

LINDBERG GEOLOGIC CONSULTING

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December 19, 2022

Project No: 0494.00

Mr. Domonic Gabriel
653 15th Street
Arcata, California 95521

Subject: Hydrologic Isolation of Well WCR2013-008234 (Legacy well #e0186272)
From Surface Waters, Old Three Creeks Road, Berry Summit, APN: 522-031-007

To Whom It May Concern:

As requested, Lindberg Geologic Consulting has completed our assessment of the existing permitted well on the above-referenced parcel to estimate its potential for significant hydrologic connectivity with nearby surface waters or wetlands, and if in our professional opinion, pumping of well 2013-008234 might affect nearby surface waters. The nearest tributaries to this well are two ephemeral tributaries of Minor Creek, a perennial tributary of Redwood Creek (Figure 1).

A California-Certified Engineering Geologist visited this site to observe the subject well and local site conditions on October 5, 2022. Based on our observations, research, and our professional experience, it is our professional opinion that this subject well has a low likelihood of being significantly hydrologically connected to nearby surface waters in any manner that could affect adjacent surface waters, wetlands, or springs in the vicinity. For the purpose of this assessment, we define the "vicinity" as the area within a 1,000-foot radius of the subject well (Figure 1), having an area of over 72 acres. The proposed use of this well is to irrigate cannabis. We are not aware of the volume of water to be extracted or what the pumping schedule might be but expect that that information is provided elsewhere in the application.

Based on Humboldt County's WebGIS and the Assessor's Parcel Map (Figure 2), parcel 522-031-007 (Figure 2,) encompasses approximately 160 acres. Our GPS located the subject well at latitude 40.96448° north, and longitude 123.75946° west ($\pm 9'$). This well is in Section 30, T7N, R4E, and was drilled to 160 feet below the ground surface (bgs). The subject well is only cased and screened to 130 feet bgs. The wellhead is at an elevation of approximately 3,700 feet (Figure 1) and the elevation of the bottom of the borehole is therefore 3,540 feet, and the bottom of the well screen is 3,570 feet bgs.

The Humboldt County WebGIS shows four watercourses within one mile of the well site. Approximately 1,600 feet to the northwest is one ephemeral tributary of Minor Creek, and approximately 1,750 feet to the southwest is a second ephemeral tributary of Minor Creek. Southeast of the subject well approximately 3,100 feet is an ephemeral tributary of Three Creeks. The head of (perennial) Supply Creek is more than 3,500 feet east of the subject well. Based on interpolation from the Humboldt County WebGIS, and the USGS "Lord-Ellis Summit, Calif." (1973), topographic map (Figure 1), we estimated the elevation of this well site to be 3,700 feet.

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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: Geologic Cross Section
- Figure 6: Hydrogeologic Cross Section
- Figure 7: USDA-NRCS Soils Map

State of California Well Completion Report:

Subject Well: WCR2013-008234 (Legacy #e0186272)

