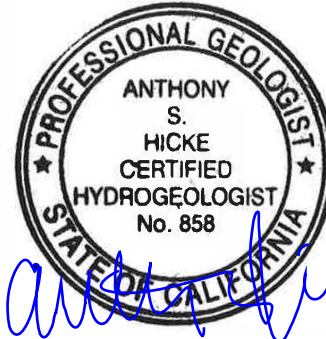




MEMORANDUM

To: Mr. Mike Muelrath
Applied Civil Engineering, Inc (ACE)
2074 West Lincoln Avenue
Napa, CA 94558
Sent via email (mike@appliedcivil.com)



July 16, 2022

Job No. 746-NPA02

Re: Preparation of Napa County Tier 3 Water Availability Analysis (WAA)
Red Dirt Grapes Vineyard Development Project
Napa County APNs 032-560-038 & 032-030-071
Long Ranch Road, Pritchard Hill, Napa County, CA

Dear Mr. Muelrath:

Richard C. Slade & Associates LLC, Consulting Groundwater Geologists (RCS), is pleased to present this Memorandum regarding a Tier 3 Water Availability Analysis for the Red Dirt Grapes property, which is located at 275 Long Ranch Road, in the vicinity of Pritchard Hill in Napa County. RCS prepared a document titled "Results of Napa County Tier 1 Water Availability Analysis, Red Dirt Grapes Vineyard Development Project, Napa County APNs 032-560-038 & 032-030-071, Vicinity Pritchard Hill, Napa County, California" dated March 17, 2022 (RCS, 2022). That document was submitted to the County as part of the review process for the proposed vineyard development project. Following Napa County review of the application, Napa County issued a letter dated June 1, 2022, titled "Application Review Determination, Red Dirt Grapes LLC., Vineyard Conversion, Agricultural Erosion Control Plan (ECPA) File # P22-00143-ECPA, Terminus of Long Ranch Road: APNs 032-030-071 & 032-560-03" (PBES, 2022). Therein, a Tier 3 WAA analysis was requested by the County. As quoted from the County's June 1, 2022, letter for the project submission:

"1.b. Water Availability Analysis (WAA): Because the project well is within 1,500 feet of a blue-line stream, provide an addendum or update to the project WAA (Richard C. Slade & Associates, March 2022) that includes a Tier 3 analysis or documentation that the Tire 3 screening criteria in the WAA Guidance Document can be met.

Therefore, the purpose of this document is to respond to the County PBES comment above, in accordance with the Napa County WAA guidelines (WAA, 2015).



Background

Figure 1, “Location Map” shows the subject property boundaries superimposed on the topographic map of the Yountville Quadrangle (USGS 1951). As shown thereon, three unnamed, dashed “blueline” intermittent streams are shown on the USGS basemap. These dashed “blueline” stream locations coincide with “blueline streams” shown in the Napa County “bluelines_public” GIS data layer (Napa County GIS, 2004); these are also plotted on Figure 1. Two of the dashed “blueline” streams are north of the project well (Well 1). These two dashed “blueline” streams merge just north of the property boundary, and join a channel that directs any runoff toward the northwest, in the direction of Lake Hennessy. The third dashed “blueline” stream is located to the southeast of the project well; its channel directs any runoff in the direction of the Rector Reservoir.

Figure 2, “Aerial Photograph Map”, shows an aerial photograph of the area and the same information as was shown Figure 1, but with the addition of an offsite reservoir location. During a site visit in February 2022, the project Civil Engineer, Mr. Mike Muelrath, observed this offsite reservoir (the reservoir is not owned by Red Dirt Vineyards and is not part of the Red Dirt Vineyards property). Based on the location of the reservoir shown on Figure 2, the “blueline” stream channel from the Napa County GIS data set may not be exactly located, as the reservoir should be within the stream channel. The reservoir was observed to be dry in February 2002, as was the intermittent “blueline” stream (see Figure 2). A second observation of this same “blueline” intermittent stream, but at a different location, was made just outside of the northwest subject property boundary. There, the project Engineer did observe water in the “blueline” channel, beneath the road crossing at that location. No observation was made in the southeast “blueline” intermittent channel, as access availability is unknown.

