



DRAFT
ADDENDUM MEMORANDUM

November 30, 2022

To: Mr. Austin Peterson
3496 Soda Canyon Road
Sent via email (a.peterson100@gmail.com)

Cc: Jim Bushey and Annalee Sanborn
PPI Engineering, Inc. (PPI)
Sent via email (jbushey@ppiengineering.com);
(asanborn@ppiengineering.com)

Job No. 603-NPA03

Re: Addendum Memorandum
Preparation of Napa County Tier 3 Water Availability Analysis (WAA)
Peterson Vineyard Development Project
Napa County APN 032-500-025
3496 Soda Canyon Road
Soda Canyon Area, Napa County, California

Dear Mr. Peterson:

Richard C. Slade & Associates LLC, Consulting Groundwater Geologists (RCS), is pleased to present this Addendum Memorandum regarding a Tier 3 Water Availability Analysis for the Peterson property, which is located at 3496 Soda Canyon Road, in the Soda Canyon area of Napa County (the subject property). RCS previously prepared a document titled "Results of Napa County Tier 1 Water Availability Analysis, Peterson Vineyard Development Project, 3496 Soda Canyon Road, Soda Canyon Area, Napa County, California" dated January 26, 2022 (RCS, 2022). That document was submitted to the County as part of the County-review process for the proposed vineyard development project. Following Napa County review of the application, Napa County Planning, Building & Environmental Services (PBES) issued a letter dated September 23, 2022, subject titled "Application Completeness Determination - Peterson Track I Vineyard" (PBES, 2022). As quoted from the County's September 23, 2022 email for the project submission:

"Please provide a Tier II and Tier III WAA. The project is subject to a Tier II (potentially) and III analysis (required due to being located within 1500' of a country identified Significant Stream...There is an identified significant stream within 1500' of the project well. As such, a Tier III analysis is required"

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



**DRAFT
ADDENDUM MEMORANDUM**

Background

RCS prepared the document “Results of Napa County Tier 1 Water Availability Analysis, Peterson Vineyard Development Project, 3496 Soda Canyon Road, Soda Canyon Area, Napa County, California” dated January 26, 2022 (RCS, 2022) for the project. That initial WAA document included significant details regarding the subject property, including descriptions of the local geology and hydrogeology, well construction, precipitation, groundwater recharge, and other factors. This Addendum Memorandum document is prepared to complement that initial Tier 1 WAA (RCS, 2022).

As stated on page 2 of the Tier 1 WAA by RCS, “because there are no known offsite wells located within 500 ft of the active onsite well... a “Tier 2” WAA has been presumptively met.” No Tier 2 WAA is required for the project according to the County’s WAA Guidelines document (Napa County, 2015).

Recently, Napa County has published information defining which Rivers, Streams, and Creeks within the County are considered “significant” for the purposes of future Tier 3 Analysis. These “Significant Streams,” as defined by Napa County, are shown on a recently published and undated map and GIS data set titled “Napa County Well Permit Standards: Significant Streams” (Napa County, 2022). According to the County’s WAA Guidelines (Napa County, 2015), if a project well is within 1,500 ft of a Significant Stream, Creek, or River, a Tier 3 WAA is required. As noted in the “Application Completeness Determination - Peterson Track I Vineyard” email from Napa County PBES, the project well lies within 1,500 ft of Rector Creek, and thus the project requires a Tier 3 analysis.

Figure 1, “Location Map”, shows the subject property boundaries superimposed on a topographic map of the Yountville Quadrangle (USGS, 1951). The main stem of Rector Creek is seen to be located ~875 feet south of the project well (the Active Onsite Well). Any runoff in Rector Creek flows west, toward Rector Reservoir, which lies ~3 miles west of the subject property. Figure 2, “Aerial Photograph Map”, shows an aerial photograph of the area and most of the same information that is shown on Figure 1, but is presented at a larger scale to provide more details for the area immediately surrounding the subject property.

Flow Observations in Rector Creek (Upstream of Rector Reservoir)

As seen on Figure 1, Rector Creek is shown on the USGS base map as a dashed line, denoting an “intermittent stream”, meaning that the creek is not known to flow year round (i.e., it is not a perennial stream). Instead, the creek likely flows only during or immediately after periods of precipitation in the region (typically the winter and perhaps early spring months). During the later spring and summer months, Rector Creek in the vicinity of the subject property is very likely dry. Recall that the proposed project is a vineyard development project, and groundwater extraction will occur only during an approximate 20 week irrigation period between May and October of each year.



