NAPA VALLEY GROUNDWATER SUSTAINABILITY

A Basin Analysis Report for the Napa Valley Subbasin

APPENDICES E - M

Part 2 of 2

Prepared by

LUHDORFF & SCALMANINI CONSULTING ENGINEERS

December 13, 2016

NAPA VALLEY GROUNDWATER SUSTAINABILITY:

A BASIN ANALYSIS REPORT FOR THE NAPA VALLEY SUBBASIN

APPENDIX E:

Napa County Groundwater-Surface Water Monitoring Facilities Project Report

Napa County
Groundwater/Surface Water Monitoring Facilities Report

California Department of Water Resources Local Groundwater Assistance Grant Program

October, 2016

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

Napa County Groundwater-Surface Water Monitoring Facilities Project Report

Prepared for
Napa County

Prepared by

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

October, 2016

TABLE OF CONTENTS

APPENDICES

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS AND ACRONYMS

bgs	below ground surface
°C	degrees Celsius
cfs	cubic feet per second
ft	feet
meq/l	milliequivalents per liter
mg/l	milligrams per liter
µS/cm	microSiemens per centimeter
DWR	California Department of Water Resources
MCL	Maximum Contaminant Limit
NAD83	North American Datum of 1983
Napa RCD	Napa County Resource Conservation District
NAVD88	North American Vertical Datum of 1988
TOC	Top of Casing
USGS	U.S. Geological Survey
WCR	Well Completion Report
WICC	Watershed Information & Conservation Council of Napa County

EXECUTIVE SUMMARY

In January of 2014 the County of Napa began implementation of a project to monitor interactions between groundwater and surface water resources in the Napa Valley Groundwater Subbasin. Funding for the project was provided by the California Department of Water Resources (DWR), through the Local Groundwater Assistance Grant Program, and the County of Napa. The project scope included monitoring facilities construction, data collection, and presentation of the results of initial data collection efforts.

Work completed for the grant took place from the first quarter of 2014 through the second quarter of 2016 and included the construction of five dual-completion monitoring wells adjacent to the Napa River and Dry Creek in the Napa Valley Groundwater Subbasin (**Figure 1.1**). Prior to construction of the monitoring facilities, hydrologic and geologic data were compiled and evaluated for each site in order to inform the monitoring well design. Monitoring well construction and development occurred in September and October of 2014. Data collection at the sites began in October of 2014 with manual groundwater level measurements followed by the installation of continuously recording transducers in December 2014 through July 2015.

Data were regularly downloaded from project transducers in 2015 and 2016, with transducers re-calibrated and serviced as needed. Project data were reviewed for quality control purposes and incorporated into an existing Napa County Data Management System. Data analysis occurred as the data were collected to track groundwater-surface water interactions and at the end of the grant period to more fully consider the data collected over the course of the project, through June 2016. Project outreach occurred through a variety of means, including presentations to the Napa County Watershed Information & Conservation Council (WICC), presentations to community groups around Napa Valley, and a field tour organized by the Sacramento-based Water Education Foundation.

The construction of dedicated monitoring facilities to track groundwater-surface water interactions in the Napa Valley Subbasin provides the County with an important source of data about these interconnected resources. Data collected in 2015 and 2016 show that shallow groundwater and surface waters were hydraulically connected throughout much of the winter and spring at the mainstem Napa River sites, and longer in some locations. The direction of flow indicated by monitoring data varied between gain stream (flow of groundwater into surface water) and losing stream (flow of surface water into the groundwater system) at most sites. The only site located on a tributary to the Napa River maintained losing stream conditions throughout 2015. Water year 2015 marked the fourth year of California’s current statewide drought. Continued data collection in subsequent years will provide a more robust understanding of the range of conditions at these sites.

Implementation of groundwater-surface water monitoring in the Napa Valley Subbasin has already proven to be very valuable for improving the understanding of surface water and groundwater interactions. Similar facilities at additional locations would help further this understanding and aid in on-going efforts to sustainably manage the Napa Valley Subbasin. Additional monitoring will also be key to the objective of maintaining or improving streamflow during drier years and/or seasons. As a result, it is recommended that in coordination with the Napa RCD and others, as appropriate, the County:

- Evaluate stream gaging network objectives, particularly with respect to the water budget requirements contained in the recently finalized Groundwater Sustainability Plan regulations, and determine the need and feasibility of additional streamflow monitoring sites.
- Consider additional areas that may also benefit from nearby shallow nested groundwater monitoring wells (similar to the facilities constructed as part of the current project) to monitor groundwater/surface water interactions in areas where data are lacking or where geologic conditions indicate that conditions not adequately represented by the current monitoring network.
- Continue efforts to integrate data collected at the groundwater/surface water monitoring sites with existing remote data acquisition systems in order to facilitate monitoring aquifer conditions in real-time.

1 INTRODUCTION

This report describes the implementation of the Napa County Groundwater-Surface Water Monitoring Project, including monitoring facilities construction, data collection, and presentation of the results of initial data collection. Funding for the project was provided by the California Department of Water Resources (DWR) and the County of Napa. The project was developed to track groundwater-surface water interrelationships in the Napa Valley Groundwater Subbasin in order to inform local decision-making processes and advance sustainable groundwater management.

1.1 Project Background and Objectives

The 2013 Napa County Groundwater Monitoring Plan identifies five priority sites for monitoring of groundwater and surface water interactions (LSCE, 2013). All five sites are located within the Napa Valley Subbasin of the Napa-Sonoma Valley Groundwater Basin, as described in DWR Bulletin 118 (**Figure 1.1**). The Napa Valley Subbasin is currently classified as a medium priority subbasin through the California Statewide Groundwater Elevation Monitoring (CASGEM) Program. Of the five groundwater basins or subbasins in Napa County, the Napa Valley Subbasin experiences the highest overall demands on groundwater resources in Napa County and was the focus of the 2013 report, *Updated Hydrogeologic Conceptualization and Characterization of Conditions* (LSCE and MBK, 2013).

Project objectives emphasize the collection of data necessary to evaluate relationships between groundwater and surface water resources. Specifically, the project objectives include:

- Install dedicated shallow groundwater monitoring facilities and groundwater and surface water instrumentation to continuously record water levels and selected water quality parameters.
- Collect groundwater and surface water data to detect changes in groundwater levels and groundwater quality and corresponding surface water stage, flow, and quality conditions.
- Collect groundwater and surface water data to establish baseline conditions that will facilitate assessments of the potential effects due to future climate change.
- Collect data that will help identify mechanisms for and quantify exchanges of water between the groundwater aquifers and surface water resources, and response of the hydrologic system due to surface and groundwater use.
- Incorporate the proposed groundwater monitoring facilities in the countywide monitoring program and also in the Napa County CASGEM program as appropriate.
- Incorporate surface water monitoring (including temperature and electrical conductivity) in the streamflow network managed by the Napa County Flood Control and Water Conservation District (NCFCWCD).
- Collect groundwater and surface water data that will help formulate strategies to address targeted water resource problems and facilitate surface waterway restoration opportunities.

Report Organization

This report summarizes the construction of dedicated monitoring facilities developed to track groundwater-surface water interrelationships in the Napa Valley Groundwater Subbasin. The report also presents the results of initial data collection at project facilities.

The report includes the following sections:

Section 2. Monitoring Facilities Construction and Instrumentation

- Monitoring Facilities Locations
- Monitoring Wells As-Built Summaries

Section 3. Hydrogeologic Site Characterization

- Geologic Cross Sections

Section 4. Groundwater and Surface Water Conditions

- Water Level and Water Quality Data

Section 5. Hydraulic Properties Analysis

- Groundwater-Surface Water Gradients and Statistical Comparisons
- Estimates of Groundwater-Surface Water Interaction

Section 6. Summary and Recommendations

- Monitoring Network Maintenance
- Future Monitoring Efforts

2 MONITORING FACILTIES CONSTRUCTION AND INSTRUMENTATION

Project monitoring facilities include project-specific groundwater monitoring wells and a combination of project specific and pre-existing surface water monitoring facilities. Project sites are located in Napa Valley from the City of Napa to the City of St. Helena (**Figure 2.1**). Sites 1, 3, 4, and 5 are located along the Napa River. Site 2 is located on Dry Creek, a tributary to the Napa River that drains portions of the Coast Range Mountains west of the Town of Yountville.

2.1 Groundwater Monitoring Wells and Surface Water Monitoring Sites

Dual-completion, nested monitoring wells[1] were constructed in September 2014 at each site to allow for data collection at discrete depths within the alluvial aquifer system (**Figure 2.2**). The upper completions, referenced in this report as the shallow casing, are screened in shallow portions of the Napa Valley Groundwater Subbasin, including the uppermost zone of saturated aquifer materials encountered, to enable observation of the groundwater processes driving groundwater-surface water interaction. Lower completions at each site, referenced in this report as the deep casing, are screened in the best available aquifer materials located at a depth of about 100 feet below ground surface. The deeper casing completions enable monitoring of the alluvial aquifer units that well completion reports reviewed by LSCE indicate is the portion of the groundwater system in Napa Valley that is more commonly developed for beneficial uses (LSCE and MBK, 2013). Project monitoring wells were constructed with multiple bentonite seals to provide hydraulic separation between the shallow and deep casings to facilitate monitoring of vertical hydraulic gradients at each site.

Table 2.1 summarizes the locations of the project monitoring wells. Shallow casing screen intervals range from 25 feet below ground surface (bgs) to 50 feet bgs. Deep casing screen intervals range from 70 feet bgs to 95 feet bgs. **Table 2.2** summarizes the locations of the project monitoring wells. Well Completion Reports for all monitoring wells are also included in **Appendix A**.

Project monitoring wells and surface water sites are instrumented with continuously recording water level and water quality transducers. The transducers are CT2X models manufactured by Instrumentation Northwest/Seametrics of Kent, Washington and Leveloger Edge models manufactured by Solinst of Georgetown, Ontario, Canada. Transducers are set to record at hourly intervals. Data downloads, regular maintenance, and field calibrations were performed at regular intervals throughout the project.

[1] Nested monitoring wells consist of multiple casings installed within a single borehole. Independent casings are visible at the surface. This construction enables monitoring and sampling at different points within an aquifer system.

Table 2.1 Monitoring Wells As-built Summary

Site	Ground Surface Elevation (ft. NAVD88)	Shallow Screen Start (ft bgs)	Shallow Screen End (ft bgs)	Deep Screen Start (ft bgs)	Deep Screen End (ft bgs)
Site 1- Napa River at First Street	18.58	30	50	75	95
Site 2- Dry Creek at Washington Street	103.41	25	45	71	81
Site 3- Napa River at Oak Knoll Avenue	56.32	25	35	78	88
Site 4- Napa River at Yountville Cross Road	98.40	25	40	70	80
Site 5- Napa River at Pope Street	212.36	25	35	80	95

2.1.1 Site 1 - Napa River at First Street

Site 1 is located adjacent to the Napa River on a vacant lot owned by the Napa County Flood Control and Water Conservation District (**Figure 2.3**). Land uses in the vicinity are predominantly commercial/retail and residential. The monitoring well at this site was constructed with screen intervals at 30 feet bgs to 50 feet bgs and 75 feet bgs to 95 feet bgs, respectively (**Figures 2.4 and 2.5**). No pre-existing surface water gauging facilities are present at this site. A surface water monitoring transducer was installed for the project on the east side of the river channel immediately downstream of the 1st Street Bridge.

2.1.2 Site 2 – Dry Creek at Washington Street

Site 2 is adjacent to Dry Creek. The monitoring well at this site was constructed within the Napa County right-of-way on Washington Street (**Figure 2.6**). Land uses in the vicinity are predominantly agricultural and residential. The monitoring well at this site was constructed with screen intervals at 25 feet bgs to 45 feet bgs and 71 feet bgs to 81 feet bgs, respectively (**Figures 2.7 and 2.8**). The Napa County Resource Conservation District (Napa RCD) has an existing surface water stage and discharge gauging site at this location (Napa RCD Site ID: Dry Creek at Hwy 29). An additional surface water monitoring transducer was installed to monitor water quality parameters for the project in the stream channel adjacent to a railroad bridge footing.

2.1.3 Site 3 - Napa River at Oak Knoll Avenue

Site 3 is adjacent to the Napa River. The monitoring well at this site was constructed within the Napa County right-of-way on Oak Knoll Avenue (**Figure 2.9**). Land uses in the vicinity are predominantly agricultural. The monitoring well at this site was constructed with screen intervals at 25 feet bgs to 35 feet bgs and 78 feet bgs to 88 feet bgs, respectively (**Figures 2.10 and 2.11**). The U.S. Geological Survey

(USGS) has an existing surface water stage and discharge gauging site at this location (USGS Site ID: 11458000). An additional surface water monitoring transducer was installed to monitor water quality parameters for the project on the western side of the river channel adjacent an Oak Knoll Avenue bridge footing.

2.1.4 Site 4 – Napa River at Yountville Cross Road

Site 4 is adjacent to the Napa River. The monitoring well at this site was constructed within the Napa County right-of-way on Yountville Cross Road (**Figure 2.12**). Land uses in the vicinity are predominantly agricultural. The monitoring well at this site was constructed with screen intervals at 25 feet bgs to 40 feet bgs and 70 feet bgs to 80 feet bgs, respectively (**Figures 2.13 and 2.14**). Napa County Resource Conservation District (Napa RCD) has an existing surface water stage gauging site at this location (Napa RCD Site ID: Napa River at Yountville Cross Rd). An additional surface water monitoring transducer was installed to monitor water quality parameters and surface water stage for the project on the eastern side of the river channel upstream of the Yountville Cross Road Bridge.

2.1.5 Site 5 – Napa River at Pope Street

Site 5 is adjacent to the Napa River. The monitoring well at this site was constructed within a City of St. Helena park (**Figure 2.15**). Land uses in the vicinity are mixture of residential, agricultural, and commercial. A City of St. Helena irrigation well is present approximately 100 feet from the project monitoring well and is used for seasonal irrigation demands for municipal parks on both side of Pope Street at this site (J. Haller, personal communication, 2014). The monitoring well at this site was constructed with screen intervals at 25 feet bgs to 35 feet bgs and 80 feet bgs to 95 feet bgs, respectively (**Figures 2.16 and 2.17**). The U.S. Geological Survey (USGS) has an existing surface water stage and discharge gauging site at this location (USGS Site ID: 11456000). An additional surface water monitoring transducer was installed to monitor water quality parameters in the river channel upstream of the Pope Street Bridge.

Table 2.2 Project Monitoring Facilities Locations

Site	WellID	Easting	Northing	Reference Point Elevation (ft, NAVD88)	Easting/Northing Coordinate System	RPE Description
Site 1 Napa River at First Street	NapaCounty-214s-swgw1	6481766.104	1871996.470	20.12	NAD83 StatePlane California II	North side of top of casing (TOC)
	NapaCounty-215d-swgw1	6481765.835	1871996.349	20.07	NAD83 StatePlane California II	North side of top of casing (TOC)
	NapaCounty-swgw-1	6481679.575	1872053.093	-0.70	NAD83 StatePlane California II	About 2 inches from bottom of slanted 1-inch diameter pipe (normal transducer location)
Site 2 Dry Creek at Washington Street	NapaCounty-216s-swgw2	6464900.944	1894991.705	103.10	NAD83 StatePlane California II	North side of top of casing (TOC)
	NapaCounty-217d-swgw2	6464900.778	1894991.734	103.08	NAD83 StatePlane California II	North side of top of casing (TOC)
	NapaCounty-swgw-2	*6464737.707*	*1894929.658*	86.48	NAD83 StatePlane California II	Bolt at bottom of vertical 1-inch pipe with transducer
Site 3 Napa River at Oak Knoll Avenue	NapaCounty-218s-swgw3	*6474230.877*	*1895714.71*	56.12	NAD83 StatePlane California II	North side of top of casing, approx. (TOC)
	NapaCounty-219d-swgw3	*6474230.877*	*1895714.71*	56.14	NAD83 StatePlane California II	North side of top of casing, approx. (TOC)
	NapaCounty-swgw-3	*6474657.005*	*1895984.265*	30.02	NAD83 StatePlane California II	Riverbed elevation at transducer site
Site 4 Napa River at Yountville Cross Road	NapaCounty-220s-swgw4	6460605.516	1914091.523	98.22	NAD83 StatePlane California II	North side of top of casing (TOC)
	NapaCounty-221d-swgw4	6460605.169	1914091.530	98.28	NAD83 StatePlane California II	North side of top of casing (TOC)
	NapaCounty-swgw-4	*6460833.732*	*1914345.444*	75.30	NAD83 StatePlane California II	Bolt at bottom of verticle 1-inch pipe with transducer
Site 5 Napa River at Pope Street	NapaCounty-222s-swgw5	*6431064.168*	*1948207.919*	217.07	NAD83 StatePlane California II	North side of top of casing (TOC)
	NapaCounty-223d-swgw5	*6431064.168*	*1948207.919*	217.10	NAD83 StatePlane California II	North side of top of casing (TOC)
	NapaCounty-swgw-5	*6431196.072*	*1948347.598*	191.01	NAD83 StatePlane California II	Riverbed elevation at transducer site

Note: Location data are based on a survey conducted on 9/25/2015 with a Topcon GRS-1 RTK Rover and Zeiss Ni2 Level. Horizontal coordinates in italics were calculated using GIS software here survey data were unavailable.

3 HYDROGEOLOGIC SITE CHARACTERIZATION

The Napa River flows southeastward and southward out of the Coast Range, through Napa Valley and lowland marshes before entering San Pablo Bay at American Canyon (**Figure 1.1**). The Napa Valley Groundwater Subbasin (Subbasin) underlies much of Napa Valley from a southern boundary near the Highway 12/29 Bridge over the Napa River northward for approximately 30 miles to the head of Napa Valley upstream of Calistoga. The Subbasin extends laterally within Napa Valley to the extent of surficial alluvial deposits that are contiguous with the main valley floor.

The *Updated Hydrogeologic Conceptualization and Characterization of Conditions* report (LSCE and MBK, 2013) describes the geologic units and hydrogeology of Napa Valley in greater detail and provides a basis for the site characterizations presented in this report. Napa County's Groundwater-Surface Water monitoring sites are generally located within the fluvial facies of the Napa Valley Floor Quaternary alluvium:

> "The fluvial facies consists of a thin narrow band of stream channel sands and gravels deposited by the Napa River. The sand and gravel beds tend to be thicker and/or more numerous in the fluvial facies area. They are interbedded with finer-grained clay beds of probable floodplain origin." (LSCE and MBK, 2013)

Geologic cross section prepared for this report are consistent with those presented in the *Updated Hydrogeologic Conceptualization and Characterization of Conditions* report in that they present the lithologic descriptions provided by well drillers for wells along the cross section and delineate major geologic formations based on the information from individual wells and the larger hydrogeologic conceptualization. **Figure 3.1** lists the major surficial geologic deposits and rock types in Napa Valley, according to relative time of formation.

The cross sections presented in this report are focused on the areas near to the project sites, rather than spanning the entirety of the Napa Valley Floor, to support the interpretation of project data. **Figure 3.2** shows the location of the project cross sections relative to the location of geologic cross sections developed for the *Updated Hydrogeologic Conceptualization and Characterization of Conditions* report, which provides a more thorough evaluation of Napa Valley hydrogeology (LSCE and MBK, 2013).

3.1 Site 1 – Napa River at First Street

Site 1 is located near the eastern margin of the Napa Valley Floor. USGS surficial geologic mapping indicates that the alluvium at the site consists of younger alluvium (Qhay) with terrace deposits (Qht) also in the vicinity (Graymer et al. 2007). Four Well Completion Reports (WCRs) used for cross section preparation at this site indicate the following (**Figure 3.3**):

- Quaternary alluvium (Qa) thicknesses range from approximate 50 feet bgs east of Site 1 to approximate 200 feet bgs west of the project site.
- WCRs for a shallow monitoring well drilled nearest to the proposed monitoring well site indicates an alluvium largely composed of sandy silt and silty sand, with sand and gravel units beginning at 19 feet to 25 feet bgs. The WRC for well 05N04W02N-01, a 560-feet boring

approximately 800 feet west of the project site, records two coarse-grained units beginning at 20 feet bgs and continuing to 70 feet bgs. The project monitoring well encountered similar materials from 29 feet bgs to 52 feet bgs.

- The lithologic log for well 05N04W02N-01 (approximately 800 feet west of the project site) records a transition from alluvial deposits to volcanic deposits at a depth of about 220 feet. Construction records for 05N04W02L-80b and 05N04W02L to the east of the project site indicate a more shallow contact with volcanic rock at depths of less than 100 feet. This offset is interpreted to occur in part due to displacement by the East Napa Fault Zone (LSCE and MBK, 2013).

3.2 Site 2 – Dry Creek at Washington Street

Site 2 is located near the western margin of the Napa Valley Floor. The cross section at this site is oriented north-south, which is generally parallel to the Napa Valley axis in this area. An alluvium thickness of approximately 100 feet occurs along the cross section at Site 2 (**Figure 3.4**). LSCE and MBK (2013) note the occurrence of alluvial fan deposits in the vicinity of this site. USGS surficial geologic mapping indicates that the alluvium at the site consists of younger alluvium (Qhay), which borders Dry Creek as it traverses the Napa Valley Floor (Graymer et al. 2007). Sub-alluvium mapping indicates that the alluvium is underlain by Sonoma Volcanics sedimentary rocks (Tss/h), which overlie a tuffaceous formation (Tsvt).

Four WCRs were identified in the vicinity of Site 2, among these was a well drilled within 500 feet of the project monitoring well site. Information in the WCRs includes:

- Quaternary alluvium (Qa) thickness ranges from 90 feet to 130 feet below ground surface.
- WCRs for two wells drilled nearest to the proposed monitoring well site, 06N04W18j1-71 and 06N04W18h-03, indicate an alluvium largely composed of sandy clay, with interbedded gravels or sands.

3.3 Site 3 – Napa River at Oak Knoll Avenue

Site 3 is located near the eastern margin of the Napa Valley Floor. **Figure 3.5** shows the alluvium increasing in thickness from the valley margin to the east to approximately 100 feet in the vicinity of the project monitoring well. As on the opposite side of the valley at Site 2, the alluvium at Site 3 is underlain by Sonoma Volcanics sedimentary rocks (Tss/h). Here the sedimentary rocks are more thin and underlain by the andesite flows and breccias (Tsva).

Four WCRs for wells nearest to the project monitoring well at Site 3 indicate the following:

- Quaternary alluvium (Qa) thickness ranges from approximately 30 feet to 100 feet below ground surface.
- WCRs on the west side of the Napa River indicate locally-thick coarse-grained lithologic units distributed throughout the alluvium. These are consistent with observations reported for wells

used in the development of Cross Section D-D’ in the *Updated Hydrogeologic Conceptualization and Characterization of Conditions* report (LSCE and MBK, 2013).

3.4 Site 4 – Napa River at Yountville Cross Road

Site 4 is located near the center of the Napa Valley Floor north of the Town of Yountville. The Quaternary alluvium (Qa) extends to depths of approximately 120 feet to 170 feet at this Site (**Figure 3.6**). The alluvium in this area of the Napa Valley Floor contains thick beds of fluvial sand and gravel and has been noted as having some of the highest reported well yields in the valley, at up to 2,200 gallons per minute (LSCE and MBK, 2013). Wells in the vicinity of Site 4, particularly west of the Napa River indicate the presence of a unit described as Tertiary Sonoma Volcanics conglomerate/breccias (Tcg/ab), which has not been correlated with a surficial formation and therefore has not been differentiated as either a sedimentary conglomerate or a volcanic breccia (LSCE and MBK, 2013). East of the Napa River at Site 4 the alluvium is underlain by an andesitic unit of the Sonoma Volcanics (Tsva) that dips westward and continues beneath the conglomerate/breccia (Tcg/ab).

Three WCRs for wells in the vicinity of Site 4 indicate the following:

- Quaternary alluvium (Qa) thickness ranges from 120 feet to 170 feet below ground surface.
- All WCRs showed multiple coarse-grained lithologic units distributed throughout the alluvium. The first of these units was consistently reported to be about 20 feet thick beginning between 22 feet and 37 feet below ground surface.

3.5 Site 5 – Napa River at Pope Street

Site 5 is located within the City of St. Helena near the eastern Napa Valley margin. The Quaternary alluvium (Qa) at Site 5 ranges in thickness from approximately 70 feet to 120 feet to the west of the Napa River (**Figure 3.7**). The river channel is aligned very near the valley margin at Site 5 leaving little thickness in the alluvial materials to the east of the Napa River. Here a tuff formation (Tsvt) outcropped adjacent to the valley may be bound by faulting at the contact with the Tertiary sedimentary rocks (Tss/h), as indicated in Cross Section A-A' developed previously (LSCE and MBK, 2013). USGS surficial geologic mapping indicates that the alluvium at the site consists predominately of terrace deposits that span both sides of the Napa River mainstem (Graymer et al. 2007). Sub-alluvium mapping indicates that the alluvium is underlain by Sonoma Volcanics sedimentary rocks (Tss/h), which outcrop at the surface beginning in the hills approximately one-half mile northeast of the site (LSCE and MBK, 2013).

Five WCRs were identified in the vicinity of Site 5 indicate the following:

- Quaternary alluvium (Qa) thickness ranges from approximately 70 feet to 120 feet below ground surface, west of the Napa River.
- While some thick coarse-grained units are recorded within the alluvium, they are less extensive with lower well yields reported than well farther south..
- Geologic units below the alluvium are consistent with mapping by LSCE (LSCE and MBK, 2013) showing Sonoma Volcanics sedimentary rocks (tss/h), described in these WCRs as large gravels (often cemented) or sandy blue clay.

4 GROUNDWATER AND SURFACE WATER CONDITIONS

As described above, project monitoring facilities were constructed to track interrelationships between surface water and groundwater within the Napa Valley Groundwater Subbasin. While the geologic structure of Napa Valley is very complex, the project monitoring wells are constructed to monitor conditions in the upper portions of the alluvial aquifer system where direct connection to surface waters is possible and lower portions of the alluvial aquifer system which are more likely to be influenced by groundwater pumping. The following sections summarize the results of continuous water level and water quality monitoring (**Section 4.1**) and a baseline round of water quality sample collection at all sites (**Section 4.2**)

4.1 Water Level and Water Quality Monitoring

4.1.1 Site 1 – Napa River at First Street

At Site 1 the Napa River is perennially wetted and tidally-influenced with a 5 to 7 foot tidal range observed during the period of record[2] (**Figure 4.1**). Data collected at this site have shown very similar heads at all three monitoring locations, including a similar, though dampened, response to the tidal cycles in the shallow and deep casings. Heads in both monitoring well casings and the river have been more than 15 feet above the thalweg elevation over the period of record. Taken together, the water level elevations and the tidal cycle fluctuations in the shallow casing indicate some degree of hydraulic connection at this location. During the summer baseflow period, short-lived head separations of less than five feet occur during low tides between the Napa River and the shallow casing. Monitoring during the winter and spring showed heads in both casings increasing both seasonally and with peaks in the river stage. From January through March, heads in the monitoring wells were consistently a couple of feet above the river stage. During this period the magnitude of tidal fluctuations in the river stage appears to have decreased, indicating that the flow of water upstream due to incoming tides was overcome by increased river discharge due to winter rains.

Temperature (**Figure 4.2**) and conductivity (**Figure 4.3**) data from the shallow and deep monitoring well casings show relatively stable conditions compared to readings measured in the Napa River. Conductivity readings in the deep casing were above 1,500 µS/cm throughout the period of record, which were the highest conductivity values recorded across all of the project monitoring wells. Conductivity values in the Napa River at Site 1 were above 30,000 µS/cm in July and August of 2015, indicating presence of brackish water at this site, where the streambed elevation is 15 feet to 20 feet below mean sea level (**Figure 4.3**). Napa River conductivity values were similar to conductivity values in the shallow casing in March while streamflow was elevated. As streamflow declined in April and May, conductivity values in the river entered a transitional period of greatest daily variability while the balance between freshwater outflows and saline inflows from San Pablo Bay shifts with the reduction in stormwater runoff. Temperatures in the Napa River varied much more widely than did groundwater at

[2] Elevated conductivity levels in the Napa River at Site 1 resulted in a failure of the instrument in August 2015. A temporary transducer was installed in November with a full replacement transducer, including conductivity sensor installed in March 2016.

this site, likely due to seasonal temperature variations with increased heat gain in the summer due to the degree of solar exposure (**Figure 4.2**).

4.1.2 Site 2 – Dry Creek at Washington Street

Dry Creek at Site 2 is an intermittent stream, with flows typically dropping to about 1 cubic feet per second (cfs) or less over summer. Over the period of record from December 2014 through June 2016 the surface water and groundwater were only directly during the winter and spring of 2016, when the elevation of groundwater in the shallow casing was at or above the stream thalweg elevation (**Figure 4.4**). Heads between the shallow and deep casings were separated by as little as six feet in the spring of 2015, increasing to 15 feet by October 2015, indicating a downward vertical gradient in the upper 80 feet of the alluvial aquifer system.

Water temperature data at Site 2 show generally stable temperatures in both monitoring well casings with much more variable temperatures in Dry Creek (**Figure 4.5**). Temperatures in the shallow casing appear to show a delayed response relative to temperatures in Dry Creek. From August 2015 through mid-November 2015 shallow casing water temperatures climbed slowly from 18.6°C to 20.1°C. Dry Creek temperatures were generally above 20°C in August and September, but declined substantially with the transition to cooler air temperatures in the fall and winter precipitation and runoff in December. Shallow casing temperatures began a more gradual decline in December 2015, coinciding with the period when shallow casing water levels suggest that the stream and shallow groundwater reconnected.

Conductivity values at Site 2 are consistent with showing a direct connection between surface water and shallow groundwater from December through April 2016, when sharp declines in surface water conductivity (likely due to precipitation induced runoff) are followed by more gradual declines in conductivity in the shallow casing (**Figure 4.6**). A similar pattern also occurred from August through October 2015, with shallow groundwater conductivity values tracking fluctuations in surface water conductivity.

4.1.3 Site 3 – Napa River at Oak Knoll Avenue

The Napa River at Site 3 is intermittent, with flows typically dropping to about 1 cfs or less over summer. Groundwater levels in the shallow casing at Site 3 indicate that surface water and groundwater experienced consistent to intermittent direct hydraulic connection[3] (**Figure 4.7**). Overall, water level data show heads in the shallow and deep casing were generally within a foot of each other. The groundwater heads also tended to remain elevated relative to the surface water elevation, except during times of sharp stream stage peaks in the winter and spring of 2016 and during the fall when surface water stages were lowest. In addition, sharp peaks in the surface water elevation were followed

[3] The surface water transducer installed at Site 3 is located in a depression that is lower than the thalweg, which accounts for some surface water levels shown to be below the thalweg elevation during late summer and fall of 2015.

by lesser peaks in the shallow and deep casings. Together these observations suggest a potential for direct hydraulic connection throughout much of the period of record.

While water temperatures in both the deep and shallow casing at Site 3remained consistent and within one degree of each other throughout the period of record, one temporary water temperature decline occurred 3/12/2016, 30 hours after the second highest surface water stage peak of the period of record and 144 hours (6 days) following the highest surface water stage peak of the period of record (**Figure 4.7 and Figure 4.8**). This may indicate that the magnitude of flow from surface water to groundwater is relatively low except during peak surface water stages, leading to limited temperature responses in the shallow casing in response to storm runoff peaks in the Napa River.

Conductivity values at Site 3 show similar concentrations at all three monitored locations from September through November 2015, when the river stage was below the thalweg (**Figure 4.9**). As river stages increased with storm runoff in December 2015, the surface water conductivity declined quickly from about 600 to 263 µS/cm. Conductivity values in the Napa River remained generally below 300 µS/cm through the spring of 2016, with short term peaks coinciding with the recession limb of storm hydrographs, when baseflow contributions increase.

Well completion reports for wells in the vicinity suggest that alluvial materials, particularly in the shallow alluvium, become less permeable from west to east (**Figure 3.5**). This supports the observations suggesting that the degree of flow between groundwater and surface water at this site may be limited, although water levels indicate a direct hydraulic connection over much of the period of record.

4.1.4 Site 4 – Napa River at Yountville Cross Road

Existing stream gauging, by the Napa RCD, at Site 4 on the Napa River includes surface water stage monitoring, although discharge monitoring is not a focus of the Napa RCD monitoring effort. Nevertheless, for this project’s period of record the Napa River remained perennially wetted (**Figure 4.10a**). Groundwater levels in the shallow casing at Site 4 indicate that surface water and groundwater experienced a consistent direct hydraulic connection from December 2014 through May 2015. Overall, water level data show heads in the shallow and deep casing are generally within a foot of each other. The groundwater heads also tend to remain elevated relative to the surface water elevation, except during times of sharp surface water stage peaks in the winter and spring and during the fall when surface water stages were lowest. However, even during the latter case shallow groundwater levels remained at an elevation above the river thalweg at the site.

Figure 4.10b shows continuous monitoring data collected at Site 4 for this project along with a long-term groundwater levels recorded manually by Napa County. The manually monitored well, NapaCounty-133, is located approximately 0.5 miles southeast of Site 4, at a similar land surface elevation at a total well depth of 120 feet. The long-term record from NapaCounty-133 shows that the fluctuations in groundwater levels at the Site 4 shallow and deep casings are comparable to those observed in the vicinity since 1978.

Water temperature data from Site 4 show a pattern similar to observations at Sites 1 and 3. While water temperatures in the Napa River at Site 4 ranged from 23.75°C to 5.18°C, groundwater temperatures were much more stable[4] (**Figure 4.11**). These observations could indicate that the magnitude of flow from surface water to groundwater during peak stream stages is limited.

Conductivity data from Site 4 are somewhat limited temporally, but tend to show similarities in values in the Napa River and shallow casing, as would be expected under a direct hydraulic connection (**Figure 4.12**). Conductivity measurements in the deep casing were lower and more stable than values in the shallow casing, possibly indicating the influence of different geologic source material in the deeper alluvium.

4.1.5 Site 5 – Napa River at Pope Street

The Napa River at Site 5 is intermittent, with flows typically dropping to about 1 cfs or less over summer. Over the period of record from December 2014 through June 2016 the surface water and groundwater were directly connected during the winter, spring, and early summer months, when the elevation of groundwater in the shallow casing was at or above the stream thalweg elevation (**Figure 4.13a**). Shallow casing groundwater elevations closely tracked the surface water elevation while water remained in the river channel. Once the river channel became dry, groundwater levels dropped by as much as five feet over the course of the late summer and fall of 2015, before quickly rebounding when flow returned to the river channel.

Heads between the shallow and deep casings were separated by as little as three feet in the spring of 2015, increasing to 15 feet by October 2015, indicating a downward vertical gradient in the upper 80 feet of the alluvial aquifer system. Water level data in the deep casing at Site 5 show the most influence from groundwater pumping in the vicinity. At Site 5, the pumping influence may be from the City of St. Helena irrigation well nearby (see **Section 2.1.5**). Manual groundwater level measurements recorded at that well (NapaCounty-212) show a close agreement with groundwater levels in the monitoring well deep casing at the time of the spring and fall 2015 measurements (**Figure 4.13b**). Despite the pumping influence seen in the deep casing, head in that casing fully recovered over the winter of 2016 relative to the winter 2015 condition. A manual measurement recorded in NapaCounty-212 shows that water levels in that nearby well recovered even further through into the spring of 2016 (**Figure 4.13b**).

Water temperatures recorded at Site 5 showed more variability in the shallow casing than at any other site (**Figure 4.14**). While temperature data from the Napa River are limited at this site, the general pattern of increasing shallow casing water temperatures during the summer of 2015 followed by declining temperatures in the winter of 2016 is similar to the pattern observed at Site 2. This along with the similarities between shallow casing and Napa River water temperatures from mid-January through mid-March 2016 also indicate a direct hydraulic connection during that time.

Conductivity data from Site 5 are somewhat limited temporally, but tend to show similarities in values in the Napa River and shallow casing, as would be expected under a direct hydraulic connection (**Figure 4.15**).

[4] A temporary failure in the shallow casing transducer at Site 4 from mid-January through mid-March 2016 resulted in a data gap during that time period.

4.2 Water Quality Sampling

Baseline water quality samples were collected at all project monitoring wells and surface water monitoring sites in on June 3, 2015 and June 4, 2015. Results from the fifteen sites samples are summarized in **Tables 4.1a** and **4.1b**. Groundwater samples were collected by submersible pump after purging for a minimum of three casing volumes and achieving field parameter stabilization. When monitoring well casings were pumped dry during the purge process a grab sample was collected following sufficient water level recovery. Surface water samples were collected as grab samples.

Samples were analyzed for general mineral, general physical, and drinking water metals by DWR's Bryte Laboratory. All reports provided by the lab and purge logs are provided in **Appendix C**.

In general, results from the water quality sampling were consistent with previously documented groundwater quality conditions in the Napa Valley Groundwater Subbasin and with the conductivity values recorded by transducers at each project site (LSCE, 2011 and LSCE, 2016).

Only one exceedance of a primary drinking water Maximum Contaminant Level (MCL) was noted in the groundwater samples collected in June 2015. The dissolved arsenic concentration in the sample collected at the deep casing at Site 3 was 0.046 mg/l, above the primary drinking water MCL of 0.010 mg/l. Nitrate concentrations were below the primary drinking water MCL in all groundwater samples collected; however, the Site 1 surface water sample had a concentration of 12.6 mg/l NO3-N compared to the primary drinking water MCL of 10 mg/l NO3-N.

A dissolved aluminum concentration of 0.432 mg/l at the deep casing at Site 2 was above the drinking water secondary MCL of 0.200 mg/l. Dissolved iron concentrations were above the drinking water secondary MCL of 0.300 mg/l in samples collected at the deep casings at Sites 2 and 5. Dissolved boron in the sample collected at the deep casing at Site 3 had a concentration of 9.1 mg/l, above the California Notification Level of 1.0 mg/l. Dissolved manganese was detected at concentration above the drinking water secondary MCL of 0.050 mg/l in all five deep casings, as well as the shallow casings at Sites 1, 4, and 5 and the surface water sample at Site 1.

A few spatial correlations between water quality constituents are evident in the Piper Diagrams (in meq/l) of **Figures 4.16**, **4.17,** and **4.18**. While the shallow casing water quality samples are generally not spatially correlated, the elevated alkalinity at Site 4 in the shallow casing (NapaCounty-220s) stands out (**Figure 4.16**). However, among the deep casing samples, similarly elevated alkalinities were found in samples from Sites 2, 4, and 5 (**Figure 4.17**). The similarity between alkalinities, and the complete cation/anion composition as well, at the shallow and deep casings at Site 4 suggests a similar geologic source. The similar alkalinities also suggest carbonate rock as a primary geologic material along the groundwater flowpath.

A Piper Diagram of deep casing water quality data suggest a spatial trend of increasing chloride concentrations in the deeper alluvium (**Figure 4.17**). A corresponding Piper Diagram of the surface water samples shows a slightly increasing trend in chloride concentration. Conductivity data records from transducers at Site 1, including stable conductivity values in shallow groundwater of between 400 µS/cm and 500 µS/cm, do not indicate that brackish water intermittently present in the Napa River at this site is impacting conductivity in either the shallow or deeper alluvium. In light of this, the trend in chloride concentrations in the deeper alluvium is more likely due to a combination of increasing distance along the groundwater flowpath and longer contact time with geologic source materials contributing to chloride enrichment.

Table 4.1a June 2015 Baseline Water Quality Results Summary

Site	Sample ID	Sample Date	Total Alkalinity mg/L as CaCO3 Std Method 2320 B [1]*	Dissolved Aluminum mg/L EPA 200.8 (D) [1]*	Dissolved Antimony mg/L EPA 200.8 (D) [1]*	Dissolved Arsenic mg/L EPA 200.8 (D) [1]*	Dissolved Barium mg/L EPA 200.8 (D) [1]*	Dissolved Beryllium mg/L EPA 200.8 (D) [1]*	Dissolved Bicarbonate (HCO3-) mg/L as CaCO3 Std Method 4500-CO2 D [1]*	Dissolved Boron mg/L EPA 200.7 (D) [1]*	Dissolved Bromide mg/L EPA 300.0 28d Hold [1]*	Dissolved Cadmium mg/L EPA 200.8 (D) [1]*	Dissolved Calcium mg/L EPA 200.7 (D) [1]*
Site 1	NapaCounty-214s	6/3/2015 8:09	117	<0.01	<0.001	<0.001	0.081	<0.001	117	0.2	0.07	<0.001	19
Site 1	NapaCounty-215d	6/3/2015 7:16	258	<0.01	<0.001	0.007	0.103	<0.001	258	1.4	0.63	<0.001	41
Site 1	NapaCounty-swgw_SW1	6/4/2015 13:39	145	0.02	<0.001	0.015	0.136	<0.001	144	1.4	15.9	<0.001	145
Site 2	NapaCounty-216s	6/3/2015 13:03	93	0.089	<0.001	<0.001	0.046	<0.001	93	<0.1	0.12	<0.001	22
Site 2	NapaCounty-217d	6/3/2015 12:23	116	0.432	<0.001	0.001	0.027	<0.001	116	<0.1	0.06	<0.001	15
Site 2	NapaCounty-swgw_SW2	6/3/2015 13:15	154	0.029	<0.001	<0.001	0.059	<0.001	153	0.1	0.02	<0.001	34
Site 3	NapaCounty-218s	6/3/2015 11:02	192	<0.01	<0.001	<0.001	0.091	<0.001	192	0.1	0.13	<0.001	47
Site 3	NapaCounty-219d	6/3/2015 10:04	225	<0.01	<0.001	0.046	0.088	<0.001	224	9.1	0.33	<0.001	17
Site 3	NapaCounty-swgw_SW3	6/4/2015 12:46	176	0.012	<0.001	0.003	0.073	<0.001	175	0.5	0.2	<0.001	36
Site 4	NapaCounty-220s	6/4/2015 8:19	199	<0.01	<0.001	0.003	0.078	<0.001	199	0.1	0.1	<0.001	32
Site 4	NapaCounty-221d	6/4/2015 7:52	124	<0.01	<0.001	0.004	0.05	<0.001	124	<0.1	0.03	<0.001	14
Site 4	NapaCounty-swgw_SW4	6/4/2015 8:50	98	<0.01	<0.001	0.001	0.042	<0.001	98	<0.1	0.08	<0.001	22
Site 5	NapaCounty-222s	6/4/2015 11:29	117	<0.01	<0.001	0.003	0.041	<0.001	117	0.6	0.12	<0.001	28
Site 5	NapaCounty-223d	6/4/2015 10:56	213	<0.01	<0.001	0.002	0.104,0.105**	<0.001	213	0.5	0.07	<0.001	16
Site 5	NapaCounty-swgw_SW5	6/4/2015 11:56	92,93**	<0.01	<0.001	0.004	0.039	<0.001	93	0.8	0.12	<0.001	21

Site	Sample ID	Sample Date	Dissolved Carbonate (CO3--) mg/L as CaCO3 Std Method 4500-CO2 D [1]*	Dissolved Chloride mg/L EPA 300.0 28d Hold [1]*	Dissolved Chromium mg/L EPA 200.8 (D) [1]*	Dissolved Cobalt mg/L EPA 200.8 (D) [1]*	Conductance (EC) µS/cm Std Method 2510-B [1]*	Dissolved Copper mg/L EPA 200.8 (D) [1]*	Dissolved Fluoride mg/L EPA 300.0 28d Hold [1]*	Dissolved Hardness mg/L as CaCO3 Std Method 2340 B [1]*	Dissolved Hydroxide (OH-) mg/L as CaCO3 Std Method 4500-CO2 D [1]*	Dissolved Iron mg/L EPA 200.8 (D) [1]*	Dissolved Lead mg/L EPA 200.8 (D) [1]*
Site 1	NapaCounty-214s	6/3/2015 8:09	<1	28	<0.001	<0.005	416	<0.001	0.2	144	<1	0.009	<0.001
Site 1	NapaCounty-215d	6/3/2015 7:16	1	177	<0.001	<0.005	1174	0.001	0.2	226	<1	0.042	<0.001
Site 1	NapaCounty-swgw_SW1	6/4/2015 13:39	1	4699	0.002	<0.005	14319	0.006	<0.1	1717	<1	0.025	<0.001
Site 2	NapaCounty-216s	6/3/2015 13:03	<1	15	0.001	<0.005	317	0.003	0.2	116	<1	0.066	<0.001
Site 2	NapaCounty-217d	6/3/2015 12:23	<1	5	0.001	<0.005	255	0.001	0.6	74	<1	0.331	<0.001
Site 2	NapaCounty-swgw_SW2	6/3/2015 13:15	1	12	0.005	<0.005	411	0.006	0.2	159	<1	0.091	<0.001
Site 3	NapaCounty-218s	6/3/2015 11:02	<1	19	0.001	<0.005	536	<0.001	<0.1	247	<1	0.008	<0.001
Site 3	NapaCounty-219d	6/3/2015 10:04	1	73	<0.001	<0.005	712	0.005	0.3	116	<1	0.021	<0.001
Site 3	NapaCounty-swgw_SW3	6/4/2015 12:46	1	27	<0.001	<0.005	515	0.001	0.2	215	<1	0.022	<0.001
Site 4	NapaCounty-220s	6/4/2015 8:19	<1	7	<0.001	<0.005	429	<0.001	0.2	190	<1	<0.005	<0.001
Site 4	NapaCounty-221d	6/4/2015 7:52	<1	6	<0.001	<0.005	263	<0.001	0.2	100	<1	0.009	<0.001
Site 4	NapaCounty-swgw_SW4	6/4/2015 8:50	<1	18	<0.001	<0.005	328	0.001	0.1	128	<1	0.046	<0.001
Site 5	NapaCounty-222s	6/4/2015 11:29	<1	32	<0.001	<0.005	372	<0.001	0.3	123	<1	0.014	<0.001
Site 5	NapaCounty-223d	6/4/2015 10:56	<1	16	0.001	<0.005	453	<0.001	0.3	113	<1	0.473,0.476**	<0.001
Site 5	NapaCounty-swgw_SW5	6/4/2015 11:56	<1	34	<0.001	<0.005	346	0.002	0.4	100	<1	0.019	<0.001

*Codes in brackets ([]) following the analyte name refer to the Method Comparability Code. For more information, please refer to http://www.water.ca.gov/waterdatalibrary/includes/mtc_code.cfm.
**More than one analysis was made for this sample

Table 4.1b June 2015 Baseline Water Quality Results Summary

Site	Sample ID	Sample Date	Dissolved Lithium mg/L EPA 200.8 (D) [1]*	Dissolved Magnesium mg/L EPA 200.7 (D) [1]*	Dissolved Manganese mg/L EPA 200.8 (D) [1]*	Dissolved Mercury mg/L EPA 200.8 (Hg Dissolved) [1]*	Dissolved Molybdenum mg/L EPA 200.8 (D) [1]*	Dissolved Nickel mg/L EPA 200.8 (D) [1]*	Dissolved Nitrate mg/L as N EPA 300.0 28d Hold [1]*	Dissolved Nitrite mg/L as N Std Method 4500-NO2 B (48Hr) [1]*	Dissolved Potassium mg/L EPA 200.7 (D) [1]*	Dissolved Selenium mg/L EPA 200.8 (D) [1]*	Dissolved Silver mg/L EPA 200.8 (D) [1]*
Site 1	NapaCounty-214s	6/3/2015 8:09	0.011	23	2.53	<0.0002	<0.005	0.003	7.3	0.02	1.1	<0.001	<0.001
Site 1	NapaCounty-215d	6/3/2015 7:16	0.059	30	1.13	<0.0002	<0.005	0.002	<0.1	<0.01	4.5	0.002	<0.001
Site 1	NapaCounty-swgw_SW1	6/4/2015 13:39	0.067	329	0.076	<0.0002	<0.005	0.007	12.6	<0.01	106.5	0.046	<0.001
Site 2	NapaCounty-216s	6/3/2015 13:03	0.012	15	0.041	<0.0002	<0.005	0.002	5.4	0.01	0.9	<0.001	<0.001
Site 2	NapaCounty-217d	6/3/2015 12:23	0.014	9	0.643	<0.0002	0.005	0.002	<0.1	<0.01	1.3	<0.001	<0.001
Site 2	NapaCounty-swgw_SW2	6/3/2015 13:15	0.008	18	0.024	<0.0002	<0.005	0.013	0.5	<0.01	2.1	<0.001	<0.001
Site 3	NapaCounty-218s	6/3/2015 11:02	0.01	31	<0.005	<0.0002	<0.005	0.003	1.8	<0.01	0.7	<0.001	<0.001
Site 3	NapaCounty-219d	6/3/2015 10:04	0.037,0.038**	18	0.241,0.242**	<0.0002	0.013,0.014**	0.001	<0.1	<0.01	5.2	<0.001	<0.001
Site 3	NapaCounty-swgw_SW3	6/4/2015 12:46	0.046	30	0.038	<0.0002	<0.005	0.004	<0.1	<0.01	2.9	<0.001	<0.001
Site 4	NapaCounty-220s	6/4/2015 8:19	<0.005	26	0.568	<0.0002	<0.005	0.005	0.7	0.03	3.6	<0.001	<0.001
Site 4	NapaCounty-221d	6/4/2015 7:52	<0.005	16	0.728	<0.0002	<0.005	0.002	<0.1	<0.01	4.7	<0.001	<0.001
Site 4	NapaCounty-swgw_SW4	6/4/2015 8:50	<0.005	17	0.041	<0.0002	<0.005	0.003	<0.1	<0.01	1.7	<0.001	<0.001
Site 5	NapaCounty-222s	6/4/2015 11:29	0.063	13	0.641	<0.0002	<0.005	0.01	<0.1	<0.01	3.8	<0.001	<0.001
Site 5	NapaCounty-223d	6/4/2015 10:56	0.075,0.076**	18	0.219,0.223**	<0.0002	<0.005	0.002	0.3	<0.01	7.1	<0.001	<0.001
Site 5	NapaCounty-swgw_SW5	6/4/2015 11:56	0.095	11	0.048	<0.0002	<0.005	0.003	<0.1	<0.01	3.7	<0.001	<0.001

Site	Sample ID	Sample Date	Dissolved Sodium mg/L EPA 200.7 (D) [1]*	Total Dissolved Solids mg/L Std Method 2540 C [1]*	Dissolved Strontium mg/L EPA 200.8 (D) [1]*	Dissolved Sulfate mg/L EPA 300.0 28d Hold [1]*	Dissolved Thallium mg/L EPA 200.8 (D) [1]*	Turbidity N.T.U. EPA 180.1 [D-2]*	Dissolved Vanadium mg/L EPA 200.8 (D) [1]*	Dissolved Zinc mg/L EPA 200.8 (D) [1]*	pH pH Units Std Method 2320 B [1]*
Site 1	NapaCounty-214s	6/3/2015 8:09	31	268	0.144	45	<0.001	1.21	<0.005	<0.005	6.9
Site 1	NapaCounty-215d	6/3/2015 7:16	164	683	0.32	74	<0.001	2.75	<0.005	<0.005	7.3
Site 1	NapaCounty-swgw_SW1	6/4/2015 13:39	2590	8830	2.19	667	<0.001	20.6	0.018	0.012	7.8
Site 2	NapaCounty-216s	6/3/2015 13:03	22	208	0.169	38	<0.001	77.4	<0.005	<0.005	6.8
Site 2	NapaCounty-217d	6/3/2015 12:23	29	164	0.107	9	<0.001	7.29	<0.005	<0.005	7.4
Site 2	NapaCounty-swgw_SW2	6/3/2015 13:15	28	255	0.269	44	<0.001	1.37	<0.005	0.027	7.6
Site 3	NapaCounty-218s	6/3/2015 11:02	20	324	0.357	65	<0.001	5.06	<0.005	<0.005	6.7
Site 3	NapaCounty-219d	6/3/2015 10:04	108	452	0.125,0.126**	32	<0.001	1.16	<0.005	0.006	7.4
Site 3	NapaCounty-swgw_SW3	6/4/2015 12:46	27	313	0.248	54	<0.001	7.48	<0.005	<0.005	7.8
Site 4	NapaCounty-220s	6/4/2015 8:19	19	292	0.199	11	<0.001	3.29	<0.005	<0.005	6.7
Site 4	NapaCounty-221d	6/4/2015 7:52	16	204	0.079	6	<0.001	7.11	<0.005	<0.005	7.1
Site 4	NapaCounty-swgw_SW4	6/4/2015 8:50	17	250	0.131	39	<0.001	3.4	<0.005	<0.005	7.3
Site 5	NapaCounty-222s	6/4/2015 11:29	26	241	0.155	21	<0.001	1.33,1.48**	<0.005	<0.005	7.1
Site 5	NapaCounty-223d	6/4/2015 10:56	56	343	0.104,0.105**	6	<0.001	18.8	<0.005	<0.005	7.2
Site 5	NapaCounty-swgw_SW5	6/4/2015 11:56	30	220	0.111	25	<0.001	1.68	<0.005	0.006	7.4

*Codes in brackets ([]) following the analyte name refer to the Method Comparability Code. For more information, please refer to http://www.water.ca.gov/waterdatalibrary/includes/mtc_code.cfm.
**More than one analysis was made for this sample

5 SUMMARY AND RECOMMENDATIONS

The construction of dedicated monitoring facilities to track groundwater-surface water interactions in the Napa Valley Subbasin provides resource managers with an important source of data about these interconnected resources. Data collected in 2015 and 2016 show that shallow groundwater and surface waters were hydraulically connected throughout much of the winter and spring at the mainstem Napa River sites, and longer in some locations. Data from Site 1, the farthest downstream site, show a consistent hydraulic connection during the year, with little variability in groundwater levels. Sites on the mainstem Napa River at Oak Knoll Avenue and Yountville Cross Rd, Sites 3 and 4, showed groundwater elevations above the river stage elevation inducing groundwater flow into the Napa River (gaining conditions) from January until September, when shallow and deep groundwater elevations continued to decline, inducing losing streamflow conditions. These losing conditions persisted into the 2015 winter storms, when high magnitude stormwater Napa River flows (with high stage elevations) induced groundwater recharge.

Losing stream conditions were observed throughout 2015 at Sites 2 and 5 where the direction of groundwater flow is away from the streambed. At Site 5, water level data indicate that the river was hydraulically connected to shallow groundwater during the first half of the year, until flows in the river ceased in July, and again in December 2015 as storms generated runoff leading to renewed flow in the river. At Site 2, located along Dry Creek, groundwater levels were consistently below the streambed elevation in 2015, indicating that groundwater was disconnected from the stream, although recharge to the groundwater system was likely occurring when water flowed in the creek.

Sites 2 and 5 also showed groundwater level differences between the shallow and deep casings of at least 5 feet for most or all of 2015. Given that most groundwater withdrawals in Napa Valley occur from depths greater than 50 feet, these water level differences show how the groundwater system's response to pumping from deeper aquifer units does not necessarily lead to an equivalent reduction in shallow groundwater levels.

Water year 2015 marked the fourth year of California's current statewide drought. Continued data collection in subsequent years will provide a more robust understanding of the range of conditions at these sites.

5.1 Recommendations

Implementation of groundwater/surface water monitoring in the Napa Valley Subbasin has already proven to be very valuable for improving the understanding of surface water and groundwater interactions. Similar facilities at additional locations would help further this understanding and aid in on-going efforts to sustainably manage the Napa Valley Subbasin. Additional monitoring will also be key to the objective of maintaining or improving streamflow during drier years and/or seasons. As a result, it is recommended that in coordination with the Napa RCD and others, as appropriate, the County:

- Evaluate stream gaging network objectives, particularly with respect to the water budget requirements contained in the recently finalized Groundwater Sustainability Plan regulations, and determine the need and feasibility of additional streamflow monitoring sites.

- Consider additional areas that may also benefit from nearby shallow nested groundwater monitoring wells (similar to the facilities constructed as part of the current project) to monitor groundwater/surface water interactions in areas where data are lacking or where geologic conditions indicate that conditions not adequately represented by the current monitoring network.

- Continue efforts to integrate data collected at the groundwater/surface water monitoring sites with existing remote data acquisition systems in order to facilitate monitoring aquifer conditions in real-time.

6 REFERENCES

Graymer, R.W., E.E. Brabb, D.L. Jones, J. Barnes, R.S. Nicholson, and R.E. Stamski. 2007. Geologic map and map database of eastern Sonoma and western Napa Counties, California: U.S. Geological Survey Scientific Investigations Map 2956, http://pubs.usgs.gov/sim/2007/2956/.

Haller, James. Parks Supervisor, City of St. Helena, Person Communication, 2014.

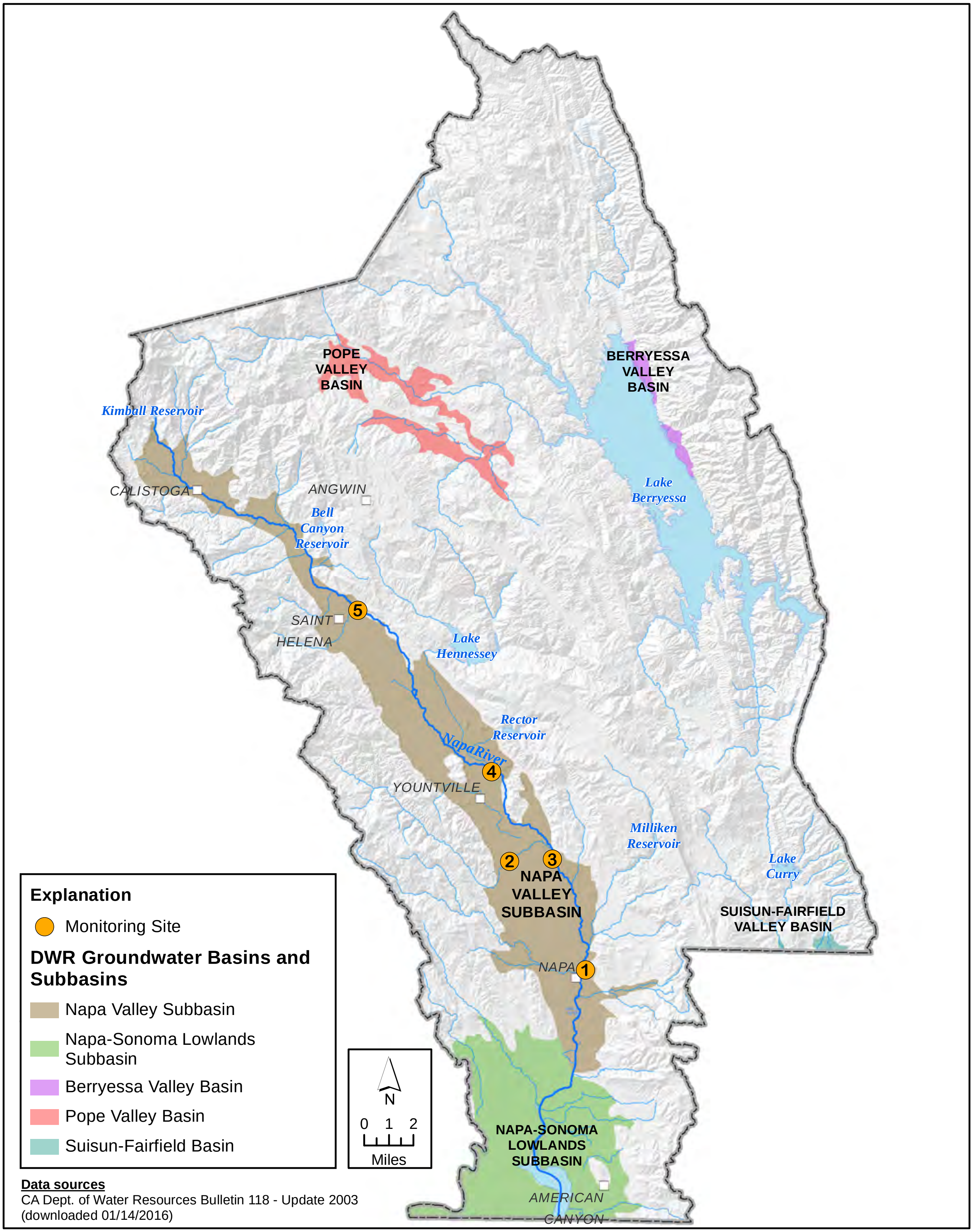
Luhdorff & Scalmanini Consulting Engineers (LSCE). 2011. Napa County groundwater conditions and groundwater monitoring recommendations. Task 4, Report.

LSCE. 2013. Napa County Groundwater Monitoring Plan 2013.

LSCE. 2016. Napa County comprehensive groundwater monitoring program 2015 annual report and CASGEM update.

LSCE and MBK Engineers (LSCE and MBK). 2013. Updated Hydrogeologic Conceptualization and Characterization of Conditions. Prepared for Napa County.

FIGURES



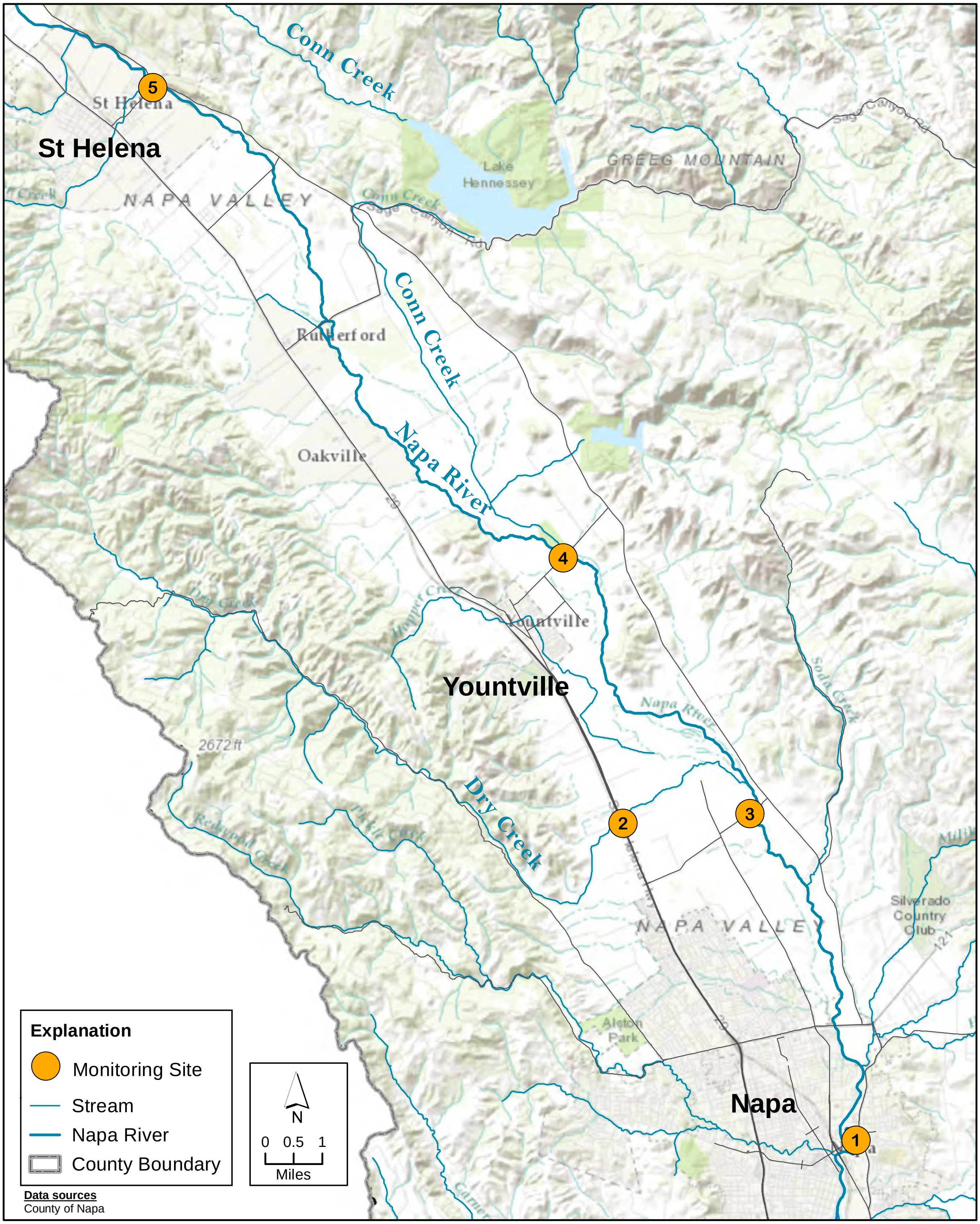
X:\2012 Job Files\12-071\GIS\Figure 1.1 GW-SW Sites and GW Basins.mxd

LUHDORFF & SCALMANINI CONSULTING ENGINEERS

FIGURE 1.1

Napa County Groundwater-Surface Water Monitoring Sites and Groundwater Basins and Subbasins

Napa County Groundwater/Surface Water Monitoring Facilities Report, DWR LGA Grant Program

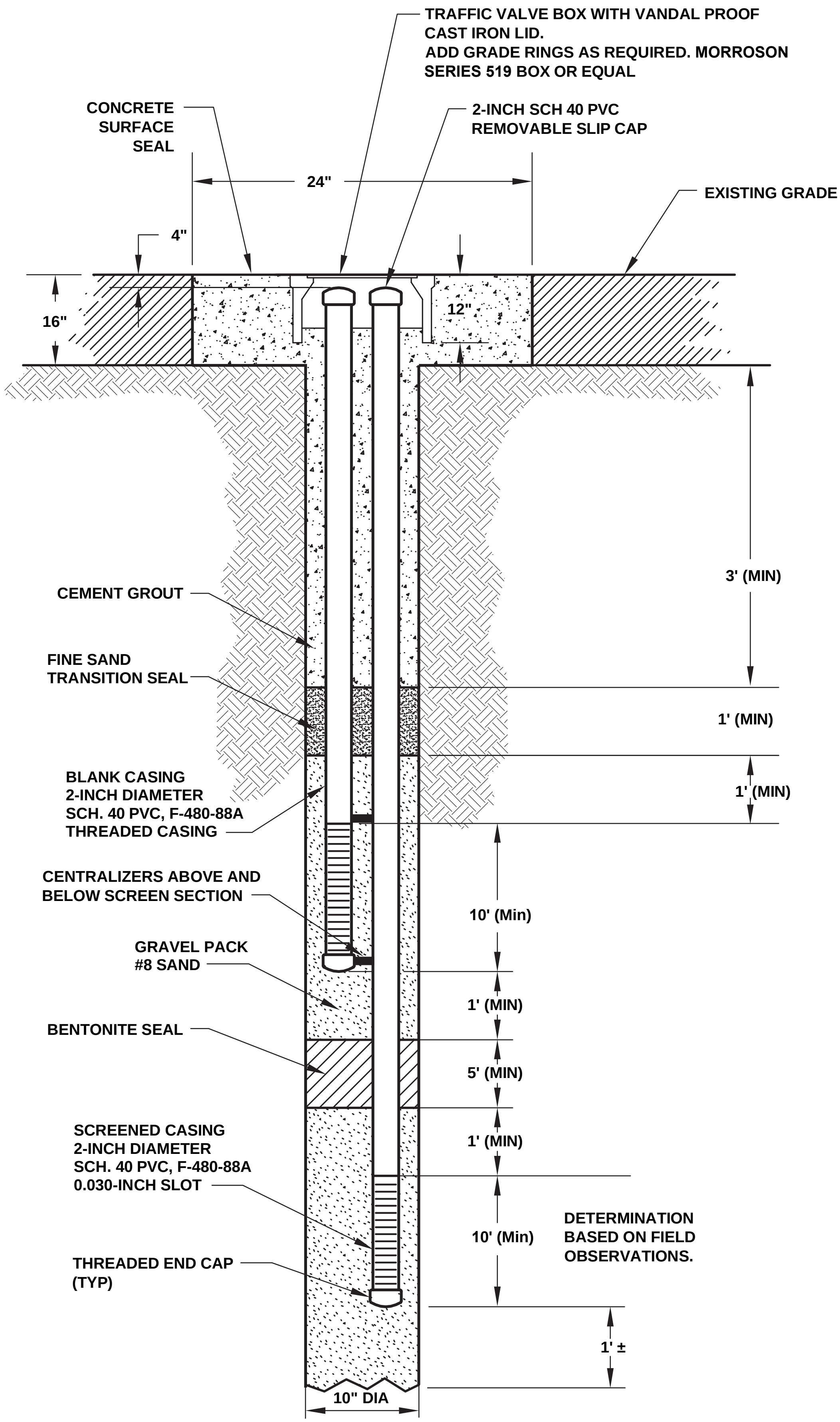


X:\2012 Job Files\12-071\GIS\Figure 2.1 GW-SW Monitoring Sites.mxd

LUHDORFF & SCALMANINI CONSULTING ENGINEERS

FIGURE 2.1
Napa County Groundwater-Surface Water Monitoring Sites Overview

Napa County Groundwater/Surface Water Monitoring Facilities Report, DWR LGA Grant Program



LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

Figure 2.2
Typical Nested Groundwater Monitoring Well Profile

Napa County Groundwater/Surface Water Monitoring Facilities Report, DWR LGA Grant Program

X:\2012 Job Files\12-071\GIS\Figure 2.x Site Maps__As-built mon well sites DDP_layout.mxd

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

FIGURE 2.3
Site Map
Site 1: Napa River at 1st St

Napa County Groundwater/Surface Water Monitoring Facilities Report, DWR LGA Grant Program

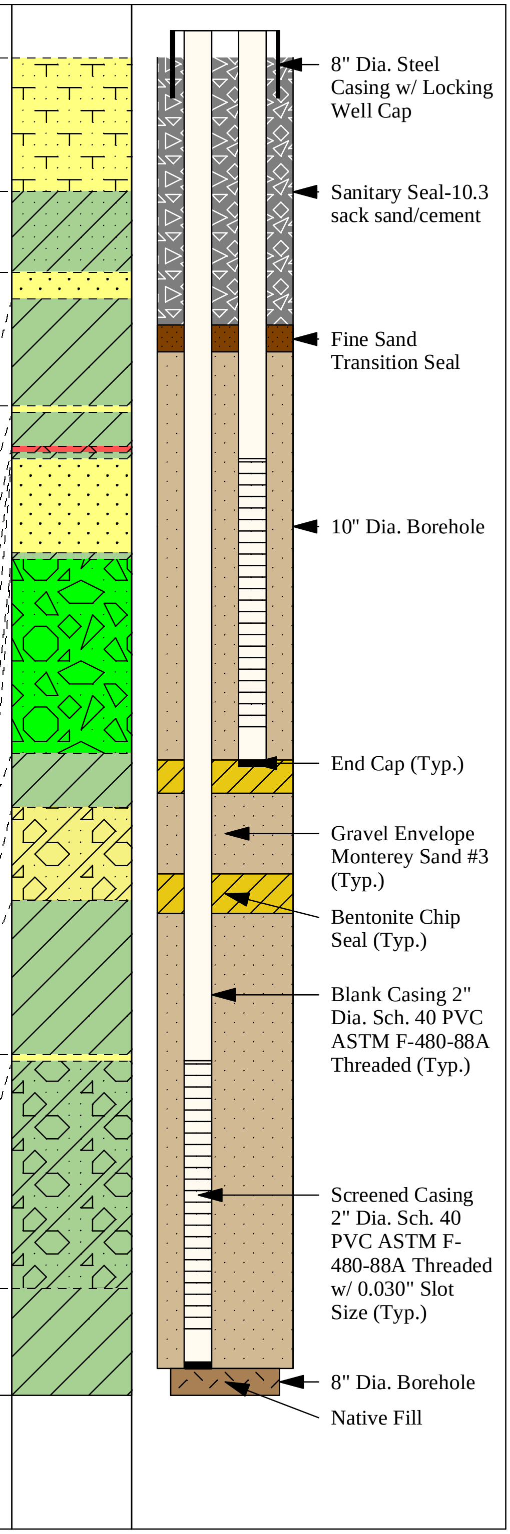
LSCE Project No.	12-1-071	Site:	Site #1- Napa River at 1st Street
Well Name:	Napa County-214s-swgw1	Drilling Method:	Hollow Stem Auger; pilot hole 8"-diameter reamed hole 10"-diameter
Lat./Long.:	38.30223/-122.27845		
Drilled By:	Clear Heart Drilling	Sampling Method:	Core Sample Barrel
Driller:	Rick Schneider	Drilling/Installation Date:	9/2/14 - 9/4/14
Site Geologist:	Charlie Jenkins, P.G.	Boring Depth (ft):	100

Well Depth (ft): 53

Well Screen (ft): 30-50

Lithologic Description | **Graphic Log** | **Well Profile As Built**

Depth (ft)	Lithologic Description
0	0-10': Silty Sand- 70% fine to medium sand, 30% non-plastic fines, minor clay, brown, dry
5	Slightly moist
10	10-16': Sandy Clay- 70% medium plastic fines, 30% fine sand, brown, stiff, moist
15	16-18': Sand- 95% very fine to coarse sand, 5% gravel, poorly sorted, gravel up to 1/4", minor clay, saturated, first encountered water at 16 ft.
20	18-26': Clay- brown, soft, medium plastic, 10% fine sand, wet
25	26-26.5': Sand- 95% fine to coarse sand, 5% gravel, saturated
30	26.5-29': Clay- 95% medium plastic fines, 5% fine sand, brown mottled greenish gray
35	29-29.5': Gravel stringer, wet, approximately 2" thick
	29.5-30': Clay- 95% medium plastic fines, 5% fine sand, brown mottled greenish gray
40	30-37': Sand- 85% very fine to coarse sand, 15% gravel, gravel up to 1/4", saturated, gravel up to 25% at 35 ft.
45	37-37.5': Clay- greenish gray, medium plastic, sticky, lense approximately 3" thick
50	37.5-52': Sand and Gravel- 70% fine to coarse sand, sub-rounded to sub-angular, 30% gravel up to 1", saturated, greenish gray in overall color, multi-colored lithics
55	52-56': Clay- 95% medium plastic fines, 5% fine sand, yellowish brown mottled light gray, hard, slightly moist
60	56-63': Sand and Gravel with Clay- 40% fine to coarse sand, 20% gravel, 40% medium plastic fines, yellowish brown, saturated, sand sub-rounded to sub-angular, gravel up to 1", trace cobbles
65	63-74.5': Clay- >95% medium plastic fines, yellowish brown mottled light gray, hard, slightly moist
70	
75	74.5-75': approximately 1" thick sandy lense, wet
80	75-92': Clay with Sand and Gravel- 30% fine to coarse sand, 20% gravel, 50% medium plastic fines, brown mottled reddish brown, wet, gravel up to 1/4"
85	
90	92-100': Clay- >95% medium plastic fines, yellowish brown mottled light gray, hard, moist, trace sand
95	
100	
105	
110	



*Measurement w/ Recreational Handheld Unit (Garmin Summit HC)

FIGURE 2.4

Monitoring Well As-Built Diagram - Site 1 NapaCounty-214s-swgw1

LUHDORFF & SCALMANINI CONSULTING ENGINEERS

LSCE Project No. 12-1-071
Well Name: Napa County-215d-swgw1
Lat./Long.: 38.30223/-122.27845
Drilled By: Clear Heart Drilling
Driller: Rick Schneider
Site Geologist: Charlie Jenkins, P.G.