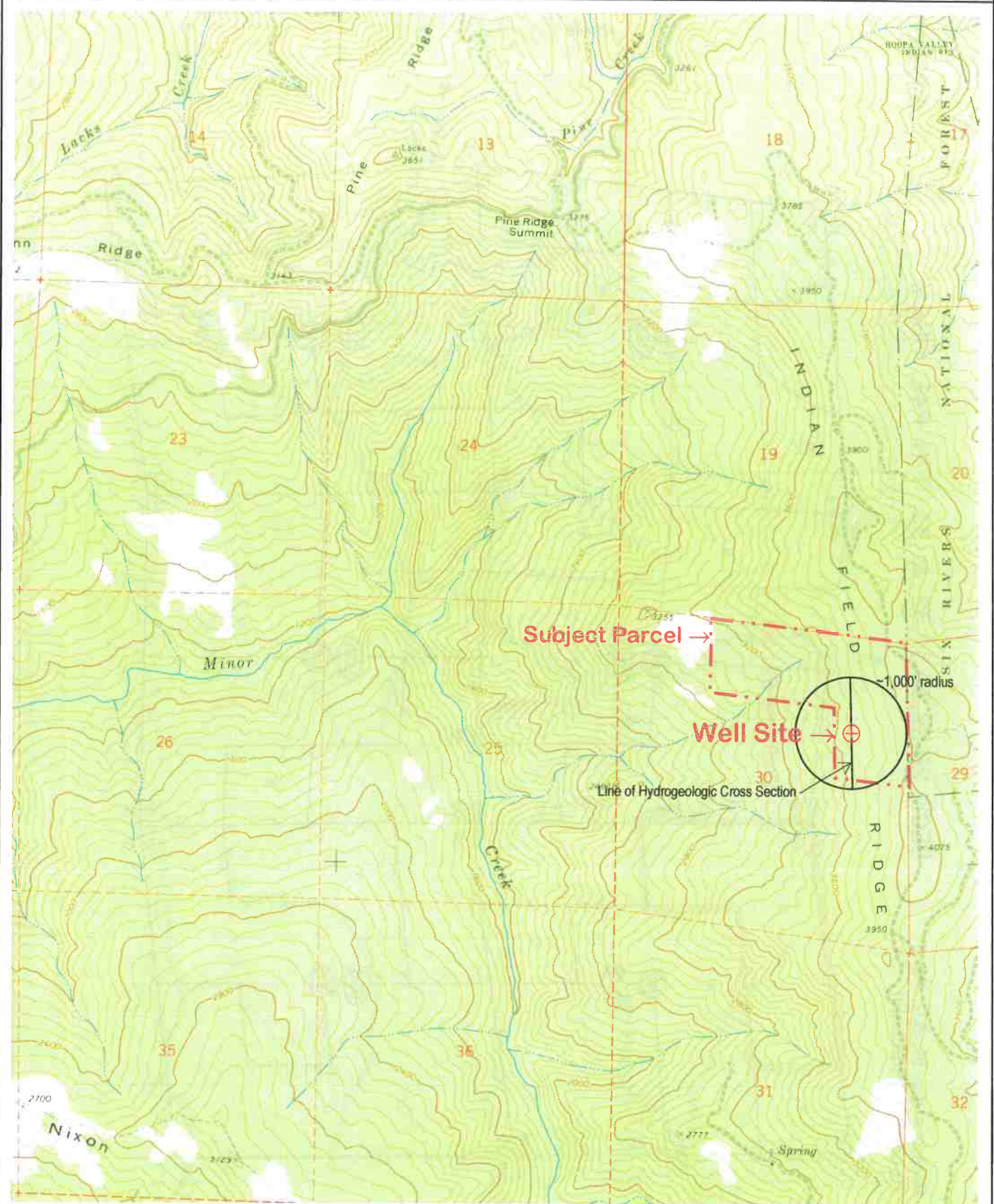
Web Soil Survey, NRCS Map Unit Description:

Bagaul-Burroin-Redtop complex, #446, 15 to 50 percent slopes.

Reference:

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

Lindberg Geologic Consulting	Engineering-Geologic Well Connectivity Assessment Report	Figure 1
Post Office Box 306	Old Three Creeks Road, near Berry Summit, APN: 522-031-007	December 19, 2022
Cutten, CA 95534	Well WCR2013-008234 (e0186272), Mr. Domonic Gabriel, Client	Project 0494.00
(707) 442-6000	Topographic Well Location Map (locations approximate)	1" ≈ 2,400'