DRAFT
ADDENDUM MEMORANDUM

RCS was able to recover only limited information related to historic surface water flow or to prior stream surveys by others in the portion of Rector Creek upstream of Rector Reservoir.

In a document titled “Central Napa River Watershed Project, Salmonid Habitat Form and Function” (NCRCD, 2005), stream fish surveys were performed in 1985 and 1988 in the portion of Rector Creek upstream of Rector Reservoir. Those surveys were conducted along a segment of the creek 300 meters (~1000 ft) and 600 meters (~2000 ft) upstream of the Reservoir, far from the subject property which is located ~3 miles (~15,800 ft) upstream of Rector Reservoir. That document does not state whether or not flow in Rector Creek stopped at the end of the survey point, but RCS speculates that a lack of flow in Rector Creek further east of those points was likely the cause for termination of the survey. No other data related to stream flow were available in this report.

In Section 6, “Groundwater and Surface Water Conditions”, of the Napa Valley Subbasin Groundwater Sustainability Plan (LSCE, 2022), a discussion of the hydraulic connection of groundwater and creeks within the County, as simulated by computer modeling, is presented. Figure 6-123b shows the “average annual hydraulic connection” of creeks in the Napa subbasin and nearby surrounding creeks, including Rector Creek (LSCE, 2022). On that Figure, the portion of Rector Creek upstream of Rector Reservoir is not shown to have hydraulic connection to groundwater during any part of the year. It is also noteworthy that Figure 6-96 in the Groundwater Sustainability Plan (LSCE, 2022) also shows the portion of Rector Creek nearest the subject property as “intermittent”, consistent with the dashed-line mapping by the USGS (1951) that is shown on Figure 1.

Another attempt to determine historic surface flow in Rector Creek (upstream of Rector Reservoir) was completed by reviewing historic aerial photographs of the property available from the Google Earth software package (Google Earth Pro, 2022). Observations were made in the area around where Rector Creek crosses Soda Canyon Road, nearest the subject property (see Figure 1 and Figure 2 for the general location of the Google Earth observations). The Google Earth imagery is of a resolution that does not allow for definitive determination of surface flow in the Creek, but review of the images can suggest a qualitative lack of flow.

Observations of a “no flow” condition were made using Google Earth aerial imagery on the following dates:

October 21, 2020	May 20, 2017	August 23, 2014
September 1, 2018	August 1, 2016	May 26, 2014
February 5, 2018	April 1, 2015	June 1, 2013

An in-person observation of a possible creek flow condition was made by an RCS geologist on September 16, 2021, at the intersection of Rector Creek and Soda Canyon Road, near the subject property. The creek was observed to be dry by the RCS geologist on that date, and this observation location is shown on Figure 2.



**DRAFT
ADDENDUM MEMORANDUM**

Data reviewed with respect to streamflow described above help to confirm that flows in Rector Creek in the vicinity of the subject property are indeed intermittent, and that flow generally does not frequently occur in the vicinity of the subject property, especially during the summer months.

Well Construction and Hydrogeology

As stated in the WAA report (RCS, 2022), the Active Onsite Well is the project well proposed to supply groundwater to the proposed vineyard development. A DWR driller's log is available for the Active Onsite Well (listed as WCR No. e0290728) and a copy of this log is available as an attachment to the original RCS WAA (2022). Driller's logs were not recovered for either of the two inactive wells on the property from any of the online data sources reviewed by RCS. As described in the RCS WAA (2022), key data for the Active Onsite Well includes:

- a. This well was drilled and constructed in August 2015 by McLean & Williams, Inc. (M&W) of Napa, California using the direct air rotary drilling method.
- b. The pilot hole depth (the initial borehole drilled before the well casing was placed downhole) was reported to be 435 ft below ground surface (bgs).
- c. The Onsite Well was cased to a total depth of 420 ft bgs with polyvinyl chloride (PVC) well casing having a nominal diameter of 6 inches.
- d. Casing perforations in the Onsite Well are machine-cut slots and have slot opening widths of 0.032 inches (32-slot). Casing perforations in the onsite well were reportedly placed between the depths of: 100 ft and 120 ft bgs; 140 ft and 160 ft bgs; 200 ft and 280 ft bgs; 300 ft and 380 ft bgs; and 400 ft and 420 ft bgs.
- e. The gravel pack material listed on the driller's log is described as "pea gravel" and was emplaced from 62 ft to 420 ft bgs; a 5-foot long bentonite seal was emplaced on top of the gravel pack from 57 ft to 62 ft bgs.
- f. The well was reportedly constructed with a sanitary seal consisting of cement (grout) to a depth of 57 ft bgs.