Site: Site #1- Napa River at 1st Street
Drilling Method: Hollow Stem Auger; pilot hole 8"-diameter reamed hole 10"-diameter
Sampling Method: Core Sample Barrel
Drilling/Installation Date: 9/2/14 - 9/4/14
Well Depth (ft): 98
Boring Depth (ft): 100
Well Screen (ft): 75-95

Lithologic Description

0-10': Silty Sand- 70% fine to medium sand, 30% non-plastic fines, minor clay, brown, dry

Slightly moist

10-16': Sandy Clay- 70% medium plastic fines, 30% fine sand, brown, stiff, moist

16-18': Sand- 95% very fine to coarse sand, 5% gravel, poorly sorted, gravel up to 1/4", minor clay, saturated, first encountered water at 16 ft.

18-26': Clay- brown, soft, medium plastic, 10% fine sand, wet

26-26.5': Sand- 95% fine to coarse sand, 5% gravel, saturated

26.5-29': Clay- 95% medium plastic fines, 5% fine sand, brown mottled greenish gray

29-29.5': Gravel stringer, wet, approximately 2" thick

29.5-30': Clay- 95% medium plastic fines, 5% fine sand, brown mottled greenish gray

30-37': Sand- 85% very fine to coarse sand, 15% gravel, gravel up to 1/4", saturated, gravel up to 25% at 35 ft.

37-37.5': Clay- greenish gray, medium plastic, sticky, lense approximately 3" thick

37.5-52': Sand and Gravel- 70% fine to coarse sand, sub-rounded to sub-angular, 30% gravel up to 1", saturated, greenish gray in overall color, multi-colored lithics

52-56': Clay- 95% medium plastic fines, 5% fine sand, yellowish brown mottled light gray, hard, slightly moist

56-63': Sand and Gravel with Clay- 40% fine to coarse sand, 20% gravel, 40% medium plastic fines, yellowish brown, saturated, sand sub-rounded to sub-angular, gravel up to 1", trace cobbles

63-74.5': Clay- >95% medium plastic fines, yellowish brown mottled light gray, hard, slightly moist

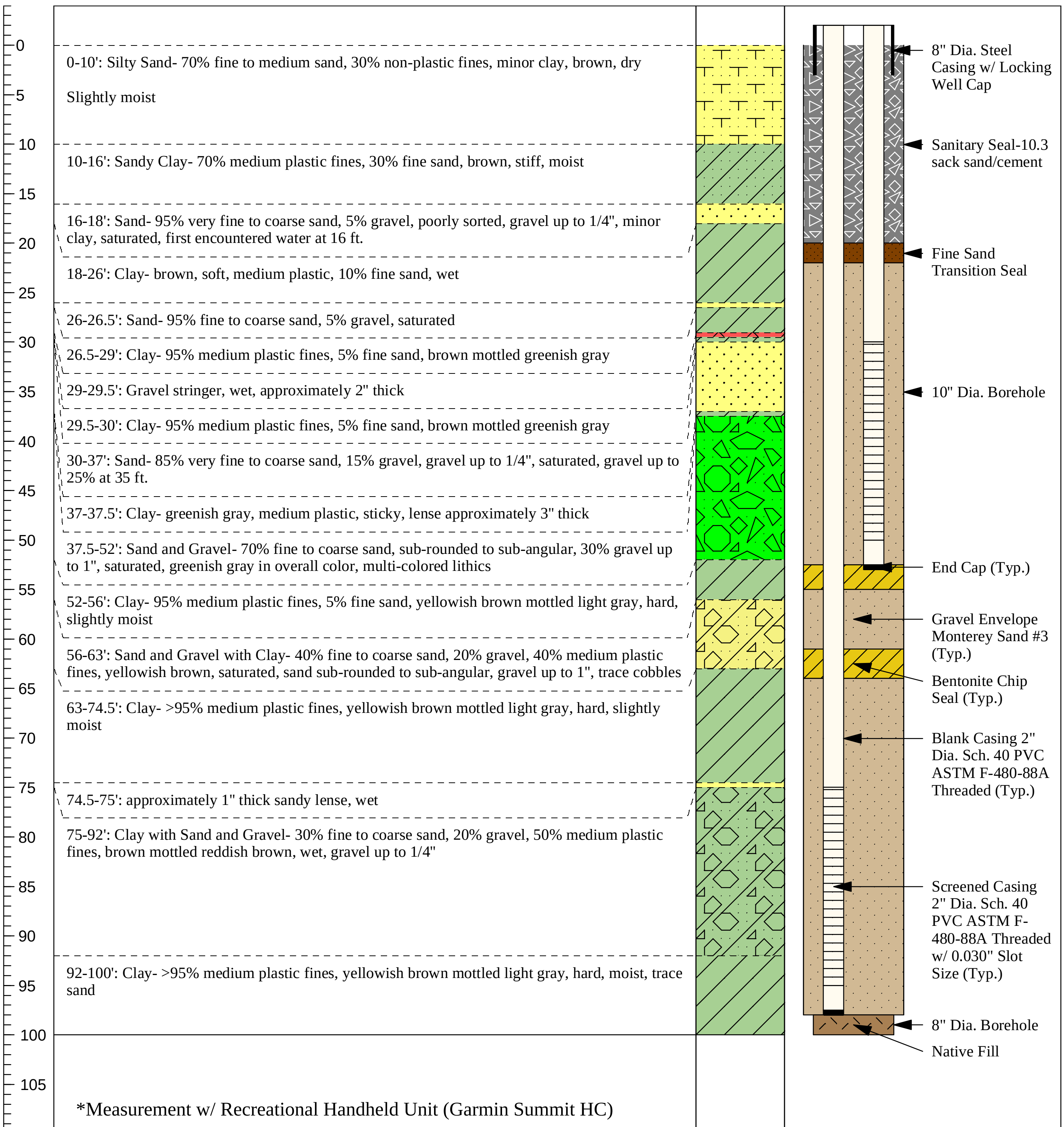
74.5-75': approximately 1" thick sandy lense, wet

75-92': Clay with Sand and Gravel- 30% fine to coarse sand, 20% gravel, 50% medium plastic fines, brown mottled reddish brown, wet, gravel up to 1/4"

92-100': Clay- >95% medium plastic fines, yellowish brown mottled light gray, hard, moist, trace sand

*Measurement w/ Recreational Handheld Unit (Garmin Summit HC)

Graphic Log **Well Profile As Built**



LUHDORFF & SCALMANINI CONSULTING ENGINEERS

FIGURE 2.5

Monitoring Well As-Built Diagram - Site 1 NapaCounty-215d-swgw1

X:\2012 Job Files\12-071\GIS\Figure 2.x Site Maps__As-built mon well sites DDP_layout.mxd

LUHDORFF & SCALMANINI CONSULTING ENGINEERS

FIGURE 2.6
Site Map
Site 2: Dry Creek at Washington St

Napa County Groundwater/Surface Water Monitoring Facilities Report, DWR LGA Grant Program

LSCE Project No. 12-1-071
Well Name: Napa County-216s-swgw2
Lat./Long.: 38.365231/-122.337532
Drilled By: Clear Heart Drilling
Driller: Rick Schneider
Site Geologist: Charlie Jenkins, P.G.

Site: Site #2- Dry Creek at Washington Street
Drilling Method: Hollow Stem Auger; pilot hole 8"-diameter reamed hole 10"-diameter
Sampling Method: Core Sample Barrel
Drilling/Installation Date: 9/22/14 - 9/23/14
Well Depth (ft): 50
Boring Depth (ft): 100
Well Screen (ft): 25-45

Lithologic Description

0-0.33': Approximately 4-inch thick asphalt road surface

0.33-4.5': Fill- gravel, sand, and fines mixture, brown, dry

4.5-7': Gravelly Sand with Clay- 40% very fine to coarse sand, 30% gravel up to 1", 30% medium plastic fines, slightly moist

7-16': Clay- 90% medium plastic fines, 10% very fine sand, brown, slightly moist

16-23': Sandy Clay- 70% medium plastic fines, 30% very fine to fine sand, yellowish brown mottled light gray, slightly moist

23-45': Gravelly Sandy Clay- 30% very fine to coarse sand, 20% gravel up to 1", 50% medium plastic fines, wet to saturated, sand and gravel in a clay matrix

saturated at 34 feet

45-47': Gravelly Sand- 80% very fine to coarse sand, 20% gravel up to 1", sand and gravel sub-round to sub-angular, saturated

47-49.5': Clay- >95% medium plastic fines, brown, moist, some sandy stringers less than 1" thick

49.5-51': Gravelly Sand- 70% very fine to coarse sand, 20% gravel up to 1", 10% fines, saturated

51-59': Clay- >95% medium plastic fines, reddish brown mottled light gray, sticky, soft in places

59-62.5': Clay- >95% medium plastic fines, greenish gray, hard, moist

62.5-73.5': Clay- >95% medium plastic fines, reddish brown mottled light gray, moist

73.5-77': Clay- 80% medium plastic fines, 10% fine sand, 10% gravel up to 3/4", reddish brown mottled light gray, stiff, moist

77-79': Sand- 85% fine to coarse sand, 15% fines, sub-round to sub-angular, minor gravel, poorly sorted, saturated

79-79.5': Clay- 90% medium plastic fines, 10% very fine sand, reddish brown mottled light gray

79.5-81': Sand- 90% very fine to medium sand, 10% fines, sub-round to sub-angular, saturated

81-100': Clay- 80% medium plastic fines, 20% very fine to fine sand, stiff, moist, gray mottled reddish brown

approximately 4" thick wet gravel lense at 85.5 ft

*Measurement w/ Recreational Handheld Unit (Garmin Summit HC)

Graphic Log **Well Profile As Built**

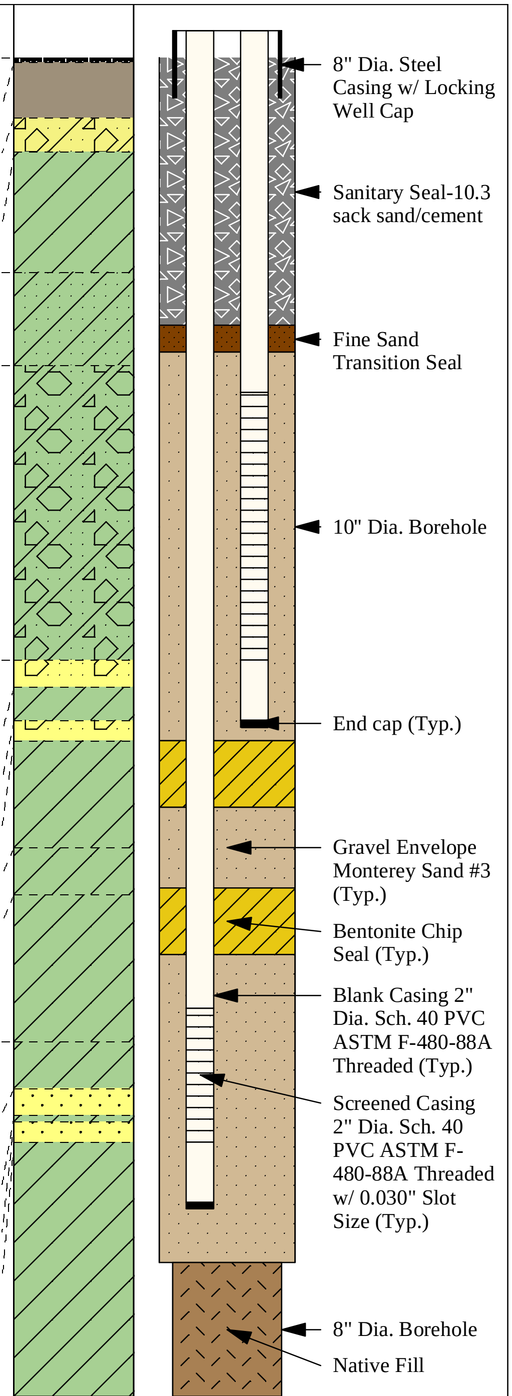


FIGURE 2.7

LUHDORFF & SCALMANINI CONSULTING ENGINEERS

Monitoring Well As-Built Diagram - Site 2 NapaCounty-216s-swgw2

Napa County Groundwater/Surface Water Monitoring Facilities Report, DWR LGA Grant Program

LSCE Project No.	12-1-071	Site:	Site #2- Dry Creek at Washington Street
Well Name:	Napa County-217d-swgw2	Drilling Method:	Hollow Stem Auger; pilot hole 8"-diameter reamed hole 10"-diameter
Lat./Long.:	38.365231/-122.337532		
Drilled By:	Clear Heart Drilling	Sampling Method:	Core Sample Barrel
Driller:	Rick Schneider	Drilling/Installation Date:	9/22/14 - 9/23/14
Site Geologist:	Charlie Jenkins, P.G.	Boring Depth (ft):	100
		Well Depth (ft):	86
		Well Screen (ft):	71-81

Lithologic Description

0-0.33': Approximately 4-inch thick asphalt road surface

0.33-4.5': Fill- gravel, sand, and fines mixture, brown, dry

4.5-7': Gravelly Sand with Clay- 40% very fine to coarse sand, 30% gravel up to 1", 30% medium plastic fines, slightly moist

7-16': Clay- 90% medium plastic fines, 10% very fine sand, brown, slightly moist

16-23': Sandy Clay- 70% medium plastic fines, 30% very fine to fine sand, yellowish brown mottled light gray, slightly moist

23-45': Gravelly Sandy Clay- 30% very fine to coarse sand, 20% gravel up to 1", 50% medium plastic fines, wet to saturated, sand and gravel in a clay matrix

saturated at 34 feet

45-47': Gravelly Sand- 80% very fine to coarse sand, 20% gravel up to 1", sand and gravel sub-round to sub-angular, saturated

47-49.5': Clay- >95% medium plastic fines, brown, moist, some sandy stringers less than 1" thick

49.5-51': Gravelly Sand- 70% very fine to coarse sand, 20% gravel up to 1", 10% fines, saturated

51-59': Clay- >95% medium plastic fines, reddish brown mottled light gray, sticky, soft in places

59-62.5': Clay- >95% medium plastic fines, greenish gray, hard, moist

62.5-73.5': Clay- >95% medium plastic fines, reddish brown mottled light gray, moist

73.5-77': Clay- 80% medium plastic fines, 10% fine sand, 10% gravel up to 3/4", reddish brown mottled light gray, stiff, moist

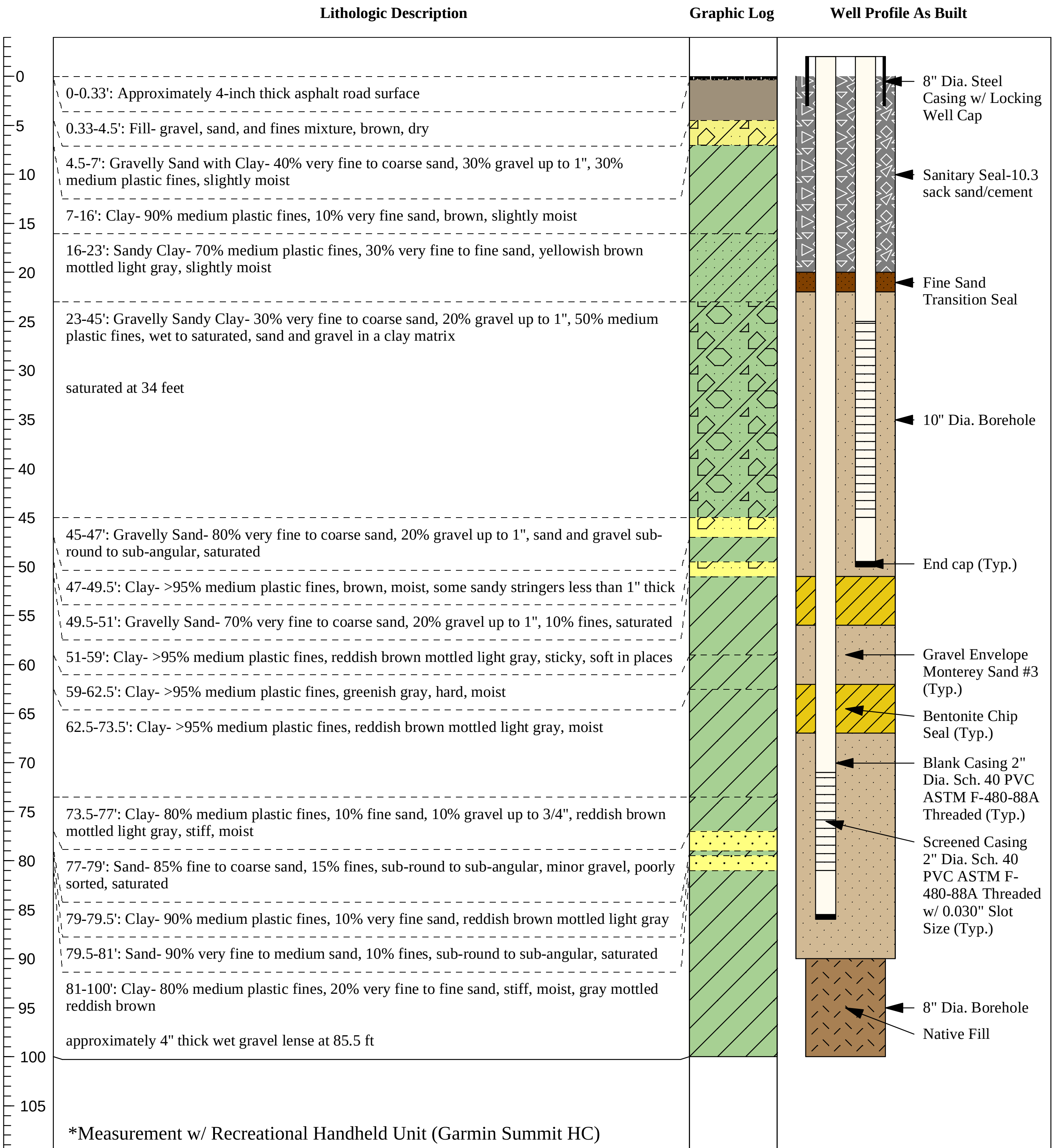
77-79': Sand- 85% fine to coarse sand, 15% fines, sub-round to sub-angular, minor gravel, poorly sorted, saturated

79-79.5': Clay- 90% medium plastic fines, 10% very fine sand, reddish brown mottled light gray

79.5-81': Sand- 90% very fine to medium sand, 10% fines, sub-round to sub-angular, saturated

81-100': Clay- 80% medium plastic fines, 20% very fine to fine sand, stiff, moist, gray mottled reddish brown

approximately 4" thick wet gravel lense at 85.5 ft



*Measurement w/ Recreational Handheld Unit (Garmin Summit HC)

FIGURE 2.8

LUHDORFF & SCALMANINI CONSULTING ENGINEERS

Monitoring Well As-Built Diagram - Site 2 NapaCounty-217d-swgw2

X:\2012 Job Files\12-071\GIS\Figure 2.x Site Maps__As-built mon well sites DDP_layout.mxd

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

FIGURE 2.9
Site Map
Site 3:Napa River at Oak Knoll Ave

LSCE Project No. 12-1-071
Well Name: Napa County-218s-swgw3
Lat./Long.: 38.367255/-122.304954
Drilled By: Clear Heart Drilling
Driller: Rick Schneider
Site Geologist: Charlie Jenkins, P.G.

Site: Site #3- Napa River at Oak Knoll Avenue
Drilling Method: Hollow Stem Auger; pilot hole 8"-diameter reamed hole 10"-diameter
Sampling Method: Core Sample Barrel
Drilling/Installation Date: 9/8/14 - 9/9/14
Well Depth (ft): 40
Boring Depth (ft): 100
Well Screen (ft): 25-35

Lithologic Description

0-13': Silty Sand- 70% very fine to medium sand, 30% non-plastic fines, brown, dry to slightly moist

13-20': Sand- 95% very fine to medium sand, 5% fines, slightly moist, brown

2-inch thick gravel lense at 19 ft., slightly moist

20-35': Gravelly Sand- 60% very fine to coarse sand, 35% gravel up to 1", rounded, 5% fines, slightly moist

50% very fine to coarse sand, 40% gravel, 10% fines, sand and gravel sub-angular to round, first encountered water at 29 ft.,

40% very fine to coarse sand, 40% gravel up to 1.5", 20% fines, saturated

35-40': Sandy Clay- 30-40% very fine to medium sand, 60-70% medium plastic fines, yellowish brown, very moist to wet, trace gravel

40-45': Clay- 10% very fine sand, 90% medium plastic fines, yellowish brown mottled light gray, moist

45-48': Sandy Clay- 30-40% fine to medium sand, 60-70% medium plastic fines, yellowish brown mottle dlight gray, very moist to wet, minor gravel

48-54': Gravelly Sand with Clay- 30% fine to coarse sand, 30% gravel up to 1", 40% medium plastic fines, very moist to wet, yellowish brown, some large cobbles up to 2.5"

54-64': Clay- 10% very fine sand, 90% medium plastic fines, yellowish brown mottled light gray, moist

64-65': Clay- >95% medium plastic fines, dark gray, stiff/hard, moist

65-78': Clay- >95% medium plastic fines, greenish gray, hard, moist

78-80.5': Clayey Sand- 60% very fine to medium sand, 40% fines, brown, wet

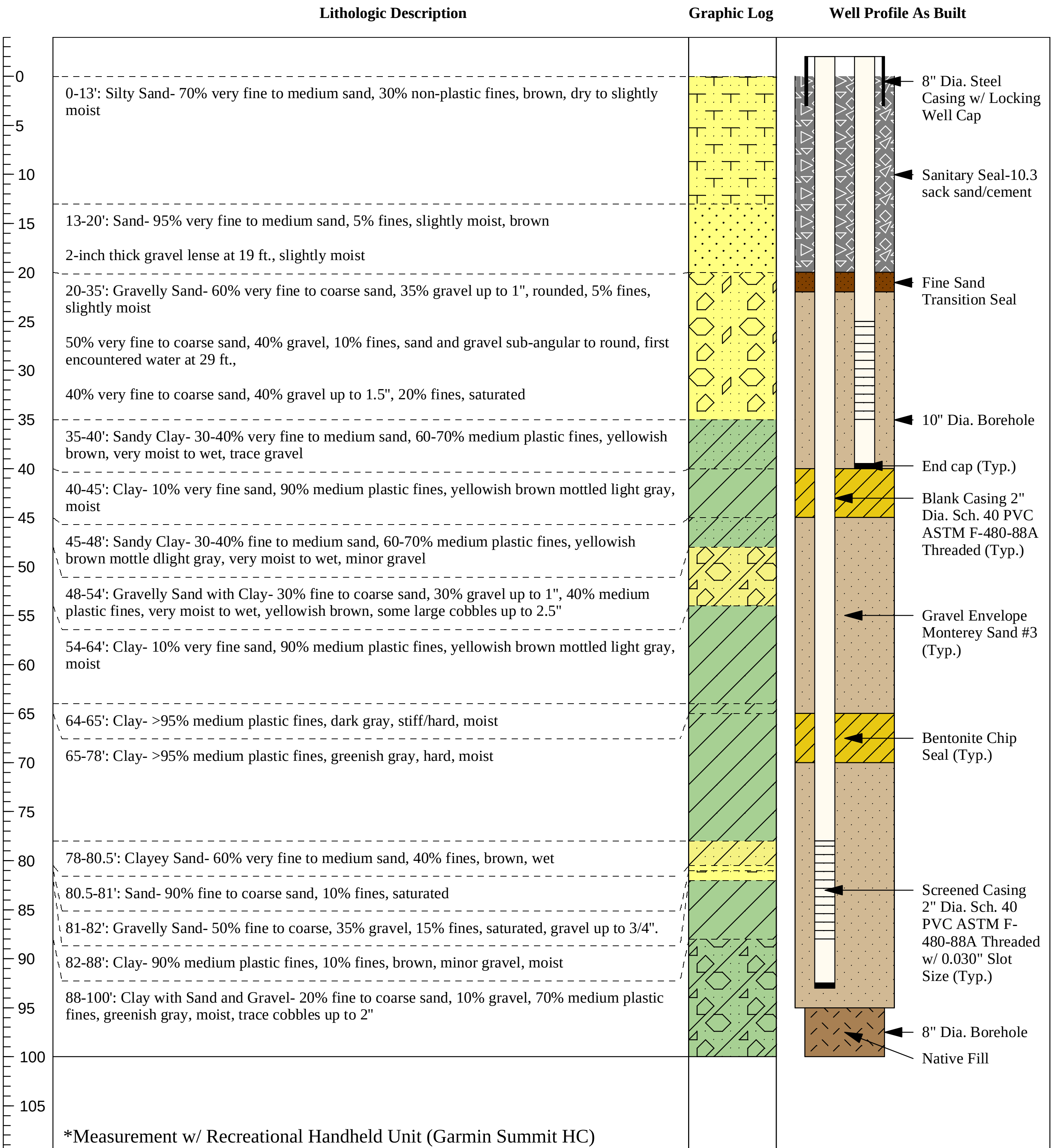
80.5-81': Sand- 90% fine to coarse sand, 10% fines, saturated

81-82': Gravelly Sand- 50% fine to coarse, 35% gravel, 15% fines, saturated, gravel up to 3/4".

82-88': Clay- 90% medium plastic fines, 10% fines, brown, minor gravel, moist

88-100': Clay with Sand and Gravel- 20% fine to coarse sand, 10% gravel, 70% medium plastic fines, greenish gray, moist, trace cobbles up to 2"

*Measurement w/ Recreational Handheld Unit (Garmin Summit HC)



LUHDORFF & SCALMANINI CONSULTING ENGINEERS

FIGURE 2.10

Monitoring Well As-Built Diagram - Site 3 NapaCounty-218s-swgw3

Napa County Groundwater/Surface Water Monitoring Facilities Report, DWR LGA Grant Program

LSCE Project No. 12-1-071

Well Name: Napa County-219d-swgw3

Lat./Long.: 38.367255/-122.304954

Drilled By: Clear Heart Drilling

Driller: Rick Schneider

Site Geologist: Charlie Jenkins, P.G.

Site: Site #3- Napa River at Oak Knoll Avenue

Drilling Method: Hollow Stem Auger; pilot hole 8"-diameter reamed hole 10"-diameter

Sampling Method: Core Sample Barrel

Drilling/Installation Date: 9/8/14 - 9/9/14

Well Depth (ft): 93

Boring Depth (ft): 100

Well Screen (ft): 78-88

Lithologic Description

0-13': Silty Sand- 70% very fine to medium sand, 30% non-plastic fines, brown, dry to slightly moist

13-20': Sand- 95% very fine to medium sand, 5% fines, slightly moist, brown

2-inch thick gravel lense at 19 ft., slightly moist

20-35': Gravelly Sand- 60% very fine to coarse sand, 35% gravel up to 1", rounded, 5% fines, slightly moist

50% very fine to coarse sand, 40% gravel, 10% fines, sand and gravel sub-angular to round, first encountered water at 29 ft.,

40% very fine to coarse sand, 40% gravel up to 1.5", 20% fines, saturated

35-40': Sandy Clay- 30-40% very fine to medium sand, 60-70% medium plastic fines, yellowish brown, very moist to wet, trace gravel

40-45': Clay- 10% very fine sand, 90% medium plastic fines, yellowish brown mottled light gray, moist

45-48': Sandy Clay- 30-40% fine to medium sand, 60-70% medium plastic fines, yellowish brown mottle dlight gray, very moist to wet, minor gravel

48-54': Gravelly Sand with Clay- 30% fine to coarse sand, 30% gravel up to 1", 40% medium plastic fines, very moist to wet, yellowish brown, some large cobbles up to 2.5"

54-64': Clay- 10% very fine sand, 90% medium plastic fines, yellowish brown mottled light gray, moist

64-65': Clay- >95% medium plastic fines, dark gray, stiff/hard, moist

65-78': Clay- >95% medium plastic fines, greenish gray, hard, moist

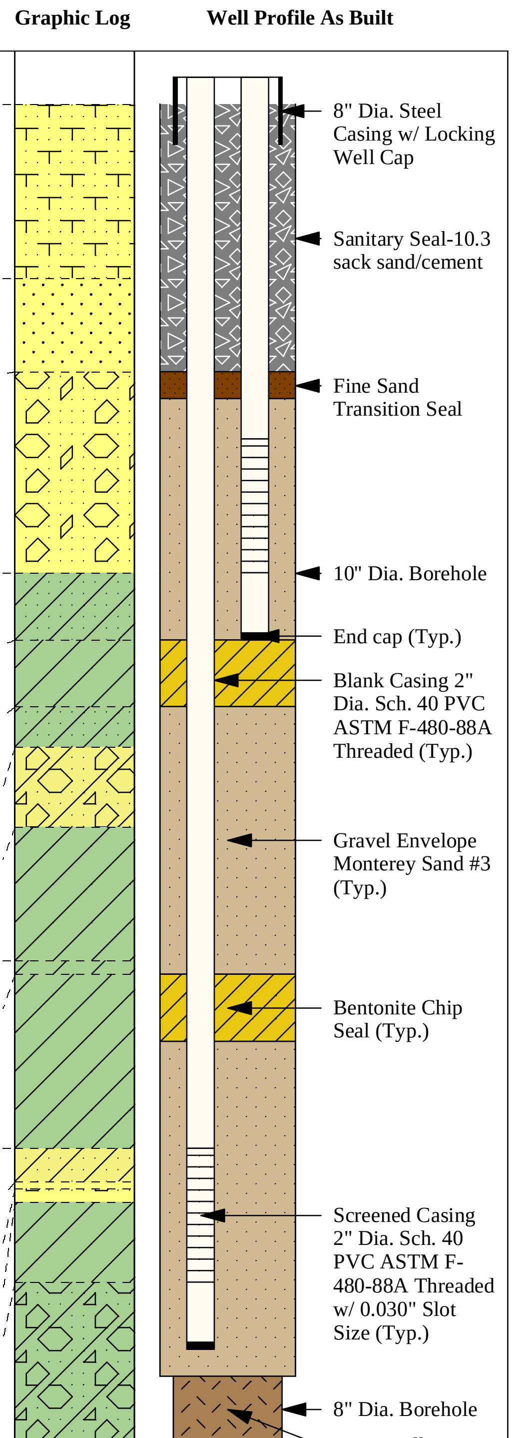
78-80.5': Clayey Sand- 60% very fine to medium sand, 40% fines, brown, wet

80.5-81': Sand- 90% fine to coarse sand, 10% fines, saturated

81-82': Gravelly Sand- 50% fine to coarse, 35% gravel, 15% fines, saturated, gravel up to 3/4".

82-88': Clay- 90% medium plastic fines, 10% fines, brown, minor gravel, moist

88-100': Clay with Sand and Gravel- 20% fine to coarse sand, 10% gravel, 70% medium plastic fines, greenish gray, moist, trace cobbles up to 2"



*Measurement w/ Recreational Handheld Unit (Garmin Summit HC)

LUHDORFF & SCALMANINI CONSULTING ENGINEERS

FIGURE 2.11

Monitoring Well As-Built Diagram - Site 3 NapaCounty-219d-swgw3

X:\2012 Job Files\12-071\GIS\Figure 2.x Site Maps__As-built mon well sites DDP_layout.mxd

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

FIGURE 2.12
Site Map
Site 4: Napa River at Yountville Cross Rd

Napa County Groundwater/Surface Water Monitoring Facilities Report, DWR LGA Grant Program

LSCE Project No. 12-1-071
Well Name: Napa County-220s-swgw4
Lat./Long.: 38.417573/-122.352665
Drilled By: Clear Heart Drilling
Driller: Rick Schneider
Site Geologist: Charlie Jenkins, P.G.

Site: Site #4- Napa River at Yountville Cross Road
Drilling Method: Hollow Stem Auger; pilot hole 8"-diameter reamed hole 10"-diameter
Sampling Method: Core Sample Barrel
Drilling/Installation Date: 9/10/14 - 9/11/14
Boring Depth (ft): 100
Well Depth (ft): 45
Well Screen (ft): 25-40

Lithologic Description

0-3': Fill- gravel, sand, and fines mixture, brown, dry

3-5': Silty Sand- 70% fine to medium sand, 30% fines, brown, dry

5-20': Clay- 90% medium plastic fines, 10% very fine sand, dark brown, slightly moist

2-inch thick sandy lense at 19.5 ft., damp

20-34': Sandy Clay- 25% very fine to medium sand, 75% low plastic fines, moist, brown

34-35': Sand- 85% very fine to medium sand, 15% fines, sub-round to sub-angular, saturated

35-48.5': Gravelly Sand- 60% fine to coarse sand, 30% gravel up to 3/4", 10% fines, saturated

cobbles up to 2"

48.5-51': Clay- 90% medium plastic fines, 10% very fine sand, brown mottled light gray, moist

51-56': Silty Sand- 60% fine to medium sand, 40% fines, overall dark brown, partially weakly cemented, wet

56-65': Sand- 85% very fine to medium sand, 15% fines, wet, loose, minor gravel

65-67.5': Clay- 80% medium plastic fines, 20% very fine sand, dark brown, moist

67.5-74': Sandy Clay- 30% very fine to fine sand, 70% low plastic fines, very moist, greenish gray

74-78': Sand- 70% very fine to coarsae sand, 30% fines, sub-round to sub-angular, wet, overall greenish gray with multi-colored lithics

78-88': Clay- >95% medium plastic fines, yellowish brown mottled light gray, moist

3-inch thick sand lense at 81 ft., very fine to coarse, saturated

88-91.5': Sand- 90% very fine to coarse sand, 10% fines, wet to saturated

91.5-100': Clay- 90% medium plastic fines, 10% fine sand, brown, hard, moist

5-inch thick gravelly lense at 96 ft., saturated

*Measurement w/ Recreational Handheld Unit (Garmin Summit HC)

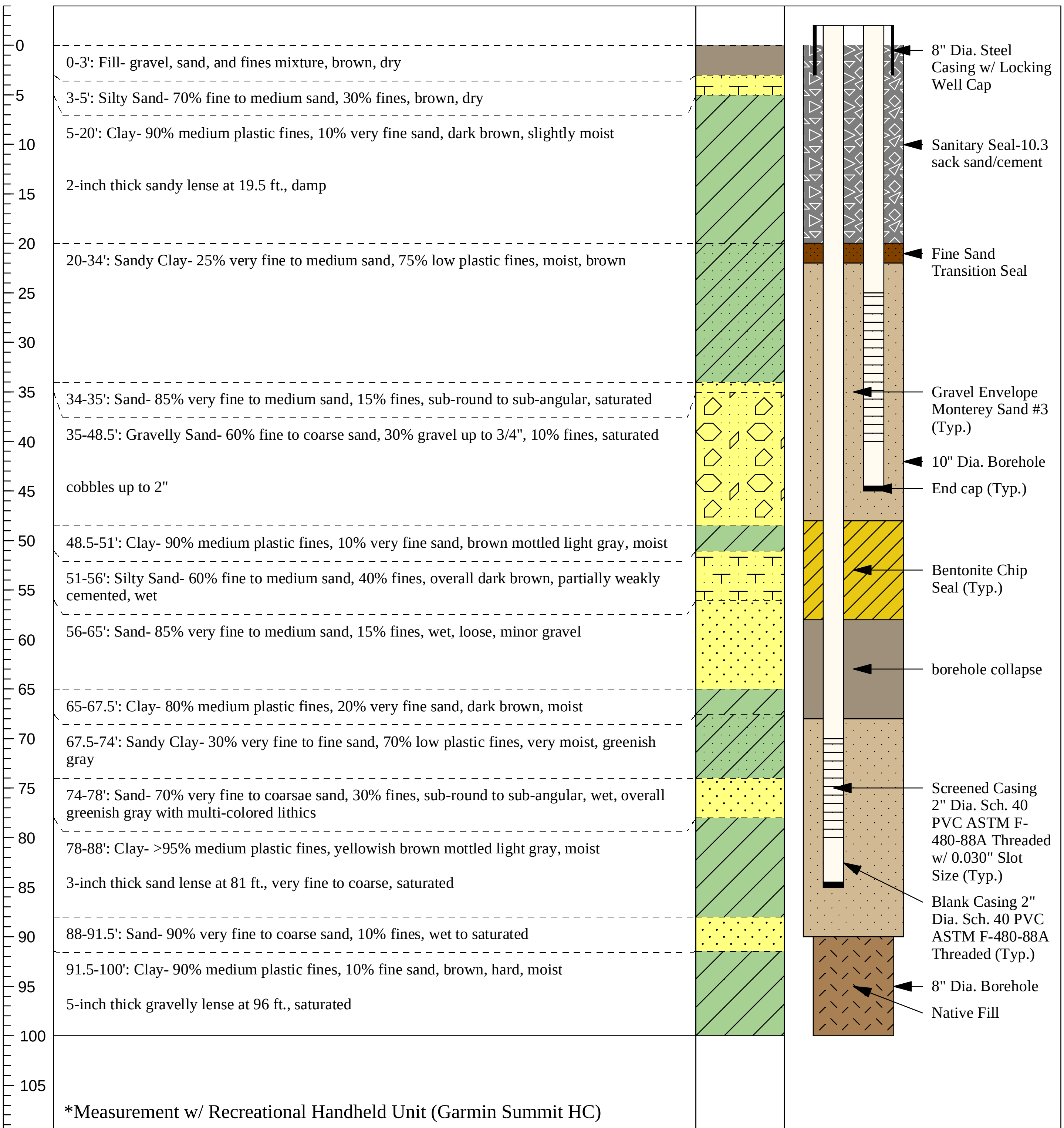


FIGURE 2.13

Monitoring Well As-Built Diagram - Site 4 NapaCounty-220s-swgw4

LUHDORFF & SCALMANINI CONSULTING ENGINEERS

LSCE Project No. 12-1-071
Well Name: Napa County-221d-swgw4
Lat./Long.: 38.417573/-122.352665
Drilled By: Clear Heart Drilling
Driller: Rick Schneider
Site Geologist: Charlie Jenkins, P.G.

Site: Site #4- Napa River at Yountville Cross Road
Drilling Method: Hollow Stem Auger; pilot hole 8"-diameter reamed hole 10"-diameter
Sampling Method: Core Sample Barrel
Drilling/Installation Date: 9/10/14 - 9/11/14
Well Depth (ft): 85
Boring Depth (ft): 100
Well Screen (ft): 70-80

Lithologic Description

0-3': Fill- gravel, sand, and fines mixture, brown, dry

3-5': Silty Sand- 70% fine to medium sand, 30% fines, brown, dry

5-20': Clay- 90% medium plastic fines, 10% very fine sand, dark brown, slightly moist

2-inch thick sandy lense at 19.5 ft., damp

20-34': Sandy Clay- 25% very fine to medium sand, 75% low plastic fines, moist, brown

34-35': Sand- 85% very fine to medium sand, 15% fines, sub-round to sub-angular, saturated

35-48.5': Gravelly Sand- 60% fine to coarse sand, 30% gravel up to 3/4", 10% fines, saturated

cobbles up to 2"

48.5-51': Clay- 90% medium plastic fines, 10% very fine sand, brown mottled light gray, moist

51-56': Silty Sand- 60% fine to medium sand, 40% fines, overall dark brown, partially weakly cemented, wet

56-65': Sand- 85% very fine to medium sand, 15% fines, wet, loose, minor gravel

65-67.5': Clay- 80% medium plastic fines, 20% very fine sand, dark brown, moist

67.5-74': Sandy Clay- 30% very fine to fine sand, 70% low plastic fines, very moist, greenish gray

74-78': Sand- 70% very fine to coarsae sand, 30% fines, sub-round to sub-angular, wet, overall greenish gray with multi-colored lithics

78-88': Clay- >95% medium plastic fines, yellowish brown mottled light gray, moist

3-inch thick sand lense at 81 ft., very fine to coarse, saturated

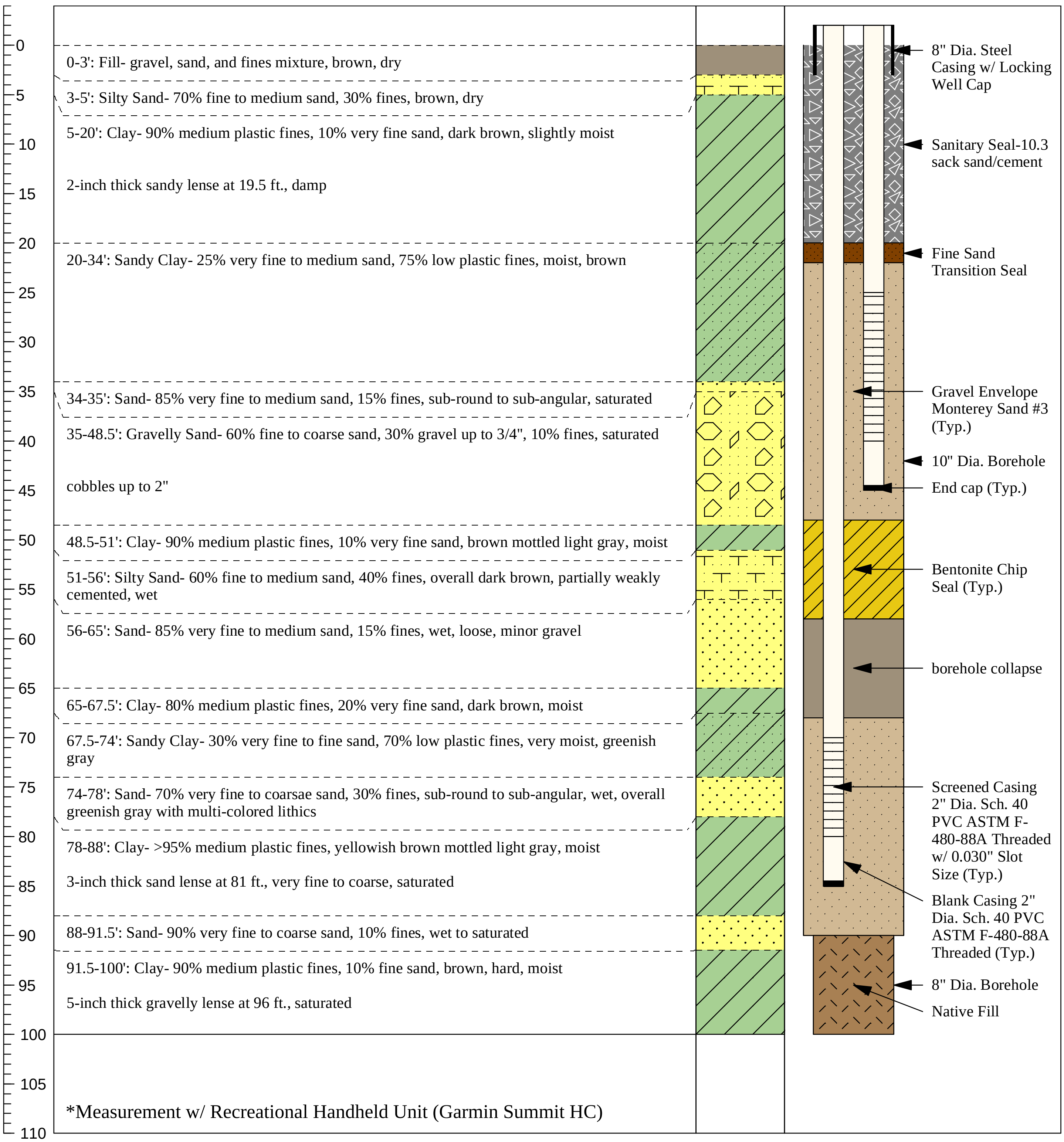
88-91.5': Sand- 90% very fine to coarse sand, 10% fines, wet to saturated

91.5-100': Clay- 90% medium plastic fines, 10% fine sand, brown, hard, moist

5-inch thick gravelly lense at 96 ft., saturated

*Measurement w/ Recreational Handheld Unit (Garmin Summit HC)

Graphic Log | **Well Profile As Built**



LUHDORFF & SCALMANINI CONSULTING ENGINEERS

FIGURE 2.14

Monitoring Well As-Built Diagram - Site 4 NapaCounty-221d-swgw4

X:\2012 Job Files\12-071\GIS\Figure 2.x Site Maps__As-built mon well sites DDP_layout.mxd

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

FIGURE 2.15
Site Map
Site 5: Napa River at Pope St

LSCE Project No. 12-1-071
Well Name: Napa County-222s-swgw5
Lat./Long.: 38.510898/-122.456426
Drilled By: Clear Heart Drilling
Driller: Rick Schneider
Site Geologist: Charlie Jenkins, P.G.

Site: Site #5- Napa River at Pope Street
Drilling Method: Hollow Stem Auger; pilot hole 8"-diameter reamed hole 10"-diameter
Sampling Method: Core Sample Barrel
Drilling/Installation Date: 9/15/14 - 9/16/14
Well Depth (ft): 40
Boring Depth (ft): 100
Well Screen (ft): 25-35

Lithologic Description

0-1': Topsoil- brown, with organics

1-15': Silty Sand- 70% very fine to medium sand, 30% fines, dark brown, slightly moist, minor gravel

15-20': Sand- 90% fine to medium sand, 10% fines, brown, slightly moist

20-25': Gravelly Sand with Clay- 40% very fine to coarse sand, 20% gravel up to 1", 40% medium plastic fines, wet, first encountered water at 20 ft

25-43': Sand with Gravel- 70% fine to coarse sand, 20% gravel up to 1/2", 10% fines, wet, loose

43-51': Clay- 90% medium plastic fines, 10% very fine sand, moist, gray

51-65': Sandy Silt- 40% very fine to medium sand, 60% fines, greenish gray, wet, partially weakly cemented

65-80': Silt- 15% very fine sand, 85% fines, greenish gray, partially cemented, hard, moist

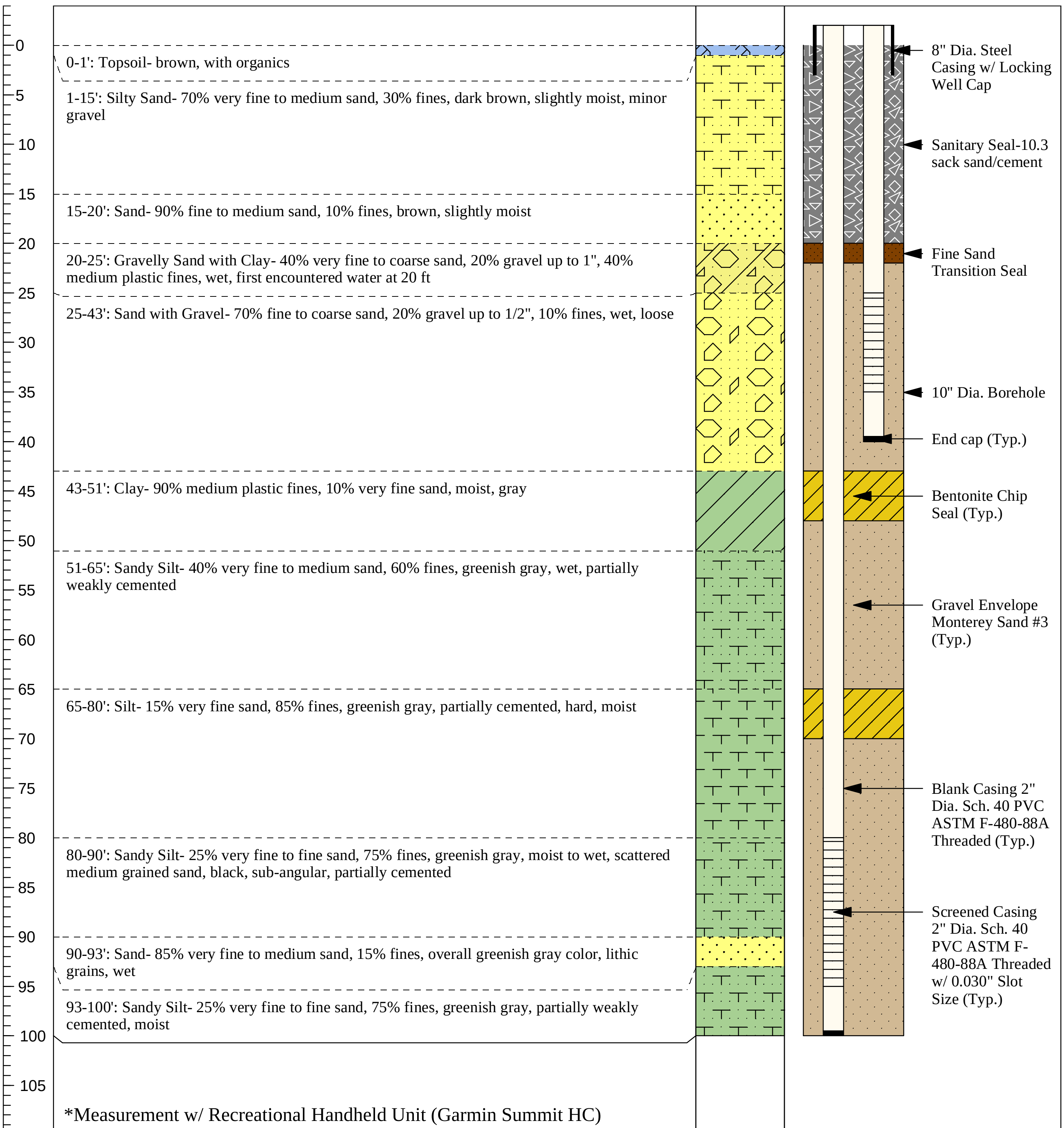
80-90': Sandy Silt- 25% very fine to fine sand, 75% fines, greenish gray, moist to wet, scattered medium grained sand, black, sub-angular, partially cemented

90-93': Sand- 85% very fine to medium sand, 15% fines, overall greenish gray color, lithic grains, wet

93-100': Sandy Silt- 25% very fine to fine sand, 75% fines, greenish gray, partially weakly cemented, moist

*Measurement w/ Recreational Handheld Unit (Garmin Summit HC)

Graphic Log | **Well Profile As Built**



LUHDORFF & SCALMANINI CONSULTING ENGINEERS

FIGURE 2.16

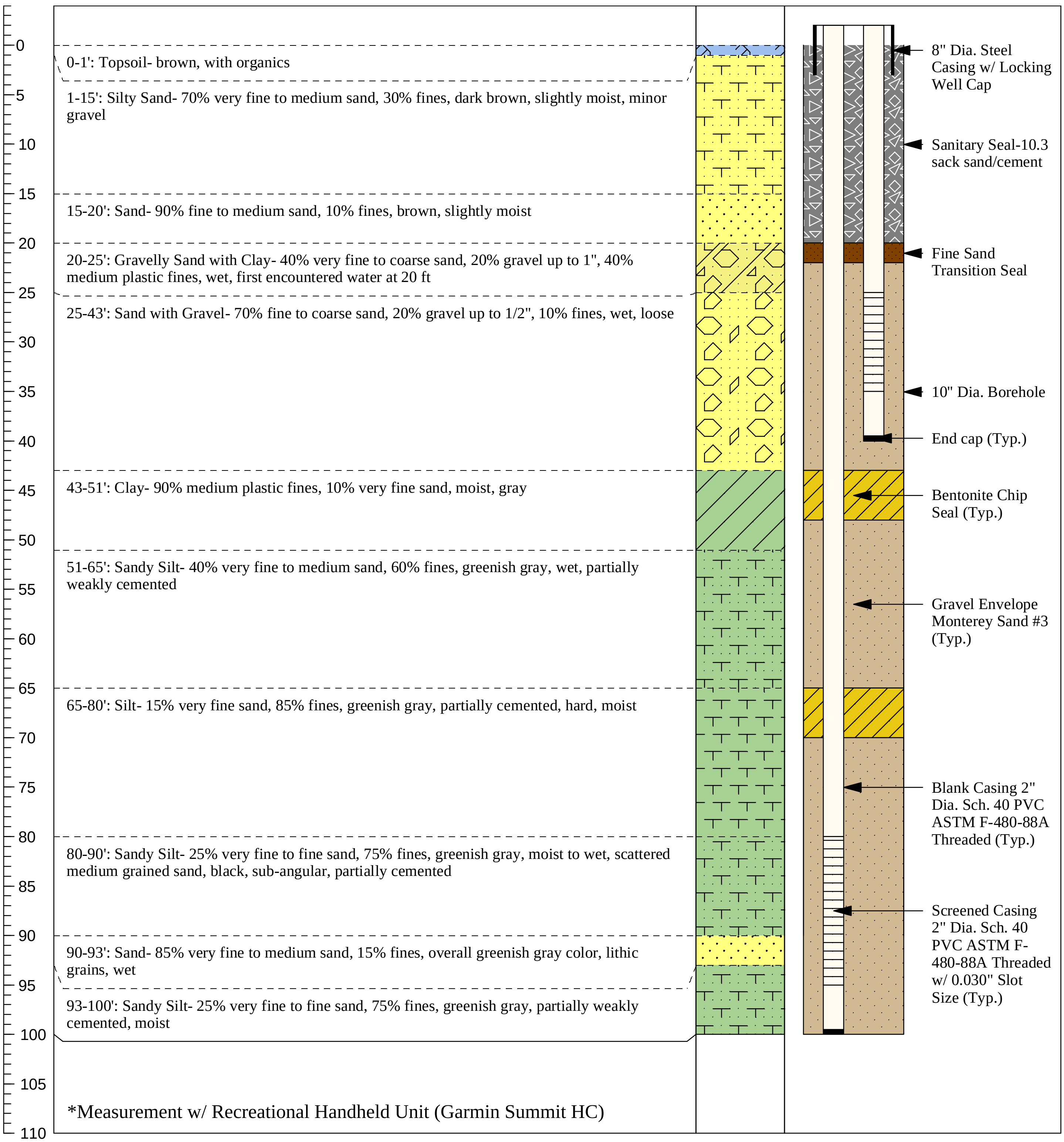
Monitoring Well As-Built Diagram - Site 5 NapaCounty-222s-swgw5

Napa County Groundwater/Surface Water Monitoring Facilities Report, DWR LGA Grant Program

LSCE Project No. 12-1-071
Well Name: Napa County-223d-swgw5
Lat./Long.: 38.510898/-122.456426
Drilled By: Clear Heart Drilling
Driller: Rick Schneider
Site Geologist: Charlie Jenkins, P.G.

Site: Site #5- Napa River at Pope Street
Drilling Method: Hollow Stem Auger; pilot hole 8"-diameter reamed hole 10"-diameter
Sampling Method: Core Sample Barrel
Drilling/Installation Date: 9/15/14 - 9/16/14
Well Depth (ft): 100
Boring Depth (ft): 100
Well Screen (ft): 80-95

Lithologic Description
0-1': Topsoil- brown, with organics
1-15': Silty Sand- 70% very fine to medium sand, 30% fines, dark brown, slightly moist, minor gravel
15-20': Sand- 90% fine to medium sand, 10% fines, brown, slightly moist
20-25': Gravelly Sand with Clay- 40% very fine to coarse sand, 20% gravel up to 1", 40% medium plastic fines, wet, first encountered water at 20 ft
25-43': Sand with Gravel- 70% fine to coarse sand, 20% gravel up to 1/2", 10% fines, wet, loose
43-51': Clay- 90% medium plastic fines, 10% very fine sand, moist, gray
51-65': Sandy Silt- 40% very fine to medium sand, 60% fines, greenish gray, wet, partially weakly cemented
65-80': Silt- 15% very fine sand, 85% fines, greenish gray, partially cemented, hard, moist
80-90': Sandy Silt- 25% very fine to fine sand, 75% fines, greenish gray, moist to wet, scattered medium grained sand, black, sub-angular, partially cemented
90-93': Sand- 85% very fine to medium sand, 15% fines, overall greenish gray color, lithic grains, wet
93-100': Sandy Silt- 25% very fine to fine sand, 75% fines, greenish gray, partially weakly cemented, moist



*Measurement w/ Recreational Handheld Unit (Garmin Summit HC)

LUHDORFF & SCALMANINI CONSULTING ENGINEERS

FIGURE 2.17

Monitoring Well As-Built Diagram - Site 5 NapaCounty-223d-swgw5

PERIOD	SERIES
Quaternary	Holocene
	Pleistocene
Tertiary	Pliocene
	Eocene & Paleocene
Cretaceous & Jurassic	

Surficial Deposits

- af Artificial fill
- Qhc Stream channel deposits
- Qha(y) Alluvium (younger)
- Qhf Alluvial Fan deposits
- Qht Terrace deposits
- Qa Alluvium
- Qt Terrace deposits
- Qf Alluvial fan deposits
- Qls Landslide deposits
- Qpa Pleistocene alluvium
- Qpt Pleistocene terrace deposits
- Qpf Pleistocene alluvial fan deposits
- Qoa Older alluvium

Tertiary Rocks

Sonoma Volcanics

Upper Member

St. Helena Ryholite

- Tsr - flows and breccias

Petrified Forest

- Tsvt - tuffs and sediments

MST Cauldera

- Tstx - tuff?
- Tsrb - breccia
- Tslt - tuff breccia

Dacite of Mt. George

- Tsvdg - flows and domes

Lower Member

Stags Leap Andesite

- Tsva - flows, breccias, tuffs
- Tsvab - flow breccia
- Tsvt - tuff
- Tsai - intrusive plug

Sedimentary Rocks

Carneros Area

- QTh - Huichica formation

Conn Valley Area

- Tss/h - sands and clays

MST Area

- Tss/h - sands and clays
- Tssd - diatomite

Marine Sedimentary Rocks

- Td - Domingene sandstone

** other units not shown*

Mesozoic Rocks

Franciscan Complex

- KJfm - melange
- KJfs - graywacke
- KJfgs - greenstone

Great Valley Complex

- Kgvu - upper
- KJgvl - lower
- KJgv - sandstones and shales

Coast Range Ophiolite

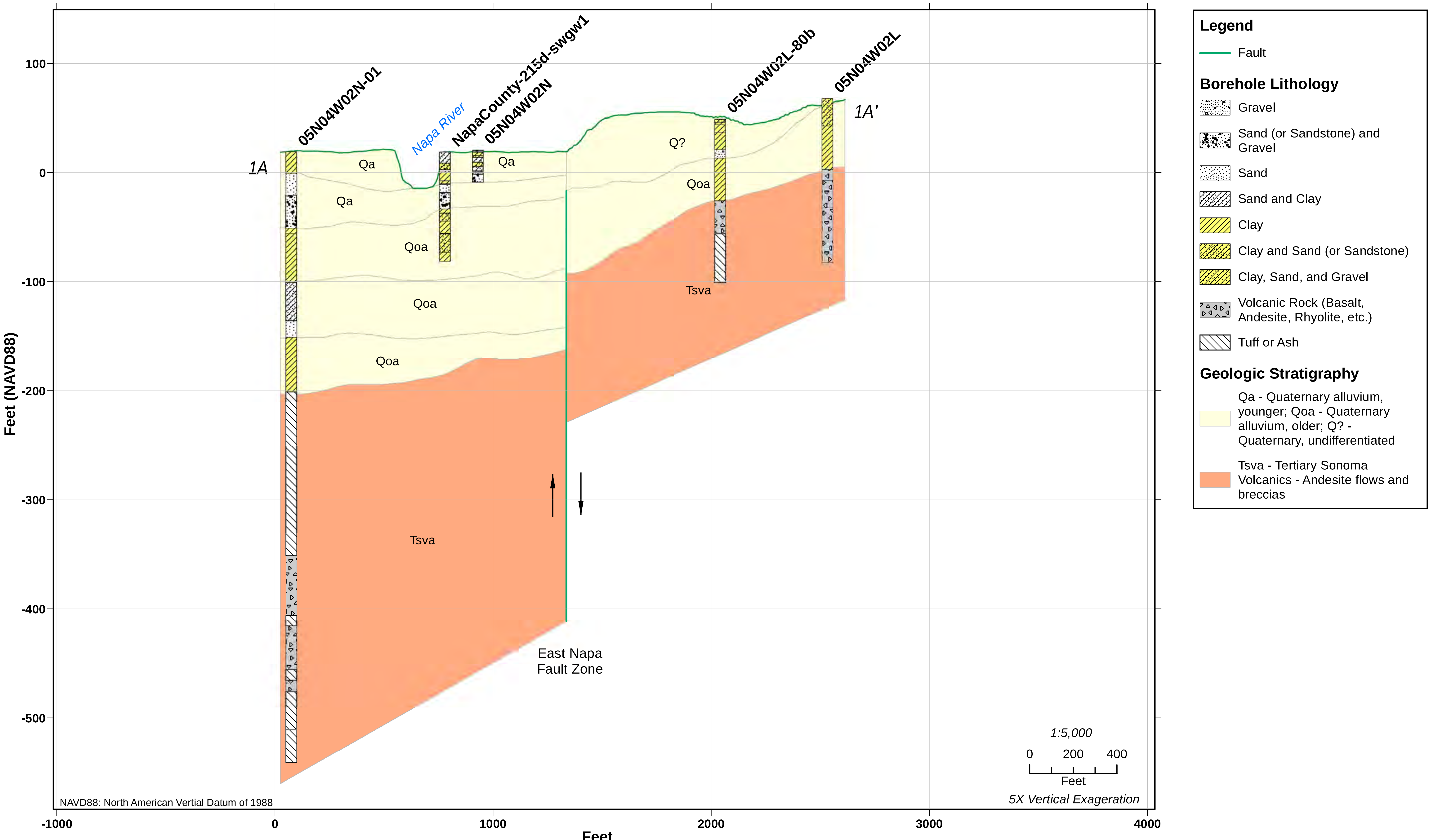
- sp - serpentinite

Document Path: X:\2012 Job Files\12-071\GIS\LSCE geo legend.mxd

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

FIGURE 3.1
Major Surficial Deposits and Rocks of Napa Valley

Napa County Groundwater/Surface Water Monitoring Facilities Report, DWR LGA Grant Program

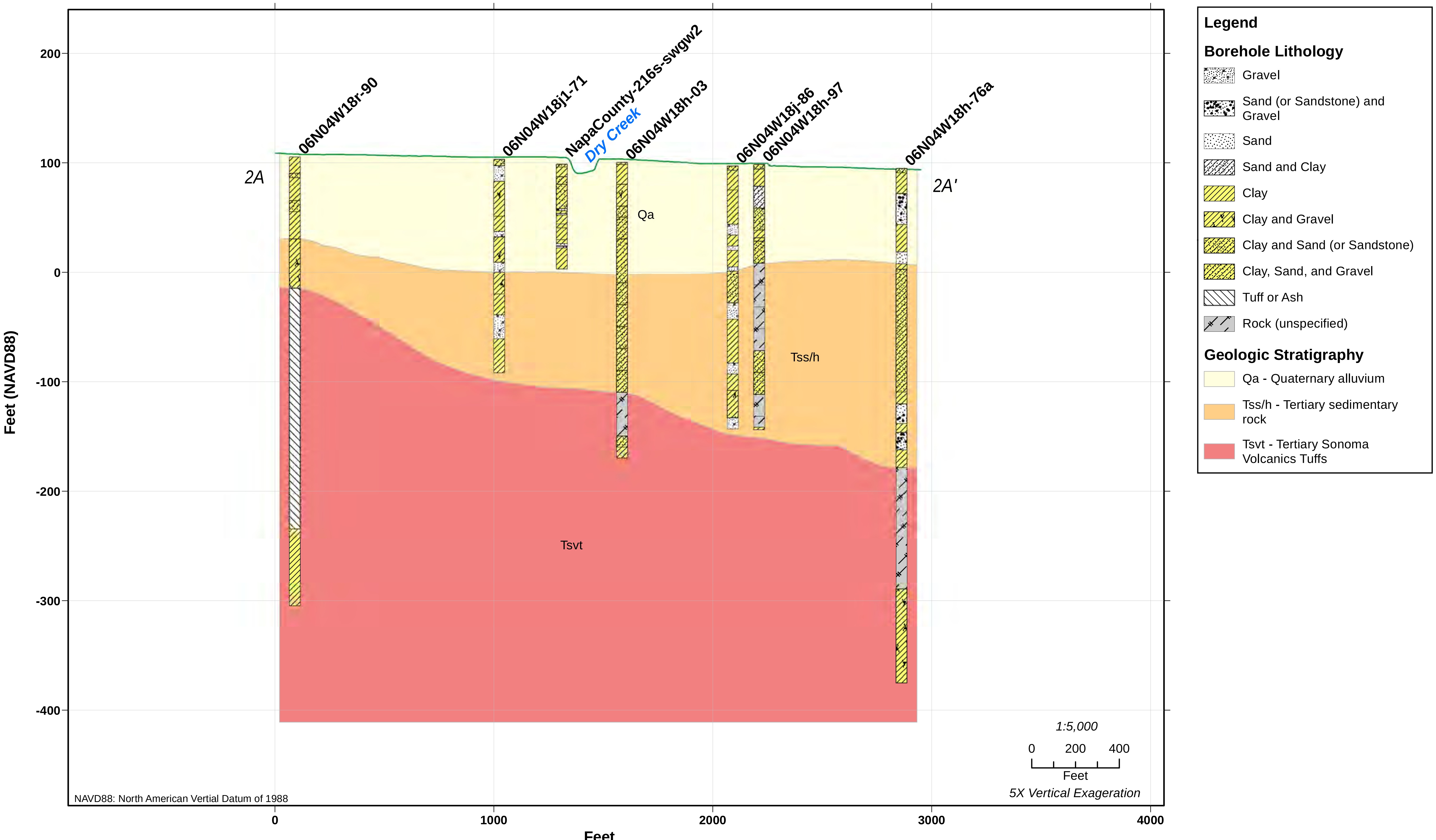


Document Path: X:\2012 Job Files\12-071\GIS\Cross Section\Figure 3.3 xsection_site1.mxd

LUHDORFF & SCALMANINI CONSULTING ENGINEERS

Figure 3.3
Geologic Cross Section
Site 1 - Napa River at First Street

Napa County Groundwater/Surface Water Monitoring Facilities Report, DWR LGA Grant Program

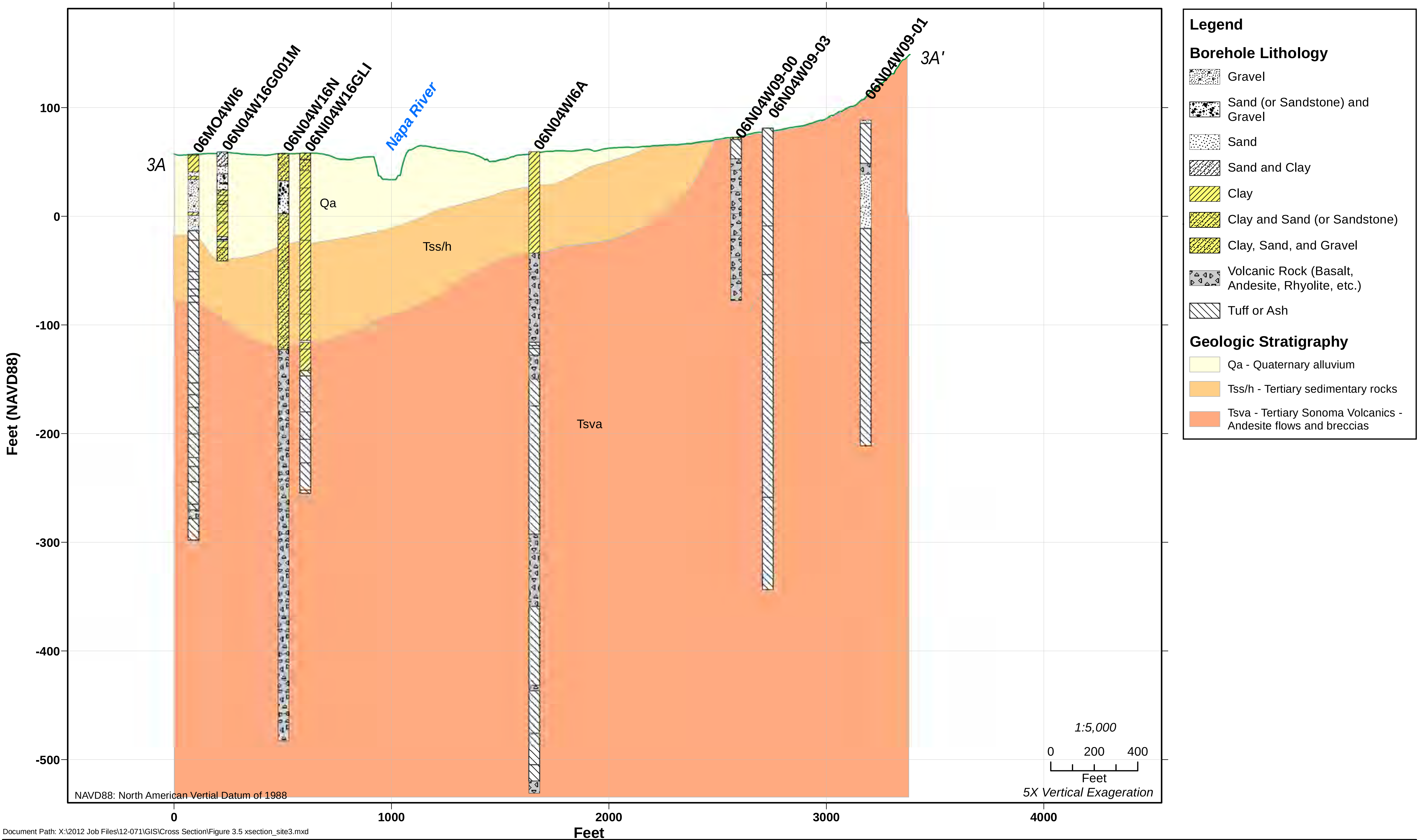


Document Path: X:\2012 Job Files\12-071\GIS\Cross Section\Figure 3.4 xsection_site2.mxd

LUHDORFF & SCALMANINI CONSULTING ENGINEERS

Figure 3.4
Geologic Cross Section
Site 2 - Dry Creek at Washington Street

Napa County Groundwater/Surface Water Monitoring Facilities Report, DWR LGA Grant Program

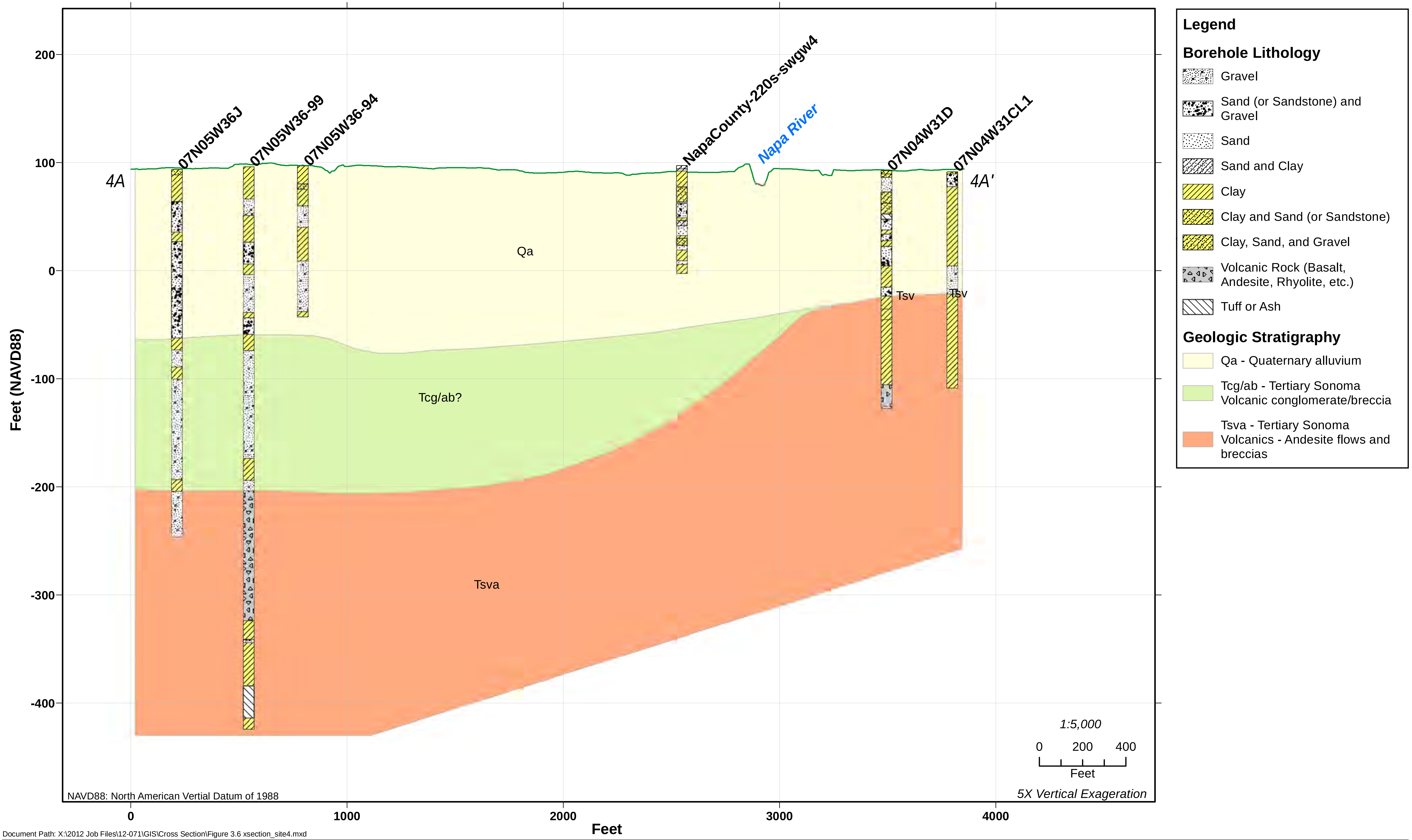


Document Path: X:\2012 Job Files\12-071\GIS\Cross Section\Figure 3.5 xsection_site3.mxd

