA 95534	DWR Well 2019-011143, APN 210-071-001, Mr. Erik Sordal, Client	Project 0481.00
(707) 442-6000	USDA-NRCS Soils Map (locations approximate)	Scale not Determined



Modified from: USGS-NRCS Web Soil Survey, September 14, 2022 N ≈

State of California

Well Completion Report

Form DWR 188 Submitted 8/8/2019

WCR2019-011143

Owner's Well Number

Date Work Began 07/30/2019 Date Work Ended 08/08/2019

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

Secondary Permit Agency

Permit Number 19/20-0026 Permit Date 07/15/2019

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

Name Eric Sordal

Mailing Address P.O. Box 202

City Carlotta State CA Zip 95528

Planned Use and Activity

Activity New Well

Planned Use Water Supply Irrigation - Agriculture

Well Location

Address 2248 Run Down Acres RD

City Bridgeville Zip 95526 County Humboldt

Latitude 40 Deg. 26 Min. 20.094 Sec. N Longitude -123 Deg. 41 Min. 35.7611 Sec. W

Dec. Lat. 40.438915 Dec. Long. -123.693267

Vertical Datum Horizontal Datum WGS84

Location Accuracy Location Determination Method

APN 210-071-001

Township 01 N

Range 04 E

Section 26

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 220 Feet

Total Depth of Completed Well 220 Feet

Water Level and Yield of Completed Well

Depth to first water 85 (Feet below surface)

Depth to Static

Water Level 17 (Feet) Date Measured 08/08/2019

Estimated Yield* 15 (GPM) Test Type Air Lift

Test Length 4 (Hours) Total Drawdown 135 (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	top soil
4	18	blue clay
18	71	soft shale
71	135	blue sandstone
135	172	sandstone shale mix
172	220	basalt

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	220	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	220	Filter Pack	Other Gravel Pack	3/8 Inch	Pea Gravel

Other Observations:

Borehole Specifications

Depth from Surface Feet to Feet		Borehole Diameter (inches)
0	220	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) | 08/08/2019 (Date Signed) | 683865 (C-57 License Number)

Attachments

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:

State of California

Well Completion Report

Form DWR 188 Submitted 11/17/2017

WCR2017-005364

Owner's Well Number: 1 | Date Work Began: 11/06/2017 | Date Work Ended: 11/07/2017

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

Secondary Permit Agency: | Permit Number: 16/17-0172 | Permit Date: 11/02/2016

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

Name: 4 WHEEL PROPERTIES, LLC, Erik Sordal

Mailing Address: PO Box 202

City: Carlotta | State: CA | Zip: 95528

Planned Use and Activity

Activity: New Well

Planned Use: Water Supply Domestic

Well Location

Address: 2248 Run Down Acres | APN: 210-071-001

City: Bridgeville | Zip: 95526 | County: Humboldt | Township:

Latitude: Deg. Min. Sec. N | Longitude: Deg. Min. Sec. W | Range:

Section:

Baseline Meridian:

Dec. Lat.: | Dec. Long.: | Ground Surface Elevation:

Vertical Datum: | Horizontal Datum: WGS84 | Elevation Accuracy:

Location Accuracy: | Location Determination Method: | 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: 50 (Feet below surface)

Depth to Static Water Level: 41 (Feet) | Date Measured: 11/07/2017

Estimated Yield*: 30 (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	18	Brown Clay
18	30	Blue Clay
30	70	Blue Clay with Black Sandstone
70	210	Blue Sandstone with Quartz

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	50	Blank	PVC	N/A	0.291	4.95			
2	50	90	Screen	PVC	N/A	0.291	4.95	Milled Slots	0.035	
2	90	150	Blank	PVC	N/A	0.291	4.95			
2	150	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

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 (Address) | Eureka (City) | CA (State) | 95501 (Zip)

Signed: *electronic signature received* (C-57 Licensed Water Well Contractor) | 11/17/2017 (Date Signed) | 1014048 (C-57 License Number)

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, Central Part, California

4426—Pasturerock-Coyoterock-Maneze complex, 15 to 50 percent slopes, dry

Map Unit Setting

National map unit symbol: 2pt36
Elevation: 520 to 3,160 feet
Mean annual precipitation: 56 to 80 inches
Mean annual air temperature: 50 to 59 degrees F
Frost-free period: 200 to 260 days
Farmland classification: Not prime farmland

Map Unit Composition

Pasturerock, dry, and similar soils: 40 percent
Coyoterock, dry, and similar soils: 25 percent
Maneze, dry, and similar soils: 15 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pasturerock, Dry

Setting

Landform: Mountain slopes
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Upper third of mountainflank
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Colluvium derived from sandstone and mudstone

Typical profile

A - 0 to 10 inches: gravelly loam
A2 - 10 to 24 inches: loam
Bt1 - 24 to 35 inches: clay loam
Bt2 - 35 to 47 inches: gravelly clay loam
Bt3 - 47 to 71 inches: gravelly clay loam

Properties and qualities

Slope: 15 to 50 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 (0.20 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: High (about 9.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: F004BX114CA - Oregon white oak/perrenial and annual grasses, mountain slopes, sandstone and mudstone, clay loam
Other vegetative classification: Oak Woodland (RNPOW001CA)
Hydric soil rating: No

Description of Coyoterock, Dry

Setting

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

Typical profile

A - 0 to 14 inches: loam
ABt - 14 to 24 inches: loam
Bt1 - 24 to 31 inches: clay
Bt2 - 31 to 37 inches: clay
Cg - 37 to 71 inches: clay

Properties and qualities

Slope: 15 to 50 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.01 to 0.06 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: Moderate (about 8.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: F004BX114CA - Oregon white oak/perrenial and annual grasses, mountain slopes, sandstone and mudstone, clay loam
Other vegetative classification: Oak Woodland (RNPOW001CA)
Hydric soil rating: No

Description of Maneze, Dry

Setting

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

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 11 inches: very cobbly loam
AB - 11 to 24 inches: very cobbly loam
Bw1 - 24 to 37 inches: extremely gravelly clay loam
Bw2 - 37 to 55 inches: very gravelly clay loam
Bw3 - 55 to 79 inches: very gravelly clay loam

Properties and qualities

Slope: 15 to 50 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 (0.20 to 0.60 in/hr)
Depth to water table: About 39 to 63 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 4.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: F004BX114CA - Oregon white oak/perrenial and annual grasses, mountain slopes, sandstone and mudstone, clay loam
Other vegetative classification: Oak Woodland (RNPOW001CA)
Hydric soil rating: No

Minor Components

Airstrip, dry

Percent of map unit: 10 percent
Landform: Mountain slopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R004BX101CA - Upper prairie, mountain slopes, sandstone and mudstone, clay loam
Other vegetative classification: Prairie (RNPP001CA)

Hydric soil rating: No

Rock outcrop

Percent of map unit: 10 percent
Landform: Mountain slopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Convex
Other vegetative classification: Oak Woodland (RNPOW001CA)
Hydric soil rating: No

Data Source Information

Soil Survey Area: Humboldt County, Central Part, California
Survey Area Data: Version 7, Sep 6, 2021

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

September 6, 2022 Project No: 0481.00

Mr. Erik Sordal
2248 Rundown Acres Lane
Bridgeville, California 95526

Subject: Hydrologic Isolation of Existing Well from Surface Waters, Well Two
2248 Run Down Acres Lane, Bridgeville, APN: 210-071-001, WCR2017-005364

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. Tributaries in the vicinity of this well drain to Butte Creek (Figure 1). A California-Certified Engineering Geologist visited this site on June 10, 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 understand that the applicant hopes to someday use water from this well 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 the Humboldt County WebGIS and the Assessor's Parcel Map (Figure 2), parcel 210-071-001 (Figure 2) encompasses approximately 341 acres, while the Assessor lists it at 410 acres. With our GPS, we located the subject well at latitude 40.43749° north, and longitude 123.69176 west (±9'). This well is in Section 26, T1N, R4E, HB&M (Figure 1 and 2).

The Humboldt County WebGIS shows this well is 400 feet southeast of an unnamed ephemeral tributary of Butte Creek (Figure 1). This ephemeral stream is reportedly dry by mid-July. Based on interpolation from the USGS "Larabee Valley, Calif." (1977), topographic quadrangle map (Figure 1), and the Humboldt County WebGIS, the elevation of this well site is approximately 2,580 feet. At its nearest point, 400 feet northwest of this well, the elevation of the nearest ephemeral tributary of Butte Creek is approximately 2,540 feet. This well is 210 feet deep, so the bottom elevation of the well is 2,370 feet, so the nearest ephemeral watercourse is 170 feet higher than the well bottom.

The well location is shown as accurately as feasible on the attached figures. This well was drilled by Watson Well Drilling, of Eureka, in November 2017, under Humboldt County well permit #16/17-0172. Watson Well Drilling is a licensed well-drilling contractor (C-57 #1014048). They submitted their well completion report (DWR 188) on November 17, 2017 (attached). The driller

estimated a yield of 30 gpm in November 2017, based on a 4-hour air lift pump test. Drawdown in the well, if any, was not reported.

Total drilled depth of this well is 210 feet. The borehole diameter is reported as 13-inches from the surface to 20-feet; from 20-feet to 210-feet the borehole diameter is 7.875-inches. From grade to 20-feet, a 6.625-inch diameter, blank low carbon steel surface conductor pipe was installed. From 0-feet to 50-feet blank PVC pipe, 4.95-inches in diameter was installed. In the next 40-feet (50 – 90 feet) screened 4.95-inch PVC pipe was installed followed by 50-feet (90 – 150 feet) of blank, 4.95-inch PVC pipe. From 150-feet to 170-feet screened 4.95-inch PVC was installed followed by 20-feet of blank PVC pipe. In the last 20-feet (190 – 210 feet) screened 4.95-inch PVC was installed. Per County requirements, a bentonite surface sanitary was place from grade to 20 feet bgs, so the well is cased and sealed through potential shallow subsurface aquifers, if any. According to the driller's report, there was no annular fill. Depth to first water was reported as 50 feet below grade, and depth to static water in the completed and developed well was reported to be 41 feet bgs when the driller conducted the pump test on November 7, 2017. Nine feet of rise in the water column suggest this aquifer is under some hydrostatic pressure, so we interpret this to be a semi-artesian, confined aquifer.

There is just one spring mapped in Section 26 of the Larabee Valley USGS topographic quadrangle map (Figure 1). From the well, the nearest mapped spring is more than 660-feet to the west-northwest beyond and above the ephemeral tributary of Butte Creek. Approximately one mile north of the subject well, there is another spring in the southeast quarter of the northwest quarter of Section 23. There are no other springs mapped within one mile of the subject well.

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 Broken Formation (cb1), of the Central Belt of the Franciscan Complex, as presented in Figure 4.

The near-surface soils are sandy and gravelly and are composed predominantly of loam, or silty fine sand with gravel. The near-surface soils also contain a ~12 to 20 percent clay. Soils, based on our explorations, are interpreted to be uniformly distributed across the flat valley floor portion of the subject parcel. In the areas explored, the soil profile consisted of approximately 1 foot of topsoil. Beneath this thin topsoil, soils are sandy loam to a depth of approximately 4. 5 feet where they are underlain by coarse sandy gravel.

Materials reported on the geologic log of the driller's well completion report (attached) include "Brown Clay" from grade to18-feet, below which was 12-feet (18 to 30-feet) of "Blue Clay". Beneath the blue clay was 40-feet (30 to 70-feet) of "Blue Clay with Black Sandstone" which was found to be the water-bearing unit and is therefore presumably fractured. From 70-feet to total depth at 210-feet, another water-bearing unit, "Blue Sandstone with Quartz," was logged.

We interpret the upper clayey section of this profile, to 30 feet bgs be an aquitard, a material of low permeability and transmissivity. Sandstone materials below 30 feet appear to be the water-bearing aquifer material tapped by this well. The water-bearing sandstone units are likely to be highly fractured and are thereby expected to have a higher transmissivity and permeability than would be typical of an unfractured sandstone. At the location of the subject well, the elevation of the water-bearing aquifer unit is thus between approximately 2,550 feet and 2,370 feet, based on our interpretation, and the reported lithologies and perforated zones in the driller's report.

As mapped by McLaughlin et al., (2000), below the surface soils, the earth materials encountered in the boring are Broken Formation of the Central Belt of the Franciscan Complex. Fractured and folded metasedimentary rock materials can have variable hydraulic conductivity and can constitute significant aquifers. We interpret the underlying sequence of materials described by the driller (clay and sandstone), as lithologies within the Broken Formation of the Central Belt of the Franciscan Complex. The sandstone units apparently have favorable hydraulic conductivity, making them, in our interpretation, the primary water bearing units in this well.

A geologic cross section of the area after McLaughlin et al., 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 alluvium and obscured by vegetation. We interpret the faults in the subsurface to be hydrologic boundaries of minimal permeability (due to grinding and shearing along the fault planes) which effectively separate units and blocks of the Franciscan Complex from each other, and limit groundwater flow between these 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 50 feet and rose to a static level at 41 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. The bentonite-sealed surface casing seals the well from surface and shallow subsurface water infiltration into the deeper shale aquifers.

When considered with the stratigraphy and northeasterly plunge of the regional geologic structure, plus the distances (horizontal and vertically) from the nearest surface waters, and the depth of the producing zone of this well (~30 to 210 feet) in Section 26, we conclude that the depth of the surface seal, combined with the 30-feet of brown clay and blue clay, is sufficient to preclude the potential for hydraulic connectivity with surface waters, of which there are none closer than 400 feet in the ephemeral tributary of Butte Creek. Thus, the water source from which this well draws appears to be a semi-artesian, confined 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.

The driller estimated the yield of this well at 30 gallons per minute (gpm) on November 7, 2017. Drawdown was not reported after Watson Well's four-hour air-lift pump test. At 30 gallons per minute, this well could potentially produce 43,200 gallons per day. As noted on the well completion report, this capacity may not be representative of this well's long-term yield. Additional testing would be necessary to establish 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 the local ephemeral tributaries of Butte Creek, which only flow for a limited period during the wet season. Nor does this well appear to be hydrologically connected to any local springs or ephemeral wetlands. 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 (or the spring), on-site the potential for significant hydrologic connectivity between surface waters and groundwater in the deeper bedrock aquifer appears negligible. Further, given the apparently limiting condition of 30 feet of low-transmissivity clay above the water-bearing sandstone units, the aquifer seems isolated from, and not likely to be significantly hydraulically connected to other aquifer(s).

As mentioned, on the Larabee Valley USGS topographic quadrangle map, there is one spring mapped in Section 26, more than 660-feet to the west-northwest of the subject well. There do not appear to be any other significant springs or wetlands mapped within 1,000 feet of this subject well. There are no ponds within 1,800 feet of the subject well on the parcel. There are two man made stock(?) ponds to the north-northeast and downslope of this well; one is on the subject parcel, and one is on parcel 210-054-008.

We researched the California Department of Water Resources (DWR) database to determine if there are any wells within 1,000 feet of the subject well. Based on the information available at the present time, there is one well within 1,000 feet in Section 26, WCR2019-011143 is more than 780 feet to the southwest, at an elevation of ~2,600 feet (per WebGIS) on parcel 210-071-001 (Figure 2). Well WCR2019-011143 is 220 feet in total depth, is screened from 40 feet to 220 feet; first water was reported at 85 feet bgs (elevation ~2,515'), 35 feet higher than 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 from source areas to the southwest, both proximal and distal to the subject well site. During the wet season, when the ephemeral tributaries are flowing, the ephemeral streams in the vicinity of the will also contribute recharge.

The Natural Resources Conservation Service's (NRCS), online Web Soil Survey, does not show the subject well in the Frostvalley-Mulecreek complex, on slopes of 2 to 9 percent, (#1002, Figure 7), but on-site observation indicates that this is indeed the case. The well is in the Frostvalley-Mulecreek complex which is described as well-drained loam and gravelly loam. The Web Soil Survey unit description is attached to this report. Mean annual precipitation in the area is listed by the NRCS as 64 to 76 inches per year. Capacity of the most limiting soil layer to transmit water

(Ksat) is described as moderately high to high (0.57 to 2.0 in/hr). Conservatively, if ten percent of 64 inches of precipitation is absorbed by the soils and does not flow across the surface and into local watercourses, then more than 1,800 acre-feet, or nearly 59 million gallons of water per year, may be expected to recharge the local aquifers below this 341-acre subject property. Recent research by the USGS (Flint et al., 2013), based on sixty years of records, shows that 34 percent of precipitation goes to recharge of groundwater.

On March 28, 2022, Governor Newsom issued an executive order (N-7-22) relating to the ongoing drought in California. In his executive order, 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 2248 Run Down Acres Lane, Bridgeville, 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 Order states that counties, cities, and other public agencies are 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* (650,000+ gallons) *of groundwater for individual domestic users, or that will exclusively provide groundwater to public water supply systems*."

