



TECHNICAL MEMORANDUM

To: Humboldt County Planning Department
From: Annjanette Dodd, PhD, CA PE #77756 Exp. 6/30/2025
Date: December 17, 2024
Subject: Groundwater Well Evaluation – Conklin Creek Farms, Inc.
795 Conklin Creek Road, Petrolia, CA (APN: 105-111-001; 105-042-002;
105-101-006; 105-071-004)



BACKGROUND AND PURPOSE

Conklin Creek Farms, Inc., has an approved Special Permit (SP), PLN-2021-17034. Conklin Creek Farms, Inc. would like to use an existing, permitted well (Attachment 1) to supply the water for the approved project.

The purpose of this Technical Memorandum (TM) is to provide an assessment to demonstrate that utilizing the existing, permitted well (Lat/Long: 40.319546, -124.269363) for the project is non-diversionary and will not impact surrounding wells.

PROJECT LOCATION AND SITE INFORMATION

The project is located at 795 Conklin Creek Road, Petrolia, CA (APN: 105-111-001; 105-042-002; 105-101-006; 105-071-004) totaling 212.6-acres. The well is located within the Mattole River watershed in the Petrolia area, approximately 0.55 miles north of the Mattole River and 205 feet south of a shallow, unnamed tributary of Mill Creek. The Petrolia area is within the California Department of Water Resources (DWR) Bulletin 118 Mattole River Valley Groundwater Basin (Basin Number 1-28) referred to herein as the Mattole Groundwater Basin (Figure 1, Attachment 2).

The subject property has historically been used for residential, agricultural, viticulture, and livestock grazing purposes.

REGULATORY FRAMEWORK

Humboldt County CCLUO

The Humboldt County Commercial Cannabis Land Use Ordinance (CCLUO) states that, "*Irrigation shall exclusively utilize stored water from non-diversionary sources...*". A non-diversionary source is defined in the CCLUO as, "*not involving the withdrawal of water from a waterbody.*" A waterbody is defined in the CCLUO as, "*any significant accumulation of water, such as lakes, ponds, rivers, streams, creeks, springs, seeps, artesian wells, wetlands, canals, groundwater from a subterranean stream flowing through a known and definite channel, or similar features.*"



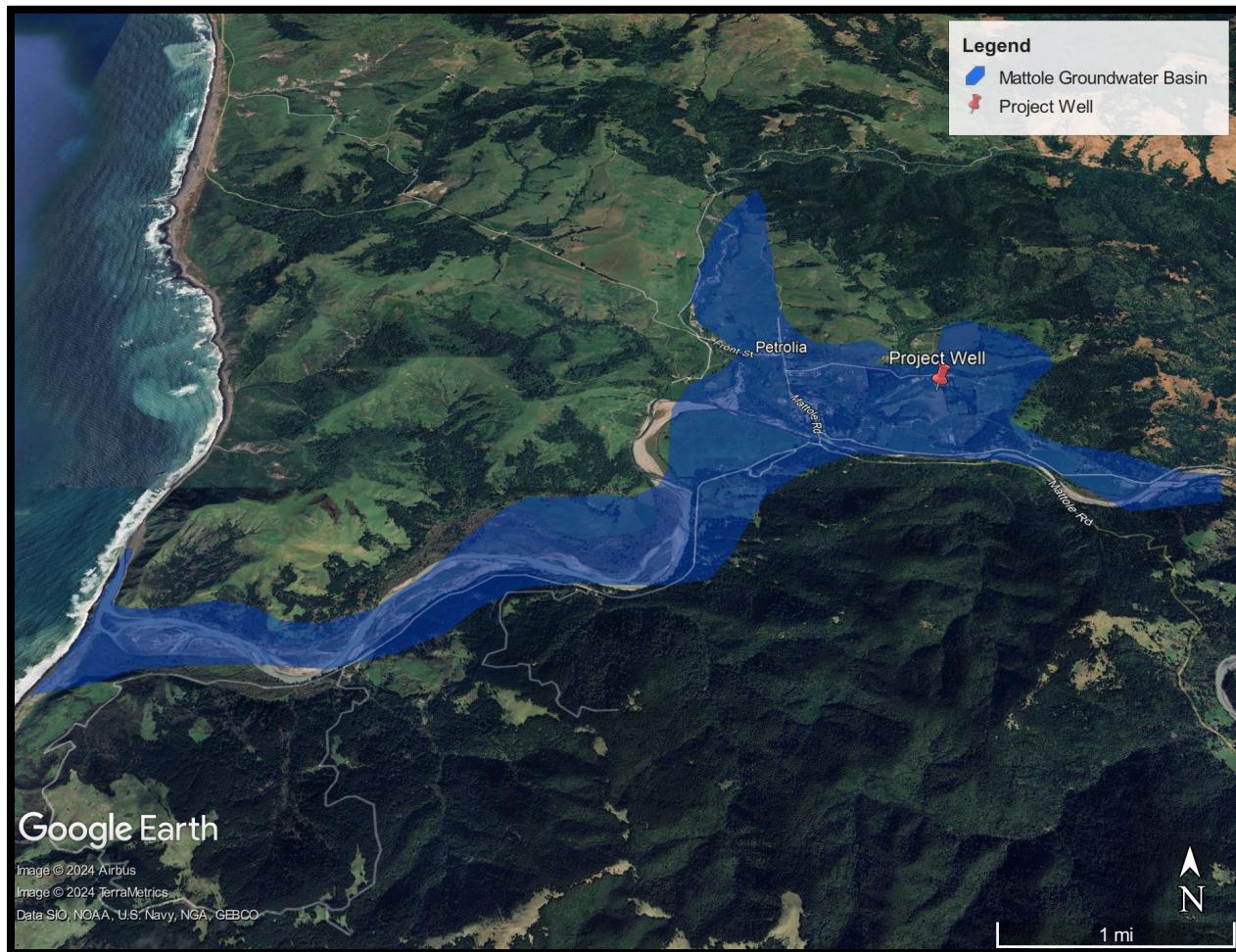


Figure 1. Mattole River Valley Groundwater Basin

California Department of Fish and Wildlife

Since the well is in a confined aquifer, it is not within the jurisdiction of the California Department of Fish and Wildlife (CDFW).

State Water Resources Control Board

The State Water Resources Control Board (SWRCB) Division of Water Rights will not grant a Cannabis Small Irrigation Use Registration (Cannabis SIUR) for a groundwater well as Cannabis SIURs apply to surface water diversion from a waterbody. A waterbody is defined as any significant accumulation of water, such as: lakes, ponds, rivers, streams, creeks, springs, artesian wells, wetlands, and canals. Surface water instream flow requirements also apply to water diverted from a subterranean stream flowing through a known and definite channel. The SWRCB will not grant an SIUR for the project's well because the source does not meet the definition of a waterbody or diversion from a subterranean stream, and using the well is not considered a surface water diversion from a waterbody.

WATER DEMAND

Per the projects Cultivation and Operations Plan, the proposed cultivation operation proposes an



annual irrigation demand of 655,000 gallons (2.0 acre-feet (AF)) (Table 1).

Table 1: Estimated annual water demand (gallons).

Month	1 acre Mixed-Light Cultivation	5,000 sq. ft. Indoor Cultivation	23,500 sq. ft. Commercial Nursery	4,360 sq. ft. Ancillary Nursery	Processing/Other	Total	Daily
January	20,000	5,000	10,000	800	300	36,100	1,165
February	20,000	5,000	12,000	1,000	300	38,300	1,368
March	35,000	5,000	12,000	1,000	300	53,300	1,719
April	35,000	5,000	12,000	1,000	300	53,300	1,777
May	50,000	5,000	12,000	1,000	300	68,300	2,203
June	60,000	5,000	12,000	1,000	300	78,300	2,610
July	60,000	5,000	12,000	1,000	300	78,300	2,526
August	50,000	5,000	12,000	1,000	300	68,300	2,203
September	40,000	5,000	12,000	1,000	300	58,300	1,943
October	35,000	5,000	12,000	1,000	300	53,300	1,719
November	17,000	5,000	10,000	800	300	33,100	1,103
December	20,000	5,000	10,000	800	300	36,100	1,165
Total	442,000	60,000	138,000	11,400	3,600	655,000	n/a

WATER SUPPLY PLAN

According to the owner/operator, during cultivation activities (which requires the largest water demand) plants will be watered 2-3 times per week. Water will be pumped at 15 gallons per minute (gpm) from the well to the water storage tanks and topped off daily during cultivation season. During peak water use, the maximum daily demand will be 2,610 gallons. At 15 gpm or 0.03 ft³/s (cfs), this would require approximately 2.9 hours of pumping to top off the tanks.

WATER STORAGE

The proposed onsite water storage is 50,000-gallons. This represents approximately 19 days of storage during peak daily demand, which occurs in June (Table 1).