As stated in the WAA report (RCS, 2022), an initial static water level (SWL) following completion of the Active Onsite Well was reported to be 172 ft bgs on September 3, 2015 (as shown on the WCR). During a site visit on September 16, 2021, a SWL was measured by the RCS geologist to be 171.95 ft bgs. Therefore, the current water level in the well is roughly the same as the post-well construction water level.

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 the subject property and surrounding areas is comprised solely by the Sonoma Volcanics (specifically, unit Tvasl, andesite flows and flow breccias of Stags Leap). The Active Onsite Well (the project well) was drilled into a ground surface exposure of rocks of the Sonoma Volcanics. Based on subsurface data reviewed in the RCS WAA (2022), on the map patterns shown on Figure 3, and on the approximate thicknesses of the Sonoma Volcanics rocks in the region, the perforated intervals in the Active Onsite Well are considered to exist solely within rocks of the Sonoma Volcanics. No unconsolidated, alluvial-type

DRAFT
ADDENDUM MEMORANDUM

geologic materials are shown to exist at or directly beneath the subject property, or beneath Rector Creek in the vicinity of the property (see Figure 3).

Figure 3 also shows the alignment of a geologic cross section created by RCS for the purposes of this Tier 3 analysis. The alignment of the cross section was chosen such that it intersected both the project well and the channel of Rector Creek, along the shortest straight-line distance between Rector Creek and the project well. The geologic cross section is shown on Figure 4, “Cross Section A-A”. The cross section is a scaled schematic illustration that shows the interpreted geologic conditions at and beneath the property; the construction of the project well (the Active Onsite Well); and the projected location and well construction details for the well. Figure 4 is notated with the surface features that the cross section intercepts, including Rector Creek and the subject property boundaries.

Rector Creek exists as a “disconnected stream” in the vicinity of the subject property. USGS Circular 1376 (Barlow, 2012) is a document that describes a number of varied geologic conditions in which groundwater and surface water interaction occurs (a situation in which the water table is in direct contact with the surface water in a stream or river). A majority of that USGS document focuses on “connected systems” in alluvial-type aquifers. Rector Creek does not exist in an alluvial aquifer in the vicinity of the subject property as clearly seen on Figure 3 herein, and is not connected to groundwater. Further, as stated on page 11 therein, “Unless otherwise stated, two important assumptions are made throughout this discussion – first, that the stream and underlying aquifer remain hydraulically connected by a continuous saturated zone, and second, that the stream does not become dry” (Barlow, 2012). As described above, observations by RCS and data derived from other sources confirm that Rector Creek becomes dry during portions of the year. Further, water level data from the Active Onsite Well suggest a significant distance (and therefore a significant unsaturated zone) between the bottom of Rector Creek and the groundwater level in the well. Based on the criteria listed above, Rector Creek is a “disconnected stream” (Barlow, 2012).

Figure 4 illustrates the fact that the upper portions of the volcanics rocks beneath Rector Creek are not saturated, and illustrates a lack of connection between groundwater accessible to the project well and surface water in the vicinity of the subject property. Shown on the cross section is the water level depth measurement described above, as measured by RCS geologists during the September 16, 2021 site visit (at a depth of approximately 172 ft bgs). This water level is essentially the same as the water level measured in the well by the driller following its construction in 2015. As illustrated on Figure 4, the elevation of the SWL measured in the Active Onsite Well (the project well) is was at an elevation 122 ft below the bottom of Rector Creek. Hence, surface water in Rector Creek, if any, cannot be in direct contact with the groundwater accessed by the Active Onsite Well, and the Active Onsite Well is not in direct hydraulic communication with Rector Creek. If the volcanic rocks directly beneath Rector Creek were saturated and in contact with groundwater, then the water level in the Active Onsite Well would likely be roughly equal to the elevation of the water in Rector Creek. Further, Figure 4 illustrates the fact the uppermost perforated interval in the Active onsite well is at an elevation roughly 50 ft deeper than the bottom of Rector Creek, and the SWL in the well is below that upper interval, further supporting the assertion that the volcanic rocks shallower than the current SWL in the well are unsaturated.