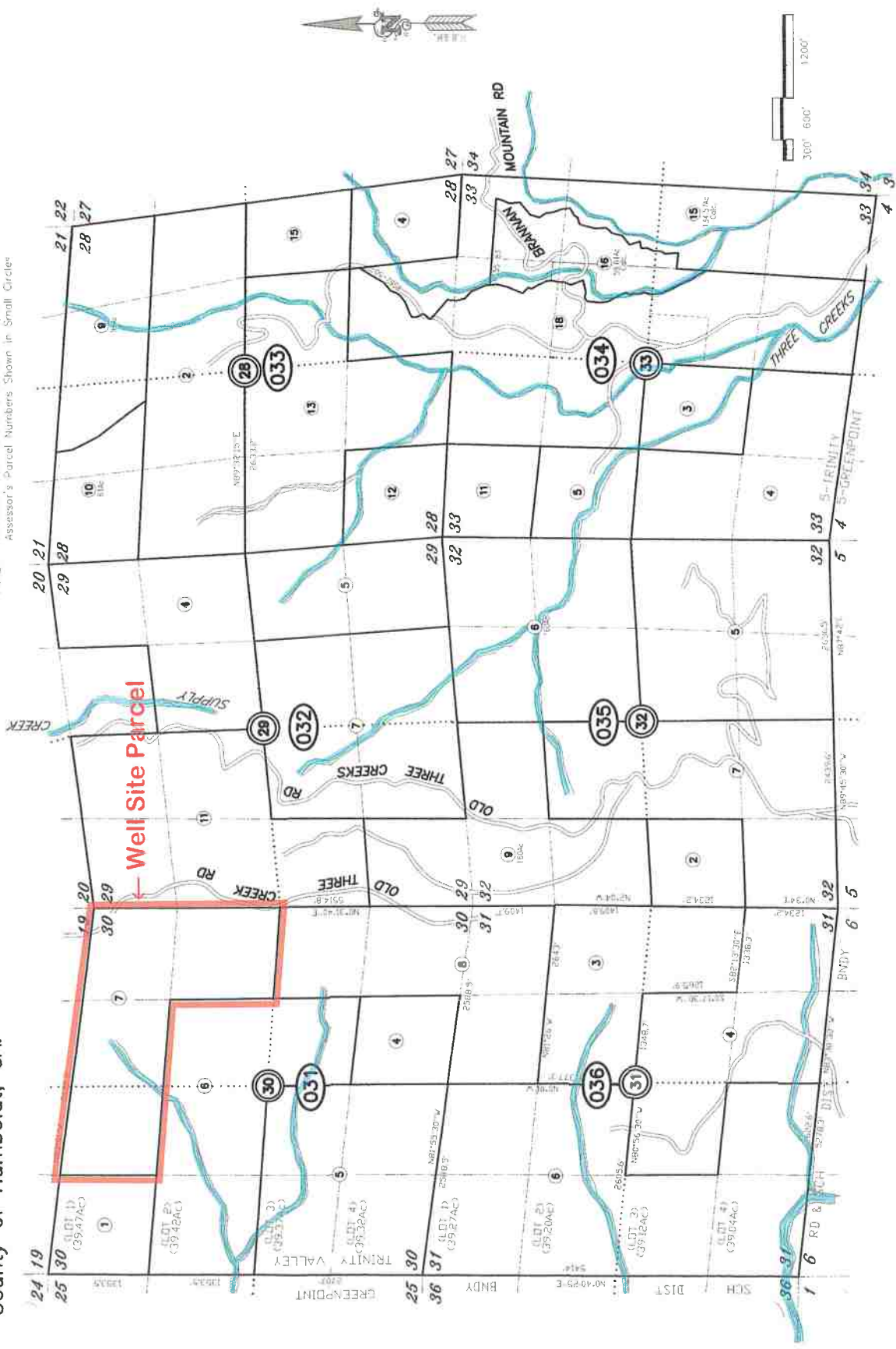
Lindberg Geologic Consulting	Engineering-Geologic Well Connectivity Assessment Report	Figure 2
Post Office Box 306	Old Three Creeks Road, near Berry Summit, APN: 522-031-007	December 19, 2022
Cutten, CA 95534	Well WCR2013-008234 (e0186272), Mr. Domonic Gabriel, Client	Project 0494.00
(707) 442-6000	Humboldt County Assessor's Parcel Map (locations approximate)	Scale as Shown

