



PACIFIC WATERSHED ASSOCIATES INC.

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May 20, 2020

Humboldt County Building and Planning Department
3015 H Street
Eureka, CA 95501

Re: Permit Application No. 11929 APN: 212-311-002, Hydrogeologic Evaluation for a Groundwater Well Permit #18/19/1053

This letter serves to provide the Humboldt County Planning Department with information that pertains to the permitted groundwater well on Humboldt County APN: 212-311-002, located at 5841 Avenue of the Giants, Miranda, Humboldt County, California. The information provided has been reviewed by Professional Geologist Kathy Moley, P.G. 7594, Senior Geologist of Pacific Watershed Associates (PWA).

Groundwater Well Information:

- (1) **Well Location** - (40.221316°, -123.816344°) The well is located within the SW ¼ of the NW ¼ of Section 11, Township 3 S, Range 3 E. The well head is located along the southern flank of a west/southwest trending ridgeline approximately 500 feet above sea level. The purpose of this well is for irrigation and domestic use.
- (2) **Nearby Surface Waters** – There are no identified springs or streams and no surface water flow has been observed within the immediate vicinity of the well head. Based on a topographic map (Miranda 7.5 Minute Quadrangle, Figure 1), there appears to be an ephemeral Class III stream approximately 170 feet southeast, and 34 feet downslope of the well head.

The nearest mapped blue line stream is the South Fork Eel River, which is approximately 900 feet to the southwest, and approximately 300 feet in vertical relief from the well head location (Figure 1).

- (3) **Well Drilling** – The well permit was issued on 7 May 2019. The well was drilled by Fisch Drilling. Work on this well began on 25 July 2019 and ended on 5 August 2019. The well was drilled vertically 200 feet below ground surface (bgs).

- (4) **Subsurface Geologic Well Log** - A Well Completion Report (Report) was prepared by David Fisch of Fisch Drilling on 8 August 2019 (See the Attached Report). The Report indicates that the well was advanced through two (2) feet of topsoil. The well report also indicates that the next ten (10) feet was drilled through a brown sandstone. From there, the well was drilled through approximately 90 feet (101 feet bgs) of a shale/basalt mix. The following 36 feet are drilled thru blue fractured sandstone. The next 50 feet consist of a soft shale which is followed by approximately 15 feet of a shale mélange.
- (5) **First Water** - The depth to first water was 105 feet bgs with Static Water standing at 101 bgs. A four (4) hour drawdown test was conducted. During that pump test water was extracted at a rate of 20 gallons per minute (gpm) with a total drawdown of 95 feet. This would bring the water down to the approximate level of the presumed well pump. While there is no information about recovery, this relatively rapid drawdown in groundwater within the well indicates a limited amount of water within this well
- (6) **Well Construction** - The Report also indicates that the well borehole is approximately 10-inches in diameter from 0 to 200 feet deep. The well casing, which is low carbon steel, is screened between 100 feet and 120 feet bgs with the remaining of the well casing being solid (unscreened). Slots size is 0.05-inches in thickness. Based on the Geologic Log on this Report, the screened portion of this well casing is within blue fractured sandstone.
- (7) **Local Geology** - Based on large scale (1:137,000) geologic mapping of the area, this well has been drilled within a thin (<0.5 km) mapped sliver of central belt Franciscan broken formation (cb1) bedrock. This thin sliver appears to be the remnant of the much larger central belt Franciscan bedrock unit which has been thrust faulted over the underlying Yager terrane. The Yager terrane, as has been mapped within the vicinity of this project area is a sheared and highly folded mudstone (y1). A description of both the broken formation and the Yager terrane are provided below.

The geologic units identified within the well logs for this project are consistent with published descriptions of the broken formation (McLaughlin et. al., 2000). Based on large scale mapping of the area, it is unlikely that this drilled well penetrated through the broken formation and into the Yager terrane bedrock.