SOURCE WELL INFORMATION

The proposed well water source is an existing groundwater well (Figure 1). According to the Well Completion Report (WCR), the well was drilled to a depth of 180 feet below ground surface (BGS) by Fisch Drilling on July 13, 2021 (Attachment 1). The well geologic log within the WCR reported loose topsoil from 0-1 ft BGS, brown clay and brown silty clay from 9-11 ft BGS, shale from 11-47 ft BGS, blue clay from 47-109 ft BGS, shale hard from 109-133 ft BGS, and blue sandstone from 74-170 ft BGS. As per the WCR, the well was cased with a 6-inch (outer diameter) blank steel casing from 0-140 ft BGS and a screened (0.05 inch slot size) 6-inch (outer diameter) steel casing from 140-180 ft BGS. Depth to first water was recorded as 55 ft BGS, a static water level of 51 ft BGS, and an estimated well yield of 15 gpm after a 4-hour air lift test.

A grid powered 0.5 HP pump has been installed on the well. On July 19, 2024, Fisch Drilling and Pump



conducted a 4-hr water production test with drawdown and recovery (Attachment 3). The pump rate during the test was 15 gpm. The initial water level was recorded at 19.5 ft BGS, dropped to 20 ft BGS after the first minute, leveled off to 19.8 ft BGS (a drawdown of only 0.3 ft) after 6 minutes, remained at 19.8 ft BGS during the remainder of pumping, and recovered to 19.5 ft BGS within 2-minutes of cessation of pumping.

SURROUNDING WELL INFORMATION

The California Department of Water Resources (DWR) Well Completion Report (WCR) Map Application¹ provides WCR data for groundwater wells in California and maps them by Public Land Survey System (PLSS) sections. Each section is one square mile. The project well location is in the southwest corner of PLSS section H02S02W02. According to the DWR WCR Map Application, there are a total of 8 wells within 0.5 miles of the project well (Figure 2). Of these 8 wells, the average well depth is 130 ft BGS, the average yield is 20 gpm, and the average screened interval is between 67 and 121 ft BGS (Attachment 4). In addition to the wells reported in the DWR WCR Map database, there are two known existing agricultural wells within 0.5 miles that do not have WCRs. There are also approximately twelve (12) potential homesteads in the 0.5-mile surrounding area that do not have documented WCRs. These potential homesteads could be served by an undocumented well or by surface water.

GROUNDWATER BASIN AND GEOLOGY

The project is located in the Mattole River Valley (Mattole) Groundwater Basin (Basin Number 1-28, Attachment 2). The Mattole Groundwater Basin covers the valleys of the Mattole and North Fork Mattole Rivers to where the Mattole River discharges to the Pacific Ocean, approximately 4.75 miles southwest of the project site. The basin covers an area of 3,150 acres (5 square miles) (Figure 1). The basin is bounded to the northwest by Tertiary marine sedimentary rocks of the Wildcat series, which is a group of old formations consisting of sandstone, marine siltstone, and claystone.

The project well is mapped in Coastal Belt Franciscan mélange underlain by ancient alluvial terrace deposits. The groundwater basin is a combination of this, and ancient alluvial terrace underlain by Coastal Belt Franciscan mélange² (Figure 3). The water bearing formation of the well is comprised of confined ancient alluvial terrace deposits underlain by fractured sandstone. Wells drilled in the vicinity of the project well are drilled and screened within the same formations (refer to WCR's for surrounding wells provided in Attachment 4). A well drilled in this alluvial aquifer is not an artesian well nor is this alluvial aquifer a subterranean stream, therefore this aquifer does not meet the definition of a waterbody per the CCLUO and the SWRCB.

The Mattole Groundwater Basin has not been identified by the California Department of Water Resources (DWR) as a critically overdrafted basin^{3,4}. Critically overdrafted is defined by DWR as, "A

¹ [Well Completion Report Map Application](#)

² McLaughlin, R.J. et. al. 2000. Geology of the Cape Mendocino, Eureka, Garberville, and Southwestern Part of Hayfork.

³ [Statewide Groundwater Management](#)

⁴ [SGMA Basin Prioritization Dashboard](#)



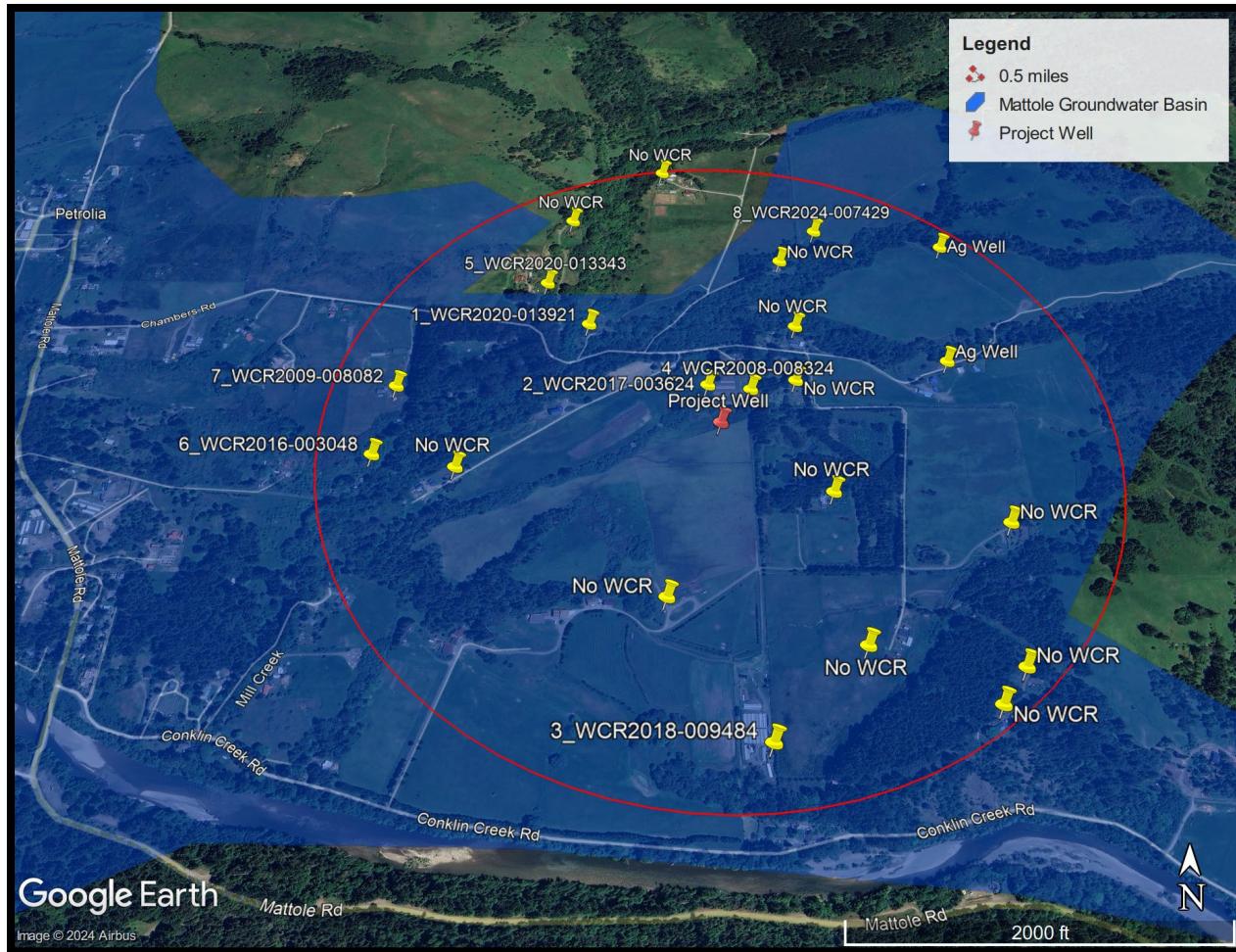


Figure 2. Project well and location of wells with WCRs within 0.5 miles of the project wells (locations were approximated based on information provided in the WCRs in Attachment 4).

basin subject to critical overdraft when continuation of present water management practices would probably result in significant adverse overdraft-related environmental, social, or economic impacts." In addition, as part of the California Statewide Groundwater Elevation Monitoring (CASGEM) Program, DWR created the CASGEM Groundwater Basin Prioritization statewide ranking system to prioritize California groundwater basins in order to help identify, evaluate, and determine the need for additional groundwater level monitoring. California's groundwater basins were classified into one of four categories high-, medium-, low-, or very low-priority. The CVGB is ranked as a very low-priority basin by the CASGEM ranking system. The very low ranking, with a ranking score of zero (0), indicates that groundwater use in the basin does not significantly impact the groundwater basin. As part of the prioritization, DWR did not identify any documented groundwater level declines in the Mattole Groundwater Basin.

GROUNDWATER RECHARGE

The USGS⁵ estimated long-term average recharge to be between 10 and 66 percent of precipitation.

⁵ [USGS Fact Sheet 2007-3007](#)



The annual minimum and average precipitation provided by the PRISM Climate Group⁶ from 2000 through 2023 is 26.2 inches and 70.6 inches, respectively. The long-term average recharge from rainfall over the groundwater basin of 3,150 acres is approximately 688-4,539 AFY and 1,853-12,231 AFY for a dry year and wet year, respectively. This does not include direct recharge from the Mattole River and its tributaries.