522-03

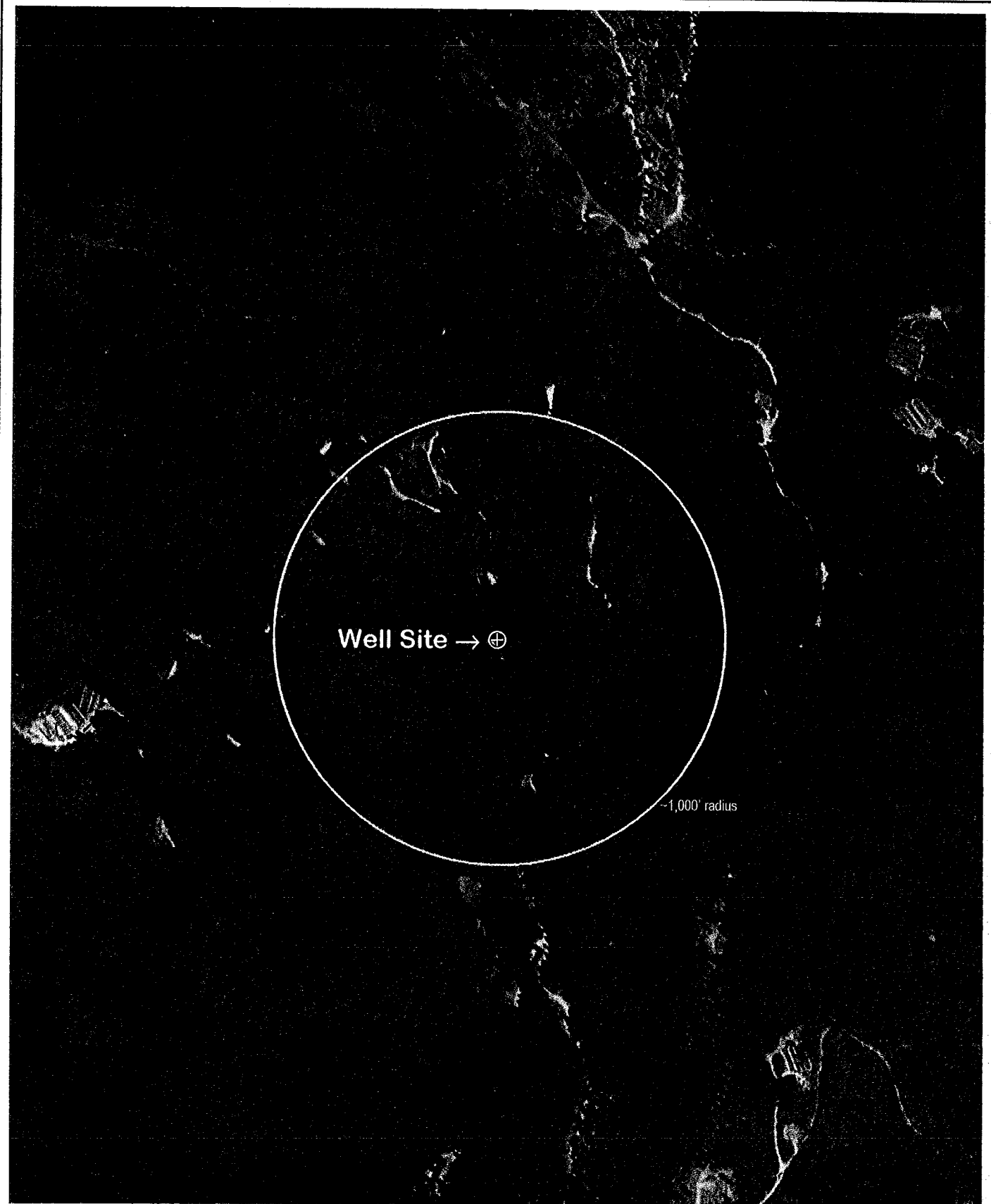
SECS 28,29,30,31,32 & 33, T7N R4E, HB&M

Assessor's Map Bk. 522, Pg. 3
County of Humboldt, CA.