Geologic Descriptions of Local Bedrock
Yager Complex (y1) – Sheared and highly folded mudstone – includes minor rhythmically interbedded sandstone, locally with lenses of conglomerate. Exhibits irregular topography lacking well-incised system of sidehill drainages.
Broken formation (cb1) - Consists 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.

Conclusions and Recommendations

With the well being screened between 100 feet bgs and 120 feet bgs, this allows for groundwater to flow into the well casing from the blue fractured sandstone and be stored within the remaining well casing for use. For the approximate 80-100 feet of the well casing below the screened interval, approximately 470 to 580 gallons of water can be stored within the well.

The central belt broken formation is a highly fractured bedrock which has the capacity to hold large volumes of water within fissures and in disconnected pockets. These pockets of water are rarely continuous and do not present themselves as large contiguous aquifers in the true meaning of the word.

This water source is likely recharged annually from rainwater. As rain falls on the hillslope water slowly makes its way through the upper soil profile and bedrock layers. This may take years or tens of years for groundwater to migrate down to the blue fractured sandstone in which this well is extracting water from. Based on geologic mapping, the surface expression of the broken formation encompasses an area of approximately 350 acres of recharge capture area. Although, based on local topography, it is likely that a much smaller area adds to the recharge of the groundwater this well is discharging from.

As part of the pump test performed, it was reported that the well was pumped for approximately 4 hours at 20 gpm. That equals out to roughly 4,800 gallons. Approximately 10 times the void volume within the well casing. There is no information about groundwater recovery from this well. However, the drawn down test displaced water an additional 95 feet from stabilized water elevations.

One could make an argument that if this well were connected to a significant groundwater source the drawdown during this test could have been significantly less.

Therefore, this drawdown of water within the well casing may indicated limited connectivity to large sources of surrounding groundwater. Frequently wells with connections to significant groundwater sources will have a smaller drawdown during a well production test. This groundwater well is pulling water from fractured bedrock and not from surface water or near surface waters (100 feet – 120 feet bgs). PWA believes that this well is not hydrologically connected to surface waters or other significant groundwater sources.

Regardless, PWA does recommends that this well not be over pumped. PWA further recommends keeping detailed records of water pumped from this well, well water stored, and water used. If you determine that the water level in the well is dropping at a significant rate, you may wish to increase the number of water storage tanks to assist you with the dryer times of the year. The shorter the time interval pumping occurs, the rate at which water is pumped, the time of day and the volume of water pumped can affect the ultimate yield and the overall health of the well.

While it is likely that most waters here on the north coast are ultimately connected, in one way or another from raindrop to ocean, the likelihood of this well exhibiting measurable impacts to surrounding surface waters is highly unlikely. Additionally, it is our opinion that the projected

use levels of the well will have no significant adverse impacts on the flora and fauna of the area and any opinion to the contrary should be supported by a detailed report specifically relating the use to the implied impacts.

If you have any further questions or would like additional detail on any of the services and project work, we are providing to this landowner, please do not hesitate to contact me at 707-839-5130.

Sincerely,

PACIFIC WATERSHED ASSOCIATES INC.

A handwritten signature in black ink, appearing to read "Kathy Moley", written over a horizontal line.

Kathy Moley PG 7594
kathym@pacificwatershed.com

Enclosures:

- Figure 1: Location Map
- Figure 2: Geologic Map of Project Vicinity
- Well Permit #18/19-1053
- Well Completion Report