RCS is not aware of nor was RCS able to recover any information related to historic surface water flows in any of the three “blueline” intermittent streams shown on Figure 1. Anecdotal information from the project Civil Engineer and other property owners in the area suggest that flow in the “blueline” intermittent streams in the area occurs primarily during and immediately following rainfall events. The northeastern “blueline” channel shown on the Figures is reportedly spring-fed, and flows annually in the early part of the year, but ceases to flow in the summer months. The actual spring location that may feed this northeastern “blueline channel” is unknown, but is thought to exist on the property located to the west-northwest of the subject Red Dirt Grapes property. As shown on Figure 3, “Geologic Map” there are two reservoirs within the “blueline” intermittent stream channel on the neighboring property. The northeastern dashed “blueline” intermittent streamline derived from the County GIS data (Napa County GIS, 2004) begins at that furthest offsite, upstream reservoir. Hence, it is possible that any surface water flows in the “blueline” intermittent stream channel may be regulated by those upstream reservoirs.

Well Construction and Hydrogeology

As stated in the WAA report (RCS, 2022), Well 1 is the project well proposed to supply groundwater to the proposed vineyard development. The well has a deep cement sanitary seal set to a depth of 53 ft below ground surface (ft bgs), and two deep perforated intervals (from 476 ft to 556 ft bgs and 636 ft to 716 ft bgs). As described in the RCS WAA, the project Well (Well 1) is perforated solely within rocks of the Sonoma Volcanics. Figure 3, “Geology Map,” is the same



geology map shown in the RCS-prepared WAA (RCS, 2022), and it shows that the ground surface at and beneath the subject property and surrounding areas are comprised solely by the Sonoma Volcanics. Figure 3 has been updated with the “blueline” intermittent stream information from the County GIS files, and includes the location of the offsite reservoir described above.

In addition, Figure 3 shows the alignments of three geologic cross sections created by RCS for the purposes of this Tier 3 analysis. The cross sections are shown on Figures 3, 4, and 5, Cross Sections A-A’, B-B’, and C-C’, respectively. The cross section alignments were chosen to intersect the project well and one of the three “blueline” stream channels at the closest distance between the “blueline” channel and the project well. The cross sections are scaled drawings, and show the interpreted geologic conditions beneath the property and the construction of the project well. Each section is notated with the surface features that each cross section intercepts, including the intermittent “blueline” streams and property lines. Also shown on the cross sections is a water level depth measurement of 461.9 ft bgs previously collected in the project well, measured during a pumping test conducted in March 2017. This pumping test described in the RCS WAA (RCS, 2022). A March 2017 measurement was used because a more recent measurement attempt was unsuccessful, as described in the RCS WAA (RCS, 2022). Note that a 431-foot post-construction water level depth was reported on the driller’s log for Well 1 (RCS, 2022). Hence, the water level in the project well has been deeper than 400 ft since its construction in 2001.

Notable on the cross sections the depths of the perforated intervals in Well 1 in relation to ground surface. Perforations in the well begin at a depth of 476 ft bgs. Hence, groundwater pumped from the well will have originated from the fractures in the volcanic rock at and below that depth. Also, the well was constructed with a 53-foot deep cement sanitary seal. This seal prevents surficial water (if any) from entering the borehole.

Also important to note from the cross sections is the elevation of the water level in the well in relation to the elevations of the “blueline” intermittent stream channels. The water level from March 2017 in Well 1 is at an elevation that is several hundreds of feet below those in the “blueline” surface channels in question. The closest elevation difference between a water level and a blueline surface water channel is illustrated on cross section A-A’ (see Figure 4). As shown thereon, the static water level measured in March 2017 in Well 1 (the project well) was roughly 375 ft lower in elevation than the “blueline” intermittent stream channel located 740 ft northwest of the well. This significant elevation difference between the water level elevations in the project well and the surficial stream channels is significant evidence to support the assertion that the project well is not hydraulically connected to the “blueline” intermittent streams that surround the subject property.