The project parcel area is 212.6 acres within the Mattole Groundwater Basin. The long-term average recharge over the project parcel is approximately 46-306 AFY and 125-826 AFY for a dry year and average year, respectively.

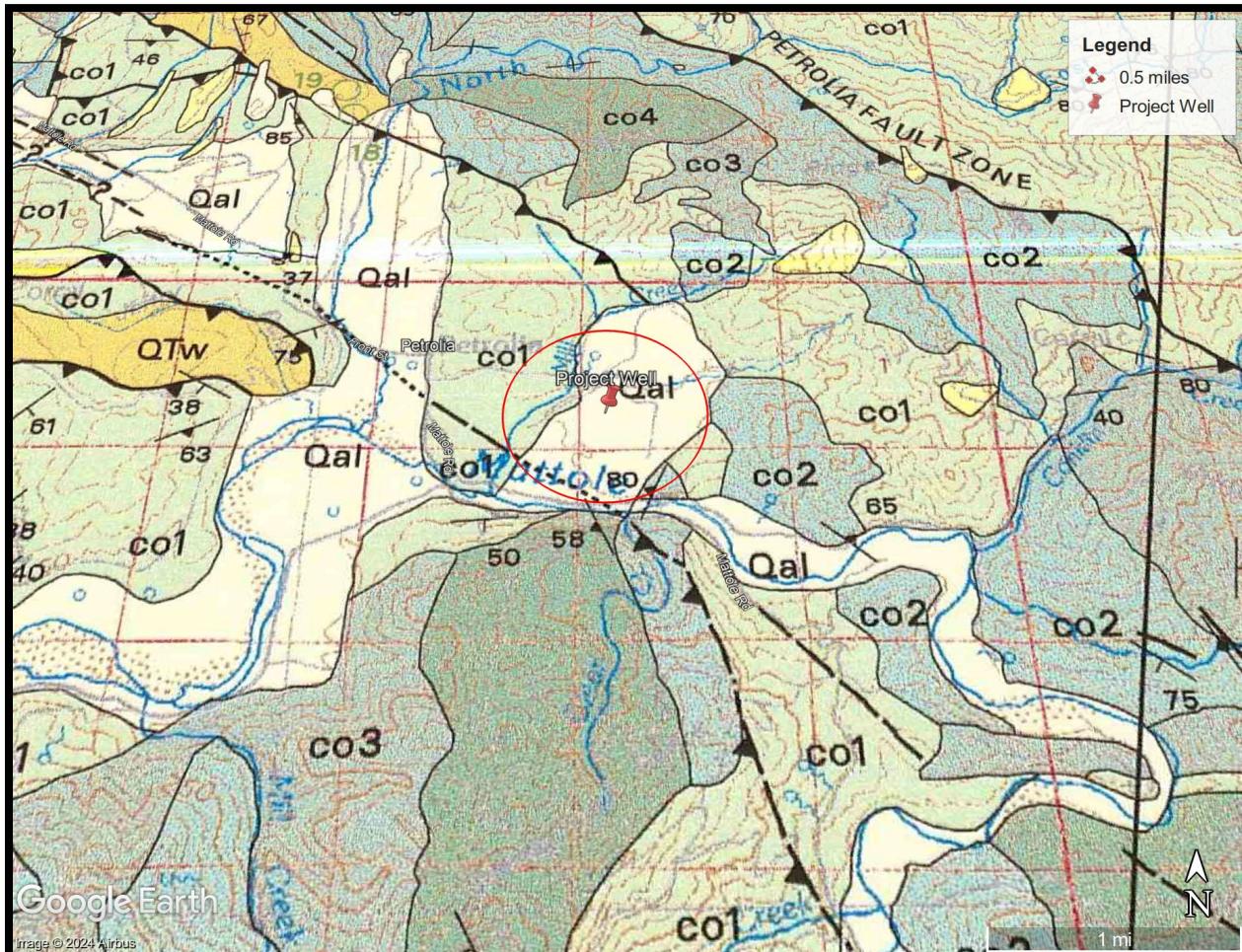


Figure 3. Geologic map of region, red circle is 0.5 mi radius around well. 'Qal' is alluvial deposits (Holocene age).
(Source: McLaughlin et. al., 2000)

WELL RADIUS OF INFLUENCE

The closest waterbody, which is an unnamed tributary Mill Creek, is located approximately 205 ft north of the project well (Figure 5). To evaluate the potential influence of using the project well for cannabis, a radius of influence evaluation was conducted on the project well using the Theis equation.

⁶ [PRISM Climate Group](#)



The radius of influence is the distance from the well where drawdown is negligible. The Theis equation was developed to model the response of an aquifer to pumping (Fetter, 2001⁷). Using the Theis equation, the drawdown at a specific distance from the well can be estimated based on the project's maximum daily pumping demand, 15 gpm, over a duration of 3 hours (time needed to top off water storage tanks). The drawdown measured during the July 2024 production test was used to estimate the specific capacity (SC) and transmissivity (T) for a confined aquifer as follows:

$$SC \text{ (gpm/ft)} = \text{Well Yield (gpm)} \div \text{Drawdown (ft)}$$

$$T \text{ (gpd/ft)} = 2000 \times SC \text{ (gpm/ft)}$$

The drawdown from the project's well for 3-hours of pumping at 15 gpm, for various distances from the well, is provided in Figure 4. Calculations are provided in Attachment 5. The radius of influence is the distance where the modeled cone of depression from groundwater extraction under these conditions is negligible (less than 6 inches). The drawdown in the well during the 4-hour pump test stabilized at 0.3 feet, which is considered negligible. Therefore, the radius of influence is small, less than 1-foot. None of the nearby wells or surface water bodies are within the modeled cone of depression. In addition, since the project proposes approximately 19 days of water storage during peak daily demand and tops the storage off daily at 3-hours per day, the well has sufficient time to recover.

During the July 2024 production test, a maximum drawdown of 0.5 feet was recorded after 1-minute of pumping, at which point equilibrium conditions were observed with no additional drawdown observed during the remainder of the test and the recovery was within 2 minutes of cessation of pumping, indicative of high transmissivity.

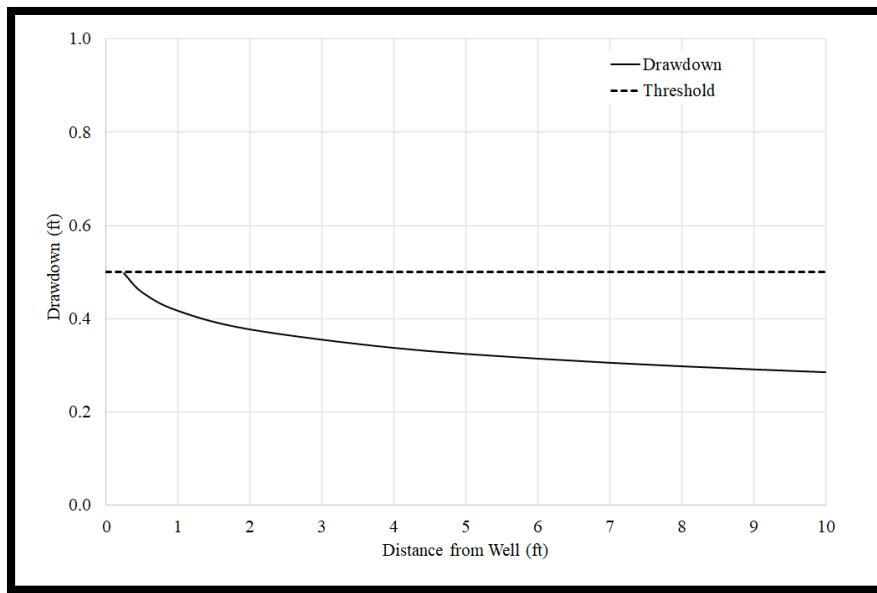


Figure 4. Estimated radius of influence associated with the project's well.

⁷ Fetter, C.W. 2001. Applied Hydrogeology. Fourth Edition.