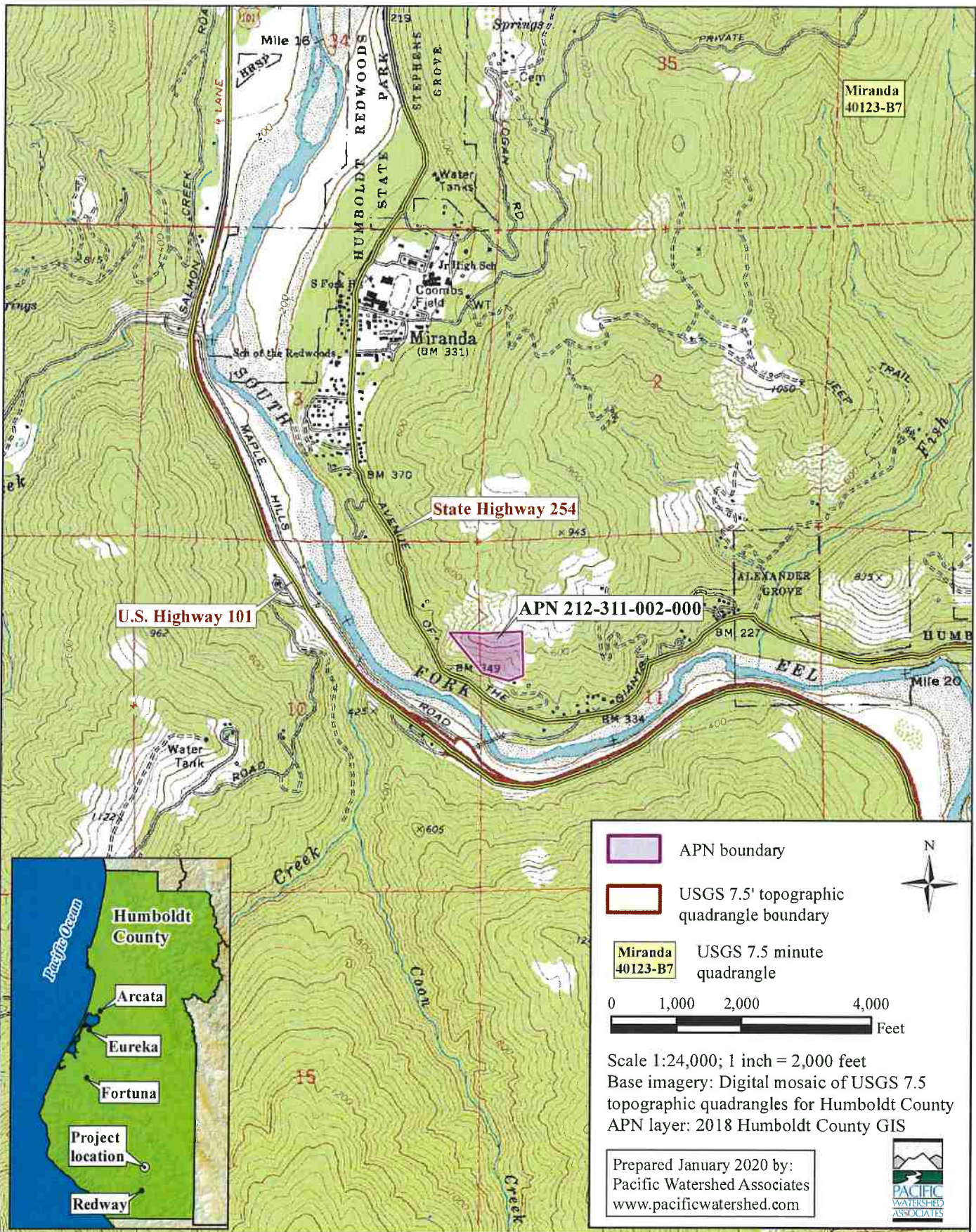