LUHDORFF & SCALMANINI CONSULTING ENGINEERS

Figure 3.5
Geologic Cross Section
Site 3 - Napa River at Oak Knoll Avenue

Napa County Groundwater/Surface Water Monitoring Facilities Report, DWR LGA Grant Program

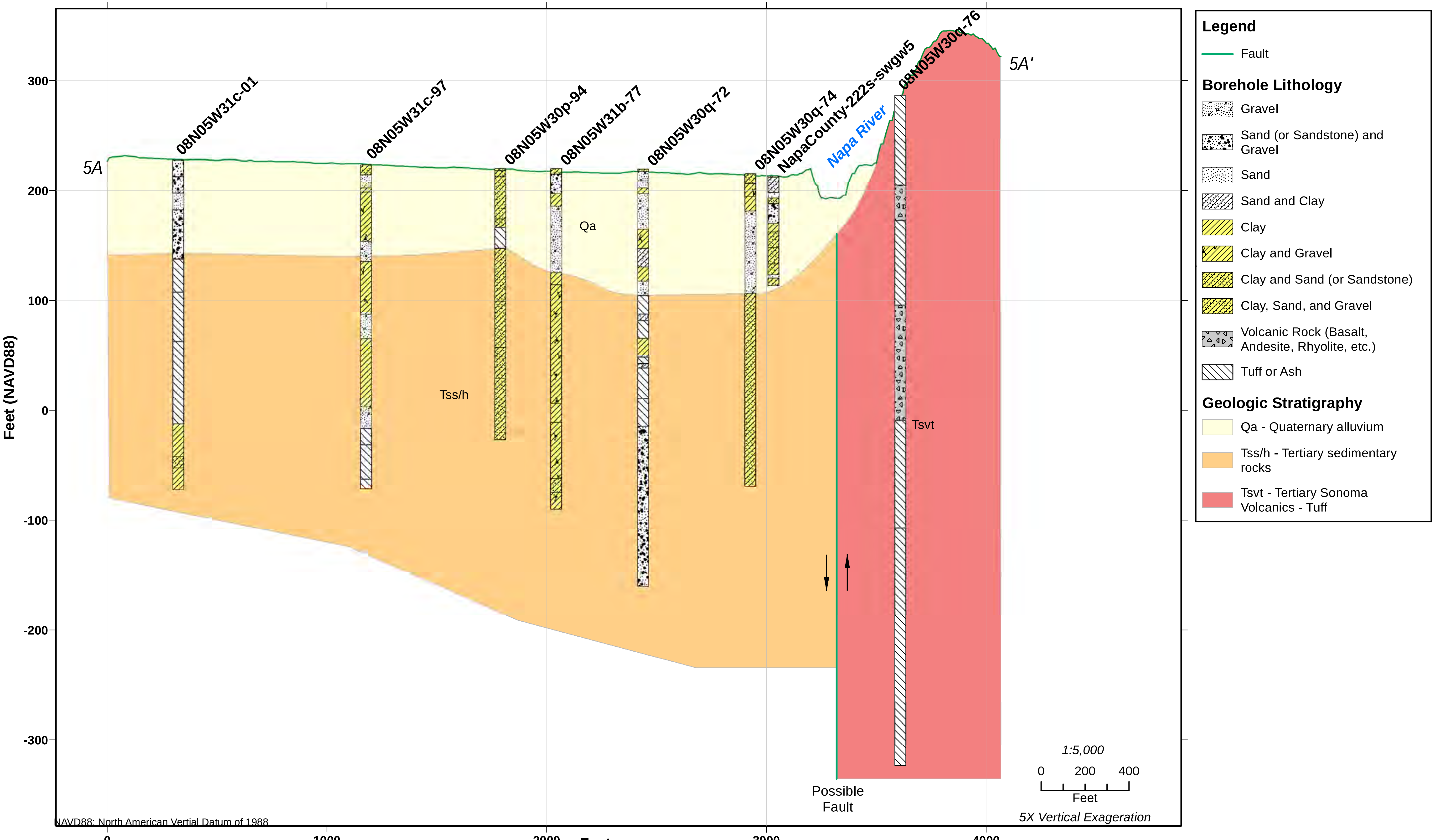


Document Path: X:\2012 Job Files\12-071\GIS\Cross Section\Figure 3.6 xsection_site4.mxd

LUHDORFF & SCALMANINI CONSULTING ENGINEERS

Figure 3.6
Geologic Cross Section
Site4 - Napa River at Yountville

Napa County Groundwater/Surface Water Monitoring Facilities Report, DWR LGA Grant Program

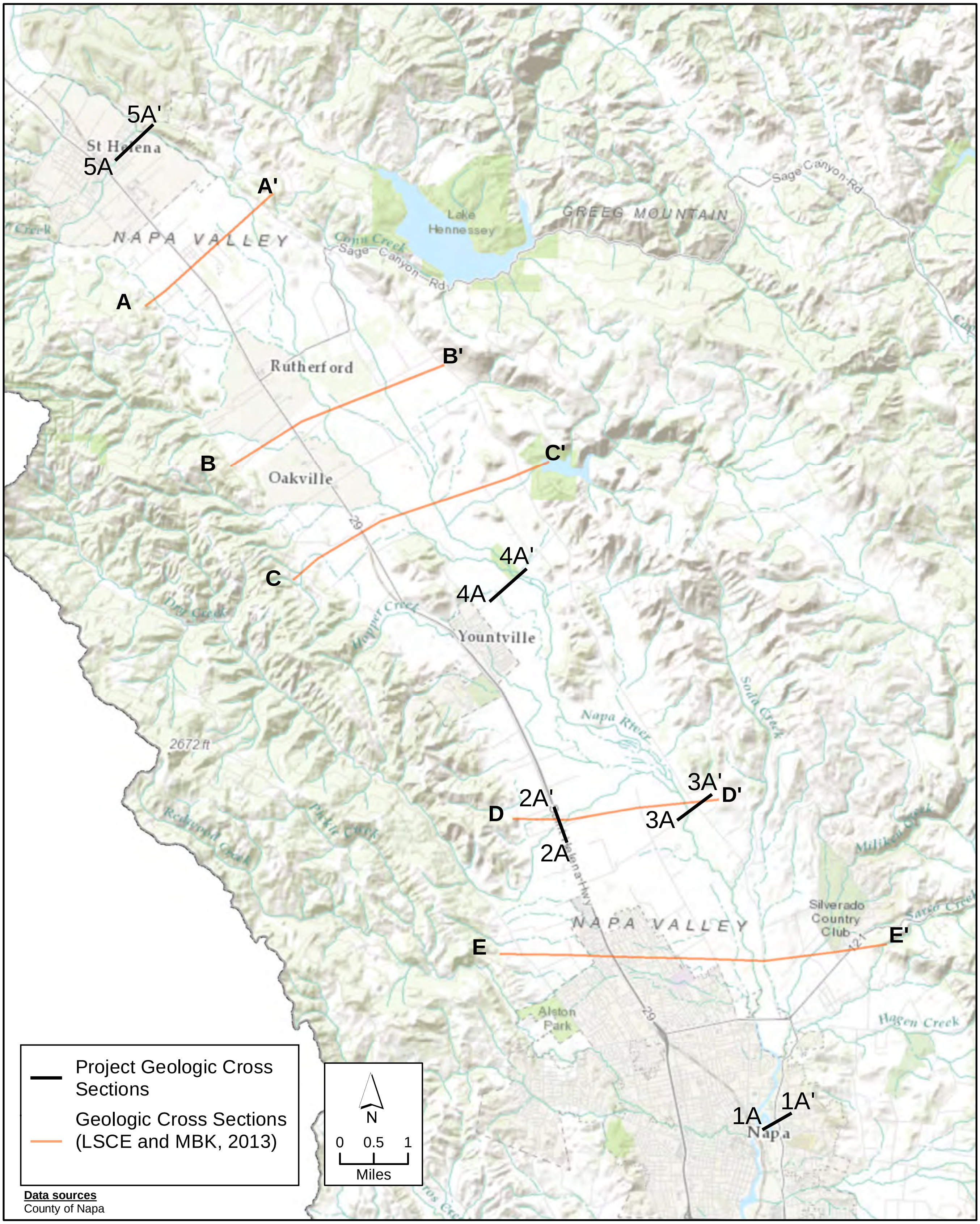


Document Path: X:\2012 Job Files\12-071\GIS\Cross Section\Figure 3.7 xsection_site5.mxd

LUHDORFF & SCALMANINI CONSULTING ENGINEERS

Figure 3.7
Geologic Cross Section
Site 5 - Napa River at Pope Street

Napa County Groundwater/Surface Water Monitoring Facilities Report, DWR LGA Grant Program



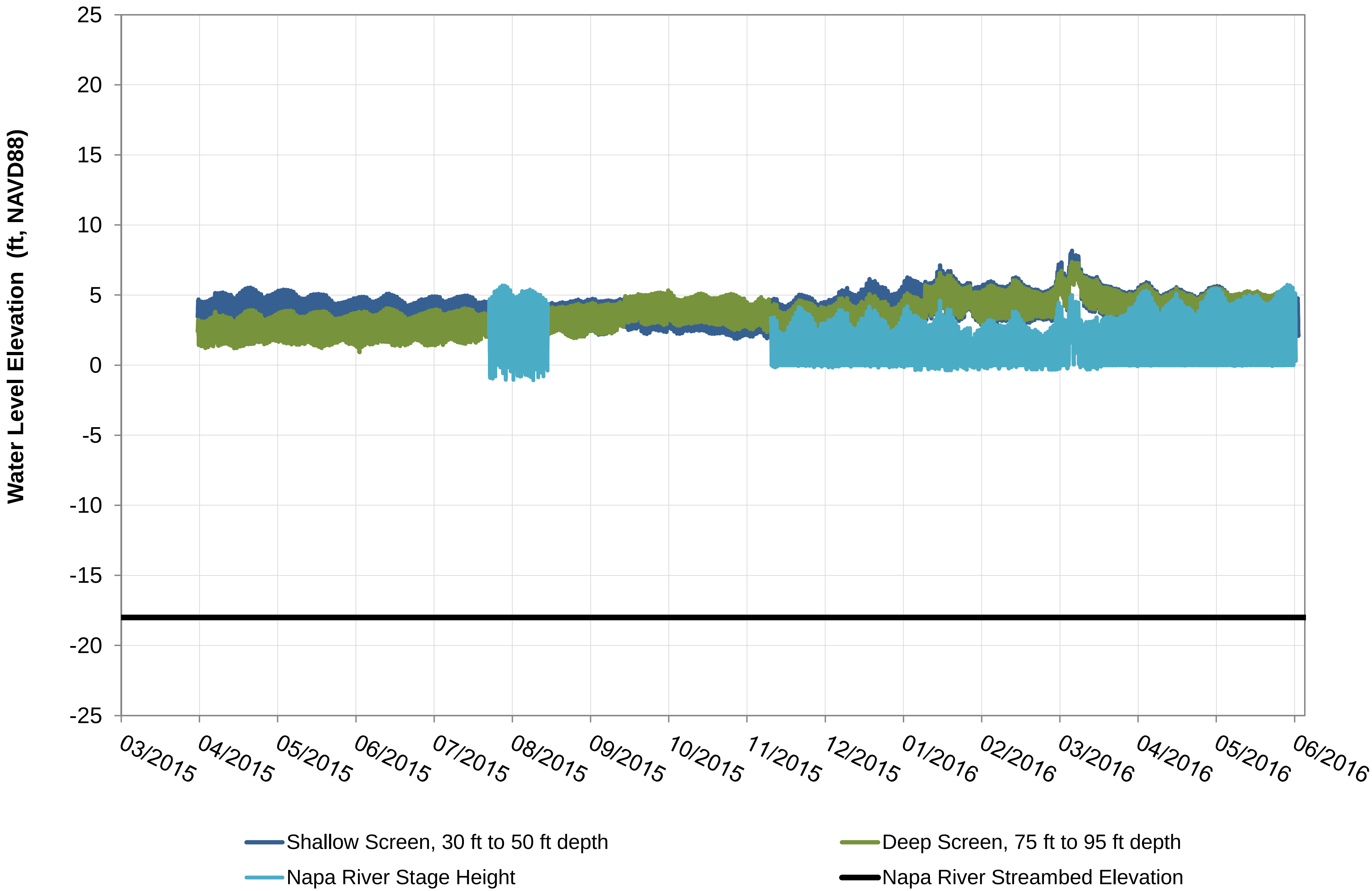
X:\2012 Job Files\12-071\GIS\FIGURE 3.2 GW-SW Project Geologic Cross Section Locations.mxd

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

FIGURE 3.2

Geologic Cross Section Locations

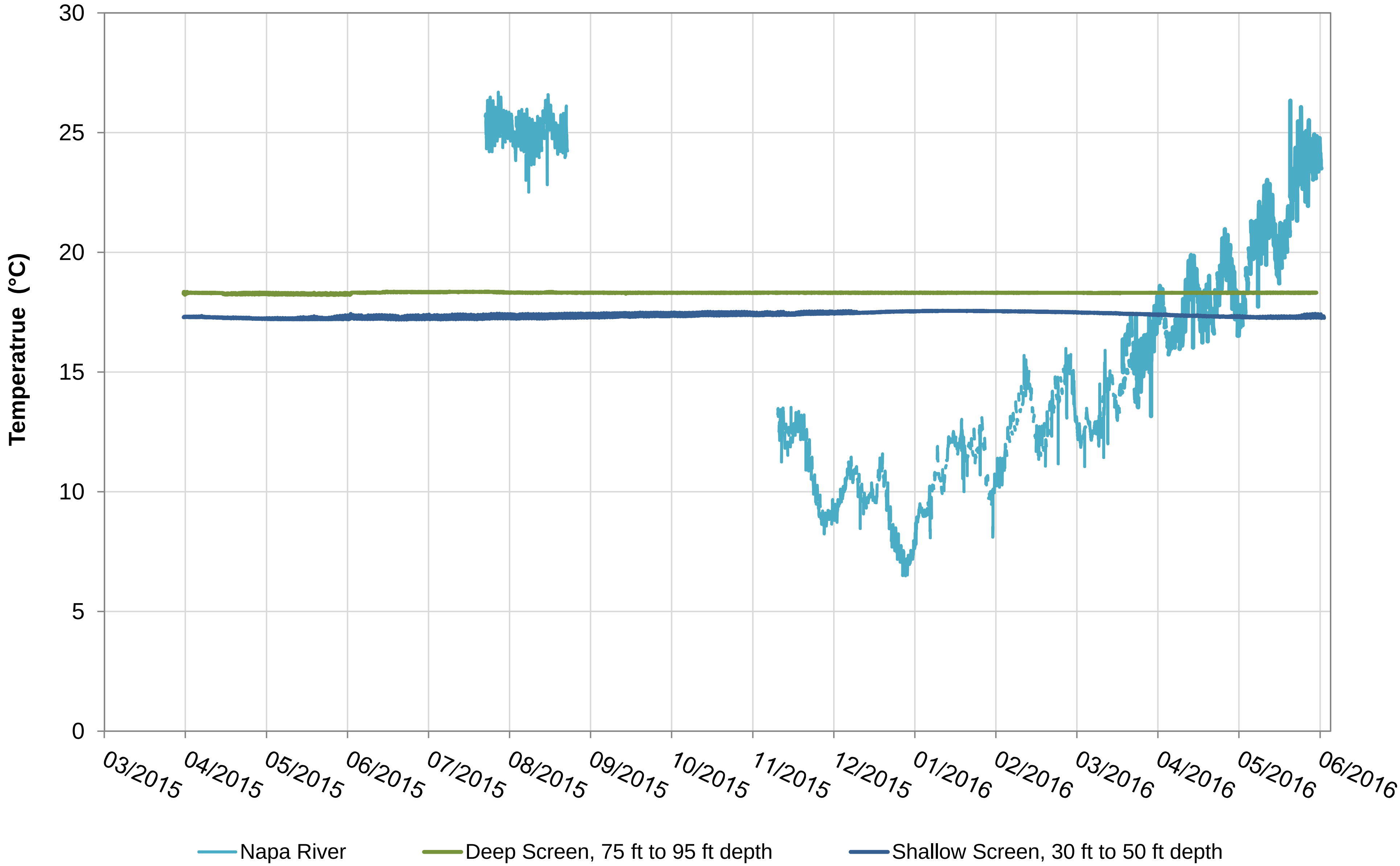
Napa County Groundwater/Surface Water Monitoring Facilities Report, DWR LGA Grant Program



X:\2012 Job Files\12-071\Data__Current Project Data Charts\DatabaseCharts.xlsm\WL Site 1

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

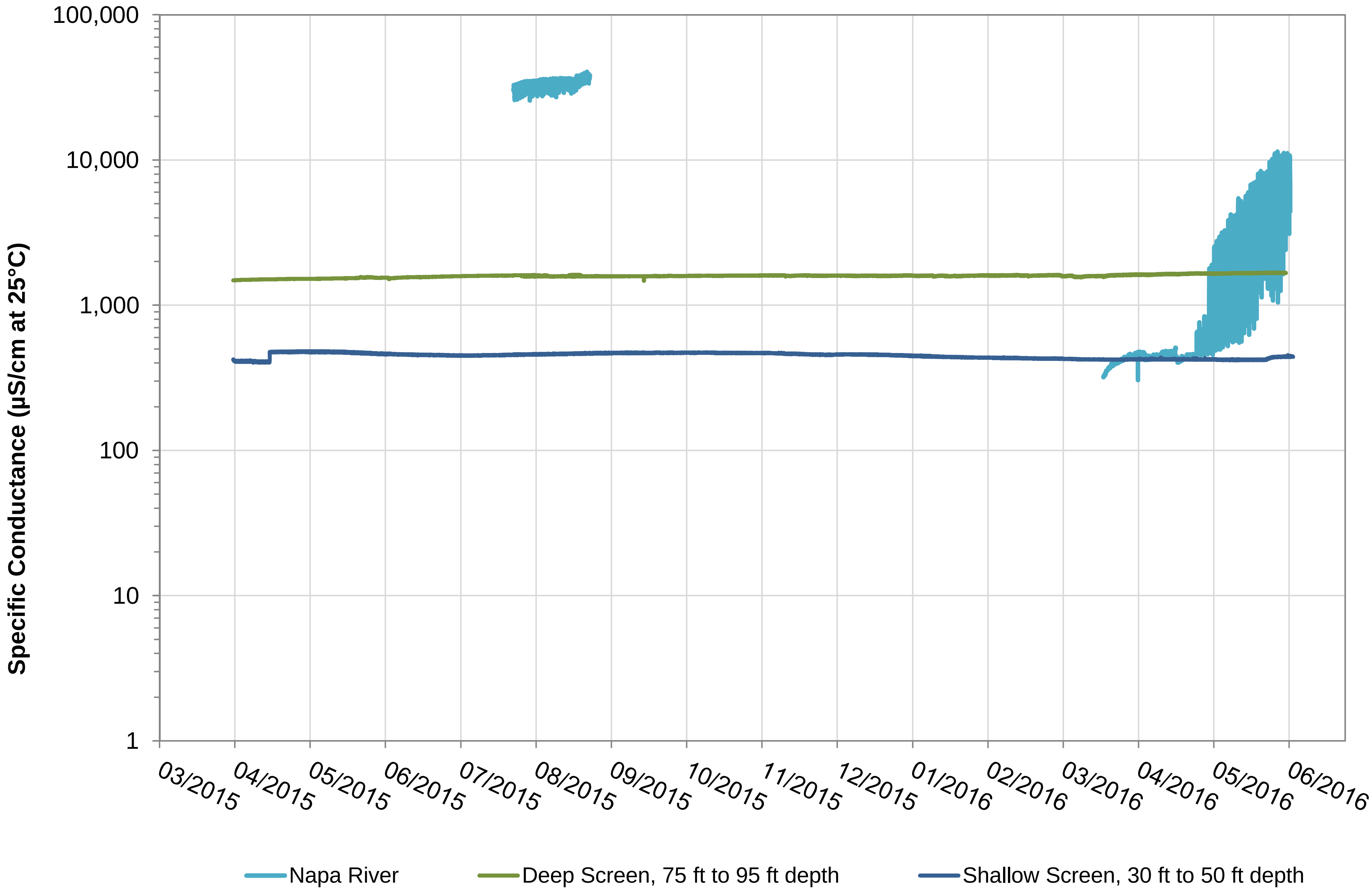
Figure 4.1
Water Level Hydrograph
Site 1: Napa River at First Street
Napa County Groundwater/Surface Water Monitoring Facilities Report, DWR LGA Grant Program



X:\2012 Job Files\12-071\Data__Current Project Data Charts\DatabaseCharts.xlsm\Site 1 Charts Chart 3

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

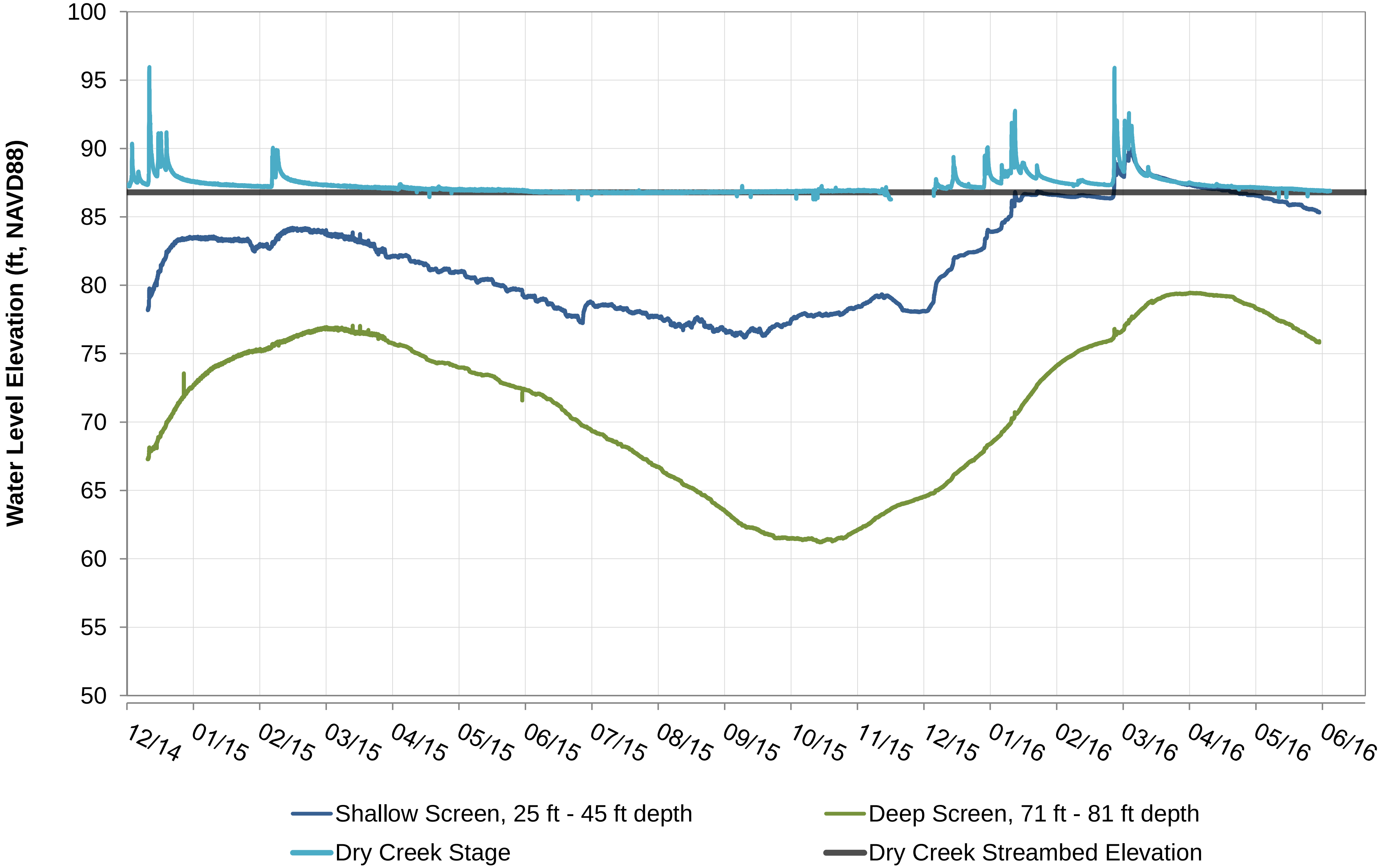
Figure 4.2
Temperature Hydrograph
Site 1: Napa River at First Street
Napa County Groundwater/Surface Water Monitoring Facilities Report, DWR LGA Grant Program



X:\2012 Job Files\12-071\Data__Current Project Data Charts\DatabaseCharts.xlsm\Site 1 Charts Chart 2

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

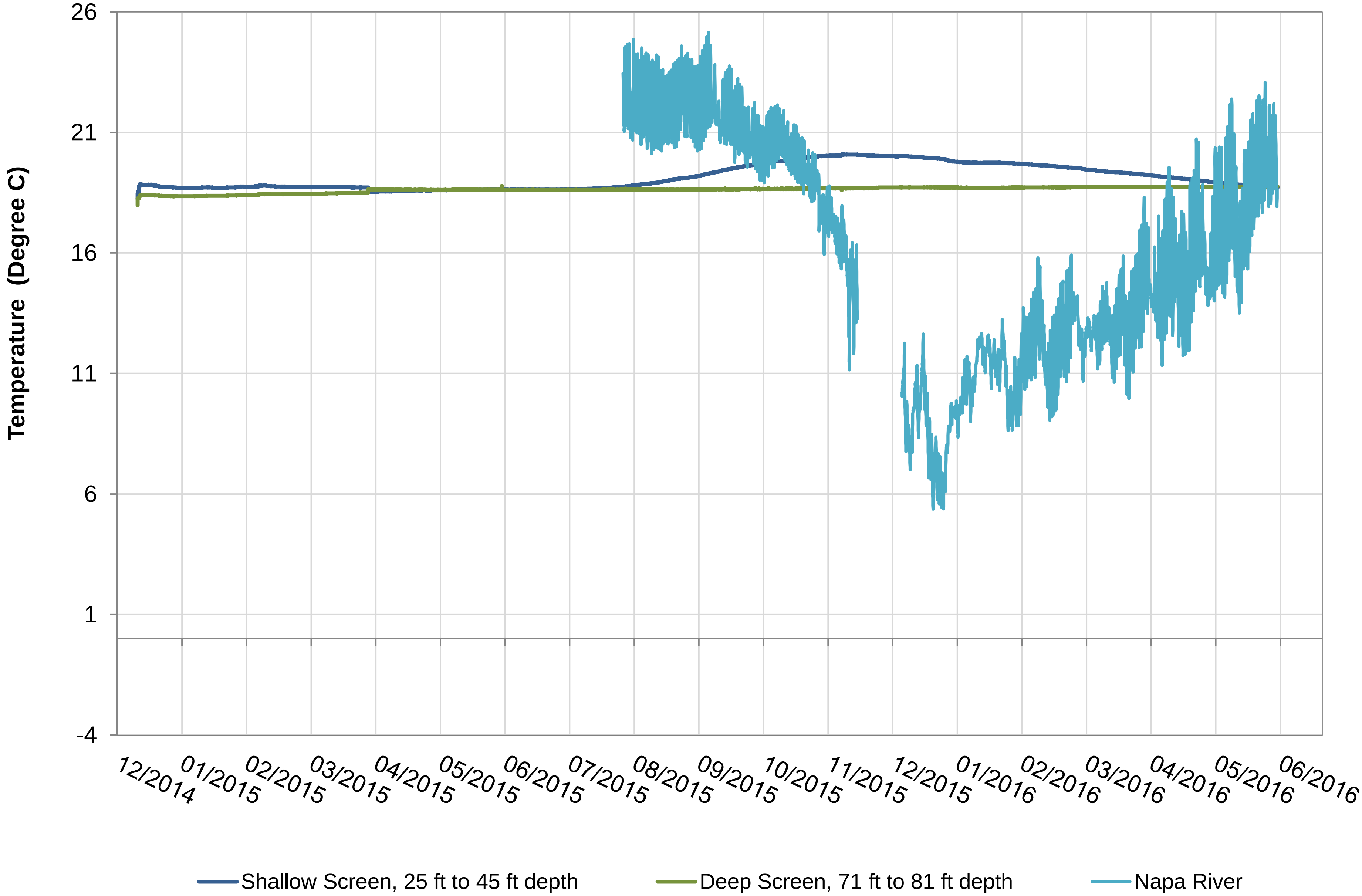
Figure 4.3
Specific Conductance Hydrograph
Site 1: Napa River at First Street
Napa County Groundwater/Surface Water Monitoring
Facilities Report, DWR LGA Grant Program



X:\2012 Job Files\12-071\Data__Current Project Data Charts\DatabaseCharts.xlsm\WL Site 2

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

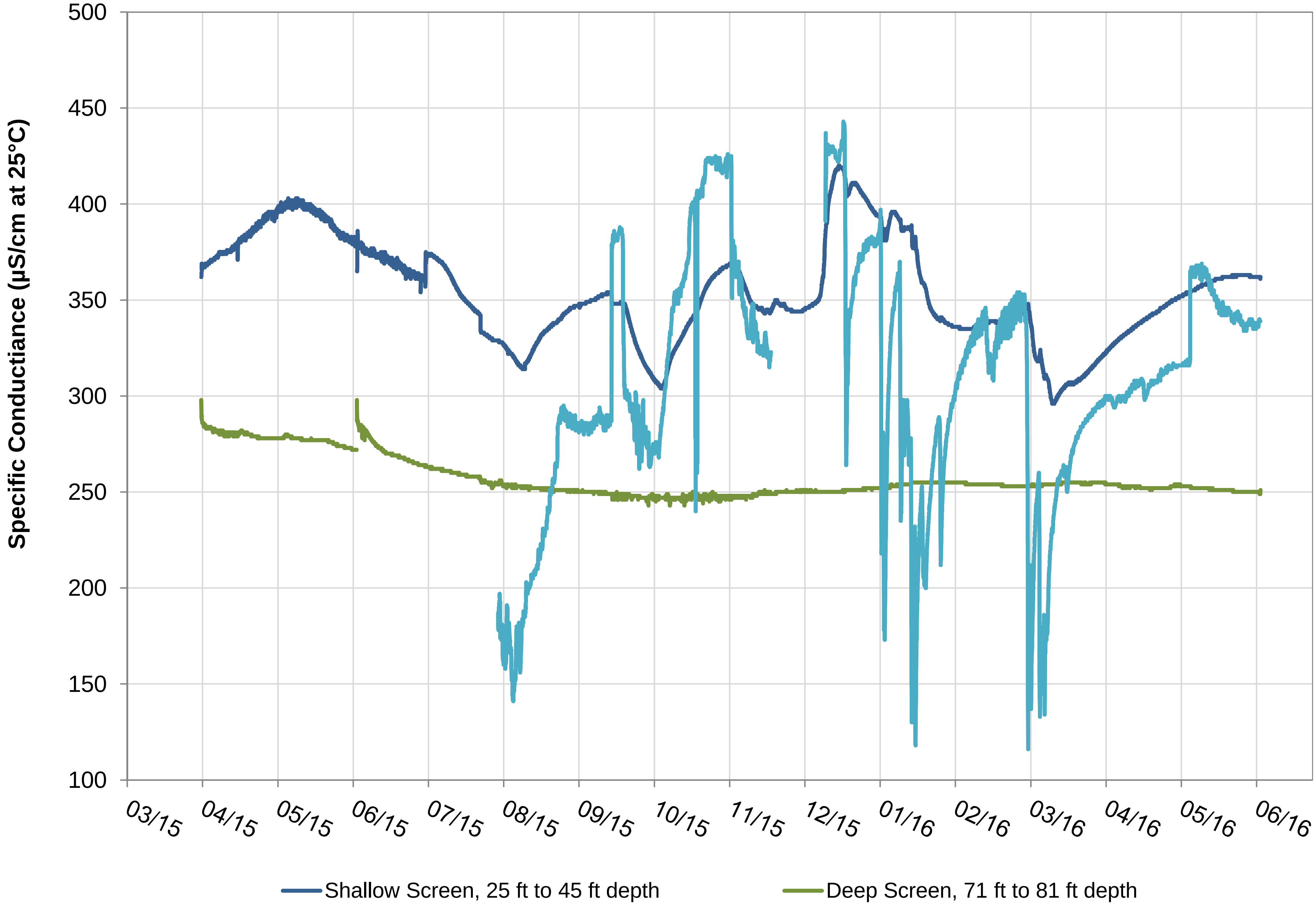
Figure 4.4
Water Level Hydrograph
Site 2: Dry Creek at Washington Street
Napa County Groundwater/Surface Water Monitoring
Facilities Report, DWR LGA Grant Program



X:\2012 Job Files\12-071\Data__Current Project Data Charts\DatabaseCharts.xlsm\Site 2 Charts Chart 3

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

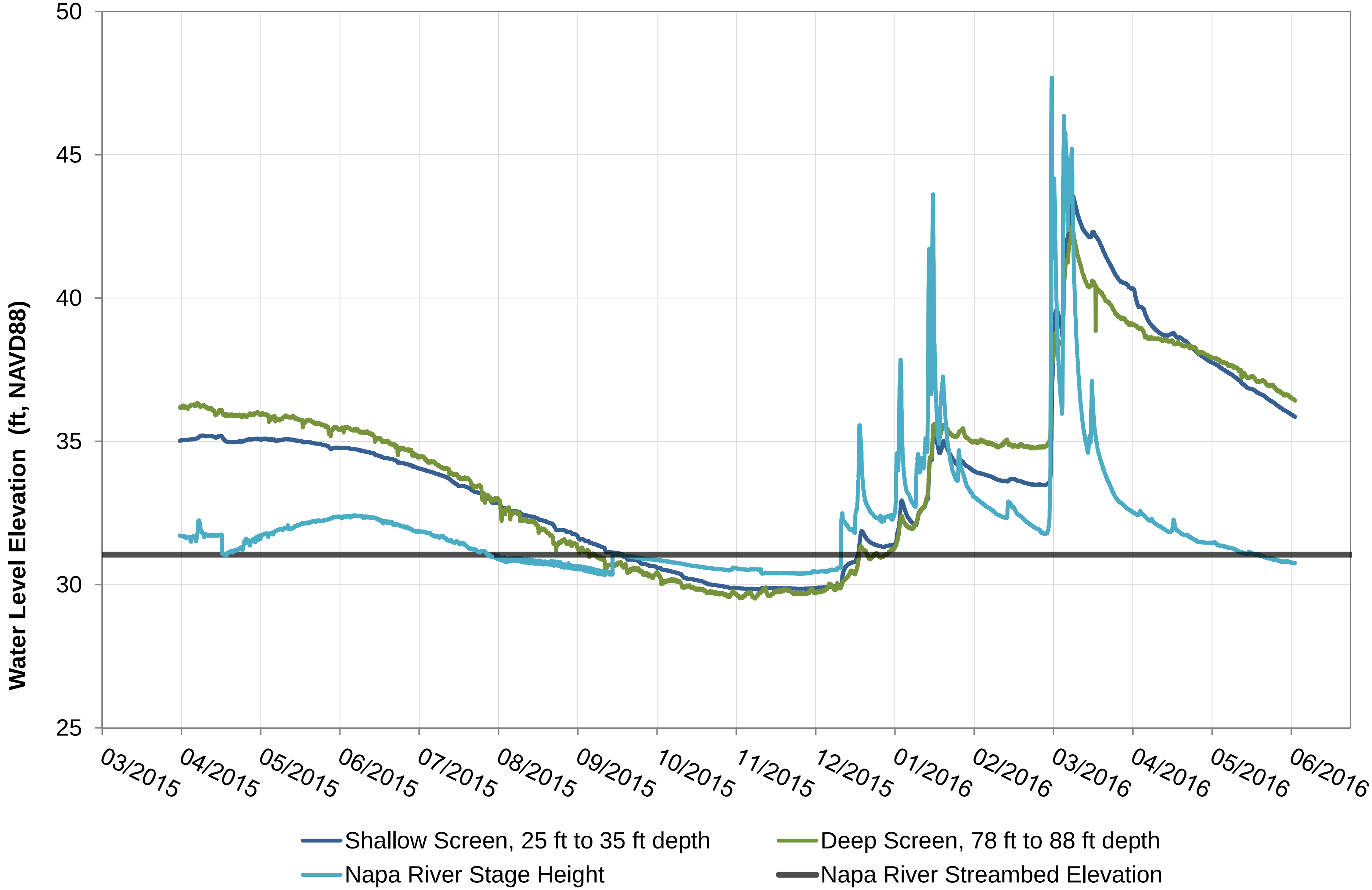
Figure 4.5
Temperature Hydrograph
Site 2: Dry Creek at Washington Street
Napa County Groundwater/Surface Water Monitoring Facilities Report, DWR LGA Grant Program



X:\2012 Job Files\12-071\Data__Current Project Data Charts\DatabaseCharts.xlsm\Site 2 Charts Chart 2

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

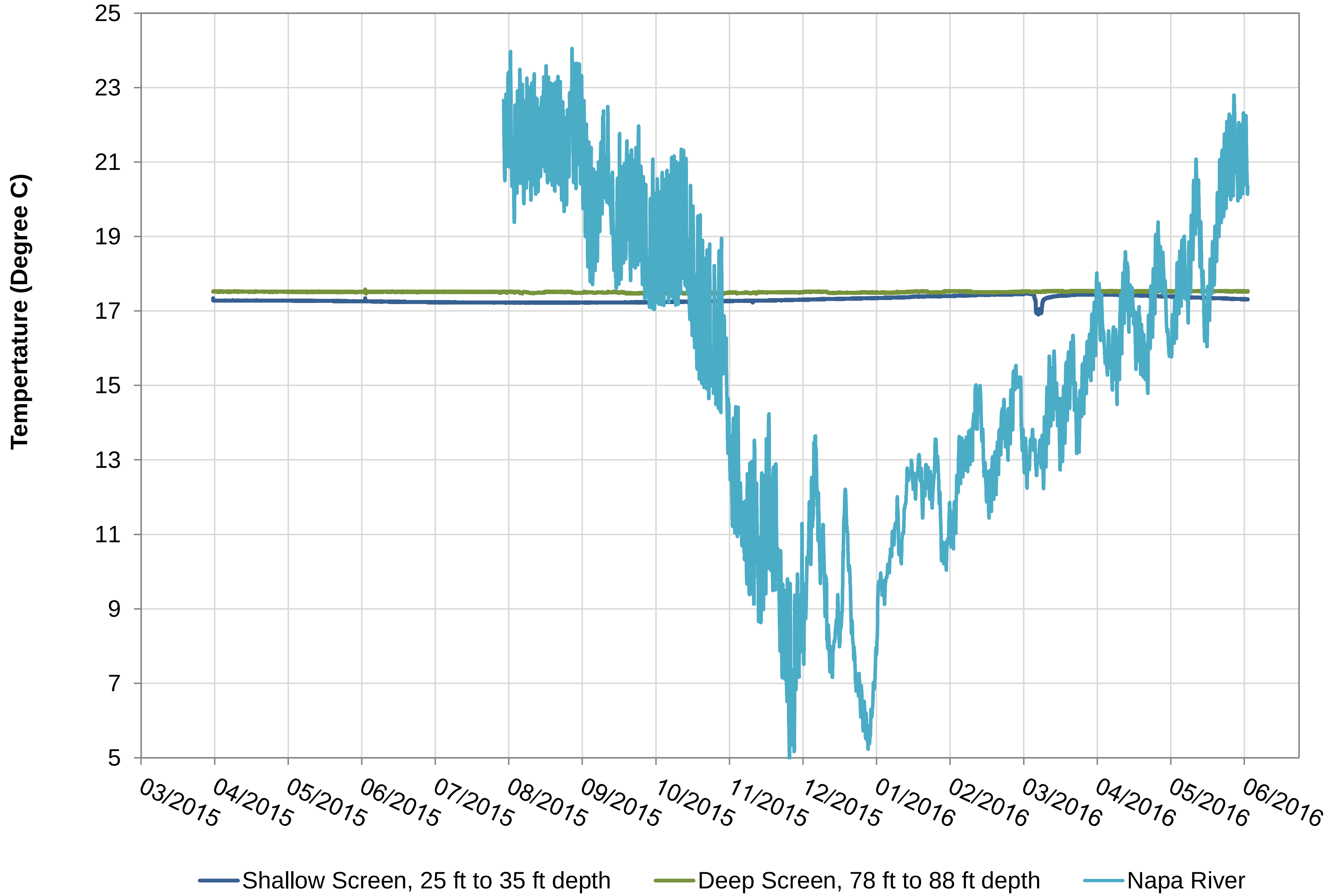
Figure 4.6
Specific Conductance Hydrograph
Site 2: Dry Creek at Washington Street
Napa County Groundwater/Surface Water Monitoring Facilities Report, DWR LGA Grant Program



X:\2012 Job Files\12-071\Data__Current Project Data Charts\DatabaseCharts.xlsm\WL Site 3

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

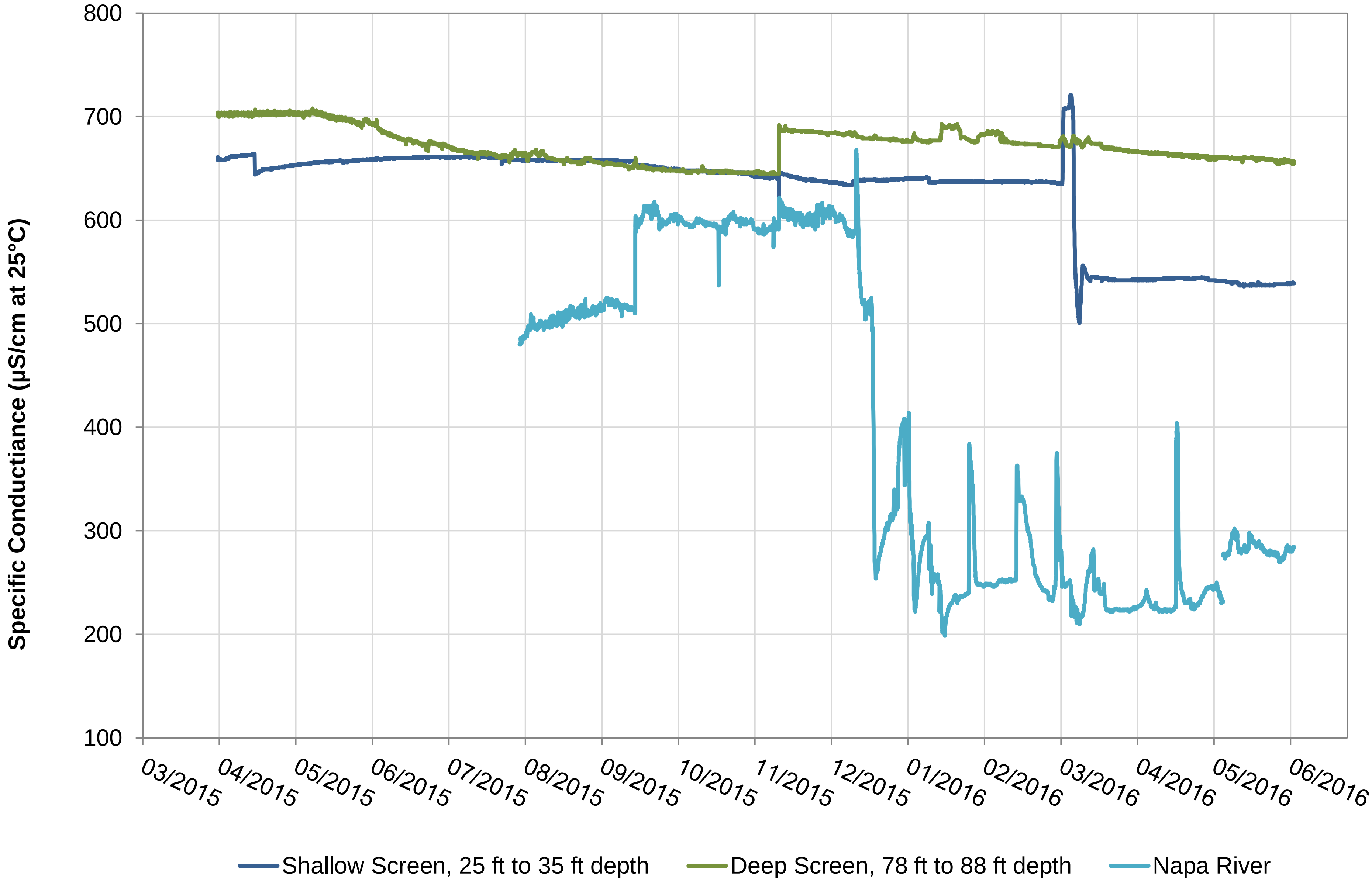
Figure 4.7
Water Level Hydrograph
Site 3: Napa River at Oak Knoll Avenue
Napa County Groundwater/Surface Water Monitoring Facilities Report, DWR LGA Grant Program



X:\2012 Job Files\12-071\Data__Current Project Data Charts\DatabaseCharts.xlsm\Site 3 Charts Chart 3

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

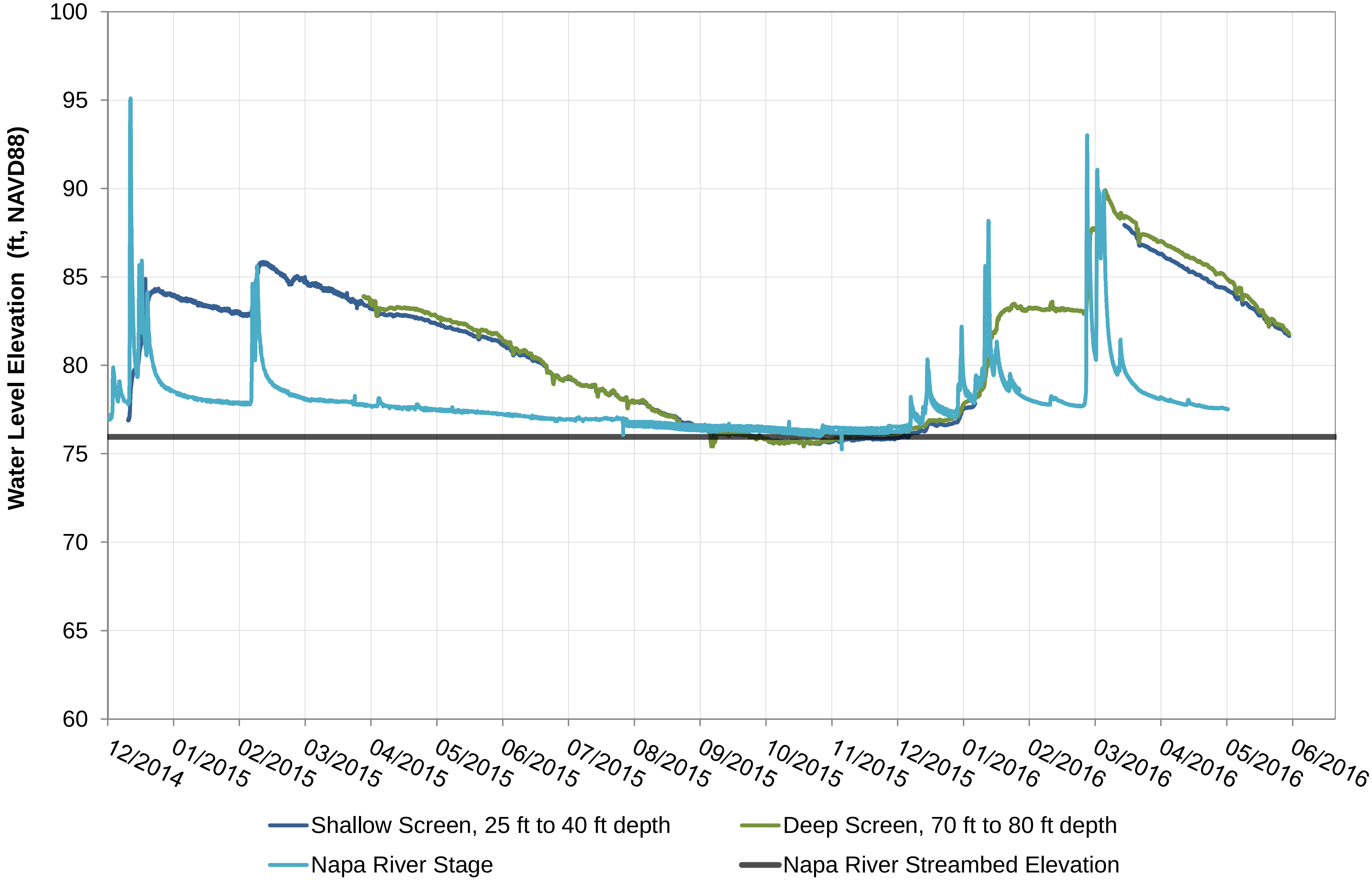
Figure 4.8
Temperature Hydrograph
Site 3: Napa River at Oak Knoll Avenue
Napa County Groundwater/Surface Water Monitoring Facilities Report, DWR LGA Grant Program



X:\2012 Job Files\12-071\Data__Current Project Data Charts\DatabaseCharts.xlsm\Site 3 Charts Chart 2

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

Figure 4.9
Specific Conductance Hydrograph
Site 3: Napa River at Oak Knoll Avenue
Napa County Groundwater/Surface Water Monitoring Facilities Report, DWR LGA Grant Program

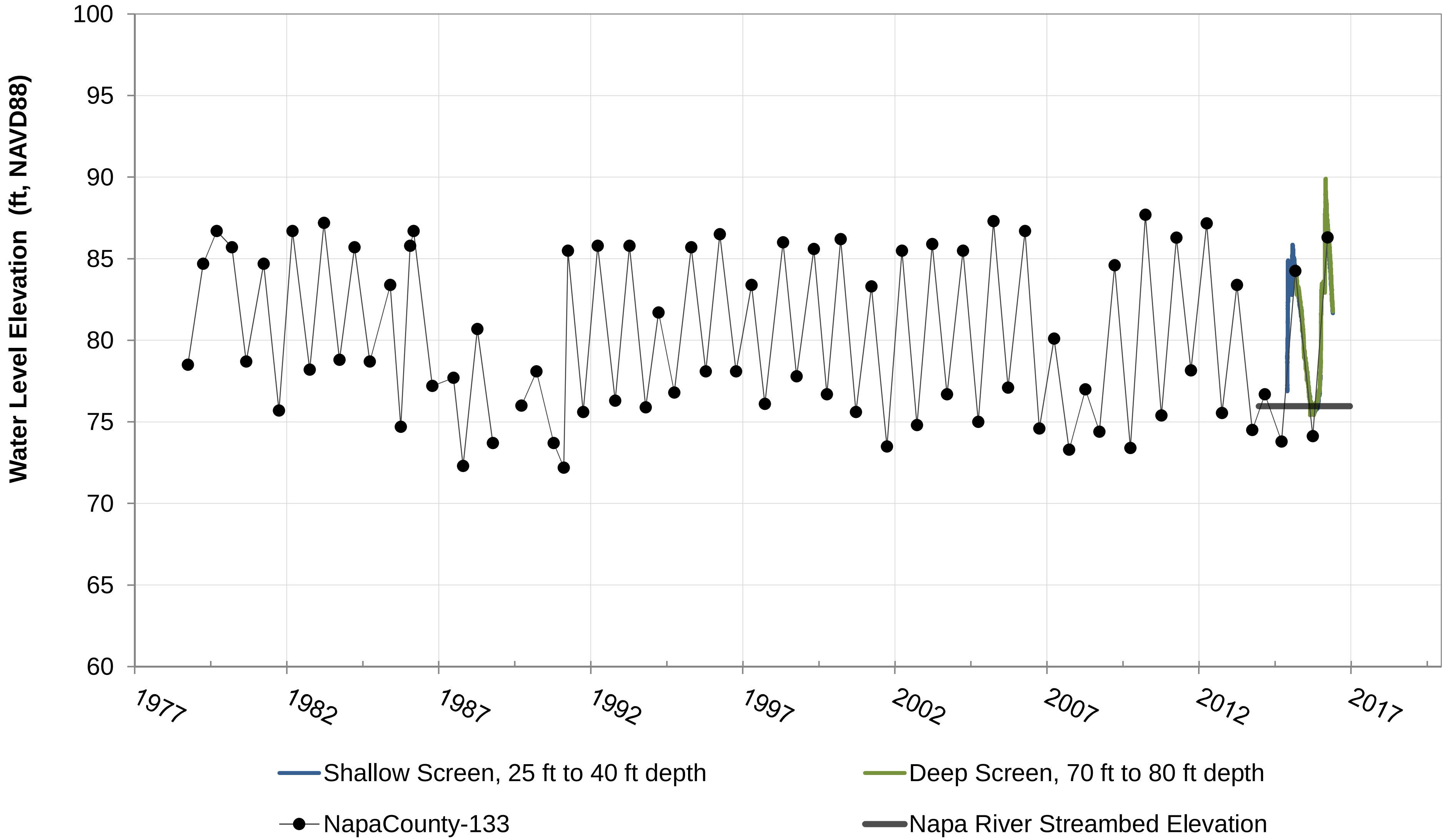


X:\2012 Job Files\12-071\Data__Current Project Data Charts\DatabaseCharts.xlsm\WL Site 4

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

Figure 4.10a
Water Level Hydrograph
Site 4: Napa River at Yountville Cross Road

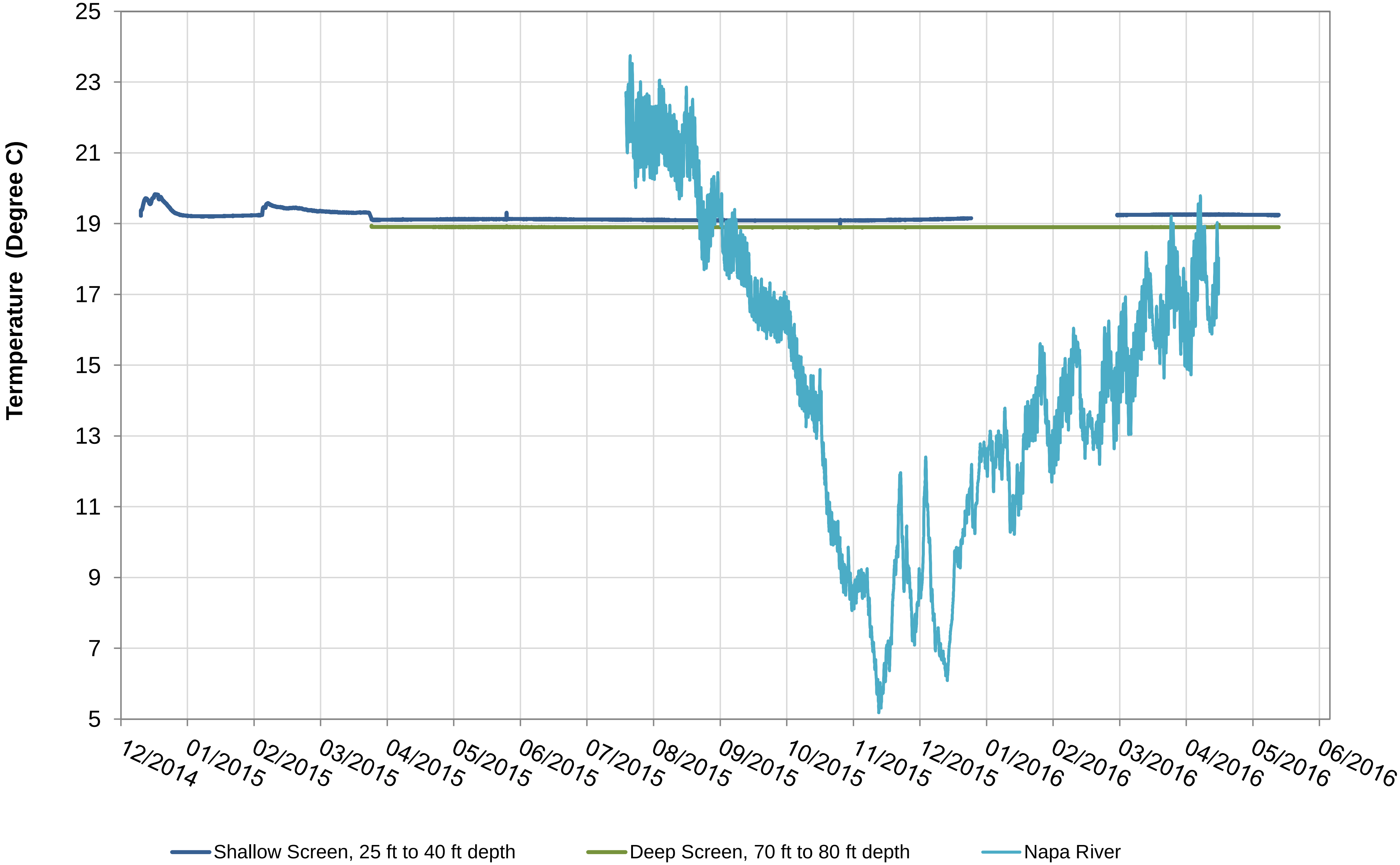
Napa County Groundwater/Surface Water Monitoring Facilities Report, DWR LGA Grant Program



X:\2012 Job Files\12-071\Data__Current Project Data Charts\DatabaseCharts.xlsm\WL Site 4

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

Figure 4.10b
Water Level Hydrograph
Site 4: Napa River at Yountville Cross Road
Napa County Groundwater/Surface Water Monitoring Facilities Report, DWR LGA Grant Program

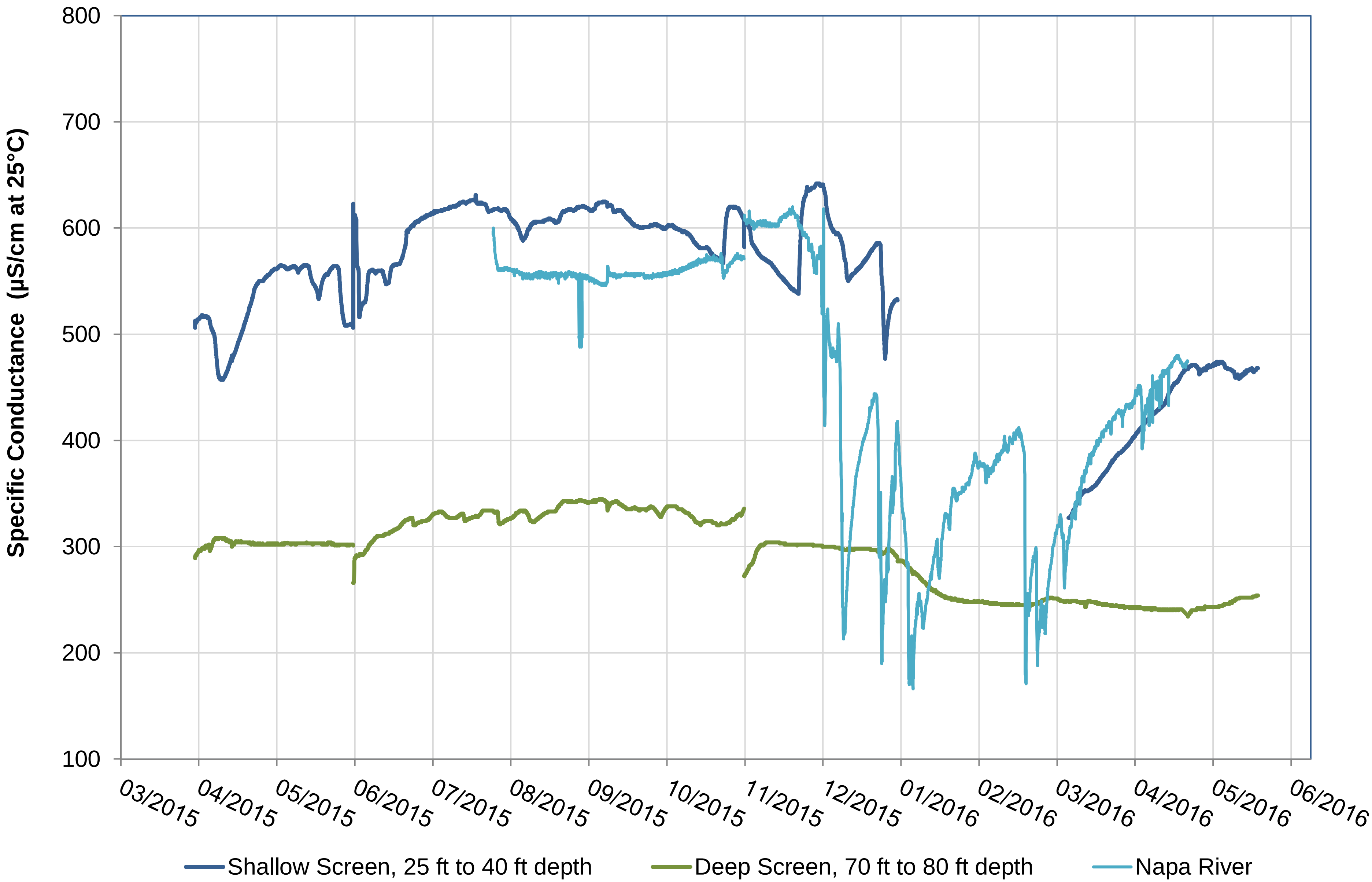


X:\2012 Job Files\12-071\Data__Current Project Data Charts\DatabaseCharts.xlsm\Site 4 Charts Chart 6

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

Figure 4.11
Temperature Hydrograph
Site 4: Napa River at Yountville Cross Road

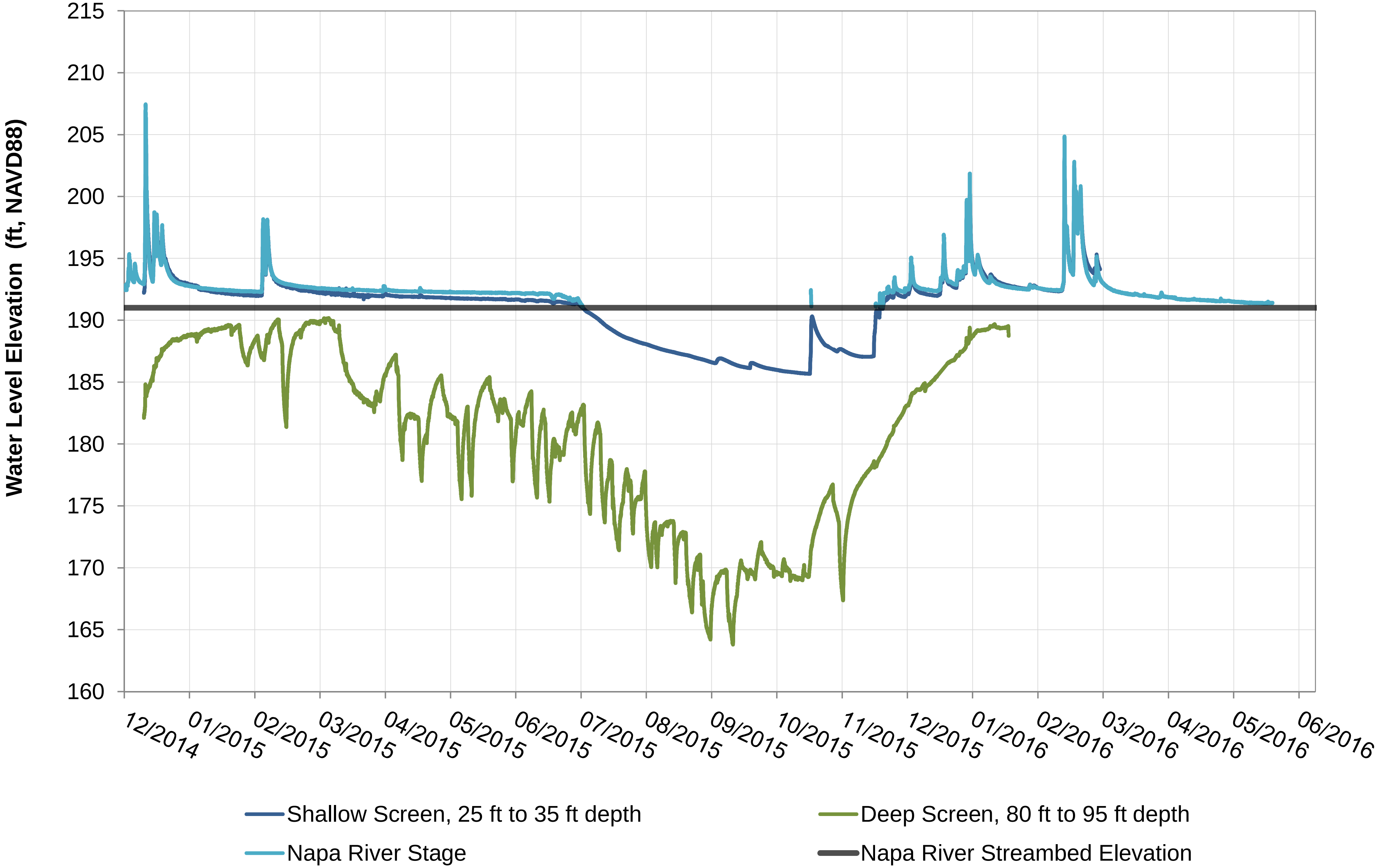
Napa County Groundwater/Surface Water Monitoring Facilities Report, DWR LGA Grant Program



X:\2012 Job Files\12-071\Data__Current Project Data Charts\DatabaseCharts.xlsm\Site 4 Charts Chart 2

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

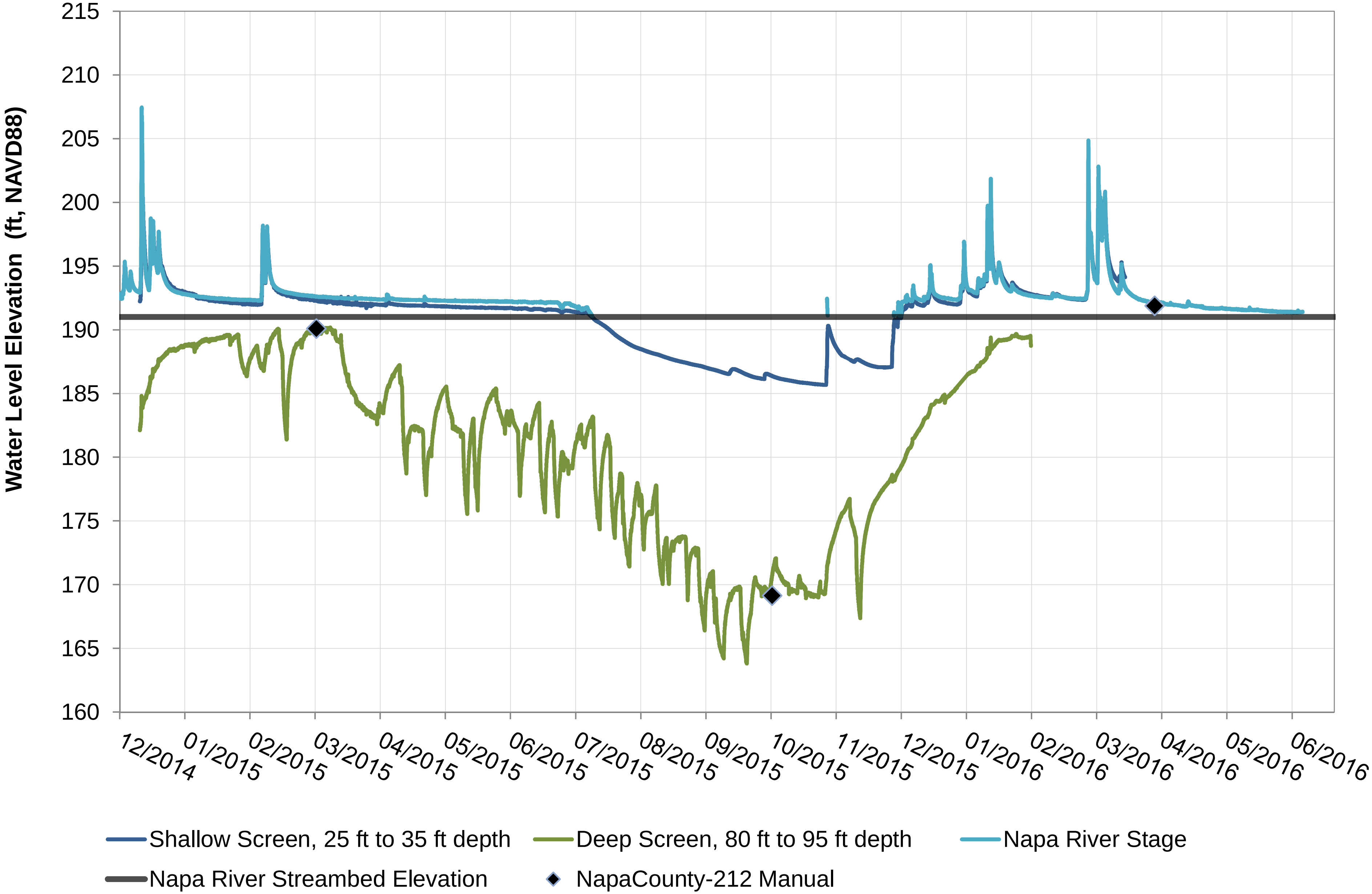
Figure 4.12
Specific Conductance Hydrograph
Site 4: Napa River at Yountville Cross Road
Napa County Groundwater/Surface Water Monitoring Facilities Report, DWR LGA Grant Program



X:\2012 Job Files\12-071\Data__Current Project Data Charts\DatabaseCharts.xlsm\WL Site5

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

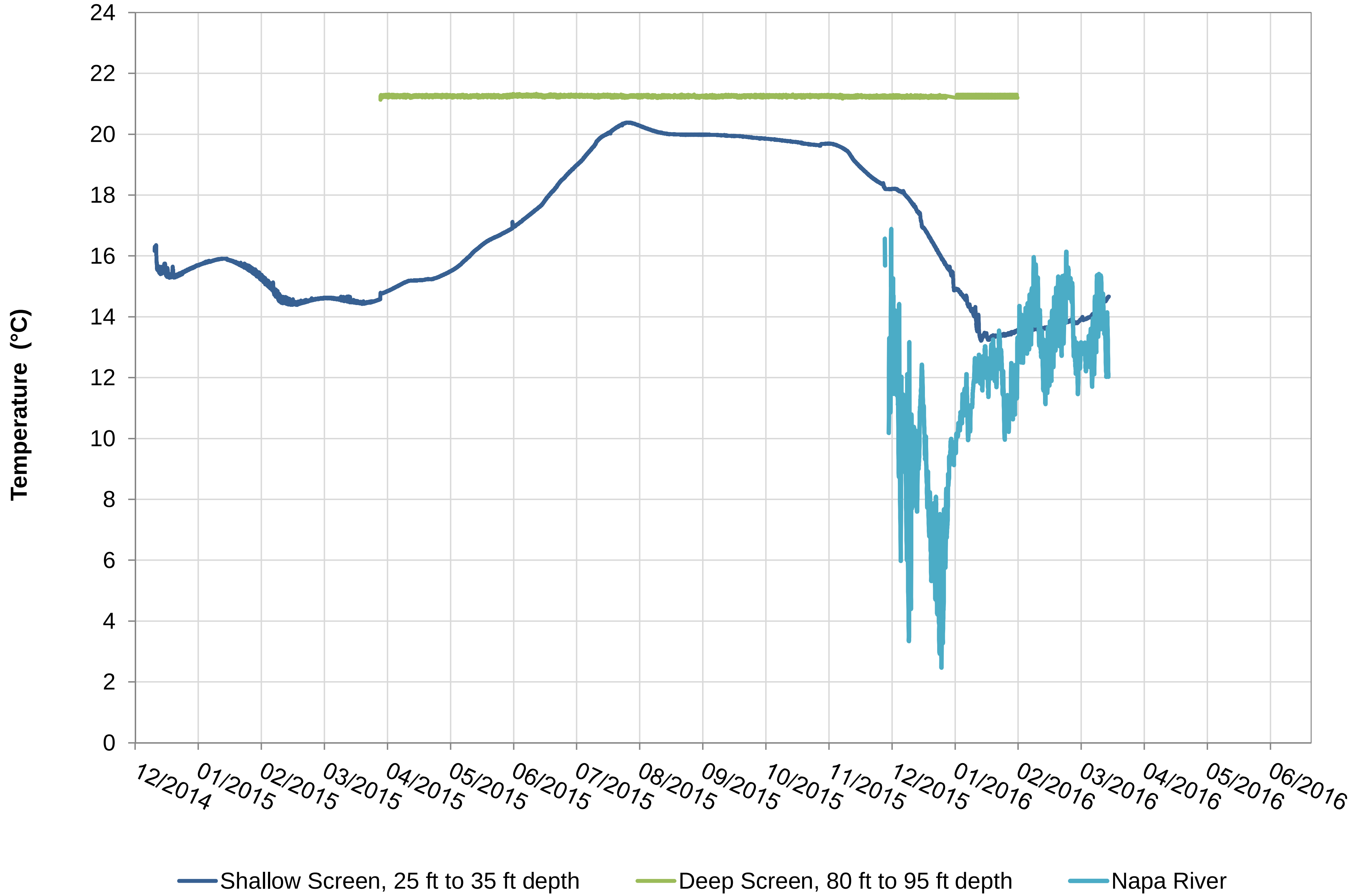
Figure 4.13a
Water Level Hydrograph
Site 5: Napa River at Pope Street
Napa County Groundwater/Surface Water Monitoring Facilities Report, DWR LGA Grant Program



X:\2012 Job Files\12-071\Data__Current Project Data Charts\DatabaseCharts.xlsm\WL Site5