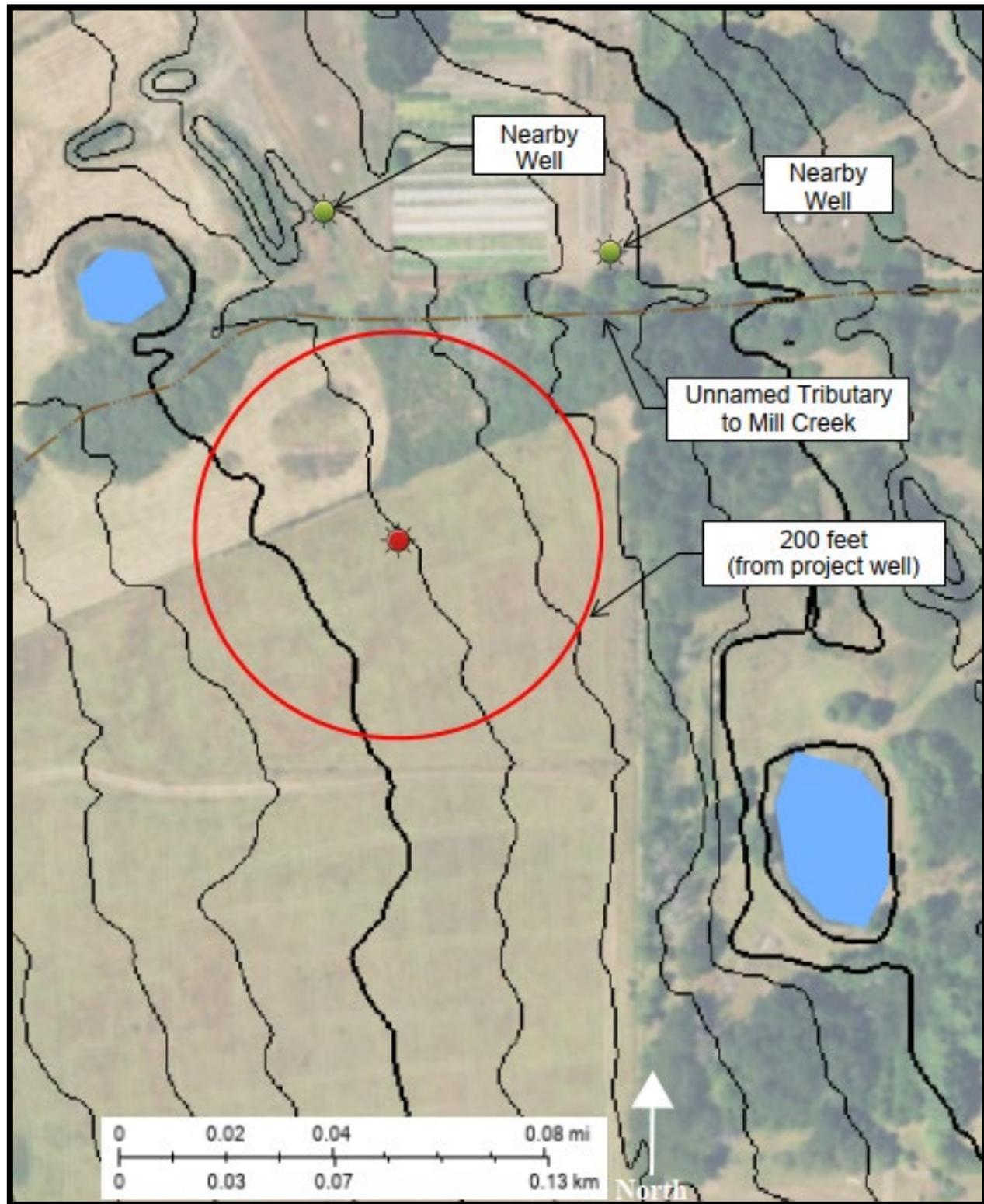


Figure 5. Project well with mapped surface water features and neighboring wells within 500 feet of the project well.



FINDINGS AND CONCLUSIONS

The purpose of this Technical Memorandum (TM) is to provide an assessment to demonstrate that the existing well is a non-diversionary source. A summary of findings and conclusions are as follows:

- The proposed annual water demand is 655,000 gallons (2.0 AF).
- The proposed water storage is 50,000 gallons, representing about 19 days of storage during peak daily demand, which is about 2,610 gallons per day.
- The project well has an estimated yield of 15 gpm. The well is screened in the Mattole River Valley Groundwater Basin.
- The Mattole River Valley Groundwater Basin is ranked as a very low priority basin by the CASGEM ranking system, indicating that groundwater use has no significant impact on the basin.
- Water will be pumped from the well at a maximum of 15 gpm (0.03 cfs) for 2.9 hours per day, daily, to meet the project's water demand.
- The estimated long-term average recharge from precipitation is approximately 688-4,539 AFY and 1,853-12,231 AFY for a dry year and average year, respectively. Therefore, there is sufficient water to recharge the Mattole River Valley Groundwater Basin aquifer.
- The estimated long-term average recharge from precipitation over the project parcel area is approximately 46-306 AFY and 125-826 AFY for a dry year and average year, respectively. The demand is only 4% of the lowest estimate of recharge over the project parcel.
- The Mattole River Valley Groundwater Basin does not meet the definition of a waterbody per the CCLUO and is therefore a non-diversionary source.
- The proposed water source is not considered a surface water diversionary source by CDFW and SWRQCB.
- The radius of influence was estimated using the Theis equation assuming a pumping rate of 15 gpm for 2.9 hours. The radius of influence is the distance from the well where drawdown is negligible and is the maximum distance from the well up to which pumping has an influence. The radius of influence is estimated to be less than 1-foot.
- The nearest waterbody is an unnamed tributary to Mill Creek approximately 205 ft to the north of the well. The creek is outside the radius of influence of the well. Thus, pumping from the well's source is not hydraulically connected to the unnamed tributary to Mill Creek.
- With all the above, it can be concluded that the proposed water source is a non-diversionary source of water and would not impact surrounding wells.

QUALIFICATIONS OF AUTHOR

Dr. Dodd has a PhD in Water Resources Engineering. In addition, Dr. Dodd is registered Professional Engineer with the State of California with 30-years of experience practicing and teaching Water Resources Engineering, including over 15 years of teaching, practicing, and modeling surface and groundwater hydrology.

LIMITATIONS

The study of groundwater hydrology is very complex and often relies on limited data, especially in rural areas. Recommendations and conclusions provided herein are based on professional judgment



made using information of the groundwater systems and geology in Humboldt County, which is limited and allows only for a general assessment of groundwater aquifer conditions and recharge. NorthPoint Consulting Group, Inc. is making analyses, recommendations, and conclusions based on readily available data, including studies and reports conducted by other professionals, Humboldt County, the State of California, and other consultants hired by the project proponent to prepare technical studies for the proposed project. If additional information or data becomes available for the project area, the recommendations and conclusions presented herein may be subject to change. This report has been prepared solely for the client and any reliance on this report by third parties shall be at such party's sole risk.

ATTACHMENTS:

1. Project Well Completion Report
2. Mattole River Valley Groundwater Basin, Bulletin 118
3. Pump Test Results
4. Surrounding WCRs
5. Radius of Influence Calculations



Attachment 1:

Project Well Completion Report



State of California
Well Completion Report
Form DWR 188 In Review 5/19/2022
WCR2021-008803

Owner's Well Number	W2249	Date Work Began	07/07/2021	Date Work Ended	07/13/2021
Local Permit Agency	Humboldt County Department of Health & Human Services - Land Use Program				
Secondary Permit Agency		Permit Number	20/21-0670	Permit Date	01/20/2021

Well Owner (must remain confidential pursuant to Water Code 13752)						Planned Use and Activity	
Name	Karl Benemann					Activity	New Well
Mailing Address	P.O. Box 1083					Planned Use	Water Supply Irrigation - Landscape
City	Trinidad		State	Ca	Zip	95570	

Well Location											
Address				APN 105-101-006							
City		Zip	County	Humboldt		Township 02 S					
Latitude	40	19	10.308	N	Longitude	-124	16	9.804	W	Range 02 W	
Deg.	Min.	Sec.			Deg.	Min.	Sec.			Section 02	
Dec. Lat. 40.31953				Dec. Long. -124.26939				Baseline Meridian Humboldt			
Vertical Datum				Horizontal Datum WGS84				Ground Surface Elevation			
Location Accuracy				Location Determination Method				Elevation Accuracy			
								Elevation Determination Method			

Borehole Information				Water Level and Yield of Completed Well			
Orientation	Vertical		Specify	Depth to first water	55	(Feet below surface)	
Drilling Method	Other - Under Ream	Drilling Fluid	Air	Depth to Static			
	Down Hole Hammer			Water Level	51	(Feet)	Date Measured 07/08/2021
Total Depth of Boring	180	Feet		Estimated Yield*	15	(GPM)	Test Type Air Lift
Total Depth of Completed Well	180	Feet		Test Length	4	(Hours)	Total Drawdown 125 (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	4	Brown Silty Clay					
4	11	Brown Clay					
11	47	Shale					
47	109	Blue Clay					
109	133	Shale Hard					
133	180	Blue Sandstone					

Casings

Casing #	Depth from Surface Feet to Feet		Casing Type	Material	Casings Specifications	Wall Thickness (inches)	Outside Diameter (inches)	Screen Type	Slot Size if any (inches)	Description
1	0	140	Blank	Low Carbon Steel	Grade: ASTM A53	0.188	6			
1	140	160	Screen	Low Carbon Steel	Grade: ASTM A53	0.188	6	Milled Slots	0.05	
1	160	180	Screen	Low Carbon Steel	Grade: ASTM A53	0.25	6	Milled Slots	0.05	