DRAFT
ADDENDUM MEMORANDUM

Based on the data presented above, any presence of surface water in Rector Creek is unconnected and independent of water levels in the Active Onsite Well. These observations strongly support the assertion that the project well is not hydraulically connected to Rector Creek. 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

- As stated in the Tier WAA (RCS, 2022), the Active Onsite Well (the project well) is not located within 500 ft of any known offsite well. Therefore, according to Napa County's WAA Guidelines document (Napa County, 2015) a Tier 2 WAA has been presumptively met." No Tier 2 WAA is required for the project
- The Active Onsite Well (the project well) is not hydraulically connected with Rector Creek. This lack of connection is demonstrated by the following:

- Rector Creek meets the description of a "disconnected stream" per USGS Circular 1376 (Barlow, 2012), and therefore flow in Rector Creek, if any, is not in direct contact with the groundwater table in the area.
- Static water levels measured in the project well in 2015 and 2021 were essentially the same and both are significantly lower than the bed elevation of Rector Creek (see Figure 4). The significant differences in elevation between water levels in the project well and the bed elevation of Rector Creek confirm a hydraulic connection between the Active Onsite water wells and Rector Creek does not exist in the vicinity of the subject property.

The uppermost perforations in the Active Onsite Well are shallower than the water level in the well, suggesting the volcanic rocks above the current static water level are unsaturated.

- Rector Creek was observed to be dry in September 2021 by an RCS geologist. Additional qualitative observations derived from Google Earth airphoto review suggest that Rector Creek is typically dry during a portion of the year in the vicinity of the subject property. This confirms the "intermittent" designation of the Creek by the USGS (1951). It is therefore likely that surficial flow in the portion of Rector Creek near the subject property and within 1,500 ft of the project well is strictly dependent upon rainfall events, and flow in Rector Creek is an ephemeral creek and not connected to groundwater in the vicinity of the subject property.
- According to the WAA Guidance document (WAA, 2015), the Tier 3 analysis has been satisfied because a lack of hydraulic connection to groundwater for Rector Creek has been demonstrated.



DRAFT
ADDENDUM MEMORANDUM

References:

Barlow, P.M., and Leake, S.A., 2012. "Streamflow depletion by wells—Understanding and managing the effects of groundwater pumping on streamflow": U.S. Geological Survey Circular 1376, 84 p.

Google Earth Pro, Keyhole, Inc. ([Earth Versions – Google Earth](#)), May 22, 2022.

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

Napa County GIS Data, "Significant_Streams_1500ft_Buffer" data layer, ARC GIS Online Data Catalog (<https://www.arcgis.com/home/item.html?id=8f3927797b6f490c89a8b07778dfed6f>), July 6, 2022.

Napa County GIS Data, "Significant_Streams" data layer, ARC GIS Online Data Catalog (<https://www.arcgis.com/home/item.html?id=3e3a0f5a59f147e1ae99723f8420f096>), July 27, 2022.

Napa County Groundwater Sustainability Website (<https://www.countyofnapa.org/3074/Groundwater-Sustainability>), "Figure 1, Napa County Well Permit Standards: Significant Streams", undated.
(<https://www.countyofnapa.org/DocumentCenter/View/25902/Figure-1-Significant-Streams-for-Tier-3>)