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

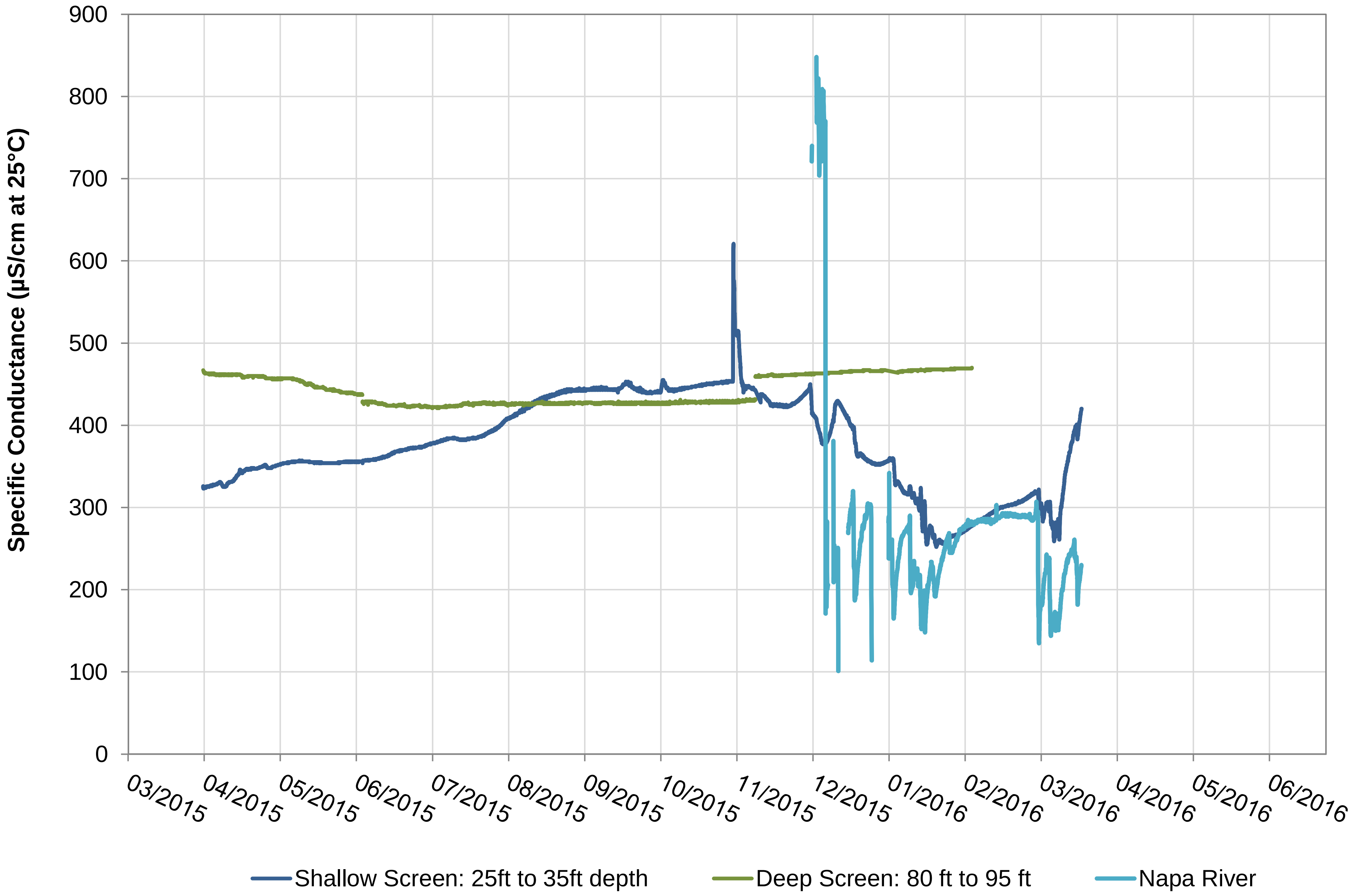
Figure 4.13b
Water Level Hydrograph
Site 5: Napa River at Pope Street
Napa County Groundwater/Surface Water Monitoring Facilities Report, DWR LGA Grant Program



X:\2012 Job Files\12-071\Data__Current Project Data Charts\DatabaseCharts.xlsm\Site 5 Temp

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

Figure 4.14
Temperature Hydrograph
Site 5: Napa River at Pope Street
Napa County Groundwater/Surface Water Monitoring Facilities Report, DWR LGA Grant Program

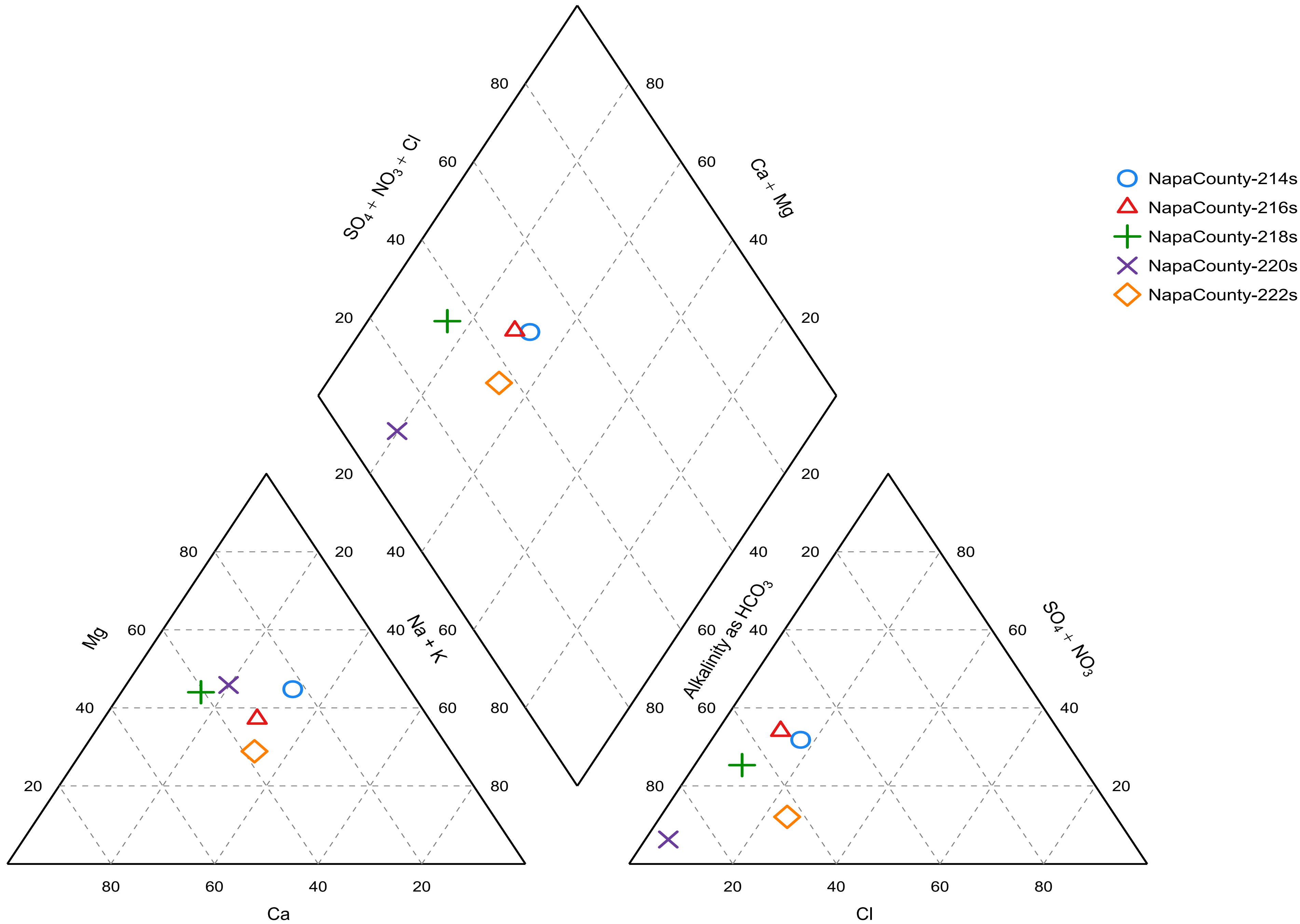


X:\2012 Job Files\12-071\Data__Current Project Data Charts\DatabaseCharts.xlsm\Site 5 SC

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

Figure 4.15
Specific Conductance Hydrograph
Site 5: Napa River at Pope Street

Napa County Groundwater/Surface Water Monitoring Facilities Report, DWR LGA Grant Program

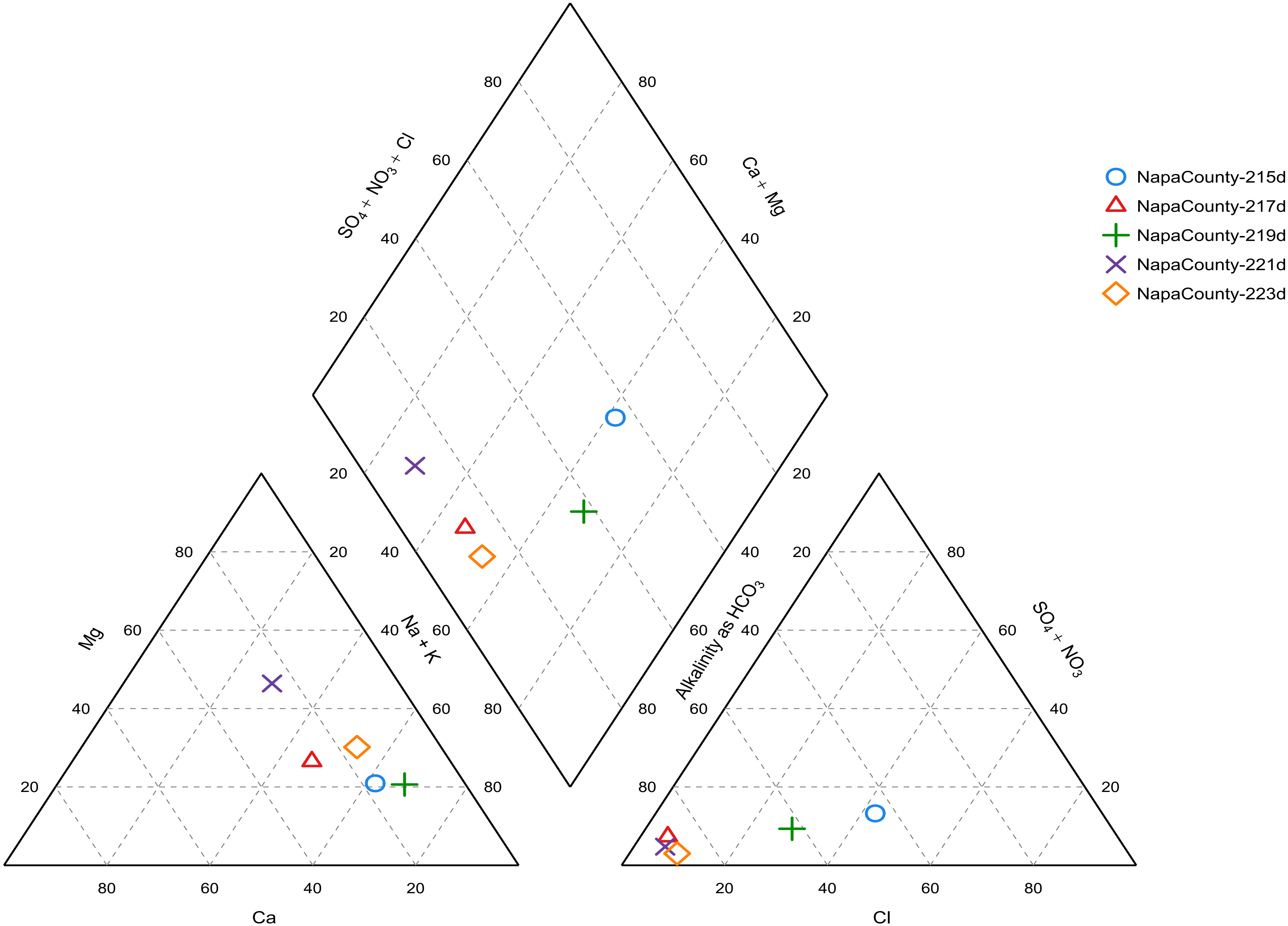


LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

FIGURE 4.16

Piper Diagram - June 2015 Monitoring Well Shallow Casing Samples

Napa County Groundwater/Surface Water Monitoring Facilities Report, DWR LGA Grant Program



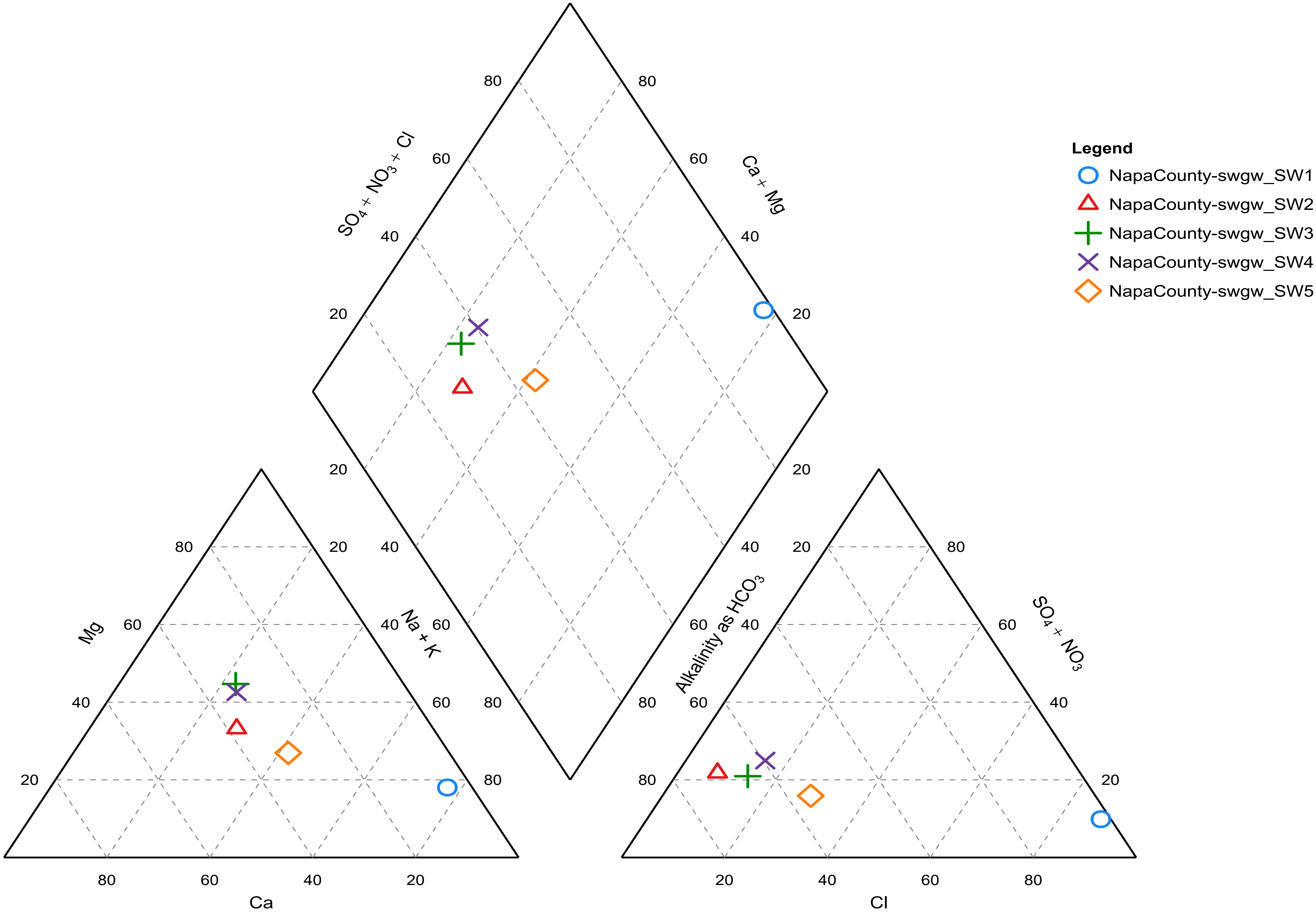
LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

FIGURE 4.17

Piper Diagram - June 2015 Monitoring Well Deep Casing Samples

Napa County Groundwater/Surface Water Monitoring

Facilities Report, DWR LGA Grant Program



LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

Figure 4.18
Piper Diagram - June 2015 Surface Water Samples
Napa County Groundwater/Surface Water Monitoring Facilities Report, DWR LGA Grant Program

APPENDIX A

*The free Adobe Reader may be used to view and complete this form. However, software must be purchased to complete, save, and reuse a saved form.

File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. **e0236840**

Owner's Well Number NapaCounty-214s-swgw1

Date Work Began 09/02/2014 Date Work Ended 9/4/2014

Local Permit Agency Napa County Department of Environmental Management

Permit Number E14-00666 Permit Date 8/20/14

DWR Use Only – Do Not Fill In

05N04W02N002M

State Well Number/Site Number

Latitude 381808 N Longitude 1221642 W

APN/TRS/Other

Geologic Log

Orientation ⦿ Vertical ○ Horizontal ○ Angle Specify

Drilling Method Hollow stem augers Drilling Fluid No

Depth from Surface Feet	to Feet	Description (Describe material, grain size, color, etc)
		SEE ATTACHED WELL LOG
		NOTE: NapaCounty-214s-swgw1 well and NapaCounty-215d-swgw1 well are in the same borehole.

Total Depth of Boring 100 Feet

Total Depth of Completed Well 53 Feet

Well Owner

Name County of Napa

Mailing Address 804 First Street

City Napa State CA Zip 94559

Well Location

Address Site #1- Napa River at First Street

City Napa County Napa

Latitude ___ Deg. ___ Min. ___ Sec. N Longitude ___ Deg. ___ Min. ___ Sec. W

Datum ___ Dec. Lat. 38.30223 Dec. Long. -122.27845

APN Book ___ Page ___ Parcel ___

Township ___ Range ___ Section ___

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North

SEE ATTACHED

West SITE LOCATION East

South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

⦿ New Well

○ Modification/Repair

○ Deepen

○ Other

○ Destroy

Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

○ Water Supply

☐ Domestic ☐ Public

☐ Irrigation ☐ Industrial

○ Cathodic Protection

○ Dewatering

○ Heat Exchange

○ Injection

⦿ Monitoring

○ Remediation

○ Sparging

○ Test Well

○ Vapor Extraction

○ Other

Water Level and Yield of Completed Well

Depth to first water 16 (Feet below surface)

Depth to Static Water Level ___ (Feet) Date Measured ___

Estimated Yield * ___ (GPM) Test Type ___

Test Length ___ (Hours) Total Drawdown ___ (Feet)

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

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
0	30	10	Blank	PVC Sch. 40	.308	2.375		
30	50	10	Screen	PVC Sch. 40	.308	2.375	Milled Slots	0.030
50	53	10	Blank	PVC Sch. 40	.308	2.375		

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	20	Cement	10.3 sack mix
20	53	Filter Pack	#3 sand

Attachments

☑ Geologic Log

☐ Well Construction Diagram

☐ Geophysical Log(s)

☐ Soil/Water Chemical Analyses

☑ Other Site Location

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name CLEAR HEART DRILLING, INC.
Person, Firm or Corporation

555 W. College Ave. Ste. B (Address) Santa Rosa (City) CA (State) 95401 (Zip)

Signed [signature] C-57 Licensed Water Well Contractor

10/15/2014 Date Signed

780357 C-57 License Number

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

e0236840

LSCE Project No.	12-1-071	Site:	Site #1- Napa River at Napa
Well Name:	Napa County-214s-swgw1	Drilling Method:	Hollow Stem Auger; pilot hole 8"-diameter reamed hole 10"-diameter
Lat./Long.:	38.30223/-122.27845	Sampling Method:	Core Sample Barrel
Drilled By:	Clear Heart Drilling	Drilling/Installation Date:	9/2/14 - 9/4/14
Driller:	Rick Schneider	Well Depth (ft):	53
Site Geologist:	Charlie Jenkins, P.G.	Boring Depth (ft):	100
		Well Screen (ft):	30-50

Lithologic Description

0-10': Silty Sand- 70% fine to medium sand, 30% non-plastic fines, minor clay, brown, dry

Slightly moist

10-16': Sandy Clay- 70% medium plastic fines, 30% fine sand, brown, stiff, moist

16-18': Sand- 95% very fine to coarse sand, 5% gravel, poorly sorted, gravel up to 1/4", minor clay, saturated, first encountered water at 16 ft.

18-26': Clay- brown, soft, medium plastic, 10% fine sand, wet

26-26.5': Sand- 95% fine to coarse sand, 5% gravel, saturated

26.5-29': Clay- 95% medium plastic fines, 5% fine sand, brown mottled greenish gray

29-29.5': Gravel stringer, wet, approximately 2" thick

29.5-30': Clay- 95% medium plastic fines, 5% fine sand, brown mottled greenish gray

30-37': Sand- 85% very fine to coarse sand, 15% gravel, gravel up to 1/4", saturated, gravel up to 25% at 35 ft.

37-37.5': Clay- greenish gray, medium plastic, sticky, lense approximately 3" thick

37.5-52': Sand and Gravel- 70% fine to coarse sand, sub-rounded to sub-angular, 30% gravel up to 1", saturated, greenish gray in overall color, multi-colored lithics

52-56': Clay- 95% medium plastic fines, 5% fine sand, yellowish brown mottled light gray, hard, slightly moist

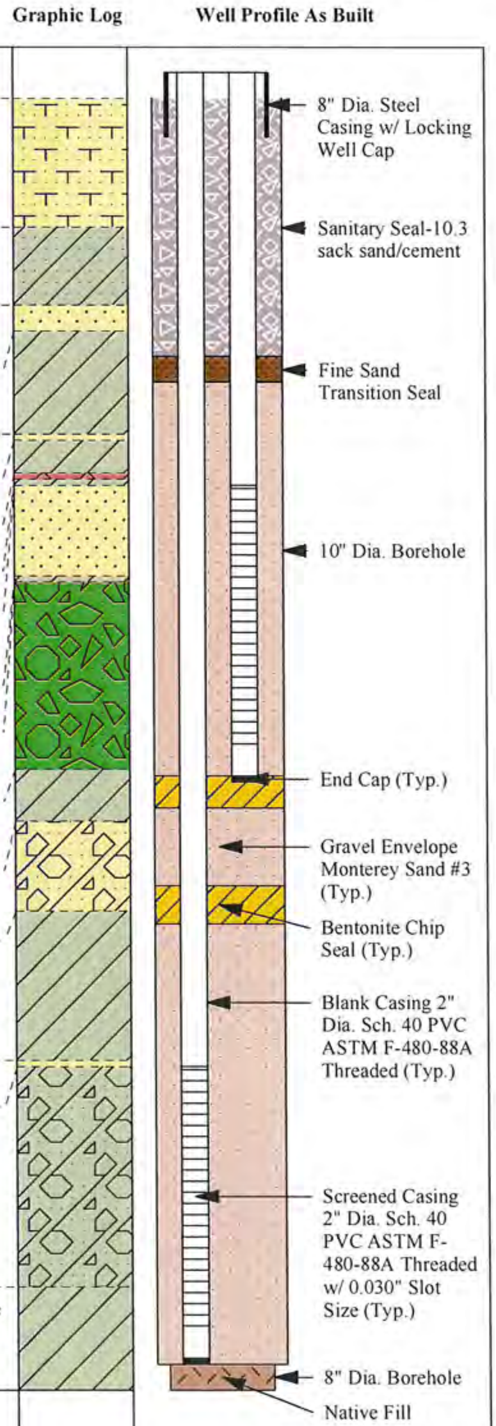
56-63': Sand and Gravel with Clay- 40% fine to coarse sand, 20% gravel, 40% medium plastic fines, yellowish brown, saturated, sand sub-rounded to sub-angular, gravel up to 1", trace cobbles

63-74.5': Clay- >95% medium plastic fines, yellowish brown mottled light gray, hard, slightly moist

74.5-75': approximately 1" thick sandy lense, wet

75-92': Clay with Sand and Gravel- 30% fine to coarse sand, 20% gravel, 50% medium plastic fines, brown mottled reddish brown, wet, gravel up to 1/4"

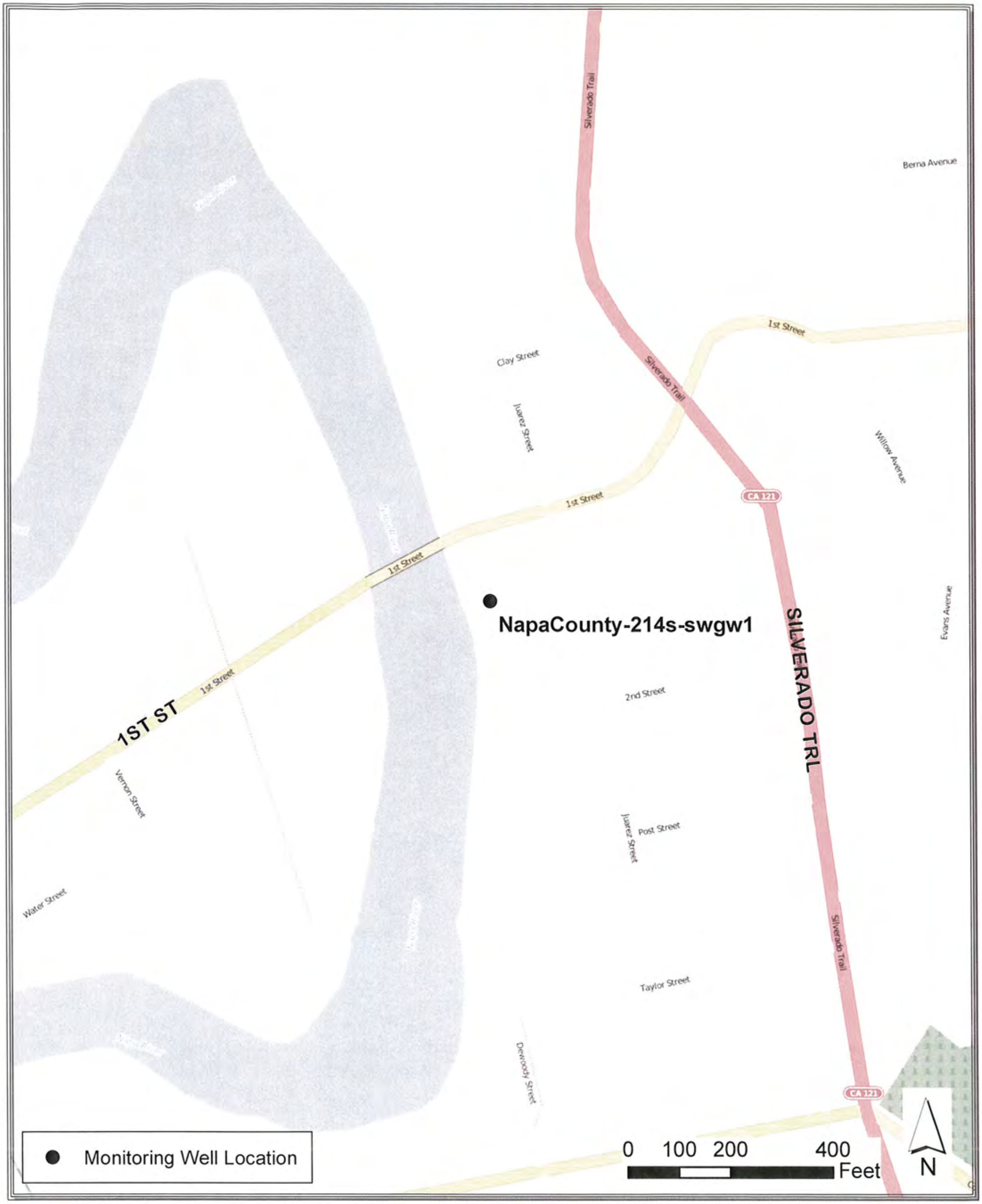
92-100': Clay- >95% medium plastic fines, yellowish brown mottled light gray, hard, moist, trace sand



LUHDORFF & SCALMANINI CONSULTING ENGINEERS

*Measurement w/ Recreational Handheld Unit (Garmin Summit HC)

e0236840



Path: X:\2014 Job Files\14-054\GIS\mapfiles\As-built mon well sites DDP.mxd

LUHDORFF & SCALMANINI CONSULTING ENGINEERS

Napa County Five Dual-Completion Monitoring Wells Project

*The free Adobe Reader may be used to view and complete this form. However, software must be purchased to complete, save, and reuse a saved form.

File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. **e0236873**

Page 1 of 3

Owner's Well Number NapaCounty-215d-swgw1

Date Work Began 09/02/2014   Date Work Ended 9/4/2014

Local Permit Agency Napa County Department of Environmental Management

Permit Number E14-00666   Permit Date 8/20/14

DWR Use Only – Do Not Fill In

05N04W02N001M
State Well Number/Site Number

Latitude 38 18 08 N   Longitude 122 16 42 W

APN/TRS/Other

Geologic Log

Orientation ⦿ Vertical ○ Horizontal ○ Angle Specify ____

Drilling Method Hollow stem augers   Drilling Fluid No

Depth from Surface Feet	to Feet	Description (Describe material, grain size, color, etc)
		SEE ATTACHED WELL LOG
		NOTE: NapaCounty-214s-swgw1 well and NapaCounty-215d-swgw1 well are in the same borehole.

Total Depth of Boring 100 Feet

Total Depth of Completed Well 98 Feet

Well Owner

Name County of Napa

Mailing Address 804 First Street

City Napa   State CA   Zip 94559

Well Location

Address Site #1- Napa River at First Street

City Napa   County Napa

Latitude ____ Deg. ____ Min. ____ Sec. N   Longitude ____ Deg. ____ Min. ____ Sec. W

Datum ____   Dec. Lat. 38.30223   Dec. Long. -122.27845

APN Book ____   Page ____   Parcel ____

Township ____   Range ____   Section ____

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North

SEE ATTACHED

West   SITE LOCATION   East

South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

○ New Well
○ Modification/Repair
 ○ Deepen
 ○ Other ____
○ Destroy
 Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

○ Water Supply
 ☐ Domestic ☐ Public
 ☐ Irrigation ☐ Industrial
○ Cathodic Protection
○ Dewatering
○ Heat Exchange
○ Injection
⦿ Monitoring
○ Remediation
○ Sparging
○ Test Well
○ Vapor Extraction
○ Other ____

Water Level and Yield of Completed Well

Depth to first water 16 (Feet below surface)

Depth to Static Water Level ____ (Feet)   Date Measured ____

Estimated Yield * ____ (GPM)   Test Type ____

Test Length ____ (Hours)   Total Drawdown ____ (Feet)

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

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
0	75	10	Blank	PVC Sch. 40	.308	2.375		
75	95	10	Screen	PVC Sch. 40	.308	2.375	Milled Slots	0.030
95	98	10	Blank	PVC Sch. 40	.308	2.375		

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	20	Cement	10.3 sack mix
20	53	Filter Pack	#3 sand
53	55	Bentonite	
55	61	Filter Pack	#3 sand
61	64	Bentonite	
64	100	Filter Pack	#3 sand

Attachments

☑ Geologic Log
☐ Well Construction Diagram
☐ Geophysical Log(s)
☐ Soil/Water Chemical Analyses
☑ Other Site Location

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name CLEAR HEART DRILLING, INC.
Person, Firm or Corporation

555 W. College Ave. Ste.B   Santa Rosa   CA   95401
Address   City   State   Zip

Signed ____ C-57 Licensed Water Well Contractor   10/15/2014 Date Signed   780357 C-57 License Number

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

e0236873

LSCE Project No.	12-1-071	Site:	Site #1- Napa River at Napa
Well Name:	Napa County-215d-swgw1	Drilling Method:	Hollow Stem Auger; pilot hole 8"-diameter reamed hole 10"-diameter
Lat./Long.:	38.30223/-122.27845	Sampling Method:	Core Sample Barrel
Drilled By:	Clear Heart Drilling	Drilling/Installation Date:	9/2/14 - 9/4/14
Driller:	Rick Schneider	Well Depth (ft):	98
Site Geologist:	Charlie Jenkins, P.G.	Boring Depth (ft):	100
		Well Screen (ft):	75-95

Lithologic Description

0-10': Silty Sand- 70% fine to medium sand, 30% non-plastic fines, minor clay, brown, dry

Slightly moist

10-16': Sandy Clay- 70% medium plastic fines, 30% fine sand, brown, stiff, moist

16-18': Sand- 95% very fine to coarse sand, 5% gravel, poorly sorted, gravel up to 1/4", minor clay, saturated, first encountered water at 16 ft.

18-26': Clay- brown, soft, medium plastic, 10% fine sand, wet

26-26.5': Sand- 95% fine to coarse sand, 5% gravel, saturated

26.5-29': Clay- 95% medium plastic fines, 5% fine sand, brown mottled greenish gray

29-29.5': Gravel stringer, wet, approximately 2" thick

29.5-30': Clay- 95% medium plastic fines, 5% fine sand, brown mottled greenish gray

30-37': Sand- 85% very fine to coarse sand, 15% gravel, gravel up to 1/4", saturated, gravel up to 25% at 35 ft.

37-37.5': Clay- greenish gray, medium plastic, sticky, lense approximately 3" thick

37.5-52': Sand and Gravel- 70% fine to coarse sand, sub-rounded to sub-angular, 30% gravel up to 1", saturated, greenish gray in overall color, multi-colored lithics

52-56': Clay- 95% medium plastic fines, 5% fine sand, yellowish brown mottled light gray, hard, slightly moist

56-63': Sand and Gravel with Clay- 40% fine to coarse sand, 20% gravel, 40% medium plastic fines, yellowish brown, saturated, sand sub-rounded to sub-angular, gravel up to 1", trace cobbles

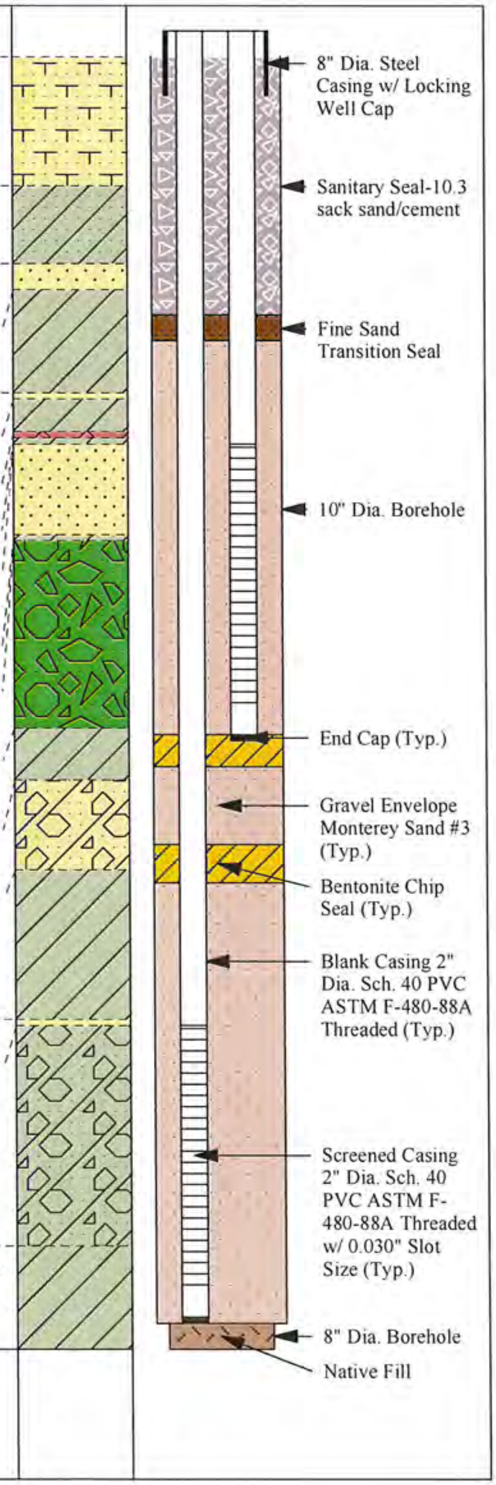
63-74.5': Clay- >95% medium plastic fines, yellowish brown mottled light gray, hard, slightly moist

74.5-75': approximately 1" thick sandy lense, wet

75-92': Clay with Sand and Gravel- 30% fine to coarse sand, 20% gravel, 50% medium plastic fines, brown mottled reddish brown, wet, gravel up to 1/4"

92-100': Clay- >95% medium plastic fines, yellowish brown mottled light gray, hard, moist, trace sand

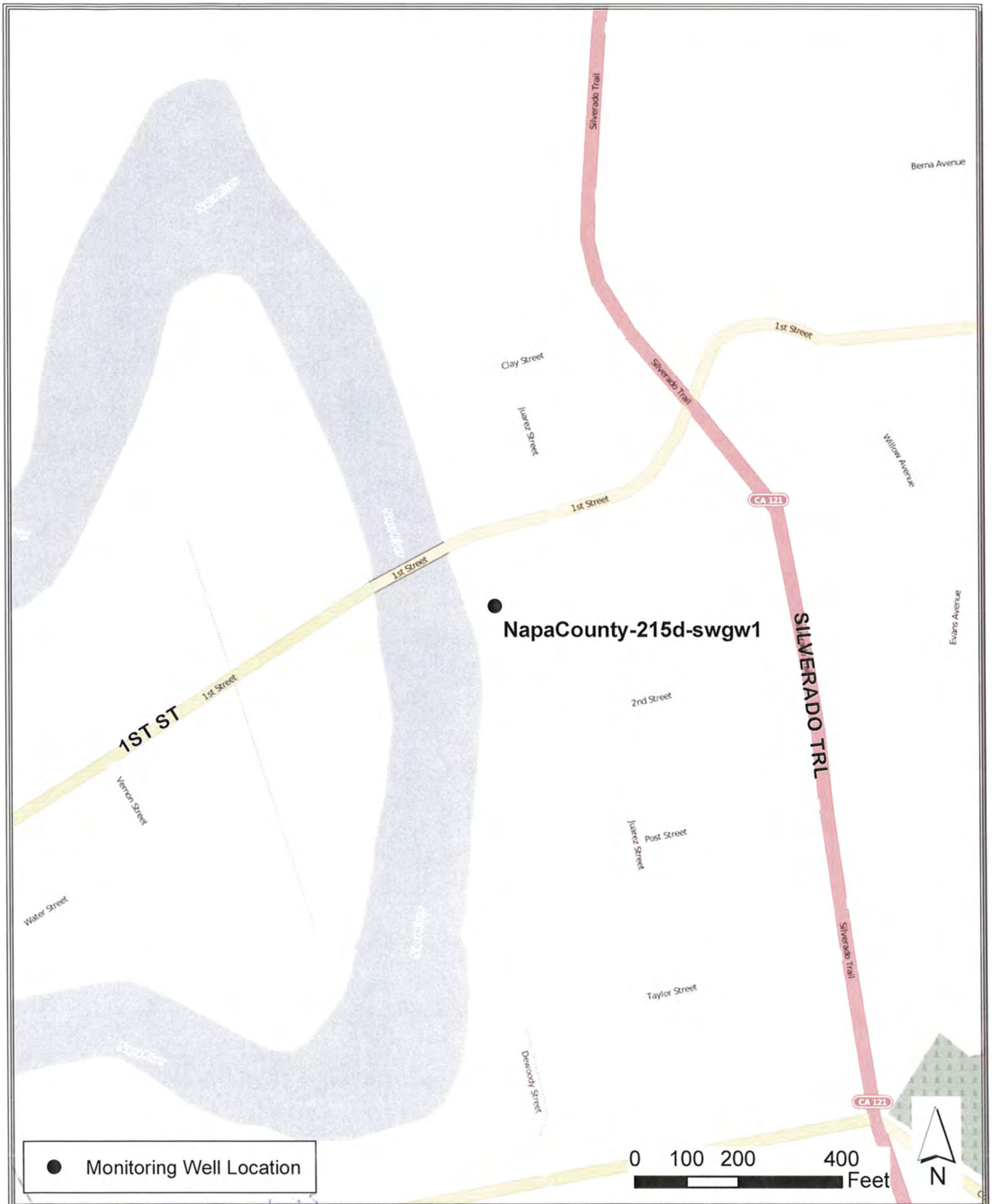
Graphic Log **Well Profile As Built**



LUHDORFF & SCALMANINI

*Measurement w/ Recreational Handheld Unit (Garmin Summit HC)

e0236873



Path: X:\2014 Job Files\14-054\GIS\mapfiles\As-built mon well sites DDP.mxd

LUHDORFF & SCALMANINI CONSULTING ENGINEERS

Napa County Five Dual-Completion Monitoring Wells Project

File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

e0236731

Page 1 of 3

Owner's Well Number NapaCounty-216s-swgw2

Date Work Began 09/22/2014 Date Work Ended 9/24/2014

Local Permit Agency Napa County Department of Environmental Management

Permit Number E14-00667 Permit Date 8/20/14

DWR Use Only – Do Not Fill In

06N04W18J003M
State Well Number/Site Number

38 21 55 N Latitude — 122 20 15 W Longitude

APN/TRS/Other

Geologic Log

Orientation ⦿ Vertical ○ Horizontal ○ Angle Specify

Drilling Method Hollow-stem augers Drilling Fluid no

Depth from Surface Feet	to Feet	Description (Describe material, grain size, color, etc)
		SEE ATTACHED WELL LOG
		NOTE: NapaCounty-216s-swgw2 well and NapaCounty-217d-swgw2 well are in the same borehole.

Total Depth of Boring 100 Feet

Total Depth of Completed Well 50 Feet

Well Owner

Name County of Napa

Mailing Address 804 First Street

City Napa State CA Zip 94559

Well Location

Address Site #2-Dry Creek at Washington Street

City Napa County Napa

Latitude ___ Deg. ___ Min. ___ Sec. N Longitude ___ Deg. ___ Min. ___ Sec. W

Datum ___ Dec. Lat. 38.365231 Dec. Long. -122.337532

APN Book ___ Page ___ Parcel ___

Township ___ Range ___ Section ___

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North — West — East — South

SEE ATTACHED SITE LOCATION

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

⦿ New Well
○ Modification/Repair
○ Deepen
○ Other
○ Destroy
Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

○ Water Supply
☐ Domestic ☐ Public
☐ Irrigation ☐ Industrial
○ Cathodic Protection
○ Dewatering
○ Heat Exchange
○ Injection
⦿ Monitoring
○ Remediation
○ Sparging
○ Test Well
○ Vapor Extraction
○ Other

Water Level and Yield of Completed Well

Depth to first water 23 (Feet below surface)

Depth to Static Water Level ___ (Feet) Date Measured ___

Estimated Yield * ___ (GPM) Test Type ___

Test Length ___ (Hours) Total Drawdown ___ (Feet)

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

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size If Any (Inches)
0	25	10	Blank	PVC Sch. 40	.308	2.375		
25	45	10	Screen	PVC Sch. 40	.308	2.375	Milled Slots	0.030
45	50	10	Blank	PVC Sch. 40	.308	2.375		

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	20	Cement	10.3 sack mix
20	51	Filter Pack	#3 sand

Attachments

☑ Geologic Log
☐ Well Construction Diagram
☐ Geophysical Log(s)
☐ Soil/Water Chemical Analyses
☑ Other Site Location

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name CLEAR HEART DRILLING, INC.
Person, Firm or Corporation

555 W. College Ave. Ste. B — Santa Rosa — CA — 95401
Address — City — State — Zip

Signed Gary M. Sol — 10/15/2014 — 780357
C-57 Licensed Water Well Contractor — Date Signed — C-57 License Number

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

e0236731

LSCE Project No.	12-1-071	Site:	Site #2- Dry Creek at Washington Street
Well Name:	Napa County-216s-swgw2	Drilling Method:	Hollow Stem Auger; pilot hole 8"-diameter reamed hole 10"-diameter
Lat./Long.:	38.365231/-122.337532		
Drilled By:	Clear Heart Drilling	Sampling Method:	Core Sample Barrel
Driller:	Rick Schneider	Drilling/Installation Date:	9/22/14 - 9/23/14 — Well Depth (ft): 50
Site Geologist:	Charlie Jenkins, P.G.	Boring Depth (ft):	100 — Well Screen (ft): 25-45

Lithologic Description | **Graphic Log** | **Well Profile As Built**

0-0.33': Approximately 4-inch thick asphalt road surface

0.33-4.5': Fill- gravel, sand, and fines mixture, brown, dry

4.5-7': Gravelly Sand with Clay- 40% very fine to coarse sand, 30% gravel up to 1", 30% medium plastic fines, slightly moist

7-16': Clay- 90% medium plastic fines, 10% very fine sand, brown, slightly moist

16-23': Sandy Clay- 70% medium plastic fines, 30% very fine to fine sand, yellowish brown mottled light gray, slightly moist

23-45': Gravelly Sandy Clay- 30% very fine to coarse sand, 20% gravel up to 1", 50% medium plastic fines, wet to saturated, sand and gravel in a clay matrix, first encountered water at 23 ft.

45-47': Gravelly Sand- 80% very fine to coarse sand, 20% gravel up to 1", sand and gravel sub-round to sub-angular, saturated

47-49.5': Clay- >95% medium plastic fines, brown, moist, some sandy stringers less than 1" thick

49.5-51': Gravelly Sand- 70% very fine to coarse sand, 20% gravel up to 1", 10% fines, saturated

51-59': Clay- >95% medium plastic fines, reddish brown mottled light gray, sticky, soft in places

59-62.5': Clay- >95% medium plastic fines, greenish gray, hard, moist

62.5-73.5': Clay- >95% medium plastic fines, reddish brown mottled light gray, moist

73.5-77': Clay- 80% medium plastic fines, 10% fine sand, 10% gravel up to 3/4", reddish brown mottled light gray, stiff, moist

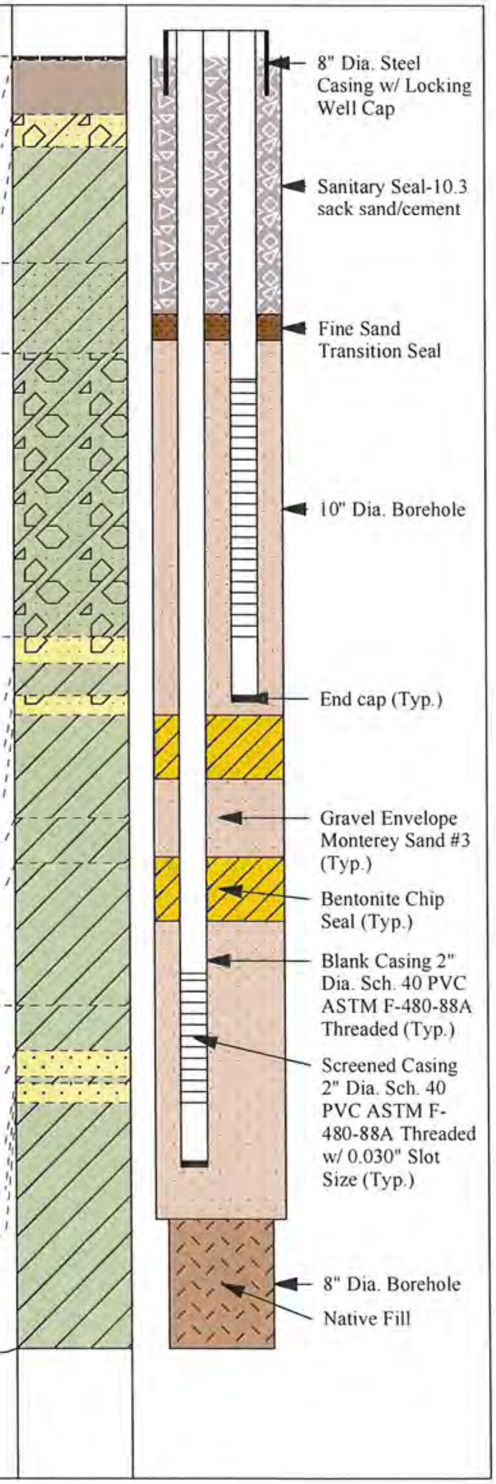
77-79': Sand- 85% fine to coarse sand, 15% fines, sub-round to sub-angular, minor gravel, poorly sorted, saturated

79-79.5': Clay- 90% medium plastic fines, 10% very fine sand, reddish brown mottled light gray

79.5-81': Sand- 90% very fine to medium sand, 10% fines, sub-round to sub-angular, saturated

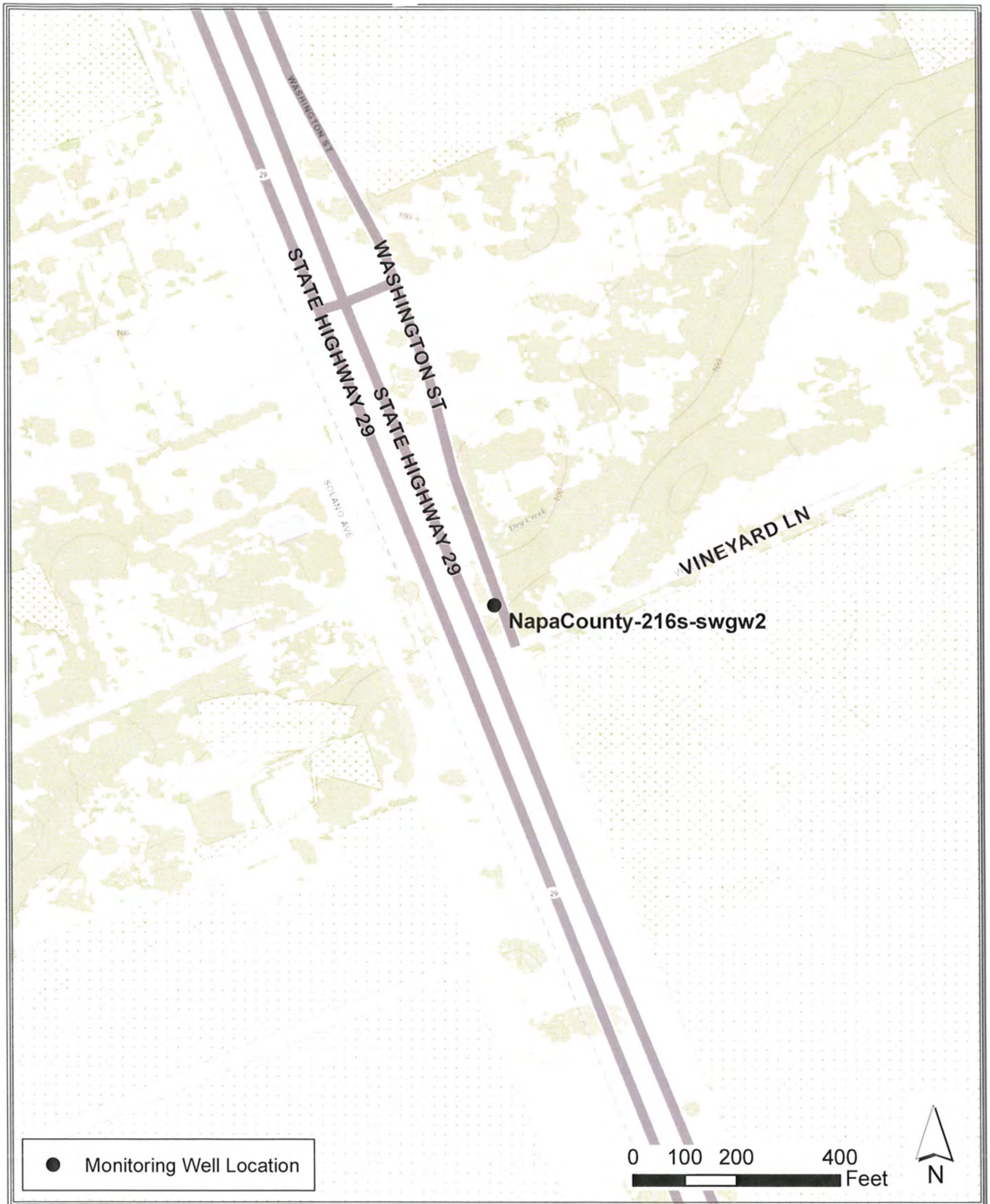
81-100': Clay- 80% medium plastic fines, 20% very fine to fine sand, stiff, moist, gray mottled reddish brown

approximately 4" thick wet gravel lense at 85.5 ft



*Measurement w/ Recreational Handheld Unit (Garmin Summit HC)

e0236731



Path: X:\2014 Job Files\14-054\GIS\mapfiles\As-built mon well sites DDP.mxd

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

Napa County Five Dual-Completion Monitoring Wells Project

*The free Adobe Reader may be used to view and complete this form. However, software must be purchased to complete, save, and reuse a saved form.

File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0236740

Owner's Well Number NapaCounty-217d-swgw2

Date Work Began 09/22/2014 Date Work Ended 9/24/2014

Local Permit Agency Napa County Department of Environmental Management

Permit Number E14-00667 Permit Date 8/20/14

DWR Use Only – Do Not Fill In

State Well Number/Site Number: 06N04W18J004M

Latitude: 382155 N Longitude: 1222015 W

APN/TRS/Other:

Geologic Log

Orientation ⦿ Vertical ○ Horizontal ○ Angle Specify

Drilling Method Hollow stem augers Drilling Fluid No

Depth from Surface Feet	to Feet	Description (Describe material, grain size, color, etc)
		SEE ATTACHED WELL LOG
		NOTE: NapaCounty-216s-swgw2 well and NapaCounty-217d-swgw2 are in the same borehole.

Total Depth of Boring 100 Feet

Total Depth of Completed Well 86 Feet

Well Owner

Name County of Napa

Mailing Address 804 First St.

City Napa State CA Zip 94559

Well Location

Address Site #2- Dry Creek at Washington Street

City Napa County Napa

Latitude ___ Deg. ___ Min. ___ Sec. N Longitude ___ Deg. ___ Min. ___ Sec. W

Datum ___ Dec. Lat. 38.365231 Dec. Long. -122.337532

APN Book ___ Page ___ Parcel ___

Township ___ Range ___ Section ___

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North

SEE ATTACHED

West SITE LOCATION East

South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

⦿ New Well
○ Modification/Repair
○ Deepen
○ Other
○ Destroy
Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

○ Water Supply
☐ Domestic ☐ Public
☐ Irrigation ☐ Industrial
○ Cathodic Protection
○ Dewatering
○ Heat Exchange
○ Injection
⦿ Monitoring
○ Remediation
○ Sparging
○ Test Well
○ Vapor Extraction
○ Other

Water Level and Yield of Completed Well

Depth to first water 23 (Feet below surface)

Depth to Static Water Level ___ (Feet) Date Measured ___

Estimated Yield * ___ (GPM) Test Type ___

Test Length ___ (Hours) Total Drawdown ___ (Feet)

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

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
0	71	10	Blank	PVC Sch. 40	.308	2.375		
71	81	10	Screen	PVC Sch. 40	.308	2,375	Milled Slots	0.030
81	86	10	Blank	PVC Sch. 40	.308	2.375		

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	20	Cement	10.3 sack mix
20	51	Filter Pack	#3 sand
51	56	Bentonite	
56	62	Filter Pack	#3 sand
62	67	Bentonite	
67	90	Filter Pack	#3 sand

Attachments

☑ Geologic Log
☐ Well Construction Diagram
☐ Geophysical Log(s)
☐ Soil/Water Chemical Analyses
☑ Other Site Location

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name CLEAR HEART DRILLING, INC.
Person, Firm or Corporation

555 W. College Ave. Ste.B Santa Rosa CA 95401
Address City State Zip

Signed [signature] 10/15/2014 780357
C-57 Licensed Water Well Contractor Date Signed C-57 License Number

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

e0236740

LSCE Project No.	12-1-071	Site:	Site #2- Dry Creek at Washington Street
Well Name:	Napa County-217d-swgw2	Drilling Method:	Hollow Stem Auger; pilot hole 8"-diameter reamed hole 10"-diameter
Lat./Long.:	38.365231/-122.337532		
Drilled By:	Clear Heart Drilling	Sampling Method:	Core Sample Barrel
Driller:	Rick Schneider	Drilling/Installation Date:	9/22/14 - 9/23/14
Site Geologist:	Charlie Jenkins, P.G.	Boring Depth (ft):	100

Well Depth (ft): 86

Well Screen (ft): 71-81

Lithologic Description

0-0.33': Approximately 4-inch thick asphalt road surface

0.33-4.5': Fill- gravel, sand, and fines mixture, brown, dry

4.5-7': Gravelly Sand with Clay- 40% very fine to coarse sand, 30% gravel up to 1", 30% medium plastic fines, slightly moist

7-16': Clay- 90% medium plastic fines, 10% very fine sand, brown, slightly moist

16-23': Sandy Clay- 70% medium plastic fines, 30% very fine to fine sand, yellowish brown mottled light gray, slightly moist

23-45': Gravelly Sandy Clay- 30% very fine to coarse sand, 20% gravel up to 1", 50% medium plastic fines, wet to saturated, sand and gravel in a clay matrix, first water encountered at 23 ft.

45-47': Gravelly Sand- 80% very fine to coarse sand, 20% gravel up to 1", sand and gravel sub-round to sub-angular, saturated

47-49.5': Clay- >95% medium plastic fines, brown, moist, some sandy stringers less than 1" thick

49.5-51': Gravelly Sand- 70% very fine to coarse sand, 20% gravel up to 1", 10% fines, saturated

51-59': Clay- >95% medium plastic fines, reddish brown mottled light gray, sticky, soft in places

59-62.5': Clay- >95% medium plastic fines, greenish gray, hard, moist

62.5-73.5': Clay- >95% medium plastic fines, reddish brown mottled light gray, moist

73.5-77': Clay- 80% medium plastic fines, 10% fine sand, 10% gravel up to 3/4", reddish brown mottled light gray, stiff, moist

77-79': Sand- 85% fine to coarse sand, 15% fines, sub-round to sub-angular, minor gravel, poorly sorted, saturated

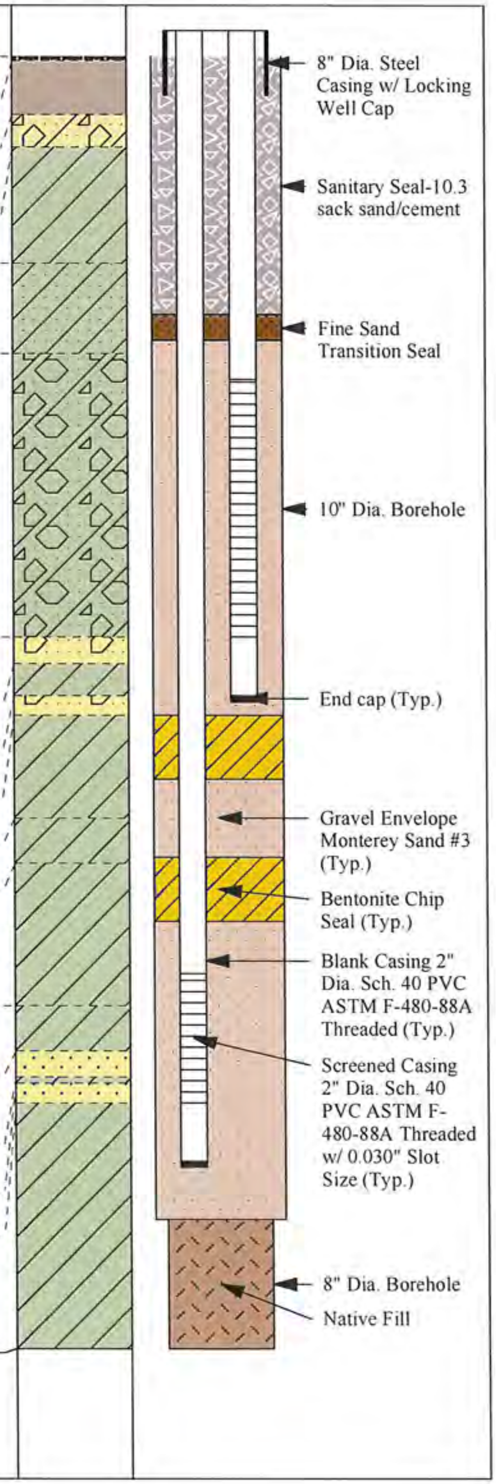
79-79.5': Clay- 90% medium plastic fines, 10% very fine sand, reddish brown mottled light gray

79.5-81': Sand- 90% very fine to medium sand, 10% fines, sub-round to sub-angular, saturated

81-100': Clay- 80% medium plastic fines, 20% very fine to fine sand, stiff, moist, gray mottled reddish brown

approximately 4" thick wet gravel lense at 85.5 ft

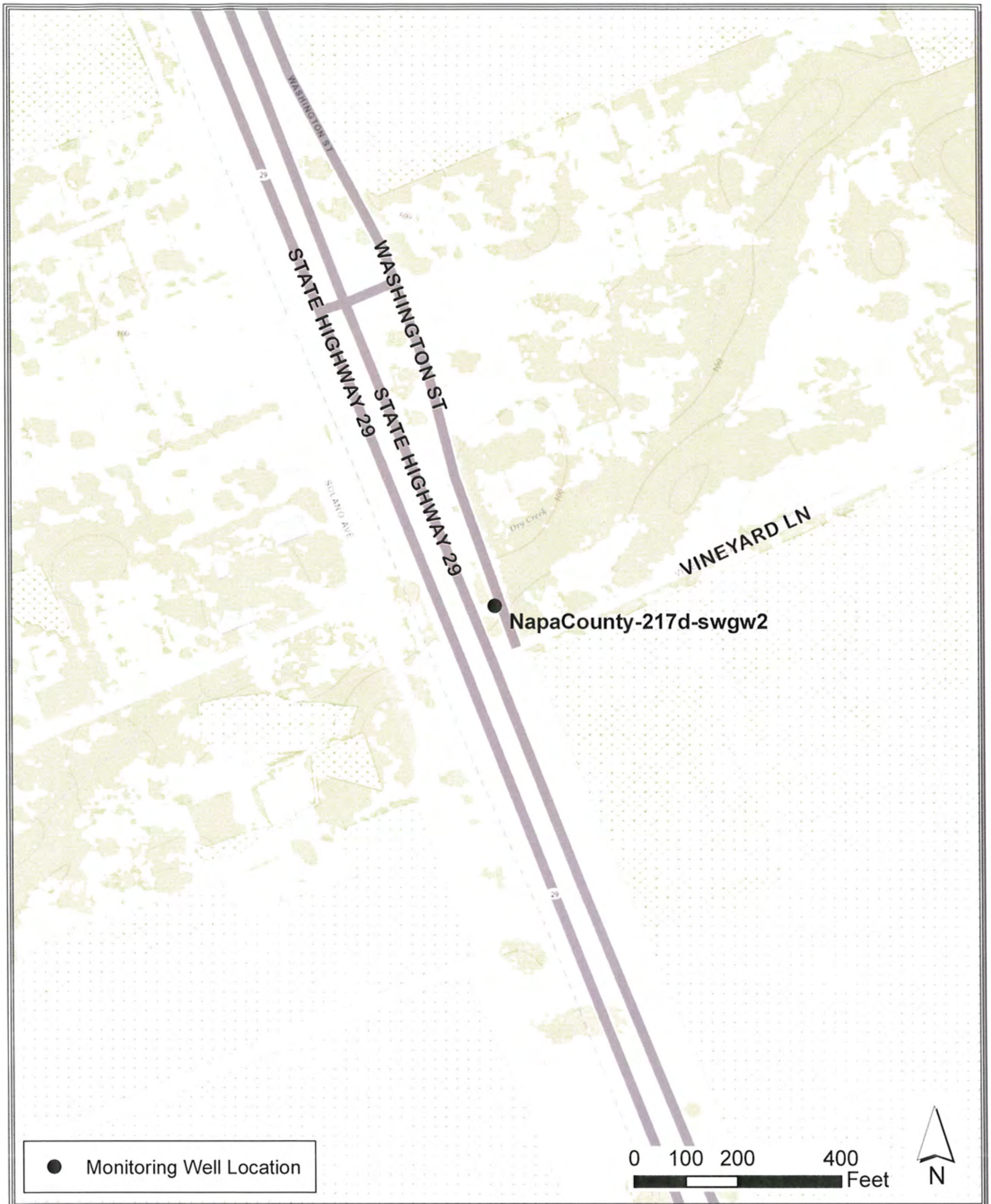
Graphic Log **Well Profile As Built**



LUHDORFF & SCALMANINI CONSULTING ENGINEERS

*Measurement w/ Recreational Handheld Unit (Garmin Summit HC)

e0236740



Path: X:\2014 Job Files\14-054\GIS\mapfiles\As-built mon well sites DDP.mxd

LUHDORFF & SCALMANINI CONSULTING ENGINEERS

Napa County Five Dual-Completion Monitoring Wells Project

*The free Adobe Reader may be used to view and complete this form. However, software must be purchased to complete, save, and reuse a saved form.

File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0236894

Page 1 of 3

Owner's Well Number NapaCounty-218s-swgw3

Date Work Began 09/08/2014 Date Work Ended 9/10/2014

Local Permit Agency Napa County Department of Environmental Health

Permit Number E14-00668 Permit Date 8/20/14

DWR Use Only – Do Not Fill In

06N04W16G001M
State Well Number/Site Number

38 22 02 N | 122 18 18 W
Latitude | Longitude

APN/TRS/Other

Geologic Log

Orientation ⦿ Vertical ○ Horizontal ○ Angle Specify

Drilling Method Hollow stem augers Drilling Fluid No

Depth from Surface Feet	to Feet	Description (Describe material, grain size, color, etc)
		SEE ATTACHED WELL LOG
		NOTE: NapaCounty-218s-swgw3 well and NapaCounty-219d-swgw3 well are in the same borehole.

Total Depth of Boring 100 Feet

Total Depth of Completed Well 40 Feet

Well Owner

Name County of Napa

Mailing Address 804 First Street

City Napa State CA Zip 94559

Well Location

Address Site #3- Napa River at Oak Knoll Boulevard

City Napa County Napa

Latitude ___ Deg. ___ Min. ___ Sec. N Longitude ___ Deg. ___ Min. ___ Sec. W

Datum ___ Dec. Lat. 38.367255 Dec. Long. -122.304954

APN Book ___ Page ___ Parcel ___

Township ___ Range ___ Section ___

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North

West East

SEE ATTACHED SITE LOCATION

South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

⦿ New Well
○ Modification/Repair
○ Deepen
○ Other
○ Destroy
Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

○ Water Supply
☐ Domestic ☐ Public
☐ Irrigation ☐ Industrial
○ Cathodic Protection
○ Dewatering
○ Heat Exchange
○ Injection
⦿ Monitoring
○ Remediation
○ Sparging
○ Test Well
○ Vapor Extraction
○ Other

Water Level and Yield of Completed Well

Depth to first water 29 (Feet below surface)

Depth to Static Water Level ___ (Feet) Date Measured ___

Estimated Yield * ___ (GPM) Test Type ___

Test Length ___ (Hours) Total Drawdown ___ (Feet)

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

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
0	25	10	Blank	PVC Sch. 40	.308	2.375		
25	35	10	Screen	PVC Sch. 40	.308	2.375	Milled Slots	0.030
35	40	10	Blank	PVC Sch. 40	.308	2.375		

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	20	Cement	10.3 sack mix
20	40	Filter Pack	#3 sand

Attachments

☑ Geologic Log
☐ Well Construction Diagram
☐ Geophysical Log(s)
☐ Soil/Water Chemical Analyses
☑ Other Site Location

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name CLEAR HEART DRILLING, INC.
Person, Firm or Corporation

555 W. College Ave. Ste. B (Address) Santa Rosa (City) CA (State) 95401 (Zip)

Signed ___ (C-57 Licensed Water Well Contractor) 10/15/2014 (Date Signed) 780357 (C-57 License Number)

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

e0236894

LSCE Project No.	12-1-071	Site:	Site #3- Napa River at Oak Knoll Boulevard
Well Name:	Napa County-218s-swgw3	Drilling Method:	Hollow Stem Auger; pilot hole 8"-diameter reamed hole 10"-diameter
Lat./Long.:	38.367255/-122.304954		
Drilled By:	Clear Heart Drilling	Sampling Method:	Core Sample Barrel
Driller:	Rick Schneider	Drilling/Installation Date:	9/8/14 - 9/9/14
Site Geologist:	Charlie Jenkins, P.G.	Boring Depth (ft):	100

Well Depth (ft): 40

Well Screen (ft): 25-35

Lithologic Description

0-13': Silty Sand- 70% very fine to medium sand, 30% non-plastic fines, brown, dry to slightly moist

13-20': Sand- 95% very fine to medium sand, 5% fines, slightly moist, brown

2-inch thick gravel lense at 19 ft., slightly moist

20-35': Gravelly Sand- 60% very fine to coarse sand, 35% gravel up to 1", rounded, 5% fines, slightly moist

50% very fine to coarse sand, 40% gravel, 10% fines, sand and gravel sub-angular to round, first encountered water at 29 ft.,

40% very fine to coarse sand, 40% gravel up to 1.5", 20% fines, saturated

35-40': Sandy Clay- 30-40% very fine to medium sand, 60-70% medium plastic fines, yellowish brown, very moist to wet, trace gravel

40-45': Clay- 10% very fine sand, 90% medium plastic fines, yellowish brown mottled light gray, moist

45-48': Sandy Clay- 30-40% fine to medium sand, 60-70% medium plastic fines, yellowish brown mottle dlight gray, very moist to wet, minor gravel

48-54': Gravelly Sand with Clay- 30% fine to coarse sand, 30% gravel up to 1", 40% medium plastic fines, very moist to wet, yellowish brown, some large cobbles up to 2.5"

54-64': Clay- 10% very fine sand, 90% medium plastic fines, yellowish brown mottled light gray, moist

64-65': Clay- >95% medium plastic fines, dark gray, stiff/hard, moist

65-78': Clay- >95% medium plastic fines, greenish gray, hard, moist

78-80.5': Clayey Sand- 60% very fine to medium sand, 40% fines, brown, wet

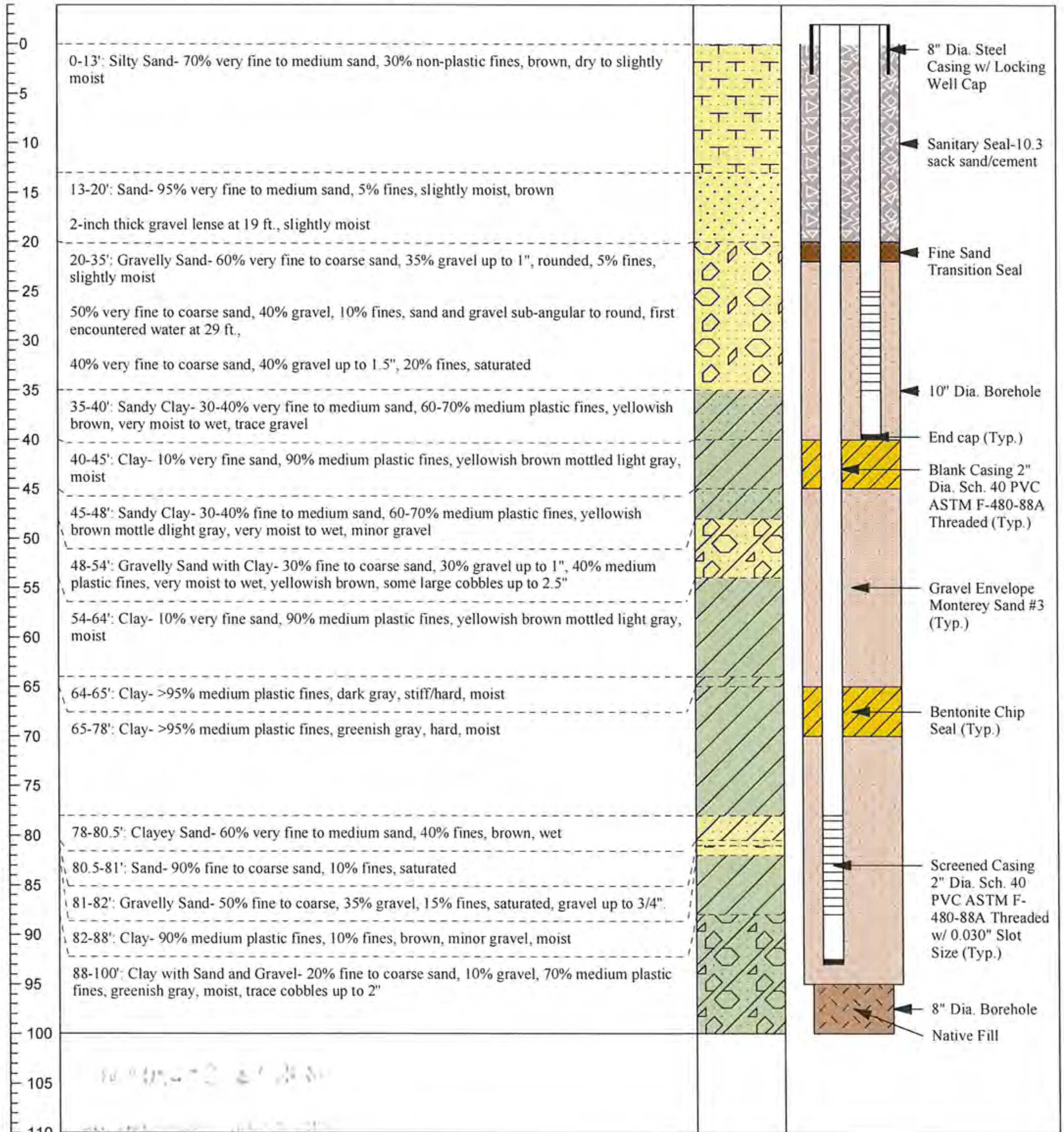
80.5-81': Sand- 90% fine to coarse sand, 10% fines, saturated

81-82': Gravelly Sand- 50% fine to coarse, 35% gravel, 15% fines, saturated, gravel up to 3/4"

82-88': Clay- 90% medium plastic fines, 10% fines, brown, minor gravel, moist

88-100': Clay with Sand and Gravel- 20% fine to coarse sand, 10% gravel, 70% medium plastic fines, greenish gray, moist, trace cobbles up to 2"

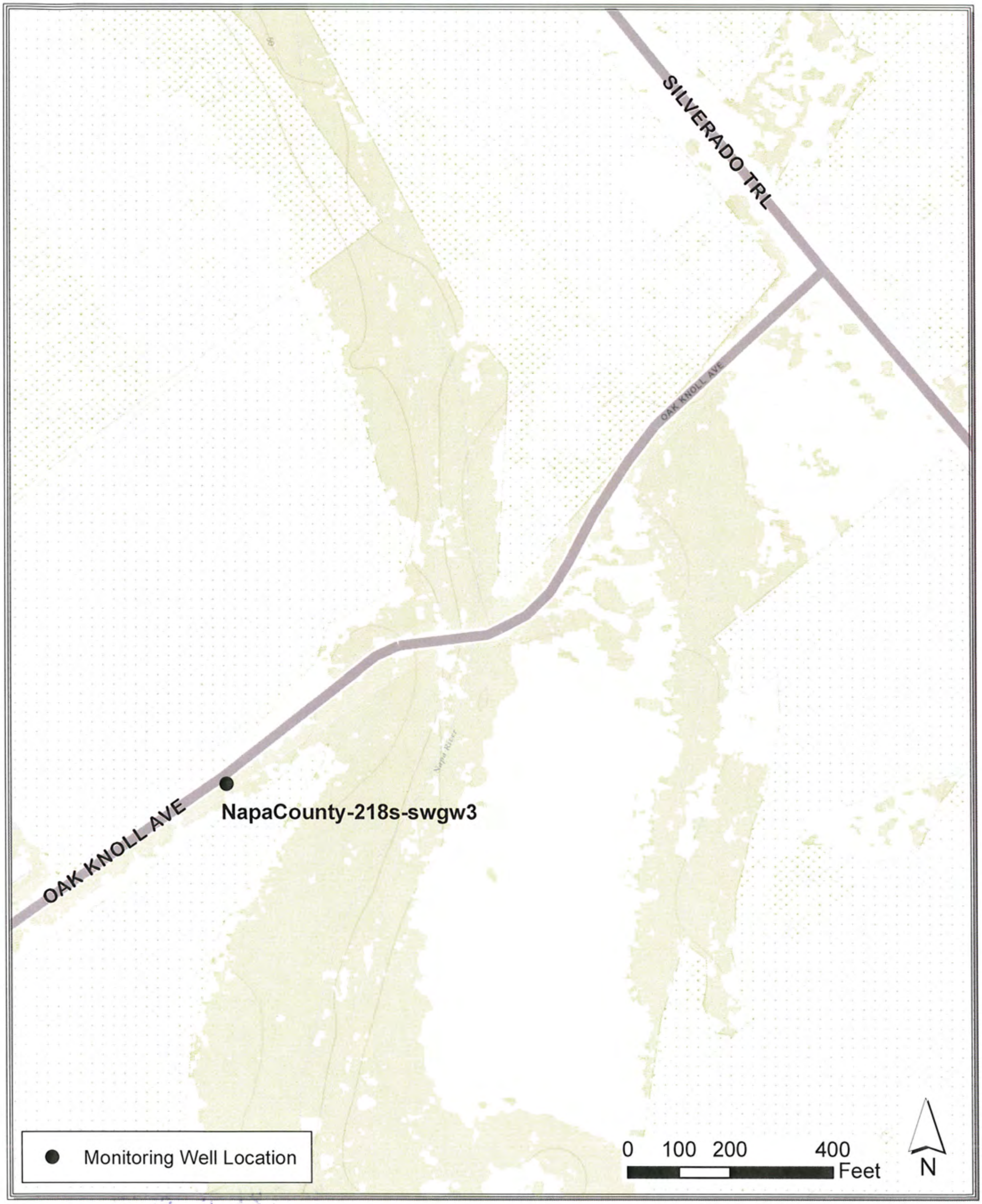
Graphic Log / **Well Profile As Built**



LUHDORFF & SCALMANINI CONSULTING ENGINEERS

*Measurement w/ Recreational Handheld Unit (Garmin Summit HC)

e0236894



Path: X:\2014 Job Files\14-054\GIS\mapfiles\As-built mon well sites DDP.mxd

LUHDORFF & SCALMANINI CONSULTING ENGINEERS

Napa County Five Dual-Completion Monitoring Wells Project

*The free Adobe Reader may be used to view and complete this form. However, software must be purchased to complete, save, and reuse a saved form.