Annular Material

Depth from Surface Feet to Feet	Fill	Fill Type Details	Filter Pack Size	Description
0	20	Bentonite	Other Bentonite	Sanitary Seal
20	180	Filter Pack	Other Gravel Pack	3/8 inch Pea Gravel

Other Observations:

Borehole Specifications

Depth from Surface Feet to Feet	Borehole Diameter (inches)
0	180

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

HYDESVILLE

CA 95547

Address

Signed


electronic signature received

07/15/2021

683865

Attachments

Location Map.pdf - Location Map

DWR Use Only

CSG #	State Well Number	Site Code	Local Well Number
		N	W

EB 2

ABN:

Attachment 2:

Mattole River Valley Groundwater

Basin, Bulletin 118



Mattole River Valley Groundwater Basin

- Groundwater Basin Number: 1-28
- County: Humboldt
- Surface Area: 3,150 acres (5 square miles)

Basin Boundaries and Hydrology

The Mattole River Valley Groundwater Basin occupies small valleys of the Mattole and North Fork Mattole Rivers where the Mattole River discharges to the ocean. The basin is bounded to the south and east by undifferentiated marine Cretaceous deposits of graywacke and shale. The basin is bounded to the northwest by Tertiary marine sedimentary rocks of the Wildcat series (Strand 1962). The Wildcat series is a group of five formations ranging in age from Miocene to Pleistocene consisting of sandstone, marine siltstone, and claystone (Evenson 1959). Annual precipitation ranges from 63- to 75-inches.

Hydrogeologic Information

Hydrogeologic information was not found for the following:

Water-Bearing Formations

Groundwater Level Trends

Groundwater Storage

Groundwater Budget (Type B)

The estimate of groundwater extraction for the Mattole River Valley Basin is based on a 1996 survey conducted by the California Department of Water Resources. The survey included landuse and sources of water. Groundwater extraction for agricultural use is estimated to be 140 acre-feet. Groundwater extraction for municipal and industrial uses is estimated to be 7 acre-feet. Deep percolation of applied water is estimated to be 87 acre-feet.

Groundwater Quality

Hydrogeologic information was not found.

Well Production characteristics

Well yields (gal/min)		
Municipal/Irrigation	NKD	
Total depths (ft)		
Domestic	Range: 48 - 51	Average: 49 (3 Well Completion Reports)
Municipal/Irrigation	NKD	

NKD – No known data

Active Monitoring Data

Agency	Parameter	Number of wells /measurement frequency
Department of Health Services	Groundwater levels	NKD
	Miscellaneous water quality	NKD
	Miscellaneous water quality	2

Basin Management

Groundwater management:	No known groundwater management plans, groundwater ordinances, or basin adjudications.
Water agencies	
Public	None
Private	None

Selected References

Evenson, R.E. 1959. Geology and Groundwater Features of Eureka Area, Humboldt County, California. USGS Water Supply Paper 1470.

Strand RG. 1962. Geologic Map of California, [Redding Sheet]. Scale 1:250,000. California Division of Mines and Geology.

Bibliography

Bailey EH. 1966. Geology of Northern California. California Division of Mines and Geology. Bulletin 190.

California Department of Water Resources. 1975. California's Ground Water. California Department of Water Resources. Bulletin 118.

California Department of Water Resources. 1980. Ground Water Basins in California. California Department of Water Resources. Bulletin 118-80.

Dickinson WR, Ingersoll RV, Graham SA. 1979. Paleogene Sediment Dispersal and Paleotectonics in Northern California. Geological Society of America Bulletin 90:1458-1528.

Fraticelli LA, Albers JP, Irwin WP, Blake MC. 1987. Geologic Map of the Redding 1 x 2 Degree Quadrangle, Shasta, Tehama, Humboldt, and Trinity Counties, California. USGS. OF-87-257.

Nolan KM, Kelsey HM, Marron DC. 1995. Summary of Research in the Redwood Creek Basin, 1973-83. USGS Professional Paper.

Planert M, Williams JS. 1995. Ground Water Atlas of the United States, Segment 1, California, Nevada. USGS. HA-730-B.

Errata

Changes made to the basin description will be noted here.

Attachment 3:

Pump Test Results





3150 Johnson Rd.
Hydesville, CA 95547
(707) 768-9800
A, C-57 – Lic. #683865

WATER PRODUCTION TEST DRAWDOWN AND RECOVERY DATA

Property Address: 40.31953 -124.26939, Conklin Creek Road, Petrolia	Date: 7/19/24
Property Owner: Karl Benemann	Phone: (707) 499-6252
Other Info:	

Drawdown Data:

Date	Clock Time	Time Since Pump Started (min.)	Pumping Water Level Measurement (ft)	Pump Rate (discharge) gpm	Comments on Factors Affecting Test Data
7/19/24	12:01	0	19.5'	15	
7/19/24	12:02	1	19.5'	15	
7/19/24	12:03	2	20'	15	
7/19/24	12:04	3	19.9'	15	
7/19/24	12:05	4	19.9'	15	
7/19/24	12:06	5	19.9'	15	
7/19/24	12:07	6	19.8'	15	
7/19/24	12:08	7	19.8'	15	
7/19/24	12:09	8	19.8'	15	
7/19/24	12:10	9	19.8'	15	
7/19/24	12:11	10	19.8'	15	
7/19/24	12:16	15	19.8'	15	
7/19/24	12:21	20	19.8'	15	
7/19/24	12:26	25	19.8'	15	
7/19/24	12:31	30	19.8'	15	
7/19/24	12:36	35	19.8'	15	
7/19/24	12:41	40	19.8'	15	
7/19/24	12:46	45	19.8'	15	
7/19/24	1:01	1:00	19.8'	15	
7/19/24	1:16	1:15	19.8'	15	

Date	Clock Time	Time Since Pump Started (min.)	Pumping Water Level Measurement (ft)	Pump Rate (discharge) gpm	Comments on Factors Affecting Test Data
7/19/24	1:31	1:30	19.8'	15	
7/19/24	2:01	2:00	19.8'	15	
7/19/24	2:31	2:30	19.8'	15	
7/19/24	3:01	3:00	19.8'	15	
7/19/24	3:31	3:30	19.8'	15	
7/19/24	4:01	4:00	19.8'	15	End Drawdown Period

Recovery Data:

Date	Clock Time	Time Since Pump Shutoff (min.)	Recovery Water Level Measurement (ft)	Comments on Factors Affecting Test Data
7/19/24	4:01	0	19.8'	
7/19/24	4:02	1	19.6'	
7/19/24	4:03	2	19.5'	Recovered
		3		
		4		
		5		
		6		
		7		
		8		
		9		
		10		
		15		
		20		
		25		
		30		
		35		
		40		
		45		
		1:00		

Attachment 4:

Surrounding WCRs



State of California

Well Completion Report
 Form DWR 188 Complete 11/29/2020
 WCR2020-013921

1) Neighbor Well 400ft SE

Owner's Well Number	Date Work Began	09/21/2020	Date Work Ended	09/22/2020	
Local Permit Agency	Humboldt County Department of Health & Human Services - Land Use Program				
Secondary Permit Agency	Permit Number	20/21-0028	Permit Date	07/15/2020	
Well Owner (must remain confidential pursuant to Water Code 13752)					
Name	XXXXXXXXXXXXXXXXXXXX				
Mailing Address	XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX				
City	XXXXXX	State	XX	Zip	XXXXX

Planned Use and Activity

Activity New Well
 Planned Use Water Supply Domestic

Well Location

Address	741 Chambers RD				APN	105-141-001
City	Petrolia		Zip	95558	County	Humboldt
Latitude	40	19	17.3999	N	Longitude	-124
	Deg.	Min.	Sec.		Deg.	Min.
Dec. Lat.	40.3215		Dec. Long.	-124.2729		
Vertical Datum			Horizontal Datum	WGS84		
Location Accuracy			Location Determination Method			

Borehole Information

Orientation	Vertical	Specify	
Drilling Method	Direct Rotary	Drilling Fluid	Air
Total Depth of Boring	80	Feet	
Total Depth of Completed Well	80	Feet	

Water Level and Yield of Completed Well

Depth to first water	31	(Feet below surface)		
Depth to Static				
Water Level	25	(Feet)	Date Measured	09/22/2020
Estimated Yield*	7	(GPM)	Test Type	Air Lift
Test Length	4	(Hours)	Total Drawdown	55 (feet)

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

Geologic Log - Free Form

Depth from Surface Feet to Feet	Description	
0	5	top soil
5	22	silty clay
22	28	sandstone
28	51	gravel
51	80	shale

State of California
Well Completion Report
WCR Form - DWR 188 Complete 09/01/2017
WCR2017-003624

Owner's Well Number 1 Date Work Began 08/02/2017 Date Work Ended 08/11/2017
Local Permit Agency Humboldt County Department of Health & Human Services - Land Use Program
Secondary Permit Agency _____ Permit Number 16/17-0721 Permit Date 02/17/2017