Based on the data above, and as illustrated on the cross sections, Well 1 is not hydraulically connected to the “blueline” intermittent streams that surround the subject Red Dirt Grapes property. As shown on the Figure F-2 “Decision Tree” in the County’s WAA Guidance Document (WAA, 2015), and described in the Guidance Document text, because the project well is not hydraulically connected to surface water(s), the “Groundwater/Surface Water Evaluation is complete.”



Conclusions

- Well 1 (the project well) is not in direct hydraulic connection with the three USGS-defined (1951) “blue-line” intermittent stream channels shown on Figures 1, 2, and 3. This lack of connection is demonstrated by the following:
 - Well 1 has a deep cement seal (53 ft bgs) and perforated intervals that begin at a depth of 476 ft bgs. Hence, this well derives its groundwater solely from fractures within the Sonoma Volcanics.
 - The water level in the project well is currently and has always been at much lower elevations than the “blue-line” intermittent stream elevations that surround the subject property.
- Because a lack of hydraulic connection has been demonstrated, then according to the WAA Guidance document (WAA, 2015), the Tier 3 analysis has been satisfied.



References:

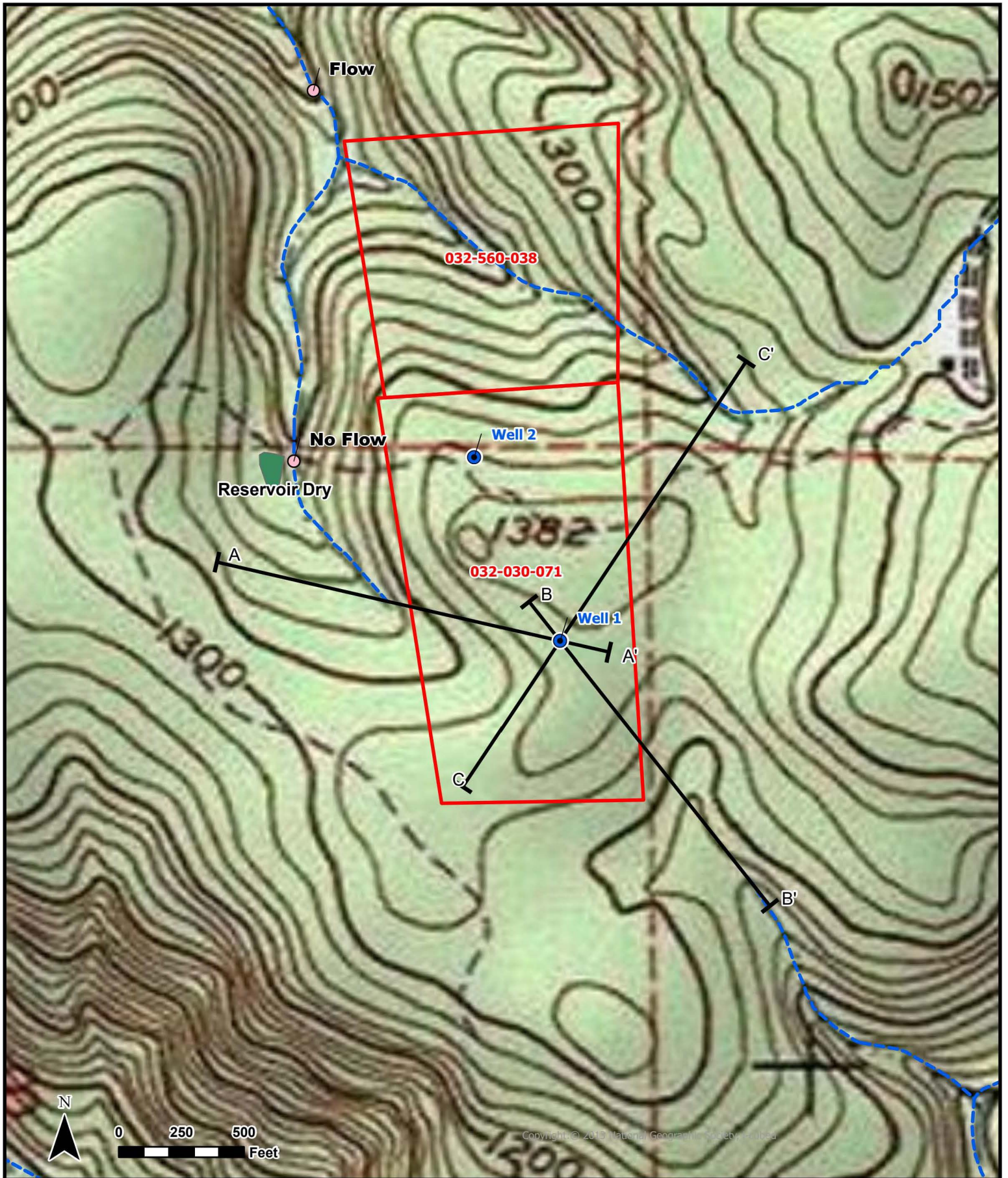
Napa County GIS Data, "Bluelines_public" data layer, Napa County GIS Data Catalog Website (http://gis.napa.ca.gov/qiscatalog/catalog_xml.asp), January 27, 2004