Based on our observations, research, and professional experience, it is our professional opinion that the well on APN 210-071-001, on 2248 Run Down Acres Lane, has a negligible likelihood of being hydrologically connected to nearby surface waters, springs, or wells in any manner that might significantly impact or 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 Location Map
Figure 2: Humboldt County Assessor's Parcel Map
Figure 3: Satellite Image of Well Sites
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

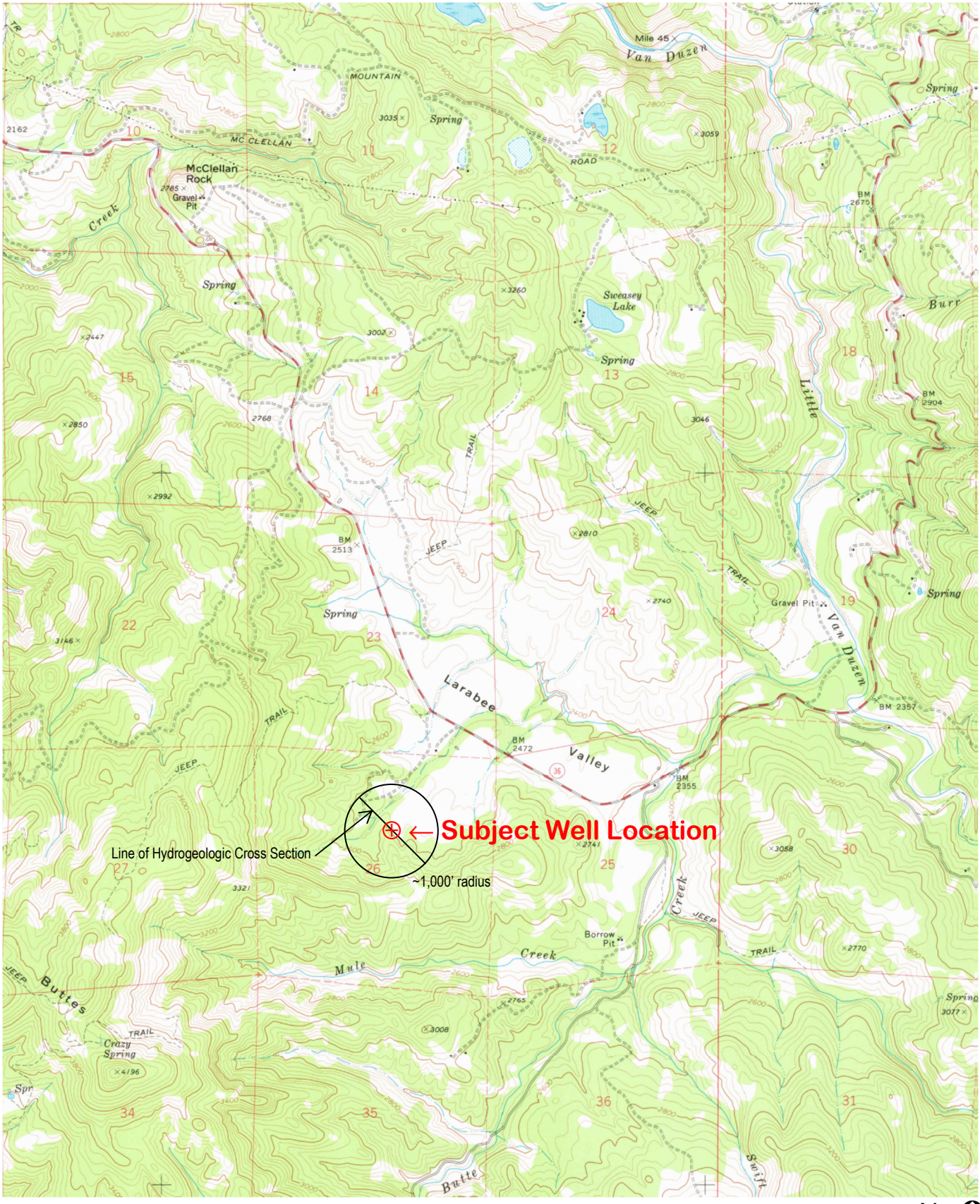
State of California Well Completion Report:
WCR2017-005364, APN: 210-071-001 (Subject Well)
WCR2019-011143, APN: 210-071-001 (808 feet to southwest)

Web Soil Survey, NRCS Map Unit Description:
Frostvalley-Mulecreek complex, 2 to 9 percent slopes, dry; #1002

Reference:

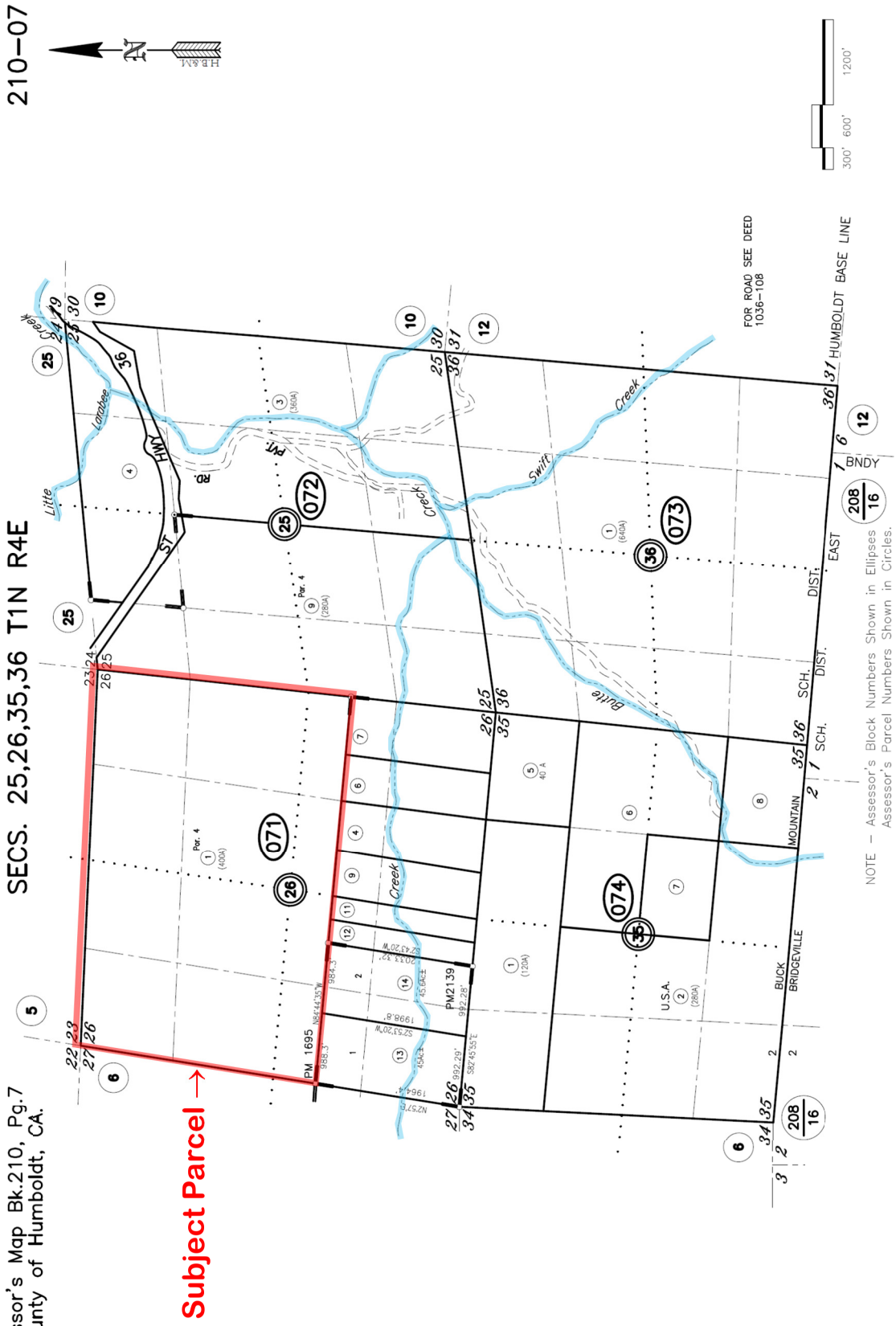
Flint et al.: Fine-scale hydrologic modeling for regional landscape applications: the California Basin Characterization Model development and performance. Ecological Processes, 2013, 2:25. (doi:10.1186/2192-1709-2-25)

Lindberg Geologic Consulting	Engineering-Geologic Well Connectivity Assessment Report	Figure 1
Post Office Box 306	2248 Run Down Acres Lane, Bridgeville, California	September 6, 2022
Cutten, CA 95534	APN 210-071-001, Mr. Erik Sordal, Client	Project 0481.00
(707) 442-6000	Topographic Well Location Map (locations approximate)	1" ≈ 2,900'

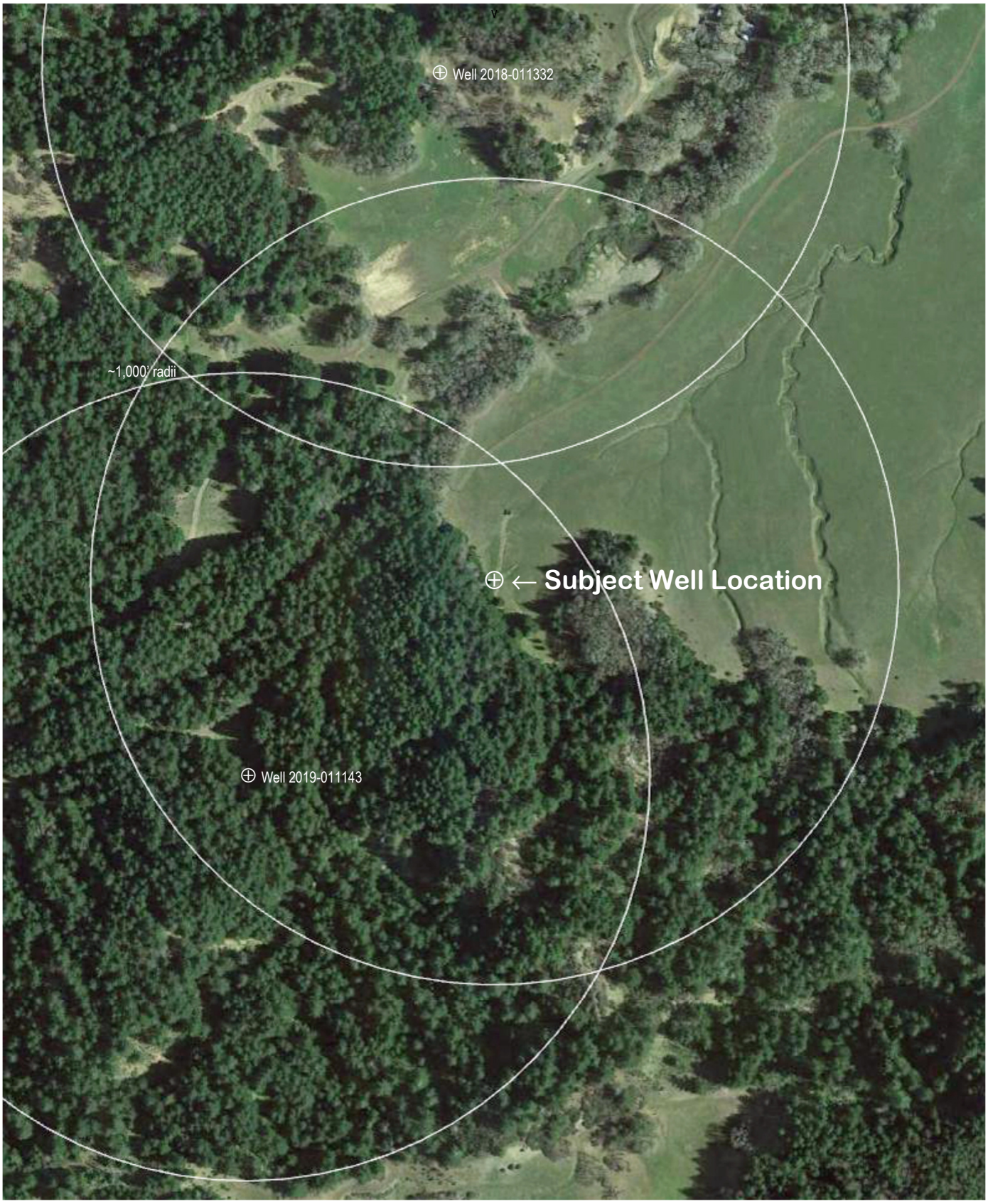


Modified from: USGS "Larabee Valley, Calif." 7.5' Quadrangle Map (1977). N ≅

Lindberg Geologic Consulting	Engineering-Geologic Well Connectivity Assessment Report	Figure 2
Post Office Box 306	2248 Run Down Acres Lane, Bridgeville, California	September 6, 2022
Cutten, CA 95534	APN 210-071-001, Mr. Erik Sordal, Client	Project 0481.00
(707) 442-6000	Humboldt County Assessor's Parcel Map (locations approximate)	Scale as Shown

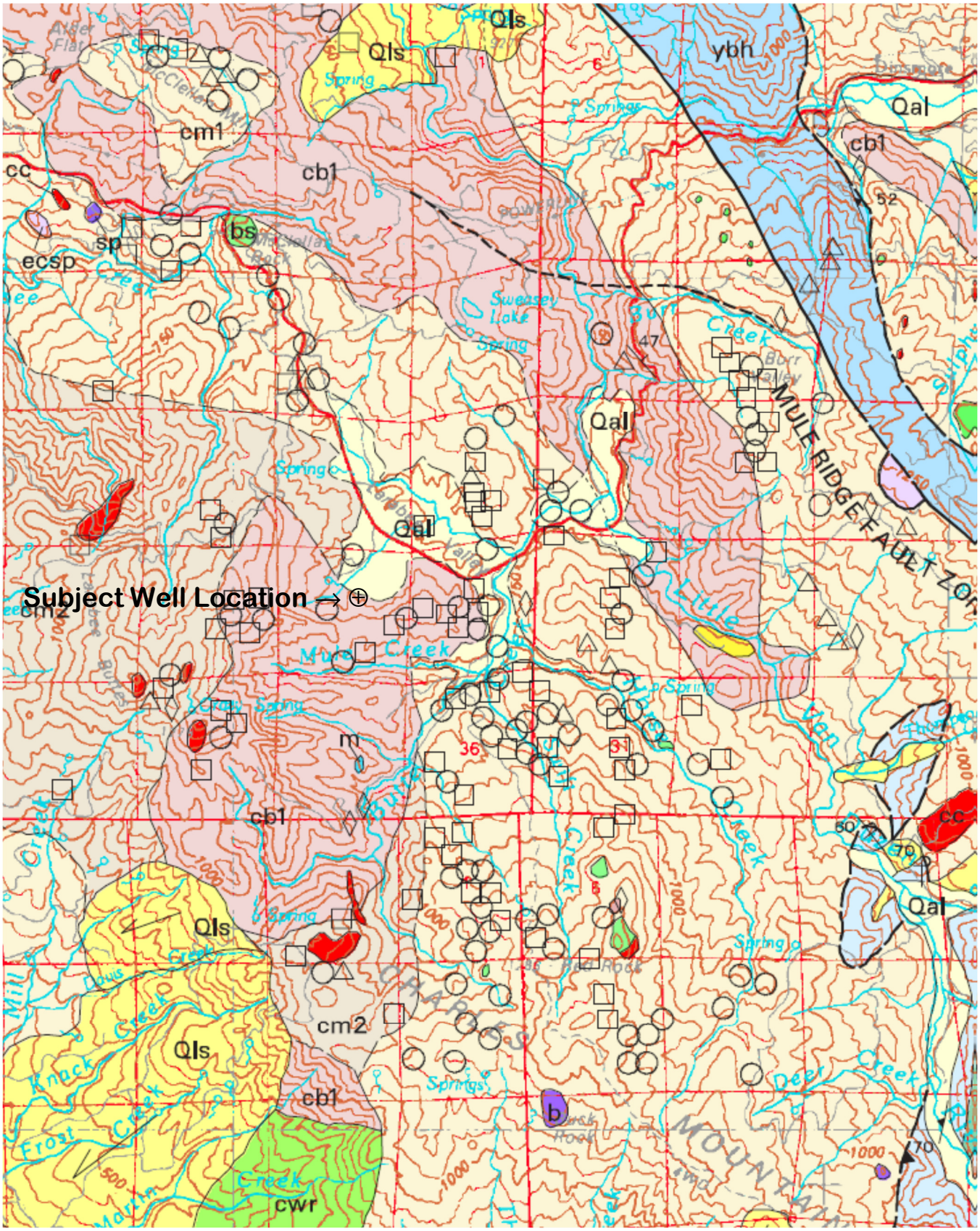


Lindberg Geologic Consulting	Engineering-Geologic Well Connectivity Assessment Report	Figure 3
Post Office Box 306	2248 Run Down Acres Lane, Bridgeville, California	September 6, 2022
Cutten, CA 95534	APN 210-071-001, Mr. Erik Sordal, Client	Project 0481.00
(707) 442-6000	Satellite Image of Well Sites (locations approximate)	1" ≈ 350'



Modified from: Google Earth Imagery of April 30, 2019. N ≈

Lindberg Geologic Consulting	Engineering-Geologic Well Connectivity Assessment Report	Figure 4
Post Office Box 306	2248 Run Down Acres Lane, Bridgeville, California	September 6, 2022
Cutten, CA 95534	APN 210-071-001, Mr. Erik Sordal, Client	Project 0481.00
(707) 442-6000	Geologic Map (locations approximate)	1" ≈ 4,750'



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

Lindberg Geologic Consulting	Engineering-Geologic Well Connectivity Assessment Report	Figure 4a
P. O. Box 306	2248 Run Down Acres Lane, Bridgeville, California	September 6, 2022
Cutten, CA 95534	APN 210-071-001, Mr. Erik Sordal, Client	Project 0481.00
(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)
- Ti — 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)
- m — Undivided blueschist (Jurassic?)

King Range terrane (Miocene to Late Cretaceous)

- Krp — Igneous and sedimentary rocks of Point Delgada (Late Cretaceous)
- m — 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)
- 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 — 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 — Taliaferro 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
- whji — 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:

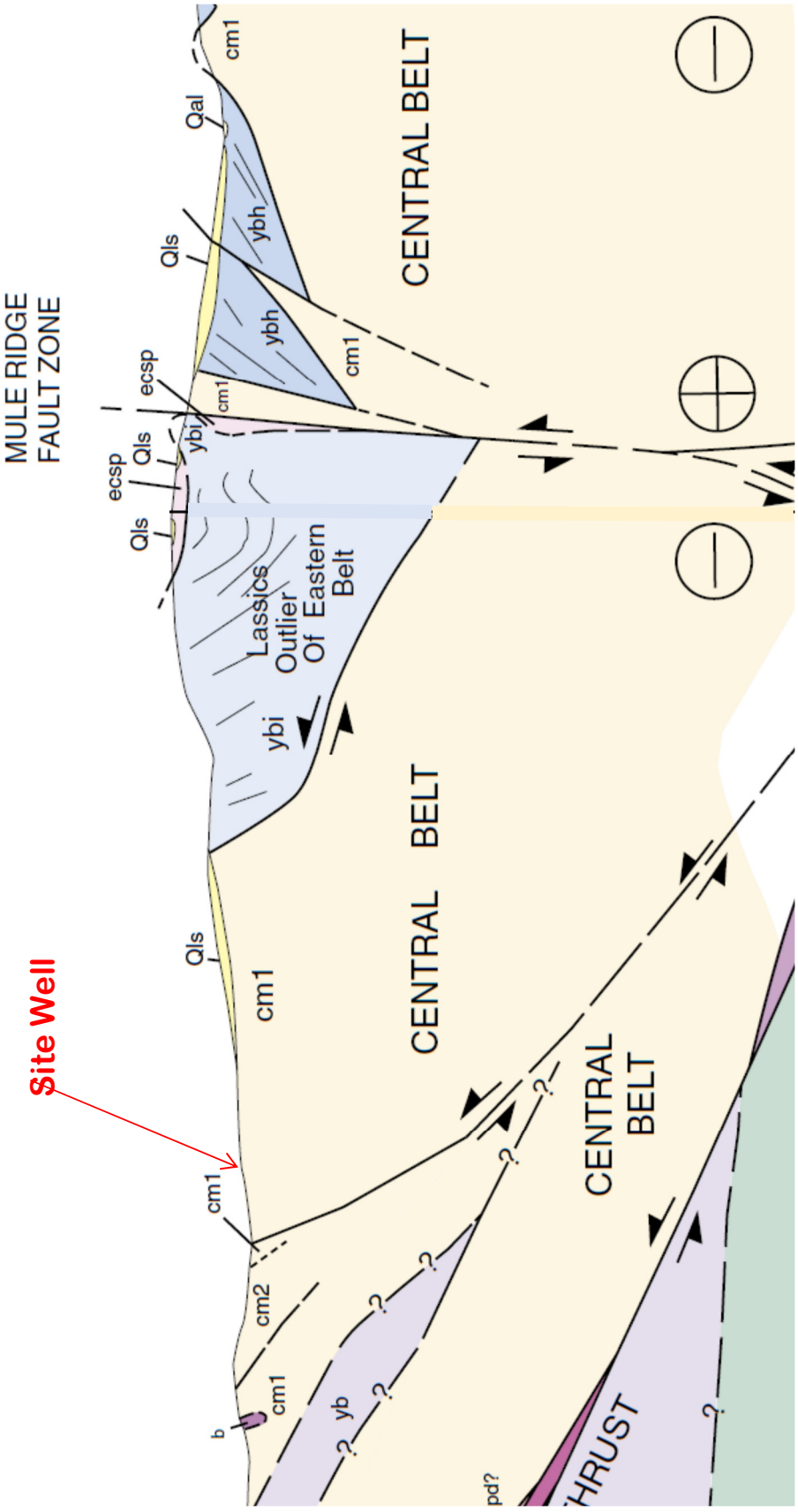
- Synclinal or synformal axis
- Anticlinal or antiformal axis
- Overturned syncline
- Landslide (Qls)

Melange Blocks:

- Serpentinite
- Chert
- Blueschist
- Greenstone
- Fossil locality and number

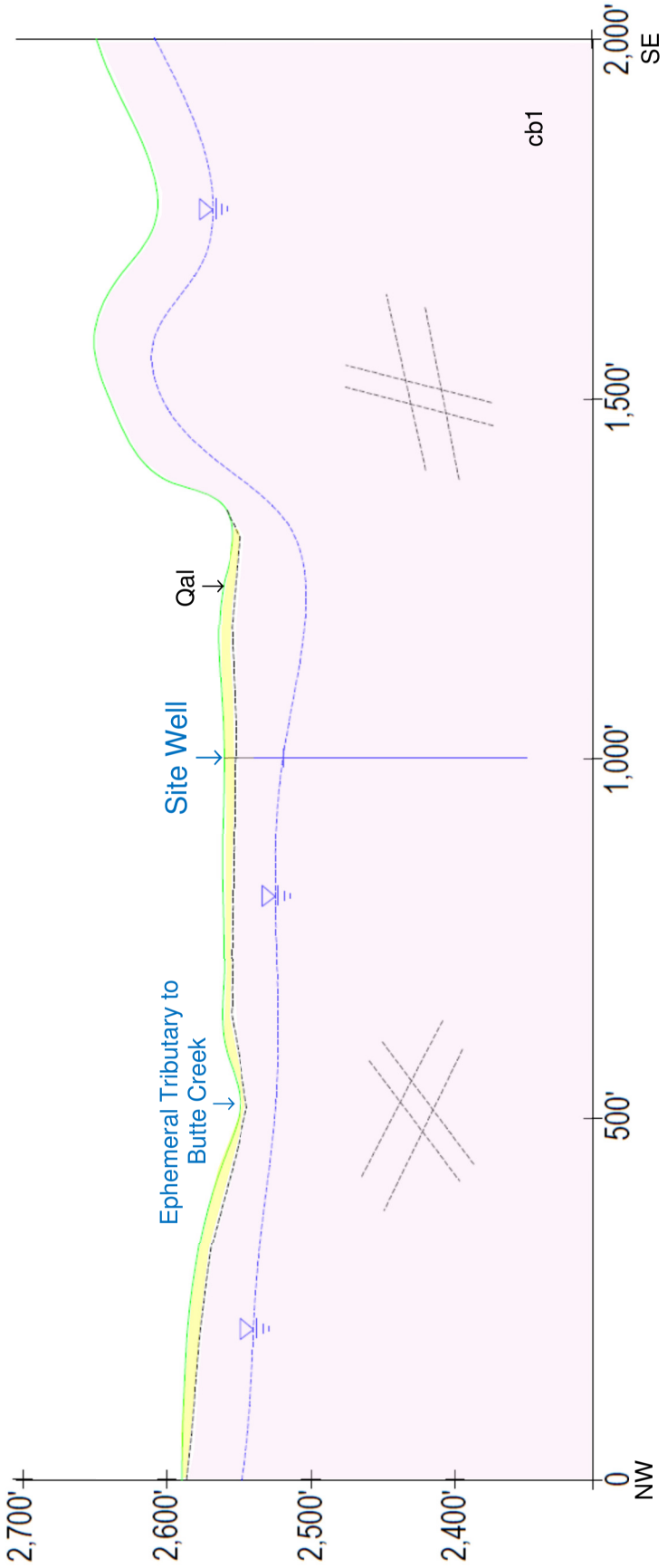
GEOLOGY OF THE CAPE MENDOCINO, EUREKA, GARBERVILLE, AND SOUTHWESTERN PART OF THE HAYFORK 30 X 60 MINUTE QUADRANGLES AND ADJACENT OFFSHORE AREA, NORTHERN CALIFORNIA (McLaughlin et al., 2000)

Lindberg Geologic Consulting	Engineering-Geologic Well Connectivity Assessment Report	Figure 5
Post Office Box 306	2248 Run Down Acres Lane, Bridgeville, California	September 6, 2022
Cutten, CA 95534	APN 210-071-001, Mr. Erik Sordal, Client	Project 0481.00
(707) 442-6000	Generalized Geologic Cross Section (locations approximate)	Not to Scale



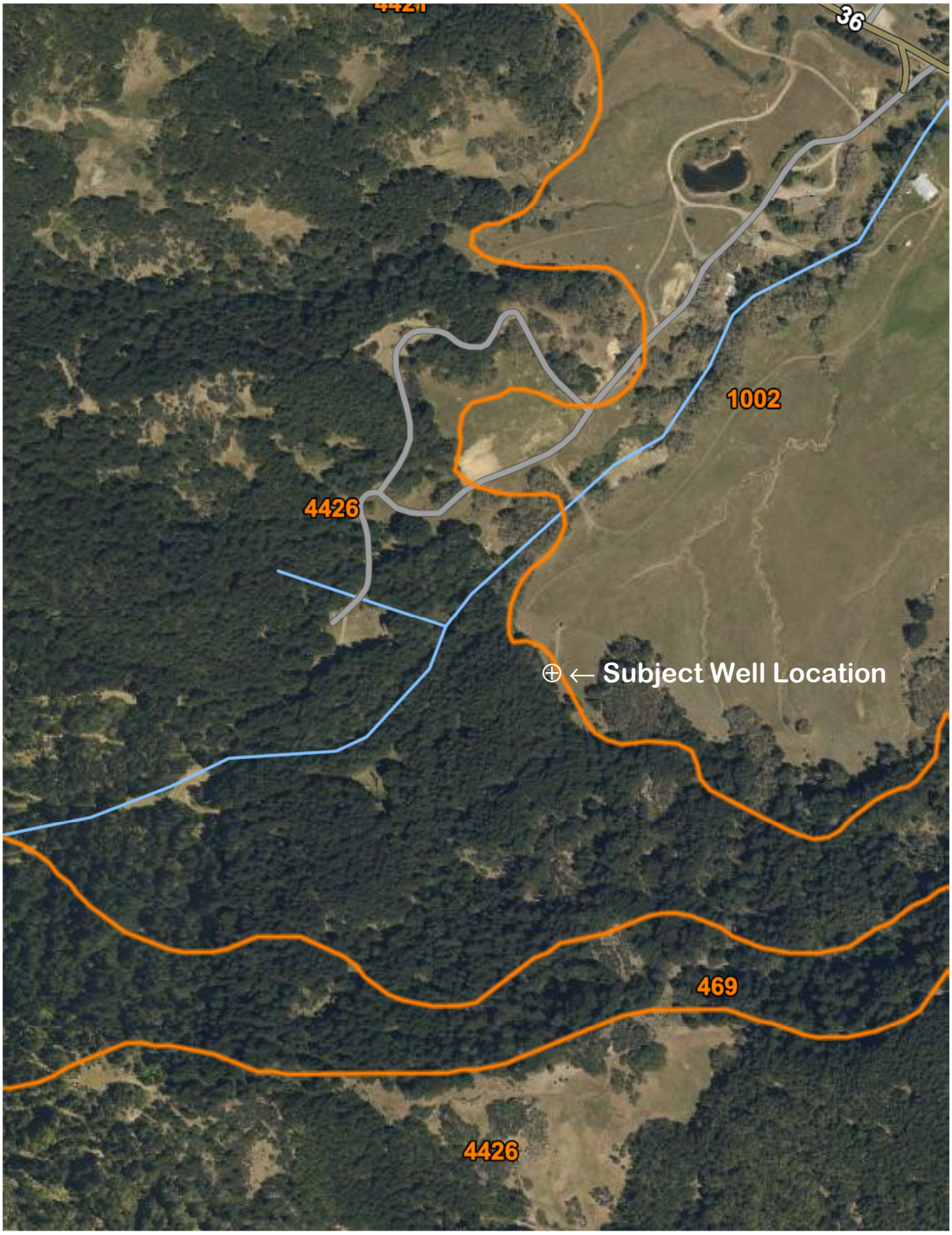
Modified from: McLaughlin, et al., (2,000).

Lindberg Geologic Consulting	Engineering-Geologic Well Connectivity Assessment Report	Figure 6
Post Office Box 306	2248 Run Down Acres Lane, Bridgeville, California	September 6, 2022
Cutten, CA 95534	APN 210-071-001, Mr. Erik Sordal, Client	Project 0481.00
(707) 442-6000	Hydrogeologic Cross Section (locations approximate)	V.E. ≈ 2



In this vertically exaggerated (~2x) cross section, the view is looking down slope toward the northeast. Groundwater flow in the 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 southwest, to the northeast toward Larabee Valley and unnamed tributaries of Butte Creek. Bedrock subgrade is presumed to be composed of abundantly fractured Broken Formation (cb1) of the Central Belt of the Franciscan Complex. The Broken Formation deposits are one of several components of the Central Belt Franciscan Complex. Groundwater is envisioned as flowing through fractured zones in the Broken Formation. Fractures are interpreted to be the primary preferential flow paths for groundwater in this area.

Lindberg Geologic Consulting	Engineering-Geologic Well Connectivity Assessment Report	Figure 7
Post Office Box 306	2248 Run Down Acres Lane, Bridgeville, California	September 6, 2022
Cutten, CA 95534	APN 210-071-001, Mr. Erik Sordal, Client	Project 0481.00
(707) 442-6000	USDA – NRCS Soils Map (locations approximate)	Scale Undetermined



Modified from: USG-NRCS Web Soil Survey, September 5, 2022 N ≈

State of California

Well Completion Report

Form DWR 188 Submitted 11/17/2017

WCR2017-005364

Owner's Well Number: 1 | Date Work Began: 11/06/2017 | Date Work Ended: 11/07/2017

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

Secondary Permit Agency: | Permit Number: 16/17-0172 | Permit Date: 11/02/2016

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

Name: 4 WHEEL PROPERTIES, LLC, Erik Sordal

Mailing Address: PO Box 202

City: Carlotta | State: CA | Zip: 95528

Planned Use and Activity

Activity: New Well

Planned Use: Water Supply Domestic

Well Location

Address: 2248 Run Down Acres | APN: 210-071-001

City: Bridgeville | Zip: 95526 | County: Humboldt | Township:

Latitude: Deg. Min. Sec. N | Longitude: Deg. Min. Sec. W | Range:

Section:

Baseline Meridian:

Dec. Lat.: | Dec. Long.: | Ground Surface Elevation:

Vertical Datum: | Horizontal Datum: WGS84 | Elevation Accuracy:

Location Accuracy: | Location Determination Method: | 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: 50 (Feet below surface)

Depth to Static Water Level: 41 (Feet) | Date Measured: 11/07/2017

Estimated Yield*: 30 (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	18	Brown Clay
18	30	Blue Clay
30	70	Blue Clay with Black Sandstone
70	210	Blue Sandstone with Quartz

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	50	Blank	PVC	N/A	0.291	4.95			
2	50	90	Screen	PVC	N/A	0.291	4.95	Milled Slots	0.035	
2	90	150	Blank	PVC	N/A	0.291	4.95			
2	150	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

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 (Address) | Eureka (City) | CA (State) | 95501 (Zip)

Signed: *electronic signature received* (C-57 Licensed Water Well Contractor) | 11/17/2017 (Date Signed) | 1014048 (C-57 License Number)

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 Submitted 8/8/2019

WCR2019-011143

Owner's Well Number

Date Work Began 07/30/2019 Date Work Ended 08/08/2019

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

Secondary Permit Agency

Permit Number 19/20-0026 Permit Date 07/15/2019

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

Name Eric Sordal

Mailing Address P.O. Box 202

City Carlotta State CA Zip 95528

Planned Use and Activity

Activity New Well

Planned Use Water Supply Irrigation - Agriculture

Well Location

Address 2248 Run Down Acres RD

City Bridgeville Zip 95526 County Humboldt

Latitude 40 Deg. 26 Min. 20.094 Sec. N Longitude -123 Deg. 41 Min. 35.7611 Sec. W

Dec. Lat. 40.438915 Dec. Long. -123.693267

Vertical Datum Horizontal Datum WGS84

Location Accuracy Location Determination Method

APN 210-071-001

Township 01 N

Range 04 E

Section 26

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 220 Feet

Total Depth of Completed Well 220 Feet

Water Level and Yield of Completed Well

Depth to first water 85 (Feet below surface)

Depth to Static

Water Level 17 (Feet) Date Measured 08/08/2019

Estimated Yield* 15 (GPM) Test Type Air Lift

Test Length 4 (Hours) Total Drawdown 135 (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	top soil
4	18	blue clay
18	71	soft shale
71	135	blue sandstone
135	172	sandstone shale mix
172	220	basalt

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	220	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	220	Filter Pack	Other Gravel Pack	3/8 Inch	Pea Gravel

Other Observations:

Borehole Specifications

Depth from Surface Feet to Feet		Borehole Diameter (inches)
0	220	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) | 08/08/2019 (Date Signed) | 683865 (C-57 License Number)

Attachments

Scan.pdf - Location Map

DWR Use Only

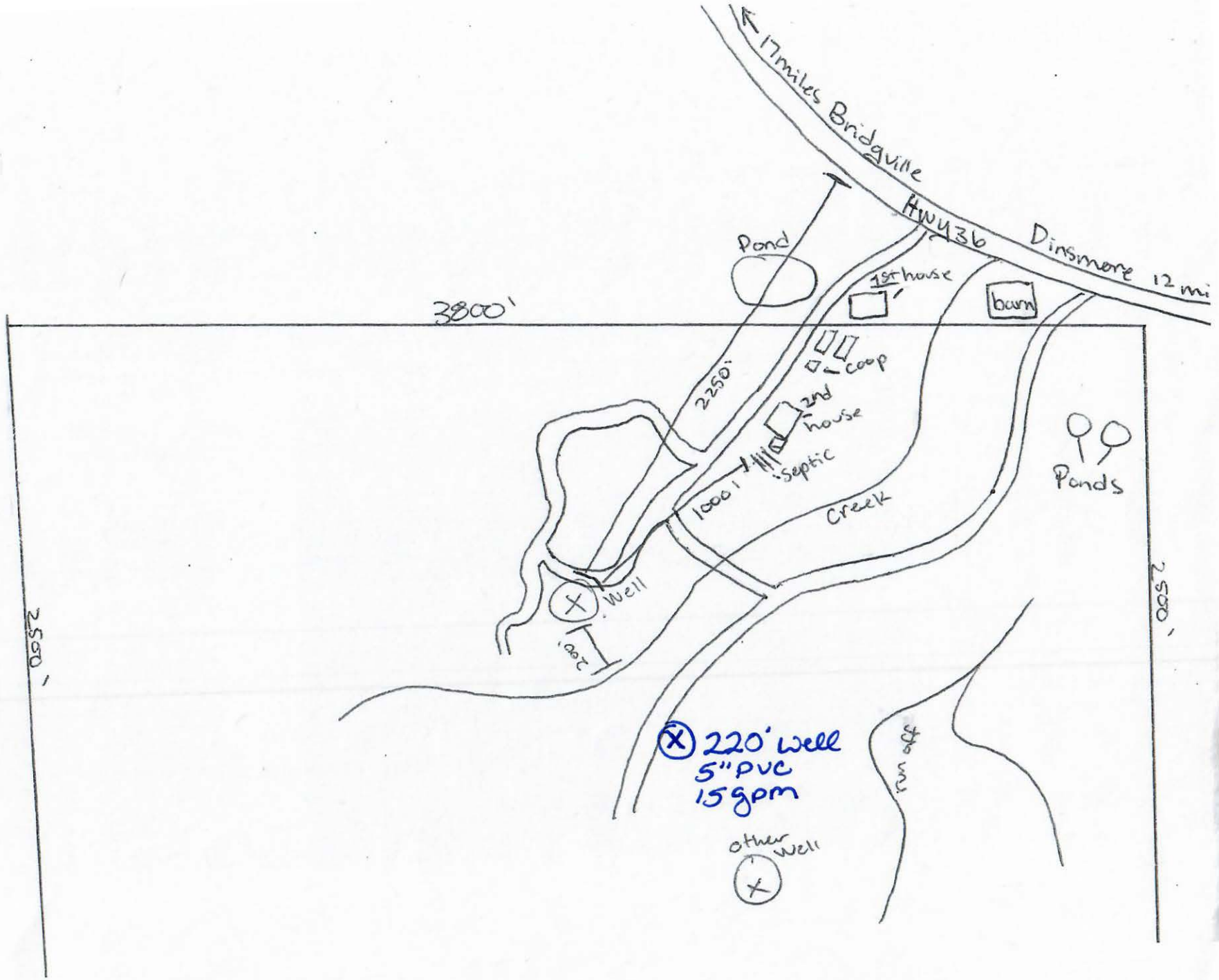
CSG #	State Well Number	Site Code	Local Well Number

N — Latitude Deg/Min/Sec

W — Longitude Deg/Min/Sec

TRS:

APN:


17 miles Bridgville
HWY 36
Dinsmore 12 mi
Pond
1st house
barn
3800'
coop
2nd house
2250'
Septic
1000'
Creek
Ponds
Well
200'
2500'
2500'
220' well
5" PVC
15 gpm
other well

lacy@fischdrilling.com

From: Fisch Drilling <chris@fischdrilling.com>
Sent: Thursday, August 8, 2019 4:47 PM
To: lacy@fischdrilling.com
Subject: FW: OSWCR: Thank you for submitting Well Completion Report WCR2019-011143

From: OSWCR-NoReply@water.ca.gov <OSWCR-NoReply@water.ca.gov>
Sent: Thursday, August 8, 2019 4:45 PM
To: chris@fischdrilling.com
Subject: OSWCR: Thank you for submitting Well Completion Report WCR2019-011143

*******Please do not reply to this e-mail message*******

Thank you for submitting your Well Completion Report - A New Production or Monitoring Well, **WCR2019-011143**, using the Online System for Well Completion Reports (OSWCR). The Department of Water Resources will review it for completeness. You will be notified if additional information is required. If you have any questions, please call your local DWR Region Office WCR contact.

DWR Northern Region Office
April Scholzen
(530)529-7368
April.Scholzen@water.ca.gov

To view this record, log in to OSWCR, or use the following link:
https://civicnet.resources.ca.gov/DWR_WELLS/urlrouting.ashx?type=1000&Module=WellCompletion&capID1=19CAP&capID2=00000&capID3=00982&agencyCode=DWR_WELLS

Licensed Contractor: FISCH DRILLING License Number: 683865
Well Owner: Eric Sordal
Well Owner Address: P.O. Box 202 Carlotta CA 95528

Well Address: 2248 Run Down Acres RD, Bridgeville, CA 95526 County: Humboldt Parcel: 210-071-001
Latitude/Longitude: 40.438915°N, -123.693267°W
Submitted: 08/08/2019
Record Status: Submitted

Humboldt County, Central Part, California

1002—Frostvalley-Mulecreek complex, 2 to 9 percent slopes

Map Unit Setting

National map unit symbol: 2sx6d
Elevation: 2,300 to 3,610 feet
Mean annual precipitation: 64 to 76 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 60 to 120 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Frostvalley and similar soils: 48 percent
Mulecreek and similar soils: 42 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Frostvalley

Setting

Landform: Terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from metasedimentary rock

Typical profile

Ap - 0 to 3 inches: loam
A - 3 to 20 inches: loam
AB - 20 to 35 inches: loam
Bw - 35 to 47 inches: gravelly loam
C - 47 to 79 inches: very gravelly loamy sand

Properties and qualities

Slope: 2 to 9 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 (0.57 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 9.9 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 3e

Hydrologic Soil Group: B
Ecological site: F005XZ003CA - Terraces
Hydric soil rating: No

Description of Mulecreek

Setting

Landform: Terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Parent material: Alluvium derived from metasedimentary rock

Typical profile

Ap - 0 to 4 inches: loam
A - 4 to 22 inches: loam
Bt1 - 22 to 30 inches: clay loam
Bt2 - 30 to 37 inches: clay loam
Bt3 - 37 to 55 inches: clay loam
BCt - 55 to 79 inches: clay loam

Properties and qualities

Slope: 2 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 20 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 11.1 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: F005XZ003CA - Terraces
Hydric soil rating: No

Minor Components

Pasturerock, dry

Percent of map unit: 5 percent
Landform: Mountain slopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave, convex, linear
Across-slope shape: Linear, concave, convex
Hydric soil rating: No

Rockyglen

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: Convex
Across-slope shape: Linear
Hydric soil rating: No

Data Source Information

Soil Survey Area: Humboldt County, Central Part, California
Survey Area Data: Version 7, Sep 6, 2021

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

September 30, 2022 Project No: 0481.00

Mr. Erik Sordal
2248 Rundown Acres Lane
Bridgeville, California 95526

Subject: Hydrologic Isolation of Existing Well from Surface Waters, Well Six
2248 Run Down Acres Lane, Bridgeville, APN: 210-062-007, WCR2019-008401

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 might affect nearby surface waters. The nearest tributaries in the vicinity of this well are ephemeral and drain to Butte Creek (Figure 1).