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

Well Location									
Address <u>702 Chambers RD</u>					APN <u>105-071-006</u>				
City <u>Petrolia</u>	Zip <u>95558</u>	County <u>Humboldt</u>	Township <u>02</u>		S				
Latitude <u>N</u> Longitude <u>W</u>			Range <u>02</u>		W				
Deg. <u>40.3204250</u>	Min. <u></u>	Sec. <u></u>	Deg. <u>-124.2696340</u>	Min. <u></u>	Sec. <u></u>	Baseline Meridian <u>Humboldt</u>			
Vertical Datum <u></u>			Horizontal Datum <u>WGS84</u>			Ground Surface Elevation <u></u>			
Location Accuracy <u></u>			Location Determination Method <u></u>			Elevation Accuracy <u></u>			
						Elevation Determination Method <u></u>			

Borehole Information					Water Level and Yield of Completed Well					
Orientation <u>Vertical</u>	Specify <u></u>			Depth to first water <u>18</u> (Feet below surface)						
Drilling Method <u>Direct Rotary</u>	Drilling Fluid <u>Bentonite</u>	Depth to Static <u></u>			Water Level <u>27</u> (Feet) Date Measured <u>08/11/2017</u>					
Total Depth of Boring <u>160</u>	Feet <u></u>	Estimated Yield* <u>20</u> (GPM) Test Type <u>Air Lift</u>			Test Length <u>4</u> (Hours) Total Drawdown <u>133</u> (Feet)					
Total Depth of Completed Well <u>160</u>	Feet <u></u>	*May not be representative of a well's long term yield.								

Geologic Log - Free Form										
Depth from Surface Feet to Feet	Description									
0	3	top soil								
3	18	brown silty clay								
18	23	blue silty clay								
23	37	shale								
37	58	blue rounded gravel								
58	142	shale								
142	157	fractured sandstone								
157	160	franciscan formation								

Casings										
Casing #	Depth from Surface Feet to Feet		Casing Type	Material	Casings Specifications	Wall Thickness (inches)	Outside Diameter (inches)	Screen Type	Slot Size if any (inches)	Description
1	0	140	Blank	PVC	OD: 5.563 in. SDR: 21 Thickness: 0.265 in.	0.265	5.563			
1	140	160	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
20 160	Filter Pack	Other Gravel Pack		Well Sand #3

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

HYDESVILLE

CA

95547

Address

City

State

Zip

Signed

electronic signature received

08/16/2017

683865

C-57 Licensed Water Well Contractor

Date Signed

C-57 License Number

Attachments

Scan.pdf - Location Map

WellReport_05222017_1_20170901_135903.pdf - WCR Final

DWR Use Only

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Site Number / State Well Number

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

Latitude Deg/Min/Sec

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

Longitude Deg/Min/Sec

TRS:

APN:

State of California
Well Completion Report
Form DWR 188 Complete 12/16/2018
WCR2018-009484

Owner's Well Number	Date Work Began	10/18/2018	Date Work Ended	10/22/2018
Local Permit Agency	Humboldt County Department of Health & Human Services - Land Use Program			
Secondary Permit Agency	Permit Number	17/18-2048	Permit Date	08/21/2018

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

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

Planned Use and Activity

Activity	New Well
Planned Use	Water Supply Irrigation - Agriculture

Well Location

Address	1197 Conklin Creek RD			APN	105-111-016
City	Petrolia	Zip	95536	County	Humboldt
Latitude	N			Longitude	W
Deg.	Min.	Sec.	Deg.	Min.	Sec.
Dec. Lat.	40.3139890			Dec. Long.	-124.2685660
Vertical Datum				Horizontal Datum	WGS84
Location Accuracy				Location Determination Method	
APN 105-111-016					
Township 02 S					
Range 02 W					
Section 11					
Baseline Meridian Humboldt					
Ground Surface Elevation					
Elevation Accuracy					
Elevation Determination Method					

Borehole Information

Orientation	Vertical	Specify	
Drilling Method	Direct Rotary	Drilling Fluid	Bentonite
Total Depth of Boring	180	Feet	
Total Depth of Completed Well	180	Feet	

Water Level and Yield of Completed Well

Depth to first water	13	(Feet below surface)
Depth to Static		
Water Level	18	(Feet)
Estimated Yield*	3	(GPM)
Test Length	4	(Hours)
Date Measured 10/22/2018		
Test Type Air Lift		
Total Drawdown 162 (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	12	brown silty clay
12	16	brown gravel
16	21	blue clay
21	32	blue gravel and clay
32	41	blue clay
41	82	shale and basalt
82	116	blue fractured sandstone
116	180	franciscan bedrock

Casings

Casing #	Depth from Surface Feet to Feet		Casing Type	Material	Casings Specications	Wall Thickness (inches)	Outside Diameter (inches)	Screen Type	Slot Size if any (inches)	Description
1	0	80	Blank	PVC	OD: 5.563 in. SDR: 21 Thickness: 0.265 in.	0.265	5.563			
1	80	160	Screen	PVC	OD: 5.563 in. SDR: 21 Thickness: 0.265 in.	0.265	5.563	Milled Slots	0.032	
1	160	180	Blank	PVC	OD: 5.563 in. SDR: 21 Thickness: 0.265 in.	0.265	5.563			

Annular Material

Depth from Surface Feet to Feet	Fill	Fill Type Details	Filter Pack Size	Description	
0	20	Bentonite	Other Bentonite	Sanitary Seal	
20	180	Filter Pack	Other Gravel Pack	3/8 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	<i>electronic signature received</i>	10/24/2018	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

TPS:

APN:

Airphoto

Topo Quads

Terrain

Mapping

4

← 9 MI TO MATTOKE RD.

CHAMBERS RD.

253' →
942' & CHAMBERS RD.

LEACH FIELD

DRIVEWAY

HOUSE

SHED

SEPTIC TANK

N
S

10507107

3.8 ACRES

④ SECONDARY
WELL SITE

EXISTING
WELL

PLANNED
PRIMARY
WELLSITE

150'

105

NEIGHBORS HOUSE

LEACH FIE

CREEK

268

Find Parcel
Search by Asse
Search Building
Search Building

State of California
Well Completion Report
Form DWR 188 Complete 11/15/2020
WCR2020-013343

Owner's Well Number	Date Work Began	09/11/2020	Date Work Ended	09/16/2020
Local Permit Agency	Humboldt County Department of Health & Human Services - Land Use Program			
Secondary Permit Agency	Permit Number	20/21-0027	Permit Date	07/15/2020

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

Well Location							
Address	631 Chambers RD				APN	105-141-001	
City	Petrolia		Zip	95558	County	Humboldt	
Latitude	40	19	20.4743	N	Longitude	-124	16
	Deg.	Min.	Sec.		Deg.	Min.	Sec.
Dec. Lat.	40.322354			Dec. Long.	-124.273823		
Vertical Datum				Horizontal Datum	WGS84		
Location Accuracy				Location Determination Method			
Elevation Accuracy							
Elevation Determination Method							

Borehole Information				Water Level and Yield of Completed Well				
Orientation	Vertical		Specify	Depth to first water	57	(Feet below surface)		
Drilling Method	Direct Rotary	Drilling Fluid	Air	Depth to Static				
Total Depth of Boring	170	Feet		Water Level	54	(Feet)	Date Measured	09/15/2020
Total Depth of Completed Well	170	Feet		Estimated Yield*	5	(GPM)	Test Type	Air Lift
				Test Length	4	(Hours)	Total Drawdown	113 (feet)
*May not be representative of a well's long term yield.								

Geologic Log - Free Form							
Depth from Surface Feet to Feet		Description					
0	9	loose top soil					
9	17	brown clay					
17	42	blue clay					
42	51	hard blue clay					
51	74	gravel					
74	170	shale					

Casings

Casing #	Depth from Surface Feet to Feet		Casing Type	Material	Casings Specifications	Wall Thickness (inches)	Outside Diameter (inches)	Screen Type	Slot Size if any (inches)	Description
1	0	55	Blank	Low Carbon Steel	Grade: ASTM A53	0.188	6			
1	55	80	Screen	Low Carbon Steel	Grade: ASTM A53	0.188	6	Milled Slots	0.05	
2	80	170	Screen	PVC	OD: 4.500 in. SDR: 21 Thickness: 0.214 in.	0.214	4.5	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	170	Filter Pack	Other Gravel Pack	Pea Gravel

Other Observations:

Borehole Specifications

Depth from Surface Feet to Feet	Borehole Diameter (inches)	
0	170	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 09/16/2020 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:

State of California
Well Completion Report
Form DWR 188 Complete 5/2/2016
WCR2016-003048

Owner's Well Number	1	Date Work Began	04/20/2016	Date Work Ended	04/21/2016
Local Permit Agency	Humboldt County Department of Health & Human Services - Land Use Program				
Secondary Permit Agency		Permit Number	15/16-0184	Permit Date	10/06/2015