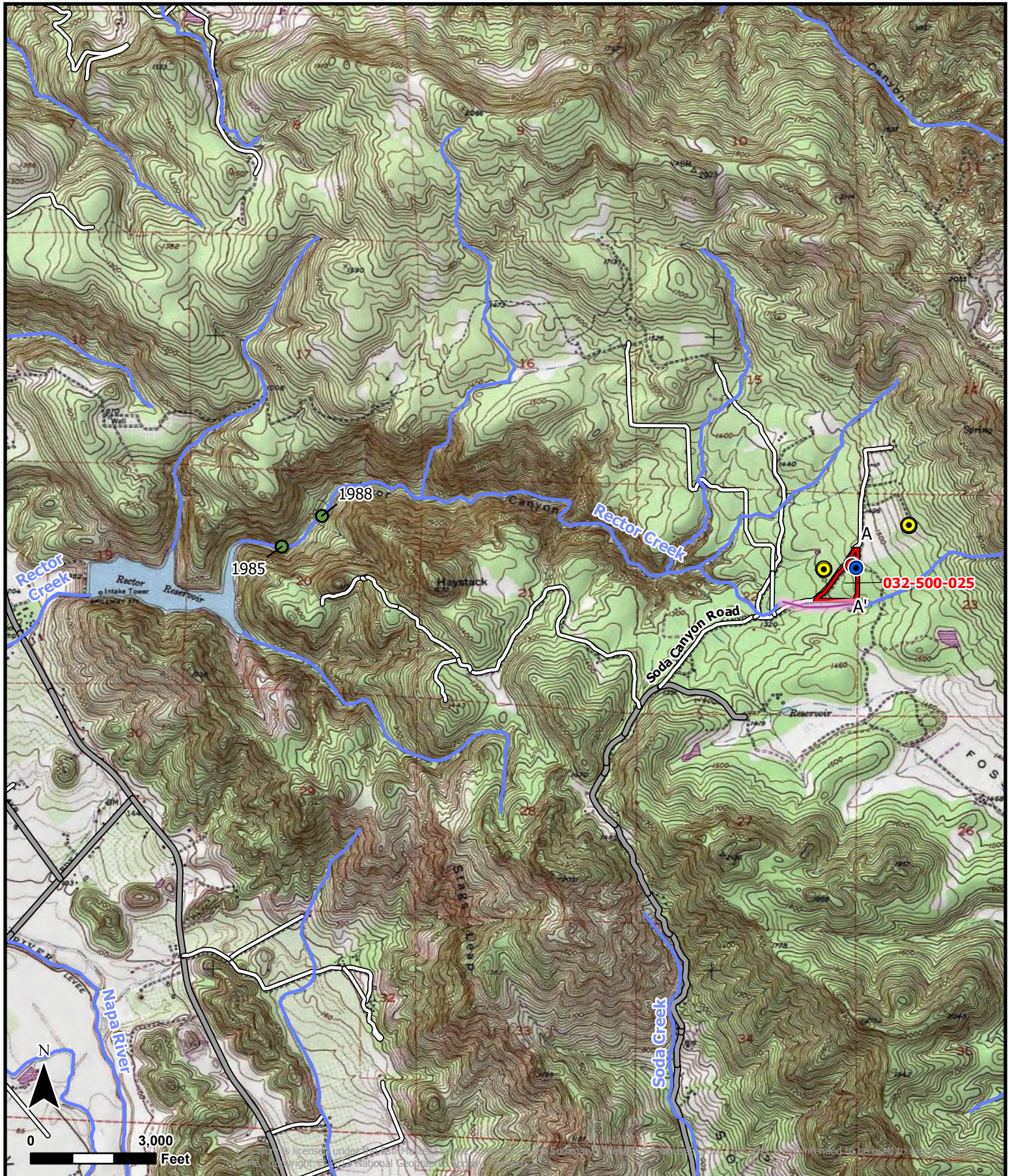
Napa County Planning, Building & Environmental Services (PBES), 2022. Letter titled "Application Completeness Determination - Peterson Track I Vineyard ". September 23, 2022.

Napa County Resource Conservation District (NCRCD), 2005. "Central Napa River Watershed Project", Prepared for the U.S. Department of Fish and Game. October 5, 2005.

Napa County "Section 6. Groundwater and Surface Water Conditions, Napa Valley Subbasin, Groundwater Sustainability Plan"
(https://www.countyofnapa.org/DocumentCenter/View/20279/GSP_Section-6_Groundwater-and-Surface-Water-Conditions?bidId=) January, 2022.

Richard C. Slade & Associates LLC (RCS), 2021. "Results of Napa County Tier 1 Water Availability Analysis, Peterson Vineyard Development Project, 3496 Soda Canyon Road, Soda Canyon Area, Napa County, California ". January 26, 2022.