Napa County Board of Supervisors, "Water Availability Analysis (WAA) – Guidance Document." Adopted May 12, 2015

Napa County Planning, Building & Environmental Services (PBES), "Application Review Determination Red Dirt Grapes LLC., Vineyard Conversion Agricultural Erosion Control Plan (ECPA) File # P22-00143-ECPA Terminus of Long Ranch Road: APNs 032-030-071 & 032-560-03". June 1, 2022.

Richard C. Slade & Associates LLC (RCS), "Results of Napa County Tier 1 Water Availability Analysis, Red Dirt Grapes Vineyard Development Project, Napa County APNs 032-560-038 & 032-030-071, Vicinity Pritchard Hill, Napa County, California". March 17, 2022.

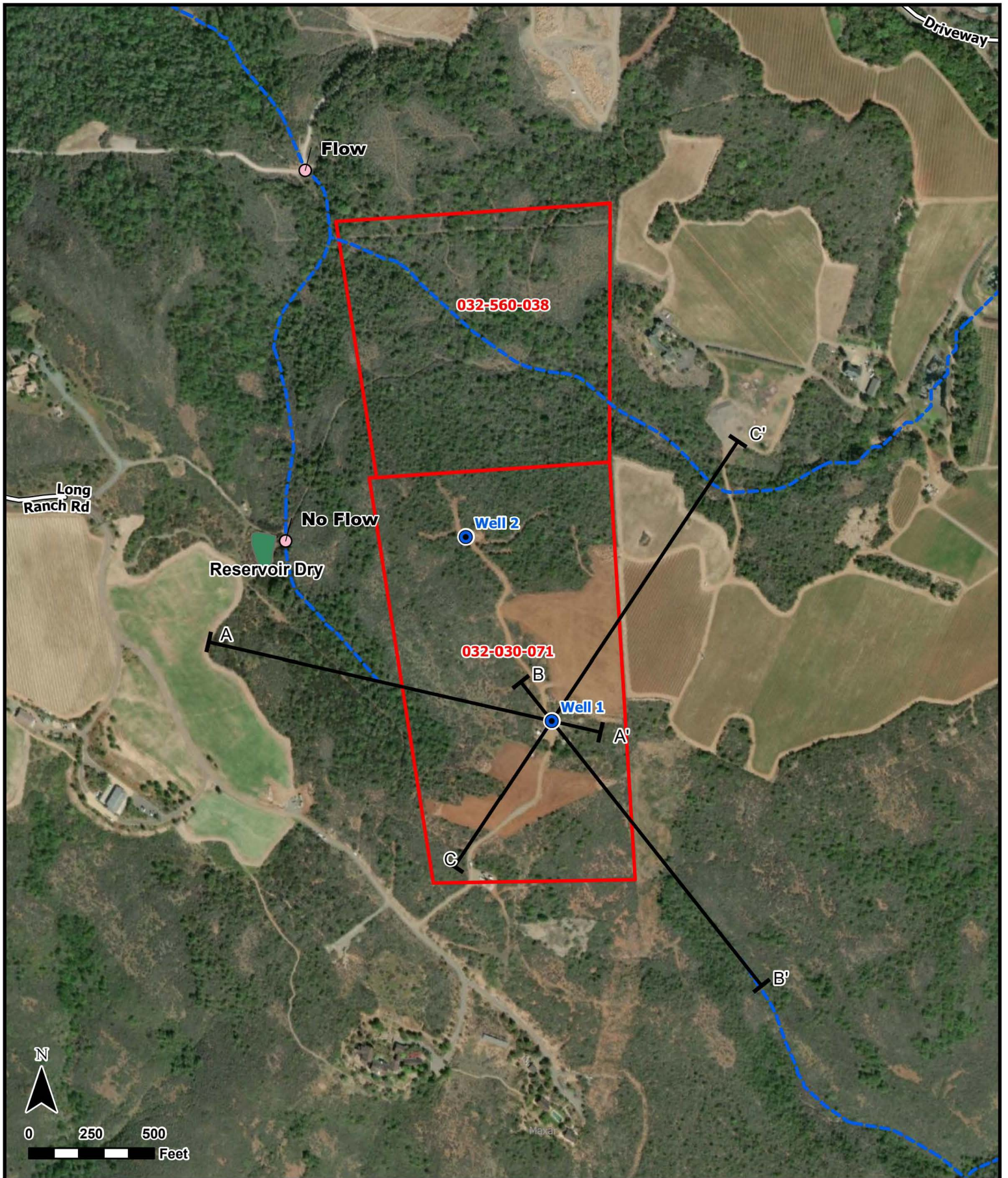
United States Geological Survey (USGS), 1:24000-scale Quadrangle for Yountville, CA. 1951:



- LEGEND**
- ▭ Subject Property (showing County APNs)
 - - - Napa County GIS Bluelines (2004)
 - Onsite Well (Approx.)
 - Observation Points (February 2022)
 - H** Cross Section