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

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

Planned Use and Activity

Activity	New Well
Planned Use	Water Supply Domestic

Well Location

Address	29505 Mattole RD			APN	105-081-09
City	Petrolia	Zip	95558	County	Humboldt
Latitude	N		Longitude	W	
Deg.	Min.	Sec.	Deg.	Min.	Sec.
Dec. Lat.	40.3193400		Dec. Long.	-124.2857800	
Vertical Datum				Horizontal Datum	WGS84
Location Accuracy				Location Determination Method	
Elevation Accuracy					
Elevation Determination Method					

Borehole Information

Orientation	Vertical	Specify	
Drilling Method	Direct Rotary	Drilling Fluid	Bentonite
Total Depth of Boring	100	Feet	
Total Depth of Completed Well	100	Feet	

Water Level and Yield of Completed Well

Depth to first water	12	(Feet below surface)		
Depth to Static				
Water Level	8	(Feet)	Date Measured	04/20/2016
Estimated Yield*	5	(GPM)	Test Type	Air Lift
Test Length	4.0	(Hours)	Total Drawdown	76 (feet)

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

Geologic Log - Free Form

Depth from Surface Feet to Feet	Description	
0	2	Top Soil
2	12	Brown Clay
12	14	Brown Gravel
14	19	Blue Clay
19	25	Blue Gravel
25	31	Blue Clay
31	39	Blue Sandstone
39	100	Grey Clay

Casings

Casing #	Depth from Surface Feet to Feet	Casing Type	Material	Casings Specifications	Wall Thickness (inches)	Outside Diameter (inches)	Screen Type	Slot Size if any (inches)	Description
1	0	20	Blank	PVC	OD: 5.563 in. SDR: 21 Thickness: 0.265 in.	0.265	5.563		
1	20	100	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	100	Filter Pack	Other Gravel Pack	Pea Gravel

Other Observations:

Borehole Specifications		
Depth from Surface Feet to Feet	Borehole Diameter (inches)	
0	100	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		04/21/2016	683865	
C-57 Licensed Water Well Contractor			Date Signed	C-57 License Number	

Attachments

SiteMap.pdf - Location Map
SiteMap_Redacted.pdf - Location Map - Redacted

DWR Use Only					
CSG #	State Well Number	Site Code	Local Well Number		
				N	W
Latitude Deg/Min/Sec				Longitude Deg/Min/Sec	
TRS:					
APN:					

NOTE:

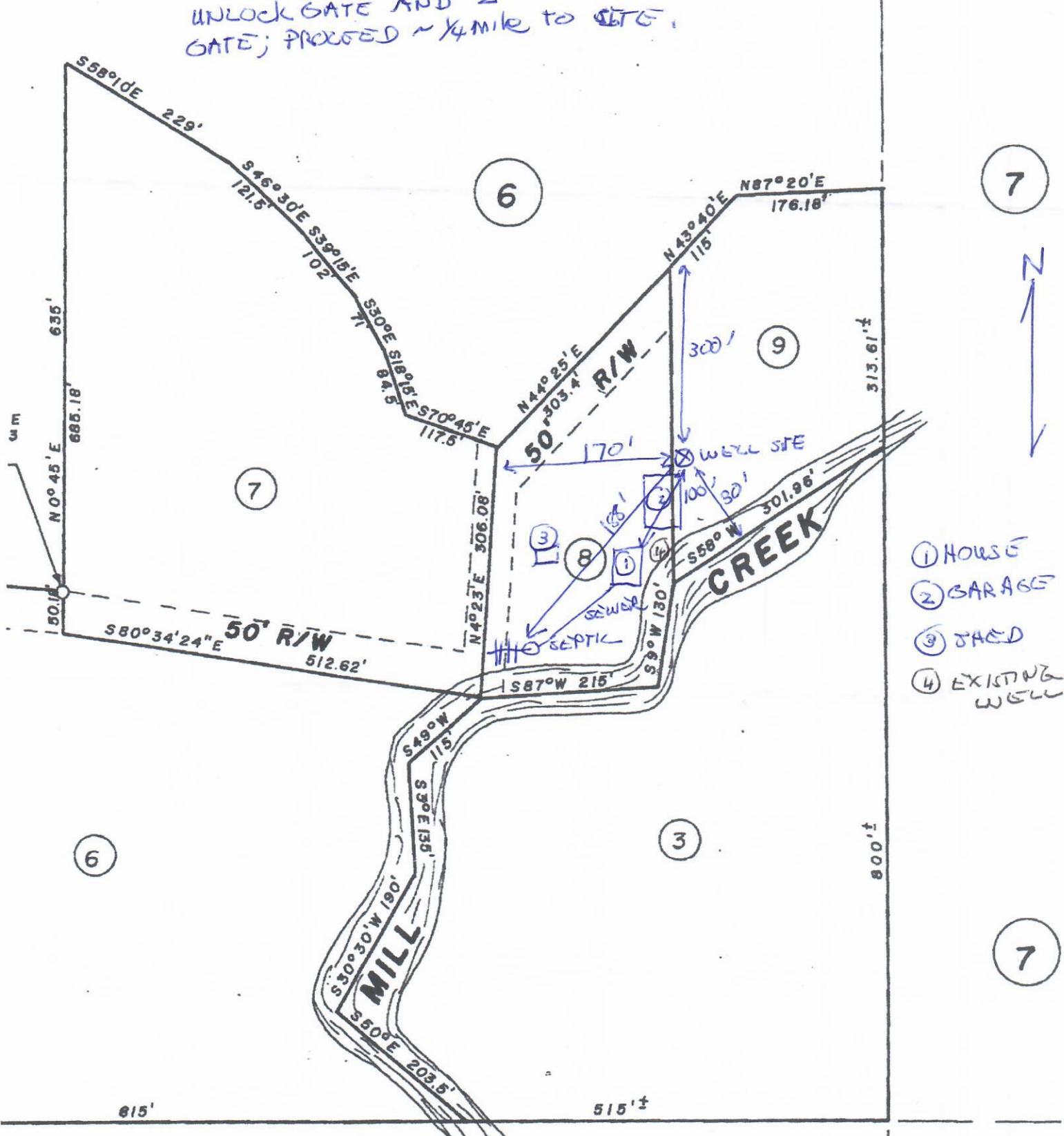
NEW MATTOLE ROAD R/W CONVYD. TO HUMBOLDT COUNTY BY A SERIES OF DEEDS. SEE OR 484 Pg. 393 FOR DESCRIPTION.

ASMT # 105-081-008-000

ASMT # 105-081-009-000

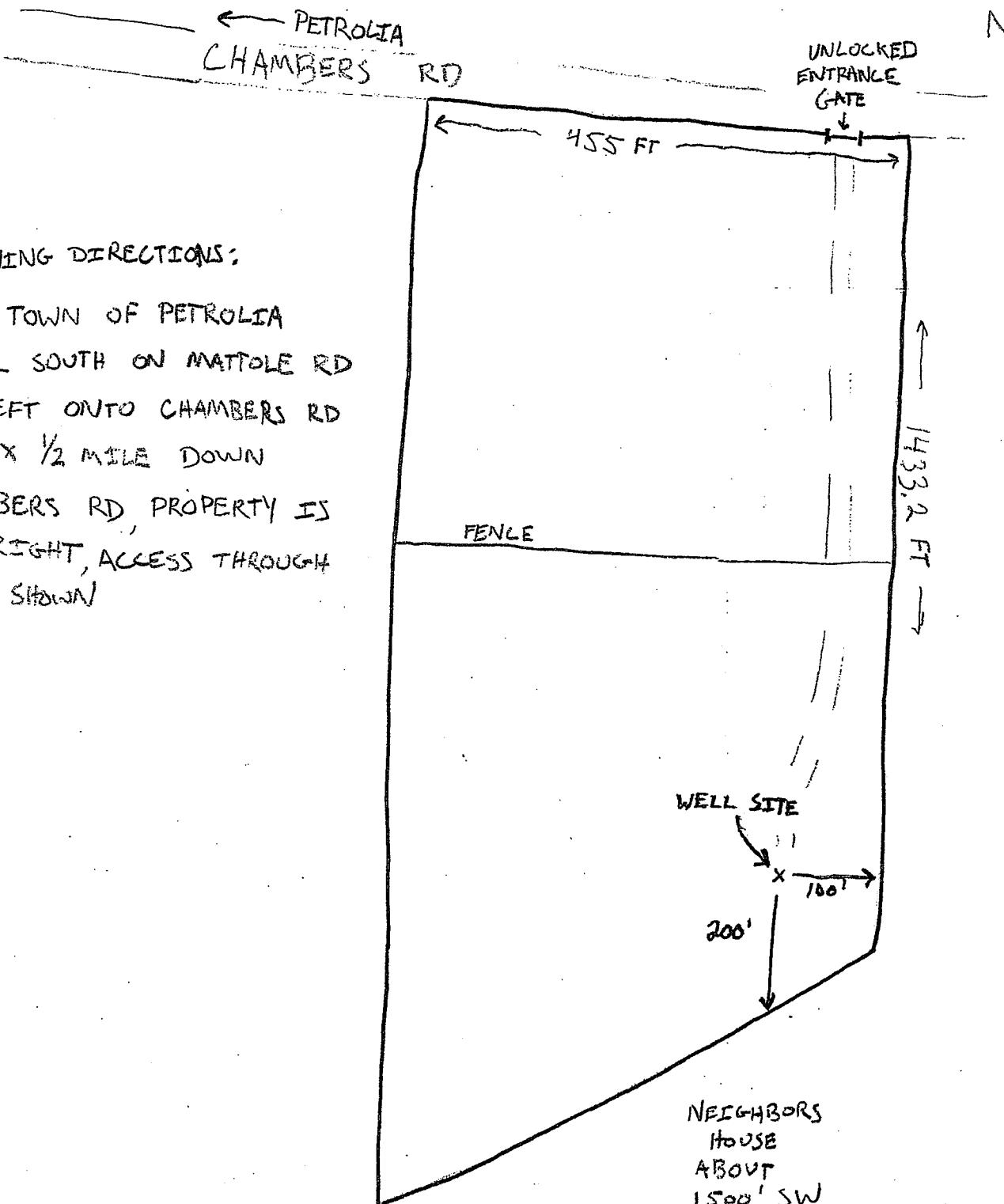
TAKE MATTOLE RD ~ 32 MILE FROM FERNDALE DS-081-009-000
TURN LEFT $\frac{1}{4}$ MILE AFTER CHAMBERS RD; GO THROUGH 1ST LOCKED UNLOCK GATE AND 2nd LOCKED GATE; PROCEED $\sim \frac{1}{4}$ MILE TO SITE.