A California-Certified Engineering Geologist visited this site on June 10, 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, an area of approximately 72 acres. We understand that the applicant hopes to use water from this well to irrigate cannabis at some future time. 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 the Humboldt County WebGIS and the Assessor's Parcel Map (Figure 2), parcel 210-062-007 (Figure 2) encompasses approximately 227 acres. With our GPS, we located the subject well at latitude 40.43696° north, and longitude 123.70589 west (±9'). This well is in Section 27, T1N, R4E, and is 235 feet deep with the wellhead at an elevation of approximately 3,420 feet (Figure 1).

The Humboldt County WebGIS shows one ephemeral tributary of Butte Creek nearby to the southeast. The nearest ephemeral tributary of Butte Creek is more than 1,900 feet east-southeast of the well, (Figure 1). The property owner reported that the ephemeral tributary of Butte Creek is dry by mid-July. As stated, based on interpolation from the USGS "Larabee Valley, Calif." (1977), topographic quadrangle map (Figure 1), and the Humboldt County WebGIS, the well site elevation is 3,420 feet. The elevation of the nearest ephemeral tributary of Butte Creek to the east-southeast is approximately 2,740 feet. The elevation of the bottom of the well is approximately 3,185 feet, making the nearest ephemeral tributary of Butte Creek is 445 feet below the bottom of the well.

Well location is shown approximately on the attached figures, and was drilled by Vics Well Drilling Inc., of Acton, California, in June 2019, under Humboldt County well permit #18/19-0066. Vics Well Drilling is a licensed well-drilling contractor (C-57 #886439). Vics Well Drilling submitted their well completion report (DWR 188) on June 17, 2019 (attached). The driller estimated a yield of 15 gpm in June 2019, based on a 4-hour air lift pump test. The total drawdown during the pump test was reported as 0 feet.

Again, total drilled depth of this well is 235 feet. The borehole diameter is 10.63-inches from grade to 235 feet. From the surface to 140 feet, a 4.5-inch diameter blank (unslotted) PVC casing was installed. From 140- to 220-feet, 4.5-inch diameter PVC, slotted (0.032-inch milled slots) well screen, was installed. In the final 15-feet, 4.5-inch blank, unslotted PVC was installed. Per County requirements, a bentonite surface sanitary seal was installed from grade to 25 feet. Below the bentonite seal, the annulus was backfilled with 3 bags of #6 silica gravel. The well is thus cased and sealed through any potential shallow subsurface aquifers in the uppermost 25 feet, five feet more than required by county regulation. Depth to first water was reported at a depth of 185 feet below the surface, and depth to static water in the completed developed well was reported to be 162 feet bgs when the driller conducted the pump test on May 28, 2019. Water at 185 feet is apparently under 23 feet of head.

Per the WebGIS, the nearest mapped spring is approximately 3,357 feet east, in Section 26 at an estimated elevation of 2,580 feet. In Section 23, more than 5,800 feet northeast of the subject well, there is another spring mapped at an elevation of approximately 2,520 feet (Figure 1).

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 this well site is underlain by Broken Formation (cb1) of the Central Belt of the Franciscan Complex; bedded to massive, locally folded, rarely conglomeratic metasandstone and meta-argillite, with only minor amounts of highly sheared rocks, as shown in Figure 4.

According to the NRCS Web Soil Survey, the near-surface soils are loam, and gravelly sandy clay loam to a depth of 79 inches. Soils are interpreted to be uniformly distributed across that portion of the subject parcel underlain by the Central Belt Broken Formation. Beneath a thin layer of decomposed plant material, loamy soils persist to a depth of approximately 6.6 feet where they are underlain by unweathered parent material.

Materials reported on the geologic log of the well completion report (attached) include 8-feet of brown "top soil" above 27-feet of "Blueshale Stone". Beneath the blueshale is 30-feet of dry hard "Serpentine Rock". Below the serpentine rock the driller reported 93-feet of very hard dry "Blue Claystone". From 160-feet to 185-feet the driller logged hard and dry "Basalt Rock". In the bottom 50-feet of the well, "Basalt with water" was logged, and is the water bearing unit in this well.

We interpret the upper blueshale and blue claystone sections of this profile, from 8- to 35-feet, and from 65- to 185-feet to be aquitards, materials of low porosity, permeability, and transmissivity. The so-called basalt material below 185-feet is apparently porous and permeable and is the first water-bearing aquifer material encountered in this well. Fractured basalt rock typically has higher transmissivity and permeability than shale. At the location of the subject well, the elevation of the first water-bearing aquifer unit is thus between approximately 185 feet and total depth, based on the reported lithologies and the driller's report.

Below the surface, the earth materials encountered in the boring are Broken Formation of the Central Belt Franciscan Complex, as mapped by McLaughlin et al., (2000). Sheared, fractured, and folded metasandstone and meta-argillite rock materials can exhibit highly variable hydraulic conductivity, but can also, under the right conditions, constitute significant aquifers. We interpret the sequence described by the driller, as lithologies within the Central Belt of the Franciscan Complex. The deep basalt section of the profile seems to have favorable hydraulic conductivity, making it, in our interpretation, the primary water bearing unit 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 professional experience, it is our 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 185 feet and rose to a static level at 162 feet bgs. This well is sealed through the upper 25 feet of any potential unconfined, near-surface aquifers with which it might communicate hydraulically through the borehole. The bentonite-sealed surface casing isolates the well bore from surface and shallow subsurface water infiltration into the deeper water-bearing aquifers.

When considered with the stratigraphy, and the presumed underlying geologic structure, plus the distances (horizontal and vertically) from any surface waters, and the depth of the producing zone of this well (~185 to 235 feet), we conclude that the depth of the surface seal, combined with more than 150 feet of low-transmissivity shale and serpentinite, are sufficient to preclude the potential for hydraulic connectivity with surface waters, of which there are none closer than 1,900 feet in the ephemeral tributary of Butte Creek. Thus, the water source from which this well draws appears to be a confined, slightly artesian, subsurface aquifer not demonstrably connected to any proximal surface waters or unconfined, near-surface aquifer(s). In our professional opinion, this well appears likely to be hydraulically isolated from nearby wells, surface waters, springs, or wetlands.

The driller estimated the yield of this well at 15 gallons per minute (gpm) on May 28, 2019. Total drawdown was reported to be zero feet after Vic's Well Drilling's four-hour air-lift pump test. At 15 gpm, this well could potentially produce 21,600 gallons per day. The water level in this well reportedly did not change during the pump test, suggesting it has a potential to be productive at the pump rate tested. As noted on the well completion report, this capacity estimated by the pump test may not be representative of this well's long-term yield. Additional testing, for example drawdown and recovery testing may be necessary to estimate a sustainable long-term yield.

This well does not appear to be hydrologically connected to, or capable of influencing surface water flows in the ephemeral tributaries to Butte Creek, which only flow for a limited period during the wet season and then cease. This well appear to be hydrologically connected to any local springs or ephemeral wetlands. 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, springs, and ponds on-site, the potential for significant hydrologic connectivity between surface waters and groundwater in the basalt aquifer appears unlikely. Further, given the apparently limiting condition of the low-transmissivity shale and serpentinite units above the water-bearing blue basalt unit, plus the 23 feet of artesian head pressure in the basalt aquifer, this well is not likely to have significant hydrologic connections to shallow unconfined aquifers.

On the Larabee Valley USGS topographic map, there is one spring mapped in Section 26, more 3,350 feet east of the subject well at elevation 2,580 feet. The second-nearest spring is mapped in the southeast quarter of the northwest quarter of Section 23, more than 5,800 feet north of the subject well, at an estimated elevation of 2,520 feet. There are no other significant (mapped) springs or wetlands mapped within proximity of this subject well. There is a legacy stock pond more than 4,900 feet northeast of the subject well, on APN 210-054-008. We interpret the pond to be sufficiently distant, and adequately sealed, to preclude significant seepage, and as such it would not be connected hydrologically to the confined aquifer tapped by well WCR2019-008401.

We researched the DWR (California Department of Water Resources) database to find other permitted wells within 1,000 feet of the subject well. Based on the information available at the present time, there are no wells which meet this criterion. The closest well to the subject well is well number is WCR2019-11143, located at 40.43614, -123.69398, and is 3,300-feet to the east-southeast. Well WCR2019-11143, is owned by the same property owner as the subject well.

As groundwater mimics topography and responds to the force of gravity, in general the near surface unconfined aquifer will flow down slope in a direction subparallel to topography. Based on topography, well WCR2019-11143 might be situated downgradient of WCR2019-008401. Groundwater flow in the deeper confined subsurface aquifers in the metasandstone and meta-argillite is likely more complex. The ground surface slopes to the northeast; thus the near surface unconfined aquifer flows to the northeast, toward the northwest to southeast axis of Little Larabee Valley. At the time of our visit the subject well did have a pump installed.

In our professional opinion, it appears that the aquifer tapped by the subject well is recharged by water infiltrating through the soil and broken formation bedrock from upslope source areas both proximal and distal to the well site. Ephemeral water courses in the vicinity of the well likely 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 Tannin-Burgsblock-Rockglen complex, on slopes of 50 to 75 percent, (#469, 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 range is listed by the NRCS as 49 to 90 inches per year. Capacity of the most limiting soil layer to transmit water (Ksat) is described as moderately high to high (0.20 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 92 acre-feet, or more than 30 million gallons of water per year, may be expected to recharge the local aquifers below this 227-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 more than 29 acre-feet, or more than 9.5 million gallons. Our estimates are conservative; the 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 at 2248 Run Down Acres Lane, Bridgeville, 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 order prohibits counties, cities, and other public agencies 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 (650,000+ gallons) *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 on APN 210-062-007, located at 2248 Run Down Acres Lane, has a minimal 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, CEG
Lindberg Geologic Consulting

DNL:sll

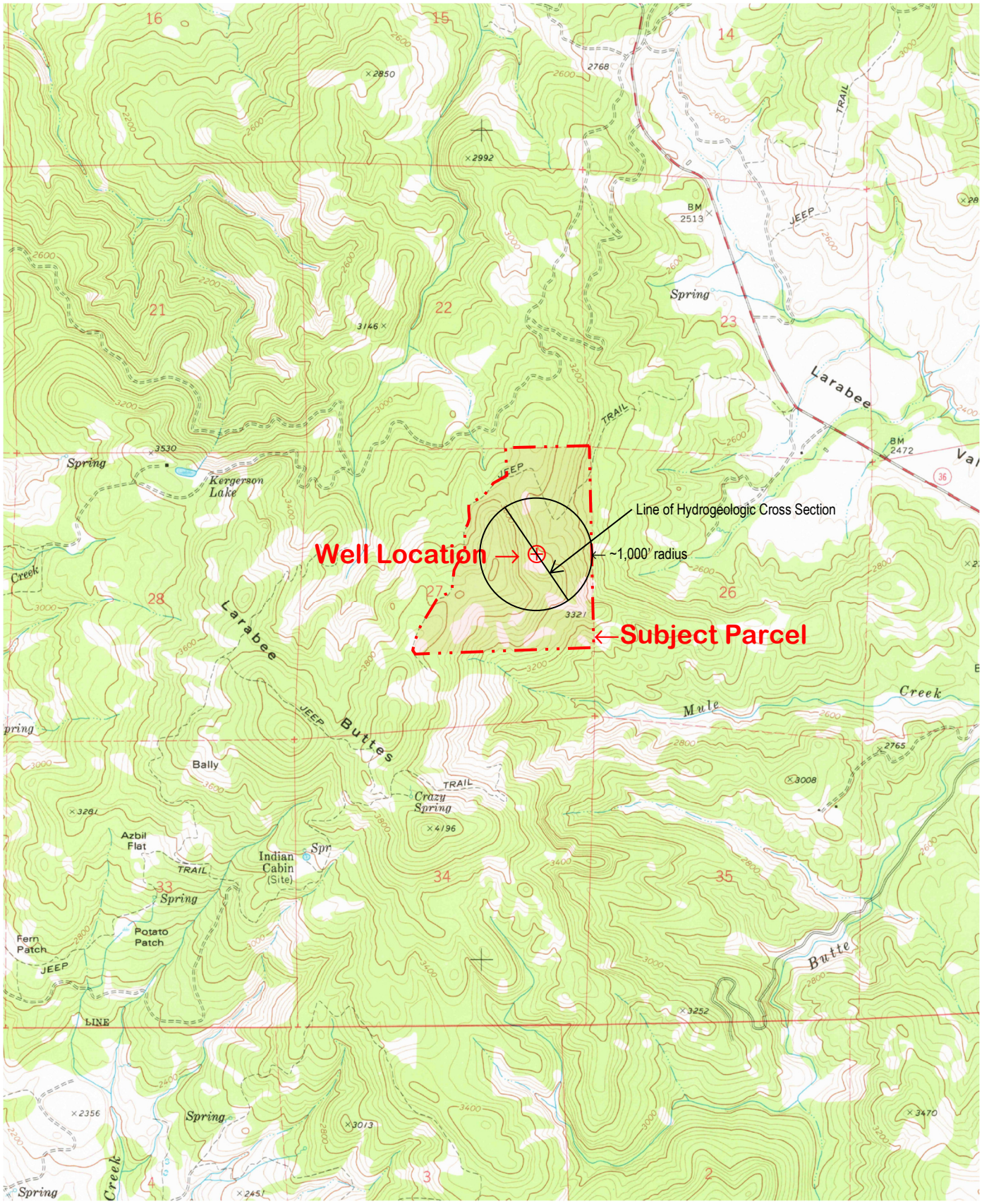
Attachments:
Figure 1: Topographic Well Location Map
Figure 2: Humboldt County Assessor's Parcel Map
Figure 3: Satellite Image of Well location
Figure 4: Geologic Map
Figure 4a: Geologic Map Explanation
Figure 5: Generalized Geologic Cross Section
Figure 6: Hydrogeologic Cross Section
Figure 7: USDA-NRCS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

State of California Well Completion Report:
WCR2019-008401, APN: 210-062-007 (Subject Well)
WCR2019-011143, APN: 210-071-001 (3,327 feet to east-northeast)

Web Soil Survey, NRCS Map Unit Description:
Tannin-Burgsblock-Rockyglen complex, #469, 50 to 75 percent slopes.

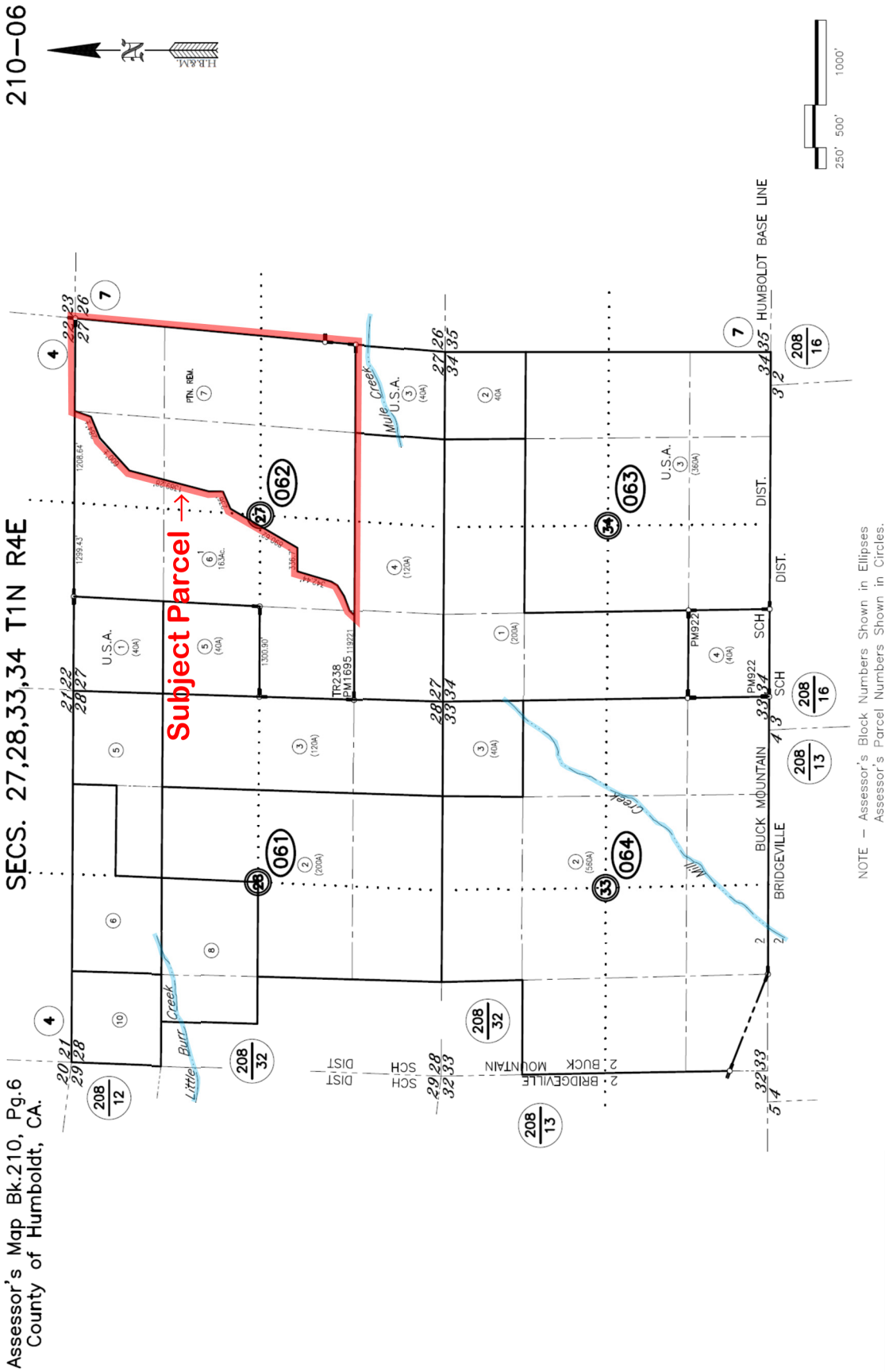
Reference:
Flint *et al*,: Fine-scale hydrologic modeling for regional landscape applications: the California Basin Characterization Model development and performance. Ecological Process, 2013, 2:25. (doi:10.1186/2192-1709-2-25)

Lindberg Geologic Consulting	Engineering-Geologic Well Connectivity Assessment Report	Figure 1
Post Office Box 306	2248 Run Down Acres Lane, Bridgeville, California	September 30, 2022
Cutten, CA 95534	DWR Well 2019-008401, APN 210-062-007, Mr. Erik Sordal, Client	Project 0481.00
(707) 442-6000	Topographic Well Location Map (locations approximate)	1" ≈ 2,400'