File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0236902

Page 1 of 3

Owner's Well Number NapaCounty-219d-swgw3

Date Work Began 09/08/2014 Date Work Ended 9/10/2014

Local Permit Agency Napa County Department of Environmental Management

Permit Number E14-00668 Permit Date 8/20/14

DWR Use Only – Do Not Fill In

06N04W16G002M

State Well Number/Site Number

382202 N 1221818 W

Latitude Longitude

APN/TRS/Other

Geologic Log

Orientation ⦿ Vertical ○ Horizontal ○ Angle Specify ____

Drilling Method Hollow stem augers Drilling Fluid No

Depth from Surface Feet to Feet		Description (Describe material, grain size, color, etc)
		SEE ATTACHED WELL LOG
		NOTE: NapaCounty-218s-swgw3 well and NapaCounty-219d-swgw3 well are not in the borehole.

Total Depth of Boring 100 Feet

Total Depth of Completed Well 93 Feet

Well Owner

Name County of Napa

Mailing Address 804 First Street

City Napa State CA Zip 94559

Well Location

Address Site #3- Napa River at Oak Knoll Boulevard

City Napa County Napa

Latitude ___ Deg. ___ Min. ___ Sec. N Longitude ___ Deg. ___ Min. ___ Sec. W

Datum ____ Dec. Lat. 38.367255 Dec. Long. -122.304954

APN Book ____ Page ____ Parcel ____

Township ____ Range ____ Section ____

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North

SEE ATTACHED

West SITE LOCATION East

South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

⦿ New Well
○ Modification/Repair
○ Deepen
○ Other ____
○ Destroy
Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

○ Water Supply
☐ Domestic ☐ Public
☐ Irrigation ☐ Industrial
○ Cathodic Protection
○ Dewatering
○ Heat Exchange
○ Injection
⦿ Monitoring
○ Remediation
○ Sparging
○ Test Well
○ Vapor Extraction
○ Other ____

Water Level and Yield of Completed Well

Depth to first water 29 (Feet below surface)

Depth to Static Water Level ____ (Feet) Date Measured ____

Estimated Yield * ____ (GPM) Test Type ____

Test Length ____ (Hours) Total Drawdown ____ (Feet)

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

Casings

Depth from Surface Feet to	Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
0	78	10	Blank	PVC Sch. 40	.308	2.375		
78	88	10	Screen	PVC Sch. 40	.308	2.375	Milled Slots	0.030
88	93	10	Blank	PVC Sch. 40	.308	2.375		

Annular Material

Depth from Surface Feet to	Feet	Fill	Description
0	20	Cement	10.3 sack mix
20	40	Filter Pack	#3 sand
40	45	Bentonite	
45	65	Filter Pack	#3 sand
65	70	Bentonite	
70	100	Filter Pack	#3 sand

Attachments

☑ Geologic Log
☐ Well Construction Diagram
☐ Geophysical Log(s)
☐ Soil/Water Chemical Analyses
☑ Other Site Location

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name CLEAR HEART DRILLING, INC.
Person, Firm or Corporation

555 W. College Ave. Ste.B Santa Rosa CA 95401
Address City State Zip

Signed [signature] 10/15/2014 780357
C-57 Licensed Water Well Contractor Date Signed C-57 License Number

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

e0236902

LSCE Project No.	12-1-071	Site:	Site #3- Napa River at Oak Knoll Boulevard
Well Name:	Napa County-219d-swgw3	Drilling Method:	Hollow Stem Auger; pilot hole 8"-diameter reamed hole 10"-diameter
Lat./Long.:	38.367255/-122.304954		
Drilled By:	Clear Heart Drilling	Sampling Method:	Core Sample Barrel
Driller:	Rick Schneider	Drilling/Installation Date:	9/8/14 - 9/9/14
Site Geologist:	Charlie Jenkins, P.G.	Boring Depth (ft):	100

Well Depth (ft): 93

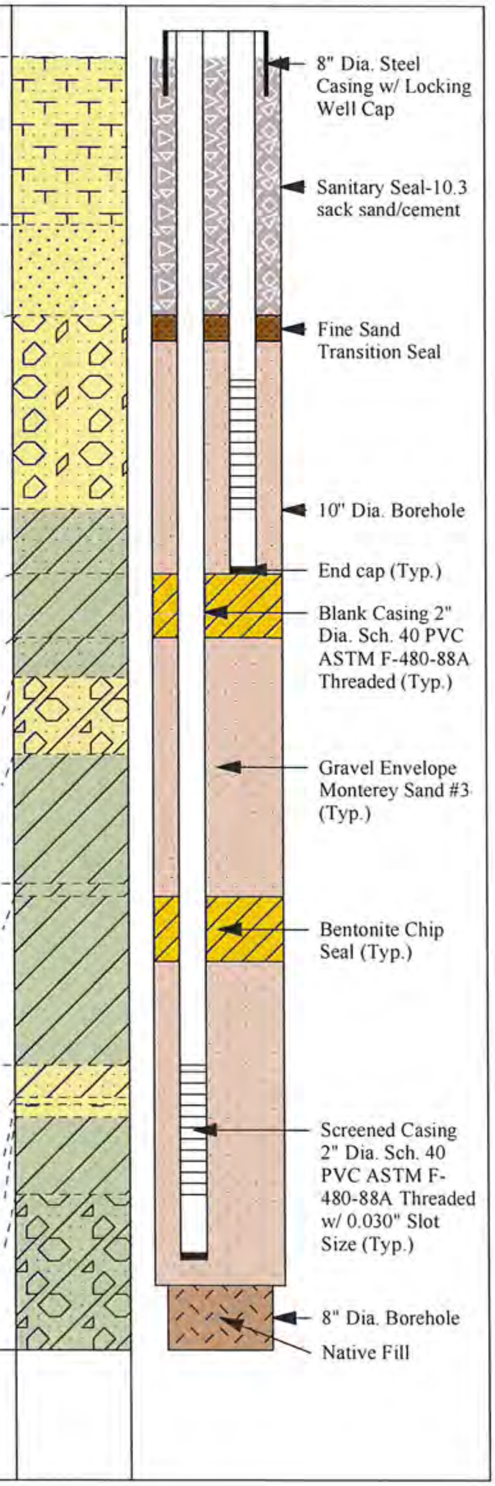
Well Screen (ft): 78-88

Lithologic Description

- 0-13': Silty Sand- 70% very fine to medium sand, 30% non-plastic fines, brown, dry to slightly moist
- 13-20': Sand- 95% very fine to medium sand, 5% fines, slightly moist, brown
  - 2-inch thick gravel lense at 19 ft., slightly moist
- 20-35': Gravelly Sand- 60% very fine to coarse sand, 35% gravel up to 1", rounded, 5% fines, slightly moist
  - 50% very fine to coarse sand, 40% gravel, 10% fines, sand and gravel sub-angular to round, first encountered water at 29 ft.,
  - 40% very fine to coarse sand, 40% gravel up to 1.5", 20% fines, saturated
- 35-40': Sandy Clay- 30-40% very fine to medium sand, 60-70% medium plastic fines, yellowish brown, very moist to wet, trace gravel
- 40-45': Clay- 10% very fine sand, 90% medium plastic fines, yellowish brown mottled light gray, moist
- 45-48': Sandy Clay- 30-40% fine to medium sand, 60-70% medium plastic fines, yellowish brown mottle dlight gray, very moist to wet, minor gravel
- 48-54': Gravelly Sand with Clay- 30% fine to coarse sand, 30% gravel up to 1", 40% medium plastic fines, very moist to wet, yellowish brown, some large cobbles up to 2.5"
- 54-64': Clay- 10% very fine sand, 90% medium plastic fines, yellowish brown mottled light gray, moist
- 64-65': Clay- >95% medium plastic fines, dark gray, stiff/hard, moist
- 65-78': Clay- >95% medium plastic fines, greenish gray, hard, moist
- 78-80.5': Clayey Sand- 60% very fine to medium sand, 40% fines, brown, wet
- 80.5-81': Sand- 90% fine to coarse sand, 10% fines, saturated
- 81-82': Gravelly Sand- 50% fine to coarse, 35% gravel, 15% fines, saturated, gravel up to 3/4".
- 82-88': Clay- 90% medium plastic fines, 10% fines, brown, minor gravel, moist
- 88-100': Clay with Sand and Gravel- 20% fine to coarse sand, 10% gravel, 70% medium plastic fines, greenish gray, moist, trace cobbles up to 2"

Depth scale (ft): 0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100, 105, 110

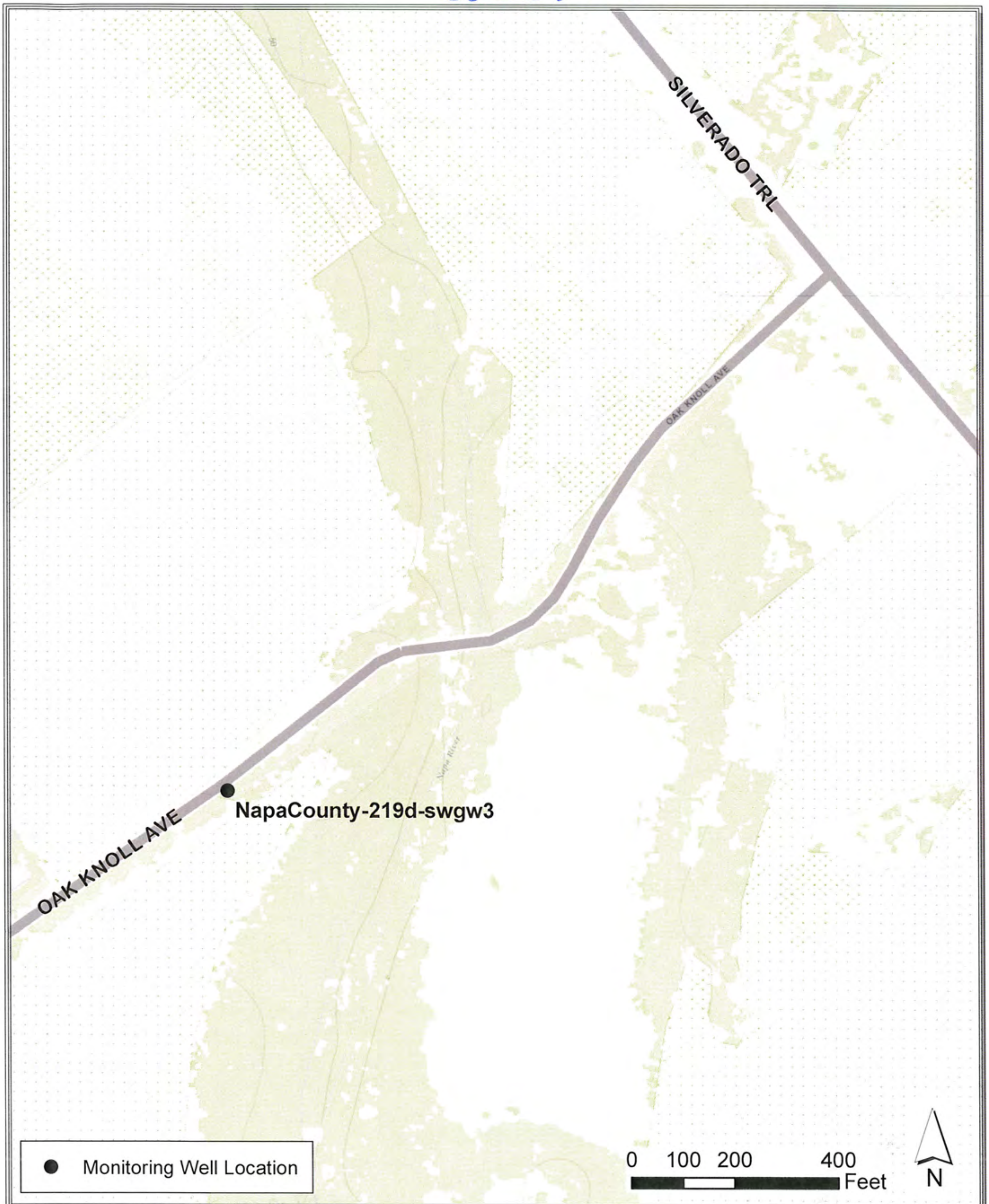
Graphic Log | **Well Profile As Built**



LUHDORFF & SCALMANINI CONSULTING ENGINEERS

*Measurement w/ Recreational Handheld Unit (Garmin Summit HC)

e0236902



Path: X:\2014 Job Files\14-054\GIS\mapfiles\As-built mon well sites DDP.mxd

LUHDORFF & SCALMANINI CONSULTING ENGINEERS

Napa County Five Dual-Completion Monitoring Wells Project

*The free Adobe Reader may be used to view and complete this form. However, software must be purchased to complete, save, and reuse a saved form.

File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. **e0236741**

Page 1 of 3

Owner's Well Number NapaCounty-220s-swgw4

Date Work Began 09/10/2014 Date Work Ended 9/12/2014

Local Permit Agency Napa County Department of Environmental Management

Permit Number E14-00669 Permit Date 8/20/14

DWR Use Only – Do Not Fill In

07N04W31D001M
State Well Number/Site Number

38 25 03 N | 122 21 10 W
Latitude | Longitude

APN/TRS/Other

Geologic Log

Orientation ⦿ Vertical ○ Horizontal ○ Angle Specify

Drilling Method Hollow stem augers Drilling Fluid No

Depth from Surface Feet	to Feet	Description (Describe material, grain size, color, etc)
		SEE ATTACHED WELL LOG
		NOTE: NapaCounty-220s-swgw4 well and NapaCounty-221d-swgw4 well are in the same borehole.

Total Depth of Boring 100 Feet

Total Depth of Completed Well 45 Feet

Well Owner

Name County of Napa

Mailing Address 804 First Street

City Napa State CA Zip 94559

Well Location

Address Site #4- Napa River at Younville Cross Road

City Yountville County Napa

Latitude ___ Deg. ___ Min. ___ Sec. N Longitude ___ Deg. ___ Min. ___ Sec. W

Datum ___ Dec. Lat. 38.417573 Dec. Long. -122.352665

APN Book ___ Page ___ Parcel ___

Township ___ Range ___ Section ___

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North

SEE ATTACHED

SITE LOCATION

West East

South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

⦿ New Well
○ Modification/Repair
○ Deepen
○ Other
○ Destroy
Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

○ Water Supply
☐ Domestic ☐ Public
☐ Irrigation ☐ Industrial
○ Cathodic Protection
○ Dewatering
○ Heat Exchange
○ Injection
⦿ Monitoring
○ Remediation
○ Sparging
○ Test Well
○ Vapor Extraction
○ Other

Water Level and Yield of Completed Well

Depth to first water 34 (Feet below surface)

Depth to Static Water Level ___ (Feet) Date Measured ___

Estimated Yield * ___ (GPM) Test Type ___

Test Length ___ (Hours) Total Drawdown ___ (Feet)

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

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
0	25	10	Blank	PVC Sch. 40	.308	2.375		
25	40	10	Screen	PVC Sch. 40	.308	2.375	Milled Slots	0.030
40	45	10	Blank	PVC Sch. 40	.308	2.375		

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	20	Cement	10.3 sack mix
20	48	Filter Pack	#3 sand

Attachments

☑ Geologic Log
☐ Well Construction Diagram
☐ Geophysical Log(s)
☐ Soil/Water Chemical Analyses
☑ Other Site Location

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name CLEAR HEART DRILLING, INC.
Person, Firm or Corporation

555 W. College Ave. Ste. B (Address) Santa Rosa (City) CA (State) 95401 (Zip)

Signed Gary M. [signature] (C-57 Licensed Water Well Contractor) 10/14/2014 (Date Signed) 780357 (C-57 License Number)

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

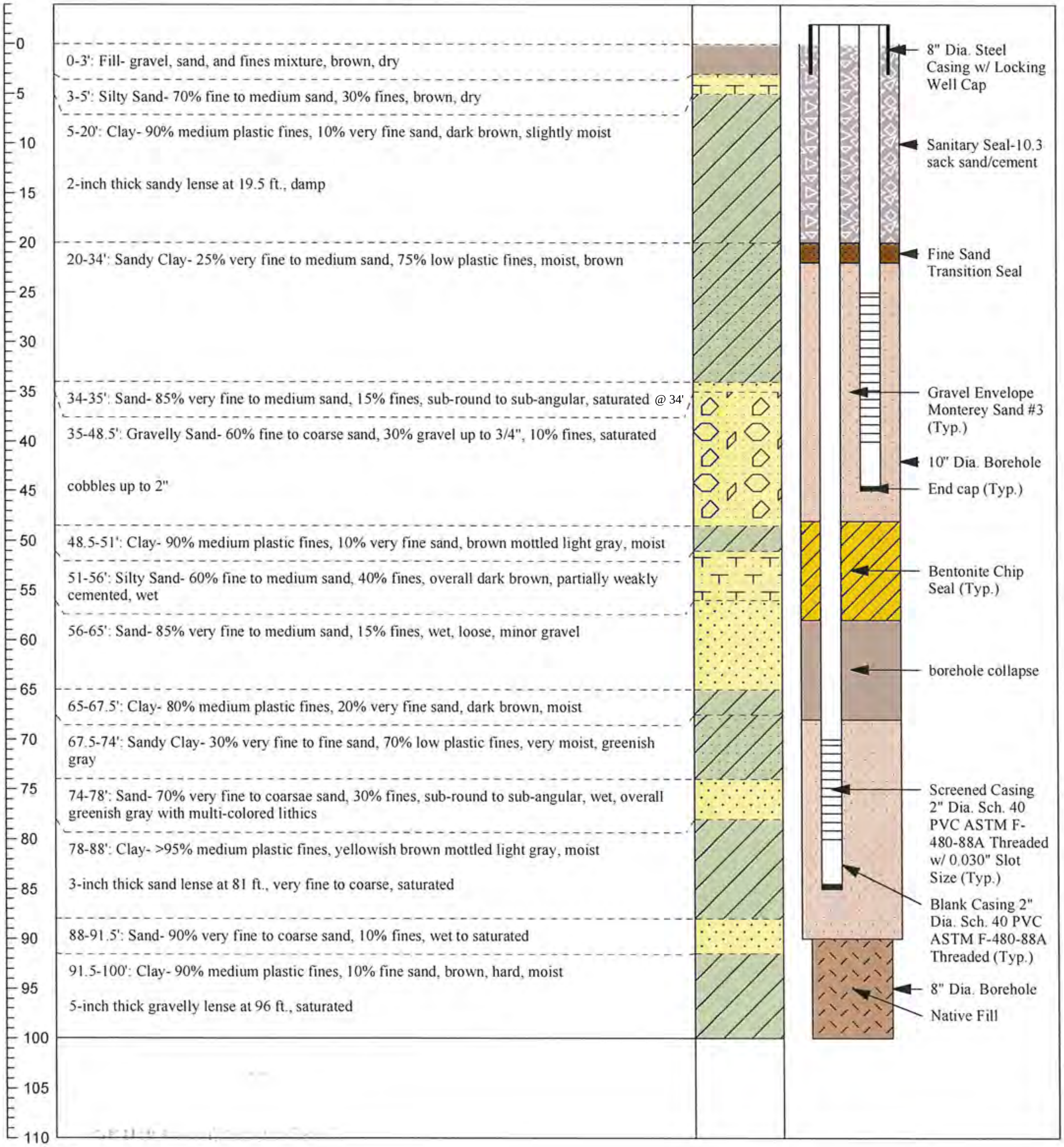
e0236741

LSCE Project No.	12-1-071	Site:	Site #4- Napa River at Yountville Cross Road
Well Name:	Napa County-220s-swgw4	Drilling Method:	Hollow Stem Auger; pilot hole 8"-diameter reamed hole 10"-diameter
Lat./Long.:	38.417573/-122.352665		
Drilled By:	Clear Heart Drilling	Sampling Method:	Core Sample Barrel
Driller:	Rick Schneider	Drilling/Installation Date:	9/10/14 - 9/11/14
Site Geologist:	Charlie Jenkins, P.G.	Boring Depth (ft):	100
		Well Depth (ft):	45
		Well Screen (ft):	25-40

Lithologic Description

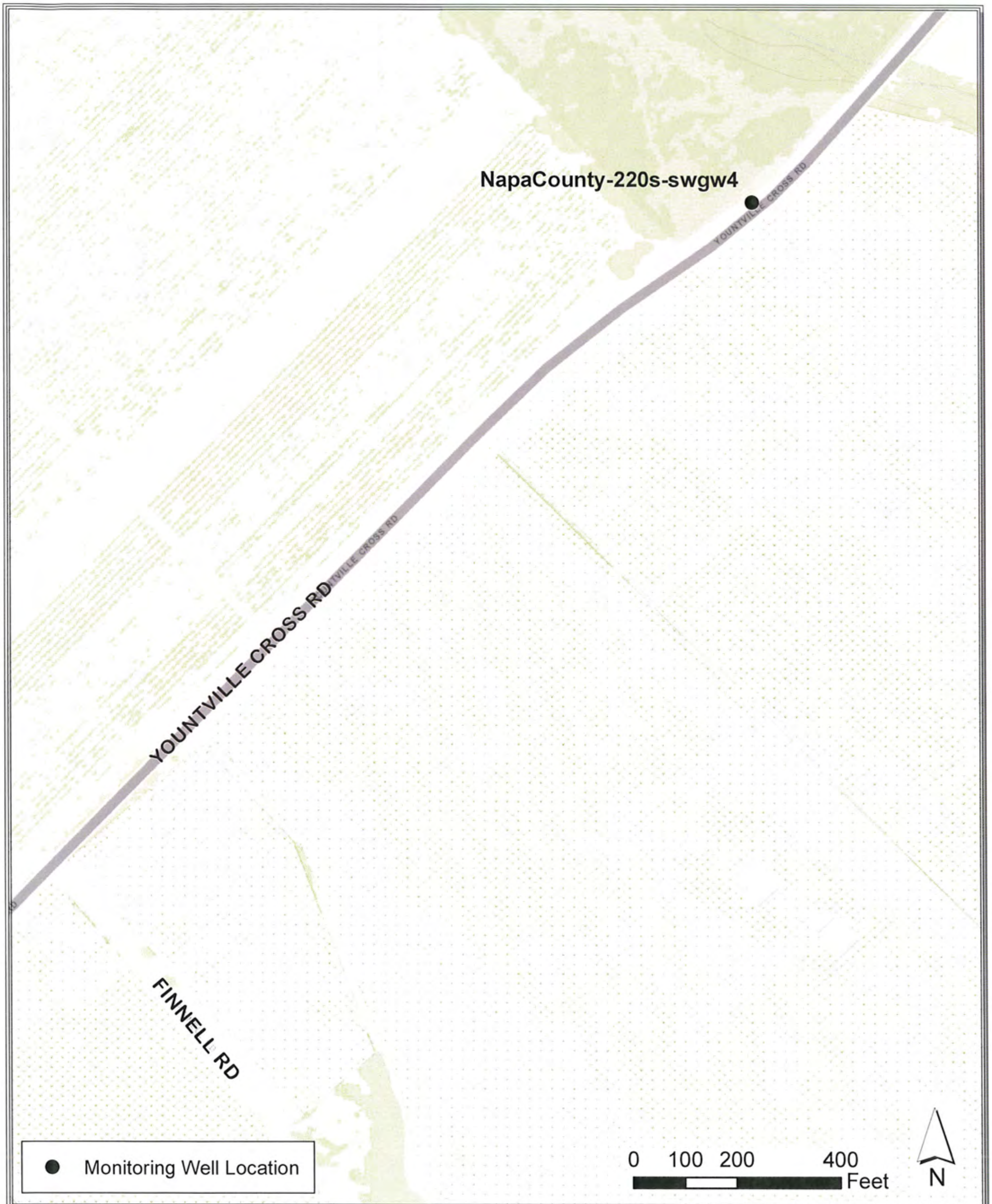
- 0-3': Fill- gravel, sand, and fines mixture, brown, dry
- 3-5': Silty Sand- 70% fine to medium sand, 30% fines, brown, dry
- 5-20': Clay- 90% medium plastic fines, 10% very fine sand, dark brown, slightly moist
  - 2-inch thick sandy lense at 19.5 ft., damp
- 20-34': Sandy Clay- 25% very fine to medium sand, 75% low plastic fines, moist, brown
- 34-35': Sand- 85% very fine to medium sand, 15% fines, sub-round to sub-angular, saturated @ 34'
- 35-48.5': Gravelly Sand- 60% fine to coarse sand, 30% gravel up to 3/4", 10% fines, saturated
  - cobbles up to 2"
- 48.5-51': Clay- 90% medium plastic fines, 10% very fine sand, brown mottled light gray, moist
- 51-56': Silty Sand- 60% fine to medium sand, 40% fines, overall dark brown, partially weakly cemented, wet
- 56-65': Sand- 85% very fine to medium sand, 15% fines, wet, loose, minor gravel
- 65-67.5': Clay- 80% medium plastic fines, 20% very fine sand, dark brown, moist
- 67.5-74': Sandy Clay- 30% very fine to fine sand, 70% low plastic fines, very moist, greenish gray
- 74-78': Sand- 70% very fine to coarsae sand, 30% fines, sub-round to sub-angular, wet, overall greenish gray with multi-colored lithics
- 78-88': Clay- >95% medium plastic fines, yellowish brown mottled light gray, moist
  - 3-inch thick sand lense at 81 ft., very fine to coarse, saturated
- 88-91.5': Sand- 90% very fine to coarse sand, 10% fines, wet to saturated
- 91.5-100': Clay- 90% medium plastic fines, 10% fine sand, brown, hard, moist
  - 5-inch thick gravelly lense at 96 ft., saturated

Graphic Log **Well Profile As Built**



*Measurement w/ Recreational Handheld Unit (Garmin Summit HC)

e0236741



Path: X:\2014 Job Files\14-054\GIS\mapfiles\As-built mon well sites DDP.mxd

LUHDORFF & SCALMANINI CONSULTING ENGINEERS

Napa County Five Dual-Completion Monitoring Wells Project

*The free Adobe Reader may be used to view and complete this form. However, software must be purchased to complete, save, and reuse a saved form.

File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0236743

DWR Use Only – Do Not Fill In	
07N04W31D002M	State Well Number/Site Number
38 2503 N	Latitude
122 2110 W	Longitude
	APN/TRS/Other

Owner's Well Number NapaCounty-221d-swgw4

Date Work Began 09/10/2014 Date Work Ended 9/12/2014

Local Permit Agency Napa County Department of Environmental Management

Permit Number E14-00669 Permit Date 8/20/14

Geologic Log

Orientation ⦿ Vertical ○ Horizontal ○ Angle Specify ______

Drilling Method Hollow stem augers Drilling Fluid No

Depth from Surface Feet	to Feet	Description (Describe material, grain size, color, etc)
		SEE ATTACHED WELL LOG
		NOTE: NapaCounty-220s-swgw4 well and NapaCounty-221d-swgw4 well are in the same borehole.

Total Depth of Boring 100 Feet

Total Depth of Completed Well 85 Feet

Well Owner

Name County of Napa

Mailing Address 804 First Street

City Napa State CA Zip 94559

Well Location

Address Site #4- Napa River at Yountville Cross Road

City Yountville County Napa

Latitude ___ Deg. ___ Min. ___ Sec. N Longitude ___ Deg. ___ Min. ___ Sec. W

Datum ______ Dec. Lat. 38.417573 Dec. Long. -122.352665

APN Book ______ Page ______ Parcel ______

Township ______ Range ______ Section ______

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North

SEE ATTACHED

West SITE LOCATION East

South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

⦿ New Well
○ Modification/Repair
○ Deepen
○ Other ______
○ Destroy
Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

○ Water Supply
☐ Domestic ☐ Public
☐ Irrigation ☐ Industrial
○ Cathodic Protection
○ Dewatering
○ Heat Exchange
○ Injection
⦿ Monitoring
○ Remediation
○ Sparging
○ Test Well
○ Vapor Extraction
○ Other ______

Water Level and Yield of Completed Well

Depth to first water 34 (Feet below surface)

Depth to Static Water Level ______ (Feet) Date Measured ______

Estimated Yield * ______ (GPM) Test Type ______

Test Length ______ (Hours) Total Drawdown ______ (Feet)

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

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
0	70	10	Blank	PVC Sch. 40	.308	2.375		
70	80	10	Screen	PVC Sch. 40	.308	2.375	Milled Slots	0.030
80	85	10	Blank	PVC Sch. 40	.308	2.375		

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	20	Cement	10.3 sack mix
20	48	Filter Pack	#3 sand
48	58	Bentonite	
58	68	Fill	
68	90	Filter Pack	#3 sand

Attachments

☑ Geologic Log
☐ Well Construction Diagram
☐ Geophysical Log(s)
☐ Soil/Water Chemical Analyses
☑ Other Site Location

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name CLEAR HEART DRILLING, INC.
Person, Firm or Corporation

555 W. College Ave. Ste. B Santa Rosa CA 95401
Address City State Zip

Signed [signature] 10/14/2014 780357
C-57 Licensed Water Well Contractor Date Signed C-57 License Number

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

e0236743

LSCE Project No.	12-1-071	Site:	Site #4- Napa River at Yountville Cross Road
Well Name:	Napa County-221d-swgw4	Drilling Method:	Hollow Stem Auger; pilot hole 8"-diameter reamed hole 10"-diameter
Lat./Long.:	38.417573/-122.352665	Sampling Method:	Core Sample Barrel
Drilled By:	Clear Heart Drilling	Drilling/Installation Date:	9/10/14 - 9/11/14
Driller:	Rick Schneider	Boring Depth (ft):	100
Site Geologist:	Charlie Jenkins, P.G.	Well Depth (ft):	85
		Well Screen (ft):	70-80

Lithologic Description

0-3': Fill- gravel, sand, and fines mixture, brown, dry

3-5': Silty Sand- 70% fine to medium sand, 30% fines, brown, dry

5-20': Clay- 90% medium plastic fines, 10% very fine sand, dark brown, slightly moist

2-inch thick sandy lense at 19.5 ft., damp

20-34': Sandy Clay- 25% very fine to medium sand, 75% low plastic fines, moist, brown

34-35': Sand- 85% very fine to medium sand, 15% fines, sub-round to sub-angular, saturated @34'

35-48.5': Gravelly Sand- 60% fine to coarse sand, 30% gravel up to 3/4", 10% fines, saturated

cobbles up to 2"

48.5-51': Clay- 90% medium plastic fines, 10% very fine sand, brown mottled light gray, moist

51-56': Silty Sand- 60% fine to medium sand, 40% fines, overall dark brown, partially weakly cemented, wet

56-65': Sand- 85% very fine to medium sand, 15% fines, wet, loose, minor gravel

65-67.5': Clay- 80% medium plastic fines, 20% very fine sand, dark brown, moist

67.5-74': Sandy Clay- 30% very fine to fine sand, 70% low plastic fines, very moist, greenish gray

74-78': Sand- 70% very fine to coarsae sand, 30% fines, sub-round to sub-angular, wet, overall greenish gray with multi-colored lithics

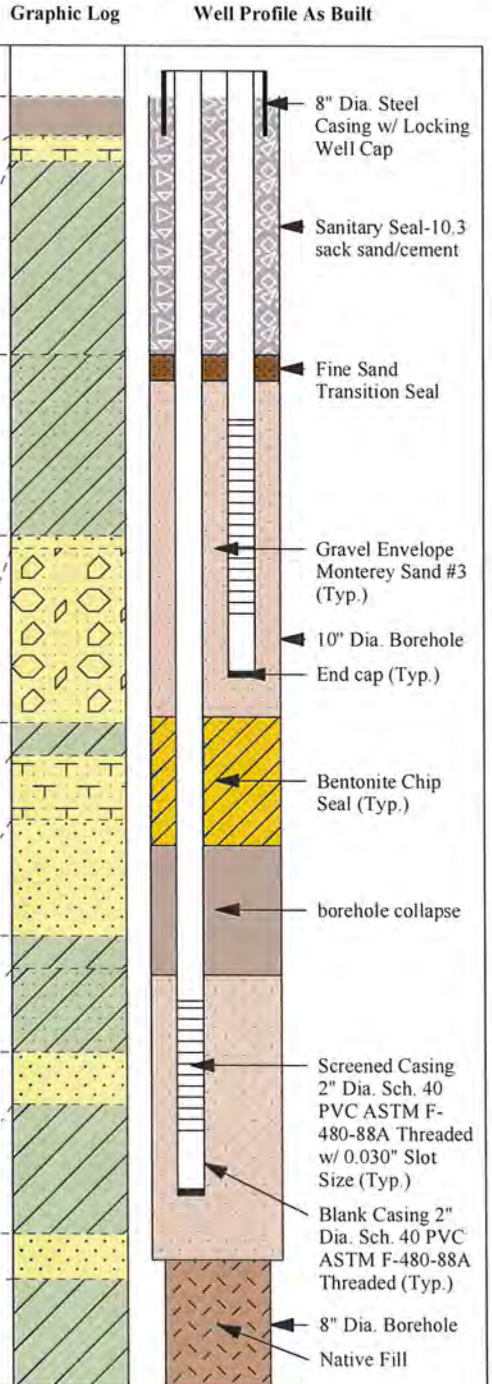
78-88': Clay- >95% medium plastic fines, yellowish brown mottled light gray, moist

3-inch thick sand lense at 81 ft., very fine to coarse, saturated

88-91.5': Sand- 90% very fine to coarse sand, 10% fines, wet to saturated

91.5-100': Clay- 90% medium plastic fines, 10% fine sand, brown, hard, moist

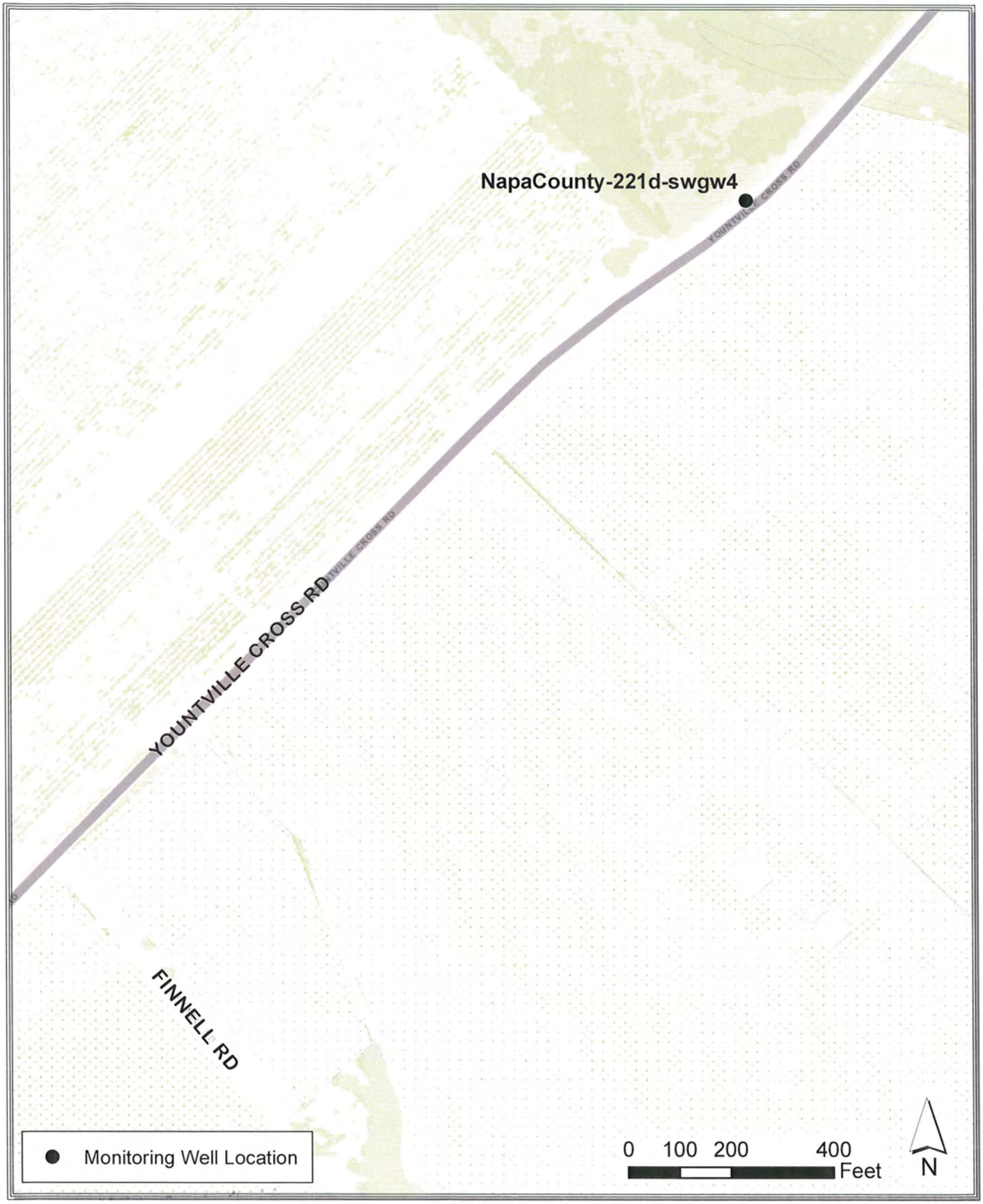
5-inch thick gravelly lense at 96 ft., saturated



LUHDORFF & SCALMANINI CONSULTING ENGINEERS

*Measurement w/ Recreational Handheld Unit (Garmin Summit HC)

e0236743



Path: X:\2014 Job Files\14-054\GIS\mapfiles\As-built mon well sites DDP.mxd

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

Napa County Five Dual-Completion Monitoring Wells Project

*The free Adobe Reader may be used to view and complete this form. However, software must be purchased to complete, save, and reuse a saved form.

File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0236824

Page 1 of 3

Owner's Well Number NapaCounty-222s-swgw5

Date Work Began 09/15/2014 Date Work Ended 9/18/2014

Local Permit Agency Napa County Department of Environmental Management

Permit Number E14-00670 Permit Date 8/20/14

DWR Use Only – Do Not Fill In

08N05W30Q001M

State Well Number/Site Number

38 30 38 N 122 27 28 W

Latitude Longitude

APN/TRS/Other

Geologic Log

Orientation ⦿ Vertical ○ Horizontal ○ Angle Specify

Drilling Method Hollow stem augers Drilling Fluid No

Depth from Surface Feet to Feet		Description (Describe material, grain size, color, etc)
		SEE ATTACHED WELL LOG
		NOTE: NapaCounty-222s-swgw5 well and NapaCounty-223d-swgw5 well are in the same borehole

Total Depth of Boring 100 Feet

Total Depth of Completed Well 40 Feet

Well Owner

Name County of Napa

Mailing Address 804 First Street

City Napa State CA Zip 94559

Well Location

Address Site #5- Napa River at Stonebridge Park

City St. Helena County Napa

Latitude ___ Deg. ___ Min. ___ Sec. N Longitude ___ Deg. ___ Min. ___ Sec. W

Datum ___ Dec. Lat. 38.510898 Dec. Long. -122.456426

APN Book ___ Page ___ Parcel ___

Township ___ Range ___ Section ___

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North

SEE ATTACHED

West SITE LOCATION East

South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

⦿ New Well
○ Modification/Repair
○ Deepen
○ Other
○ Destroy
Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

○ Water Supply
☐ Domestic ☐ Public
☐ Irrigation ☐ Industrial
○ Cathodic Protection
○ Dewatering
○ Heat Exchange
○ Injection
⦿ Monitoring
○ Remediation
○ Sparging
○ Test Well
○ Vapor Extraction
○ Other

Water Level and Yield of Completed Well

Depth to first water 20 (Feet below surface)

Depth to Static Water Level ___ (Feet) Date Measured ___

Estimated Yield * ___ (GPM) Test Type ___

Test Length ___ (Hours) Total Drawdown ___ (Feet)

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

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
0	25	10	Blank	PVC Sch. 40	.308	2.375		
25	35	10	Screen	PVC Sch. 40	.308	2.375	Milled Slots	0.030
35	40	10	Blank	PVC Sch. 40	.308	2.375		

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	20	Cement	10.3 sack mix
20	43	Filter Pack	#3 sand

Attachments

☑ Geologic Log
☐ Well Construction Diagram
☐ Geophysical Log(s)
☐ Soil/Water Chemical Analyses
☑ Other Site Location

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name CLEAR HEART DRILLING, INC.

Person, Firm or Corporation

555 W. College Ave. Ste.B Santa Rosa CA 95401

Address City State Zip

Signed [signature] 10/15/14 780357

C-57 Licensed Water Well Contractor Date Signed C-57 License Number

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

e0236824

LSCE Project No.	12-1-071	Site:	Site #5- Napa River at Stonebridge Park
Well Name:	Napa County-222s-swgw5	Drilling Method:	Hollow Stem Auger; pilot hole 8"-diameter reamed hole 10"-diameter
Lat./Long.:	38.510898/-122.456426		
Drilled By:	Clear Heart Drilling	Sampling Method:	Core Sample Barrel
Driller:	Rick Schneider	Drilling/Installation Date:	9/15/14 - 9/16/14
Site Geologist:	Charlie Jenkins, P.G.	Boring Depth (ft):	100
		Well Depth (ft):	40
		Well Screen (ft):	25-35

Lithologic Description

0-1': Topsoil- brown, with organics

1-15': Silty Sand- 70% very fine to medium sand, 30% fines, dark brown, slightly moist, minor gravel

15-20': Sand- 90% fine to medium sand, 10% fines, brown, slightly moist

20-25': Gravelly Sand with Clay- 40% very fine to coarse sand, 20% gravel up to 1", 40% medium plastic fines, wet, first encountered water at 20 ft

25-43': Sand with Gravel- 70% fine to coarse sand, 20% gravel up to 1/2", 10% fines, wet, loose

43-51': Clay- 90% medium plastic fines, 10% very fine sand, moist, gray

51-65': Sandy Silt- 40% very fine to medium sand, 60% fines, greenish gray, wet, partially weakly cemented

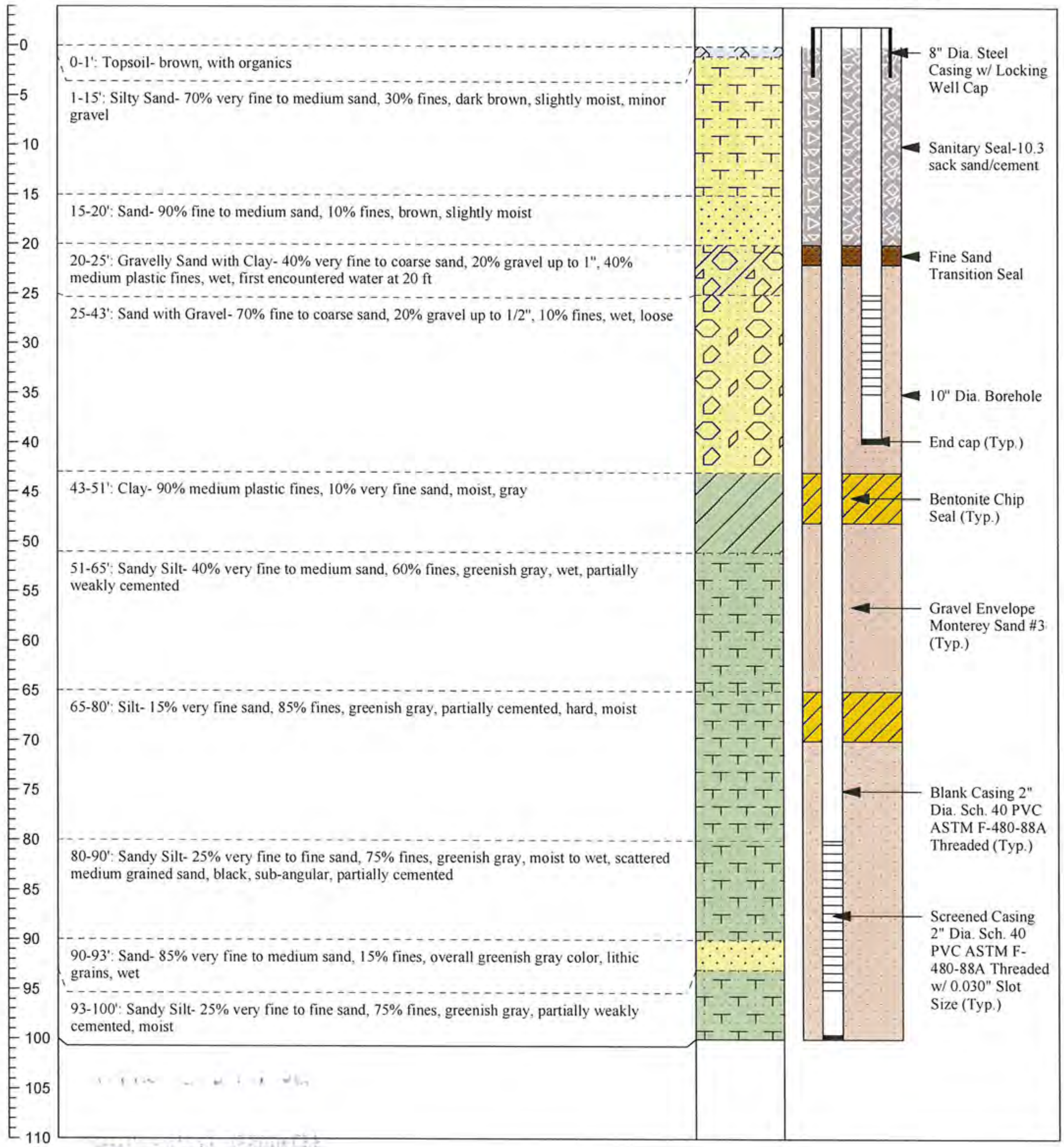
65-80': Silt- 15% very fine sand, 85% fines, greenish gray, partially cemented, hard, moist

80-90': Sandy Silt- 25% very fine to fine sand, 75% fines, greenish gray, moist to wet, scattered medium grained sand, black, sub-angular, partially cemented

90-93': Sand- 85% very fine to medium sand, 15% fines, overall greenish gray color, lithic grains, wet

93-100': Sandy Silt- 25% very fine to fine sand, 75% fines, greenish gray, partially weakly cemented, moist

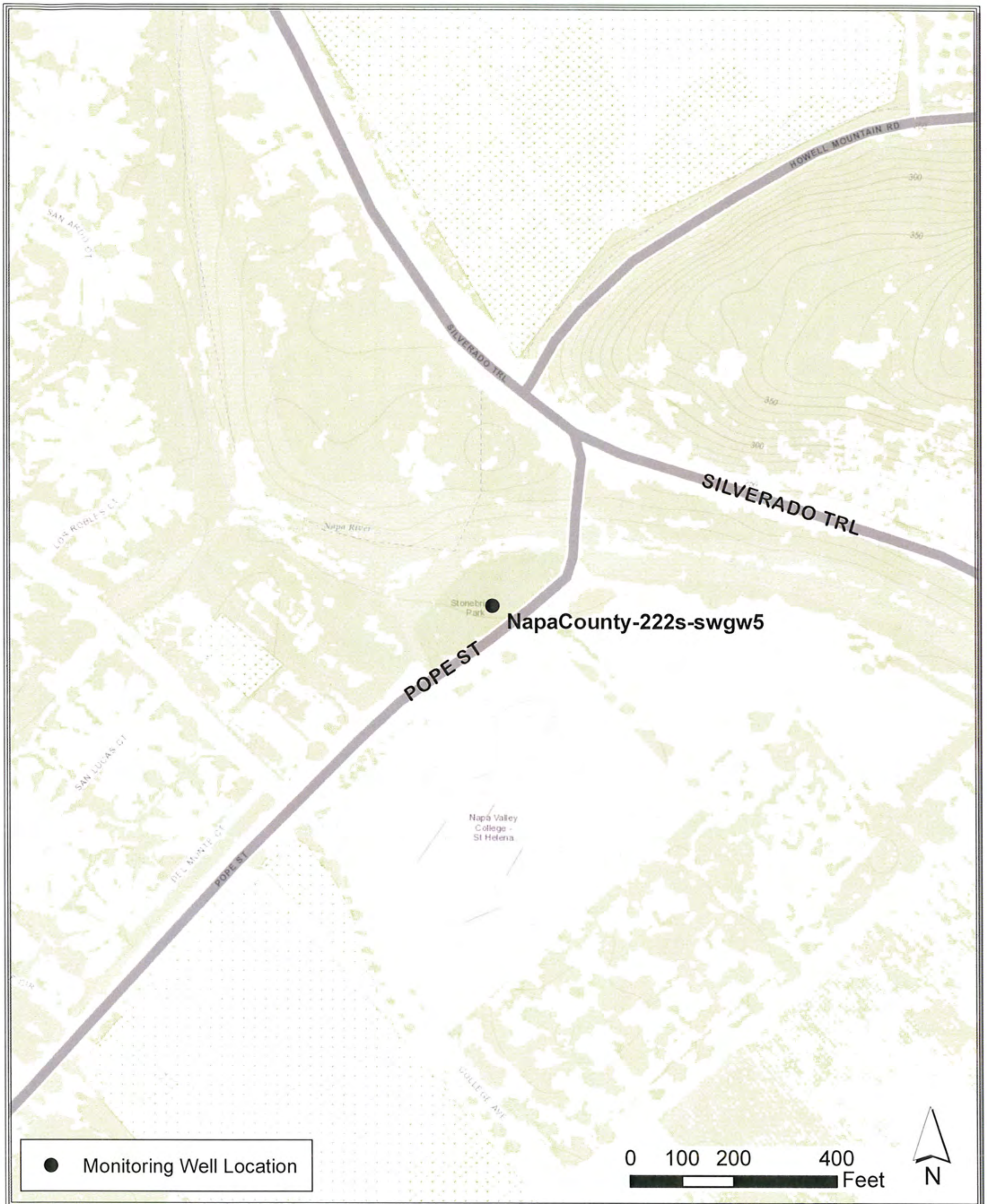
Graphic Log **Well Profile As Built**



LUHDORFF & SCALMANINI CONSULTING ENGINEERS

*Measurement w/ Recreational Handheld Unit (Garmin Summit HC)

e0236824



Path: X:\2014 Job Files\14-054\GIS\mapfiles\As-built mon well sites DDP.mxd

LUHDORFF & SCALMANINI CONSULTING ENGINEERS

Napa County Five Dual-Completion Monitoring Wells Project

*The free Adobe Reader may be used to view and complete this form. However, software must be purchased to complete, save, and reuse a saved form.

File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

e0236836

Page 1 of 3

Owner's Well Number NapaCounty-223d-swgw5

Date Work Began 09/15/2014 Date Work Ended 9/18/2014

Local Permit Agency Napa County Department of Environmental Management

Permit Number E14-00670 Permit Date 8/20/14

DWR Use Only – Do Not Fill In

08N05W30Q002M

State Well Number/Site Number

383039 N 1222723 W

Latitude Longitude

APN/TRS/Other

Geologic Log

Orientation ⦿ Vertical ○ Horizontal ○ Angle Specify

Drilling Method Hollow-stem augers Drilling Fluid no

Depth from Surface Feet	to Feet	Description (Describe material, grain size, color, etc)
		SEE ATTACHED WELL LOG
		NOTE: NapaCounty-222s-swgw5 well and NapaCounty-223d-swgw5 well are in the same borehole.

Total Depth of Boring 100 Feet

Total Depth of Completed Well 100 Feet

Well Owner

Name County of Napa

Mailing Address 804 First Street

City Napa State CA Zip 94559

Well Location

Address Site #5-Napa River at Stonebridge Park

City St. Helena County Napa

Latitude ___ Deg. ___ Min. ___ Sec. N Longitude ___ Deg. ___ Min. ___ Sec. W

Datum ___ Dec. Lat. 38.510898 Dec. Long. -122.456426

APN Book ___ Page ___ Parcel ___

Township ___ Range ___ Section ___

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North

SEE ATTACHED

SITE LOCATION

West East

South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

⦿ New Well
○ Modification/Repair
○ Deepen
○ Other
○ Destroy (Describe procedures and materials under "GEOLOGIC LOG")

Planned Uses

○ Water Supply
☐ Domestic ☐ Public
☐ Irrigation ☐ Industrial
○ Cathodic Protection
○ Dewatering
○ Heat Exchange
○ Injection
⦿ Monitoring
○ Remediation
○ Sparging
○ Test Well
○ Vapor Extraction
○ Other

Water Level and Yield of Completed Well

Depth to first water 20 (Feet below surface)

Depth to Static Water Level ___ (Feet) Date Measured ___

Estimated Yield * ___ (GPM) Test Type ___

Test Length ___ (Hours) Total Drawdown ___ (Feet)

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

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size If Any (Inches)
0	80	10	Blank	PVC Sch. 40	.308	2.375		
80	95	10	Screen	PVC Sch. 40	.308	2.375	Milled Slots	0.030
95	100	10	Blank	PVC Sch. 40	.308	2.375		

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	20	Cement	10.3 sack mix
20	43	Filter Pack	#3 sand
43	48	Bentonite	
48	65	Filter Pack	
65	70	Bentonite	
70	100	Filter Pack	#3 sand

Attachments

☑ Geologic Log
☐ Well Construction Diagram
☐ Geophysical Log(s)
☐ Soil/Water Chemical Analyses
☑ Other Site Location

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name CLEAR HEART DRILLING, INC

Person, Firm or Corporation

555 W. College Ave. Ste. B7 Santa Rosa CA 95401

Address City State Zip

Signed [signature] 10/15/2014 780357

C-57 Licensed Water Well Contractor Date Signed C-57 License Number

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

e0236836

LSCE Project No.	12-1-071	Site:	Site #5- Napa River at Stonebridge Park
Well Name:	Napa County-223d-swgw5	Drilling Method:	Hollow Stem Auger; pilot hole 8"-diameter reamed hole 10"-diameter
Lat./Long.:	38.510898/-122.456426		
Drilled By:	Clear Heart Drilling	Sampling Method:	Core Sample Barrel
Driller:	Rick Schneider	Drilling/Installation Date:	9/15/14 - 9/16/14
Site Geologist:	Charlie Jenkins, P.G.	Boring Depth (ft):	100
		Well Depth (ft):	100
		Well Screen (ft):	80-95

Lithologic Description

0-1': Topsoil- brown, with organics

1-15': Silty Sand- 70% very fine to medium sand, 30% fines, dark brown, slightly moist, minor gravel

15-20': Sand- 90% fine to medium sand, 10% fines, brown, slightly moist

20-25': Gravelly Sand with Clay- 40% very fine to coarse sand, 20% gravel up to 1", 40% medium plastic fines, wet, first encountered water at 20 ft

25-43': Sand with Gravel- 70% fine to coarse sand, 20% gravel up to 1/2", 10% fines, wet, loose

43-51': Clay- 90% medium plastic fines, 10% very fine sand, moist, gray

51-65': Sandy Silt- 40% very fine to medium sand, 60% fines, greenish gray, wet, partially weakly cemented

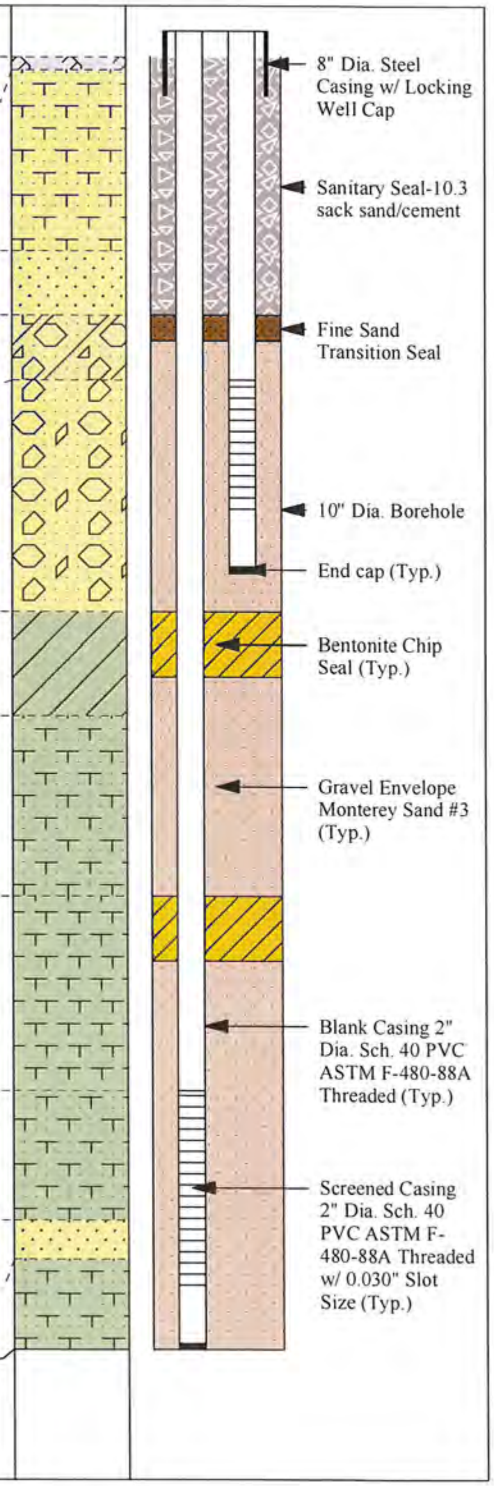
65-80': Silt- 15% very fine sand, 85% fines, greenish gray, partially cemented, hard, moist

80-90': Sandy Silt- 25% very fine to fine sand, 75% fines, greenish gray, moist to wet, scattered medium grained sand, black, sub-angular, partially cemented

90-93': Sand- 85% very fine to medium sand, 15% fines, overall greenish gray color, lithic grains, wet

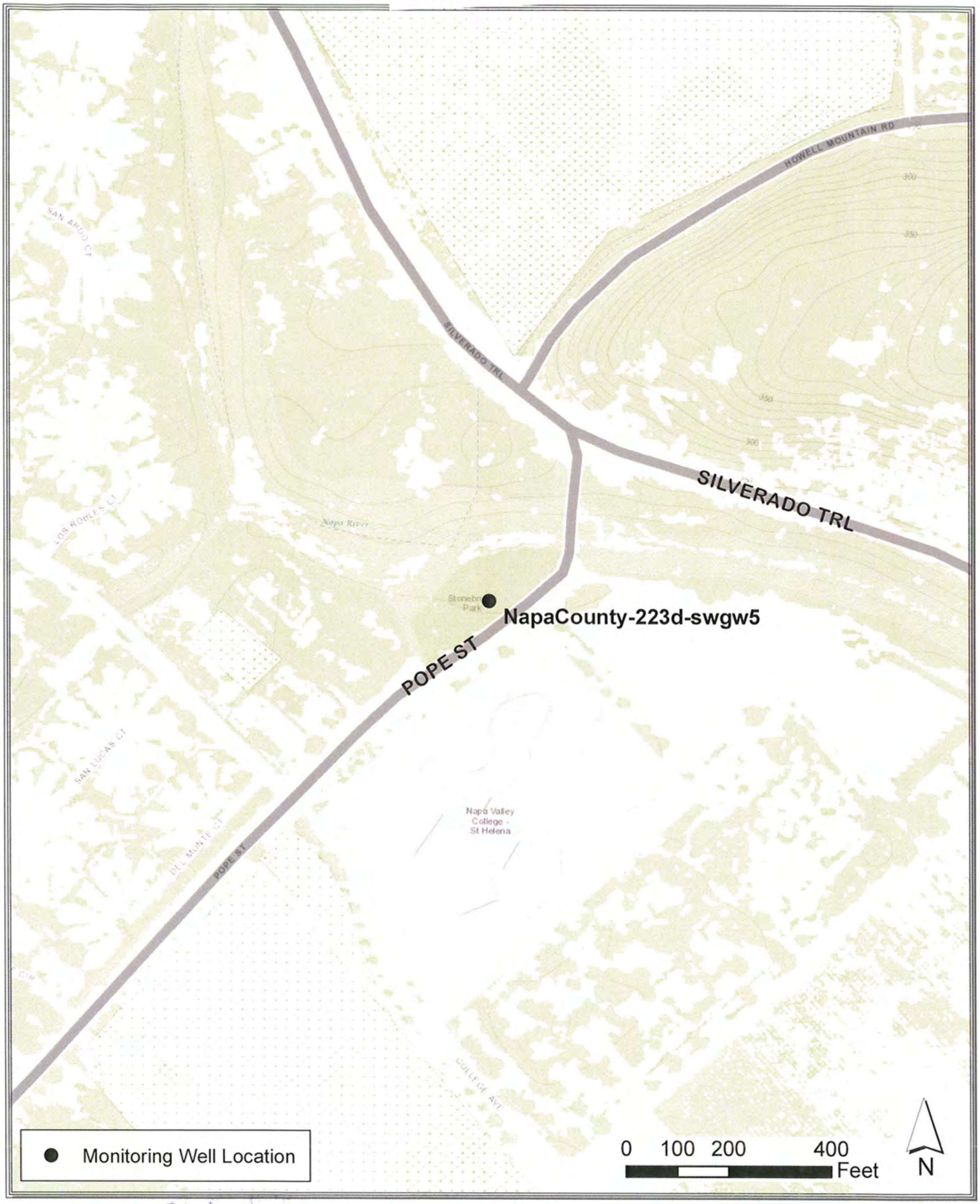
93-100': Sandy Silt- 25% very fine to fine sand, 75% fines, greenish gray, partially weakly cemented, moist

Graphic Log **Well Profile As Built**



*Measurement w/ Recreational Handheld Unit (Garmin Summit HC)

e0236836



Path: X:\2014 Job Files\14-054\GIS\mapfiles\As-built mon well sites DDP.mxd

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

Napa County Five Dual-Completion Monitoring Wells Project

APPENDIX B

Appendix B: Summary of Wells Used for Hydrogeologic Site Characterization

Site	Well Completion Report	Approx. Distance from Site (miles)	Borehole Total Depth (ft, bgs)	Approx. Bottom of Alluvium/Unconsolidated material (ft, bgs)	First Sand/Gravel (ft, bgs)	Second Sand/Gravel (ft, bgs)	Third Sand/Gravel (ft, bgs)	Fourth Sand/Gravel (ft, bgs)	Fifth Sand/Gravel (ft, bgs)	Sand/Gravel Description	Drilling method
Site 1	769450	0.15	560	75	20-40	40-70	155-170	-	-	black sands, brown sands and gravel, black sand	Rotary
	475430	0.5	26	unk	22-26			-	-	brown sand	Auger
	49958	0.2	150	36	28-36	-	-	-	-	gravel	Rotary
	342791 - 342792 (2 MWs)	0.05	30	unk	19.2-20.7	22-29.2	-	-	-	sand medium to coarse grained, sands and gravels	Auger
Site 2	774352	0.3	200	???	30-45	-	-	-	-	boulders & gravel	Rotary
	121101	0.3	470	92	23-51	76-87	215-233	-	-	Small gravel and sand, coarse sand, sand and gravel	Rotary
	323987	0.2	242	90	-	-	-	-	-	sand stringers noted from 20' to 60'	Rotary
	818722	0.05	270	110-130	-	-	-	-	-	imbedded gravel noted at 20' to 40' and again at 50' to 70'	Rotary
Site 3	482277	0.05	355	70	16-20	23-53	56-70	-	-	sand, gravel and clay, gravel	
	119532		590	93	unk	unk	unk	-	-	unk	
	11077	0.1	313	>180	32-80	80-126	172-174	-	-	clay and gravel, clay and gravel, gravel	
	15236	0.25	328	321	23-28	38-51	51-70	-	-	loose sand and gravel, loose gravel and rocks, gravel and clay, loose gravel, loose sand and gravel	

Appendix B: Summary of Wells Used for Hydrogeologic Site Characterization

Site	Well Completion Report	Approx. Distance from Site (miles)	Borehole Total Depth (ft, bgs)	Approx. Bottom of Alluvium/Unconsolidated material (ft, bgs)	First Sand/Gravel (ft, bgs)	Second Sand/Gravel (ft, bgs)	Third Sand/Gravel (ft, bgs)	Fourth Sand/Gravel (ft, bgs)	Fifth Sand/Gravel (ft, bgs)	Sand/Gravel Description	Drilling method
	119576	0.06	540	180	25-55	-	-	-	-	gravel and sand	
Site 4	437070	.	520	300	30-45	70-90	100-135	140-155	170-270	1/4" pea gravel, sand and 1/2" gravel, 1/2" pea gravel, sand and 1/4" gravel, 1/4" gravel	Rotary
	121202	0.45	340	167	30-58	67-156	-			sand and gravel, small gravel and sand	Rotary
	281504	0.5	280	240	22-40	80-140	160-190	190-220	240-280	gravel, gravel, gravel, gravel and coarse sand, gravel	Rotary
	462631	0.35	140	n/a	37-57	88-135	-	-	-	gravel and boulders, gravel and boulders	Rotary
Site 5	110119	0.05	285	21	-	-	-	-	-		Rotary
	482209	0.3	300	34	-	-	-	-	-		Rotary
	427004	0.2	247	54	-	-	-	-	-		Rotary
	72914	0.05	380	22	2-17	-	-	-	-	gravel	Rotary
	151102	0.25	256	80	25-80	-	-	-	-	sand and gravel with clay stringers	Rotary

APPENDIX C

Site	Sample ID	Sample Date	Total Alkalinity mg/L as CaCO3 Std Method 2320 B [1]*	Dissolved Aluminum mg/L EPA 200.8 (D) [1]*	Dissolved Antimony mg/L EPA 200.8 (D) [1]*	Dissolved Arsenic mg/L EPA 200.8 (D) [1]*	Dissolved Barium mg/L EPA 200.8 (D) [1]*	Dissolved Beryllium mg/L EPA 200.8 (D) [1]*	Dissolved Bicarbonate (HCO3-) mg/L as CaCO3 Std Method 4500-CO2 D [1]*	Dissolved Boron mg/L EPA 200.7 (D) [1]*	Dissolved Bromide mg/L EPA 300.0 28d Hold [1]*	Dissolved Cadmium mg/L EPA 200.8 (D) [1]*	Dissolved Calcium mg/L EPA 200.7 (D) [1]*
Site 1	NapaCounty-214s	6/3/2015 8:09	117	<0.01	<0.001	<0.001	0.081	<0.001	117	0.2	0.07	<0.001	19
Site 1	NapaCounty-215d	6/3/2015 7:16	258	<0.01	<0.001	0.007	0.103	<0.001	258	1.4	0.63	<0.001	41
Site 1	NapaCounty-swgw_SW1	6/4/2015 13:39	145	0.02	<0.001	0.015	0.136	<0.001	144	1.4	15.9	<0.001	145
Site 2	NapaCounty-216s	6/3/2015 13:03	93	0.089	<0.001	<0.001	0.046	<0.001	93	<0.1	0.12	<0.001	22
Site 2	NapaCounty-217d	6/3/2015 12:23	116	0.432	<0.001	0.001	0.027	<0.001	116	<0.1	0.06	<0.001	15
Site 2	NapaCounty-swgw_SW2	6/3/2015 13:15	154	0.029	<0.001	<0.001	0.059	<0.001	153	0.1	0.02	<0.001	34
Site 3	NapaCounty-218s	6/3/2015 11:02	192	<0.01	<0.001	<0.001	0.091	<0.001	192	0.1	0.13	<0.001	47
Site 3	NapaCounty-219d	6/3/2015 10:04	225	<0.01	<0.001	0.046	0.088	<0.001	224	9.1	0.33	<0.001	17
Site 3	NapaCounty-swgw_SW3	6/4/2015 12:46	176	0.012	<0.001	0.003	0.073	<0.001	175	0.5	0.2	<0.001	36
Site 4	NapaCounty-220s	6/4/2015 8:19	199	<0.01	<0.001	0.003	0.078	<0.001	199	0.1	0.1	<0.001	32
Site 4	NapaCounty-221d	6/4/2015 7:52	124	<0.01	<0.001	0.004	0.05	<0.001	124	<0.1	0.03	<0.001	14
Site 4	NapaCounty-swgw_SW4	6/4/2015 8:50	98	<0.01	<0.001	0.001	0.042	<0.001	98	<0.1	0.08	<0.001	22
Site 5	NapaCounty-222s	6/4/2015 11:29	117	<0.01	<0.001	0.003	0.041	<0.001	117	0.6	0.12	<0.001	28
Site 5	NapaCounty-223d	6/4/2015 10:56	213	<0.01	<0.001	0.002	0.104,0.105**	<0.001	213	0.5	0.07	<0.001	16
Site 5	NapaCounty-swgw_SW5	6/4/2015 11:56	92,93**	<0.01	<0.001	0.004	0.039	<0.001	93	0.8	0.12	<0.001	21

Site	Sample ID	Sample Date	Dissolved Carbonate (CO3--) mg/L as CaCO3 Std Method 4500-CO2 D [1]*	Dissolved Chloride mg/L EPA 300.0 28d Hold [1]*	Dissolved Chromium mg/L EPA 200.8 (D) [1]*	Dissolved Cobalt mg/L EPA 200.8 (D) [1]*	Conductance (EC) µS/cm Std Method 2510-B [1]*	Dissolved Copper mg/L EPA 200.8 (D) [1]*	Dissolved Fluoride mg/L EPA 300.0 28d Hold [1]*	Dissolved Hardness mg/L as CaCO3 Std Method 2340 B [1]*	Dissolved Hydroxide (OH-) mg/L as CaCO3 Std Method 4500-CO2 D [1]*	Dissolved Iron mg/L EPA 200.8 (D) [1]*	Dissolved Lead mg/L EPA 200.8 (D) [1]*
Site 1	NapaCounty-214s	6/3/2015 8:09	<1	28	<0.001	<0.005	416	<0.001	0.2	144	<1	0.009	<0.001
Site 1	NapaCounty-215d	6/3/2015 7:16	1	177	<0.001	<0.005	1174	0.001	0.2	226	<1	0.042	<0.001
Site 1	NapaCounty-swgw_SW1	6/4/2015 13:39	1	4699	0.002	<0.005	14319	0.006	<0.1	1717	<1	0.025	<0.001
Site 2	NapaCounty-216s	6/3/2015 13:03	<1	15	0.001	<0.005	317	0.003	0.2	116	<1	0.066	<0.001
Site 2	NapaCounty-217d	6/3/2015 12:23	<1	5	0.001	<0.005	255	0.001	0.6	74	<1	0.331	<0.001
Site 2	NapaCounty-swgw_SW2	6/3/2015 13:15	1	12	0.005	<0.005	411	0.006	0.2	159	<1	0.091	<0.001
Site 3	NapaCounty-218s	6/3/2015 11:02	<1	19	0.001	<0.005	536	<0.001	<0.1	247	<1	0.008	<0.001
Site 3	NapaCounty-219d	6/3/2015 10:04	1	73	<0.001	<0.005	712	0.005	0.3	116	<1	0.021	<0.001
Site 3	NapaCounty-swgw_SW3	6/4/2015 12:46	1	27	<0.001	<0.005	515	0.001	0.2	215	<1	0.022	<0.001
Site 4	NapaCounty-220s	6/4/2015 8:19	<1	7	<0.001	<0.005	429	<0.001	0.2	190	<1	<0.005	<0.001
Site 4	NapaCounty-221d	6/4/2015 7:52	<1	6	<0.001	<0.005	263	<0.001	0.2	100	<1	0.009	<0.001
Site 4	NapaCounty-swgw_SW4	6/4/2015 8:50	<1	18	<0.001	<0.005	328	0.001	0.1	128	<1	0.046	<0.001
Site 5	NapaCounty-222s	6/4/2015 11:29	<1	32	<0.001	<0.005	372	<0.001	0.3	123	<1	0.014	<0.001
Site 5	NapaCounty-223d	6/4/2015 10:56	<1	16	0.001	<0.005	453	<0.001	0.3	113	<1	0.473,0.476**	<0.001
Site 5	NapaCounty-swgw_SW5	6/4/2015 11:56	<1	34	<0.001	<0.005	346	0.002	0.4	100	<1	0.019	<0.001

*Codes in brackets ([]) following the analyte name refer to the Method Comparability Code. For more information, please refer to http://www.water.ca.gov/waterdatalibrary/includes/mtc_code.cfm.
**More than one analysis was made for this sample

Site	Sample ID	Sample Date	Dissolved Lithium mg/L EPA 200.8 (D) [1]*	Dissolved Magnesium mg/L EPA 200.7 (D) [1]*	Dissolved Manganese mg/L EPA 200.8 (D) [1]*	Dissolved Mercury mg/L EPA 200.8 (Hg Dissolved) [1]*	Dissolved Molybdenum mg/L EPA 200.8 (D) [1]*	Dissolved Nickel mg/L EPA 200.8 (D) [1]*	Dissolved Nitrate mg/L as N EPA 300.0 28d Hold [1]*	Dissolved Nitrite mg/L as N Std Method 4500-NO2 B (48Hr) [1]*	Dissolved Potassium mg/L EPA 200.7 (D) [1]*	Dissolved Selenium mg/L EPA 200.8 (D) [1]*	Dissolved Silver mg/L EPA 200.8 (D) [1]*
Site 1	NapaCounty-214s	6/3/2015 8:09	0.011	23	2.53	<0.0002	<0.005	0.003	7.3	0.02	1.1	<0.001	<0.001
Site 1	NapaCounty-215d	6/3/2015 7:16	0.059	30	1.13	<0.0002	<0.005	0.002	<0.1	<0.01	4.5	0.002	<0.001
Site 1	NapaCounty-swgw_SW1	6/4/2015 13:39	0.067	329	0.076	<0.0002	<0.005	0.007	12.6	<0.01	106.5	0.046	<0.001
Site 2	NapaCounty-216s	6/3/2015 13:03	0.012	15	0.041	<0.0002	<0.005	0.002	5.4	0.01	0.9	<0.001	<0.001
Site 2	NapaCounty-217d	6/3/2015 12:23	0.014	9	0.643	<0.0002	0.005	0.002	<0.1	<0.01	1.3	<0.001	<0.001
Site 2	NapaCounty-swgw_SW2	6/3/2015 13:15	0.008	18	0.024	<0.0002	<0.005	0.013	0.5	<0.01	2.1	<0.001	<0.001
Site 3	NapaCounty-218s	6/3/2015 11:02	0.01	31	<0.005	<0.0002	<0.005	0.003	1.8	<0.01	0.7	<0.001	<0.001
Site 3	NapaCounty-219d	6/3/2015 10:04	0.037,0.038**	18	0.241,0.242**	<0.0002	0.013,0.014**	0.001	<0.1	<0.01	5.2	<0.001	<0.001
Site 3	NapaCounty-swgw_SW3	6/4/2015 12:46	0.046	30	0.038	<0.0002	<0.005	0.004	<0.1	<0.01	2.9	<0.001	<0.001
Site 4	NapaCounty-220s	6/4/2015 8:19	<0.005	26	0.568	<0.0002	<0.005	0.005	0.7	0.03	3.6	<0.001	<0.001
Site 4	NapaCounty-221d	6/4/2015 7:52	<0.005	16	0.728	<0.0002	<0.005	0.002	<0.1	<0.01	4.7	<0.001	<0.001
Site 4	NapaCounty-swgw_SW4	6/4/2015 8:50	<0.005	17	0.041	<0.0002	<0.005	0.003	<0.1	<0.01	1.7	<0.001	<0.001
Site 5	NapaCounty-222s	6/4/2015 11:29	0.063	13	0.641	<0.0002	<0.005	0.01	<0.1	<0.01	3.8	<0.001	<0.001
Site 5	NapaCounty-223d	6/4/2015 10:56	0.075,0.076**	18	0.219,0.223**	<0.0002	<0.005	0.002	0.3	<0.01	7.1	<0.001	<0.001
Site 5	NapaCounty-swgw_SW5	6/4/2015 11:56	0.095	11	0.048	<0.0002	<0.005	0.003	<0.1	<0.01	3.7	<0.001	<0.001

Site	Sample ID	Sample Date	Dissolved Sodium mg/L EPA 200.7 (D) [1]*	Total Dissolved Solids mg/L Std Method 2540 C [1]*	Dissolved Strontium mg/L EPA 200.8 (D) [1]*	Dissolved Sulfate mg/L EPA 300.0 28d Hold [1]*	Dissolved Thallium mg/L EPA 200.8 (D) [1]*	Turbidity N.T.U. EPA 180.1 [D-2]*	Dissolved Vanadium mg/L EPA 200.8 (D) [1]*	Dissolved Zinc mg/L EPA 200.8 (D) [1]*	pH pH Units Std Method 2320 B [1]*
Site 1	NapaCounty-214s	6/3/2015 8:09	31	268	0.144	45	<0.001	1.21	<0.005	<0.005	6.9
Site 1	NapaCounty-215d	6/3/2015 7:16	164	683	0.32	74	<0.001	2.75	<0.005	<0.005	7.3
Site 1	NapaCounty-swgw_SW1	6/4/2015 13:39	2590	8830	2.19	667	<0.001	20.6	0.018	0.012	7.8
Site 2	NapaCounty-216s	6/3/2015 13:03	22	208	0.169	38	<0.001	77.4	<0.005	<0.005	6.8
Site 2	NapaCounty-217d	6/3/2015 12:23	29	164	0.107	9	<0.001	7.29	<0.005	<0.005	7.4
Site 2	NapaCounty-swgw_SW2	6/3/2015 13:15	28	255	0.269	44	<0.001	1.37	<0.005	0.027	7.6
Site 3	NapaCounty-218s	6/3/2015 11:02	20	324	0.357	65	<0.001	5.06	<0.005	<0.005	6.7
Site 3	NapaCounty-219d	6/3/2015 10:04	108	452	0.125,0.126**	32	<0.001	1.16	<0.005	0.006	7.4
Site 3	NapaCounty-swgw_SW3	6/4/2015 12:46	27	313	0.248	54	<0.001	7.48	<0.005	<0.005	7.8
Site 4	NapaCounty-220s	6/4/2015 8:19	19	292	0.199	11	<0.001	3.29	<0.005	<0.005	6.7
Site 4	NapaCounty-221d	6/4/2015 7:52	16	204	0.079	6	<0.001	7.11	<0.005	<0.005	7.1
Site 4	NapaCounty-swgw_SW4	6/4/2015 8:50	17	250	0.131	39	<0.001	3.4	<0.005	<0.005	7.3
Site 5	NapaCounty-222s	6/4/2015 11:29	26	241	0.155	21	<0.001	1.33,1.48**	<0.005	<0.005	7.1
Site 5	NapaCounty-223d	6/4/2015 10:56	56	343	0.104,0.105**	6	<0.001	18.8	<0.005	<0.005	7.2
Site 5	NapaCounty-swgw_SW5	6/4/2015 11:56	30	220	0.111	25	<0.001	1.68	<0.005	0.006	7.4

*Codes in brackets ([]) following the analyte name refer to the Method Comparability Code. For more information, please refer to http://www.water.ca.gov/waterdatalibrary/includes/mtc_code.cfm.
**More than one analysis was made for this sample

DWR Bryte Analytical Lab

1450 Riverbank Road, West Sacramento, CA 95605

Report of Analytical Results

22-Jun-15

Submittal Name: Napa L&S 2015

Submittal ID: CH0615B0001

These results are also available to DWR staff in electronic form via the DWR Water Data Library (WDL) http://wdl.water.ca.gov. Contact Kelley Pepper (kelley.pepper@water.ca.gov) to set up access.