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



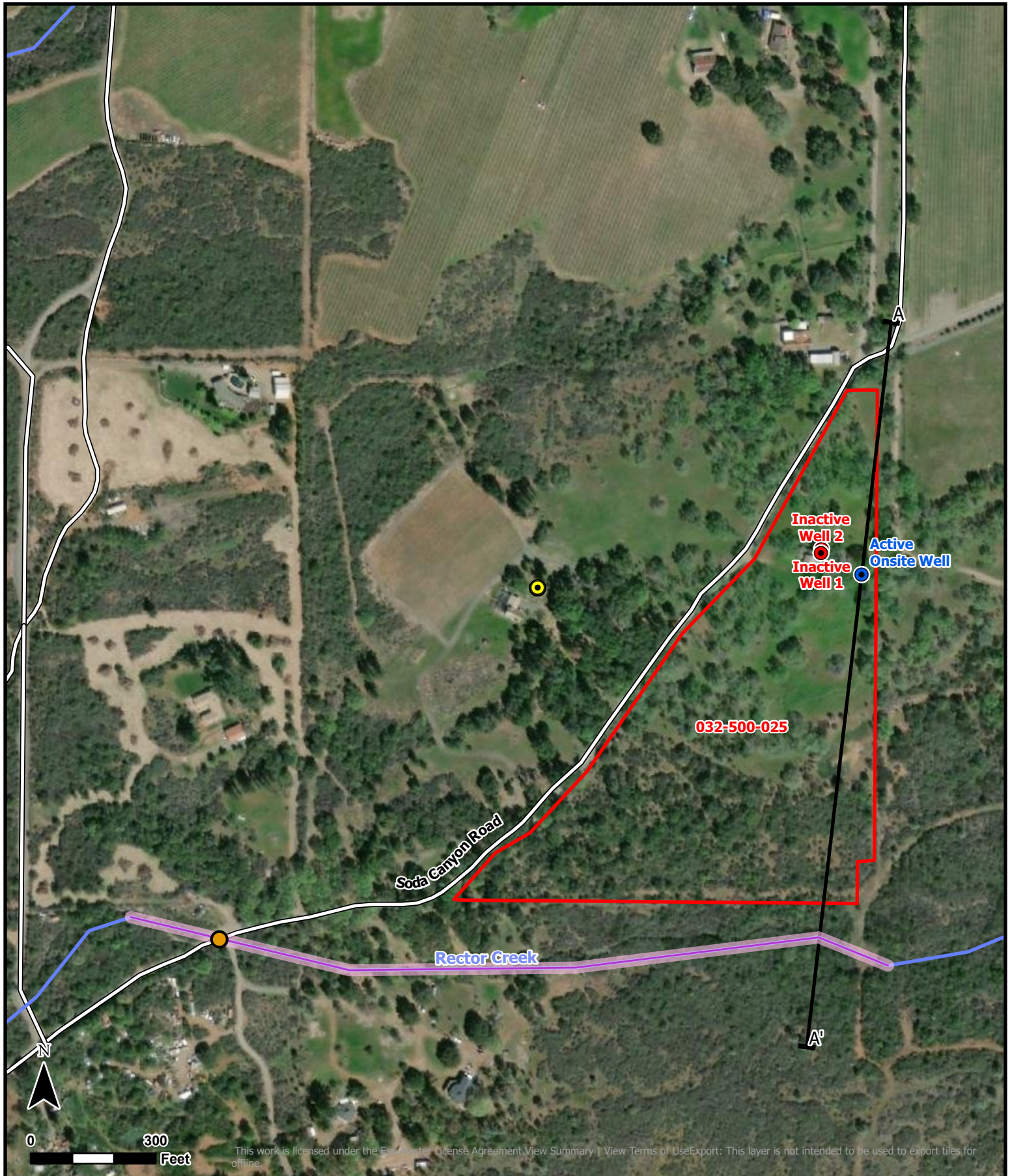
LEGEND

- Active Onsite Well (Approx.)
- Two Inactive Onsite Wells (Approx.)
- Offsite Well (Approx.)
- Significant Stream (Napa County, 2022)
- Subject Property (showing County APN)
- Approximate Limit and Date of NCRCD (2005) Survey
- Approximate Area of Google Earth Observation