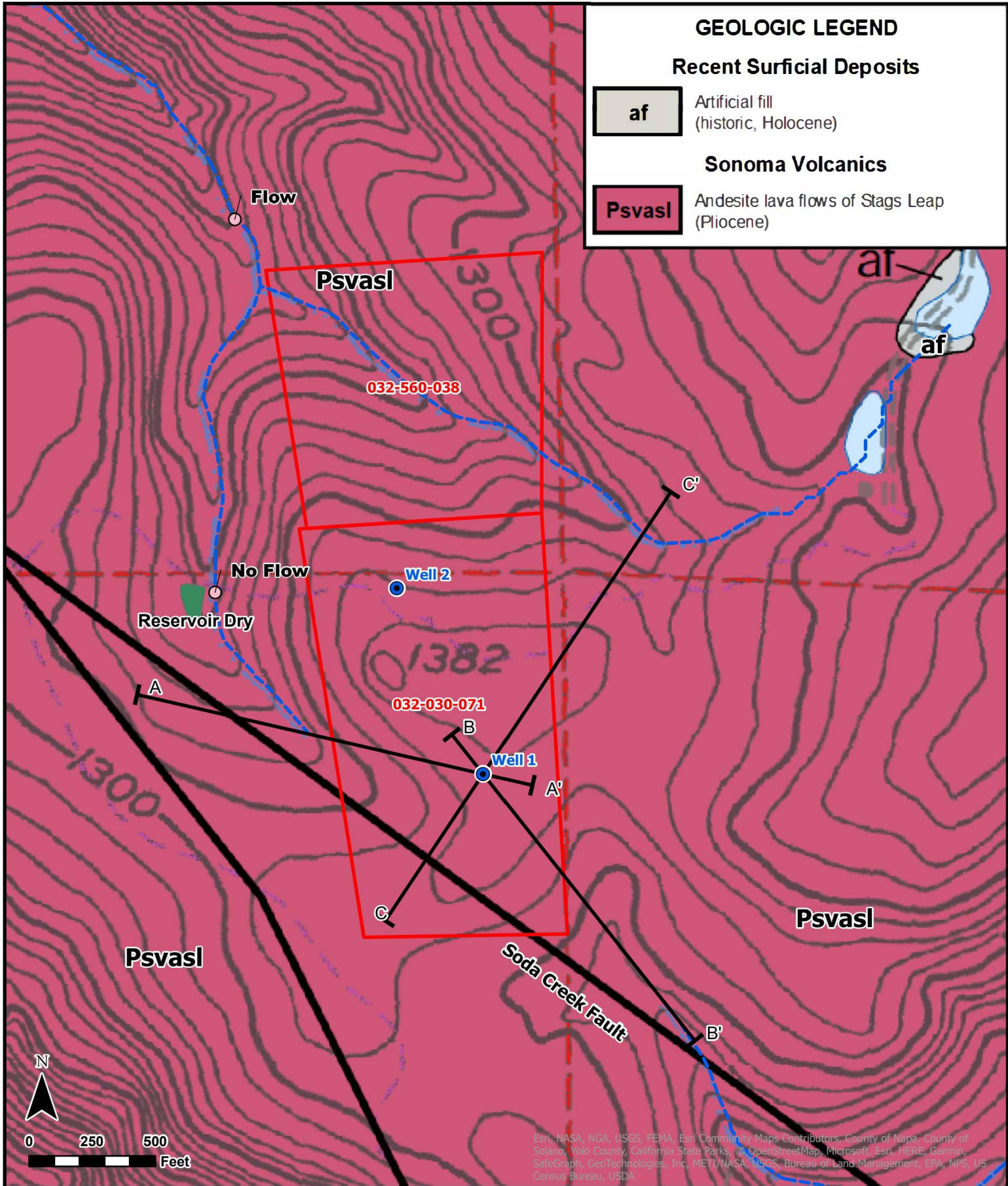
**FIGURE 1
LOCATION MAP**



- LEGEND**
- ▭ Subject Property (showing County APNs)
 - - - Napa County GIS Bluelines (2004)
 - Onsite Well (Approx.)
 - Observation Points (February 2022)
 - H** Cross Section



**FIGURE 2
AERIAL PHOTOGRAPH
MAP**



GEOLOGIC LEGEND

Recent Surficial Deposits

af Artificial fill
(historic, Holocene)