(First) Collection Date: 6/3/2015

Received Date: 6/3/2015 3:50:00 PM

Report to:

Bill Brewster

DWR North Central Region Office

, CA

Priority: 5

Submitted By: John MacDougall

Received By: Carroll, Marilyn

Instructions to Lab:

Samples:

CH0615B0001	CH0615B0002	CH0615B0003	CH0615B0004	CH0615B0005	CH0615B0006
CH0615B0013	CH0615B0016	CH0615B0017			

Analyst Summary:

16 - Carroll, Marilyn	20 - Chan, Elaine	5 - Hernandez, Richard	9 - Pineda, Maritza	10 - Quiambao, Josie
13 - Thind, Pritam				

Submittal Review Notes From Lab:

Sample and Analyte Flag Summary

Flag	*Flag Description*
R4	Analyte Reporting Limit raised due to high analyte level.

Report of Field Results

Sample Number CH0615B0001 — **Field Results**

StationNumber:	StationName	Matrix	Cost Code:	Collection Date
05N04W02N990M	NapaCounty-214s	Water, Natural	L10583900000	6/03/2015 8:09 AM

Method	Analyte	Result	Rpt.Lmt.	Units	Time	Footnotes
Specific Conductance	Conductance (EC)		1	µS/cm		
Dissolved Oxygen (Electrode)	Dissolved Oxygen			mg/L		
pH (Field)	pH					
Oxidation-Reduction Potential	Redox Potential		10	mV		
Turbidity, Nephalometry (Fiel	Turbidity		1	N.T.U.		
Temperature, Water (Field)	Water Temperature (w/time)			°C		

Sample Number CH0615B0002 — **Field Results**

StationNumber:	StationName	Matrix	Cost Code:	Collection Date
05N04W02N991M	NapaCounty-215d	Water, Natural	L10583900000	6/03/2015 7:16 AM

Method	Analyte	Result	Rpt.Lmt.	Units	Time	Footnotes
Specific Conductance	Conductance (EC)		1	µS/cm		
Dissolved Oxygen (Electrode)	Dissolved Oxygen			mg/L		
pH (Field)	pH					
Oxidation-Reduction Potential	Redox Potential		10	mV		
Turbidity, Nephalometry (Fiel	Turbidity		1	N.T.U.		
Temperature, Water (Field)	Water Temperature (w/time)			°C		

Sample Number CH0615B0003 — **Field Results**

StationNumber:	StationName	Matrix	Cost Code:	Collection Date
06N04W18J992M	NapaCounty-216s	Water, Natural	L10583900000	6/03/2015 1:03 PM

Method	Analyte	Result	Rpt.Lmt.	Units	Time	Footnotes
Specific Conductance	Conductance (EC)		1	µS/cm		
Dissolved Oxygen (Electrode)	Dissolved Oxygen			mg/L		
pH (Field)	pH					
Oxidation-Reduction Potential	Redox Potential		10	mV		
Turbidity, Nephalometry (Fiel	Turbidity		1	N.T.U.		
Temperature, Water (Field)	Water Temperature (w/time)			°C		

Sample Number CH0615B0004 — **Field Results**

StationNumber:	StationName	Matrix	Cost Code:	Collection Date
06N04W18J993M	NapaCounty-217d	Water, Natural	L10583900000	6/03/2015 12:23 PM

Method	Analyte	Result	Rpt.Lmt.	Units	Time	Footnotes
Specific Conductance	Conductance (EC)		1	µS/cm		
Dissolved Oxygen (Electrode)	Dissolved Oxygen			mg/L		
pH (Field)	pH					
Oxidation-Reduction Potential	Redox Potential		10	mV		
Turbidity, Nephalometry (Fiel	Turbidity		1	N.T.U.		
Temperature, Water (Field)	Water Temperature (w/time)			°C		

Sample Number CH0615B0005 — **Field Results**

StationNumber:	StationName	Matrix	Cost Code:	Collection Date
06N04W16G994M	NapaCounty-218s	Water, Natural	L10583900000	6/03/2015 11:02 AM

Method	Analyte	Result	Rpt.Lmt.	Units	Time	Footnotes
Specific Conductance	Conductance (EC)		1	µS/cm		
Dissolved Oxygen (Electrode)	Dissolved Oxygen			mg/L		
pH (Field)	pH					
Oxidation-Reduction Potential	Redox Potential		10	mV		

Sample Number CH0615B0005 — **Field Results**

Turbidity, Nephalometry (Fiel	Turbidity	1	N.T.U.
Temperature, Water (Field)	Water Temperature (w/time)		°C

Sample Number CH0615B0006 — **Field Results**

StationNumber:	StationName	Matrix	Cost Code:	Collection Date
06N04W16G995M	NapaCounty-219d	Water, Natural	L10583900000	6/03/2015 10:04 AM

Method	Analyte	Result	Rpt.Lmt.	Units	Time	Footnotes
Specific Conductance	Conductance (EC)		1	µS/cm		
Dissolved Oxygen (Electrode)	Dissolved Oxygen			mg/L		
pH (Field)	pH					
Oxidation-Reduction Potential	Redox Potential		10	mV		
Turbidity, Nephalometry (Fiel	Turbidity		1	N.T.U.		
Temperature, Water (Field)	Water Temperature (w/time)			°C		

Sample Number CH0615B0013 — **Field Results**

StationNumber:	StationName	Matrix	Cost Code:	Collection Date
E3012234	NapaCounty-swgw_SW2	Water, Natural	L10583900000	6/03/2015 1:15 PM

Method	Analyte	Result	Rpt.Lmt.	Units	Time	Footnotes
Specific Conductance	Conductance (EC)		1	µS/cm		
Dissolved Oxygen (Electrode)	Dissolved Oxygen			mg/L		
pH (Field)	pH					
Oxidation-Reduction Potential	Redox Potential		10	mV		
Turbidity, Nephalometry (Fiel	Turbidity		1	N.T.U.		
Temperature, Water (Field)	Water Temperature (w/time)			°C		

Sample Number CH0615B0016 — **Field Results**

StationNumber:	StationName	Matrix	Cost Code:	Collection Date
06N04W18J993M	NapaCounty-217d	Water, Natural	L10583900000	6/03/2015 12:23 PM

Method	Analyte	Result	Rpt.Lmt.	Units	Time	Footnotes
Specific Conductance	Conductance (EC)		1	µS/cm		
Dissolved Oxygen (Electrode)	Dissolved Oxygen			mg/L		
pH (Field)	pH					
Oxidation-Reduction Potential	Redox Potential		10	mV		
Turbidity, Nephalometry (Fiel	Turbidity		1	N.T.U.		
Temperature, Water (Field)	Water Temperature (w/time)			°C		

Sample Number CH0615B0017 — **Field Results**

StationNumber:	StationName	Matrix	Cost Code:	Collection Date
Blank; Field	Blank; Field	Water, Purified	L10583900000	6/03/2015 1:06 PM

Method	Analyte	Result	Rpt.Lmt.	Units	Time	Footnotes
Specific Conductance	Conductance (EC)		1	µS/cm		
pH (Field)	pH					
Temperature, Water (Field)	Water Temperature			°C		

Report of Inorganic Analytical Results

Including Misc Physical Measurements

Sample Number CH0615B0001 — **Inorganic Analytical Results**

CH0615B0001 *Sample Type(Purpose):* Normal Sample *Depth:* 1 m *Collection Date:* 6/3/2015 8:09:00 AM

StationNumber: 05N04W02N990M *StationName:* NapaCounty-214s *Matrix:* Water, Natural *Cost Code:* L10583900000

Sample Condition: 2.0 °C when received. Iced.

Method	Analyte	Result	Units	R.L.	Dilution	ChemID	Analysis Date	Flags and Notes:
Std Method 2510-B	Conductance (EC)	416	µS/cm	1.	1.	20	6/4/2015	

N.A.=Not Analyzed R.L..=Reporting Limit (Reporting Limits Adjusted For Dilution)

Sample Number CH0615B0001 — **Inorganic Analytical Results**

EPA 200.8 (D)	Dissolved Aluminum	< 0.01	mg/L	0.01	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Antimony	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Arsenic	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Barium	0.081	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Beryllium	< 0.001	mg/L	0.001	1.	13	6/4/2015	
Std Method 4500-CO2 D	Dissolved Bicarbonate (HCO3-)	117	mg/L as CaCO3	1.	1.	20	6/4/2015	
EPA 200.7 (D)	Dissolved Boron	0.1853	mg/L	0.1	1.	10	6/11/2015	
EPA 300.0 28d Hold	Dissolved Bromide	0.07	mg/L	0.01	1.	9	6/9/2015	
EPA 200.8 (D)	Dissolved Cadmium	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.7 (D)	Dissolved Calcium	19.02	mg/L	1.	1.	10	6/11/2015	
Std Method 4500-CO2 D	Dissolved Carbonate (CO3--)	< 1	mg/L as CaCO3	1.	1.	20	6/4/2015	
EPA 300.0 28d Hold	Dissolved Chloride	28	mg/L	1.	1.	9	6/9/2015	
EPA 200.8 (D)	Dissolved Chromium	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Cobalt	< 0.005	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Copper	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 300.0 28d Hold	Dissolved Fluoride	0.17	mg/L	0.1	1.	9	6/9/2015	
Std Method 2340 B	Dissolved Hardness	144	mg/L as CaCO3	1.	1.	10	6/11/2015	
Std Method 4500-CO2 D	Dissolved Hydroxide (OH-)	< 1	mg/L as CaCO3	1.	1.	20	6/4/2015	
EPA 200.8 (D)	Dissolved Iron	0.009	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Lead	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Lithium	0.011	mg/L	0.005	1.	13	6/4/2015	
EPA 200.7 (D)	Dissolved Magnesium	23.39	mg/L	1.	1.	10	6/11/2015	
EPA 200.8 (D)	Dissolved Manganese	2.53	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (Hg Dissolved)	Dissolved Mercury	< 0.0002	mg/L	0.0002	1.	13	6/18/2015	
EPA 200.8 (D)	Dissolved Molybdenum	< 0.005	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Nickel	0.003	mg/L	0.001	1.	13	6/4/2015	
EPA 300.0 28d Hold	Dissolved Nitrate	7.33	mg/L	0.1	1.	9	6/9/2015	
Std Method 4500-NO2 B (48	Dissolved Nitrite	0.02	mg/L as N	0.01	1.	5	6/4/2015	
EPA 200.7 (D)	Dissolved Potassium	1.064	mg/L	0.5	1.	10	6/11/2015	
EPA 200.8 (D)	Dissolved Selenium	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Silver	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.7 (D)	Dissolved Sodium	31.35	mg/L	1.	1.	10	6/11/2015	
EPA 200.8 (D)	Dissolved Strontium	0.144	mg/L	0.005	1.	13	6/4/2015	
EPA 300.0 28d Hold	Dissolved Sulfate	45.29	mg/L	1.	1.	9	6/9/2015	
EPA 200.8 (D)	Dissolved Thallium	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Vanadium	< 0.005	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Zinc	< 0.005	mg/L	0.005	1.	13	6/4/2015	
Std Method 2320 B	pH	6.9		0.1	1.	20	6/4/2015	
Std Method 2320 B	Total Alkalinity	117	mg/L as CaCO3	1.	1.	20	6/4/2015	
Std Method 2540 C	Total Dissolved Solids	268	mg/L	1.	1.	20	6/5/2015	
Std Method 2540 C	Total Dissolved Solids	268	mg/L	1.	1.	20	6/5/2015	Dup-CH0615B0001
EPA 180.1	Turbidity	1.21	N.T.U.	1.	1.	16	6/4/2015	

Sample Number CH0615B0002 — **Inorganic Analytical Results**

CH0615B0002 *Sample Type(Purpose):* Normal Sample *Depth:* 1 m *Collection Date:* 6/3/2015 7:16:00 AM

StationNumber: 05N04W02N991M *StationName:* NapaCounty-215d *Matrix:* Water, Natural *Cost Code:* L10583900000

Sample Condition: 2.0 °C when received. Iced.

Method	Analyte	Result	Units	R.L.	Dilution	ChemID	Analysis Date	Flags and Notes:
Std Method 2510-B	Conductance (EC)	1174	µS/cm	1.	1.	20	6/4/2015	
EPA 200.8 (D)	Dissolved Aluminum	< 0.01	mg/L	0.01	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Antimony	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Arsenic	0.007	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Barium	0.103	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Beryllium	< 0.001	mg/L	0.001	1.	13	6/4/2015	

Sample Number CH0615B0002 **Inorganic Analytical Results**

Std Method 4500-CO2 D	Dissolved Bicarbonate (HCO3-)	258	mg/L as CaCO3	1.	1.	20	6/4/2015		
EPA 200.7 (D)	Dissolved Boron	1.416	mg/L	0.1	1.	10	6/11/2015		
EPA 300.0 28d Hold	Dissolved Bromide	0.63	mg/L	0.01	1.	9	6/9/2015		
EPA 200.8 (D)	Dissolved Cadmium	< 0.001	mg/L	0.001	1.	13	6/4/2015		
EPA 200.7 (D)	Dissolved Calcium	40.57	mg/L	1.	1.	10	6/11/2015		
Std Method 4500-CO2 D	Dissolved Carbonate (CO3--)	1	mg/L as CaCO3	1.	1.	20	6/4/2015		
EPA 300.0 28d Hold	Dissolved Chloride	177	mg/L	10.	10.	9	6/9/2015	R4	Dil-CH0615B0002
EPA 200.8 (D)	Dissolved Chromium	< 0.001	mg/L	0.001	1.	13	6/4/2015		
EPA 200.8 (D)	Dissolved Cobalt	< 0.005	mg/L	0.005	1.	13	6/4/2015		
EPA 200.8 (D)	Dissolved Copper	0.001	mg/L	0.001	1.	13	6/4/2015		
EPA 300.0 28d Hold	Dissolved Fluoride	0.18	mg/L	0.1	1.	9	6/9/2015		
Std Method 2340 B	Dissolved Hardness	226	mg/L as CaCO3	1.	1.	10	6/11/2015		
Std Method 4500-CO2 D	Dissolved Hydroxide (OH-)	< 1	mg/L as CaCO3	1.	1.	20	6/4/2015		
EPA 200.8 (D)	Dissolved Iron	0.042	mg/L	0.005	1.	13	6/4/2015		
EPA 200.8 (D)	Dissolved Lead	< 0.001	mg/L	0.001	1.	13	6/4/2015		
EPA 200.8 (D)	Dissolved Lithium	0.059	mg/L	0.005	1.	13	6/4/2015		
EPA 200.7 (D)	Dissolved Magnesium	30.24	mg/L	1.	1.	10	6/11/2015		
EPA 200.8 (D)	Dissolved Manganese	1.13	mg/L	0.005	1.	13	6/4/2015		
EPA 200.8 (Hg Dissolved)	Dissolved Mercury	< 0.0002	mg/L	0.0002	1.	13	6/18/2015		
EPA 200.8 (D)	Dissolved Molybdenum	< 0.005	mg/L	0.005	1.	13	6/4/2015		
EPA 200.8 (D)	Dissolved Nickel	0.002	mg/L	0.001	1.	13	6/4/2015		
EPA 300.0 28d Hold	Dissolved Nitrate	< 0.1	mg/L	0.1	1.	9	6/9/2015		
Std Method 4500-NO2 B (48	Dissolved Nitrite	< 0.01	mg/L as N	0.01	1.	5	6/4/2015		
EPA 200.7 (D)	Dissolved Potassium	4.505	mg/L	0.5	1.	10	6/11/2015		
EPA 200.8 (D)	Dissolved Selenium	0.002	mg/L	0.001	1.	13	6/4/2015		
EPA 200.8 (D)	Dissolved Silver	< 0.001	mg/L	0.001	1.	13	6/4/2015		
EPA 200.7 (D)	Dissolved Sodium	163.5	mg/L	1.	1.	10	6/11/2015		
EPA 200.8 (D)	Dissolved Strontium	0.32	mg/L	0.005	1.	13	6/4/2015		
EPA 300.0 28d Hold	Dissolved Sulfate	74	mg/L	1.	1.	9	6/9/2015		
EPA 200.8 (D)	Dissolved Thallium	< 0.001	mg/L	0.001	1.	13	6/4/2015		
EPA 200.8 (D)	Dissolved Vanadium	< 0.005	mg/L	0.005	1.	13	6/4/2015		
EPA 200.8 (D)	Dissolved Zinc	< 0.005	mg/L	0.005	1.	13	6/4/2015		
Std Method 2320 B	pH	7.3		0.1	1.	20	6/4/2015		
Std Method 2320 B	Total Alkalinity	258	mg/L as CaCO3	1.	1.	20	6/4/2015		
Std Method 2540 C	Total Dissolved Solids	683	mg/L	1.	1.	20	6/5/2015		
EPA 180.1	Turbidity	2.75	N.T.U.	1.	1.	16	6/4/2015		

Sample Number CH0615B0003 **Inorganic Analytical Results**

CH0615B0003 ***Sample Type(Purpose):*** Normal Sample ***Depth:*** 1 m ***Collection Date:*** 6/3/2015 1:03:00 PM

StationNumber: 06N04W18J992M ***StationName:*** NapaCounty-216s ***Matrix:*** Water, Natural ***Cost Code:*** L10583900000

Sample Condition: 2.0 °C when received. Iced.

Method	*Analyte*	*Result*	*Units*	*R.L.*	*Dilution*	*ChemID*	*Analysis Date*	*Flags and Notes:*	
Std Method 2510-B	Conductance (EC)	317	µS/cm	1.	1.	20	6/4/2015		
EPA 200.8 (D)	Dissolved Aluminum	0.089	mg/L	0.01	1.	13	6/4/2015		
EPA 200.8 (D)	Dissolved Antimony	< 0.001	mg/L	0.001	1.	13	6/4/2015		
EPA 200.8 (D)	Dissolved Arsenic	< 0.001	mg/L	0.001	1.	13	6/4/2015		
EPA 200.8 (D)	Dissolved Barium	0.046	mg/L	0.005	1.	13	6/4/2015		
EPA 200.8 (D)	Dissolved Beryllium	< 0.001	mg/L	0.001	1.	13	6/4/2015		
Std Method 4500-CO2 D	Dissolved Bicarbonate (HCO3-)	93	mg/L as CaCO3	1.	1.	20	6/4/2015		
EPA 200.7 (D)	Dissolved Boron	< 0.1	mg/L	0.1	1.	10	6/11/2015		Measured: 0.0927
EPA 300.0 28d Hold	Dissolved Bromide	0.12	mg/L	0.01	1.	9	6/9/2015		Dup-CH0615B0003
EPA 300.0 28d Hold	Dissolved Bromide	0.12	mg/L	0.01	1.	9	6/9/2015		
EPA 200.8 (D)	Dissolved Cadmium	< 0.001	mg/L	0.001	1.	13	6/4/2015		

Sample Number **CH0615B0003** ***Inorganic Analytical Results***

EPA 200.7 (D)	Dissolved Calcium	22.26	mg/L	1.	1.	10	6/11/2015		
Std Method 4500-CO2 D	Dissolved Carbonate (CO3--)	< 1	mg/L as CaCO3	1.	1.	20	6/4/2015		
EPA 300.0 28d Hold	Dissolved Chloride	15.34	mg/L	1.	1.	9	6/9/2015		
EPA 300.0 28d Hold	Dissolved Chloride	15.33	mg/L	1.	1.	9	6/9/2015		Dup-CH0615B0003
EPA 200.8 (D)	Dissolved Chromium	0.001	mg/L	0.001	1.	13	6/4/2015		
EPA 200.8 (D)	Dissolved Cobalt	< 0.005	mg/L	0.005	1.	13	6/4/2015		
EPA 200.8 (D)	Dissolved Copper	0.003	mg/L	0.001	1.	13	6/4/2015		
EPA 300.0 28d Hold	Dissolved Fluoride	0.16	mg/L	0.1	1.	9	6/9/2015		Dup-CH0615B0003
EPA 300.0 28d Hold	Dissolved Fluoride	0.16	mg/L	0.1	1.	9	6/9/2015		
Std Method 2340 B	Dissolved Hardness	116	mg/L as CaCO3	1.	1.	10	6/11/2015		
Std Method 4500-CO2 D	Dissolved Hydroxide (OH-)	< 1	mg/L as CaCO3	1.	1.	20	6/4/2015		
EPA 200.8 (D)	Dissolved Iron	0.066	mg/L	0.005	1.	13	6/4/2015		
EPA 200.8 (D)	Dissolved Lead	< 0.001	mg/L	0.001	1.	13	6/4/2015		
EPA 200.8 (D)	Dissolved Lithium	0.012	mg/L	0.005	1.	13	6/4/2015		
EPA 200.7 (D)	Dissolved Magnesium	14.61	mg/L	1.	1.	10	6/11/2015		
EPA 200.8 (D)	Dissolved Manganese	0.041	mg/L	0.005	1.	13	6/4/2015		
EPA 200.8 (Hg Dissolved)	Dissolved Mercury	< 0.0002	mg/L	0.0002	1.	13	6/18/2015		
EPA 200.8 (D)	Dissolved Molybdenum	< 0.005	mg/L	0.005	1.	13	6/4/2015		
EPA 200.8 (D)	Dissolved Nickel	0.002	mg/L	0.001	1.	13	6/4/2015		
EPA 300.0 28d Hold	Dissolved Nitrate	5.4	mg/L	0.1	1.	9	6/9/2015		Dup-CH0615B0003
EPA 300.0 28d Hold	Dissolved Nitrate	5.4	mg/L	0.1	1.	9	6/9/2015		
Std Method 4500-NO2 B (48	Dissolved Nitrite	0.01	mg/L as N	0.01	1.	5	6/4/2015		
EPA 200.7 (D)	Dissolved Potassium	0.8767	mg/L	0.5	1.	10	6/11/2015		
EPA 200.8 (D)	Dissolved Selenium	< 0.001	mg/L	0.001	1.	13	6/4/2015		
EPA 200.8 (D)	Dissolved Silver	< 0.001	mg/L	0.001	1.	13	6/4/2015		
EPA 200.7 (D)	Dissolved Sodium	21.55	mg/L	1.	1.	10	6/11/2015		
EPA 200.8 (D)	Dissolved Strontium	0.169	mg/L	0.005	1.	13	6/4/2015		
EPA 300.0 28d Hold	Dissolved Sulfate	38.3	mg/L	1.	1.	9	6/9/2015		
EPA 300.0 28d Hold	Dissolved Sulfate	38.3	mg/L	1.	1.	9	6/9/2015		Dup-CH0615B0003
EPA 200.8 (D)	Dissolved Thallium	< 0.001	mg/L	0.001	1.	13	6/4/2015		
EPA 200.8 (D)	Dissolved Vanadium	< 0.005	mg/L	0.005	1.	13	6/4/2015		
EPA 200.8 (D)	Dissolved Zinc	< 0.005	mg/L	0.005	1.	13	6/4/2015		
Std Method 2320 B	pH	6.8		0.1	1.	20	6/4/2015		
Std Method 2320 B	Total Alkalinity	93	mg/L as CaCO3	1.	1.	20	6/4/2015		
Std Method 2540 C	Total Dissolved Solids	208	mg/L	1.	1.	20	6/5/2015		
EPA 180.1	Turbidity	77.4	N.T.U.	3.	3.	16	6/4/2015	R4	

Sample Number **CH0615B0004** ***Inorganic Analytical Results***

CH0615B0004 ***Sample Type(Purpose):*** Normal Sample ***Depth:*** 1 m ***Collection Date:*** 6/3/2015 12:23:00 PM

StationNumber: 06N04W18J993M ***StationName:*** NapaCounty-217d ***Matrix:*** Water, Natural ***Cost Code:*** L10583900000

Sample Condition: 2.0 °C when received. Iced.

Method	*Analyte*	*Result*	*Units*	*R.L.*	*Dilution*	*ChemID*	*Analysis Date*	*Flags and Notes:*	
Std Method 2510-B	Conductance (EC)	255	µS/cm	1.	1.	20	6/4/2015		
EPA 200.8 (D)	Dissolved Aluminum	0.432	mg/L	0.01	1.	13	6/4/2015		
EPA 200.8 (D)	Dissolved Antimony	< 0.001	mg/L	0.001	1.	13	6/4/2015		
EPA 200.8 (D)	Dissolved Arsenic	0.001	mg/L	0.001	1.	13	6/4/2015		
EPA 200.8 (D)	Dissolved Barium	0.027	mg/L	0.005	1.	13	6/4/2015		
EPA 200.8 (D)	Dissolved Beryllium	< 0.001	mg/L	0.001	1.	13	6/4/2015		
Std Method 4500-CO2 D	Dissolved Bicarbonate (HCO3-)	116	mg/L as CaCO3	1.	1.	20	6/4/2015		
EPA 200.7 (D)	Dissolved Boron	< 0.1	mg/L	0.1	1.	10	6/11/2015		Measured: 0.0798
EPA 300.0 28d Hold	Dissolved Bromide	0.06	mg/L	0.01	1.	9	6/9/2015		
EPA 200.8 (D)	Dissolved Cadmium	< 0.001	mg/L	0.001	1.	13	6/4/2015		
EPA 200.7 (D)	Dissolved Calcium	15.21	mg/L	1.	1.	10	6/11/2015		

Sample Number **CH0615B0004** — *Inorganic Analytical Results*

Method	Analyte	Result	Units	R.L.	Dilution	ChemID	Analysis Date	Flags and Notes:
Std Method 4500-CO2 D	Dissolved Carbonate (CO3--)	< 1	mg/L as CaCO3	1.	1.	20	6/4/2015	
EPA 300.0 28d Hold	Dissolved Chloride	5	mg/L	1.	1.	9	6/9/2015	
EPA 200.8 (D)	Dissolved Chromium	0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Cobalt	< 0.005	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Copper	0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 300.0 28d Hold	Dissolved Fluoride	0.56	mg/L	0.1	1.	9	6/9/2015	
Std Method 2340 B	Dissolved Hardness	74	mg/L as CaCO3	1.	1.	10	6/11/2015	
Std Method 4500-CO2 D	Dissolved Hydroxide (OH-)	< 1	mg/L as CaCO3	1.	1.	20	6/4/2015	
EPA 200.8 (D)	Dissolved Iron	0.331	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Lead	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Lithium	0.014	mg/L	0.005	1.	13	6/4/2015	
EPA 200.7 (D)	Dissolved Magnesium	8.758	mg/L	1.	1.	10	6/11/2015	
EPA 200.8 (D)	Dissolved Manganese	0.643	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (Hg Dissolved)	Dissolved Mercury	< 0.0002	mg/L	0.0002	1.	13	6/18/2015	
EPA 200.8 (D)	Dissolved Molybdenum	0.005	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Nickel	0.002	mg/L	0.001	1.	13	6/4/2015	
EPA 300.0 28d Hold	Dissolved Nitrate	< 0.1	mg/L	0.1	1.	9	6/9/2015	
Std Method 4500-NO2 B (48	Dissolved Nitrite	< 0.01	mg/L as N	0.01	1.	5	6/4/2015	
EPA 200.7 (D)	Dissolved Potassium	1.309	mg/L	0.5	1.	10	6/11/2015	
EPA 200.8 (D)	Dissolved Selenium	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Silver	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.7 (D)	Dissolved Sodium	28.53	mg/L	1.	1.	10	6/11/2015	
EPA 200.8 (D)	Dissolved Strontium	0.107	mg/L	0.005	1.	13	6/4/2015	
EPA 300.0 28d Hold	Dissolved Sulfate	9.31	mg/L	1.	1.	9	6/9/2015	
EPA 200.8 (D)	Dissolved Thallium	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Vanadium	< 0.005	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Zinc	< 0.005	mg/L	0.005	1.	13	6/4/2015	
Std Method 2320 B	pH	7.4		0.1	1.	20	6/4/2015	
Std Method 2320 B	Total Alkalinity	116	mg/L as CaCO3	1.	1.	20	6/4/2015	
Std Method 2540 C	Total Dissolved Solids	164	mg/L	1.	1.	20	6/5/2015	
EPA 180.1	Turbidity	7.29	N.T.U.	1.	1.	16	6/4/2015	

Sample Number **CH0615B0005** — *Inorganic Analytical Results*

CH0615B0005 *Sample Type(Purpose):* Normal Sample *Depth:* 1 m *Collection Date:* 6/3/2015 11:02:00 AM

StationNumber: 06N04W16G994M *StationName:* NapaCounty-218s *Matrix:* Water, Natural *Cost Code:* L10583900000

Sample Condition: 2.0 °C when received. Iced.

Method	Analyte	Result	Units	R.L.	Dilution	ChemID	Analysis Date	Flags and Notes:
Std Method 2510-B	Conductance (EC)	536	µS/cm	1.	1.	20	6/4/2015	
EPA 200.8 (D)	Dissolved Aluminum	< 0.01	mg/L	0.01	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Antimony	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Arsenic	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Barium	0.091	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Beryllium	< 0.001	mg/L	0.001	1.	13	6/4/2015	
Std Method 4500-CO2 D	Dissolved Bicarbonate (HCO3-)	192	mg/L as CaCO3	1.	1.	20	6/4/2015	
EPA 200.7 (D)	Dissolved Boron	0.1072	mg/L	0.1	1.	10	6/11/2015	
EPA 300.0 28d Hold	Dissolved Bromide	0.13	mg/L	0.01	1.	9	6/9/2015	
EPA 200.8 (D)	Dissolved Cadmium	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.7 (D)	Dissolved Calcium	47.39	mg/L	1.	1.	10	6/11/2015	
Std Method 4500-CO2 D	Dissolved Carbonate (CO3--)	< 1	mg/L as CaCO3	1.	1.	20	6/4/2015	
EPA 300.0 28d Hold	Dissolved Chloride	19	mg/L	1.	1.	9	6/9/2015	
EPA 200.8 (D)	Dissolved Chromium	0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Cobalt	< 0.005	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Copper	< 0.001	mg/L	0.001	1.	13	6/4/2015	

Sample Number CH0615B0005 — **Inorganic Analytical Results**

EPA 300.0 28d Hold	Dissolved Fluoride	< 0.1	mg/L	0.1	1.	9	6/9/2015	
Std Method 2340 B	Dissolved Hardness	247	mg/L as CaCO3	1.	1.	10	6/11/2015	
Std Method 4500-CO2 D	Dissolved Hydroxide (OH-)	< 1	mg/L as CaCO3	1.	1.	20	6/4/2015	
EPA 200.8 (D)	Dissolved Iron	0.008	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Lead	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Lithium	0.01	mg/L	0.005	1.	13	6/4/2015	
EPA 200.7 (D)	Dissolved Magnesium	31.18	mg/L	1.	1.	10	6/11/2015	
EPA 200.8 (D)	Dissolved Manganese	< 0.005	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (Hg Dissolved)	Dissolved Mercury	< 0.0002	mg/L	0.0002	1.	13	6/18/2015	
EPA 200.8 (D)	Dissolved Molybdenum	< 0.005	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Nickel	0.003	mg/L	0.001	1.	13	6/4/2015	
EPA 300.0 28d Hold	Dissolved Nitrate	1.8	mg/L	0.1	1.	9	6/9/2015	
Std Method 4500-NO2 B (48	Dissolved Nitrite	< 0.01	mg/L as N	0.01	1.	5	6/4/2015	
EPA 200.7 (D)	Dissolved Potassium	0.7058	mg/L	0.5	1.	10	6/11/2015	
EPA 200.8 (D)	Dissolved Selenium	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Silver	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.7 (D)	Dissolved Sodium	20.11	mg/L	1.	1.	10	6/11/2015	
EPA 200.8 (D)	Dissolved Strontium	0.357	mg/L	0.005	1.	13	6/4/2015	
EPA 300.0 28d Hold	Dissolved Sulfate	65.1	mg/L	1.	1.	9	6/9/2015	
EPA 200.8 (D)	Dissolved Thallium	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Vanadium	< 0.005	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Zinc	< 0.005	mg/L	0.005	1.	13	6/4/2015	
Std Method 2320 B	pH	6.7		0.1	1.	20	6/4/2015	
Std Method 2320 B	Total Alkalinity	192	mg/L as CaCO3	1.	1.	20	6/4/2015	
Std Method 2540 C	Total Dissolved Solids	324	mg/L	1.	1.	20	6/5/2015	
EPA 180.1	Turbidity	5.06	N.T.U.	1.	1.	16	6/4/2015	

Sample Number CH0615B0006 — **Inorganic Analytical Results**

CH0615B0006 *Sample Type(Purpose):* Normal Sample *Depth:* 1 m *Collection Date:* 6/3/2015 10:04:00 AM

StationNumber: 06N04W16G995M *StationName:* NapaCounty-219d *Matrix:* Water, Natural *Cost Code:* L10583900000

Sample Condition: 2.0 °C when received. Iced.

Method	Analyte	Result	Units	R.L.	Dilution	ChemID	Analysis Date	Flags and Notes:
Std Method 2510-B	Conductance (EC)	712	µS/cm	1.	1.	20	6/4/2015	
EPA 200.8 (D)	Dissolved Aluminum	< 0.01	mg/L	0.01	1.	13	6/4/2015	Dup-CH0615B0006
EPA 200.8 (D)	Dissolved Aluminum	< 0.01	mg/L	0.01	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Antimony	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Antimony	< 0.001	mg/L	0.001	1.	13	6/4/2015	Dup-CH0615B0006
EPA 200.8 (D)	Dissolved Arsenic	0.046	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Arsenic	0.046	mg/L	0.001	1.	13	6/4/2015	Dup-CH0615B0006
EPA 200.8 (D)	Dissolved Barium	0.088	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Barium	0.088	mg/L	0.005	1.	13	6/4/2015	Dup-CH0615B0006
EPA 200.8 (D)	Dissolved Beryllium	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Beryllium	< 0.001	mg/L	0.001	1.	13	6/4/2015	Dup-CH0615B0006
Std Method 4500-CO2 D	Dissolved Bicarbonate (HCO3-)	224	mg/L as CaCO3	1.	1.	20	6/4/2015	
EPA 200.7 (D)	Dissolved Boron	9.063	mg/L	0.1	1.	10	6/11/2015	
EPA 300.0 28d Hold	Dissolved Bromide	0.33	mg/L	0.01	1.	9	6/9/2015	
EPA 200.8 (D)	Dissolved Cadmium	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Cadmium	< 0.001	mg/L	0.001	1.	13	6/4/2015	Dup-CH0615B0006
EPA 200.7 (D)	Dissolved Calcium	16.74	mg/L	1.	1.	10	6/11/2015	
Std Method 4500-CO2 D	Dissolved Carbonate (CO3--)	1	mg/L as CaCO3	1.	1.	20	6/4/2015	
EPA 300.0 28d Hold	Dissolved Chloride	73	mg/L	1.	1.	9	6/9/2015	
EPA 200.8 (D)	Dissolved Chromium	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Chromium	< 0.001	mg/L	0.001	1.	13	6/4/2015	Dup-CH0615B0006
EPA 200.8 (D)	Dissolved Cobalt	< 0.005	mg/L	0.005	1.	13	6/4/2015	

Sample Number CH0615B0006 — **Inorganic Analytical Results**

EPA 200.8 (D)	Dissolved Cobalt	< 0.005	mg/L	0.005	1.	13	6/4/2015	Dup-CH0615B0006
EPA 200.8 (D)	Dissolved Copper	0.005	mg/L	0.001	1.	13	6/4/2015	Dup-CH0615B0006
EPA 200.8 (D)	Dissolved Copper	0.005	mg/L	0.001	1.	13	6/4/2015	
EPA 300.0 28d Hold	Dissolved Fluoride	0.25	mg/L	0.1	1.	9	6/9/2015	
Std Method 2340 B	Dissolved Hardness	116	mg/L as CaCO3	1.	1.	10	6/11/2015	
Std Method 4500-CO2 D	Dissolved Hydroxide (OH-)	< 1	mg/L as CaCO3	1.	1.	20	6/4/2015	
EPA 200.8 (D)	Dissolved Iron	0.021	mg/L	0.005	1.	13	6/4/2015	Dup-CH0615B0006
EPA 200.8 (D)	Dissolved Iron	0.021	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Lead	< 0.001	mg/L	0.001	1.	13	6/4/2015	Dup-CH0615B0006
EPA 200.8 (D)	Dissolved Lead	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Lithium	0.038	mg/L	0.005	1.	13	6/4/2015	Dup-CH0615B0006
EPA 200.8 (D)	Dissolved Lithium	0.037	mg/L	0.005	1.	13	6/4/2015	
EPA 200.7 (D)	Dissolved Magnesium	17.9	mg/L	1.	1.	10	6/11/2015	
EPA 200.8 (D)	Dissolved Manganese	0.242	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Manganese	0.241	mg/L	0.005	1.	13	6/4/2015	Dup-CH0615B0006
EPA 200.8 (Hg Dissolved)	Dissolved Mercury	< 0.0002	mg/L	0.0002	1.	13	6/18/2015	
EPA 200.8 (D)	Dissolved Molybdenum	0.014	mg/L	0.005	1.	13	6/4/2015	Dup-CH0615B0006
EPA 200.8 (D)	Dissolved Molybdenum	0.013	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Nickel	0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Nickel	0.001	mg/L	0.001	1.	13	6/4/2015	Dup-CH0615B0006
EPA 300.0 28d Hold	Dissolved Nitrate	< 0.1	mg/L	0.1	1.	9	6/9/2015	
Std Method 4500-NO2 B (48	Dissolved Nitrite	< 0.01	mg/L as N	0.01	1.	5	6/4/2015	Dup-CH0615B0006
Std Method 4500-NO2 B (48	Dissolved Nitrite	< 0.01	mg/L as N	0.01	1.	5	6/4/2015	
EPA 200.7 (D)	Dissolved Potassium	5.163	mg/L	0.5	1.	10	6/11/2015	
EPA 200.8 (D)	Dissolved Selenium	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Selenium	< 0.001	mg/L	0.001	1.	13	6/4/2015	Dup-CH0615B0006
EPA 200.8 (D)	Dissolved Silver	< 0.001	mg/L	0.001	1.	13	6/4/2015	Dup-CH0615B0006
EPA 200.8 (D)	Dissolved Silver	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.7 (D)	Dissolved Sodium	107.9	mg/L	1.	1.	10	6/11/2015	
EPA 200.8 (D)	Dissolved Strontium	0.125	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Strontium	0.126	mg/L	0.005	1.	13	6/4/2015	Dup-CH0615B0006
EPA 300.0 28d Hold	Dissolved Sulfate	32	mg/L	1.	1.	9	6/9/2015	
EPA 200.8 (D)	Dissolved Thallium	< 0.001	mg/L	0.001	1.	13	6/4/2015	Dup-CH0615B0006
EPA 200.8 (D)	Dissolved Thallium	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Vanadium	< 0.005	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Vanadium	< 0.005	mg/L	0.005	1.	13	6/4/2015	Dup-CH0615B0006
EPA 200.8 (D)	Dissolved Zinc	0.006	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Zinc	0.006	mg/L	0.005	1.	13	6/4/2015	Dup-CH0615B0006
Std Method 2320 B	pH	7.4		0.1	1.	20	6/4/2015	
Std Method 2320 B	Total Alkalinity	225	mg/L as CaCO3	1.	1.	20	6/4/2015	
Std Method 2540 C	Total Dissolved Solids	452	mg/L	1.	1.	20	6/5/2015	
EPA 180.1	Turbidity	1.16	N.T.U.	1.	1.	16	6/4/2015	

Sample Number CH0615B0013 — **Inorganic Analytical Results**

CH0615B0013 *Sample Type(Purpose):* Normal Sample *Depth:* 1 m *Collection Date:* 6/3/2015 1:15:00 PM

StationNumber: E3012234 *StationName:* NapaCounty-swgw_SW2 *Matrix:* Water, Natural *Cost Code:* L10583900000

Sample Condition: 2.0 °C when received. Iced.

Method	Analyte	Result	Units	R.L.	Dilution	ChemID	Analysis Date	Flags and Notes:
Std Method 2510-B	Conductance (EC)	411	µS/cm	1.	1.	20	6/4/2015	
EPA 200.8 (D)	Dissolved Aluminum	0.029	mg/L	0.01	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Antimony	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Arsenic	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Barium	0.059	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Beryllium	< 0.001	mg/L	0.001	1.	13	6/4/2015	
Std Method 4500-CO2 D	Dissolved Bicarbonate (HCO3-)	153	mg/L as CaCO3	1.	1.	20	6/4/2015	

Sample Number CH0615B0013 **Inorganic Analytical Results**

EPA 200.7 (D)	Dissolved Boron	0.1329	mg/L	0.1	1.	10	6/11/2015	
EPA 300.0 28d Hold	Dissolved Bromide	0.02	mg/L	0.01	1.	9	6/8/2015	
EPA 200.8 (D)	Dissolved Cadmium	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.7 (D)	Dissolved Calcium	33.74	mg/L	1.	1.	10	6/11/2015	
Std Method 4500-CO2 D	Dissolved Carbonate (CO3--)	1	mg/L as CaCO3	1.	1.	20	6/4/2015	
EPA 300.0 28d Hold	Dissolved Chloride	12.13	mg/L	1.	1.	9	6/8/2015	
EPA 200.8 (D)	Dissolved Chromium	0.005	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Cobalt	< 0.005	mg/L	0.005	1.	13	6/4/2015	Measured: 0.001
EPA 200.8 (D)	Dissolved Copper	0.006	mg/L	0.001	1.	13	6/4/2015	
EPA 300.0 28d Hold	Dissolved Fluoride	0.17	mg/L	0.1	1.	9	6/8/2015	
Std Method 2340 B	Dissolved Hardness	159	mg/L as CaCO3	1.	1.	10	6/11/2015	
Std Method 4500-CO2 D	Dissolved Hydroxide (OH-)	< 1	mg/L as CaCO3	1.	1.	20	6/4/2015	
EPA 200.8 (D)	Dissolved Iron	0.091	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Lead	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Lithium	0.008	mg/L	0.005	1.	13	6/4/2015	
EPA 200.7 (D)	Dissolved Magnesium	18.05	mg/L	1.	1.	10	6/11/2015	
EPA 200.8 (D)	Dissolved Manganese	0.024	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (Hg Dissolved)	Dissolved Mercury	< 0.0002	mg/L	0.0002	1.	13	6/18/2015	
EPA 200.8 (D)	Dissolved Molybdenum	< 0.005	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Nickel	0.013	mg/L	0.001	1.	13	6/4/2015	
EPA 300.0 28d Hold	Dissolved Nitrate	0.5	mg/L	0.1	1.	9	6/8/2015	
Std Method 4500-NO2 B (48	Dissolved Nitrite	< 0.01	mg/L as N	0.01	1.	5	6/4/2015	
EPA 200.7 (D)	Dissolved Potassium	2.142	mg/L	0.5	1.	10	6/11/2015	
EPA 200.8 (D)	Dissolved Selenium	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Silver	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.7 (D)	Dissolved Sodium	28.27	mg/L	1.	1.	10	6/11/2015	
EPA 200.8 (D)	Dissolved Strontium	0.269	mg/L	0.005	1.	13	6/4/2015	
EPA 300.0 28d Hold	Dissolved Sulfate	44.13	mg/L	1.	1.	9	6/8/2015	
EPA 200.8 (D)	Dissolved Thallium	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Vanadium	< 0.005	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Zinc	0.027	mg/L	0.005	1.	13	6/4/2015	
Std Method 2320 B	pH	7.6		0.1	1.	20	6/4/2015	
Std Method 2320 B	Total Alkalinity	154	mg/L as CaCO3	1.	1.	20	6/4/2015	
Std Method 2540 C	Total Dissolved Solids	255	mg/L	1.	1.	20	6/5/2015	
EPA 180.1	Turbidity	1.37	N.T.U.	1.	1.	16	6/4/2015	

Sample Number CH0615B0016 **Inorganic Analytical Results**

CH0615B0016 *Sample Type(Purpose):* Duplicate Sample CH0615B0004 *Depth:* 1 m *Collection Date:* 6/3/2015 12:23:00 PM

StationNumber: 06N04W18J993M *StationName:* NapaCounty-217d *Matrix:* Water, Natural *Cost Code:* L10583900000

Sample Condition: 2.0 °C when received. Iced.

Method	Analyte	Result	Units	R.L.	Dilution	ChemID	Analysis Date	Flags and Notes:
Std Method 2510-B	Conductance (EC)	256	µS/cm	1.	1.	20	6/4/2015	Dup-CH0615B0016
Std Method 2510-B	Conductance (EC)	256	µS/cm	1.	1.	20	6/4/2015	
EPA 200.8 (D)	Dissolved Aluminum	0.422	mg/L	0.01	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Antimony	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Arsenic	0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Barium	0.027	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Beryllium	< 0.001	mg/L	0.001	1.	13	6/4/2015	
Std Method 4500-CO2 D	Dissolved Bicarbonate (HCO3-)	118	mg/L as CaCO3	1.	1.	20	6/4/2015	
Std Method 4500-CO2 D	Dissolved Bicarbonate (HCO3-)	118	mg/L as CaCO3	1.	1.	20	6/4/2015	Dup-CH0615B0016
EPA 200.7 (D)	Dissolved Boron	< 0.1	mg/L	0.1	1.	10	6/11/2015	Measured: 0.0808
EPA 300.0 28d Hold	Dissolved Bromide	0.06	mg/L	0.01	1.	9	6/9/2015	
EPA 200.8 (D)	Dissolved Cadmium	< 0.001	mg/L	0.001	1.	13	6/4/2015	

Sample Number CH0615B0016 — **Inorganic Analytical Results**

EPA 200.7 (D)	Dissolved Calcium	15.05	mg/L	1.	1.	10	6/11/2015	
Std Method 4500-CO2 D	Dissolved Carbonate (CO3--)	< 1	mg/L as CaCO3	1.	1.	20	6/4/2015	
Std Method 4500-CO2 D	Dissolved Carbonate (CO3--)	< 1	mg/L as CaCO3	1.	1.	20	6/4/2015	Dup-CH0615B0016
EPA 300.0 28d Hold	Dissolved Chloride	5	mg/L	1.	1.	9	6/9/2015	
EPA 200.8 (D)	Dissolved Chromium	0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Cobalt	< 0.005	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Copper	0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 300.0 28d Hold	Dissolved Fluoride	0.549	mg/L	0.1	1.	9	6/9/2015	
Std Method 2340 B	Dissolved Hardness	74	mg/L as CaCO3	1.	1.	10	6/11/2015	
Std Method 4500-CO2 D	Dissolved Hydroxide (OH-)	< 1	mg/L as CaCO3	1.	1.	20	6/4/2015	
Std Method 4500-CO2 D	Dissolved Hydroxide (OH-)	< 1	mg/L as CaCO3	1.	1.	20	6/4/2015	Dup-CH0615B0016
EPA 200.8 (D)	Dissolved Iron	0.331	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Lead	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Lithium	0.014	mg/L	0.005	1.	13	6/4/2015	
EPA 200.7 (D)	Dissolved Magnesium	8.798	mg/L	1.	1.	10	6/11/2015	
EPA 200.8 (D)	Dissolved Manganese	0.635	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (Hg Dissolved)	Dissolved Mercury	< 0.0002	mg/L	0.0002	1.	13	6/18/2015	
EPA 200.8 (D)	Dissolved Molybdenum	0.005	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Nickel	0.002	mg/L	0.001	1.	13	6/4/2015	
EPA 300.0 28d Hold	Dissolved Nitrate	< 0.1	mg/L	0.1	1.	9	6/9/2015	
Std Method 4500-NO2 B (48	Dissolved Nitrite	< 0.01	mg/L as N	0.01	1.	5	6/4/2015	
EPA 200.7 (D)	Dissolved Potassium	1.349	mg/L	0.5	1.	10	6/11/2015	
EPA 200.8 (D)	Dissolved Selenium	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Silver	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.7 (D)	Dissolved Sodium	28.53	mg/L	1.	1.	10	6/11/2015	
EPA 200.8 (D)	Dissolved Strontium	0.109	mg/L	0.005	1.	13	6/4/2015	
EPA 300.0 28d Hold	Dissolved Sulfate	9.2	mg/L	1.	1.	9	6/9/2015	
EPA 200.8 (D)	Dissolved Thallium	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Vanadium	< 0.005	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Zinc	< 0.005	mg/L	0.005	1.	13	6/4/2015	
Std Method 2320 B	pH	7.4		0.1	1.	20	6/4/2015	
Std Method 2320 B	pH	7.4		0.1	1.	20	6/4/2015	Dup-CH0615B0016
Std Method 2320 B	Total Alkalinity	118	mg/L as CaCO3	1.	1.	20	6/4/2015	Dup-CH0615B0016
Std Method 2320 B	Total Alkalinity	118	mg/L as CaCO3	1.	1.	20	6/4/2015	
Std Method 2540 C	Total Dissolved Solids	165	mg/L	1.	1.	20	6/5/2015	
EPA 180.1	Turbidity	6.68	N.T.U.	1.	1.	16	6/4/2015	Dup-CH0615B0016
EPA 180.1	Turbidity	6.23	N.T.U.	1.	1.	16	6/4/2015	

Sample Number CH0615B0017 — **Inorganic Analytical Results**

CH0615B0017 *Sample Type(Purpose):* Blank; Field *Depth:* 0 m *Collection Date:* 6/3/2015 1:06:00 PM

StationNumber: Blank; Field *StationName:* Blank; Field *Matrix:* Water, Purified *Cost Code:* L10583900000

Sample Condition: 2.0 °C when received. Iced.

Method	Analyte	Result	Units	R.L.	Dilution	ChemID	Analysis Date	Flags and Notes:
Std Method 2510-B	Conductance (EC)	< 1	µS/cm	1.	1.	20	6/4/2015	
EPA 200.8 (D)	Dissolved Aluminum	< 0.01	mg/L	0.01	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Antimony	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Arsenic	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Barium	< 0.005	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Beryllium	< 0.001	mg/L	0.001	1.	13	6/4/2015	
Std Method 4500-CO2 D	Dissolved Bicarbonate (HCO3-)	2	mg/L as CaCO3	1.	1.	20	6/4/2015	
EPA 200.7 (D)	Dissolved Boron	< 0.1	mg/L	0.1	1.	10	6/11/2015	
EPA 300.0 28d Hold	Dissolved Bromide	< 0.01	mg/L	0.01	1.	9	6/9/2015	
EPA 200.8 (D)	Dissolved Cadmium	< 0.001	mg/L	0.001	1.	13	6/4/2015	

Sample Number **CH0615B0017** ***Inorganic Analytical Results***

EPA 200.7 (D)	Dissolved Calcium	< 1	mg/L	1.	1.	10	6/11/2015	
Std Method 4500-CO2 D	Dissolved Carbonate (CO3--)	< 1	mg/L as CaCO3	1.	1.	20	6/4/2015	
EPA 300.0 28d Hold	Dissolved Chloride	< 1	mg/L	1.	1.	9	6/9/2015	
EPA 200.8 (D)	Dissolved Chromium	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Cobalt	< 0.005	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Copper	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 300.0 28d Hold	Dissolved Fluoride	< 0.1	mg/L	0.1	1.	9	6/9/2015	
Std Method 2340 B	Dissolved Hardness	< 1	mg/L as CaCO3	1.	1.	10	6/11/2015	
Std Method 4500-CO2 D	Dissolved Hydroxide (OH-)	< 1	mg/L as CaCO3	1.	1.	20	6/4/2015	
EPA 200.8 (D)	Dissolved Iron	< 0.005	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Lead	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Lithium	< 0.005	mg/L	0.005	1.	13	6/4/2015	
EPA 200.7 (D)	Dissolved Magnesium	< 1	mg/L	1.	1.	10	6/11/2015	
EPA 200.8 (D)	Dissolved Manganese	< 0.005	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (Hg Dissolved)	Dissolved Mercury	< 0.0002	mg/L	0.0002	1.	13	6/18/2015	
EPA 200.8 (D)	Dissolved Molybdenum	< 0.005	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Nickel	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 300.0 28d Hold	Dissolved Nitrate	< 0.1	mg/L	0.1	1.	9	6/9/2015	
Std Method 4500-NO2 B (48	Dissolved Nitrite	< 0.01	mg/L as N	0.01	1.	5	6/4/2015	
EPA 200.7 (D)	Dissolved Potassium	< 0.5	mg/L	0.5	1.	10	6/11/2015	
EPA 200.8 (D)	Dissolved Selenium	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Silver	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.7 (D)	Dissolved Sodium	< 1	mg/L	1.	1.	10	6/11/2015	
EPA 200.8 (D)	Dissolved Strontium	< 0.005	mg/L	0.005	1.	13	6/4/2015	
EPA 300.0 28d Hold	Dissolved Sulfate	< 1	mg/L	1.	1.	9	6/9/2015	
EPA 200.8 (D)	Dissolved Thallium	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Vanadium	< 0.005	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Zinc	< 0.005	mg/L	0.005	1.	13	6/4/2015	
Std Method 2320 B	pH	5.2		0.1	1.	20	6/4/2015	
Std Method 2320 B	Total Alkalinity	2	mg/L as CaCO3	1.	1.	20	6/4/2015	
Std Method 2540 C	Total Dissolved Solids	< 1	mg/L	1.	1.	20	6/5/2015	
EPA 180.1	Turbidity	< 1	N.T.U.	1.	1.	16	6/4/2015	Measured: 0.09

DWR Bryte Analytical Lab

1450 Riverbank Road, West Sacramento, CA 95605

Report of Analytical Results

22-Jun-15

Submittal Name: Napa L&S 2015

Submittal ID: CH0615B0001

These results are also available to DWR staff in electronic form via the DWR Water Data Library (WDL) http://wdl.water.ca.gov. Contact Kelley Pepper (kelley.pepper@water.ca.gov) to set up access.

(First) Collection Date: 6/3/2015

Received Date: 6/3/2015 3:50:00 PM

Report to:

Bill Brewster

DWR North Central Region Office

, CA

Priority: 5

Submitted By: John MacDougall

Received By: Carroll, Marilyn

Instructions to Lab:

Samples:

CH0615B0001	CH0615B0002	CH0615B0003	CH0615B0004	CH0615B0005	CH0615B0006
CH0615B0013	CH0615B0016	CH0615B0017			

Analyst Summary:

16 - Carroll, Marilyn	20 - Chan, Elaine	5 - Hernandez, Richard	9 - Pineda, Maritza	10 - Quiambao, Josie
13 - Thind, Pritam				

Submittal Review Notes From Lab:

Sample and Analyte Flag Summary

Flag	*Flag Description*
R4	Analyte Reporting Limit raised due to high analyte level.

N.A.=Not Analyzed R.L..=Reporting Limit (Reporting Limits Adjusted For Dilution)

Report of Field Results

Sample Number CH0615B0001 — **Field Results**

StationNumber:	StationName	Matrix	Cost Code:	Collection Date
05N04W02N990M	NapaCounty-214s	Water, Natural	L10583900000	6/03/2015 8:09 AM

Method	Analyte	Result	Rpt.Lmt.	Units	Time	Footnotes
Specific Conductance	Conductance (EC)		1	µS/cm		
Dissolved Oxygen (Electrode)	Dissolved Oxygen			mg/L		
pH (Field)	pH					
Oxidation-Reduction Potential	Redox Potential		10	mV		
Turbidity, Nephalometry (Fiel	Turbidity		1	N.T.U.		
Temperature, Water (Field)	Water Temperature (w/time)			°C		

Sample Number CH0615B0002 — **Field Results**

StationNumber:	StationName	Matrix	Cost Code:	Collection Date
05N04W02N991M	NapaCounty-215d	Water, Natural	L10583900000	6/03/2015 7:16 AM

Method	Analyte	Result	Rpt.Lmt.	Units	Time	Footnotes
Specific Conductance	Conductance (EC)		1	µS/cm		
Dissolved Oxygen (Electrode)	Dissolved Oxygen			mg/L		
pH (Field)	pH					
Oxidation-Reduction Potential	Redox Potential		10	mV		
Turbidity, Nephalometry (Fiel	Turbidity		1	N.T.U.		
Temperature, Water (Field)	Water Temperature (w/time)			°C		

Sample Number CH0615B0003 — **Field Results**

StationNumber:	StationName	Matrix	Cost Code:	Collection Date
06N04W18J992M	NapaCounty-216s	Water, Natural	L10583900000	6/03/2015 1:03 PM

Method	Analyte	Result	Rpt.Lmt.	Units	Time	Footnotes
Specific Conductance	Conductance (EC)		1	µS/cm		
Dissolved Oxygen (Electrode)	Dissolved Oxygen			mg/L		
pH (Field)	pH					
Oxidation-Reduction Potential	Redox Potential		10	mV		
Turbidity, Nephalometry (Fiel	Turbidity		1	N.T.U.		
Temperature, Water (Field)	Water Temperature (w/time)			°C		

Sample Number CH0615B0004 — **Field Results**

StationNumber:	StationName	Matrix	Cost Code:	Collection Date
06N04W18J993M	NapaCounty-217d	Water, Natural	L10583900000	6/03/2015 12:23 PM

Method	Analyte	Result	Rpt.Lmt.	Units	Time	Footnotes
Specific Conductance	Conductance (EC)		1	µS/cm		
Dissolved Oxygen (Electrode)	Dissolved Oxygen			mg/L		
pH (Field)	pH					
Oxidation-Reduction Potential	Redox Potential		10	mV		
Turbidity, Nephalometry (Fiel	Turbidity		1	N.T.U.		
Temperature, Water (Field)	Water Temperature (w/time)			°C		

Sample Number CH0615B0005 — **Field Results**

StationNumber:	StationName	Matrix	Cost Code:	Collection Date
06N04W16G994M	NapaCounty-218s	Water, Natural	L10583900000	6/03/2015 11:02 AM

Method	Analyte	Result	Rpt.Lmt.	Units	Time	Footnotes
Specific Conductance	Conductance (EC)		1	µS/cm		
Dissolved Oxygen (Electrode)	Dissolved Oxygen			mg/L		
pH (Field)	pH					
Oxidation-Reduction Potential	Redox Potential		10	mV		

Sample Number CH0615B0005 — **Field Results**

Method	Analyte	Result	Rpt.Lmt. Units	Time	Footnotes
Turbidity, Nephalometry (Fiel	Turbidity		1 N.T.U.		
Temperature, Water (Field)	Water Temperature (w/time)		°C		

Sample Number CH0615B0006 — **Field Results**

StationNumber:	StationName	Matrix	Cost Code:	Collection Date
06N04W16G995M	NapaCounty-219d	Water, Natural	L10583900000	6/03/2015 10:04 AM

Method	Analyte	Result	Rpt.Lmt. Units	Time	Footnotes
Specific Conductance	Conductance (EC)		1 µS/cm		
Dissolved Oxygen (Electrode)	Dissolved Oxygen		mg/L		
pH (Field)	pH				
Oxidation-Reduction Potential	Redox Potential		10 mV		
Turbidity, Nephalometry (Fiel	Turbidity		1 N.T.U.		
Temperature, Water (Field)	Water Temperature (w/time)		°C		

Sample Number CH0615B0013 — **Field Results**

StationNumber:	StationName	Matrix	Cost Code:	Collection Date
E3012234	NapaCounty-swgw_SW2	Water, Natural	L10583900000	6/03/2015 1:15 PM

Method	Analyte	Result	Rpt.Lmt. Units	Time	Footnotes
Specific Conductance	Conductance (EC)		1 µS/cm		
Dissolved Oxygen (Electrode)	Dissolved Oxygen		mg/L		
pH (Field)	pH				
Oxidation-Reduction Potential	Redox Potential		10 mV		
Turbidity, Nephalometry (Fiel	Turbidity		1 N.T.U.		
Temperature, Water (Field)	Water Temperature (w/time)		°C		

Sample Number CH0615B0016 — **Field Results**

StationNumber:	StationName	Matrix	Cost Code:	Collection Date
06N04W18J993M	NapaCounty-217d	Water, Natural	L10583900000	6/03/2015 12:23 PM

Method	Analyte	Result	Rpt.Lmt. Units	Time	Footnotes
Specific Conductance	Conductance (EC)		1 µS/cm		
Dissolved Oxygen (Electrode)	Dissolved Oxygen		mg/L		
pH (Field)	pH				
Oxidation-Reduction Potential	Redox Potential		10 mV		
Turbidity, Nephalometry (Fiel	Turbidity		1 N.T.U.		
Temperature, Water (Field)	Water Temperature (w/time)		°C		

Sample Number CH0615B0017 — **Field Results**

StationNumber:	StationName	Matrix	Cost Code:	Collection Date
Blank; Field	Blank; Field	Water, Purified	L10583900000	6/03/2015 1:06 PM

Method	Analyte	Result	Rpt.Lmt. Units	Time	Footnotes
Specific Conductance	Conductance (EC)		1 µS/cm		
pH (Field)	pH				
Temperature, Water (Field)	Water Temperature		°C		

Report of Inorganic Analytical Results

Including Misc Physical Measurements

Sample Number CH0615B0001 — **Inorganic Analytical Results**

CH0615B0001 *Sample Type(Purpose):* Normal Sample *Depth:* 1 m *Collection Date:* 6/3/2015 8:09:00 AM

StationNumber: 05N04W02N990M *StationName:* NapaCounty-214s *Matrix:* Water, Natural *Cost Code:* L10583900000

Sample Condition: 2.0 °C when received. Iced.

Method	Analyte	Result	Units	R.L.	Dilution	ChemID	Analysis Date	Flags and Notes:
Std Method 2510-B	Conductance (EC)	416	µS/cm	1.	1.	20	6/4/2015	

N.A.=Not Analyzed R.L..=Reporting Limit (Reporting Limits Adjusted For Dilution)

Sample Number CH0615B0001 **Inorganic Analytical Results**

EPA 200.8 (D)	Dissolved Aluminum	< 0.01	mg/L	0.01	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Antimony	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Arsenic	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Barium	0.081	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Beryllium	< 0.001	mg/L	0.001	1.	13	6/4/2015	
Std Method 4500-CO2 D	Dissolved Bicarbonate (HCO3-)	117	mg/L as CaCO3	1.	1.	20	6/4/2015	
EPA 200.7 (D)	Dissolved Boron	0.1853	mg/L	0.1	1.	10	6/11/2015	
EPA 300.0 28d Hold	Dissolved Bromide	0.07	mg/L	0.01	1.	9	6/9/2015	
EPA 200.8 (D)	Dissolved Cadmium	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.7 (D)	Dissolved Calcium	19.02	mg/L	1.	1.	10	6/11/2015	
Std Method 4500-CO2 D	Dissolved Carbonate (CO3--)	< 1	mg/L as CaCO3	1.	1.	20	6/4/2015	
EPA 300.0 28d Hold	Dissolved Chloride	28	mg/L	1.	1.	9	6/9/2015	
EPA 200.8 (D)	Dissolved Chromium	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Cobalt	< 0.005	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Copper	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 300.0 28d Hold	Dissolved Fluoride	0.17	mg/L	0.1	1.	9	6/9/2015	
Std Method 2340 B	Dissolved Hardness	144	mg/L as CaCO3	1.	1.	10	6/11/2015	
Std Method 4500-CO2 D	Dissolved Hydroxide (OH-)	< 1	mg/L as CaCO3	1.	1.	20	6/4/2015	
EPA 200.8 (D)	Dissolved Iron	0.009	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Lead	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Lithium	0.011	mg/L	0.005	1.	13	6/4/2015	
EPA 200.7 (D)	Dissolved Magnesium	23.39	mg/L	1.	1.	10	6/11/2015	
EPA 200.8 (D)	Dissolved Manganese	2.53	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (Hg Dissolved)	Dissolved Mercury	< 0.0002	mg/L	0.0002	1.	13	6/18/2015	
EPA 200.8 (D)	Dissolved Molybdenum	< 0.005	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Nickel	0.003	mg/L	0.001	1.	13	6/4/2015	
EPA 300.0 28d Hold	Dissolved Nitrate	7.33	mg/L	0.1	1.	9	6/9/2015	
Std Method 4500-NO2 B (48	Dissolved Nitrite	0.02	mg/L as N	0.01	1.	5	6/4/2015	
EPA 200.7 (D)	Dissolved Potassium	1.064	mg/L	0.5	1.	10	6/11/2015	
EPA 200.8 (D)	Dissolved Selenium	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Silver	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.7 (D)	Dissolved Sodium	31.35	mg/L	1.	1.	10	6/11/2015	
EPA 200.8 (D)	Dissolved Strontium	0.144	mg/L	0.005	1.	13	6/4/2015	
EPA 300.0 28d Hold	Dissolved Sulfate	45.29	mg/L	1.	1.	9	6/9/2015	
EPA 200.8 (D)	Dissolved Thallium	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Vanadium	< 0.005	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Zinc	< 0.005	mg/L	0.005	1.	13	6/4/2015	
Std Method 2320 B	pH	6.9		0.1	1.	20	6/4/2015	
Std Method 2320 B	Total Alkalinity	117	mg/L as CaCO3	1.	1.	20	6/4/2015	
Std Method 2540 C	Total Dissolved Solids	268	mg/L	1.	1.	20	6/5/2015	
Std Method 2540 C	Total Dissolved Solids	268	mg/L	1.	1.	20	6/5/2015	Dup-CH0615B0001
EPA 180.1	Turbidity	1.21	N.T.U.	1.	1.	16	6/4/2015	

Sample Number CH0615B0002 **Inorganic Analytical Results**

CH0615B0002 *Sample Type(Purpose):* Normal Sample *Depth:* 1 m *Collection Date:* 6/3/2015 7:16:00 AM

StationNumber: 05N04W02N991M *StationName:* NapaCounty-215d *Matrix:* Water, Natural *Cost Code:* L10583900000

Sample Condition: 2.0 °C when received. Iced.