Modified from: USGS "Larabee Valley, Calif." 7.5' Quadrangle Map (1977). N ≅

Lindberg Geologic Consulting	Engineering-Geologic Well Connectivity Assessment Report	Figure 2
Post Office Box 306	2248 Run Down Acres Lane, Bridgeville, California	September 30, 2022
Cutten, CA 95534	DWR Well 2019-008401, APN 210-062-007, Mr. Erik Sordal, Client	Project 0481.00
(707) 442-6000	Humboldt County Assessor's Parcel Map (locations approximate)	Scale as Shown

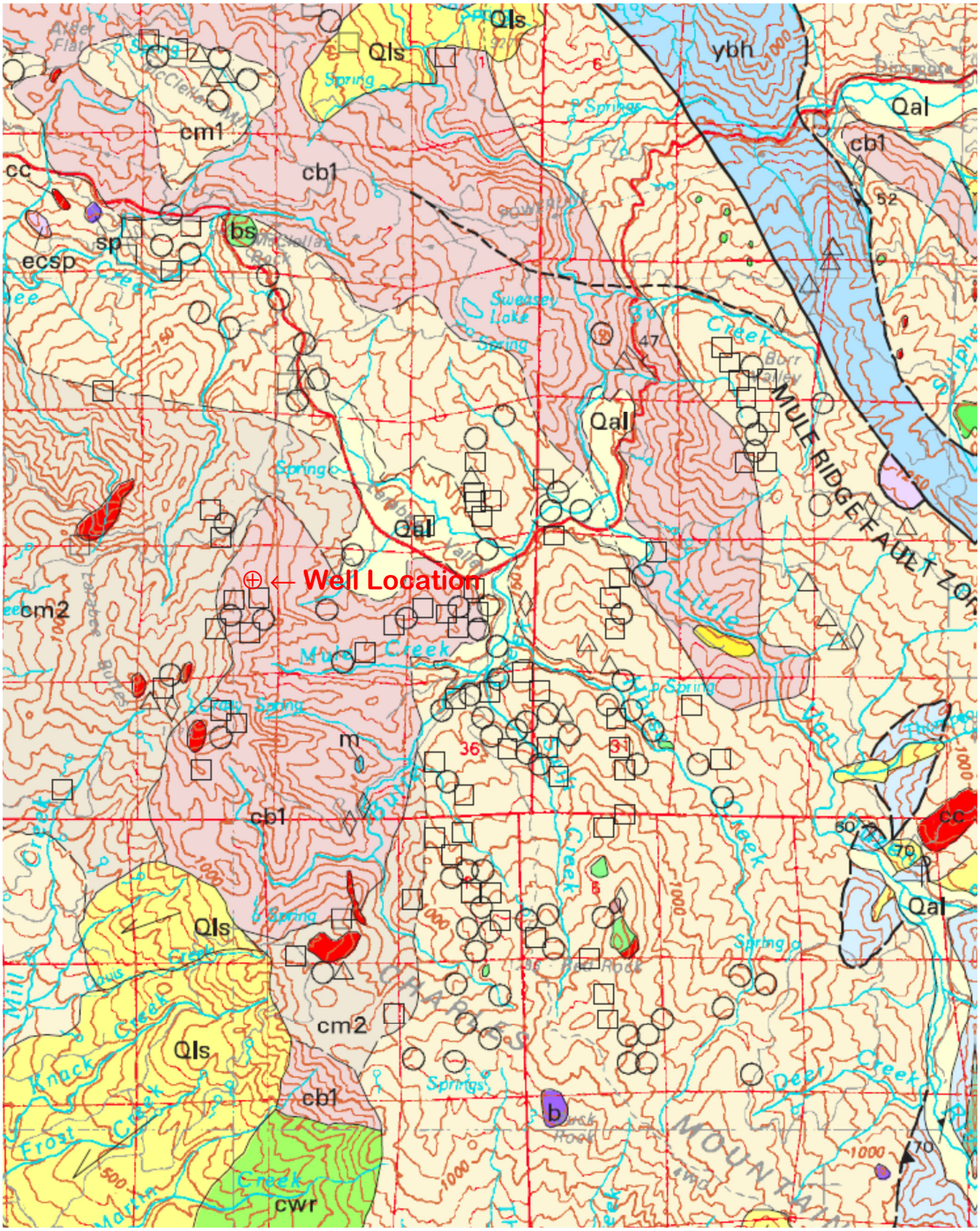


Lindberg Geologic Consulting	Engineering-Geologic Well Connectivity Assessment Report	Figure 3
Post Office Box 306	2248 Run Down Acres Lane, Bridgeville, California	September 30, 2022
Cutten, CA 95534	DWR Well 2019-008401, APN 210-062-007, Mr. Erik Sordal, Client	Project 0481.00
(707) 442-6000	Satellite Image of Well location (locations approximate)	1" ≈ 800'



Modified from: Google Earth Imagery of April 30, 2019. N ≈

Lindberg Geologic Consulting	Engineering-Geologic Well Connectivity Assessment Report	Figure 4
Post Office Box 306	2248 Run Down Acres Lane, Bridgeville, California	September 30, 2022
Cutten, CA 95534	DWR Well 2019-008401, APN 210-062-007, Mr. Erik Sordal, Client	Project 0481.00
(707) 442-6000	Geologic Map (locations approximate)	1" ≈ 4,750'



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

Lindberg Geologic Consulting	Engineering-Geologic Well Connectivity Assessment Report	Figure 4a
P. O. Box 306	2248 Run Down Acres Lane, Bridgeville, California	September 30, 2022
Cutten, CA 95534	DWR Well 2019-008401, APN 210-062-007, Mr. Erik Sordal, Client	Project 0481.00
(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)
- Ti — 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)
- m — Undivided blueschist (Jurassic?)

King Range terrane (Miocene to Late Cretaceous)

- Krp — Igneous and sedimentary rocks of Point Delgada (Late Cretaceous)
- m — 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)
- 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 — 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 — Taliaferro 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
- whji — 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:

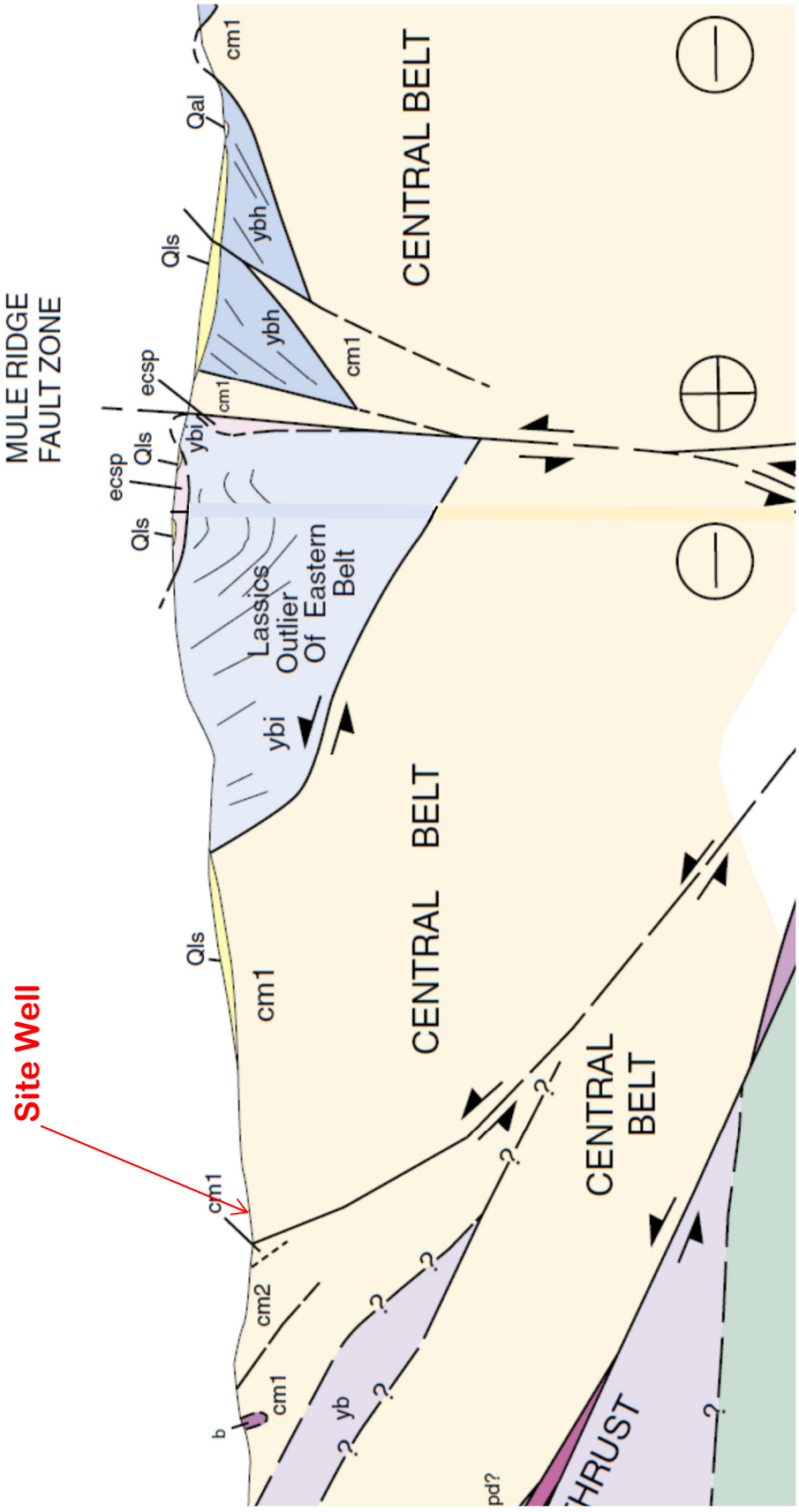
- Synclinal or synformal axis
- Anticlinal or antiformal axis
- Overturned syncline
- Landslide (Qls)

Melange Blocks:

- Serpentinite
- Chert
- Blueschist
- Greenstone
- Fossil locality and number

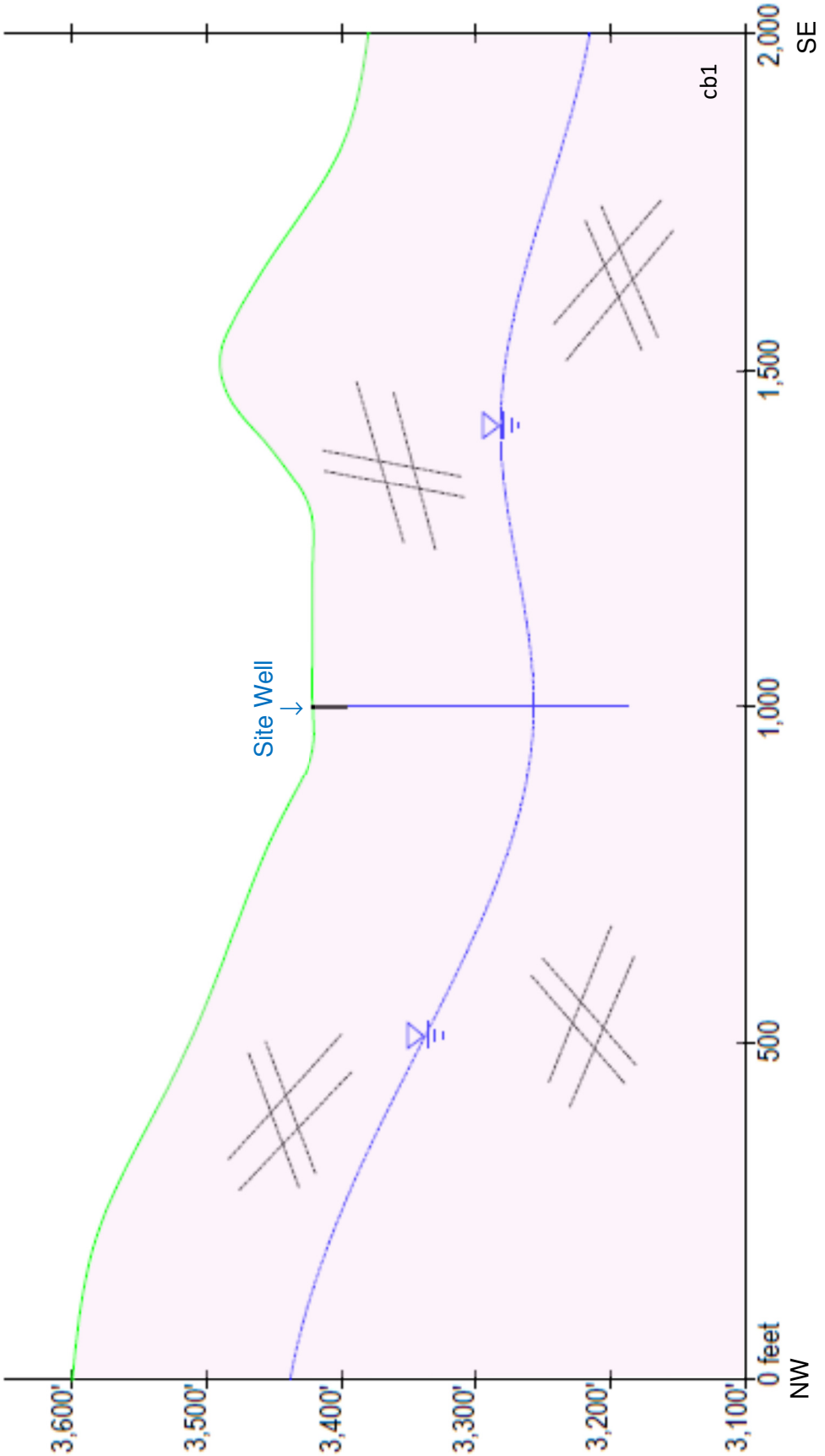
GEOLOGY OF THE CAPE MENDOCINO, EUREKA, GARBERVILLE, AND SOUTHWESTERN PART OF THE HAYFORK 30 X 60 MINUTE QUADRANGLES AND ADJACENT OFFSHORE AREA, NORTHERN CALIFORNIA (McLaughlin et al., 2000)

Lindberg Geologic Consulting	Engineering-Geologic Well Connectivity Assessment Report	Figure 5
Post Office Box 306	2248 Run Down Acres Lane, Bridgeville, California	September 30, 2022
Cutten, CA 95534	DWR Well 2019-008401, APN 210-062-007, Mr. Erik Sordal, Client	Project 0481.00
(707) 442-6000	Generalized Geologic Cross Section (locations approximate)	Not to Scale



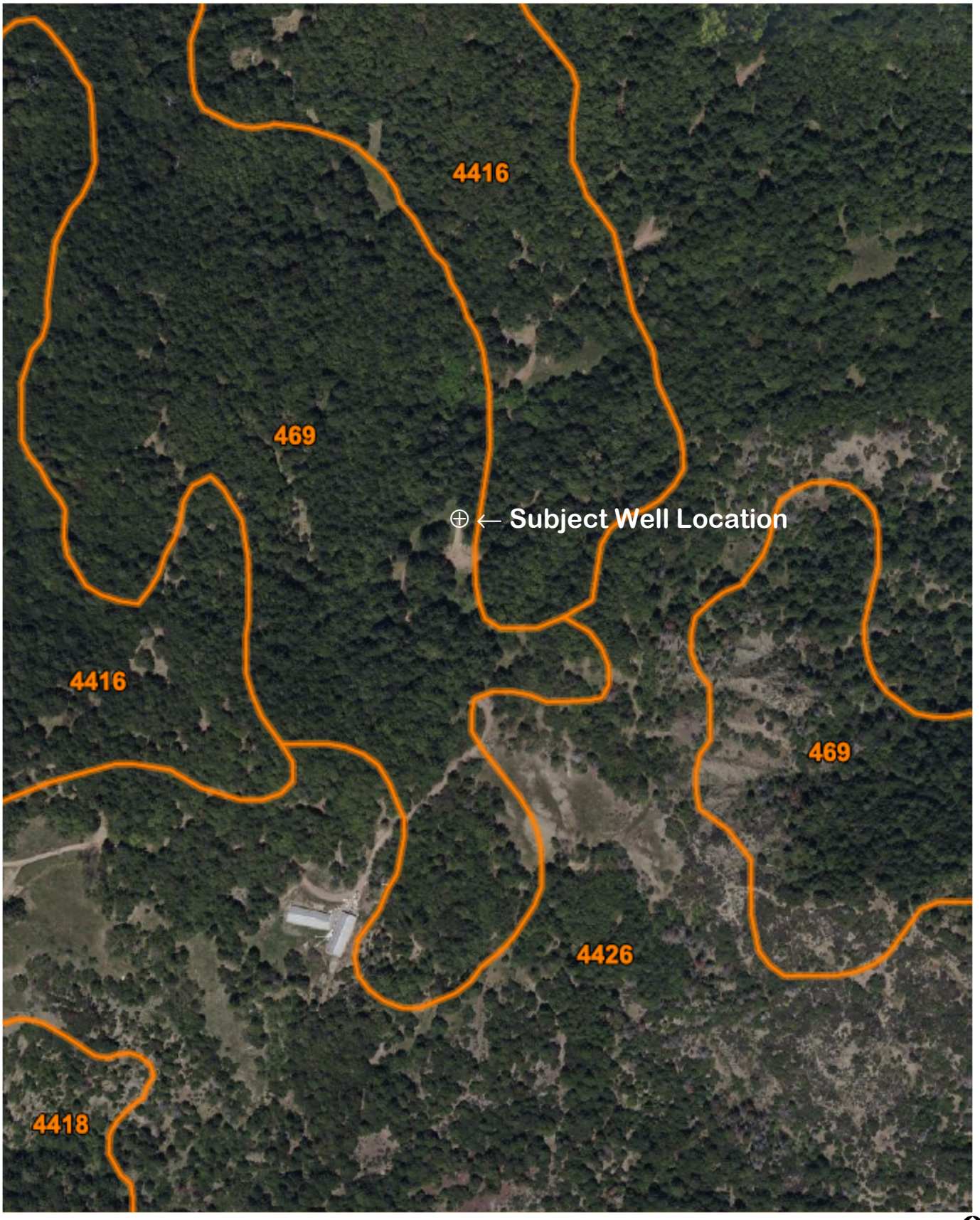
Modified from: McLaughlin, et al., (2,000).

Lindberg Geologic Consulting	Engineering-Geologic Well Connectivity Assessment Report	Figure 6
Post Office Box 306	2248 Run Down Acres Lane, Bridgeville, California	September 30, 2022
Cutten, CA 95534	DWR Well 2019-008401, APN 210-062-007, Mr. Erik Sordal, Client	Project 0481.00
(707) 442-6000	Geologic Map (locations approximate)	2 x V. E.



In this vertically exaggerated (~2x) cross section, the view is looking down slope and toward the northeast. 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 southwest, to the northeast toward Larabee Valley and unnamed tributaries of Butte Creek. Bedrock subgrade is mapped by McLaughlin et al. as composed of abundantly fractured Broken Formation (cb1) of the Central Belt of the Franciscan Complex. Broken Formation is one of several components of the Central Belt Franciscan Complex. Groundwater is envisioned as flowing through fractured zones in the Broken Formation. Fractures are interpreted to be the primary permeability and providing preferential flow paths for groundwater in this area.