**Figure 1
Location Map**

DRAFT



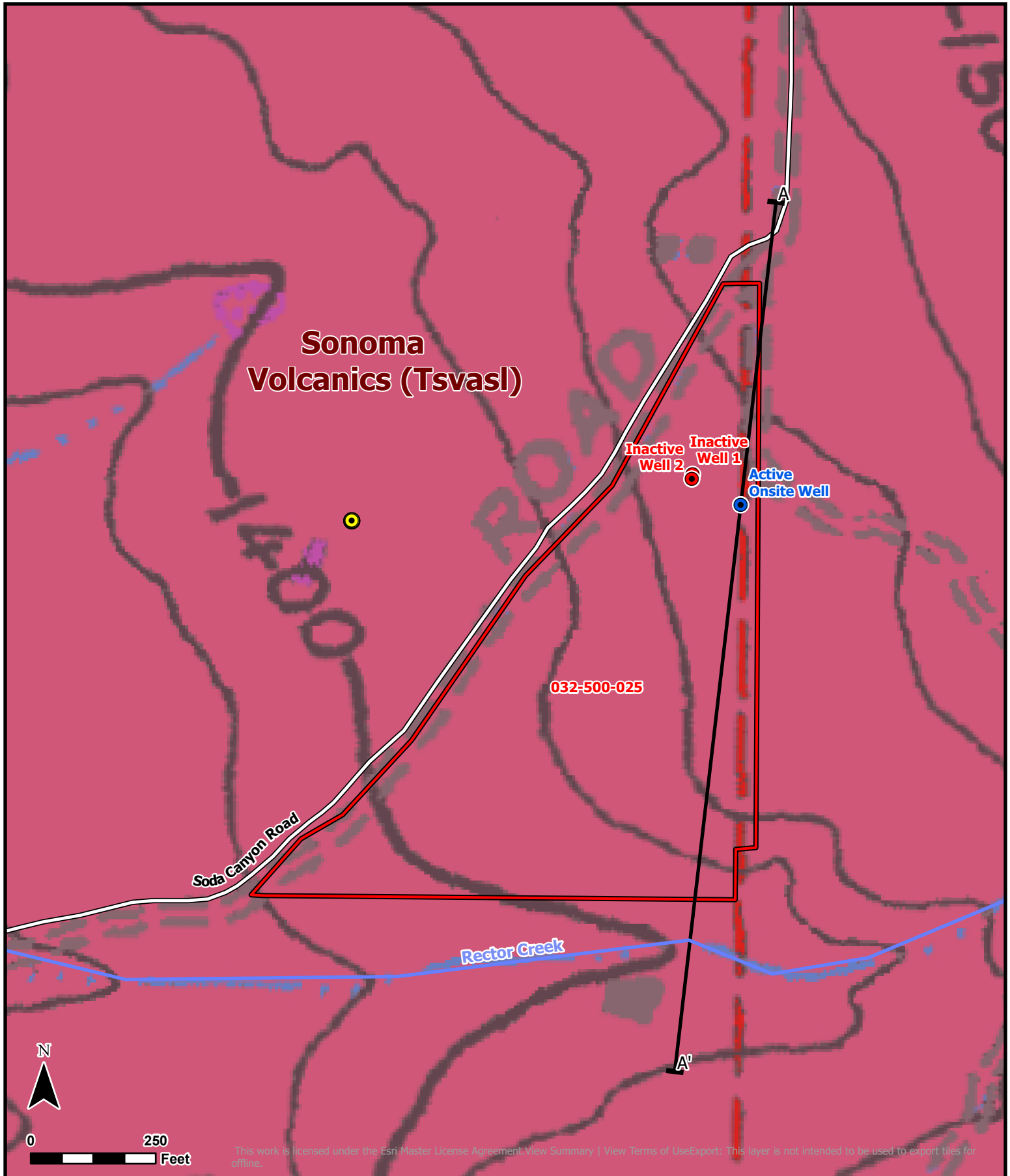
LEGEND

- Active Onsite Well (Approx.)
- Inactive Onsite Well (Approx.)
- Offsite Well (Approx.)
- Significant Stream (Napa County, 2022)
- Subject Property (showing County APN)
- Cross Section Line
- RCS Dry Creek Observation Point (Sept. 2021)
- Approximate Area of Google Earth Observation