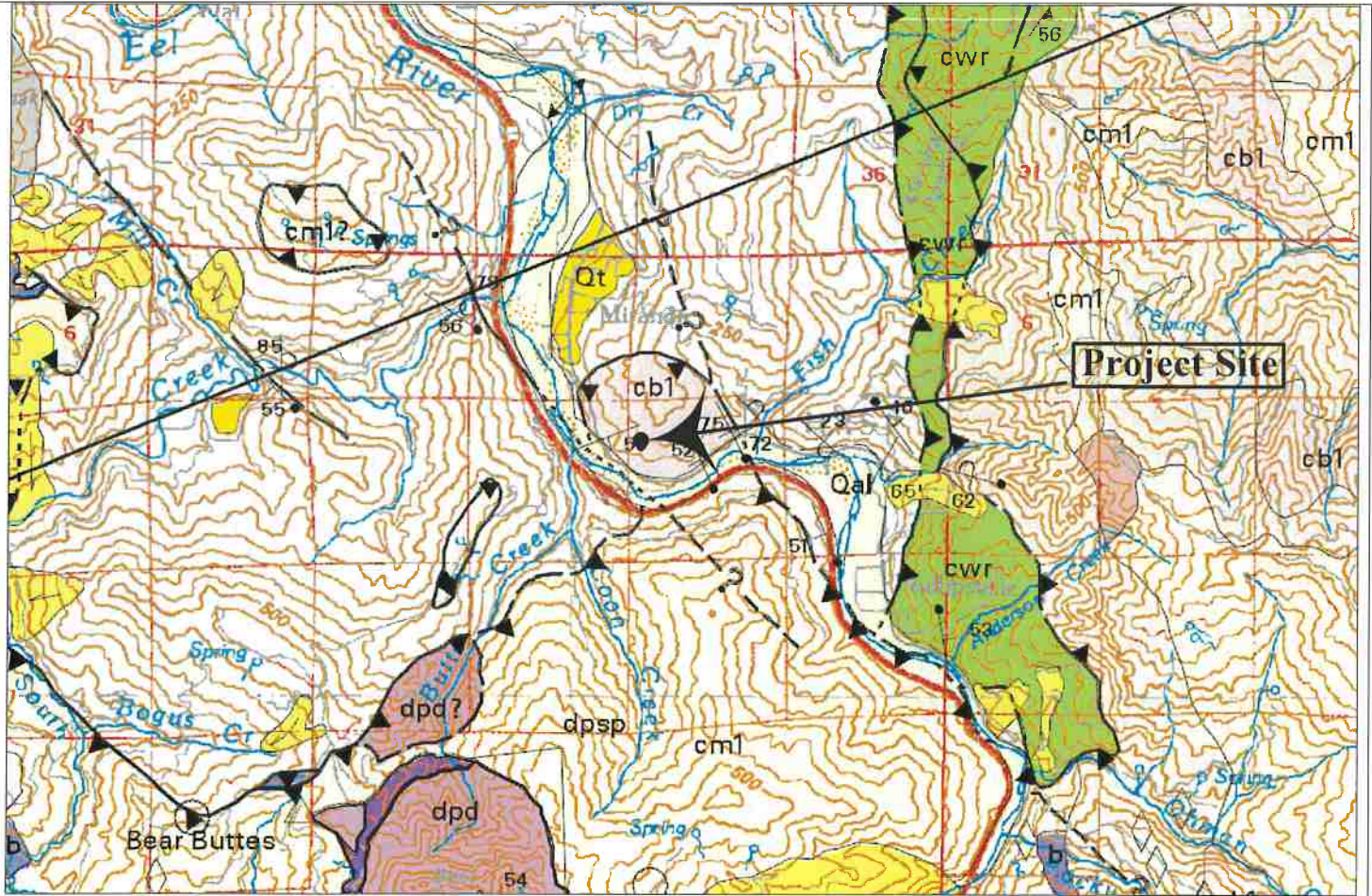