Method	Analyte	Result	Units	R.L.	Dilution	ChemID	Analysis Date	Flags and Notes:
Std Method 2510-B	Conductance (EC)	1174	µS/cm	1.	1.	20	6/4/2015	
EPA 200.8 (D)	Dissolved Aluminum	< 0.01	mg/L	0.01	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Antimony	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Arsenic	0.007	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Barium	0.103	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Beryllium	< 0.001	mg/L	0.001	1.	13	6/4/2015	

Sample Number **CH0615B0002** — ***Inorganic Analytical Results***

Std Method 4500-CO2 D	Dissolved Bicarbonate (HCO3-)	258	mg/L as CaCO3	1.	1.	20	6/4/2015		
EPA 200.7 (D)	Dissolved Boron	1.416	mg/L	0.1	1.	10	6/11/2015		
EPA 300.0 28d Hold	Dissolved Bromide	0.63	mg/L	0.01	1.	9	6/9/2015		
EPA 200.8 (D)	Dissolved Cadmium	< 0.001	mg/L	0.001	1.	13	6/4/2015		
EPA 200.7 (D)	Dissolved Calcium	40.57	mg/L	1.	1.	10	6/11/2015		
Std Method 4500-CO2 D	Dissolved Carbonate (CO3--)	1	mg/L as CaCO3	1.	1.	20	6/4/2015		
EPA 300.0 28d Hold	Dissolved Chloride	177	mg/L	10.	10.	9	6/9/2015	R4	Dil-CH0615B0002
EPA 200.8 (D)	Dissolved Chromium	< 0.001	mg/L	0.001	1.	13	6/4/2015		
EPA 200.8 (D)	Dissolved Cobalt	< 0.005	mg/L	0.005	1.	13	6/4/2015		
EPA 200.8 (D)	Dissolved Copper	0.001	mg/L	0.001	1.	13	6/4/2015		
EPA 300.0 28d Hold	Dissolved Fluoride	0.18	mg/L	0.1	1.	9	6/9/2015		
Std Method 2340 B	Dissolved Hardness	226	mg/L as CaCO3	1.	1.	10	6/11/2015		
Std Method 4500-CO2 D	Dissolved Hydroxide (OH-)	< 1	mg/L as CaCO3	1.	1.	20	6/4/2015		
EPA 200.8 (D)	Dissolved Iron	0.042	mg/L	0.005	1.	13	6/4/2015		
EPA 200.8 (D)	Dissolved Lead	< 0.001	mg/L	0.001	1.	13	6/4/2015		
EPA 200.8 (D)	Dissolved Lithium	0.059	mg/L	0.005	1.	13	6/4/2015		
EPA 200.7 (D)	Dissolved Magnesium	30.24	mg/L	1.	1.	10	6/11/2015		
EPA 200.8 (D)	Dissolved Manganese	1.13	mg/L	0.005	1.	13	6/4/2015		
EPA 200.8 (Hg Dissolved)	Dissolved Mercury	< 0.0002	mg/L	0.0002	1.	13	6/18/2015		
EPA 200.8 (D)	Dissolved Molybdenum	< 0.005	mg/L	0.005	1.	13	6/4/2015		
EPA 200.8 (D)	Dissolved Nickel	0.002	mg/L	0.001	1.	13	6/4/2015		
EPA 300.0 28d Hold	Dissolved Nitrate	< 0.1	mg/L	0.1	1.	9	6/9/2015		
Std Method 4500-NO2 B (48	Dissolved Nitrite	< 0.01	mg/L as N	0.01	1.	5	6/4/2015		
EPA 200.7 (D)	Dissolved Potassium	4.505	mg/L	0.5	1.	10	6/11/2015		
EPA 200.8 (D)	Dissolved Selenium	0.002	mg/L	0.001	1.	13	6/4/2015		
EPA 200.8 (D)	Dissolved Silver	< 0.001	mg/L	0.001	1.	13	6/4/2015		
EPA 200.7 (D)	Dissolved Sodium	163.5	mg/L	1.	1.	10	6/11/2015		
EPA 200.8 (D)	Dissolved Strontium	0.32	mg/L	0.005	1.	13	6/4/2015		
EPA 300.0 28d Hold	Dissolved Sulfate	74	mg/L	1.	1.	9	6/9/2015		
EPA 200.8 (D)	Dissolved Thallium	< 0.001	mg/L	0.001	1.	13	6/4/2015		
EPA 200.8 (D)	Dissolved Vanadium	< 0.005	mg/L	0.005	1.	13	6/4/2015		
EPA 200.8 (D)	Dissolved Zinc	< 0.005	mg/L	0.005	1.	13	6/4/2015		
Std Method 2320 B	pH	7.3		0.1	1.	20	6/4/2015		
Std Method 2320 B	Total Alkalinity	258	mg/L as CaCO3	1.	1.	20	6/4/2015		
Std Method 2540 C	Total Dissolved Solids	683	mg/L	1.	1.	20	6/5/2015		
EPA 180.1	Turbidity	2.75	N.T.U.	1.	1.	16	6/4/2015		

Sample Number **CH0615B0003** — ***Inorganic Analytical Results***

CH0615B0003 ***Sample Type(Purpose):*** Normal Sample ***Depth:*** 1 m ***Collection Date:*** 6/3/2015 1:03:00 PM

StationNumber: 06N04W18J992M ***StationName:*** NapaCounty-216s ***Matrix:*** Water, Natural ***Cost Code:*** L10583900000

Sample Condition: 2.0 °C when received. Iced.

Method	*Analyte*	*Result*	*Units*	*R.L.*	*Dilution*	*ChemID*	*Analysis Date*	*Flags and Notes:*
Std Method 2510-B	Conductance (EC)	317	µS/cm	1.	1.	20	6/4/2015	
EPA 200.8 (D)	Dissolved Aluminum	0.089	mg/L	0.01	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Antimony	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Arsenic	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Barium	0.046	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Beryllium	< 0.001	mg/L	0.001	1.	13	6/4/2015	
Std Method 4500-CO2 D	Dissolved Bicarbonate (HCO3-)	93	mg/L as CaCO3	1.	1.	20	6/4/2015	
EPA 200.7 (D)	Dissolved Boron	< 0.1	mg/L	0.1	1.	10	6/11/2015	Measured: 0.0927
EPA 300.0 28d Hold	Dissolved Bromide	0.12	mg/L	0.01	1.	9	6/9/2015	Dup-CH0615B0003
EPA 300.0 28d Hold	Dissolved Bromide	0.12	mg/L	0.01	1.	9	6/9/2015	
EPA 200.8 (D)	Dissolved Cadmium	< 0.001	mg/L	0.001	1.	13	6/4/2015	

Sample Number CH0615B0003 — **Inorganic Analytical Results**

EPA 200.7 (D)	Dissolved Calcium	22.26	mg/L	1.	1.	10	6/11/2015		
Std Method 4500-CO2 D	Dissolved Carbonate (CO3--)	< 1	mg/L as CaCO3	1.	1.	20	6/4/2015		
EPA 300.0 28d Hold	Dissolved Chloride	15.34	mg/L	1.	1.	9	6/9/2015		
EPA 300.0 28d Hold	Dissolved Chloride	15.33	mg/L	1.	1.	9	6/9/2015		Dup-CH0615B0003
EPA 200.8 (D)	Dissolved Chromium	0.001	mg/L	0.001	1.	13	6/4/2015		
EPA 200.8 (D)	Dissolved Cobalt	< 0.005	mg/L	0.005	1.	13	6/4/2015		
EPA 200.8 (D)	Dissolved Copper	0.003	mg/L	0.001	1.	13	6/4/2015		
EPA 300.0 28d Hold	Dissolved Fluoride	0.16	mg/L	0.1	1.	9	6/9/2015		Dup-CH0615B0003
EPA 300.0 28d Hold	Dissolved Fluoride	0.16	mg/L	0.1	1.	9	6/9/2015		
Std Method 2340 B	Dissolved Hardness	116	mg/L as CaCO3	1.	1.	10	6/11/2015		
Std Method 4500-CO2 D	Dissolved Hydroxide (OH-)	< 1	mg/L as CaCO3	1.	1.	20	6/4/2015		
EPA 200.8 (D)	Dissolved Iron	0.066	mg/L	0.005	1.	13	6/4/2015		
EPA 200.8 (D)	Dissolved Lead	< 0.001	mg/L	0.001	1.	13	6/4/2015		
EPA 200.8 (D)	Dissolved Lithium	0.012	mg/L	0.005	1.	13	6/4/2015		
EPA 200.7 (D)	Dissolved Magnesium	14.61	mg/L	1.	1.	10	6/11/2015		
EPA 200.8 (D)	Dissolved Manganese	0.041	mg/L	0.005	1.	13	6/4/2015		
EPA 200.8 (Hg Dissolved)	Dissolved Mercury	< 0.0002	mg/L	0.0002	1.	13	6/18/2015		
EPA 200.8 (D)	Dissolved Molybdenum	< 0.005	mg/L	0.005	1.	13	6/4/2015		
EPA 200.8 (D)	Dissolved Nickel	0.002	mg/L	0.001	1.	13	6/4/2015		
EPA 300.0 28d Hold	Dissolved Nitrate	5.4	mg/L	0.1	1.	9	6/9/2015		Dup-CH0615B0003
EPA 300.0 28d Hold	Dissolved Nitrate	5.4	mg/L	0.1	1.	9	6/9/2015		
Std Method 4500-NO2 B (48	Dissolved Nitrite	0.01	mg/L as N	0.01	1.	5	6/4/2015		
EPA 200.7 (D)	Dissolved Potassium	0.8767	mg/L	0.5	1.	10	6/11/2015		
EPA 200.8 (D)	Dissolved Selenium	< 0.001	mg/L	0.001	1.	13	6/4/2015		
EPA 200.8 (D)	Dissolved Silver	< 0.001	mg/L	0.001	1.	13	6/4/2015		
EPA 200.7 (D)	Dissolved Sodium	21.55	mg/L	1.	1.	10	6/11/2015		
EPA 200.8 (D)	Dissolved Strontium	0.169	mg/L	0.005	1.	13	6/4/2015		
EPA 300.0 28d Hold	Dissolved Sulfate	38.3	mg/L	1.	1.	9	6/9/2015		
EPA 300.0 28d Hold	Dissolved Sulfate	38.3	mg/L	1.	1.	9	6/9/2015		Dup-CH0615B0003
EPA 200.8 (D)	Dissolved Thallium	< 0.001	mg/L	0.001	1.	13	6/4/2015		
EPA 200.8 (D)	Dissolved Vanadium	< 0.005	mg/L	0.005	1.	13	6/4/2015		
EPA 200.8 (D)	Dissolved Zinc	< 0.005	mg/L	0.005	1.	13	6/4/2015		
Std Method 2320 B	pH	6.8		0.1	1.	20	6/4/2015		
Std Method 2320 B	Total Alkalinity	93	mg/L as CaCO3	1.	1.	20	6/4/2015		
Std Method 2540 C	Total Dissolved Solids	208	mg/L	1.	1.	20	6/5/2015		
EPA 180.1	Turbidity	77.4	N.T.U.	3.	3.	16	6/4/2015	R4	

Sample Number CH0615B0004 — **Inorganic Analytical Results**

CH0615B0004 *Sample Type(Purpose):* Normal Sample *Depth:* 1 m *Collection Date:* 6/3/2015 12:23:00 PM

StationNumber: 06N04W18J993M *StationName:* NapaCounty-217d *Matrix:* Water, Natural *Cost Code:* L10583900000

Sample Condition: 2.0 °C when received. Iced.

Method	Analyte	Result	Units	R.L.	Dilution	ChemID	Analysis Date	Flags and Notes:	
Std Method 2510-B	Conductance (EC)	255	µS/cm	1.	1.	20	6/4/2015		
EPA 200.8 (D)	Dissolved Aluminum	0.432	mg/L	0.01	1.	13	6/4/2015		
EPA 200.8 (D)	Dissolved Antimony	< 0.001	mg/L	0.001	1.	13	6/4/2015		
EPA 200.8 (D)	Dissolved Arsenic	0.001	mg/L	0.001	1.	13	6/4/2015		
EPA 200.8 (D)	Dissolved Barium	0.027	mg/L	0.005	1.	13	6/4/2015		
EPA 200.8 (D)	Dissolved Beryllium	< 0.001	mg/L	0.001	1.	13	6/4/2015		
Std Method 4500-CO2 D	Dissolved Bicarbonate (HCO3-)	116	mg/L as CaCO3	1.	1.	20	6/4/2015		
EPA 200.7 (D)	Dissolved Boron	< 0.1	mg/L	0.1	1.	10	6/11/2015		Measured: 0.0798
EPA 300.0 28d Hold	Dissolved Bromide	0.06	mg/L	0.01	1.	9	6/9/2015		
EPA 200.8 (D)	Dissolved Cadmium	< 0.001	mg/L	0.001	1.	13	6/4/2015		
EPA 200.7 (D)	Dissolved Calcium	15.21	mg/L	1.	1.	10	6/11/2015		

Sample Number CH0615B0004 **Inorganic Analytical Results**

Std Method 4500-CO2 D	Dissolved Carbonate (CO3--)	< 1	mg/L as CaCO3	1.	1.	20	6/4/2015
EPA 300.0 28d Hold	Dissolved Chloride	5	mg/L	1.	1.	9	6/9/2015
EPA 200.8 (D)	Dissolved Chromium	0.001	mg/L	0.001	1.	13	6/4/2015
EPA 200.8 (D)	Dissolved Cobalt	< 0.005	mg/L	0.005	1.	13	6/4/2015
EPA 200.8 (D)	Dissolved Copper	0.001	mg/L	0.001	1.	13	6/4/2015
EPA 300.0 28d Hold	Dissolved Fluoride	0.56	mg/L	0.1	1.	9	6/9/2015
Std Method 2340 B	Dissolved Hardness	74	mg/L as CaCO3	1.	1.	10	6/11/2015
Std Method 4500-CO2 D	Dissolved Hydroxide (OH-)	< 1	mg/L as CaCO3	1.	1.	20	6/4/2015
EPA 200.8 (D)	Dissolved Iron	0.331	mg/L	0.005	1.	13	6/4/2015
EPA 200.8 (D)	Dissolved Lead	< 0.001	mg/L	0.001	1.	13	6/4/2015
EPA 200.8 (D)	Dissolved Lithium	0.014	mg/L	0.005	1.	13	6/4/2015
EPA 200.7 (D)	Dissolved Magnesium	8.758	mg/L	1.	1.	10	6/11/2015
EPA 200.8 (D)	Dissolved Manganese	0.643	mg/L	0.005	1.	13	6/4/2015
EPA 200.8 (Hg Dissolved)	Dissolved Mercury	< 0.0002	mg/L	0.0002	1.	13	6/18/2015
EPA 200.8 (D)	Dissolved Molybdenum	0.005	mg/L	0.005	1.	13	6/4/2015
EPA 200.8 (D)	Dissolved Nickel	0.002	mg/L	0.001	1.	13	6/4/2015
EPA 300.0 28d Hold	Dissolved Nitrate	< 0.1	mg/L	0.1	1.	9	6/9/2015
Std Method 4500-NO2 B (48	Dissolved Nitrite	< 0.01	mg/L as N	0.01	1.	5	6/4/2015
EPA 200.7 (D)	Dissolved Potassium	1.309	mg/L	0.5	1.	10	6/11/2015
EPA 200.8 (D)	Dissolved Selenium	< 0.001	mg/L	0.001	1.	13	6/4/2015
EPA 200.8 (D)	Dissolved Silver	< 0.001	mg/L	0.001	1.	13	6/4/2015
EPA 200.7 (D)	Dissolved Sodium	28.53	mg/L	1.	1.	10	6/11/2015
EPA 200.8 (D)	Dissolved Strontium	0.107	mg/L	0.005	1.	13	6/4/2015
EPA 300.0 28d Hold	Dissolved Sulfate	9.31	mg/L	1.	1.	9	6/9/2015
EPA 200.8 (D)	Dissolved Thallium	< 0.001	mg/L	0.001	1.	13	6/4/2015
EPA 200.8 (D)	Dissolved Vanadium	< 0.005	mg/L	0.005	1.	13	6/4/2015
EPA 200.8 (D)	Dissolved Zinc	< 0.005	mg/L	0.005	1.	13	6/4/2015
Std Method 2320 B	pH	7.4		0.1	1.	20	6/4/2015
Std Method 2320 B	Total Alkalinity	116	mg/L as CaCO3	1.	1.	20	6/4/2015
Std Method 2540 C	Total Dissolved Solids	164	mg/L	1.	1.	20	6/5/2015
EPA 180.1	Turbidity	7.29	N.T.U.	1.	1.	16	6/4/2015

Sample Number CH0615B0005 **Inorganic Analytical Results**

CH0615B0005 *Sample Type(Purpose):* Normal Sample *Depth:* 1 m *Collection Date:* 6/3/2015 11:02:00 AM

StationNumber: 06N04W16G994M *StationName:* NapaCounty-218s *Matrix:* Water, Natural *Cost Code:* L10583900000

Sample Condition: 2.0 °C when received. Iced.

Method	Analyte	Result	Units	R.L.	Dilution	ChemID	Analysis Date	Flags and Notes:
Std Method 2510-B	Conductance (EC)	536	µS/cm	1.	1.	20	6/4/2015	
EPA 200.8 (D)	Dissolved Aluminum	< 0.01	mg/L	0.01	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Antimony	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Arsenic	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Barium	0.091	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Beryllium	< 0.001	mg/L	0.001	1.	13	6/4/2015	
Std Method 4500-CO2 D	Dissolved Bicarbonate (HCO3-)	192	mg/L as CaCO3	1.	1.	20	6/4/2015	
EPA 200.7 (D)	Dissolved Boron	0.1072	mg/L	0.1	1.	10	6/11/2015	
EPA 300.0 28d Hold	Dissolved Bromide	0.13	mg/L	0.01	1.	9	6/9/2015	
EPA 200.8 (D)	Dissolved Cadmium	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.7 (D)	Dissolved Calcium	47.39	mg/L	1.	1.	10	6/11/2015	
Std Method 4500-CO2 D	Dissolved Carbonate (CO3--)	< 1	mg/L as CaCO3	1.	1.	20	6/4/2015	
EPA 300.0 28d Hold	Dissolved Chloride	19	mg/L	1.	1.	9	6/9/2015	
EPA 200.8 (D)	Dissolved Chromium	0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Cobalt	< 0.005	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Copper	< 0.001	mg/L	0.001	1.	13	6/4/2015	

Sample Number CH0615B0005 **Inorganic Analytical Results**

EPA 300.0 28d Hold	Dissolved Fluoride	< 0.1	mg/L	0.1	1.	9	6/9/2015	
Std Method 2340 B	Dissolved Hardness	247	mg/L as CaCO3	1.	1.	10	6/11/2015	
Std Method 4500-CO2 D	Dissolved Hydroxide (OH-)	< 1	mg/L as CaCO3	1.	1.	20	6/4/2015	
EPA 200.8 (D)	Dissolved Iron	0.008	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Lead	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Lithium	0.01	mg/L	0.005	1.	13	6/4/2015	
EPA 200.7 (D)	Dissolved Magnesium	31.18	mg/L	1.	1.	10	6/11/2015	
EPA 200.8 (D)	Dissolved Manganese	< 0.005	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (Hg Dissolved)	Dissolved Mercury	< 0.0002	mg/L	0.0002	1.	13	6/18/2015	
EPA 200.8 (D)	Dissolved Molybdenum	< 0.005	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Nickel	0.003	mg/L	0.001	1.	13	6/4/2015	
EPA 300.0 28d Hold	Dissolved Nitrate	1.8	mg/L	0.1	1.	9	6/9/2015	
Std Method 4500-NO2 B (48	Dissolved Nitrite	< 0.01	mg/L as N	0.01	1.	5	6/4/2015	
EPA 200.7 (D)	Dissolved Potassium	0.7058	mg/L	0.5	1.	10	6/11/2015	
EPA 200.8 (D)	Dissolved Selenium	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Silver	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.7 (D)	Dissolved Sodium	20.11	mg/L	1.	1.	10	6/11/2015	
EPA 200.8 (D)	Dissolved Strontium	0.357	mg/L	0.005	1.	13	6/4/2015	
EPA 300.0 28d Hold	Dissolved Sulfate	65.1	mg/L	1.	1.	9	6/9/2015	
EPA 200.8 (D)	Dissolved Thallium	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Vanadium	< 0.005	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Zinc	< 0.005	mg/L	0.005	1.	13	6/4/2015	
Std Method 2320 B	pH	6.7		0.1	1.	20	6/4/2015	
Std Method 2320 B	Total Alkalinity	192	mg/L as CaCO3	1.	1.	20	6/4/2015	
Std Method 2540 C	Total Dissolved Solids	324	mg/L	1.	1.	20	6/5/2015	
EPA 180.1	Turbidity	5.06	N.T.U.	1.	1.	16	6/4/2015	

Sample Number CH0615B0006 **Inorganic Analytical Results**

CH0615B0006 *Sample Type(Purpose):* Normal Sample *Depth:* 1 m *Collection Date:* 6/3/2015 10:04:00 AM

StationNumber: 06N04W16G995M *StationName:* NapaCounty-219d *Matrix:* Water, Natural *Cost Code:* L10583900000

Sample Condition: 2.0 °C when received. Iced.

Method	Analyte	Result	Units	R.L.	Dilution	ChemID	Analysis Date	Flags and Notes:
Std Method 2510-B	Conductance (EC)	712	µS/cm	1.	1.	20	6/4/2015	
EPA 200.8 (D)	Dissolved Aluminum	< 0.01	mg/L	0.01	1.	13	6/4/2015	Dup-CH0615B0006
EPA 200.8 (D)	Dissolved Aluminum	< 0.01	mg/L	0.01	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Antimony	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Antimony	< 0.001	mg/L	0.001	1.	13	6/4/2015	Dup-CH0615B0006
EPA 200.8 (D)	Dissolved Arsenic	0.046	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Arsenic	0.046	mg/L	0.001	1.	13	6/4/2015	Dup-CH0615B0006
EPA 200.8 (D)	Dissolved Barium	0.088	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Barium	0.088	mg/L	0.005	1.	13	6/4/2015	Dup-CH0615B0006
EPA 200.8 (D)	Dissolved Beryllium	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Beryllium	< 0.001	mg/L	0.001	1.	13	6/4/2015	Dup-CH0615B0006
Std Method 4500-CO2 D	Dissolved Bicarbonate (HCO3-)	224	mg/L as CaCO3	1.	1.	20	6/4/2015	
EPA 200.7 (D)	Dissolved Boron	9.063	mg/L	0.1	1.	10	6/11/2015	
EPA 300.0 28d Hold	Dissolved Bromide	0.33	mg/L	0.01	1.	9	6/9/2015	
EPA 200.8 (D)	Dissolved Cadmium	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Cadmium	< 0.001	mg/L	0.001	1.	13	6/4/2015	Dup-CH0615B0006
EPA 200.7 (D)	Dissolved Calcium	16.74	mg/L	1.	1.	10	6/11/2015	
Std Method 4500-CO2 D	Dissolved Carbonate (CO3--)	1	mg/L as CaCO3	1.	1.	20	6/4/2015	
EPA 300.0 28d Hold	Dissolved Chloride	73	mg/L	1.	1.	9	6/9/2015	
EPA 200.8 (D)	Dissolved Chromium	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Chromium	< 0.001	mg/L	0.001	1.	13	6/4/2015	Dup-CH0615B0006
EPA 200.8 (D)	Dissolved Cobalt	< 0.005	mg/L	0.005	1.	13	6/4/2015	

Sample Number CH0615B0006 — **Inorganic Analytical Results**

EPA 200.8 (D)	Dissolved Cobalt	< 0.005	mg/L	0.005	1.	13	6/4/2015	Dup-CH0615B0006
EPA 200.8 (D)	Dissolved Copper	0.005	mg/L	0.001	1.	13	6/4/2015	Dup-CH0615B0006
EPA 200.8 (D)	Dissolved Copper	0.005	mg/L	0.001	1.	13	6/4/2015	
EPA 300.0 28d Hold	Dissolved Fluoride	0.25	mg/L	0.1	1.	9	6/9/2015	
Std Method 2340 B	Dissolved Hardness	116	mg/L as CaCO3	1.	1.	10	6/11/2015	
Std Method 4500-CO2 D	Dissolved Hydroxide (OH-)	< 1	mg/L as CaCO3	1.	1.	20	6/4/2015	
EPA 200.8 (D)	Dissolved Iron	0.021	mg/L	0.005	1.	13	6/4/2015	Dup-CH0615B0006
EPA 200.8 (D)	Dissolved Iron	0.021	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Lead	< 0.001	mg/L	0.001	1.	13	6/4/2015	Dup-CH0615B0006
EPA 200.8 (D)	Dissolved Lead	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Lithium	0.038	mg/L	0.005	1.	13	6/4/2015	Dup-CH0615B0006
EPA 200.8 (D)	Dissolved Lithium	0.037	mg/L	0.005	1.	13	6/4/2015	
EPA 200.7 (D)	Dissolved Magnesium	17.9	mg/L	1.	1.	10	6/11/2015	
EPA 200.8 (D)	Dissolved Manganese	0.242	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Manganese	0.241	mg/L	0.005	1.	13	6/4/2015	Dup-CH0615B0006
EPA 200.8 (Hg Dissolved)	Dissolved Mercury	< 0.0002	mg/L	0.0002	1.	13	6/18/2015	
EPA 200.8 (D)	Dissolved Molybdenum	0.014	mg/L	0.005	1.	13	6/4/2015	Dup-CH0615B0006
EPA 200.8 (D)	Dissolved Molybdenum	0.013	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Nickel	0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Nickel	0.001	mg/L	0.001	1.	13	6/4/2015	Dup-CH0615B0006
EPA 300.0 28d Hold	Dissolved Nitrate	< 0.1	mg/L	0.1	1.	9	6/9/2015	
Std Method 4500-NO2 B (48	Dissolved Nitrite	< 0.01	mg/L as N	0.01	1.	5	6/4/2015	Dup-CH0615B0006
Std Method 4500-NO2 B (48	Dissolved Nitrite	< 0.01	mg/L as N	0.01	1.	5	6/4/2015	
EPA 200.7 (D)	Dissolved Potassium	5.163	mg/L	0.5	1.	10	6/11/2015	
EPA 200.8 (D)	Dissolved Selenium	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Selenium	< 0.001	mg/L	0.001	1.	13	6/4/2015	Dup-CH0615B0006
EPA 200.8 (D)	Dissolved Silver	< 0.001	mg/L	0.001	1.	13	6/4/2015	Dup-CH0615B0006
EPA 200.8 (D)	Dissolved Silver	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.7 (D)	Dissolved Sodium	107.9	mg/L	1.	1.	10	6/11/2015	
EPA 200.8 (D)	Dissolved Strontium	0.125	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Strontium	0.126	mg/L	0.005	1.	13	6/4/2015	Dup-CH0615B0006
EPA 300.0 28d Hold	Dissolved Sulfate	32	mg/L	1.	1.	9	6/9/2015	
EPA 200.8 (D)	Dissolved Thallium	< 0.001	mg/L	0.001	1.	13	6/4/2015	Dup-CH0615B0006
EPA 200.8 (D)	Dissolved Thallium	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Vanadium	< 0.005	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Vanadium	< 0.005	mg/L	0.005	1.	13	6/4/2015	Dup-CH0615B0006
EPA 200.8 (D)	Dissolved Zinc	0.006	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Zinc	0.006	mg/L	0.005	1.	13	6/4/2015	Dup-CH0615B0006
Std Method 2320 B	pH	7.4		0.1	1.	20	6/4/2015	
Std Method 2320 B	Total Alkalinity	225	mg/L as CaCO3	1.	1.	20	6/4/2015	
Std Method 2540 C	Total Dissolved Solids	452	mg/L	1.	1.	20	6/5/2015	
EPA 180.1	Turbidity	1.16	N.T.U.	1.	1.	16	6/4/2015	

Sample Number CH0615B0013 — **Inorganic Analytical Results**

CH0615B0013 *Sample Type(Purpose):* Normal Sample *Depth:* 1 m *Collection Date:* 6/3/2015 1:15:00 PM

StationNumber: E3012234 *StationName:* NapaCounty-swgw_SW2 *Matrix:* Water, Natural *Cost Code:* L10583900000

Sample Condition: 2.0 °C when received. Iced.

Method	Analyte	Result	Units	R.L.	Dilution	ChemID	Analysis Date	Flags and Notes:
Std Method 2510-B	Conductance (EC)	411	µS/cm	1.	1.	20	6/4/2015	
EPA 200.8 (D)	Dissolved Aluminum	0.029	mg/L	0.01	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Antimony	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Arsenic	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Barium	0.059	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Beryllium	< 0.001	mg/L	0.001	1.	13	6/4/2015	
Std Method 4500-CO2 D	Dissolved Bicarbonate (HCO3-)	153	mg/L as CaCO3	1.	1.	20	6/4/2015	

Sample Number CH0615B0013 — **Inorganic Analytical Results**

EPA 200.7 (D)	Dissolved Boron	0.1329	mg/L	0.1	1.	10	6/11/2015	
EPA 300.0 28d Hold	Dissolved Bromide	0.02	mg/L	0.01	1.	9	6/8/2015	
EPA 200.8 (D)	Dissolved Cadmium	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.7 (D)	Dissolved Calcium	33.74	mg/L	1.	1.	10	6/11/2015	
Std Method 4500-CO2 D	Dissolved Carbonate (CO3--)	1	mg/L as CaCO3	1.	1.	20	6/4/2015	
EPA 300.0 28d Hold	Dissolved Chloride	12.13	mg/L	1.	1.	9	6/8/2015	
EPA 200.8 (D)	Dissolved Chromium	0.005	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Cobalt	< 0.005	mg/L	0.005	1.	13	6/4/2015	Measured: 0.001
EPA 200.8 (D)	Dissolved Copper	0.006	mg/L	0.001	1.	13	6/4/2015	
EPA 300.0 28d Hold	Dissolved Fluoride	0.17	mg/L	0.1	1.	9	6/8/2015	
Std Method 2340 B	Dissolved Hardness	159	mg/L as CaCO3	1.	1.	10	6/11/2015	
Std Method 4500-CO2 D	Dissolved Hydroxide (OH-)	< 1	mg/L as CaCO3	1.	1.	20	6/4/2015	
EPA 200.8 (D)	Dissolved Iron	0.091	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Lead	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Lithium	0.008	mg/L	0.005	1.	13	6/4/2015	
EPA 200.7 (D)	Dissolved Magnesium	18.05	mg/L	1.	1.	10	6/11/2015	
EPA 200.8 (D)	Dissolved Manganese	0.024	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (Hg Dissolved)	Dissolved Mercury	< 0.0002	mg/L	0.0002	1.	13	6/18/2015	
EPA 200.8 (D)	Dissolved Molybdenum	< 0.005	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Nickel	0.013	mg/L	0.001	1.	13	6/4/2015	
EPA 300.0 28d Hold	Dissolved Nitrate	0.5	mg/L	0.1	1.	9	6/8/2015	
Std Method 4500-NO2 B (48	Dissolved Nitrite	< 0.01	mg/L as N	0.01	1.	5	6/4/2015	
EPA 200.7 (D)	Dissolved Potassium	2.142	mg/L	0.5	1.	10	6/11/2015	
EPA 200.8 (D)	Dissolved Selenium	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Silver	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.7 (D)	Dissolved Sodium	28.27	mg/L	1.	1.	10	6/11/2015	
EPA 200.8 (D)	Dissolved Strontium	0.269	mg/L	0.005	1.	13	6/4/2015	
EPA 300.0 28d Hold	Dissolved Sulfate	44.13	mg/L	1.	1.	9	6/8/2015	
EPA 200.8 (D)	Dissolved Thallium	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Vanadium	< 0.005	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Zinc	0.027	mg/L	0.005	1.	13	6/4/2015	
Std Method 2320 B	pH	7.6		0.1	1.	20	6/4/2015	
Std Method 2320 B	Total Alkalinity	154	mg/L as CaCO3	1.	1.	20	6/4/2015	
Std Method 2540 C	Total Dissolved Solids	255	mg/L	1.	1.	20	6/5/2015	
EPA 180.1	Turbidity	1.37	N.T.U.	1.	1.	16	6/4/2015	

Sample Number CH0615B0016 — **Inorganic Analytical Results**

CH0615B0016 *Sample Type(Purpose):* Duplicate Sample CH0615B0004 *Depth:* 1 m *Collection Date:* 6/3/2015 12:23:00 PM

StationNumber: 06N04W18J993M *StationName:* NapaCounty-217d *Matrix:* Water, Natural *Cost Code:* L10583900000

Sample Condition: 2.0 °C when received. Iced.

Method	Analyte	Result	Units	R.L.	Dilution	ChemID	Analysis Date	Flags and Notes:
Std Method 2510-B	Conductance (EC)	256	µS/cm	1.	1.	20	6/4/2015	Dup-CH0615B0016
Std Method 2510-B	Conductance (EC)	256	µS/cm	1.	1.	20	6/4/2015	
EPA 200.8 (D)	Dissolved Aluminum	0.422	mg/L	0.01	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Antimony	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Arsenic	0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Barium	0.027	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Beryllium	< 0.001	mg/L	0.001	1.	13	6/4/2015	
Std Method 4500-CO2 D	Dissolved Bicarbonate (HCO3-)	118	mg/L as CaCO3	1.	1.	20	6/4/2015	
Std Method 4500-CO2 D	Dissolved Bicarbonate (HCO3-)	118	mg/L as CaCO3	1.	1.	20	6/4/2015	Dup-CH0615B0016
EPA 200.7 (D)	Dissolved Boron	< 0.1	mg/L	0.1	1.	10	6/11/2015	Measured: 0.0808
EPA 300.0 28d Hold	Dissolved Bromide	0.06	mg/L	0.01	1.	9	6/9/2015	
EPA 200.8 (D)	Dissolved Cadmium	< 0.001	mg/L	0.001	1.	13	6/4/2015	

Sample Number CH0615B0016 **Inorganic Analytical Results**

EPA 200.7 (D)	Dissolved Calcium	15.05	mg/L	1.	1.	10	6/11/2015	
Std Method 4500-CO2 D	Dissolved Carbonate (CO3--)	< 1	mg/L as CaCO3	1.	1.	20	6/4/2015	
Std Method 4500-CO2 D	Dissolved Carbonate (CO3--)	< 1	mg/L as CaCO3	1.	1.	20	6/4/2015	Dup-CH0615B0016
EPA 300.0 28d Hold	Dissolved Chloride	5	mg/L	1.	1.	9	6/9/2015	
EPA 200.8 (D)	Dissolved Chromium	0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Cobalt	< 0.005	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Copper	0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 300.0 28d Hold	Dissolved Fluoride	0.549	mg/L	0.1	1.	9	6/9/2015	
Std Method 2340 B	Dissolved Hardness	74	mg/L as CaCO3	1.	1.	10	6/11/2015	
Std Method 4500-CO2 D	Dissolved Hydroxide (OH-)	< 1	mg/L as CaCO3	1.	1.	20	6/4/2015	
Std Method 4500-CO2 D	Dissolved Hydroxide (OH-)	< 1	mg/L as CaCO3	1.	1.	20	6/4/2015	Dup-CH0615B0016
EPA 200.8 (D)	Dissolved Iron	0.331	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Lead	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Lithium	0.014	mg/L	0.005	1.	13	6/4/2015	
EPA 200.7 (D)	Dissolved Magnesium	8.798	mg/L	1.	1.	10	6/11/2015	
EPA 200.8 (D)	Dissolved Manganese	0.635	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (Hg Dissolved)	Dissolved Mercury	< 0.0002	mg/L	0.0002	1.	13	6/18/2015	
EPA 200.8 (D)	Dissolved Molybdenum	0.005	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Nickel	0.002	mg/L	0.001	1.	13	6/4/2015	
EPA 300.0 28d Hold	Dissolved Nitrate	< 0.1	mg/L	0.1	1.	9	6/9/2015	
Std Method 4500-NO2 B (48	Dissolved Nitrite	< 0.01	mg/L as N	0.01	1.	5	6/4/2015	
EPA 200.7 (D)	Dissolved Potassium	1.349	mg/L	0.5	1.	10	6/11/2015	
EPA 200.8 (D)	Dissolved Selenium	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Silver	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.7 (D)	Dissolved Sodium	28.53	mg/L	1.	1.	10	6/11/2015	
EPA 200.8 (D)	Dissolved Strontium	0.109	mg/L	0.005	1.	13	6/4/2015	
EPA 300.0 28d Hold	Dissolved Sulfate	9.2	mg/L	1.	1.	9	6/9/2015	
EPA 200.8 (D)	Dissolved Thallium	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Vanadium	< 0.005	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Zinc	< 0.005	mg/L	0.005	1.	13	6/4/2015	
Std Method 2320 B	pH	7.4		0.1	1.	20	6/4/2015	
Std Method 2320 B	pH	7.4		0.1	1.	20	6/4/2015	Dup-CH0615B0016
Std Method 2320 B	Total Alkalinity	118	mg/L as CaCO3	1.	1.	20	6/4/2015	Dup-CH0615B0016
Std Method 2320 B	Total Alkalinity	118	mg/L as CaCO3	1.	1.	20	6/4/2015	
Std Method 2540 C	Total Dissolved Solids	165	mg/L	1.	1.	20	6/5/2015	
EPA 180.1	Turbidity	6.68	N.T.U.	1.	1.	16	6/4/2015	Dup-CH0615B0016
EPA 180.1	Turbidity	6.23	N.T.U.	1.	1.	16	6/4/2015	

Sample Number CH0615B0017 **Inorganic Analytical Results**

CH0615B0017 *Sample Type(Purpose):* Blank; Field *Depth:* 0 m *Collection Date:* 6/3/2015 1:06:00 PM

StationNumber: Blank; Field *StationName:* Blank; Field *Matrix:* Water, Purified *Cost Code:* L10583900000

Sample Condition: 2.0 °C when received. Iced.

Method	Analyte	Result	Units	R.L.	Dilution	ChemID	Analysis Date	Flags and Notes:
Std Method 2510-B	Conductance (EC)	< 1	µS/cm	1.	1.	20	6/4/2015	
EPA 200.8 (D)	Dissolved Aluminum	< 0.01	mg/L	0.01	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Antimony	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Arsenic	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Barium	< 0.005	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Beryllium	< 0.001	mg/L	0.001	1.	13	6/4/2015	
Std Method 4500-CO2 D	Dissolved Bicarbonate (HCO3-)	2	mg/L as CaCO3	1.	1.	20	6/4/2015	
EPA 200.7 (D)	Dissolved Boron	< 0.1	mg/L	0.1	1.	10	6/11/2015	
EPA 300.0 28d Hold	Dissolved Bromide	< 0.01	mg/L	0.01	1.	9	6/9/2015	
EPA 200.8 (D)	Dissolved Cadmium	< 0.001	mg/L	0.001	1.	13	6/4/2015	

N.A.=Not Analyzed R.L..=Reporting Limit (Reporting Limits Adjusted For Dilution)

Sample Number CH0615B0017 **Inorganic Analytical Results**

EPA 200.7 (D)	Dissolved Calcium	< 1	mg/L	1.	1.	10	6/11/2015	
Std Method 4500-CO2 D	Dissolved Carbonate (CO3--)	< 1	mg/L as CaCO3	1.	1.	20	6/4/2015	
EPA 300.0 28d Hold	Dissolved Chloride	< 1	mg/L	1.	1.	9	6/9/2015	
EPA 200.8 (D)	Dissolved Chromium	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Cobalt	< 0.005	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Copper	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 300.0 28d Hold	Dissolved Fluoride	< 0.1	mg/L	0.1	1.	9	6/9/2015	
Std Method 2340 B	Dissolved Hardness	< 1	mg/L as CaCO3	1.	1.	10	6/11/2015	
Std Method 4500-CO2 D	Dissolved Hydroxide (OH-)	< 1	mg/L as CaCO3	1.	1.	20	6/4/2015	
EPA 200.8 (D)	Dissolved Iron	< 0.005	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Lead	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Lithium	< 0.005	mg/L	0.005	1.	13	6/4/2015	
EPA 200.7 (D)	Dissolved Magnesium	< 1	mg/L	1.	1.	10	6/11/2015	
EPA 200.8 (D)	Dissolved Manganese	< 0.005	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (Hg Dissolved)	Dissolved Mercury	< 0.0002	mg/L	0.0002	1.	13	6/18/2015	
EPA 200.8 (D)	Dissolved Molybdenum	< 0.005	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Nickel	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 300.0 28d Hold	Dissolved Nitrate	< 0.1	mg/L	0.1	1.	9	6/9/2015	
Std Method 4500-NO2 B (48	Dissolved Nitrite	< 0.01	mg/L as N	0.01	1.	5	6/4/2015	
EPA 200.7 (D)	Dissolved Potassium	< 0.5	mg/L	0.5	1.	10	6/11/2015	
EPA 200.8 (D)	Dissolved Selenium	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Silver	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.7 (D)	Dissolved Sodium	< 1	mg/L	1.	1.	10	6/11/2015	
EPA 200.8 (D)	Dissolved Strontium	< 0.005	mg/L	0.005	1.	13	6/4/2015	
EPA 300.0 28d Hold	Dissolved Sulfate	< 1	mg/L	1.	1.	9	6/9/2015	
EPA 200.8 (D)	Dissolved Thallium	< 0.001	mg/L	0.001	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Vanadium	< 0.005	mg/L	0.005	1.	13	6/4/2015	
EPA 200.8 (D)	Dissolved Zinc	< 0.005	mg/L	0.005	1.	13	6/4/2015	
Std Method 2320 B	pH	5.2		0.1	1.	20	6/4/2015	
Std Method 2320 B	Total Alkalinity	2	mg/L as CaCO3	1.	1.	20	6/4/2015	
Std Method 2540 C	Total Dissolved Solids	< 1	mg/L	1.	1.	20	6/5/2015	
EPA 180.1	Turbidity	< 1	N.T.U.	1.	1.	16	6/4/2015	Measured: 0.09

Bryte Chemical Laboratory Chain of Custody

Submittal ID & Run/Submittal Name: CH0615B0001 - Napa L&S 2015

Send Report To: Bill Brewster
DWR North Central Region Office

CA

Activity Unit: 6200

Container Summary

Polyethylene, 1 Pint, HNO3, pH <2, Filt	~~19~~ 9
Polyethylene, 1 Pint	~~19~~ 9
Polyethylene, 1 Quart, Filt	~~19~~ 9
Polyethylene, 1/2 Pint, Filt	~~19~~ 9
Polyethylene, 1/2 Pint, HNO3, pH <2, Filt	~~19~~ 9
Bottle Check: Lab Initials: MC Field Initials: JM Total:	~~95~~ 45

Sampler(s): John MacDougall

Instructions to Lab:

Notice: Please deliver samples to the lab as soon as possible. Allow time for lab handling and preparation after delivery. The lab is not responsible for missed holding times due to late delivery. SEE YOUR LAB ANALYSIS GROUPS FOR MINIMUM SAMPLE HOLD TIME. Samples must be transported in accordance with method and handling requirements, on ice and arrive below 6°C if transported overnight.

Submitted By: Signature: John M Date Relinquished: 6-3-15

Print Name: John MacDougall Phone Number: 530-908-4200

Received By: Signature: Marilyn Carroll Print Name: Marilyn Carroll

Date and Time Received: 6/3/15 15:50 Condition When Received: 2 °C Iced? Yes X No

Submittal ID: CH0615B0001

DWR Sample Number **CH0615B0001** Collection Date 6/3/2015 Collection Time: 08:09 EC: 483 µS/cm

Station No.: 05N04W02N990M Station Name: NapaCounty-214s Matrix: Water, Natural

Add'l Note: Cost Code: L10583900000

Alkalinity		Fld Filtered	Carbonate by Calculation		Fld Filtered
Electrical Conductivity (EC)			Dissolved Boron		Fld Filtered
Dissolved Calcium		Fld Filtered	Dissolved Magnesium		Fld Filtered
Dissolved Potassium		Fld Filtered	Dissolved Sodium		Fld Filtered
Dissolved Aluminum		Fld Filtered	Dissolved Antimony		Fld Filtered
Dissolved Arsenic		Fld Filtered	Dissolved Barium		Fld Filtered
Dissolved Beryllium		Fld Filtered	Dissolved Cadmium		Fld Filtered
Dissolved Chromium		Fld Filtered	Dissolved Cobalt		Fld Filtered
Dissolved Copper		Fld Filtered	Dissolved Iron		Fld Filtered
Dissolved Lead		Fld Filtered	Dissolved Lithium		Fld Filtered
Dissolved Manganese		Fld Filtered	Dissolved Molybdenum		Fld Filtered
Dissolved Nickel		Fld Filtered	Dissolved Selenium		Fld Filtered
Dissolved Silver		Fld Filtered	Dissolved Strontium		Fld Filtered
Dissolved Thallium		Fld Filtered	Dissolved Vanadium		Fld Filtered
Dissolved Zinc		Fld Filtered	Dissolved Bromide		Fld Filtered
Dissolved Chloride		Fld Filtered	Dissolved Fluoride		Fld Filtered
Dissolved Nitrate		Fld Filtered	Dissolved Sulfate		Fld Filtered
Dissolved Mercury		Fld Filtered	Dissolved Nitrite		Fld Filtered
Total Dissolved Solids (TDS)		Fld Filtered	Total Hardness By Calculation		Fld Filtered
Turbidity					

DWR Sample Number	Collection Date 6/3/2015	Collection Time: 07:16	EC: 1217 µS/cm
CH0615B0002	Station No.: 05N04W02N991M	Station Name: NapaCounty-215d	Matrix: Water, Natural
Add'l Note:		Cost Code: L10583900000	

Alkalinity	Fld Filtered	Carbonate by Calculation	Fld Filtered
Electrical Conductivity (EC)		Dissolved Boron	Fld Filtered
Dissolved Calcium	Fld Filtered	Dissolved Magnesium	Fld Filtered
Dissolved Potassium	Fld Filtered	Dissolved Sodium	Fld Filtered
Dissolved Aluminum	Fld Filtered	Dissolved Antimony	Fld Filtered
Dissolved Arsenic	Fld Filtered	Dissolved Barium	Fld Filtered
Dissolved Beryllium	Fld Filtered	Dissolved Cadmium	Fld Filtered
Dissolved Chromium	Fld Filtered	Dissolved Cobalt	Fld Filtered
Dissolved Copper	Fld Filtered	Dissolved Iron	Fld Filtered
Dissolved Lead	Fld Filtered	Dissolved Lithium	Fld Filtered
Dissolved Manganese	Fld Filtered	Dissolved Molybdenum	Fld Filtered
Dissolved Nickel	Fld Filtered	Dissolved Selenium	Fld Filtered
Dissolved Silver	Fld Filtered	Dissolved Strontium	Fld Filtered
Dissolved Thallium	Fld Filtered	Dissolved Vanadium	Fld Filtered
Dissolved Zinc	Fld Filtered	Dissolved Bromide	Fld Filtered
Dissolved Chloride	Fld Filtered	Dissolved Fluoride	Fld Filtered
Dissolved Nitrate	Fld Filtered	Dissolved Sulfate	Fld Filtered
Dissolved Mercury	Fld Filtered	Dissolved Nitrite	Fld Filtered
Total Dissolved Solids (TDS)	Fld Filtered	Total Hardness By Calculation	Fld Filtered
Turbidity			

DWR Sample Number	Collection Date 6/3/2015	Collection Time: ~~07:16~~ PM 13:03	EC: 347 µS/cm
CH0615B0003	Station No.: 06N04W18J992M	Station Name: NapaCounty-216s	Matrix: Water, Natural
Add'l Note:		Cost Code: L10583900000	

Alkalinity	Fld Filtered	Carbonate by Calculation	Fld Filtered
Electrical Conductivity (EC)		Dissolved Boron	Fld Filtered
Dissolved Calcium	Fld Filtered	Dissolved Magnesium	Fld Filtered
Dissolved Potassium	Fld Filtered	Dissolved Sodium	Fld Filtered
Dissolved Aluminum	Fld Filtered	Dissolved Antimony	Fld Filtered
Dissolved Arsenic	Fld Filtered	Dissolved Barium	Fld Filtered
Dissolved Beryllium	Fld Filtered	Dissolved Cadmium	Fld Filtered
Dissolved Chromium	Fld Filtered	Dissolved Cobalt	Fld Filtered
Dissolved Copper	Fld Filtered	Dissolved Iron	Fld Filtered
Dissolved Lead	Fld Filtered	Dissolved Lithium	Fld Filtered
Dissolved Manganese	Fld Filtered	Dissolved Molybdenum	Fld Filtered
Dissolved Nickel	Fld Filtered	Dissolved Selenium	Fld Filtered
Dissolved Silver	Fld Filtered	Dissolved Strontium	Fld Filtered
Dissolved Thallium	Fld Filtered	Dissolved Vanadium	Fld Filtered
Dissolved Zinc	Fld Filtered	Dissolved Bromide	Fld Filtered
Dissolved Chloride	Fld Filtered	Dissolved Fluoride	Fld Filtered
Dissolved Nitrate	Fld Filtered	Dissolved Sulfate	Fld Filtered
Dissolved Mercury	Fld Filtered	Dissolved Nitrite	Fld Filtered
Total Dissolved Solids (TDS)	Fld Filtered	Total Hardness By Calculation	Fld Filtered
Turbidity			

DWR Sample Number	Collection Date 6/3/2015	Collection Time: 12: 23	EC: 293 µS/cm
CH0615B0004	Station No.: 06N04W18J993M	Station Name: NapaCounty-217d	Matrix: Water, Natural
Add'l Note:		Cost Code: L10583900000	

Alkalinity		Fld Filtered	Carbonate by Calculation		Fld Filtered
Electrical Conductivity (EC)			Dissolved Boron		Fld Filtered
Dissolved Calcium		Fld Filtered	Dissolved Magnesium		Fld Filtered
Dissolved Potassium		Fld Filtered	Dissolved Sodium		Fld Filtered
Dissolved Aluminum		Fld Filtered	Dissolved Antimony		Fld Filtered
Dissolved Arsenic		Fld Filtered	Dissolved Barium		Fld Filtered
Dissolved Beryllium		Fld Filtered	Dissolved Cadmium		Fld Filtered
Dissolved Chromium		Fld Filtered	Dissolved Cobalt		Fld Filtered
Dissolved Copper		Fld Filtered	Dissolved Iron		Fld Filtered
Dissolved Lead		Fld Filtered	Dissolved Lithium		Fld Filtered
Dissolved Manganese		Fld Filtered	Dissolved Molybdenum		Fld Filtered
Dissolved Nickel		Fld Filtered	Dissolved Selenium		Fld Filtered
Dissolved Silver		Fld Filtered	Dissolved Strontium		Fld Filtered
Dissolved Thallium		Fld Filtered	Dissolved Vanadium		Fld Filtered
Dissolved Zinc		Fld Filtered	Dissolved Bromide		Fld Filtered
Dissolved Chloride		Fld Filtered	Dissolved Fluoride		Fld Filtered
Dissolved Nitrate		Fld Filtered	Dissolved Sulfate		Fld Filtered
Dissolved Mercury		Fld Filtered	Dissolved Nitrite		Fld Filtered
Total Dissolved Solids (TDS)		Fld Filtered	Total Hardness By Calculation		Fld Filtered
Turbidity					

DWR Sample Number	Collection Date 6/3/2015	Collection Time: 11 : 02	EC: 554 µS/cm
CH0615B0005	Station No.: 06N04W16G994M	Station Name: NapaCounty-218s	Matrix: Water, Natural
Add'l Note:		Cost Code: L10583900000	

Alkalinity		Fld Filtered	Carbonate by Calculation		Fld Filtered
Electrical Conductivity (EC)			Dissolved Boron		Fld Filtered
Dissolved Calcium		Fld Filtered	Dissolved Magnesium		Fld Filtered
Dissolved Potassium		Fld Filtered	Dissolved Sodium		Fld Filtered
Dissolved Aluminum		Fld Filtered	Dissolved Antimony		Fld Filtered
Dissolved Arsenic		Fld Filtered	Dissolved Barium		Fld Filtered
Dissolved Beryllium		Fld Filtered	Dissolved Cadmium		Fld Filtered
Dissolved Chromium		Fld Filtered	Dissolved Cobalt		Fld Filtered
Dissolved Copper		Fld Filtered	Dissolved Iron		Fld Filtered
Dissolved Lead		Fld Filtered	Dissolved Lithium		Fld Filtered
Dissolved Manganese		Fld Filtered	Dissolved Molybdenum		Fld Filtered
Dissolved Nickel		Fld Filtered	Dissolved Selenium		Fld Filtered
Dissolved Silver		Fld Filtered	Dissolved Strontium		Fld Filtered
Dissolved Thallium		Fld Filtered	Dissolved Vanadium		Fld Filtered
Dissolved Zinc		Fld Filtered	Dissolved Bromide		Fld Filtered
Dissolved Chloride		Fld Filtered	Dissolved Fluoride		Fld Filtered
Dissolved Nitrate		Fld Filtered	Dissolved Sulfate		Fld Filtered
Dissolved Mercury		Fld Filtered	Dissolved Nitrite		Fld Filtered
Total Dissolved Solids (TDS)		Fld Filtered	Total Hardness By Calculation		Fld Filtered
Turbidity					

DWR Sample Number **CH0615B0006** Collection Date 6/3/2015 Station No.: 06N04W16G995M Collection Time: 10:04 Station Name: NapaCounty-219d EC: 704 µS/cm Matrix: Water, Natural

Add'l Note: Cost Code: L10583900000

Alkalinity		Fld Filtered	Carbonate by Calculation		Fld Filtered
Electrical Conductivity (EC)			Dissolved Boron		Fld Filtered
Dissolved Calcium		Fld Filtered	Dissolved Magnesium		Fld Filtered
Dissolved Potassium		Fld Filtered	Dissolved Sodium		Fld Filtered
Dissolved Aluminum		Fld Filtered	Dissolved Antimony		Fld Filtered
Dissolved Arsenic		Fld Filtered	Dissolved Barium		Fld Filtered
Dissolved Beryllium		Fld Filtered	Dissolved Cadmium		Fld Filtered
Dissolved Chromium		Fld Filtered	Dissolved Cobalt		Fld Filtered
Dissolved Copper		Fld Filtered	Dissolved Iron		Fld Filtered
Dissolved Lead		Fld Filtered	Dissolved Lithium		Fld Filtered
Dissolved Manganese		Fld Filtered	Dissolved Molybdenum		Fld Filtered
Dissolved Nickel		Fld Filtered	Dissolved Selenium		Fld Filtered
Dissolved Silver		Fld Filtered	Dissolved Strontium		Fld Filtered
Dissolved Thallium		Fld Filtered	Dissolved Vanadium		Fld Filtered
Dissolved Zinc		Fld Filtered	Dissolved Bromide		Fld Filtered
Dissolved Chloride		Fld Filtered	Dissolved Fluoride		Fld Filtered
Dissolved Nitrate		Fld Filtered	Dissolved Sulfate		Fld Filtered
Dissolved Mercury		Fld Filtered	Dissolved Nitrite		Fld Filtered
Total Dissolved Solids (TDS)		Fld Filtered	Total Hardness By Calculation		Fld Filtered
Turbidity					

DWR Sample Number **CH0615B0007** Collection Date 6/3/2015 Station No.: 07N04W31D996M Collection Time: : Station Name: NapaCounty-220s EC: µS/cm Matrix: Water, Natural

Add'l Note: Cost Code: L10583900000

Alkalinity		Fld Filtered	Carbonate by Calculation		Fld Filtered
Electrical Conductivity (EC)			Dissolved Boron		Fld Filtered
Dissolved Calcium		Fld Filtered	Dissolved Magnesium		Fld Filtered
Dissolved Potassium		Fld Filtered	Dissolved Sodium		Fld Filtered
Dissolved Aluminum		Fld Filtered	Dissolved Antimony		Fld Filtered
Dissolved Arsenic		Fld Filtered	Dissolved Barium		Fld Filtered
Dissolved Beryllium		Fld Filtered	Dissolved Cadmium		Fld Filtered
Dissolved Chromium		Fld Filtered	Dissolved Cobalt		Fld Filtered
Dissolved Copper		Fld Filtered	Dissolved Iron		Fld Filtered
Dissolved Lead		Fld Filtered	Dissolved Lithium		Fld Filtered
Dissolved Manganese		Fld Filtered	Dissolved Molybdenum		Fld Filtered
Dissolved Nickel		Fld Filtered	Dissolved Selenium		Fld Filtered
Dissolved Silver		Fld Filtered	Dissolved Strontium		Fld Filtered
Dissolved Thallium		Fld Filtered	Dissolved Vanadium		Fld Filtered
Dissolved Zinc		Fld Filtered	Dissolved Bromide		Fld Filtered
Dissolved Chloride		Fld Filtered	Dissolved Fluoride		Fld Filtered
Dissolved Nitrate		Fld Filtered	Dissolved Sulfate		Fld Filtered
Dissolved Mercury		Fld Filtered	Dissolved Nitrite		Fld Filtered
Total Dissolved Solids (TDS)		Fld Filtered	Total Hardness By Calculation		Fld Filtered
Turbidity					

DWR Sample Number	Collection Date 6/3/2015	Collection Time: :	EC: µS/cm
CH0615B0008	Station No.: 07N04W31D997M	Station Name: NapaCounty-221d	Matrix: Water, Natural
Add'l Note:		Cost Code: L10583900000	

Alkalinity		Fld Filtered	Carbonate by Calculation		Fld Filtered
Electrical Conductivity (EC)			Dissolved Boron		Fld Filtered
Dissolved Calcium		Fld Filtered	Dissolved Magnesium		Fld Filtered
Dissolved Potassium		Fld Filtered	Dissolved Sodium		Fld Filtered
Dissolved Aluminum		Fld Filtered	Dissolved Antimony		Fld Filtered
Dissolved Arsenic		Fld Filtered	Dissolved Barium		Fld Filtered
Dissolved Beryllium		Fld Filtered	Dissolved Cadmium		Fld Filtered
Dissolved Chromium		Fld Filtered	Dissolved Cobalt		Fld Filtered
Dissolved Copper		Fld Filtered	Dissolved Iron		Fld Filtered
Dissolved Lead		Fld Filtered	Dissolved Lithium		Fld Filtered
Dissolved Manganese		Fld Filtered	Dissolved Molybdenum		Fld Filtered
Dissolved Nickel		Fld Filtered	Dissolved Selenium		Fld Filtered
Dissolved Silver		Fld Filtered	Dissolved Strontium		Fld Filtered
Dissolved Thallium		Fld Filtered	Dissolved Vanadium		Fld Filtered
Dissolved Zinc		Fld Filtered	Dissolved Bromide		Fld Filtered
Dissolved Chloride		Fld Filtered	Dissolved Fluoride		Fld Filtered
Dissolved Nitrate		Fld Filtered	Dissolved Sulfate		Fld Filtered
Dissolved Mercury		Fld Filtered	Dissolved Nitrite		Fld Filtered
Total Dissolved Solids (TDS)		Fld Filtered	Total Hardness By Calculation		Fld Filtered
Turbidity					

DWR Sample Number	Collection Date 6/3/2015	Collection Time: :	EC: µS/cm
CH0615B0009	Station No.: 08N05W30Q998M	Station Name: NapaCounty-222s	Matrix: Water, Natural
Add'l Note:		Cost Code: L10583900000	

Alkalinity		Fld Filtered	Carbonate by Calculation		Fld Filtered
Electrical Conductivity (EC)			Dissolved Boron		Fld Filtered
Dissolved Calcium		Fld Filtered	Dissolved Magnesium		Fld Filtered
Dissolved Potassium		Fld Filtered	Dissolved Sodium		Fld Filtered
Dissolved Aluminum		Fld Filtered	Dissolved Antimony		Fld Filtered
Dissolved Arsenic		Fld Filtered	Dissolved Barium		Fld Filtered
Dissolved Beryllium		Fld Filtered	Dissolved Cadmium		Fld Filtered
Dissolved Chromium		Fld Filtered	Dissolved Cobalt		Fld Filtered
Dissolved Copper		Fld Filtered	Dissolved Iron		Fld Filtered
Dissolved Lead		Fld Filtered	Dissolved Lithium		Fld Filtered
Dissolved Manganese		Fld Filtered	Dissolved Molybdenum		Fld Filtered
Dissolved Nickel		Fld Filtered	Dissolved Selenium		Fld Filtered
Dissolved Silver		Fld Filtered	Dissolved Strontium		Fld Filtered
Dissolved Thallium		Fld Filtered	Dissolved Vanadium		Fld Filtered
Dissolved Zinc		Fld Filtered	Dissolved Bromide		Fld Filtered
Dissolved Chloride		Fld Filtered	Dissolved Fluoride		Fld Filtered
Dissolved Nitrate		Fld Filtered	Dissolved Sulfate		Fld Filtered
Dissolved Mercury		Fld Filtered	Dissolved Nitrite		Fld Filtered
Total Dissolved Solids (TDS)		Fld Filtered	Total Hardness By Calculation		Fld Filtered
Turbidity					

DWR Sample Number	Collection Date 6/3/2015	Collection Time: :	EC: µS/cm
CH0615B0010	Station No.: 08N05W30Q999M	Station Name: NapaCounty-223d	Matrix: Water, Natural
Add'l Note:		Cost Code: L10583900000	

Alkalinity		Fld Filtered	Carbonate by Calculation		Fld Filtered
Electrical Conductivity (EC)			Dissolved Boron		Fld Filtered
Dissolved Calcium		Fld Filtered	Dissolved Magnesium		Fld Filtered
Dissolved Potassium		Fld Filtered	Dissolved Sodium		Fld Filtered
Dissolved Aluminum		Fld Filtered	Dissolved Antimony		Fld Filtered
Dissolved Arsenic		Fld Filtered	Dissolved Barium		Fld Filtered
Dissolved Beryllium		Fld Filtered	Dissolved Cadmium		Fld Filtered
Dissolved Chromium		Fld Filtered	Dissolved Cobalt		Fld Filtered
Dissolved Copper		Fld Filtered	Dissolved Iron		Fld Filtered
Dissolved Lead		Fld Filtered	Dissolved Lithium		Fld Filtered
Dissolved Manganese		Fld Filtered	Dissolved Molybdenum		Fld Filtered
Dissolved Nickel		Fld Filtered	Dissolved Selenium		Fld Filtered
Dissolved Silver		Fld Filtered	Dissolved Strontium		Fld Filtered
Dissolved Thallium		Fld Filtered	Dissolved Vanadium		Fld Filtered
Dissolved Zinc		Fld Filtered	Dissolved Bromide		Fld Filtered
Dissolved Chloride		Fld Filtered	Dissolved Fluoride		Fld Filtered
Dissolved Nitrate		Fld Filtered	Dissolved Sulfate		Fld Filtered
Dissolved Mercury		Fld Filtered	Dissolved Nitrite		Fld Filtered
Total Dissolved Solids (TDS)		Fld Filtered	Total Hardness By Calculation		Fld Filtered
Turbidity					

DWR Sample Number	Collection Date 6/3/2015	Collection Time: :	EC: µS/cm
CH0615B0011	Station No.: E3012228	Station Name: NapaCounty-swgw_SW1	Matrix: Water, Natural
Add'l Note:		Cost Code: L10583900000	

Alkalinity		Fld Filtered	Carbonate by Calculation		Fld Filtered
Electrical Conductivity (EC)			Dissolved Boron		Fld Filtered
Dissolved Calcium		Fld Filtered	Dissolved Magnesium		Fld Filtered
Dissolved Potassium		Fld Filtered	Dissolved Sodium		Fld Filtered
Dissolved Aluminum		Fld Filtered	Dissolved Antimony		Fld Filtered
Dissolved Arsenic		Fld Filtered	Dissolved Barium		Fld Filtered
Dissolved Beryllium		Fld Filtered	Dissolved Cadmium		Fld Filtered
Dissolved Chromium		Fld Filtered	Dissolved Cobalt		Fld Filtered
Dissolved Copper		Fld Filtered	Dissolved Iron		Fld Filtered
Dissolved Lead		Fld Filtered	Dissolved Lithium		Fld Filtered
Dissolved Manganese		Fld Filtered	Dissolved Molybdenum		Fld Filtered
Dissolved Nickel		Fld Filtered	Dissolved Selenium		Fld Filtered
Dissolved Silver		Fld Filtered	Dissolved Strontium		Fld Filtered
Dissolved Thallium		Fld Filtered	Dissolved Vanadium		Fld Filtered
Dissolved Zinc		Fld Filtered	Dissolved Bromide		Fld Filtered
Dissolved Chloride		Fld Filtered	Dissolved Fluoride		Fld Filtered
Dissolved Nitrate		Fld Filtered	Dissolved Sulfate		Fld Filtered
Dissolved Mercury		Fld Filtered	Dissolved Nitrite		Fld Filtered
Total Dissolved Solids (TDS)		Fld Filtered	Total Hardness By Calculation		Fld Filtered
Turbidity					

DWR Sample Number	Collection Date 6/3/2015	Collection Time: :	EC: µS/cm
CH0615B0012	Station No.: E3012230	Station Name: E3012230	Matrix: Water, Natural
Add'l Note:		Cost Code: L10583900000	

Alkalinity		Fld Filtered	Carbonate by Calculation		Fld Filtered
Electrical Conductivity (EC)			Dissolved Boron		Fld Filtered
Dissolved Calcium		Fld Filtered	Dissolved Magnesium		Fld Filtered
Dissolved Potassium		Fld Filtered	Dissolved Sodium		Fld Filtered
Dissolved Aluminum		Fld Filtered	Dissolved Antimony		Fld Filtered
Dissolved Arsenic		Fld Filtered	Dissolved Barium		Fld Filtered
Dissolved Beryllium		Fld Filtered	Dissolved Cadmium		Fld Filtered
Dissolved Chromium		Fld Filtered	Dissolved Cobalt		Fld Filtered
Dissolved Copper		Fld Filtered	Dissolved Iron		Fld Filtered
Dissolved Lead		Fld Filtered	Dissolved Lithium		Fld Filtered
Dissolved Manganese		Fld Filtered	Dissolved Molybdenum		Fld Filtered
Dissolved Nickel		Fld Filtered	Dissolved Selenium		Fld Filtered
Dissolved Silver		Fld Filtered	Dissolved Strontium		Fld Filtered
Dissolved Thallium		Fld Filtered	Dissolved Vanadium		Fld Filtered
Dissolved Zinc		Fld Filtered	Dissolved Bromide		Fld Filtered
Dissolved Chloride		Fld Filtered	Dissolved Fluoride		Fld Filtered
Dissolved Nitrate		Fld Filtered	Dissolved Sulfate		Fld Filtered
Dissolved Mercury		Fld Filtered	Dissolved Nitrite		Fld Filtered
Total Dissolved Solids (TDS)		Fld Filtered	Total Hardness By Calculation		Fld Filtered
Turbidity					

DWR Sample Number	Collection Date 6/3/2015	Collection Time: 13:15	EC: 426 µS/cm
CH0615B0013	Station No.: E3012234	Station Name: NapaCounty-swgw_SW2	Matrix: Water, Natural
Add'l Note:		Cost Code: L10583900000	

Alkalinity		Fld Filtered	Carbonate by Calculation		Fld Filtered
Electrical Conductivity (EC)			Dissolved Boron		Fld Filtered
Dissolved Calcium		Fld Filtered	Dissolved Magnesium		Fld Filtered
Dissolved Potassium		Fld Filtered	Dissolved Sodium		Fld Filtered
Dissolved Aluminum		Fld Filtered	Dissolved Antimony		Fld Filtered
Dissolved Arsenic		Fld Filtered	Dissolved Barium		Fld Filtered
Dissolved Beryllium		Fld Filtered	Dissolved Cadmium		Fld Filtered
Dissolved Chromium		Fld Filtered	Dissolved Cobalt		Fld Filtered
Dissolved Copper		Fld Filtered	Dissolved Iron		Fld Filtered
Dissolved Lead		Fld Filtered	Dissolved Lithium		Fld Filtered
Dissolved Manganese		Fld Filtered	Dissolved Molybdenum		Fld Filtered
Dissolved Nickel		Fld Filtered	Dissolved Selenium		Fld Filtered
Dissolved Silver		Fld Filtered	Dissolved Strontium		Fld Filtered
Dissolved Thallium		Fld Filtered	Dissolved Vanadium		Fld Filtered
Dissolved Zinc		Fld Filtered	Dissolved Bromide		Fld Filtered
Dissolved Chloride		Fld Filtered	Dissolved Fluoride		Fld Filtered
Dissolved Nitrate		Fld Filtered	Dissolved Sulfate		Fld Filtered
Dissolved Mercury		Fld Filtered	Dissolved Nitrite		Fld Filtered
Total Dissolved Solids (TDS)		Fld Filtered	Total Hardness By Calculation		Fld Filtered
Turbidity					

DWR Sample Number	Collection Date 6/3/2015	Collection Time: :	EC: µS/cm
CH0615B0014	Station No.: E3012235	Station Name: E3012235	Matrix: Water, Natural
Add'l Note:		Cost Code: L10583900000	

Alkalinity		Fld Filtered	Carbonate by Calculation		Fld Filtered
Electrical Conductivity (EC)			Dissolved Boron		Fld Filtered
Dissolved Calcium		Fld Filtered	Dissolved Magnesium		Fld Filtered
Dissolved Potassium		Fld Filtered	Dissolved Sodium		Fld Filtered
Dissolved Aluminum		Fld Filtered	Dissolved Antimony		Fld Filtered
Dissolved Arsenic		Fld Filtered	Dissolved Barium		Fld Filtered
Dissolved Beryllium		Fld Filtered	Dissolved Cadmium		Fld Filtered
Dissolved Chromium		Fld Filtered	Dissolved Cobalt		Fld Filtered
Dissolved Copper		Fld Filtered	Dissolved Iron		Fld Filtered
Dissolved Lead		Fld Filtered	Dissolved Lithium		Fld Filtered
Dissolved Manganese		Fld Filtered	Dissolved Molybdenum		Fld Filtered
Dissolved Nickel		Fld Filtered	Dissolved Selenium		Fld Filtered
Dissolved Silver		Fld Filtered	Dissolved Strontium		Fld Filtered
Dissolved Thallium		Fld Filtered	Dissolved Vanadium		Fld Filtered
Dissolved Zinc		Fld Filtered	Dissolved Bromide		Fld Filtered
Dissolved Chloride		Fld Filtered	Dissolved Fluoride		Fld Filtered
Dissolved Nitrate		Fld Filtered	Dissolved Sulfate		Fld Filtered
Dissolved Mercury		Fld Filtered	Dissolved Nitrite		Fld Filtered
Total Dissolved Solids (TDS)		Fld Filtered	Total Hardness By Calculation		Fld Filtered
Turbidity					

DWR Sample Number	Collection Date 6/3/2015	Collection Time: :	EC: µS/cm
CH0615B0015	Station No.: E3012246	Station Name: NapaCounty-swgw_SW5	Matrix: Water, Natural
Add'l Note:		Cost Code: L10583900000	

Alkalinity		Fld Filtered	Carbonate by Calculation		Fld Filtered
Electrical Conductivity (EC)			Dissolved Boron		Fld Filtered
Dissolved Calcium		Fld Filtered	Dissolved Magnesium		Fld Filtered
Dissolved Potassium		Fld Filtered	Dissolved Sodium		Fld Filtered
Dissolved Aluminum		Fld Filtered	Dissolved Antimony		Fld Filtered
Dissolved Arsenic		Fld Filtered	Dissolved Barium		Fld Filtered
Dissolved Beryllium		Fld Filtered	Dissolved Cadmium		Fld Filtered
Dissolved Chromium		Fld Filtered	Dissolved Cobalt		Fld Filtered
Dissolved Copper		Fld Filtered	Dissolved Iron		Fld Filtered
Dissolved Lead		Fld Filtered	Dissolved Lithium		Fld Filtered
Dissolved Manganese		Fld Filtered	Dissolved Molybdenum		Fld Filtered
Dissolved Nickel		Fld Filtered	Dissolved Selenium		Fld Filtered
Dissolved Silver		Fld Filtered	Dissolved Strontium		Fld Filtered
Dissolved Thallium		Fld Filtered	Dissolved Vanadium		Fld Filtered
Dissolved Zinc		Fld Filtered	Dissolved Bromide		Fld Filtered
Dissolved Chloride		Fld Filtered	Dissolved Fluoride		Fld Filtered
Dissolved Nitrate		Fld Filtered	Dissolved Sulfate		Fld Filtered
Dissolved Mercury		Fld Filtered	Dissolved Nitrite		Fld Filtered
Total Dissolved Solids (TDS)		Fld Filtered	Total Hardness By Calculation		Fld Filtered
Turbidity					

DWR Sample Number **CH0615B0016** Collection Date 6/3/2015 Collection Time: 12 : 23 EC: 293 µS/cm

Station No.: (NONE) Station Name: (None) Matrix: Water, Natural

Add'l Note: DUP of Napa County-217 d (CH0615B0004) Cost Code: L10583900000

Alkalinity		Fld Filtered	Carbonate by Calculation		Fld Filtered
Electrical Conductivity (EC)			Dissolved Boron		Fld Filtered
Dissolved Calcium		Fld Filtered	Dissolved Magnesium		Fld Filtered
Dissolved Potassium		Fld Filtered	Dissolved Sodium		Fld Filtered
Dissolved Aluminum		Fld Filtered	Dissolved Antimony		Fld Filtered
Dissolved Arsenic		Fld Filtered	Dissolved Barium		Fld Filtered
Dissolved Beryllium		Fld Filtered	Dissolved Cadmium		Fld Filtered
Dissolved Chromium		Fld Filtered	Dissolved Cobalt		Fld Filtered
Dissolved Copper		Fld Filtered	Dissolved Iron		Fld Filtered
Dissolved Lead		Fld Filtered	Dissolved Lithium		Fld Filtered
Dissolved Manganese		Fld Filtered	Dissolved Molybdenum		Fld Filtered
Dissolved Nickel		Fld Filtered	Dissolved Selenium		Fld Filtered
Dissolved Silver		Fld Filtered	Dissolved Strontium		Fld Filtered
Dissolved Thallium		Fld Filtered	Dissolved Vanadium		Fld Filtered
Dissolved Zinc		Fld Filtered	Dissolved Bromide		Fld Filtered
Dissolved Chloride		Fld Filtered	Dissolved Fluoride		Fld Filtered
Dissolved Nitrate		Fld Filtered	Dissolved Sulfate		Fld Filtered
Dissolved Mercury		Fld Filtered	Dissolved Nitrite		Fld Filtered
Total Dissolved Solids (TDS)		Fld Filtered	Total Hardness By Calculation		Fld Filtered
Turbidity					

DWR Sample Number **CH0615B0017** Collection Date 6/3/2015 Collection Time: 13:06 EC: ——— µS/cm

Station No.: Blank; Field Station Name: Blank; Field Matrix: Water, Purified

Add'l Note: Cost Code: L10583900000

Alkalinity		Fld Filtered	Carbonate by Calculation		Fld Filtered
Electrical Conductivity (EC)			Dissolved Boron		Fld Filtered
Dissolved Calcium		Fld Filtered	Dissolved Magnesium		Fld Filtered
Dissolved Potassium		Fld Filtered	Dissolved Sodium		Fld Filtered
Dissolved Aluminum		Fld Filtered	Dissolved Antimony		Fld Filtered
Dissolved Arsenic		Fld Filtered	Dissolved Barium		Fld Filtered
Dissolved Beryllium		Fld Filtered	Dissolved Cadmium		Fld Filtered
Dissolved Chromium		Fld Filtered	Dissolved Cobalt		Fld Filtered
Dissolved Copper		Fld Filtered	Dissolved Iron		Fld Filtered
Dissolved Lead		Fld Filtered	Dissolved Lithium		Fld Filtered
Dissolved Manganese		Fld Filtered	Dissolved Molybdenum		Fld Filtered
Dissolved Nickel		Fld Filtered	Dissolved Selenium		Fld Filtered
Dissolved Silver		Fld Filtered	Dissolved Strontium		Fld Filtered
Dissolved Thallium		Fld Filtered	Dissolved Vanadium		Fld Filtered
Dissolved Zinc		Fld Filtered	Dissolved Bromide		Fld Filtered
Dissolved Chloride		Fld Filtered	Dissolved Fluoride		Fld Filtered
Dissolved Nitrate		Fld Filtered	Dissolved Sulfate		Fld Filtered
Dissolved Mercury		Fld Filtered	Dissolved Nitrite		Fld Filtered
Total Dissolved Solids (TDS)		Fld Filtered	Total Hardness By Calculation		Fld Filtered
Turbidity					

This was Received! 6/3/2015

DWR Sample Number	Collection Date 6/3/2015	Collection Time: ~~13:00~~	EC: µS/cm
CH0615B0018	Station No.: Blank; Field	Station Name: Blank; Field	Matrix: Water, Purified
Add'l Note:		Cost Code:	L10583900000

Alkalinity		Fld Filtered	Carbonate by Calculation		Fld Filtered
Electrical Conductivity (EC)			Dissolved Boron		Fld Filtered
Dissolved Calcium		Fld Filtered	Dissolved Magnesium		Fld Filtered
Dissolved Potassium		Fld Filtered	Dissolved Sodium		Fld Filtered
Dissolved Aluminum		Fld Filtered	Dissolved Antimony		Fld Filtered
Dissolved Arsenic		Fld Filtered	Dissolved Barium		Fld Filtered
Dissolved Beryllium		Fld Filtered	Dissolved Cadmium		Fld Filtered
Dissolved Chromium		Fld Filtered	Dissolved Cobalt		Fld Filtered
Dissolved Copper		Fld Filtered	Dissolved Iron		Fld Filtered
Dissolved Lead		Fld Filtered	Dissolved Lithium		Fld Filtered
Dissolved Manganese		Fld Filtered	Dissolved Molybdenum		Fld Filtered
Dissolved Nickel		Fld Filtered	Dissolved Selenium		Fld Filtered
Dissolved Silver		Fld Filtered	Dissolved Strontium		Fld Filtered
Dissolved Thallium		Fld Filtered	Dissolved Vanadium		Fld Filtered
Dissolved Zinc		Fld Filtered	Dissolved Bromide		Fld Filtered
Dissolved Chloride		Fld Filtered	Dissolved Fluoride		Fld Filtered
Dissolved Nitrate		Fld Filtered	Dissolved Sulfate		Fld Filtered
Dissolved Mercury		Fld Filtered	Dissolved Nitrite		Fld Filtered
Total Dissolved Solids (TDS)		Fld Filtered	Total Hardness By Calculation		Fld Filtered
Turbidity					

DWR Sample Number	Collection Date 6/3/2015	Collection Time: :	EC: µS/cm
CH0615B0019	Station No.: Blank; Field	Station Name: Blank; Field	Matrix: Water, Purified
Add'l Note:		Cost Code:	L10583900000

Alkalinity		Fld Filtered	Carbonate by Calculation		Fld Filtered
Electrical Conductivity (EC)			Dissolved Boron		Fld Filtered
Dissolved Calcium		Fld Filtered	Dissolved Magnesium		Fld Filtered
Dissolved Potassium		Fld Filtered	Dissolved Sodium		Fld Filtered
Dissolved Aluminum		Fld Filtered	Dissolved Antimony		Fld Filtered
Dissolved Arsenic		Fld Filtered	Dissolved Barium		Fld Filtered
Dissolved Beryllium		Fld Filtered	Dissolved Cadmium		Fld Filtered
Dissolved Chromium		Fld Filtered	Dissolved Cobalt		Fld Filtered
Dissolved Copper		Fld Filtered	Dissolved Iron		Fld Filtered
Dissolved Lead		Fld Filtered	Dissolved Lithium		Fld Filtered
Dissolved Manganese		Fld Filtered	Dissolved Molybdenum		Fld Filtered
Dissolved Nickel		Fld Filtered	Dissolved Selenium		Fld Filtered
Dissolved Silver		Fld Filtered	Dissolved Strontium		Fld Filtered
Dissolved Thallium		Fld Filtered	Dissolved Vanadium		Fld Filtered
Dissolved Zinc		Fld Filtered	Dissolved Bromide		Fld Filtered
Dissolved Chloride		Fld Filtered	Dissolved Fluoride		Fld Filtered
Dissolved Nitrate		Fld Filtered	Dissolved Sulfate		Fld Filtered
Dissolved Mercury		Fld Filtered	Dissolved Nitrite		Fld Filtered
Total Dissolved Solids (TDS)		Fld Filtered	Total Hardness By Calculation		Fld Filtered
Turbidity					

Checklist for Sample Submittal by Field Personnel

- [x] Correct collection dates and times are on the COC.
- [x] An EC result per collection event has been written on the COC.
- [x] The number of containers being submitted matches the container count on the COC.
- [x] * Please correct the count if it is not the same and initial the appropriate area to confirm.
- [x] Container label's DWR Sample Number matches what is on the COC .
- [x] Samples/stations/collection events not collected are crossed out and clearly marked as not sampled "N.S." with your initials.
- [x] *If the N.S. reason needs to go to the WDL please write the reason on the COC or make sure it is entered in FLIMS on the canceled collection event with the "Reason Going to WDL" checkbox checked.
- [ ] Volumes for chlorophyll samples are written on either the label or the packet.
- [x] The "Send Report To:" contact on the COC is correct.
- [x] The "Submitted By:" signature, printed name and phone number are on the COC.
- [x] Sample submittal date and time are on the COC.