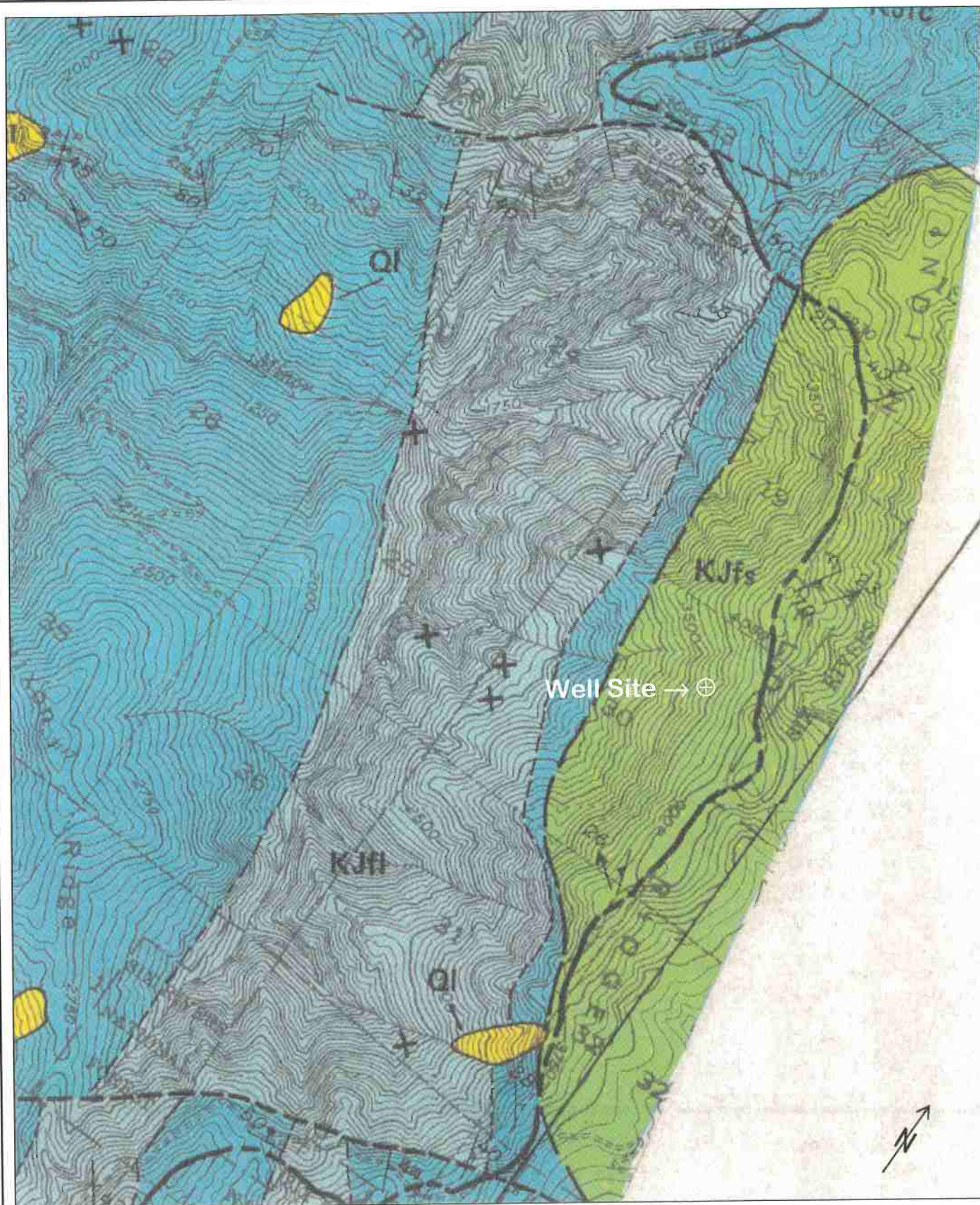
NOTE - Assessor's Block Numbers Shown in Ellipses
Assessor's Parcel Numbers Shown in Small Circles



Lindberg Geologic Consulting	Engineering-Geologic Well Connectivity Assessment Report	Figure 3
Post Office Box 306	Old Three Creeks Road, near Berry Summit, APN: 522-031-007	December 19, 2022
Cutten, CA 95534	Well WCR2013-008234 (e0186272), Mr. Domonic Gabriel, Client	Project 0494.00
(707) 442-6000	Satellite Image of Well Location (locations approximate)	1" ≈ 600'