Figure 1. General Location Map for Hydrogeologic Evaluation for a Groundwater Well on APN: 212-311-002, Located at 5841 Avenue of the Giants, Miranda, Humboldt County, California.



**Geology Map of the
Project Vicinity
A.P. No.: 212-311-002**

Source Map

**GEOLOGY OF THE CAPE MENDOCINO, EUREKA, GARBERVILLE,
AND SOUTHWESTERN PART OF THE HAYFORK 30 X 60 MINUTE QUADRANGLES
AND ADJACENT OFFSHORE AREA, NORTHERN CALIFORNIA**

By
R.J. McLaughlin, S.D. Ellen, M.C. Blake, Jr., A.S. Jayko, W.P. Irwin, K.R. Aalta, G.A. Carver, and S.H. Clarke, Jr.
Digital database by J.B. Barnes, J.D. Cecil, and K.A. Cyr
2000

Figure 2

State of California
Well Completion Report
 Form DWR 188 Submitted 8/7/2019
 WCR2019-010978

Owner's Well Number _____ Date Work Began 07/25/2019 Date Work Ended 08/05/2019
 Local Permit Agency Humboldt County Department of Health & Human Services - Land Use Program
 Secondary Permit Agency _____ Permit Number 18/19-1053 Permit Date 05/07/2019

Well Owner (must remain confidential pursuant to Water Code 13752)		Planned Use and Activity
Name <u>Georgi Stoyanov</u>	Activity <u>New Well</u>	
Mailing Address <u>P.O. Box 476</u>	Planned Use <u>Water Supply Irrigation - Agriculture</u>	
City <u>Garberville</u> State <u>CA</u> Zip <u>95560</u>		

Well Location		
Address <u>5841 Ave. of the Giants</u>	APN <u>212-311-002</u>	
City <u>Miranda</u> Zip <u>95553</u> County <u>Humboldt</u>	Township <u>03 S</u>	
Latitude <u>40</u> <u>13</u> <u>16.7376</u> N Longitude <u>-123</u> <u>48</u> <u>58.8383</u> W	Range <u>03 E</u>	
Deg. Min. Sec. Deg. Min. Sec.	Section <u>11</u>	
Dec. Lat. <u>40.221316</u> Dec. Long. <u>-123.816344</u>	Baseline Meridian <u>Humboldt</u>	
Vertical Datum _____ Horizontal Datum <u>WGS84</u>	Ground Surface Elevation _____	
Location Accuracy _____ Location Determination Method _____	Elevation Accuracy _____	
	Elevation Determination Method _____	

Borehole Information	Water Level and Yield of Completed Well
Orientation <u>Vertical</u> Specify _____	Depth to first water <u>105</u> (Feet below surface)
Drilling Method <u>Other - Under-Ream Down Hole Hammer</u> Drilling Fluid <u>Air</u>	Depth to Static _____
Total Depth of Boring <u>200</u> Feet	Water Level <u>101</u> (Feet) Date Measured <u>08/05/2019</u>
Total Depth of Completed Well <u>200</u> Feet	Estimated Yield* <u>20</u> (GPM) Test Type <u>Air Lift</u>
	Test Length <u>4</u> (Hours) Total Drawdown <u>95</u> (feet)
	*May not be representative of a well's long term yield.

Geologic Log - Free Form		
Depth from Surface	Feet to Feet	Description
0	2	top soil
2	12	brown sandstone
12	101	shale/basalt mix
101	137	blue fractured sandstone
137	186	soft shale
186	200	shale melange

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	100	Blank	Low Carbon Steel	Grade: ASTM A53	0.188	6			
1	100	120	Screen	Low Carbon Steel	Grade: ASTM A53	0.188	6	Milled Slots	0.05	
1	120	200	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	200	Filter Pack	Other Gravel Pack	3/8 Inch	Pea Gravel

Other Observations:

Borehole Specifications

Depth from Surface Feet to Feet		Borehole Diameter (inches)
0	200	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 *[Signature]* 08/07/2019 683865
Electronic signature received Date Signed C-57 License Number
 C-57 Licensed Water Well Contractor

Attachments

Scan.pdf - Location Map

DWR Use Only

CSG #	State Well Number	Site Code	Local Well Number

	N		W
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Latitude Deg/Min/Sec Longitude Deg/Min/Sec

TRS:
APN:

COUNTY OF
 LAND USE
 E EXISTING
 FEET (SF)
 APPLICANT
 IE EXISTING
) "AE" WITH
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 OR DRYING,
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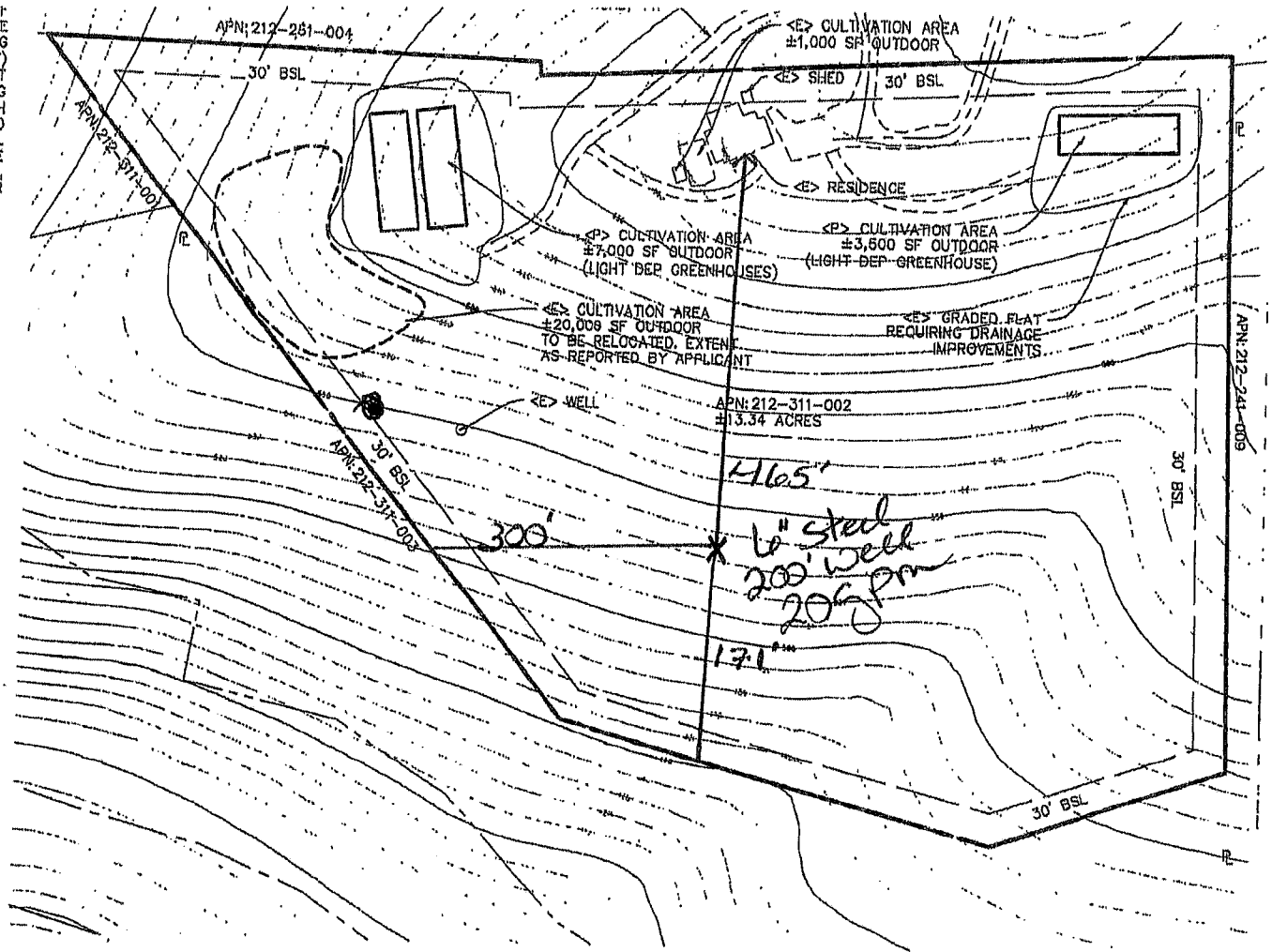
SHALL

FORMATION
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T THE
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 PPROVAL



PLOT PLAN

22x34 SHEET: 1"=75'
 11x17 SHEET: 1"=150'

0 37.5 75 150



SHEET INDEX:

C0 - ZONING PLOT PLAN, VICINITY MAP,
 PROJECT NOTES