Lindberg Geologic Consulting	Engineering-Geologic Well Connectivity Assessment Report	Figure 7
Post Office Box 306	2248 Run Down Acres Lane, Bridgeville, California	September 30, 2022
Cutten, CA 95534	DWR Well 2019-008401, APN 210-062-007, Mr. Erik Sordal, Client	Project 0481.00
(707) 442-6000	USDA-NRCS Soil Map (locations approximate)	Scale not Determined



Modified from: USGS-NRCS Web Soil Survey, September 28, 2022 N ≈

State of California

Well Completion Report

Form DWR 188 Submitted 6/17/2019

WCR2019-008401

Owner's Well Number 1 | Date Work Began 05/14/2019 | Date Work Ended 05/28/2019

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

Secondary Permit Agency | Permit Number 18/19-0066 | Permit Date 07/20/2018

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

Name ERIK SORDAL

Mailing Address P.O BOX 202

City CARLATTA | State CA | Zip 95526

Planned Use and Activity

Activity New Well

Planned Use Water Supply Irrigation - Agriculture

Well Location

Address 2248 RUNDOWN ACRES

City BRIDGEVILLE | Zip 95526 | County Humboldt

Latitude 40 Deg. 26 Min. 12.9983 Sec. N | Longitude -123 Deg. 42 Min. 21.1737 Sec. W

Dec. Lat. 40.436944 | Dec. Long. -123.7058816

Vertical Datum | Horizontal Datum WGS84

Location Accuracy 5 Ft | Location Determination Method GPS

APN 210-062-007-000

Township 01 N

Range 04 E

Section 27

Baseline Meridian Humboldt

Ground Surface Elevation 3339

Elevation Accuracy 10 Ft

Elevation Determination Method GPS

Borehole Information

Orientation Vertical | Specify

Drilling Method Downhole Rotary Hammer | Drilling Fluid Air

Total Depth of Boring 235 Feet

Total Depth of Completed Well 235 Feet

Water Level and Yield of Completed Well

Depth to first water 185 (Feet below surface)

Depth to Static Water Level 162 (Feet) | Date Measured 05/28/2019

Estimated Yield* 15 (GPM) | Test Type Air Lift

Test Length 4 (Hours) | Total Drawdown 0 (feet)

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

Geologic Log - Lite

Depth from Surface Feet to Feet		Material Type	Material Color	Material Texture	Material Description
0	8	Soil or Organic	Brown	Organic	TOP SOIL
8	35	Claystone	Blue	Hard	BLUESHALE STONE VERY HARD AND DRY
35	65	Rock	Green	Gummy	SERPENTINE ROCK DRY AND HARD
65	160	Claystone	Blue	Hard	BLUE CLAYSTONE VERY HARD AND DRY
160	185	Rock	Blue	Hard	BASALT ROCK YARD AND DRY
185	235	Rock	Blue	Hard	BASALT WITH WATER BEARING

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	140	Blank	PVC	OD: 4.500 in. | Thickness: 0.337 in.	0.337	4.5			
1	140	220	Screen	PVC	OD: 4.500 in. | Thickness: 0.337 in.	0.337	4.5	Milled Slots	32	.032 SLOT
1	220	235	Blank	PVC	OD: 4.500 in. | Thickness: 0.337 in.	0.337	4.5			BLANK W/ 4.5 INCH CAP

Annular Material

Depth from Surface Feet to Feet		Fill	Fill Type Details	Filter Pack Size	Description
0	25	Bentonite	Other Bentonite	3/8 BETONITE CHIPS	ADDED WATER WHILE DUMPING CHIPS
25	235	Filter Pack	Other Gravel Pack	#6 SILICA GRAVEL	3 BAGS SILICA GRAVEL

Other Observations:

Borehole Specifications

Depth from Surface Feet to Feet		Borehole Diameter (inches)
0	235	10.63

Certification Statement

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

Name: VICS WELL DRILLING INC (Person, Firm or Corporation)

3807 SIERRA HWY UNIT #6 (Address) | ACTON (City) | CA (State) | 93510 (Zip)

Signed: *electronic signature received* (C-57 Licensed Water Well Contractor) | 06/17/2019 (Date Signed) | 886439 (C-57 License Number)

Attachments

PLOT PLAN#1.jpg - Location Map

ZHAN APPROVED PERMIT.pdf - Permit

ZHAN GIS.pdf - Other

ZHAN DRILLERS REPORT.docx - Other

ZHAN DIR..pdf - Location Map

DWR Use Only

CSG #	State Well Number	Site Code	Local Well Number

					N					W

Latitude Deg/Min/Sec | Longitude Deg/Min/Sec

TRS:

APN:

State of California

Well Completion Report

Form DWR 188 Submitted 8/8/2019

WCR2019-011143

Owner's Well Number

Date Work Began 07/30/2019 Date Work Ended 08/08/2019

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

Secondary Permit Agency

Permit Number 19/20-0026 Permit Date 07/15/2019

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

Name Eric Sordal

Mailing Address P.O. Box 202

City Carlotta State CA Zip 95528

Planned Use and Activity

Activity New Well

Planned Use Water Supply Irrigation - Agriculture

Well Location

Address 2248 Run Down Acres RD

City Bridgeville Zip 95526 County Humboldt

Latitude 40 Deg. 26 Min. 20.094 Sec. N Longitude -123 Deg. 41 Min. 35.7611 Sec. W

Dec. Lat. 40.438915 Dec. Long. -123.693267

Vertical Datum Horizontal Datum WGS84

Location Accuracy Location Determination Method

APN 210-071-001

Township 01 N

Range 04 E

Section 26

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 220 Feet

Total Depth of Completed Well 220 Feet

Water Level and Yield of Completed Well

Depth to first water 85 (Feet below surface)

Depth to Static

Water Level 17 (Feet) Date Measured 08/08/2019

Estimated Yield* 15 (GPM) Test Type Air Lift

Test Length 4 (Hours) Total Drawdown 135 (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	top soil
4	18	blue clay
18	71	soft shale
71	135	blue sandstone
135	172	sandstone shale mix
172	220	basalt

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	220	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	220	Filter Pack	Other Gravel Pack	3/8 Inch	Pea Gravel

Other Observations:

Borehole Specifications

Depth from Surface Feet to Feet		Borehole Diameter (inches)
0	220	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) | 08/08/2019 (Date Signed) | 683865 (C-57 License Number)

Attachments

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, Central Part, California

469—Tannin-Burgsblock-Rockyglen complex, 50 to 75 percent slopes

Map Unit Setting

National map unit symbol: xhw0
Elevation: 200 to 3,280 feet
Mean annual precipitation: 49 to 90 inches
Mean annual air temperature: 52 to 59 degrees F
Frost-free period: 240 to 280 days
Farmland classification: Not prime farmland

Map Unit Composition

Tannin and similar soils: 40 percent
Burgsblock and similar soils: 25 percent
Rockyglen and similar soils: 20 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tannin

Setting

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

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 9 inches: loam
ABt - 9 to 22 inches: loam
Bt1 - 22 to 35 inches: sandy clay loam
Bt2 - 35 to 67 inches: gravelly sandy clay loam
BCt - 67 to 79 inches: gravelly sandy clay loam

Properties and qualities

Slope: 50 to 75 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 (0.20 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: Moderate (about 8.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: F005XZ022CA - Mesic Mountains >60"ppt
Hydric soil rating: No

Description of Burgsblock

Setting

Landform: Mountain slopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Center third of mountainflank
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Parent material: Colluvium derived from sandstone and/or colluvium derived from mudstone and/or residuum weathered from sandstone and/or residuum weathered from mudstone

Typical profile

A - 0 to 7 inches: very gravelly loam
Bt1 - 7 to 24 inches: very gravelly loam
Bt2 - 24 to 39 inches: very gravelly clay loam
Bt3 - 39 to 55 inches: very gravelly clay loam
Bt4 - 55 to 79 inches: very gravelly clay loam

Properties and qualities

Slope: 50 to 75 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 high to high (0.20 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: Moderate (about 6.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C
Ecological site: F005XZ022CA - Mesic Mountains >60"ppt
Hydric soil rating: No

Description of Rockyglen

Setting

Landform: Mountain slopes
Landform position (two-dimensional): Shoulder, backslope, footslope
Landform position (three-dimensional): Center third of mountainflank
Down-slope shape: Concave, convex, linear
Across-slope shape: Linear, concave, convex
Parent material: Colluvium derived from mudstone and/or residuum weathered from sandstone

Typical profile

Oi - 0 to 2 inches: gravelly slightly decomposed plant material
A - 2 to 9 inches: very gravelly loam
AB - 9 to 22 inches: very gravelly loam
Bt1 - 22 to 39 inches: very gravelly loam
Bt2 - 39 to 63 inches: extremely gravelly loam
BC - 63 to 79 inches: extremely gravelly sandy clay loam

Properties and qualities

Slope: 50 to 75 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: Moderate (about 6.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: F005XZ022CA - Mesic Mountains >60"ppt
Hydric soil rating: No

Minor Components

Wohly

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: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

Coolyork

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, linear
Across-slope shape: Linear, concave
Hydric soil rating: No

Chalkmountain

Percent of map unit: 4 percent
Landform: Mountain slopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave, convex, linear
Across-slope shape: Linear, concave, convex
Hydric soil rating: No

Rock outcrop

Percent of map unit: 1 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, Central Part, California
Survey Area Data: Version 7, Sep 6, 2021

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

October 6, 2022 Project No: 0481.00

Mr. Erik Sordal
2248 Rundown Acres Lane
Bridgeville, California 95526

Subject: Hydrologic Isolation of Existing Well from Surface Waters, Well Seven
2238 Run Down Acres Lane, Bridgeville, APN: 210-054-008, WCR2022-005782

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 nearby surface waters or adjacent wetlands and, and if pumping this well might affect such nearby surface waters. The nearest tributaries in the vicinity of this well (Figure 1) drain to Butte Creek.

A California-Certified Engineering Geologist visited this site on June 10, 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, an area of approximately 72 acres. We understand that the applicant may use water from this well to irrigate cannabis at some future time. 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 the Humboldt County WebGIS and the Assessor's Parcel Map (Figure 2), parcel 210-054-008 (Figure 2) encompasses approximately 187 acres. Our GPS located the subject well at latitude 40.44854° north, and longitude 123.69198 west (±9'). This well is in Section 23, T1N, R4E, and is 160 feet deep. Based on the Larabee Valley, Calif. 7.5' topographic map (1977) the wellhead elevation is approximately 2,520 feet (Figure 1).

The Humboldt County WebGIS shows a spring-fed perennial tributary of Butte Creek more than 450 feet north-northeast of the site well (Figure 1). The property owner reported that the ephemeral tributary of Butte Creek in this area run dry by mid-July. As stated, based on interpolation from the USGS "Larabee Valley, Calif." (1977), topographic quadrangle map (Figure 1), and the Humboldt County WebGIS, the well site elevation is 2,520 feet. The elevation of the spring-fed perennial tributary of Butte Creek to the north-northeast is estimated to be approximately 2,490 feet. The well bottom elevation of the well is approximately 2,360 feet, making the nearby spring-fed perennial tributary of Butte Creek 130 feet higher than the total depth of the well.

Well location is shown approximately on the attached figures, and was drilled by Fisch Drilling of Hydesville, California, in May 2022, under Humboldt County well permit #20/21-1183. Fisch Drilling is a licensed well drilling contractor (C-57 #683865). Fisch submitted their well completion report (DWR 188) on May 23, 2022 (attached). The driller estimated a yield of 25 gpm in May 2022, based on a 4-hour air lift pump test. Total drawdown during the pump test was reported as 11 feet.

Again, total drilled depth of this well is 160 feet. The borehole diameter is 10-inches from grade to 160-feet. From the surface to 160 feet, a 6-inch diameter blank (unslotted) low carbon steel casing was installed. This well was "developed from the bottom" by the driller; no well screen was installed, and groundwater inflow occurs through the bottom of the casing. In accordance with 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. Depth to first water was reported at 61 feet below the surface, and depth to static water in the completed developed well was reported to be 20 feet bgs when the driller conducted the pump test on May 20, 2022. Groundwater at this location is under some hydrostatic (artesian) head (pressure) as indicated by the more than 40-foot difference in static versus first water elevations.

Per the USGS topographic map and the WebGIS, the nearest mapped spring is more than 890 feet northwest, in Section 23 at an estimated elevation of approximately 2,510 feet. There are no other springs mapped in Section 23, Figure 1. There is a spring in Section 26, more than 3,800 feet to the south of the site well.

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 are loam, at the surface, grading with depth to gravelly loam and very gravelly loamy sand and clay loam to a depth of 79 inches. Soils are interpreted to be uniformly distributed across that portion of the subject parcel underlain by the Central Belt mélange (cm2). At a depth of approximately seven feet soils are underlain by unweathered parent material.

Materials reported on the geologic log of the driller's well completion report (attached) include 1-foot of "top soil" above 15-feet (1-foot to 16-feet) of "Brown Clay". Beneath the brown clay lies 16-feet of "Brown Silty Clay/Brown Sandstone" (16- to 32-feet), below which the driller reported 29-feet of "Brown Sandstone", (32- to 61-feet). The next 22-feet (61- to 83-feet) the driller logged "Blue Sandstone" , which is the first water bearing unit, followed by 47-feet of "Fractured Shale", (83- to 130-feet). The driller then logged 1-foot (130- to 131-feet) of "Shale Clay". In the final 29-

feet of the boring, from 131-feet to 160-feet, “Fractured Shale” was logged. Based on conversation with the driller, the fractured shale in the last 29 feet of the boring is the main water-bearing unit in this well.

We interpret the upper brown clay section of the profile in this well, from one to 16-feet, to be an aquitard, a material of low permeability and transmissivity. Blue sandstone, and fractured shale below 61 feet are expected to be porous and permeable and are the productive water-bearing units in this well. Sandstones and fractured shales typically have higher transmissivity and permeability than clays or clay shales. At the location of the subject well, the elevation of the first water-bearing aquifer unit is thus between approximately 61 feet and 83 feet, based on the reported lithologies in the driller’s report.

Below the surface, the earth materials encountered in the boring are mélange of the Central Belt Franciscan Complex, as mapped by McLaughlin et al., (2000). Sheared, fractured, and folded metasedimentary rock materials can have highly variable hydraulic conductivity, but can also, under suitable conditions, constitute significant aquifers. We interpret the sequence described by the driller, as lithologies within the central belt mélange (cm2) of the Franciscan Complex. The blue sandstone and fractured shale sections of this profile apparently have favorable hydraulic conductivity, making them, in our interpretation, the primary water bearing units 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 a direct or significant connection to proximal surface waters. First water was reportedly encountered at 61 feet and rose to a static level at 20 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. This well was also developed from the bottom, so it is primarily drawing water from the fractured shale found from 131 to 160 feet, with some inflow possible from the blue sandstone units and the fractured shale from 83 to 130 feet. The bentonite-sealed surface casing isolates the well bore from surface and shallow subsurface water infiltration through the borehole into the deeper water-bearing aquifers.

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 primary producing zone of this well (~131 to 160 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, combined with the 31 feet of brown clay and silty clay, are sufficient to preclude the potential for hydraulic connectivity with surface waters, of which there are none closer than 450 feet, in the spring-fed perennial tributary of Butte Creek. Thus, the water source from which this well draws appears to be a confined, moderately artesian 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 25 gallons per minute (gpm) on May 20, 2022. Total drawdown was reported to be 11 feet after Fisch Drilling's four-hour air-lift pump test. At 25 gpm, this well would potentially produce 36,000 gallons per day. As noted on the well completion report, this capacity may not be representative of this well's long-term yield. Additional 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 the local spring-fed perennial tributary of Butte Creek, or in the more-distal ephemeral tributaries of Butte Creek, which only flow for a limited period during the wet season and then go dry. Nor does this well appear to be hydrologically connected to local springs or ephemeral wetlands. Given the horizontal distances involved, and the elevation differences between the 131- to 160-foot deep, main water-producing zone in the subject well, and the surface waters of the nearest watercourses, springs, and ponds, the potential for significant hydrologic connectivity between surface waters and groundwater in the blue sandstone and fractured shale aquifers appears unlikely. Further, given the apparently limiting condition of the low-transmissivity brown clay and silty clay units above and below the water-bearing units, and the artesian pressure in these aquifers, they are unlikely to have significantly hydraulically connections to shallow unconfined aquifers feeding the closest springs.

As mentioned, on the Larabee Valley USGS topographic quadrangle map, there is a spring mapped in the southeast quarter of the northwest quarter of Section 23, more than 890 feet northwest of the subject well, at an estimated elevation of 2,510 feet. One other spring mapped in Section 26, more than 3,800 feet south of the subject well at an elevation of 2,580 feet. There are no other significant (mapped) springs or wetlands within 1,000 feet of this subject well. The owner does have a rainwater catchment pond more than 1,000 feet to the southwest, at an elevation of approximately 2,750 feet of the subject well, on APN 210-054-008. This pond is lined, to preclude seepage, and as such it cannot be connected hydrologically to well WCR2022-005782.

We researched the DWR (California Department of Water Resources) database to find other permitted wells within 1,000 feet of the subject well. Based on the information available at the present time, there are two wells which meet this criterion. The closest well to the subject well is WCR2012-008156, located at 40.44929, -123.6916, APN: 210-051-070, more than 280-feet to the north-northwest at an elevation of 2,520-feet. Well 008156 encountered dissimilar stratigraphy

and is a 10-inch, 15 gpm well, 120 feet in depth, screened from 20 to 120-feet. The well bottom elevation of well 008156 is 2,400 feet. The elevation of the subject well is 60 feet lower than the subject well (WCR2022-005782). The other well within 1,000 feet of the subject well is WCR2012-008152, located at 40.4502, -123.6930, more than 650 feet to the north-northwest. Well 008152 is another 120-foot deep well, that tested at five gallons per minute and is screened from 20- to 120-feet. Well 008152 encountered generally similar stratigraphy; first water was encountered at 21-feet and the static water level was the same.

As groundwater mimics topography and responds to the force of gravity, in general the near surface unconfined aquifer will flow down slope in a direction subparallel to topography. Based on topography, wells 008152 and 008156 are situated across-gradient from the subject well. Groundwater flow in the deeper confined subsurface aquifers in the cm2 mélange is likely far more complex. In general, the ground surface slopes to the northeast; thus the near surface unconfined aquifer flows to the northeast, toward the northwest to southeast axis of Little Larabee Valley. At the time of our visit the subject well did not have a pump installed.

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 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 Frostvalley-Mulecreek complex, on slopes of 2 to 9 percent, (#1002, 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 64 to 76 inches per year. Capacity of the most limiting soil layer to transmit water (Ksat) is described as moderately high to high (0.57 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 (64 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 99 acre-feet, or more than 32 million gallons of water per year (MGPY), may be expected to recharge the local aquifer system below this 187-acre parcel. Given that same 64-inches of precipitation, and the same 10 percent partitioned to groundwater recharge, then recharge can be estimated within a 1,000-foot radius of the subject well. Recharge within the 72 acres enclosed by a circle having a 1,000-foot radius, would be more than 38 acre-feet, and more than 12.5 MGPY. Our estimates are by design conservative; United States Geological Survey (USGS) researchers estimate that in northwest California, approximately 33 percent of precipitation goes to recharge (Flint, et al., 2103). Modelling the 72-acre circle surrounding the well with 33 percent of precipitation to recharge results in 41 MGPY.

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 2238 Run Down Acres Lane, Bridgeville, was permitted prior to the Order and is not within a basin subject to the Act; there has been no Groundwater Sustainability Agency established with authority over the area where this permitted well is sited.