Lindberg Geologic Consulting	Engineering-Geologic Well Connectivity Assessment Report	Figure 4
Post Office Box 306	Old Three Creeks Road, near Berry Summit, APN: 522-031-007	December 19, 2022
Cutten, CA 95534	Well WCR2013-008234 (e0186272), Mr. Domic Gabriel, Client	Project 0494.00
(707) 442-6000	Geologic Map (locations approximate)	1" ≈ 2,640'









Modified from: Hardin, et al., (1982)



Lindberg Geologic Consulting	Engineering-Geologic Well Connectivity Assessment Report	Figure 4a
Post Office Box 306	Old Three Creeks Road, near Berry Summit, APN: 522-031-007	December 19, 2022
Cutten, CA 95534	Well WCR2013-008234 (e0186272), Mr. Domonic Gabriel, Client	Project 0494.00
(707) 442-6000	Geologic Map Explanation	No Scale

EXPLANATION

-  Drainage divide
-  Contact—dashed where approximately located, short dashes where gradational and/or sheared, dotted where concealed
-  Fault—dashed where approximately located, short dashes where inferred, dotted where concealed
-  Thrust fault—sawteeth on upper plate, dashed where approximately located
-  Photo-geological lineaments
-  Area of common greenstone, chert, or sandstone outcrops
-  Outcrops of metabasalt and metatuff

- Strike and dip of beds**
-  Inclined
-  Vertical
-  Vertical; dot indicates top of bed
-  Overturned

- Strike and dip of foliation**
-  Inclined
-  Vertical

-  Crenulated bedding; arrow shows trend of minor fold axes
-  Minor folds, showing plunge of axes

KJfl

Coherent Unit of Lacks Ck.: Coherent Sandstone and interbedded sandstone and mudstone. Sandstone - mudstone sequences are typical of turbidites.