29505 MATTOLE RD.



PLOT MAP

AP# 105-061-011
470 Chambers Rd. Petrolia



State of California
Well Completion Report
Form DWR 188 Submitted 8/13/2024
WCR2024-007429

Owner's Well Number	Date Work Began	06/27/2024	Date Work Ended	07/11/2024	
Local Permit Agency	Humboldt County Department of Health & Human Services - Land Use Program				
Secondary Permit Agency	Permit Number	20/21-0279	Permit Date	10/19/2020	
Well Owner (must remain confidential pursuant to Water Code 13752)				Planned Use and Activity	
Name	KARL FRANCIS BENEMANN & ESTHER DAWN BENEMANN FAMILY REVOCABLE			Activity	New Well
Mailing Address	PO Box 1083			Planned Use	Water Supply Domestic
City	Trinidad	State	CA	Zip	95570

Well Location											
Address	1414 Chambers RD									APN	104-191-001
City	Petrolia		Zip	95558	County	Humboldt				Township	02 S
Latitude	40	19	28.146	N	Longitude	-124	15	59.9148	W	Range	02 W
	Deg.	Min.	Sec.			Deg.	Min.	Sec.		Section	02
Dec. Lat.	40.324485				Dec. Long.	-124.266643				Baseline Meridian	Humboldt
Vertical Datum				Horizontal Datum	WGS84				Ground Surface Elevation		
Location Accuracy				Location Determination Method					Elevation Accuracy		
									Elevation Determination Method		

Borehole Information				Water Level and Yield of Completed Well				
Orientation	Vertical	Specify		Depth to first water	34	(Feet below surface)		
Drilling Method	Direct Rotary	Drilling Fluid	Air	Depth to Static				
Total Depth of Boring	160	Feet		Water Level	32	(Feet)	Date Measured	07/12/2024
Total Depth of Completed Well	160	Feet		Estimated Yield*	25	(GPM)	Test Type	Air Lift
				Test Length	4	(Hours)	Total Drawdown	128 (feet)
*May not be representative of a well's long term yield.								

Geologic Log - Free Form									
Depth from Surface Feet to Feet	Description								
0	2	Top Soil							
2	18	Brown Silty Clay							
18	28	Brown Clay							
28	35	Brown Gravel							
35	89	Shale Clay							
89	98	Blue Sandstone Fractured							
98	160	Shale Clay							

Casings

Casing #	Depth from Surface Feet to Feet		Casing Type	Material	Casings Specifications	Wall Thickness (inches)	Outside Diameter (inches)	Screen Type	Slot Size if any (inches)	Description
1	0	80	Blank	Low Carbon Steel	Grade: ASTM A53	0.188	6			
1	80	100	Screen	Low Carbon Steel	Grade: ASTM A53	0.188	6	Milled Slots	0.05	
1	100	140	Blank	Low Carbon Steel	Grade: ASTM A53	0.188	6			
1	140	160	Blank	Low Carbon Steel	Grade: ASTM A53	0.25	6			

Annular Material

Depth from Surface Feet to Feet	Fill	Fill Type Details	Filter Pack Size	Description
0	20	Bentonite	High Solids	Sanitary Seal
20	160	Filter Pack	Other Gravel Pack	3/8 Inch

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 & PUMP INC**

Person, Firm or Corporation

3150 JOHNSON ROAD HYDESVILLE CA 95547

Address _____ City _____ State _____ Zip _____

Signed electronic signature received 08/13/2024 683865
C-57 Licensed Water Well Contractor Date Signed C-57 License Number

Attachments

scan20240813.pdf - Location Map

DWR Use Only

CSG #	State Well Number	Site Code	Local Well Number
		N	W

TRS:

APN:

Attachment 6:

Radius of Influence Calculation



Well (Confined Aquifer)							
Storativity	0.0011	0.0011	0.0011	0.0011	0.0011	0.0011	0.0011
Well Drawdown (ft)	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Yield Q (gpm)	15	15	15	15	15	15	15
SC Specific Capacity	30.00	30.00	30.00	30.00	30.00	30.00	30.00
T (gpd/ft)	60000.0	60000.0	60000.0	60000.0	60000.0	60000.0	60000.0
T (ft ² /day)	8020.9	8020.9	8020.9	8020.9	8020.9	8020.9	8020.9
Project Q (gpm)	15.0	15.0	15.0	15.0	15.0	15.0	15.0
Q (ft ³ /d)	2887	2887	2887	2887	2887	2887	2887
Time (days)	0.125	0.125	0.125	0.125	0.125	0.125	0.125
r (ft)	0.2	1	1	2	4	6	8
u	0.00000	0.00000	0.00000	0.00000	0.00000	0.00002	0.00003
w(u)	17.4065	15.9566	14.5703	13.1840	11.7977	10.9868	10.4114
Drawdown [h-ho] (ft)	0.5	0.5	0.4	0.4	0.3	0.3	0.3
Drawdown [h-ho] (in)	6.0	5.5	5.0	4.5	4.1	3.8	3.4

Notes:
 Storativity - Average of Minimum and Maximum in range (see below)
 Maximum drawdown from Pump Test
 Pump rate from Pump Test
 Well Yield / Available Drawdown
 Driscoll's (1968) Estimate for confined aquifer of $T = 2000 \times Q/SC$
 gallon = 0.133681 cubic foot

conversion $ft^3/d = 0.00519481 \text{ gpm}$

Fetter (2001) Equation 5.10
 Fetter (2001) Equation 5.11: $W(u) \sim -0.5772 \cdot \ln(u) + u - u^2 / (2 \cdot \text{fact}^2)$
 Fetter (2001) Equation 5.11

Sources:
 Applied Hydrogeology, Fourth Edition, C.W. Fetter. 2001
 Groundwater Wells, Second Edition, F.G. Driscoll 1986. (<https://sehydrogeology.com/using-specific-capacity-monitor-well-performance/#:~:text=The%20Specific%20Capacity%20of%20a.penetrated%20by%20the%20well%20screens.>)

Storativity - Confined Aquifer (Sources)

Minimum	Maximum	Average
0.00005	0.005	0.0010586
0.00001	0.0001	Average of all six estimates of Storativity

Radius of influence is distance from well where drawdown is negligible.

Well Aquifer Thickness (WCR) (ft) 0.000133 Aquifer Thickness * 0.000001
 Total Aquifer Thickness (WCR) (ft) 133 Estimated from WCR 180 ft - 47 ft

Source: http://www.aqtesolv.com/aquifer-tests/aquifer_properties.htm

aquifer (or aquitard) thickness [L].

The typical **storativity** of a confined aquifer, which varies with specific storage and aquifer thickness, ranges from 5×10^{-5} to 5×10^{-3} ([Todd 1989](#)).

Specific storage is the volume of water that a unit volume of aquifer (or

Source: <https://www.sciencedirect.com/topics/earth-and-planetary>

from the expansion of water and compaction of the aquifer, both of which are exceedingly small. For confined aquifers the storativity generally ranges between 0.0001 and 0.00001, and for leaky confined aquifers it is in the range of 0.001. One method to estimate storativity for confined aquifers is to multiply the aquifer thickness by 0.000001. The small storativity for confined aquifers means that to obtain a sufficient supply from a well there must be a large pressure change throughout a wide area. This is not the case with unconfined aquifers because the water derived is not related to expansion and compression but comes instead from **gravity drainage** and dewatering of the aquifer.