The order states that counties, cities, and other public agencies are 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 the conditions in the Order, are not applicable to "*wells that provide less than two acre-feet per year* (650,000+ gallons) *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 on APN 210-054-008, located at 2238 Run Down Acres Lane, 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, 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

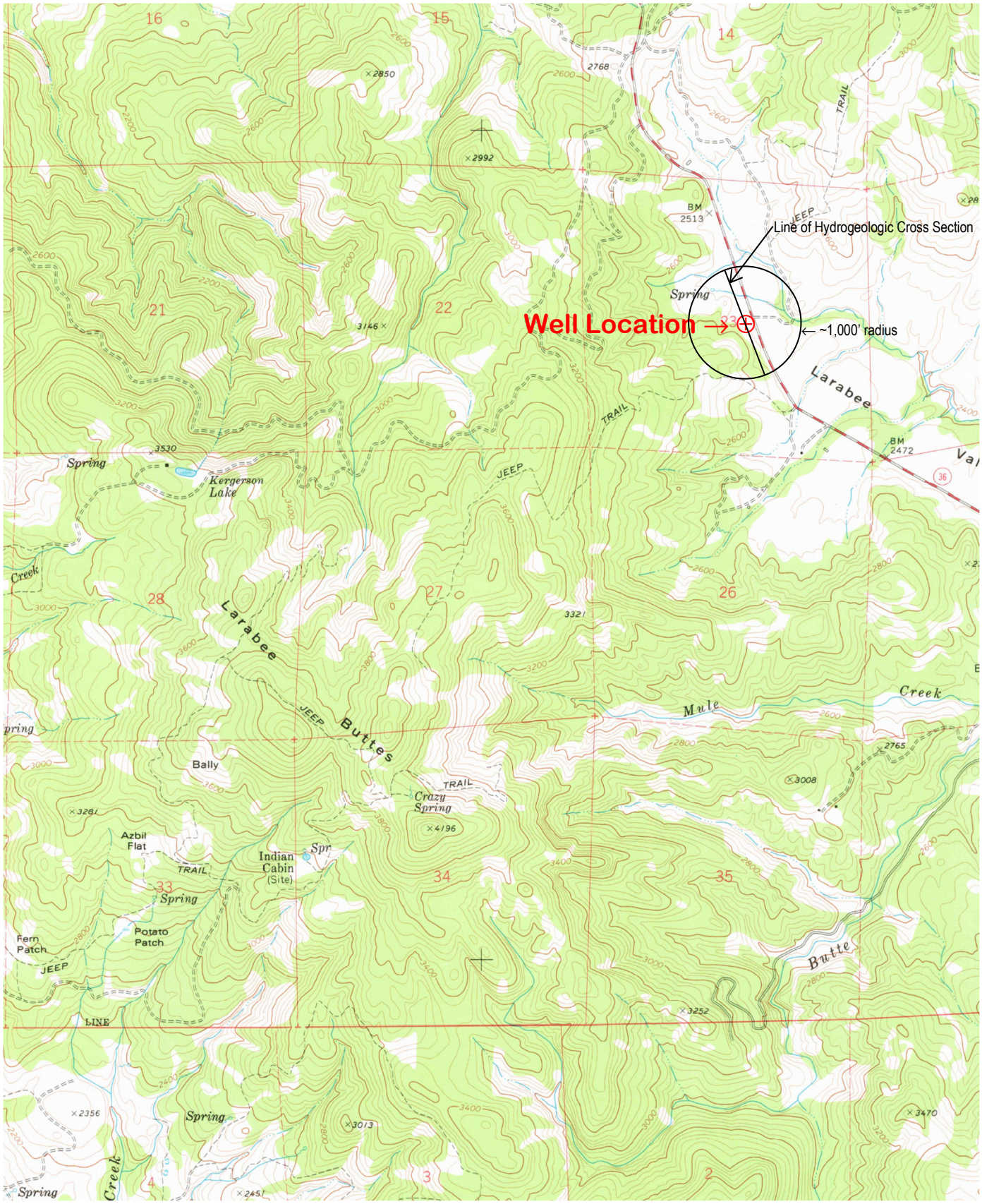
Figure 4a: Geologic Map Explanation
Figure 5: Generalized Geologic Cross Section
Figure 6: Hydrogeologic Cross Section
Figure 7: USDA-NRCS Soils Map

State of California Well Completion Report:
WCR2022-005782, APN: 210-054-008 (Subject Well)
WCR2012-008156, Legacy Number e0153131, APN: 210-051-070 (>280' N-NE)
WCR2012-008152, Legacy Number e0152676, APN: 210-051-027 (>650' NW)

Web Soil Survey, NRCS Map Unit Description:
Frostvalley-Mulecreek complex, #1002, 6 to 9 percent slopes.

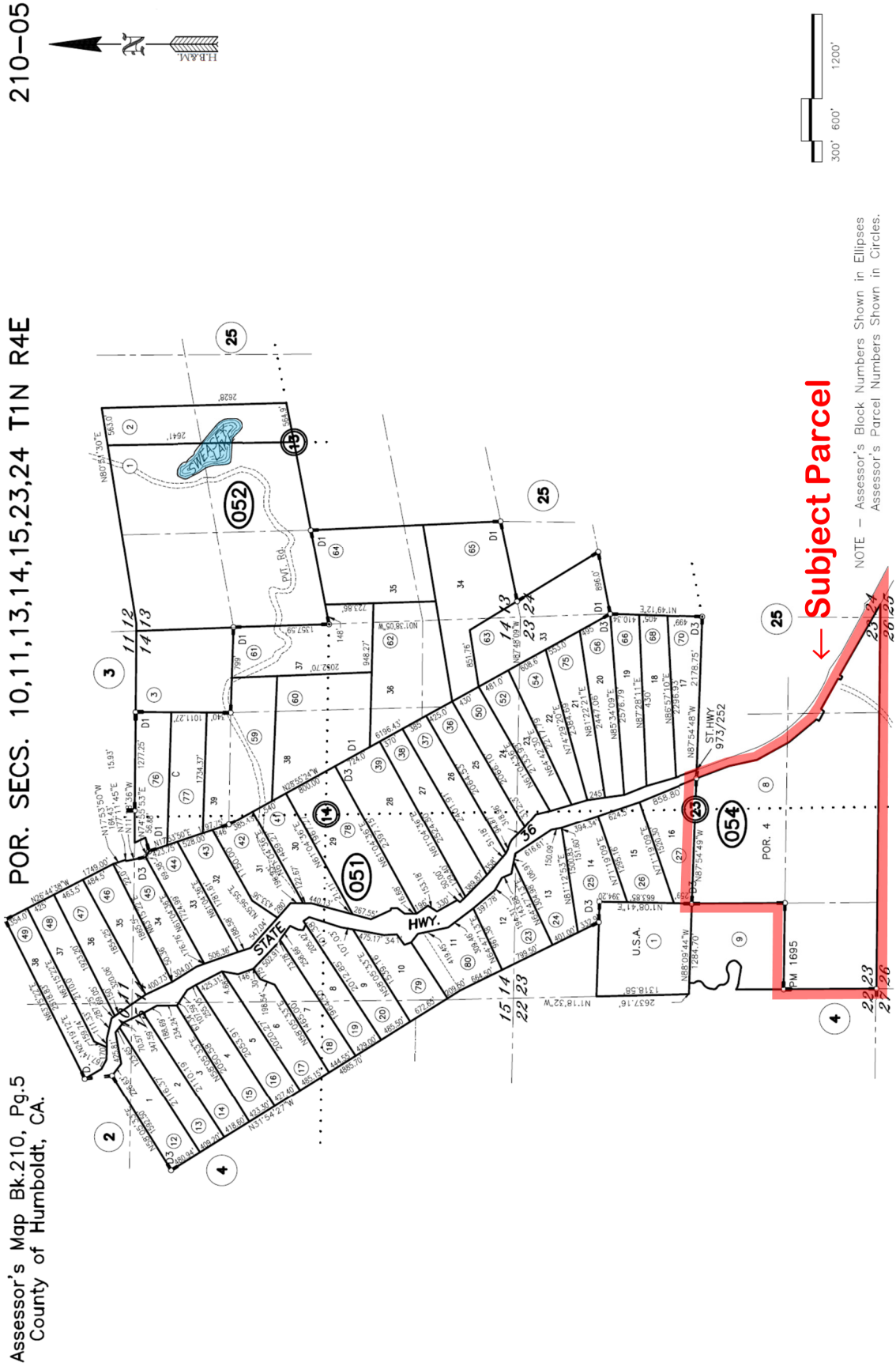
Reference:
Flint et al.: Fine-scale hydrologic modeling for regional landscape applications: the California Basin Characterization Model development and performance. Ecological Process, 2013, 2:25. (doi:10.1186/2192-1709-2-25)

Lindberg Geologic Consulting	Engineering-Geologic Well Connectivity Assessment Report	Figure 1
Post Office Box 306	2238 Run Down Acres Lane, Bridgeville, California	October 6, 2022
Cutten, CA 95534	DWR Well 2022-005782, APN 210-054-008, Mr. Erik Sordal, Client	Project 0481.00
(707) 442-6000	Topographic Well Location Map (locations approximate)	1" ≈ 2,400'



Modified from: USGS "Larabee Valley, Calif." 7.5' Quadrangle Map (1977). N ≅

Lindberg Geologic Consulting	Engineering-Geologic Well Connectivity Assessment Report	Figure 2
Post Office Box 306	2238 Run Down Acres Lane, Bridgeville, California	October 6, 2022
Cutten, CA 95534	DWR Well 2022-005782, APN 210-054-008, Mr. Erik Sordal, Client	Project 0481.00
(707) 442-6000	Humboldt County Assessor's Parcel Map (locations approximate)	Scale as Shown

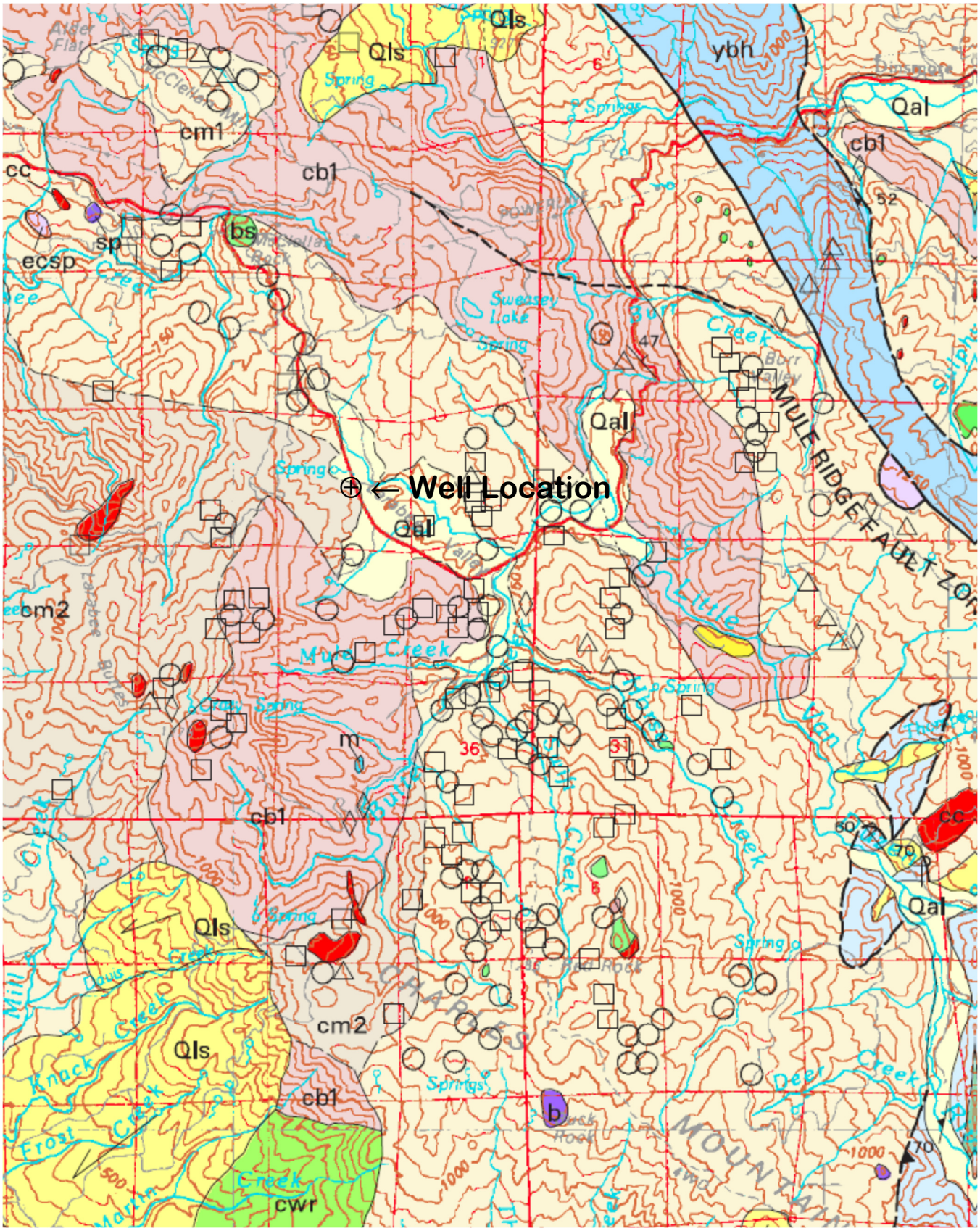


Lindberg Geologic Consulting	Engineering-Geologic Well Connectivity Assessment Report	Figure 3
Post Office Box 306	2238 Run Down Acres Lane, Bridgeville, California	October 6, 2022
Cutten, CA 95534	DWR Well 2022-005782, APN 210-054-008, Mr. Erik Sordal, Client	Project 0481.00
(707) 442-6000	Satellite Image of Well Location (locations approximate)	1" ≈ 880'



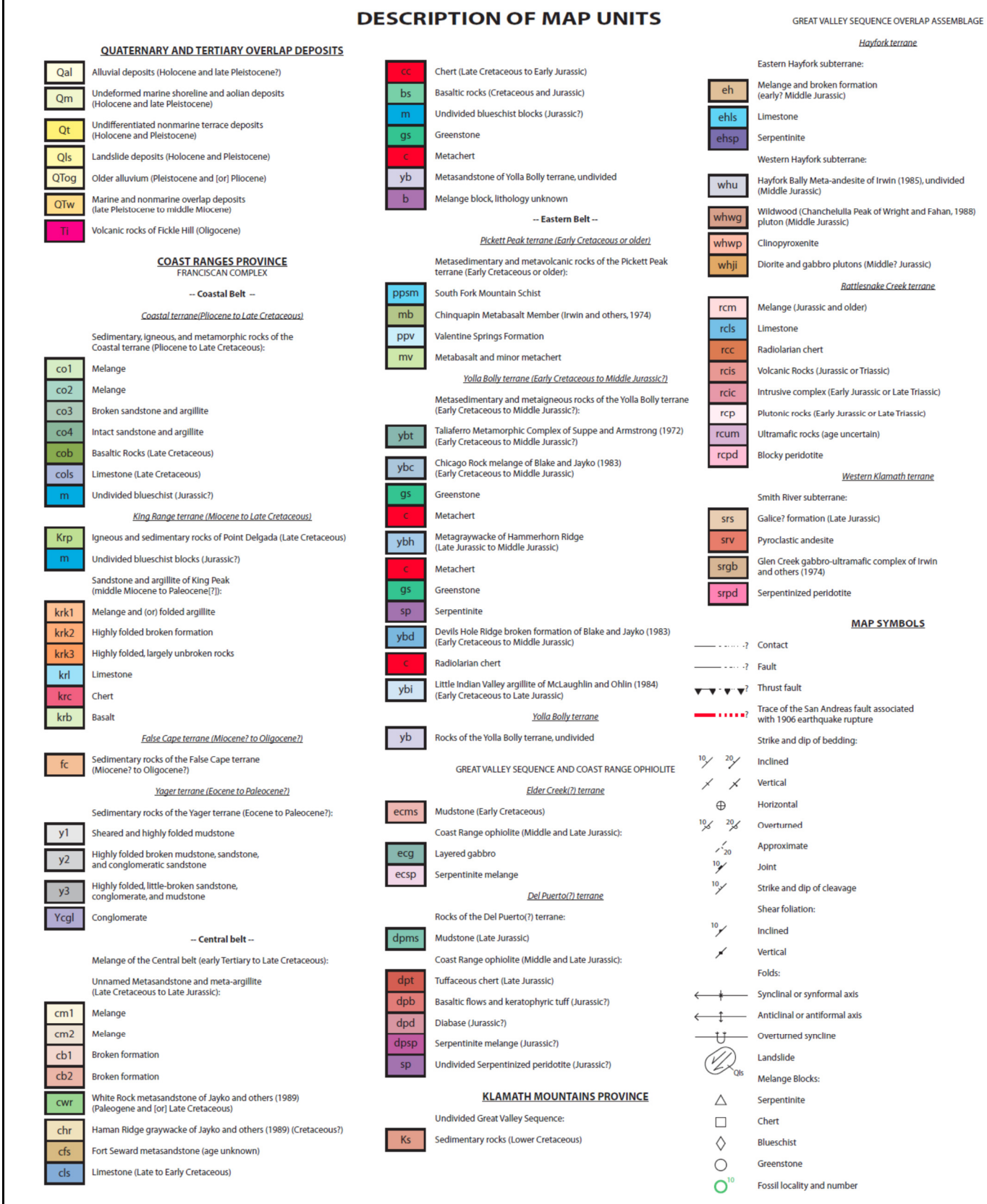
Modified from: Google Earth Imagery of April 30, 2019. N ≈

Lindberg Geologic Consulting	Engineering-Geologic Well Connectivity Assessment Report	Figure 4
Post Office Box 306	2238 Run Down Acres Lane, Bridgeville, California	October 6, 2022
Cutten, CA 95534	DWR Well 2022-005782, APN 210-054-008, Mr. Erik Sordal, Client	Project 0481.00
(707) 442-6000	Geologic Map (locations approximate)	1" ≈ 4,750'



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

Lindberg Geologic Consulting	Engineering-Geologic Well Connectivity Assessment Report	Figure 4a
P. O. Box 306	2238 Run Down Acres Lane, Bridgeville, California	October 6, 2022
Cutten, CA 95534	DWR Well 2022-005782, APN 210-054-008, Mr. Erik Sordal, Client	Project 0481.00
(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)
- Ti — 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)
- m — Undivided blueschist (Jurassic?)