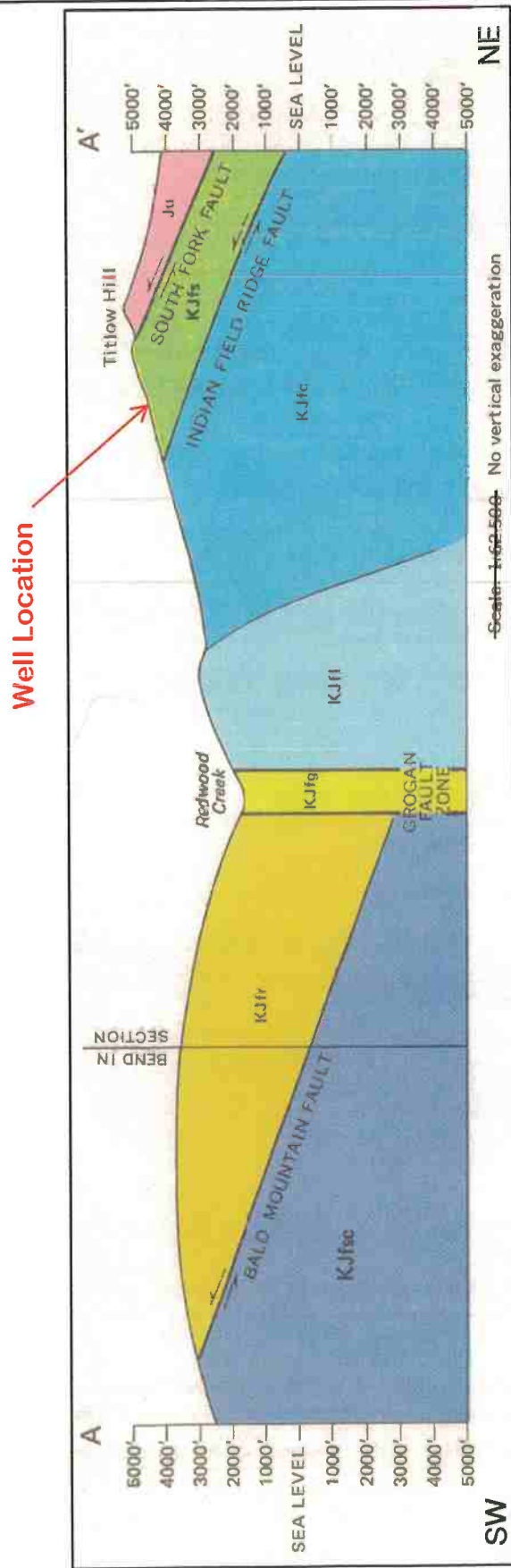
KJfc

Incoherent Unit of Coyote Ck.: Lower Sandstone:Mudstone Ratio, massive Sandstone beds are less common than in the KJfl.

KJfs

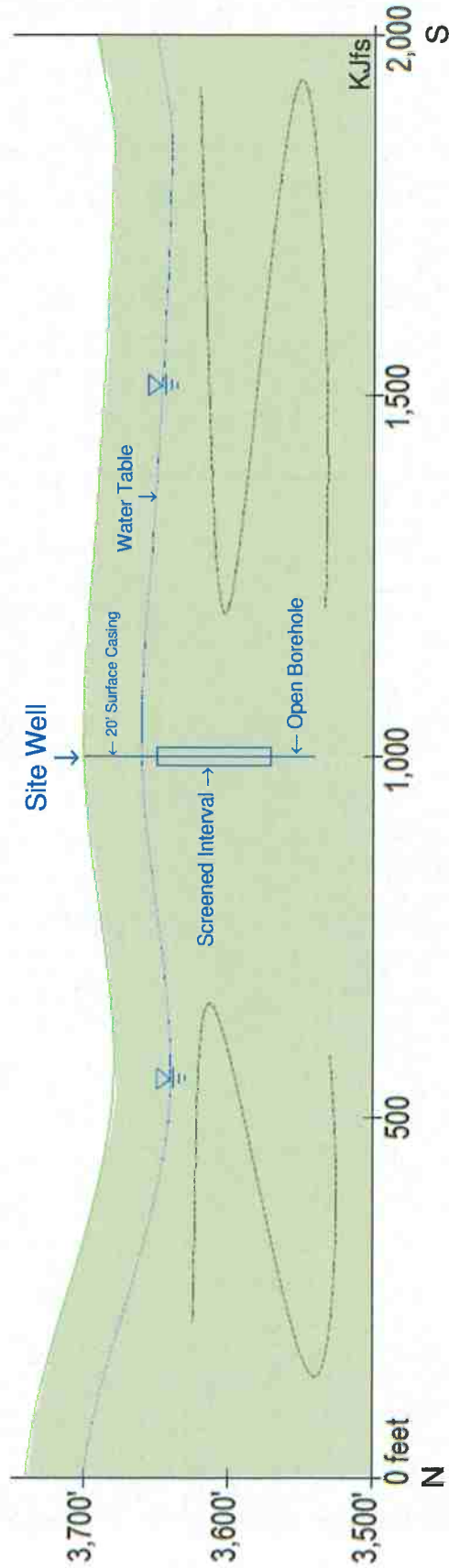
South Fork Mountain Schist: Quartz-albite-white mica-chlorite schist.

Lindberg Geologic Consulting	Engineering-Geologic Well Connectivity Assessment Report	Figure 5
Post Office Box 306	Old Three Creeks Road, near Berry Summit, APN: 522-031-007	December 19, 2022
Cutten, CA 95534	Well WCR2013-008234 (e0186272), Mr. Domonic Gabriel, Client	Project 0494.00
(707) 442-6000	Geologic Cross Section (locations approximate)	Not to Scale



Cross Section from: Geologic Map of the Redwood Creek Drainage Basin, Humboldt County, California, (1982), Hardin, D. R., Kelsey, H. M., Morrison, S. D., and Stephens, T. A., Department of the Interior, United States Geologic Survey, Water-Resources Investigations, Open-File Report 81-496.