DRAFT

**Figure 2
Aerial Photograph Map**



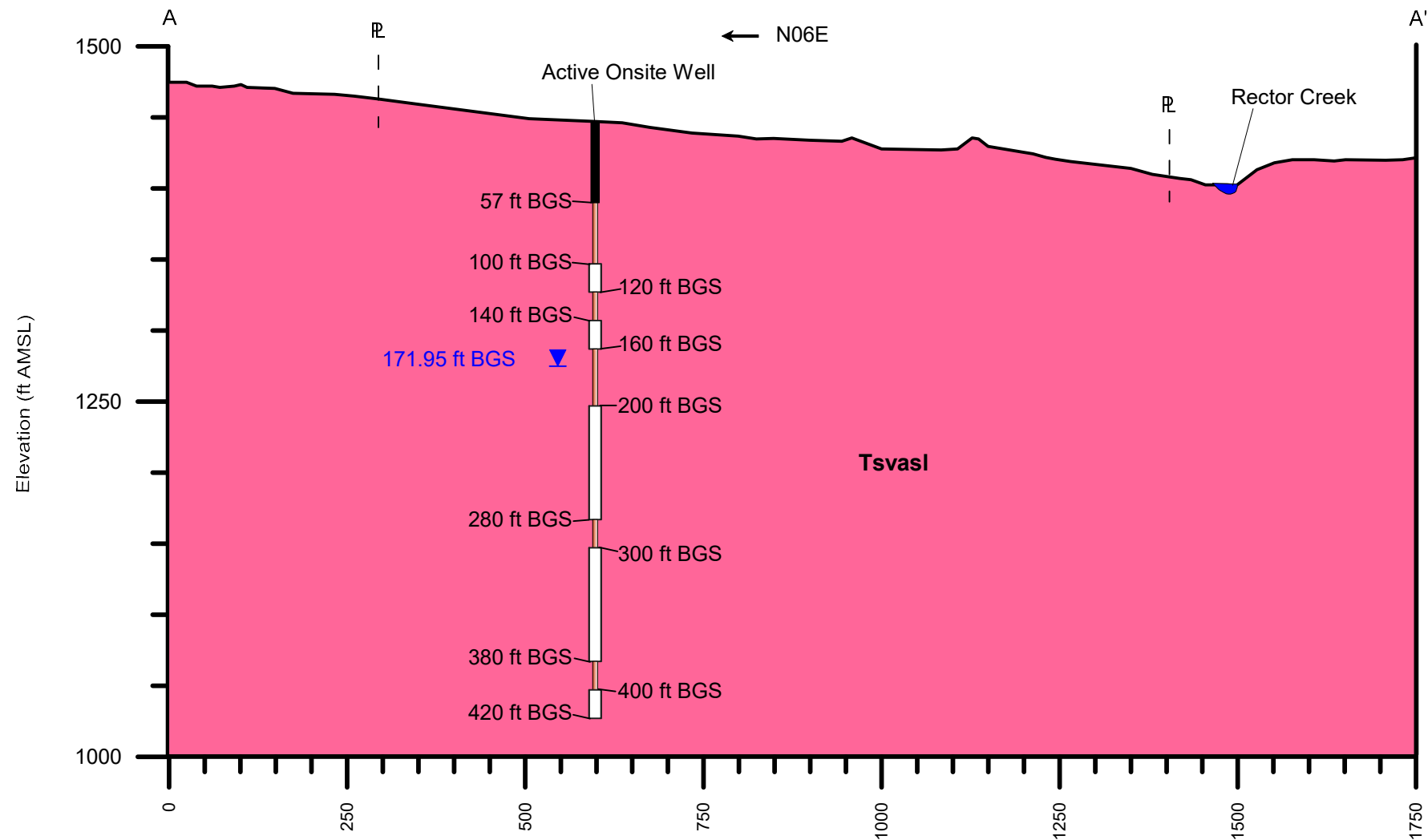
LEGEND

- Active Onsite Well (Approx.)
- Inactive Onsite Well (Approx.)
- Offsite Well (Approx.)
- Subject Property (showing County APN)
- Significant Stream (Napa County, 2022)
- Cross Section Line



**Figure 3
Geology Map**

DRAFT



ft BGS = Feet Below Ground Surface

See location of section line on Figures 2-3

ft AMSL = Feet Above Mean Sea Level

Vertical Exaggeration = 2x

LEGEND

- Cement Seal
- Blank Casing
- Perforated Interval

- Tsvasí Andesite flows and flow breccias of Stags Leap
- Static Water Level by RCS (September 2021)



FIGURE 4
CROSS SECTION A-A'