Sonoma Volcanics

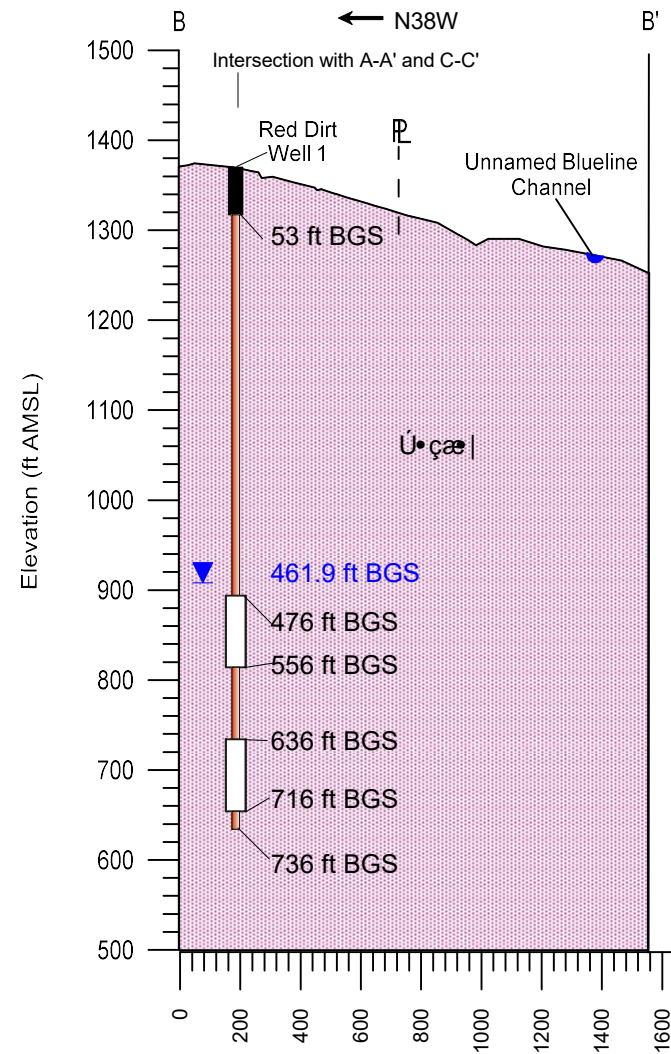
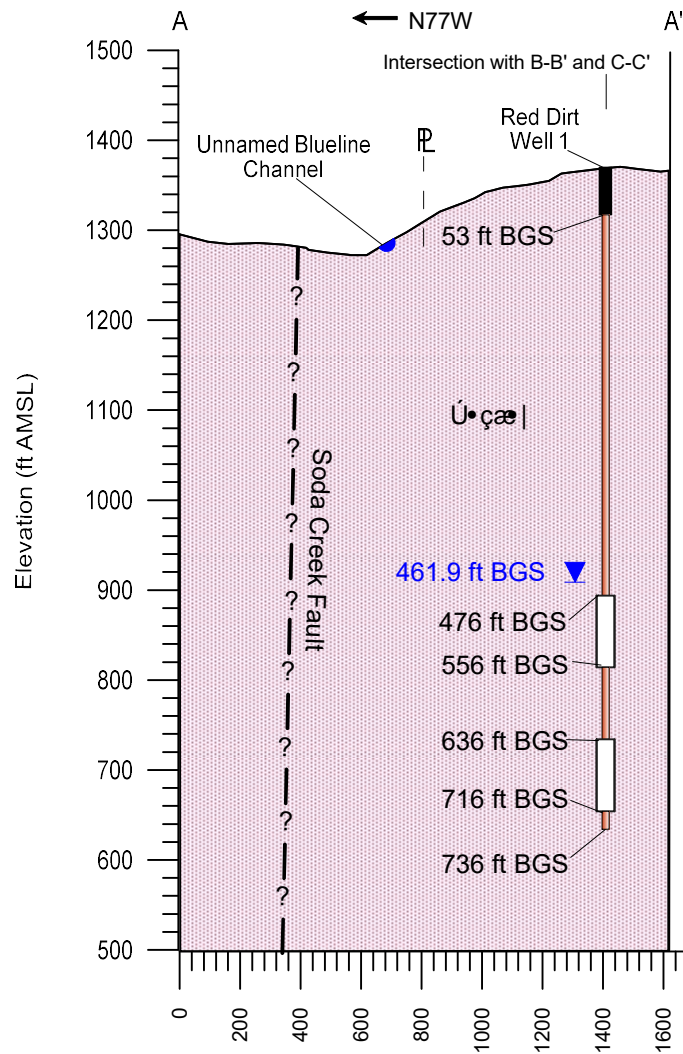
Psvasl Andesite lava flows of Stags Leap
(Pliocene)

- LEGEND**
- Subject Property (showing County APNs)
 - Napa County GIS Bluelines (2004)
 - Onsite Well (Approx.)
 - Observation Points (February 2022)
 - H** Cross Section



**FIGURE 3
GEOLOGIC MAP**

Esri, NASA, NGA, USGS, FEMA, Esri Community Maps Contributors, County of Napa, County of Solano, Yolo County, California State Parks, © OpenStreetMap, Microsoft, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, US Census Bureau, USDA