Lindberg Geologic Consulting	Engineering-Geologic Well Connectivity Assessment Report	Figure 6
Post Office Box 306	Old Three Creeks Road, near Berry Summit, APN: 214-233-008	December 19, 2022
Cutten, CA 95534	Well WCR2013-008234 (e0186272), Mr. Domic Gabriel, Client	Project 0494.00
(707) 442-6000	Hydrogeologic Cross Section (locations approximate)	V. E. = 2



In this vertically exaggerated (~2x) cross section, the view is looking to the east toward Indian Field Ridge. Groundwater flow in this cross section is westerly, toward from the viewer, or out of the page. Groundwater is presumed to flow from recharge areas in the higher ground to the east. This well is sited high on the Indian Field Ridge valley wall slope above Redwood Creek valley. Subgrade is composed of fine-grained quartz-mica schist of the South Fork Mountain Schist (KJfs), the easternmost component of the Franciscan Complex. Groundwater is envisioned to flow through fractured South Fork Mountain Schist. Fractures in the schist are interpreted to be the primary permeability, providing preferential flow paths for the local groundwater. The driller noted that first water occurred 40 feet below the surface. Static water occurred 22 feet below the surface. A sanitary surface seal was installed by the driller for the ground surface to the 20-foot depth. This well is cased to 50 feet below the existing ground surface, screened from 50 feet to 130 feet where this well draws groundwater, with open borehole from 130 feet to 160 feet. Bedrock subgrade mapping (Figure 4), is from Hardin, et al., (1982).

Humboldt and Del Norte Area, California

446—Bagaul-Burroin-Redtop complex, 15 to 50 percent slopes

Map Unit Setting

National map unit symbol: mg9f
Elevation: 150 to 4,560 feet
Mean annual precipitation: 49 to 80 inches
Mean annual air temperature: 50 to 59 degrees F
Frost-free period: 150 to 250 days
Farmland classification: Not prime farmland

Map Unit Composition

Bagaul and similar soils: 35 percent
Burroin and similar soils: 30 percent
Redtop and similar soils: 20 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bagaul

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 and residuum derived from phyllite and schist

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 20 inches: gravelly loam
Bt1 - 20 to 48 inches: gravelly clay loam
Bt2 - 48 to 61 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 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 7.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: F005XZ020CA - Very Deep Mesic Mountains
40-60"ppt
Hydric soil rating: No

Description of Burroin

Setting

Landform: Mountain slopes
Landform position (two-dimensional): Backslope, summit
Landform position (three-dimensional): Mountainflank
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Colluvium and residuum derived from schist

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 6 inches: loam
Bt1 - 6 to 12 inches: clay loam
Bt2 - 12 to 24 inches: gravelly clay loam
BCt - 24 to 33 inches: extremely gravelly loam
R - 33 to 43 inches: bedrock

Properties and qualities

Slope: 15 to 50 percent
Depth to restrictive feature: 20 to 39 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water
(Ksat): Moderately low to moderately high (0.14 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: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: F005XZ021CA - Very Deep Gravelly Mesic
Mountains 40-60"ppt
Hydric soil rating: No

Description of Redtop

Setting

Landform: Mountain slopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank

Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Colluvium and residuum derived from schist

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 10 inches: loam
AB - 10 to 20 inches: clay loam
Bt - 20 to 61 inches: 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 low to moderately high (0.06 to 0.20 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 9.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: F005XZ020CA - Very Deep Mesic Mountains
40-60"ppt
Hydric soil rating: No

Minor Components

Hullygully

Percent of map unit: 10 percent
Landform: Colluvial aprons, landslides, mountain slopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Center third of mountainflank
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: No

Rock outcrop

Percent of map unit: 5 percent
Landform: Bluffs
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Center third of mountainflank
Down-slope shape: Linear
Across-slope shape: Convex

Hydric soil rating: No

Data Source Information

Soil Survey Area: Humboldt and Del Norte Area, California
Survey Area Data: Version 17, Sep 2, 2022

Soil Survey Area: Six Rivers National Forest Area, California
Survey Area Data: Version 17, Sep 7, 2022