King Range terrane (Miocene to Late Cretaceous)

- Krp — Igneous and sedimentary rocks of Point Delgada (Late Cretaceous)
- m — 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)
- 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 — 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 — Taliaferro 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
- whji — 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:

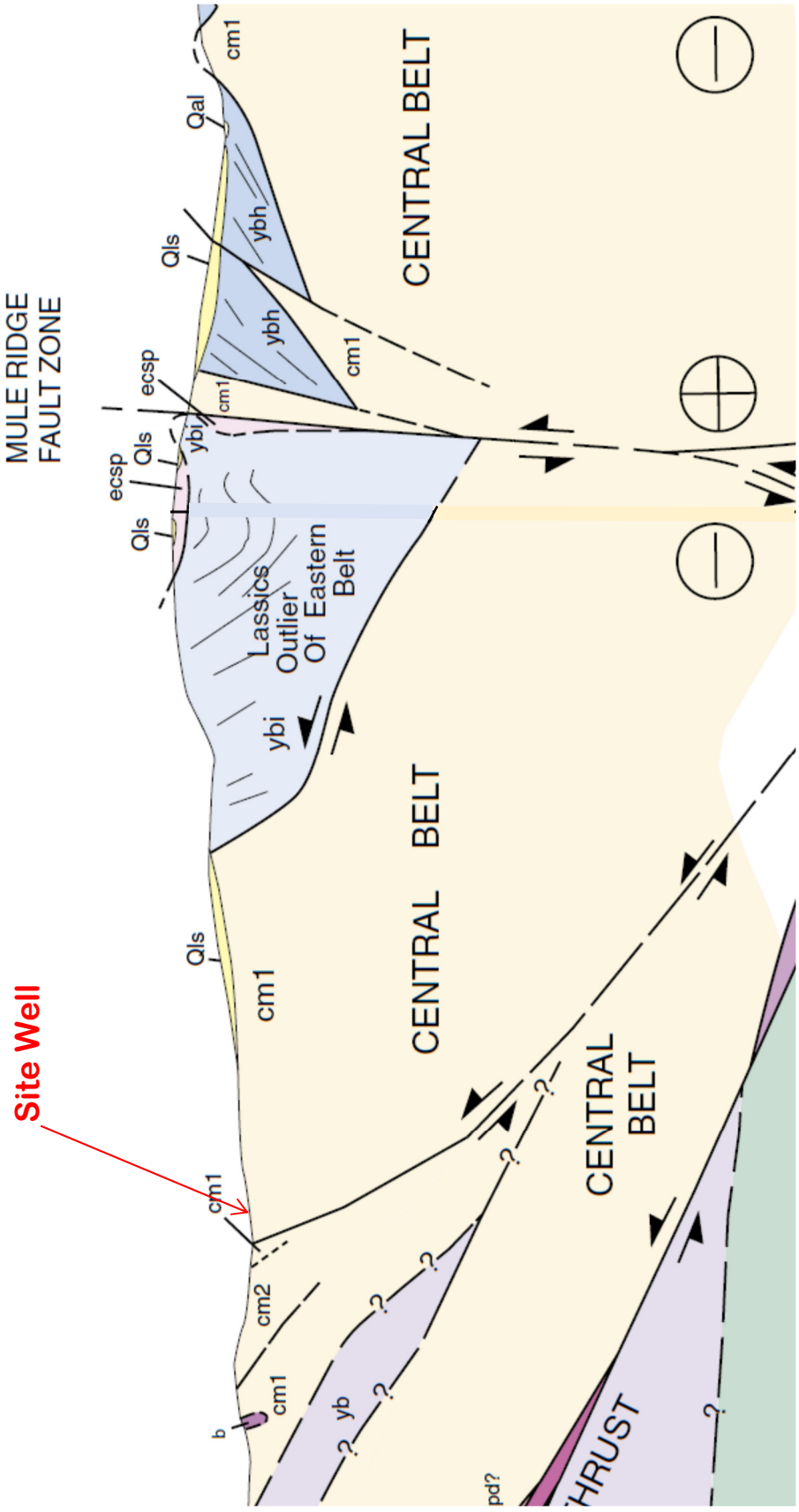
- Synclinal or synformal axis
- Anticlinal or antiformal axis
- Overturned syncline
- Landslide (Qls)

Melange Blocks:

- Serpentinite
- Chert
- Blueschist
- Greenstone
- Fossil locality and number

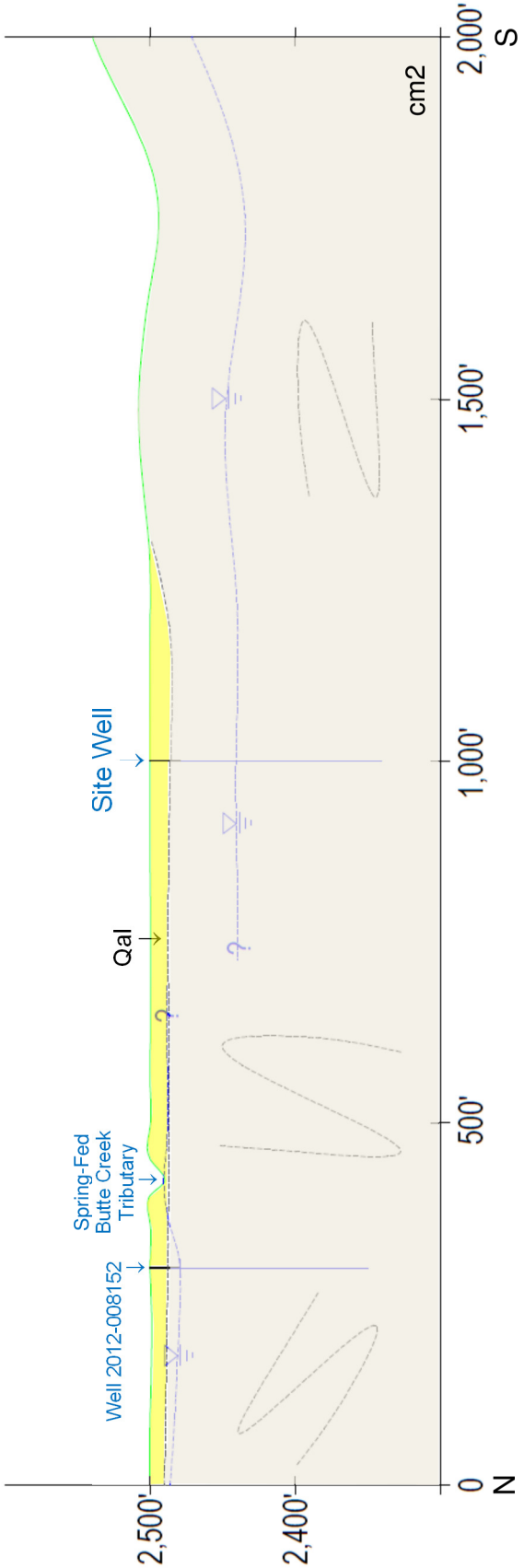
GEOLOGY OF THE CAPE MENDOCINO, EUREKA, GARBERVILLE, AND SOUTHWESTERN PART OF THE HAYFORK 30 X 60 MINUTE QUADRANGLES AND ADJACENT OFFSHORE AREA, NORTHERN CALIFORNIA (McLaughlin et al., 2000)

Lindberg Geologic Consulting	Engineering-Geologic Well Connectivity Assessment Report	Figure 5
Post Office Box 306	2238 Run Down Acres Lane, Bridgeville, California	October 6, 2022
Cutten, CA 95534	DWR Well 2022-005782, APN 210-054-008, Mr. Erik Sordal, Client	Project 0481.00
(707) 442-6000	Generalized Geologic Cross Section (locations approximate)	Not to Scale



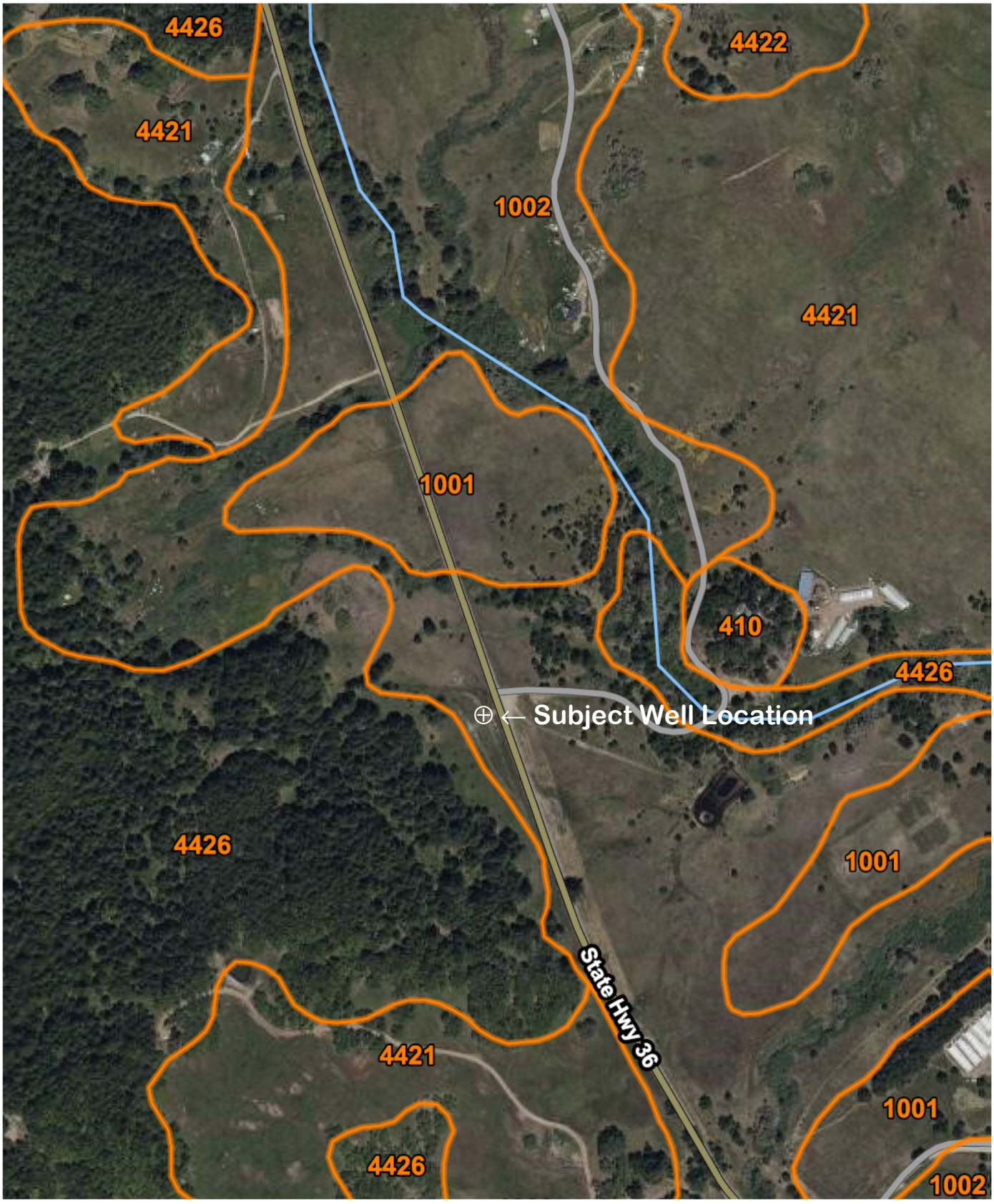
Modified from: McLaughlin, et al., (2,000).

Lindberg Geologic Consulting	Engineering-Geologic Well Connectivity Assessment Report	Figure 6
Post Office Box 306	2238 Run Down Acres Lane, Bridgeville, California	October 6, 2022
Cutten, CA 95534	DWR Well 2022-005782, APN 210-054-008, Mr. Erik Sordal, Client	Project 0481.00
(707) 442-6000	Hydrogeologic Cross Section (locations approximate)	2X V. E.



In this vertically exaggerated (~2x) cross section, the view is looking down slope and toward the east. 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 southwest, to the northeast toward Larabee Valley and unnamed tributaries of Butte Creek. Bedrock subgrade is mapped by McLaughlin et al. as composed of mélange (cm2) 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 the metasandstone portion of the mélange. Fractures are interpreted to be the primary permeability and providing preferential flow paths for groundwater in this area. Differing water levels in the Site Well and well 2012-008152, indicate that they likely encountered different aquifers.

Lindberg Geologic Consulting	Engineering-Geologic Well Connectivity Assessment Report	Figure 7
Post Office Box 306	2238 Run Down Acres Lane, Bridgeville, California	October 6, 2022
Cutten, CA 95534	DWR Well 2022-005782, APN 210-054-008, Mr. Erik Sordal, Client	Project 0481.00
(707) 442-6000	USDA-NRCS Soil Map (locations approximate)	Scale not Determined



Modified from: USGS-NRCS Web Soil Survey, September 28, 2022 N ≈

State of California

Well Completion Report

Form DWR 188 Submitted 5/23/2022

WCR2022-005782

Owner's Well Number | Date Work Began 05/19/2022 | Date Work Ended 05/20/2022

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

Secondary Permit Agency | Permit Number 20/21-1183 | Permit Date 09/20/2021

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

Name 4 WHEEL PROPERTIES LLC,

Mailing Address P.O. Box 202

City Carlotta State CA Zip 95528

Planned Use and Activity

Activity New Well

Planned Use Water Supply Domestic

Well Location

Address 2238 Run Down Acres RD

City Bridgeville Zip 95526 County Humboldt

Latitude 40 Deg. 26 Min. 54.888 Sec. N

Longitude -123 Deg. 41 Min. 31.1279 Sec. W

Dec. Lat. 40.44858 Dec. Long. -123.69198

Vertical Datum | Horizontal Datum WGS84

Location Accuracy | Location Determination Method

APN 210-054-008

Township 01 N

Range 04 E

Section 23

Baseline Meridian Humboldt

Ground Surface Elevation

Elevation Accuracy

Elevation Determination Method

Borehole Information

Orientation Vertical Specify

Drilling Method Downhole Hammer Drilling Fluid Air

Total Depth of Boring 160 Feet

Total Depth of Completed Well 160 Feet

Water Level and Yield of Completed Well

Depth to first water 61 (Feet below surface)

Depth to Static Water Level 20 (Feet) Date Measured 05/20/2022

Estimated Yield* 25 (GPM) Test Type Air Lift

Test Length 4 (Hours) Total Drawdown 11 (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	16	Brown Clay
16	32	Brown Silty Clay/Brown Sandstone
32	61	Brown Sandstone
61	83	Blue Sandstone
83	130	Fractured Shale
130	131	Shale Clay
131	160	Fractured 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	160	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	160	Filter Pack	Other Gravel Pack	3/8 inch	Pea Gravel

Other Observations:

Borehole Specifications

Depth from Surface Feet to Feet		Borehole Diameter (inches)
0	160	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) | 05/23/2022 (Date Signed) | 683865 (C-57 License Number)

Attachments

Location Map.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:

*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 JUN 22 2012

Page 1 of 2

Owner's Well Number 1

Date Work Began 05/29/2012 Date Work Ended 5/30/2012

Local Permit Agency Humboldt County E.H.D.

Permit Number 11/12/0494 Permit Date 6/5/12

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0153131

DWR Use Only – Do Not Fill In

State Well Number/Site Number: 01N | 04E | 23

Latitude N | Longitude W

APN/TRS/Other

Geologic Log

Orientation ◉ Vertical ○ Horizontal ○ Angle Specify

Drilling Method Direct Rotary Drilling Fluid Bentonite mud

Depth from Surface Feet	to Feet	Description Describe material, grain size, color, etc
0	3	Top Soil
3	16	Clay Brown
16	21	Sand W/Small Gravel Brown
21	27	Sand W/Layers of Clay Brown
27	39	Blue Clay W/Birds Eye Gravel
39	67	Blue Clay W/Sand Layers
67	92	Dark Blue Clay
92	120	Sandstone Blue

Total Depth of Boring 120 Feet

Total Depth of Completed Well 120 Feet

Well Location

Address 33865 Hwy 36

City Bridgeville County Humboldt

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

Datum ___ Decimal Lat. ___ Decimal Long. ___

APN Book 210 Page 051 Parcel 070

Township 01N Range 04E Section 23

Location Sketch

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

North / West / East / South

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 21 (Feet below surface)

Depth to Static Water Level 16 (Feet) Date Measured 05/30/2012

Estimated Yield * 15 (GPM) Test Type Air Lift

Test Length 4.0 (Hours) Total Drawdown 60 (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	20	10	Blank	PVC Sch. 80	CL200	5		
20	120	10	Screen	PVC Sch. 80	CL200	5	Milled Slots	0.032

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	20	Bentonite	Sanitary Seal
20	120	Filter Pack	#3 Sand

Attachments

☐ Geologic Log
☐ Well Construction Diagram
☐ Geophysical Log(s)
☐ Soil/Water Chemical Analyses
☑ Other Location Map

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 FISCH DRILLING (Person, Firm or Corporation)

3150 JOHNSON ROAD (Address) HYDESVILLE (City) CA (State) 95547 (Zip)

Signed ___ (C-57 Licensed Water Well Contractor) 06/06/2012 (Date Signed) 683865 (C-57 License Number)

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

*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

JUN - 4 2012

Page 1 of 2

Owner's Well Number 1

Date Work Began 05/23/2012 Date Work Ended 5/29/2012

Local Permit Agency Humboldt County E.H.D.

Permit Number 11/12-0147 Permit Date 10/6/11

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0152676

DWR Use Only – Do Not Fill In

State Well Number/Site Number: 01N | 04E | 23

Latitude N | Longitude W

APN/TRS/Other

Geologic Log

Orientation ◉ Vertical ○ Horizontal ○ Angle Specify

Drilling Method Direct Rotary Drilling Fluid Bentonite mud

Depth from Surface Feet	to Feet	Description Describe material, grain size, color, etc
0	3	Top Soil
3	18	Silty Clay, Brown
18	108	Layered Clay/Sand/Fractured Rock, Grey
108	120	Sandstone, Grey

Total Depth of Boring 120 Feet

Total Depth of Completed Well 120 Feet

Well Location

Address 33796 Hwy 36

City Bridgeville County Humboldt

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

Datum ___ Decimal Lat. ___ Decimal Long. ___

APN Book 210 Page 051 Parcel 027

Township 01N Range 04E Section 23

Location Sketch

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

North / West / East / South

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 21 (Feet below surface)

Depth to Static Water Level 21 (Feet) Date Measured 05/24/2012

Estimated Yield * 5 (GPM) Test Type Air Lift

Test Length 4.0 (Hours) Total Drawdown 105 (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	20	10	Blank	PVC Sch. 80	CL200	5		
20	120	10	Screen	PVC Sch. 80	CL200	5	Milled Slots	0.032

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	20	Bentonite	Sanitary Seal
20	100	Filter Pack	#3 Sand

Attachments

☐ Geologic Log
☐ Well Construction Diagram
☐ Geophysical Log(s)
☐ Soil/Water Chemical Analyses
☑ Other Location Map

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 FISCH DRILLING (Person, Firm or Corporation)

3150 JOHNSON ROAD (Address) HYDESVILLE (City) CA (State) 95547 (Zip)

Signed [signature] (C-57 Licensed Water Well Contractor) 05/29/2012 (Date Signed) 683865 (C-57 License Number)

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

Humboldt County, Central Part, California

1002—Frostvalley-Mulecreek complex, 2 to 9 percent slopes

Map Unit Setting

National map unit symbol: 2sx6d
Elevation: 2,300 to 3,610 feet
Mean annual precipitation: 64 to 76 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 60 to 120 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Frostvalley and similar soils: 48 percent
Mulecreek and similar soils: 42 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Frostvalley

Setting

Landform: Terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from metasedimentary rock

Typical profile

Ap - 0 to 3 inches: loam
A - 3 to 20 inches: loam
AB - 20 to 35 inches: loam
Bw - 35 to 47 inches: gravelly loam
C - 47 to 79 inches: very gravelly loamy sand

Properties and qualities

Slope: 2 to 9 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 (0.57 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 9.9 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 3e

Hydrologic Soil Group: B
Ecological site: F005XZ003CA - Terraces
Hydric soil rating: No

Description of Mulecreek

Setting

Landform: Terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Parent material: Alluvium derived from metasedimentary rock

Typical profile

Ap - 0 to 4 inches: loam
A - 4 to 22 inches: loam
Bt1 - 22 to 30 inches: clay loam
Bt2 - 30 to 37 inches: clay loam
Bt3 - 37 to 55 inches: clay loam
BCt - 55 to 79 inches: clay loam

Properties and qualities

Slope: 2 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 20 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 11.1 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: F005XZ003CA - Terraces
Hydric soil rating: No

Minor Components

Pasturerock, dry

Percent of map unit: 5 percent
Landform: Mountain slopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave, convex, linear
Across-slope shape: Linear, concave, convex
Hydric soil rating: No

Rockyglen

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: Convex
Across-slope shape: Linear
Hydric soil rating: No

Data Source Information

Soil Survey Area: Humboldt County, Central Part, California
Survey Area Data: Version 9, Sep 1, 2022