Vertical Exaggeration = 3x

Distance (Feet)

Distance (Feet)

ft BGS = Feet Below Ground Surface

See location of section line on Figures 1-3

ft AMSL = Feet Above Mean Sea Level

LEGEND





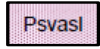
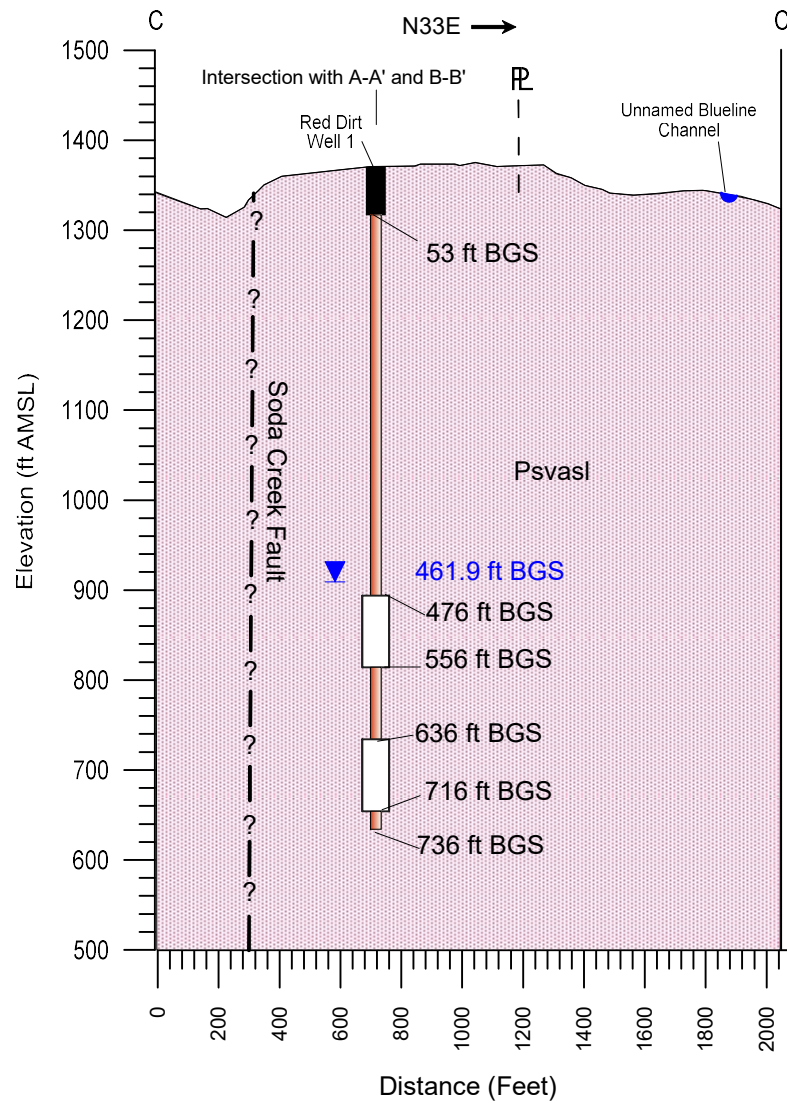
-  Cement Seal
-  Blank Casing
-  Perforated Interval
-  Static Water Level (March 2017)
-  Psvasl Andesite Lava Flows of Stags Leap (Pliocene)



FIGURE 4 CROSS SECTIONS AA' AND BB'



Vertical Exaggeration = 3x

See location of section line on Figures 1-3

ft BGS = Feet Below Ground Surface
ft AMSL = Feet Above Mean Sea Level

LEGEND

- Cement Seal
- Blank Casing
- Perforated Interval
- ▼ Static Water Level (March 2017)
- Psvasl Andesite Lava Flows of Stags Leap (Pliocene)



FIGURE 5 CROSS SECTION CC'