Checklist for Bryte Lab Sample Receiving Personnel

- [x] The DWR Sample Number on the container labels matches the COC.
- [x] Collection dates and times are on the COC for every sample.
- [x] The EC for each collection event is written on the COC.
- [x] The Priority Code for the submittal/samples is 5. If it is >5 alert Bryte management prior to field personnel leaving.
- [ ] ~~The volume~~ for chlorophyll samples are written on the packet or label.
- [x] The container count matches COC.
- [x] The container count has been initialed on COC by both parties to confirm.
- [x] UNFROZEN sample temperature is written on the COC.
- [x] Note on the COC either "frozen", "will be frozen within required time" or "not frozen" for samples that should be frozen.
- [x] Sites that are not collected are crossed out and clearly marked as not sampled "N.S." with field personnel initials. Not Sampled will be collected tomorrow
- [ ] If the "N.S." reason needs to go to the Water Data Library (WDL) the reason is written on the COC.
- [ ] -- CHECKLIST FOR SAMPLE RECEIVING IN FLIMS (LAB INTERNAL USE ONLY) --
- [x] ~~All~~ EC's are in FLIMS before the project is submitted. Please do not enter any other field data (including pH) besides EC per Sid Fong and Allan W. Wong.
- [x] The collection date and time in FLIMS matches the COC.
- [ ] ~~The N.S.~~ stations/collection events have been canceled.
- [ ] ~~If there is a~~ N.S. reason written on the COC it is in FLIMS and "Reason Going to WDL" box is checked.

FIELD PURGE DATA
Monitoring Wells

Client: Napa County Date: 6-3-15

Project: [illegible] Project No.: 12-1-071

Well ID: 214S Measured By: John MacDougall

TOTAL WELL DEPTH (ft)	CASING DIAMETER (in)	STICKUP (ft)	STATIC WATER LEVEL (ft)
53'	2" PVC / Steel		16.32

STANDING WATER COLUMN (ft)	x	0.17 (for 2" casing): 0.37 (for 3" casing) 0.65 (for 4" casing): 1.0 (for 5" casing) 1.47 (for 6" casing): 2.61 (for 8" casing) 4.08 (for 10" casing): 5.88 (for 12" casing) 10.45 (for 16" casing): 16.32 (for 20" casing)	=	WET CASING VOLUME, Vc (gal)	3 Vc (gal)
36.68				6.24	18.7

Clock Time	Pumping Time (min)	Pump Rate (Hz)	Flow Rate (gpm)	Cumulative Flow (gals)	DTW (ft)	Temp (°F / °C)	pH	Sp. Cond. at 25°C (µs/cm)	Turbidity (NTU)	DO (mg/L)	ORP (milliVolt)	Observations (redox, color, odor, etc.)
0749	0	200	1	0	16.32	62.68	6.93	532	150	3.21	360.9	turbid
0754	5	200	1	5		63.14	6.62	490	26.6	0.19	397.4	Clear
0759	10	200	1	10		63.33	6.55	484	8.60	0.14	405.6	Cloudy
0804	15	200	1	15		62.84	6.52	483	4.84	0.13	418.1	Clear
0809	20	200	1	20		62.92	6.51	483	3.66	0.12	411.3	Clear

Water Sample Collection (number of bottles and sample I.D.)

Trans Pulled 0740 In 0820

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS
500 FIRST STREET, WOODLAND, CA 95695
(530) 661-0109 Fax: (530) 661-6806

530-908-9089

FIELD PURGE DATA
Monitoring Wells

Client: Napa　　Date: 6-3-15

Project: 　　Project No.: 12-1-071

Well ID: 215d　　Measured By: JM

TOTAL WELL DEPTH (ft)	CASING DIAMETER (in)	STICKUP (ft)	STATIC WATER LEVEL (ft)
98FT	2 PVC / Steel		16.28

STANDING WATER COLUMN (ft)				WET CASING VOLUME, Vc (gal)	3 Vc (gal)
81.72	x	0.17 (for 2" casing); 0.37 (for 3" casing) 0.65 (for 4" casing); 1.0 (for 5" casing) 1.47 (for 6" casing); 2.61 (for 8" casing) 4.08 (for 10" casing); 5.88 (for 12" casing) 10.45 (for 16" casing); 16.32 (for 20" casing)	=	13.89	41.68

Clock Time	Pumping Time (min)	Pump Rate (Hz)	Flow Rate (gpm)	Cumulative Flow (gals)	DTW (ft)	Temp (°F / °C)	pH	Sp. Cond. at 25°C (µs/cm)	Turbidity (NTU)	DO (mg/L)	ORP (milliVolt)	Observations (redox, color, odor, etc.)
0635	0	200	1	0	16.28	63.62	7.27	1396	4.30	0.28	414.8	Sulfer smell
0648	13	240	1.5	13	—	64.11	7.27	1350	11.47	0.66	360.9	clear smells
0655	20	240	1	20	—	64.48	7.19	1330	8.51	0.23	387	Clear
0705	30	240	1	30	—	64.50	7.13	1291	7.31	0.14	410.9	Clear
0716	41	240	1	41	30.78	64.46	7.08	1217	5.31	0.11	420.7	Clear

Water Sample Collection (number of bottles and sample I.D.)

Transducer Pulled at 0540　Trans Back 0739

Cant fit Sounder with Pump in well

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS
500 FIRST STREET, WOODLAND, CA 95695
(530) 661-0109　Fax: (530) 661-6806

FIELD PURGE DATA
Monitoring Wells

Client: Napa Date: 6-3-15

Project: Project No.: 12-1-071

Well ID: 216s Measured By: JJM

TOTAL WELL DEPTH (ft)	CASING DIAMETER (in)	STICKUP (ft)	STATIC WATER LEVEL (ft)
50	2" PVC / Steel	0	23.47

STANDING WATER COLUMN (ft)				WET CASING VOLUME, Vc (gal)	3 Vc (gal)
26.53	x	0.17 (for 2" casing): 0.37 (for 3" casing) 0.65 (for 4" casing): 1.0 (for 5" casing) 1.47 (for 6" casing): 2.61 (for 8" casing) 4.08 (for 10" casing): 5.88 (for 12" casing) 10.45 (for 16" casing): 16.32 (for 20" casing)	=	4.5	13.53

Clock Time	Pumping Time (min)	Pump Rate (Hz)	Flow Rate (gpm)	Cumulative Flow (gals)	DTW (ft)	Temp (°F / °C)	pH	Sp. Cond. at 25°C (μs/cm)	Turbidity (NTU)	DO (mg/L)	ORP (milliVolt)	Observations (redox, color, odor, etc.)
1248	0	240	1	0	23.47	67.84	7.21	383	355	3.73	311	Turbid
1253	~~[illegible]~~5	240	1	5	26.53	67.81	6.63	361	68.9	1.92	421	"
1258	10	240	1	10	26.90	67.86	6.62	349	66.5	1.46	452	"
1303	15	240	1	15		67.88	6.62	347	63.0	1.11	399	"

Water Sample Collection (number of bottles and sample I.D.)

Trans out 1243 Back ~~1315~~ 1315

Pump at 40'

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS
500 FIRST STREET, WOODLAND, CA 95695
(530) 661-0109 Fax: (530) 661-6806

FIELD PURGE DATA
Monitoring Wells

Client: Napa
Date: 6-3-15
Project:
Project No.: 12-1-071
Well ID: 217d
Measured By: JJM

TOTAL WELL DEPTH (ft)	CASING DIAMETER (in)	STICKUP (ft)	STATIC WATER LEVEL (ft)
86	2" PVC / Steel	0	30.63

STANDING WATER COLUMN (ft)	x	0.17 (for 2" casing); 0.37 (for 3" casing) 0.65 (for 4" casing); 1.0 (for 5" casing) 1.47 (for 6" casing); 2.61 (for 8" casing) 4.08 (for 10" casing); 5.88 (for 12" casing) 10.45 (for 16" casing); 16.32 (for 20" casing)	=	WET CASING VOLUME, Vc (gal)	3 Vc (gal)
55.37				9.42	28.23

Clock Time	Pumping Time (min)	Pump Rate (Hz)	Flow Rate (gpm)	Cumulative Flow (gals)	DTW (ft)	Temp (°F / °C)	pH	Sp. Cond. at 25°C (µs/cm)	Turbidity (NTU)	DO (mg/L)	ORP (milliVolt)	Observations (redox, color, odor, etc.)
1158	~~300~~	300	2	0	30.63	68.02	7.2	306	107	0.63	338.1	Turbid
1203	5	300	2	10	35.69	68.23	7.33	307	29.4	0.19	363.1	Turbid
1208	10	300	2	20	36.56	68.17	7.34	301	13.70	0.13	426	
1213	15	300	2	30	37.53	68.28	7.31	297	13.61	0.11	404	
1218	20	300	2	40	37.92	68.09	7.28	294	8.35	0.10	439	clear
1223	25	300	2	50		68.09	7.27	293	4.76	0.09	449	clear

Water Sample Collection (number of bottles and sample I.D.)

Trans Pulled 1150 Back in 1242

Dupe

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS
500 FIRST STREET, WOODLAND, CA 95695
(530) 661-0109 Fax: (530) 661-6806

FIELD PURGE DATA
Monitoring Wells

Client: Napa Date: 6-3-15

Project: Project No.: 12-1-071

Well ID: 2185 Measured By: JJM

TOTAL WELL DEPTH (ft)	CASING DIAMETER (in)	STICKUP (ft)	STATIC WATER LEVEL (ft)
40	PVC / Steel	0	21.23

STANDING WATER COLUMN (ft)	x		=	WET CASING VOLUME, Vc (gal)	3 Vc (gal)
18.77	x	0.17 (for 2" casing): 0.37 (for 3" casing) 0.65 (for 4" casing): 1.0 (for 5" casing) 1.47 (for 6" casing): 2.61 (for 8" casing) 4.08 (for 10" casing): 5.88 (for 12" casing) 10.45 (for 16" casing): 16.32 (for 20" casing)	=	3.19	9.5

Clock Time	Pumping Time (min)	Pump Rate (Hz)	Flow Rate (gpm)	Cumulative Flow (gals)	DTW (ft)	Temp (°F / °C)	pH	Sp. Cond. at 25°C (μs/cm)	Turbidity (NTU)	DO (mg/L)	ORP (milliVolt)	Observations (redox, color, odor, etc.)
1044	0	~~250~~	1.	0	21.23	64.52	6.62	5.76	24.7	5.58	374	
1049	5	251	1	5		64.54	6.51	5.60	19.86	2.27	374.1	
1051	7	251	1	7		64.47	6.46	556	13.15	2.20	396.1	
1053	9	251	1	9		64.50	6.43	555	12.03	2.17	406	
1055	11	251	1	11	21.69	64.52	6.42	555	6.22	2.13	411	
1059	15	251	1	15	21.73	64.50	6.41	554	6.03	2.15	434.1	
1102	18	251	1	18		64.52	6.11	554	6.30	2.18	435	

Water Sample Collection (number of bottles and sample I.D.)

Pulled Trans 1027 Resumed 11:15
Pump 351

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS
500 FIRST STREET, WOODLAND, CA 95695
(530) 661-0109 Fax: (530) 661-6806

FIELD PURGE DATA
Monitoring Wells

Client: Napa Date: 6-3-19

Project: Project No.: 12-1-071

Well ID: 219d Measured By: JJM

TOTAL WELL DEPTH (ft)		CASING DIAMETER (in)		STICKUP (ft)	STATIC WATER LEVEL (ft)
93		PVC / Steel		0	20.69
STANDING WATER COLUMN (ft)	x	0.17 (for 2" casing): 0.37 (for 3" casing) 0.65 (for 4" casing): 1.0 (for 5" casing) 1.47 (for 6" casing): 2.61 (for 8" casing) 4.08 (for 10" casing): 5.88 (for 12" casing) 10.45 (for 16" casing): 16.32 (for 20" casing)	=	WET CASING VOLUME, Vc (gal)	3 Vc (gal)
72.31				12.29	36.87

Clock Time	Pumping Time (min)	Pump Rate (Hz)	Flow Rate (gpm)	Cumulative Flow (gals)	DTW (ft)	Temp (°F / °C)	pH	Sp. Cond. at 25°C (µs/cm)	Turbidity (NTU)	DO (mg/L)	ORP (milliVolt)	Observations (redox, color, odor, etc.)
941	0	240	1	0	20.69	62.99	7.38	692	60.7	1.88	319.4	Turbid
946	5	240	1	5		63.22	7.30	696	6.98	0.80	255.3	Clear
951	10	240	1.2	11		63.41	7.26	702	1.68	0.41	168.7	Clear
956	15	240	1.2	17		63.53	7.25	702	1.48	0.3	163	Clear
1001	20	240	1.2	23		63.66	7.24	703	0.39	0.26	247.1	clear
1006	25	240	1.2	29		63.76	7.23	704	0	0.21	295.4	clear
1012	30	240	1.2	35		63.94	7.23	704	0	0.26	345.8	Clear
1014	32	240	1.2	37.5		63.90	7.23	704	0	0.20	346.7	Clear

Water Sample Collection (number of bottles and sample I.D.)

trans Removed 0920 Back in 1027

004

FIELD PURGE DATA
Monitoring Wells

Client: Napa County

Date: 6-4-15

Project:

Project No.: 121-071

Well ID: 220s

Measured By: JJM

TOTAL WELL DEPTH (ft)	CASING DIAMETER (in)	STICKUP (ft)	STATIC WATER LEVEL (ft)
45	2" PVC / Steel	0	16.94 @ 0700

STANDING WATER COLUMN (ft)	x	0.17 (for 2" casing): 0.37 (for 3" casing) 0.65 (for 4" casing): 1.0 (for 5" casing) 1.47 (for 6" casing): 2.61 (for 8" casing) 4.08 (for 10" casing): 5.88 (for 12" casing) 10.45 (for 16" casing): 16.32 (for 20" casing)	=	WET CASING VOLUME, Vc (gal)	3 Vc (gal)
28.06				4.77	14.31

Clock Time	Pumping Time (min)	Pump Rate (Hz)	Flow Rate (gpm)	Cumulative Flow (gals)	DTW (ft)	Temp (°F / °C)	pH	Sp. Cond. at 25°C (µs/cm)	Turbidity (NTU)	DO (mg/L)	ORP (milliVolt)	Observations (redox, color, odor, etc.)
809	0	200			16.94	65.90	7.03	450	69.1	0.36	353	Turbid
811	2	200	1.5	3	21.12	66.40	6.88	452	14.41	0.14	363	cloudy
813	4	200	1.5	4.5	21.29	66.49	6.80	443	8.45	0.10	394	clear
8.16	7	200	1.5	10.5		67.02	6.76	440	5.35	0.09	398	clear
8.19	10	200	1.5	15	21.69	67.00	6.74	440	3.73	0.08	413	Clear

L

Water Sample Collection (number of bottles and sample I.D.)

Trans out @ 8:05 Back @ 830

Pump @ 40'

07

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS
500 FIRST STREET, WOODLAND, CA 95695
(530) 661-0109 Fax: (530) 661-6806

FIELD PURGE DATA
Monitoring Wells

Client: Napa Co

Date: 6-4-15

Project:

Project No.: 12-1-021

Well ID: 221d

Measured By: JJM

TOTAL WELL DEPTH (ft)	CASING DIAMETER (in)	STICKUP (ft)	STATIC WATER LEVEL (ft)
85	2" PVC / Steel	Ø	16.73 @ 0702

STANDING WATER COLUMN (ft)	x	0.17 (for 2" casing): 0.37 (for 3" casing) 0.65 (for 4" casing): 1.0 (for 5" casing) 1.47 (for 6" casing): 2.61 (for 8" casing) 4.08 (for 10" casing): 5.88 (for 12" casing) 10.45 (for 16" casing): 16.32 (for 20" casing)	=	WET CASING VOLUME, Vc (gal)	3 Vc (gal)
68.27				11.6	34.81

Clock Time	Pumping Time (min)	Pump Rate (Hz)	Flow Rate (gpm)	Cumulative Flow (gals)	DTW (ft)	Temp (°F / °C)	pH	Sp. Cond. at 25°C (µs/cm)	Turbidity (NTU)	DO (mg/L)	ORP (milliVolt)	Observations (redox, color, odor, etc.)
7:24	0	250	1.25	0	16.73	64.12	7.87	319	9.68	3.21	328.9	Turbid
7:28	4	250	1.25	5	27.46	66.07	7.37	310	363	0.27	354	Turbid
7:32	8	250	1.25	10	28.02	66.21	7.36	298	45.9	0.16	381.8	"
7:36	12	250	1.25	15	28.16	66.38	7.34	296	32.0	0.13	362.0	Sandy
7:40	16	250	1.25	20	28.29	66.60	7.30	295	12.27	0.1	344.9	"
7:44	20	250	1.25	25	28.33	66.21	7.26	293	6.90	0.09	383.4	clear
7:48	24	250	1.25	30	28.34	66.78	7.22	293	9.51	0.06	392.1	"
7:52	28	250	1.25	35	28.32	66.69	7.21	292	5.77	0.08	360.1	"

Water Sample Collection (number of bottles and sample I.D.)

trans out 7:11 In 8:04

Pump at 70'

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS
500 FIRST STREET, WOODLAND, CA 95695
(530) 661-0109 Fax: (530) 661-6806

FIELD PURGE DATA
Monitoring Wells

Client: Nafa

Date: 6-4-15

Project: Nc

Project No.: 12-1-071

Well ID: 222S

Measured By: JJM

TOTAL WELL DEPTH (ft)	CASING DIAMETER (in)	STICKUP (ft)	STATIC WATER LEVEL (ft)
40	2" PVC / Steel	5.4	25.30 @ 10:30

STANDING WATER COLUMN (ft)	x	0.17 (for 2" casing); 0.37 (for 3" casing) 0.65 (for 4" casing); 1.0 (for 5" casing) 1.47 (for 6" casing); 2.61 (for 8" casing) 4.08 (for 10" casing); 5.88 (for 12" casing) 10.45 (for 16" casing); 16.32 (for 20" casing)	=	WET CASING VOLUME, Vc (gal)	3 Vc (gal)
20.1				3.42	10.25

Clock Time	Pumping Time (min)	Pump Rate (Hz)	Flow Rate (gpm)	Cumulative Flow (gals)	DTW (ft)	Temp (°F / °C)	pH	Sp. Cond. at 25°C (µs/cm)	Turbidity (NTU)	DO (mg/L)	ORP (milliVolt)	Observations (redox, color, odor, etc.)
11:19	0	225	1	0	25.30	65.73	7.15	405	101	2.28	390.0	Turbid
11:24	5	225	1	5		64.77	7.03	380	13.03	0.20	449.0	
11:29	10	228	1	10		64.68	7.01	380	2.55	0.12	486.0	Clear

Water Sample Collection (number of bottles and sample I.D.)

Trans out @ 11:12 Back @ 11:45

Pump @ 35 9

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS
500 FIRST STREET, WOODLAND, CA 95695
(530) 661-0109 Fax: (530) 661-6806

FIELD PURGE DATA
Monitoring Wells

Client: Napa
Date: 6-4-15
Project:
Project No.: 12-1-071
Well ID: 223d
Measured By: JJM

TOTAL WELL DEPTH (ft)	CASING DIAMETER (in)	STICKUP (ft)	STATIC WATER LEVEL (ft)
100	2" PVC / Steel	5.4'	34.92 @ 1030

STANDING WATER COLUMN (ft)	x	0.17 (for 2" casing); 0.37 (for 3" casing) 0.65 (for 4" casing); 1.0 (for 5" casing) 1.47 (for 6" casing); 2.61 (for 8" casing) 4.08 (for 10" casing); 5.88 (for 12" casing) 10.45 (for 16" casing); 16.32 (for 20" casing)	=	WET CASING VOLUME, Vc (gal)	3 Vc (gal)
70.58				11.9	35.99

Clock Time	Pumping Time (min)	Pump Rate (Hz)	Flow Rate (gpm)	Cumulative Flow (gals)	DTW (ft)	Temp (°F / °C)	pH	Sp. Cond. at 25°C (µs/cm)	Turbidity (NTU)	DO (mg/L)	ORP (milliVolt)	Observations (redox, color, odor, etc.)
1041	0	300	1.25	0	34.92	65.10	7.44	457	4.22	2.11	361.9	Clear
1046	5	300	1.25	6.25		66.87	7.18	457	30.3	0.33	436.3	Turbid
1051	10	300	1.25	11.25	74.22	Well		De watered				
			Well		De	watered		at	1		casing	
1056		300	1.25	13		66.92	7.25	453	48.2	0.27	531	~~Clear~~ Turbid

Water Sample Collection (number of bottles and sample I.D.)

Trans out @ 10:30 Back in @ 11:12

10

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS
500 FIRST STREET, WOODLAND, CA 95695
(530) 661-0109 Fax: (530) 661-6806

FIELD PURGE DATA
Monitoring Wells

Client: Napa

Date: 6-4-15

Project:

Project No.: 12-1-021

Well ID: SW-1

Measured By: JJM

TOTAL WELL DEPTH (ft)	CASING DIAMETER (in)	STICKUP (ft)	STATIC WATER LEVEL (ft)
	PVC / Steel		

STANDING WATER COLUMN (ft)				WET CASING VOLUME, Vc (gal)	3 Vc (gal)
	x	0.17 (for 2" casing): 0.37 (for 3" casing) 0.65 (for 4" casing): 1.0 (for 5" casing) 1.47 (for 6" casing): 2.61 (for 8" casing) 4.08 (for 10" casing): 5.88 (for 12" casing) 10.45 (for 16" casing): 16.32 (for 20" casing)	=		

Clock Time	Pumping Time (min)	Pump Rate (Hz)	Flow Rate (gpm)	Cumulative Flow (gals)	DTW (ft)	Temp (°F / °C)	pH	Sp. Cond. at 25°C (μs/cm)	Turbidity (NTU)	DO (mg/L)	ORP (milliVolt)	Observations (redox, color, odor, etc.)
1339	—	—	—	—	—	72.35	7.61	12967	25.0	5.0	441	

Water Sample Collection (number of bottles and sample I.D.)

011

Blank 19

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS
500 FIRST STREET, WOODLAND, CA 95695
(530) 661-0109 Fax: (530) 661-6806

FIELD PURGE DATA
Monitoring Wells

Client: Napa
Date: 6-3-15
Project:
Project No.: 12-1-071
Well ID: SW-2
Measured By: JJM

TOTAL WELL DEPTH (ft)	CASING DIAMETER (in)	STICKUP (ft)	STATIC WATER LEVEL (ft)
	PVC / Steel		

STANDING WATER COLUMN (ft)				WET CASING VOLUME, Vc (gal)	3 Vc (gal)
	x	0.17 (for 2" casing): 0.37 (for 3" casing) 0.65 (for 4" casing): 1.0 (for 5" casing) 1.47 (for 6" casing): 2.61 (for 8" casing) 4.08 (for 10" casing): 5.88 (for 12" casing) 10.45 (for 16" casing): 16.32 (for 20" casing)	=		

Clock Time	Pumping Time (min)	Pump Rate (Hz)	Flow Rate (gpm)	Cumulative Flow (gals)	DTW (ft)	Temp (°F / °C)	pH	Sp. Cond. at 25°C (µs/cm)	Turbidity (NTU)	DO (mg/L)	ORP (milliVolt)	Observations (redox, color, odor, etc.)
1315	0	0	0	0	0	65.14	6.96	426	2.43	5.24	477.6	Clear

Water Sample Collection (number of bottles and sample I.D.)

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS
500 FIRST STREET, WOODLAND, CA 95695
(530) 661-0109 Fax: (530) 661-6806

FIELD PURGE DATA
Monitoring Wells

Client: Nafa

Date: 6-4-15

Project:

Project No.: +2-1-071

Well ID: SW-3

Measured By: JJM

TOTAL WELL DEPTH (ft)		CASING DIAMETER (in)		STICKUP (ft)	STATIC WATER LEVEL (ft)
		PVC / Steel			
STANDING WATER COLUMN (ft)	x	0.17 (for 2" casing); 0.37 (for 3" casing) 0.65 (for 4" casing); 1.0 (for 5" casing) 1.47 (for 6" casing); 2.61 (for 8" casing) 4.08 (for 10" casing); 5.88 (for 12" casing) 10.45 (for 16" casing); 16.32 (for 20" casing)	=	WET CASING VOLUME, Vc (gal)	3 Vc (gal)

Clock Time	Pumping Time (min)	Pump Rate (Hz)	Flow Rate (gpm)	Cumulative Flow (gals)	DTW (ft)	Temp (°F / °C)	pH	Sp. Cond. at 25°C (µs/cm)	Turbidity (NTU)	DO (mg/L)	ORP (milliVolt)	Observations (redox, color, odor, etc.)
1246	—	—	—	—	—	68.36	7.74	503	6.87	5.85	430	

Water Sample Collection (number of bottles and sample I.D.) 012

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS
500 FIRST STREET, WOODLAND, CA 95695
(530) 661-0109 Fax: (530) 661-6806

FIELD PURGE DATA
Monitoring Wells

Client: Nafca

Date: 6-4-15

Project:

Project No.: 12-1-071

Well ID: SW-4

Measured By: JJM

TOTAL WELL DEPTH (ft)	CASING DIAMETER (in)	STICKUP (ft)	STATIC WATER LEVEL (ft)
	PVC / Steel		

STANDING WATER COLUMN (ft)				WET CASING VOLUME, Vc (gal)	3 Vc (gal)
	x	0.17 (for 2" casing): 0.37 (for 3" casing) 0.65 (for 4" casing): 1.0 (for 5" casing) 1.47 (for 6" casing): 2.61 (for 8" casing) 4.08 (for 10" casing): 5.88 (for 12" casing) 10.45 (for 16" casing): 16.32 (for 20" casing)	=		

Clock Time	Pumping Time (min)	Pump Rate (Hz)	Flow Rate (gpm)	Cumulative Flow (gals)	DTW (ft)	Temp (°F / °C)	pH	Sp. Cond. at 25°C (µs/cm)	Turbidity (NTU)	DO (mg/L)	ORP (milliVolt)	Observations (redox, color, odor, etc.)
0850	—	—	—	—	—	60.98	7.46	336	1.78	7.16	263.6	

Water Sample Collection (number of bottles and sample I.D.)

14

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS
500 FIRST STREET, WOODLAND, CA 95695
(530) 661-0109 Fax: (530) 661-6806

FIELD PURGE DATA
Monitoring Wells

Client: Napa

Project:

Well ID: SW-5

Date: 6-4-15

Project No.: 12-1-071

Measured By: JJM

TOTAL WELL DEPTH (ft)	CASING DIAMETER (in)	STICKUP (ft)	STATIC WATER LEVEL (ft)
	PVC / Steel		

STANDING WATER COLUMN (ft)				WET CASING VOLUME, Vc (gal)	3 Vc (gal)
	x	0.17 (for 2" casing); 0.37 (for 3" casing) 0.65 (for 4" casing); 1.0 (for 5" casing) 1.47 (for 6" casing); 2.61 (for 8" casing) 4.08 (for 10" casing); 5.88 (for 12" casing) 10.45 (for 16" casing); 16.32 (for 20" casing)	=		

Clock Time	Pumping Time (min)	Pump Rate (Hz)	Flow Rate (gpm)	Cumulative Flow (gals)	DTW (ft)	Temp (°F / °C)	pH	Sp. Cond. at 25°C (µs/cm)	Turbidity (NTU)	DO (mg/L)	ORP (milliVolt)	Observations (redox, color, odor, etc.)
1156	—	—	—	—	—	70.90	7.83	353	2.57	5.34	265	Clear

Water Sample Collection (number of bottles and sample I.D.)

16

NAPA VALLEY GROUNDWATER SUSTAINABILITY:

A BASIN ANALYSIS REPORT FOR THE NAPA VALLEY SUBBASIN

APPENDIX F:

Groundwater Monitoring Protocols

Appendix F

NAPA COUNTY PROCEDURE FOR MEASURING THE DEPTH TO WATER IN MONITORING AND PRODUCTION WELLS

Purpose

To obtain an accurate dated and timed measurement of the static depth to water in a well that can be converted into a water level elevation in reference to a commonly used reference datum (e.g., NAVD 1988). In this context, static means that the water level in the well is not influenced by pumping of the well. For comparability, measurements should be obtained according to an established schedule designed to capture times of both highest and lowest seasonal water level elevations. Also for comparability, measurements during a particular field campaign should be obtained consecutively and without delay within the shortest reasonable time.

Measurement Procedure

- If a well is being pumped, do not measure; return later, but not sooner than 60 minutes and preferably after 24 hours (see below "Special Circumstances" for additional instructions).
- Turn on water level indicator signaling device and check battery by hitting the test button.
- Remove access plug or well cap from the well cover and lower probe (electric sounder) into the well.
- When probe hits water a loud "beep" will sound and signal light will turn red.
- Retract slightly until the tone stops.
- Slowly lower the probe until the tone sounds.
- Note depth measurement at rim (i.e., the surveyed reference point for water level readings) of well to the nearest 0.01 foot and rewind probe completely out of well.
- Remove excess water and lower probe once again into well and measure again.
- If difference is within ±0.02 foot of first measurement, record measurement.
- If difference is greater repeat the same procedure until three consecutive measurements are recorded within ± 0.02 foot.
- Rewind and remove probe from well and replace the access plug or well cap in the well cover.
- Clean and dry the measuring device/probe and continue to next well.

Special Circumstances

Oil Encountered in Well

If oil is detected in the well structure, the depth to the air-oil interface is measured. To obtain such a measurement, the electric sounder is used similar to the way chalked steel tapes were traditionally used for depth-to-water measurements.

1. Lower the cleaned probe well below the air-oil interface (e.g., 1 foot). Read and record the depth at the reference point (since this depth is chosen somewhat arbitrarily by the field

technician, an even number can be chosen, e.g., 37.00 feet). This measurement is the length of cable lowered into the well and corresponds to a line that the oil leaves on the probe or cable (i.e., the oil inundation line). Above this line, smudges of oil may appear on the cable. Below this line, the cable/probe is completely covered with oil. If the probe is lowered too far, completely penetrates the oil, and is far submerged in the water below the oil, parts of the probe/cable below the oil inundation line may also appear smudgy.

2. Retrieve probe, identify and record the oil inundation line on the cable (e.g., 2.72 feet). This measurement does not reflect the thickness of the oil. It reflects the length of the cable below the air-oil interface.
3. Compute the depth to oil by subtracting the length of line below the air-oil interface from the corresponding measurement at the reference point: Depth to oil = 37.00 feet – 2.72 feet = 34.28 feet.

Since oil has a slightly smaller density than water, a depth-to-oil measurement will always be smaller than a corresponding depth-to-water measurement in the same well if oil were not present. Depth-to-oil measurements yield a reasonable approximation to depth-to-water measurements unless the oil thickness is great. For each foot of oil in the well casing, the depth- to-oil measurement will be approximately 0.12 foot smaller than a corresponding depth-to-water measurement if oil were not present.

Pumping Water Level on Arrival

If well is being pumped, do not measure. Return later when the water level has stabilized. Using past field notes, the field technician will use his/her experience to determine the appropriate duration necessary for static measurements. Upon returning to the well site (at a location where pumping was previously noted on the same day), the technician will measure the water level. The technician will have available historical water level data to determine whether the measurement is consistent with past measurements. If the initial measurement appears anomalous, the technician will measure water levels every 10 minutes over a period of 30 minutes.[1]8 If measurements vary significantly from past measurements (taking into account seasonal variations), the technician will note the circumstances (i.e., the date and time when the well was first visited, total time it was pumping (if known), when it was shutoff, when the technician returned, and subsequent water level measurements [on the same day, or as the case may be based on experience, the day immediately following]). Subsequent consideration of pumping effects at a site-specific well location will be addressed as necessary.

Recordation

1. Name of field technician
2. Unique identification of well
3. Weather and site conditions (e.g., clear, sunny, strong north wind, intense dust blowing over wellhead from nearby plowed field; dry ground, easy access)
4. Condition of well structure (e.g., well cap cracked – replaced with new one; wasp hive between well casing and well housing; no action, discuss with project manager)

[1] During this period, if the groundwater level difference is greater [than +/- 0.02 feet], repeat the same procedure until three consecutive measurements are recorded within +- 0.02 foot.

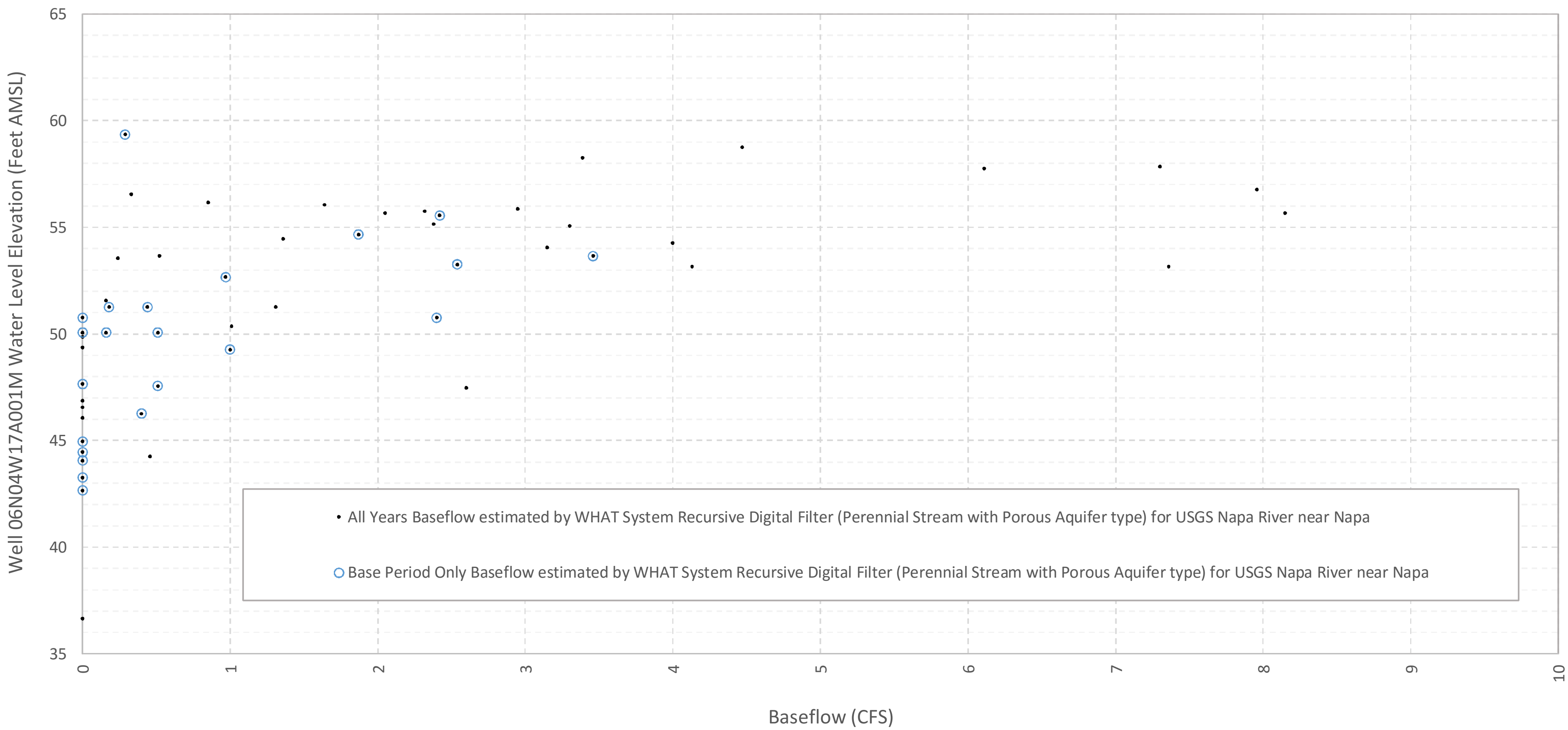
5. Time and date of depth-to-water reading
6. Any other pertinent comments (e.g., sounder hangs up at 33 feet, thus no measurement; or: fifth measurement of ~55.68 feet in a row…residual water in end cap?; or: oil in well…measurement is depth to oil; or: intense sulfur odor upon opening well cap; or: nearby (west ~100 feet) irrigation well pump)

NAPA VALLEY GROUNDWATER SUSTAINABILITY:

A BASIN ANALYSIS REPORT FOR THE NAPA VALLEY SUBBASIN

APPENDIX G:

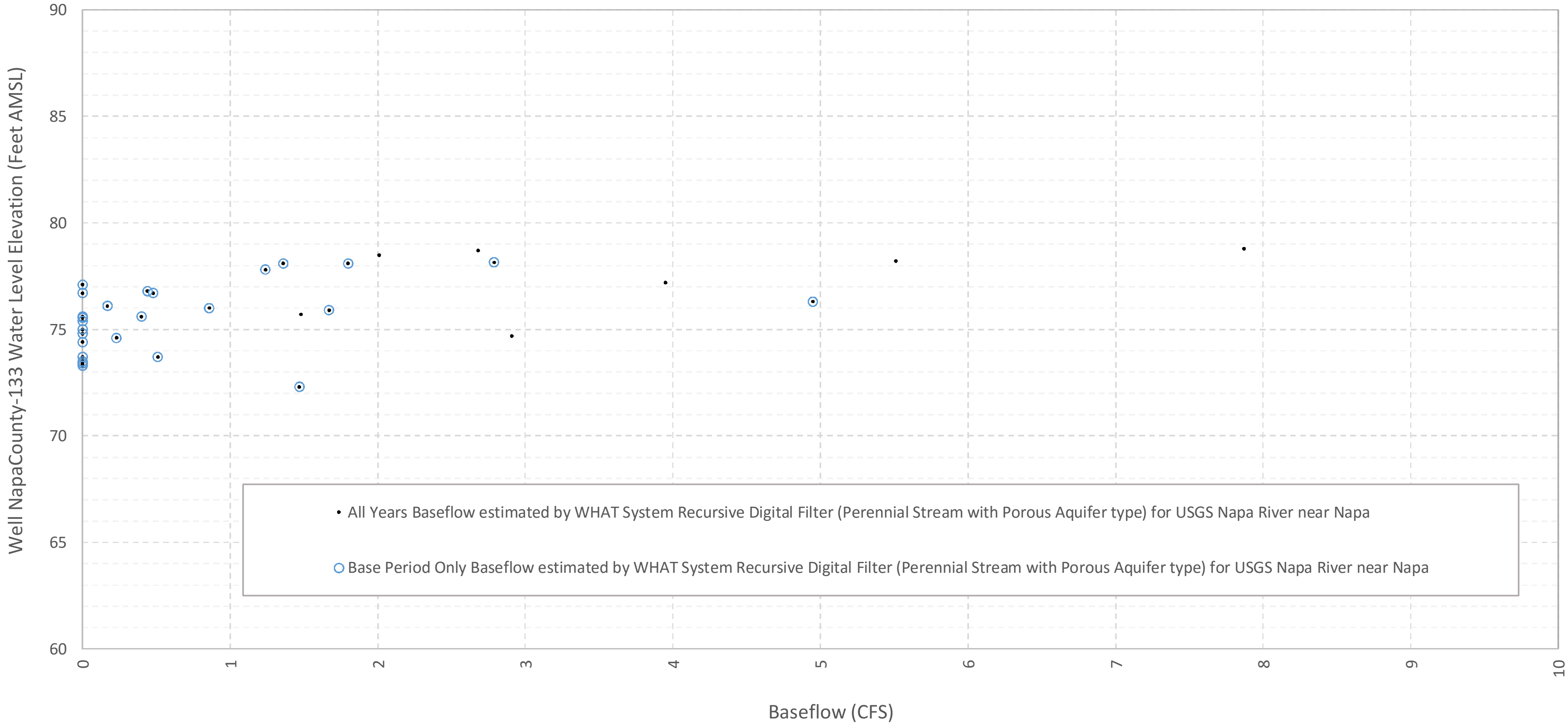
Surface Water-Groundwater Plots for Representative Station Pairs



LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

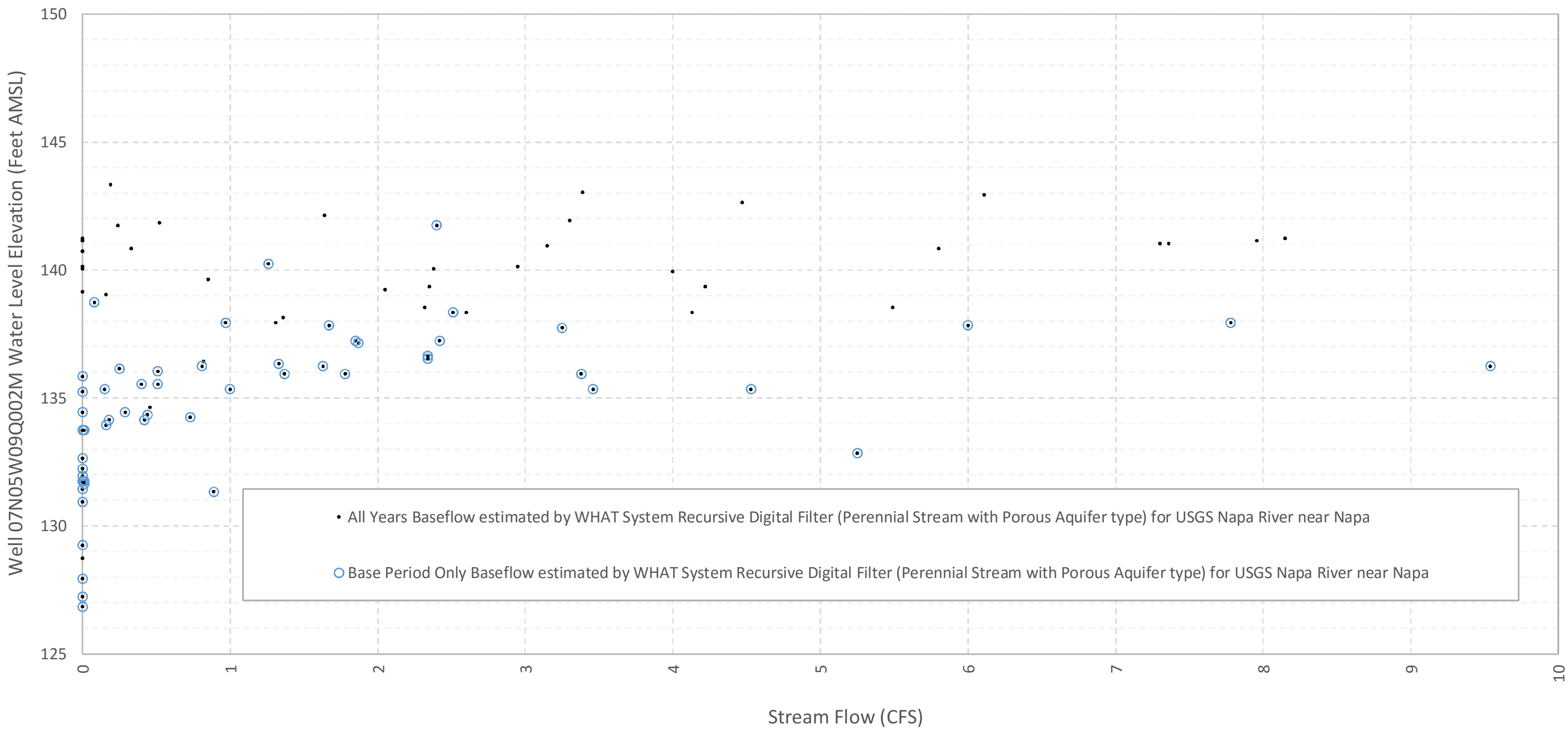
Appendix 4-1

Baseflow USGS Napa River Near Napa and Well 06N04W17A001M Groundwater Elevation (All Years and Base Period, Fall)



LUHDORFF & SCALMANINI CONSULTING ENGINEERS

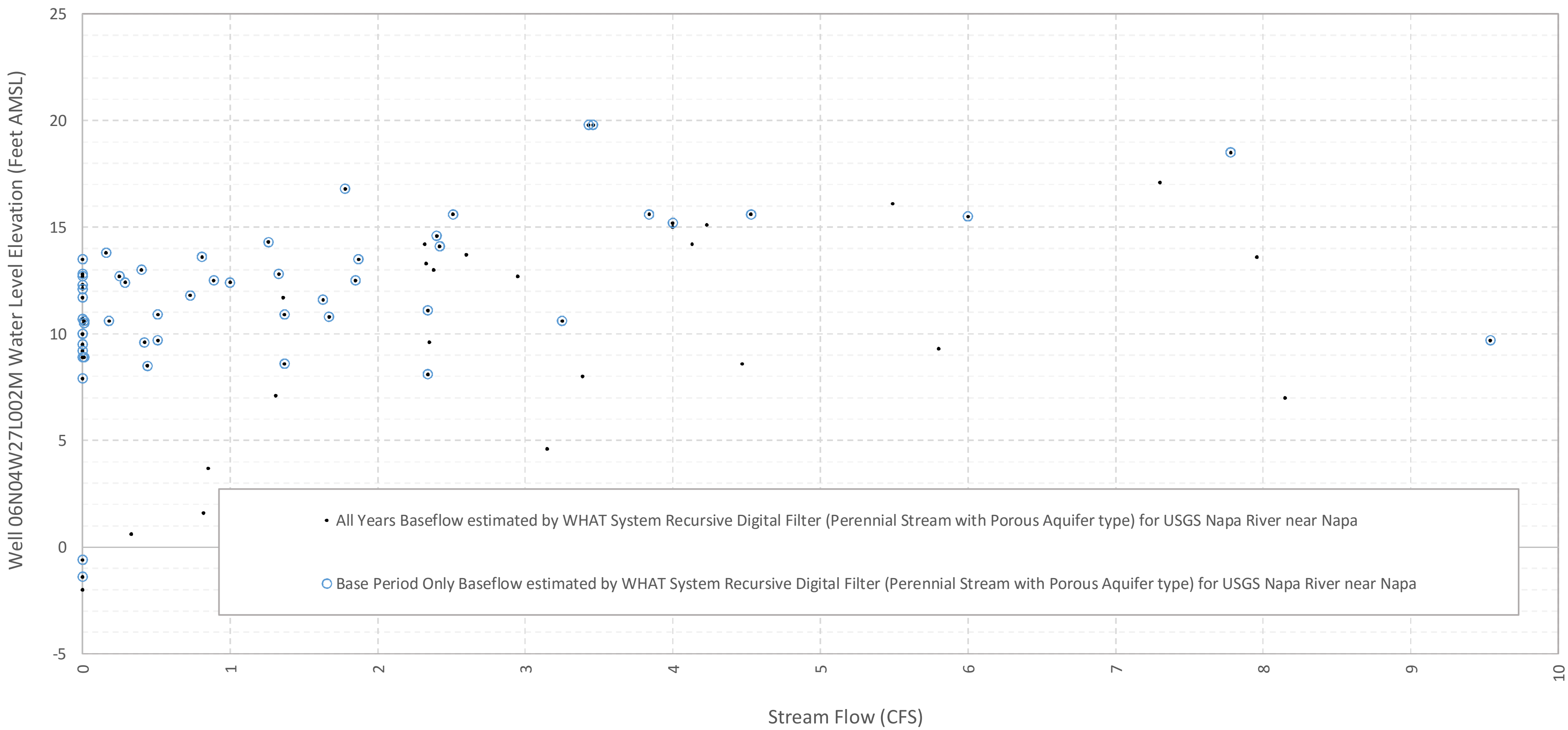
Appendix 4-2
Baseflow USGS Napa River Near Napa and Well NapaCounty-133 Groundwater Elevation (All Years and Base Period, Fall)



LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

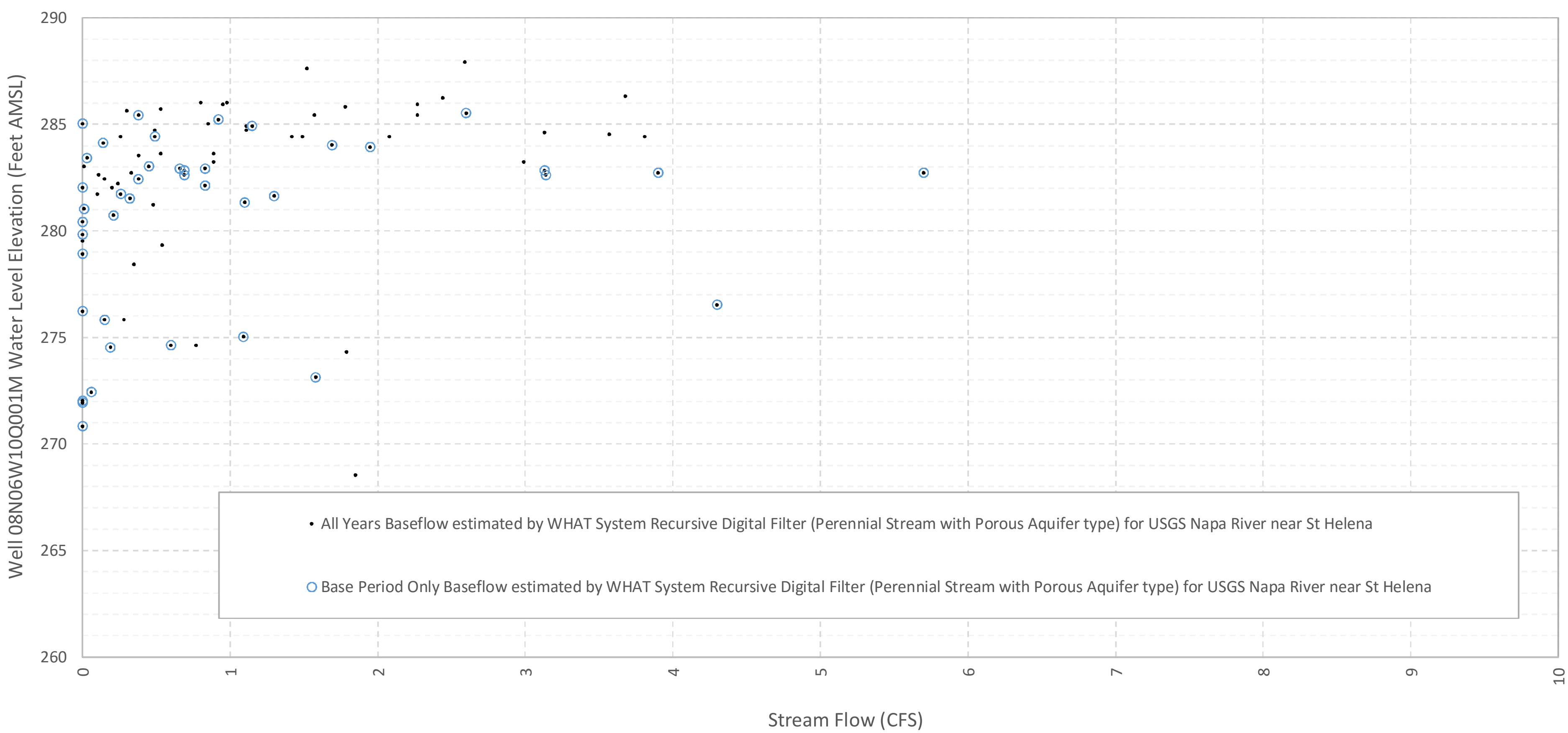
Appendix 4-3

Baseflow USGS Napa River Near Napa and Well 07N05W09Q002M Groundwater Elevation (All Years and Base Period, Fall)



LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

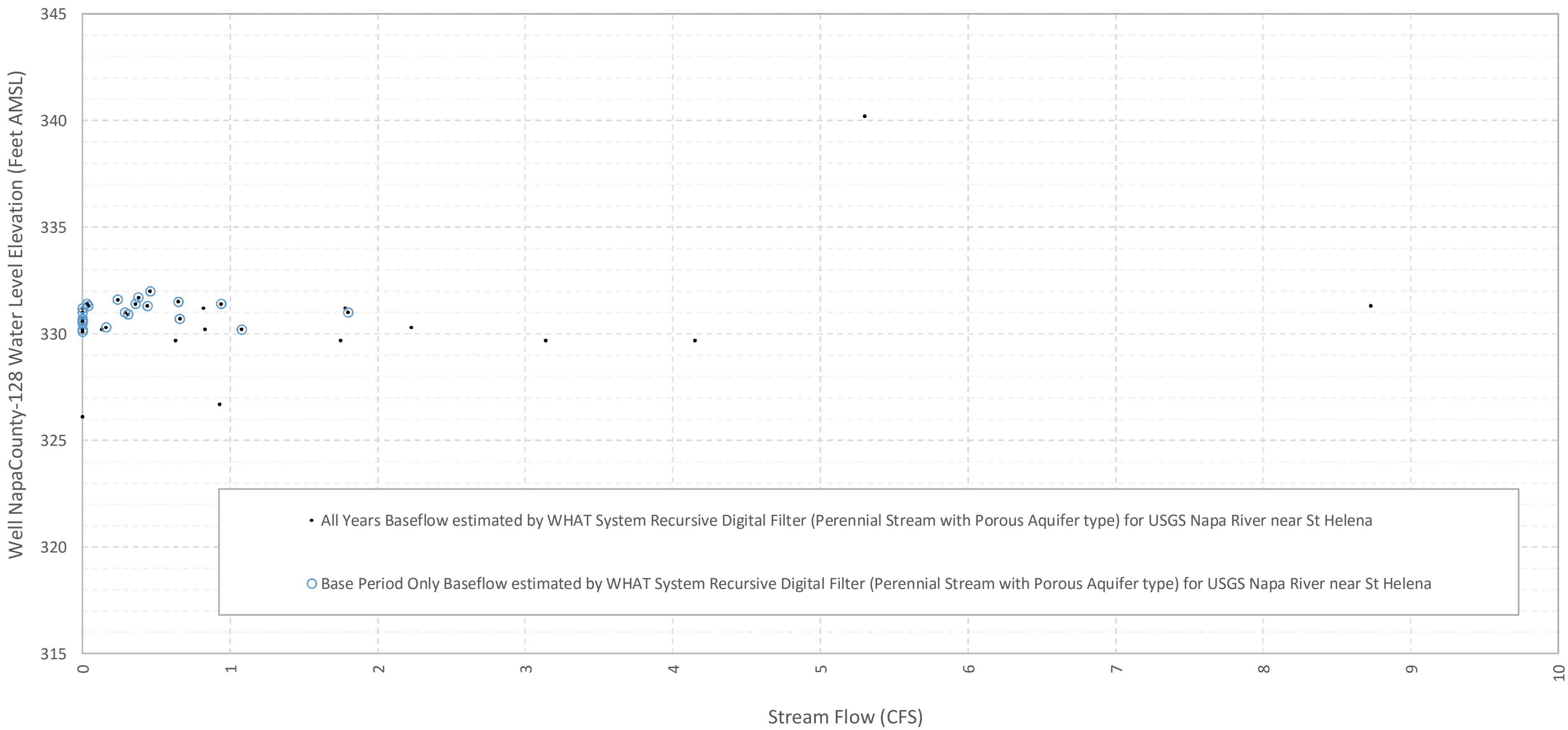
Appendix 4-4
Baseflow USGS Napa River Near Napa and Well 06N04W27L002M Groundwater Elevation (All Years and Base Period, Fall)



LUHDORFF & SCALMANINI CONSULTING ENGINEERS

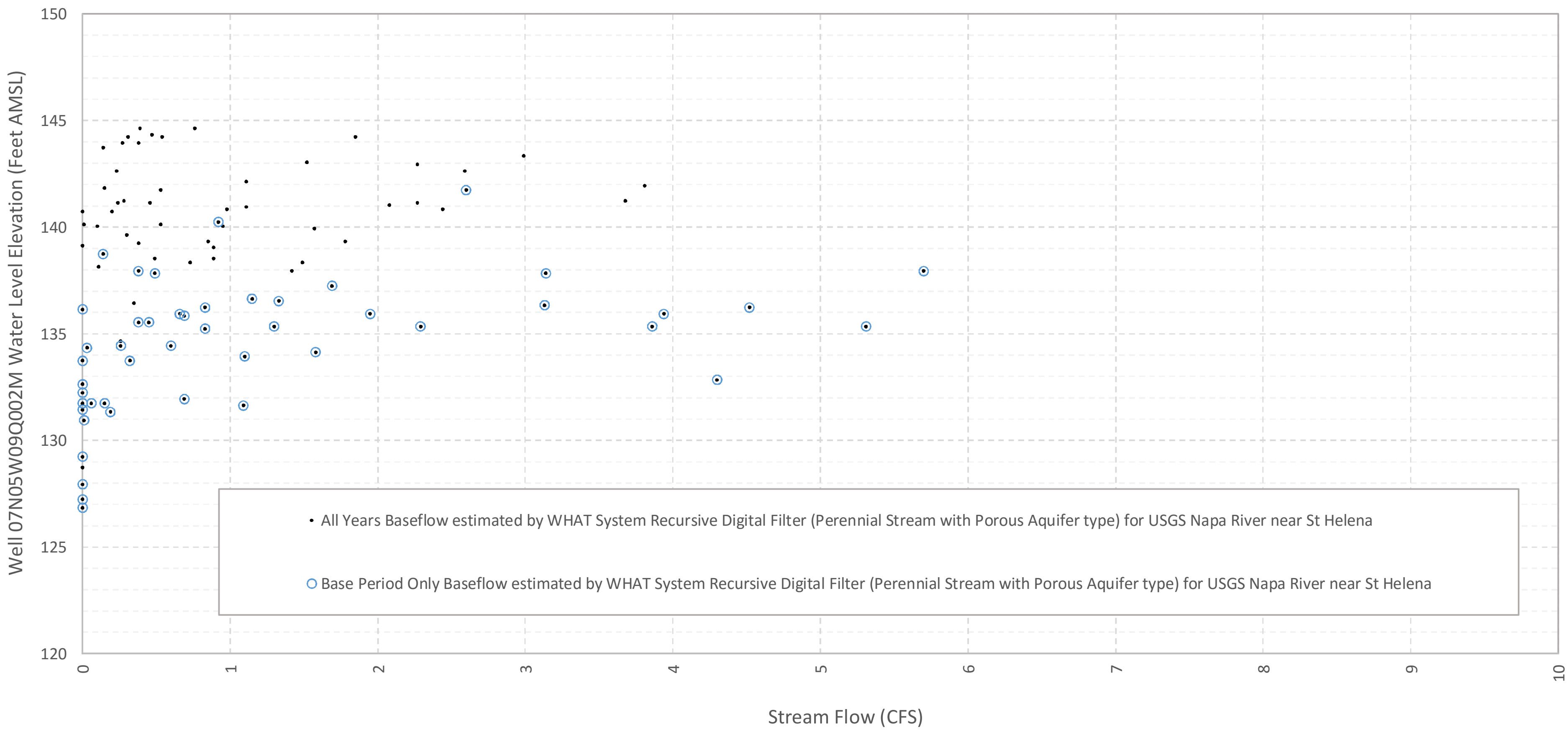
Appendix 4-5

Baseflow USGS Napa River Near St Helena and Well 08N06W10Q001M Groundwater Elevation (All Years and Base Period, Fall)



LUHDORFF & SCALMANINI CONSULTING ENGINEERS

Appendix 4-6
Baseflow USGS Napa River Near St Helena and Well NapaCounty-128 Groundwater Elevation (All Years and Base Period, Fall)



LUHDORFF & SCALMANINI CONSULTING ENGINEERS

Appendix 4-7
Baseflow USGS Napa River Near St Helena and Well 07N05W09Q002M Groundwater Elevation (All Years and Base Period, Fall)

NAPA VALLEY GROUNDWATER SUSTAINABILITY:

A BASIN ANALYSIS REPORT FOR THE NAPA VALLEY SUBBASIN

APPENDIX H:

Napa County's Voluntary Groundwater Level Monitoring, Data Management and Disclosure

Napa County's Voluntary Groundwater Level Monitoring

Data Management and Disclosure

The Voluntary Groundwater Level Monitoring Program has two participation levels; each having different levels of data management and disclosure. The County will make every effort to keep the data it collects confidential. However, the County cannot guarantee that all data provided will be kept confidential if a Public Records Act request is filed.

California Water Code §13752 was amended in 2015 to allow public access to Well Completion Reports. However, the law requires the Department of Water Resource to comply with The Information Practices Act of 1977, redacting personal information from the Well Completion Reports before making them public. Please see: http://www.water.ca.gov/groundwater/wells/well_completion_reports.cfm for more information.

1) **Napa County Program**

- Groundwater level measurements are collected twice a year (spring and fall) and reported to the well owner if requested.
- Well construction details, well location, reference and ground surface elevations and water elevation data will be kept confidential as permitted by law and will not be made available to the public (see disclosure statement above). The water elevation data collected will be used internally by the County to gain a better understanding of general groundwater level conditions across the County's groundwater basins.
- Groundwater quality testing (if applicable) is conducted twice a year (spring and fall) and reported to the well owner.
- Level of Disclosure: **Low**
  - Well construction detail, location, ground surface elevation, and water elevation data NOT made available to the public. Data collected will be used internally by the county to understand general groundwater level fluctuations across the larger basin. Groundwater quality testing (if applicable) conducted twice annually in April and October and reported to the well owner.

2) **California Statewide Groundwater Elevation Monitoring (CASGEM) Program**

- Groundwater level measurements are collected twice a year (spring and fall) and reported to the well owner if requested.
- Well construction detail (including completion type, total depth, construction data, screen intervals [if available], whether or not a well completion report available [y/n], report # [if available], well location, reference and ground surface elevations, and water elevation data) will be made available to the public via websites (State and/or County) or through other means. Data is available on the CASGEM website at: http://www.water.ca.gov/groundwater/casgem/.
- All information provided to CASGEM should be assumed to be available to the public.
- Level of Disclosure: **High**
  - Well construction detail, completion type, total depth, construction data, screen intervals (if available), whether or not a well completion report is available (y/n), report # (if available), well location, ground surface elevation, and water elevation data are made available to the public via websites (State and/or County or through other means. Data Currently available on:

    http://www.water.ca.gov/groundwater/casgem/

Napa County's Voluntary Groundwater Level Monitoring

Frequently Asked Questions for Well Owners

What is the Voluntary Groundwater Level Monitoring Program and why is it important?

The Voluntary Groundwater Level Monitoring Program provides the opportunity to measure the depth to groundwater in wells throughout the County twice per year. Monitoring groundwater elevation helps assess the overall status of Napa County aquifers. The expanding network of privately owned volunteer wells augments County data from publicly monitored wells.

What is required to participate?

Participating well owners must sign an agreement allowing (1) the release of depth-to-groundwater data and (2) access to the property, allowing Napa County Department of Public Works or its contractor to access the well to measure the groundwater elevations twice per year.

Who collects the well measurements and how often are measurements taken?

Groundwater measurements are taken by the Napa County Department of Public Works or its contractor. Measurements generally take place twice per year in the spring and fall.

How will the collected information be used?

The information will be used to monitor and track groundwater levels, understand the relationship between surface water and groundwater, maintain a central database of monitoring results, and improve the accuracy and reliability of relevant water resource models.

What does participation mean to well owners?

Volunteers will (1) receive accurate groundwater level readings twice per year (spring and fall), (2) be able to see seasonal and long-term groundwater level trends of their well, (3) receive water quality data if testing is agreed to and conducted, and (4) gain improved understanding of our groundwater resources countywide.

Will the County measure how much water I use?

No. The amount of groundwater used is not measured. The only measurement taken is the depth to groundwater in the well (water level). If water quality testing is available and agreed to, a sample of well water will be collected and sent to an independent testing laboratory for analysis.

Will someone try to curtail my groundwater use if I participate in the program?

No. The Voluntary Groundwater Level Monitoring Program is a non-regulatory, volunteer program that only measures the groundwater elevation/level (and quality if testing is available and agreed to) in volunteer wells. Groundwater use is not being measured or monitored as part of this program.

Will my well information be kept confidential?

Napa County will make every effort to maintain the confidentiality of a well owner's information. However, such information could be accessed through a public records request. In such a case the County will notify the owner.

Scan with your phone to sign up for the groundwater list serve

http://www.countyofnapa.org/groundwater/

NAPA VALLEY GROUNDWATER SUSTAINABILITY:

A BASIN ANALYSIS REPORT FOR THE NAPA VALLEY SUBBASIN

APPENDIX I:

Water Availability Analysis

(guidance document)

WATER AVAILABILITY ANALYSIS (WAA)

Adopted May 12, 2015

Contents

Introduction and Purpose

The County is required by the California Environmental Quality Act (CEQA) (Public Resources Code 21000–21177) and the CEQA Guidelines (California Code of Regulations, Title 14, Division 6, Chapter 3, Sections 15000–15387) to conduct an environmental analysis of all discretionary permits submitted for approval. CEQA requires analysis of literally dozens of environmental aspects, including the following:

"Would the project substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?"

The purpose of this document, the Water Availability Analysis (WAA), is to provide guidance and a procedure to assist county staff, decision makers, applicants, neighbors, and other interested parties to gather the information necessary to adequately answer that question. The WAA is not an ordinance, is not prescriptive, and project specific conditions may require more, less, or different analysis in order to meet the requirements of CEQA. However, the WAA is used procedurally as the baseline to commence analysis of any given discretionary project.

A Water Availability Analysis is required for any discretionary project that may utilize groundwater or will increase the intensity of groundwater use of any parcel through an existing, improved, or new water supply system[1]. As such, it will most commonly be used for discretionary development applications using groundwater such as wineries and commercial uses. Since CEQA does not apply to non-discretionary ("ministerial") projects, it does not apply to projects such as building permits, single family homes, track II replants, etc. While discretionary vineyard projects are welcome to borrow from the WAA, such vineyard projects, due to their size and scope, generally receive a much more exhaustive analysis under longstanding processes managed by the Conservation Division of the Planning Building & Environmental Services (PBES) Department.

The WAA may also apply when a discretionary Groundwater Permit is required by the Groundwater Conservation Ordinance, Section 13.15.010 of the Napa County Code. The ordinance's provisions are summarized below. (Should there be any conflict between the summary below and the Ordinance, the Ordinance shall prevail).

Outside of Designated Groundwater Deficient Areas

Most non-discretionary development in any area of the county, except for designated groundwater deficient areas, is exempt from the need to secure any type of groundwater permit. This includes projects to develop an on-site or off-site water source serving agriculture, projects to construct or develop rainwater harvesting or graywater recycling systems and minor and convenience water supply system improvements (see definitions in 13.15.010). Other

[1] The Groundwater Conservation Ordinance (Section 13.15.010) defines a water supply system as "any system including the water source the purpose of which is to extract and distribute groundwater".

exemptions outside groundwater deficient areas include projects such as building permits, well and septic permits, lot line adjustments, track II replants, etc. The following, however, are not exempt:

- Projects to develop or improve a water supply to serve *more* than a single contiguous parcel (agricultural development for multiple contiguous parcels is eligible for an exemption under certain conditions) or
- Projects that can be served by a public water supply.

Within Designated Groundwater Deficient Areas

Most any type of development in groundwater deficient areas (as defined in Napa County Code, Section 13.15.010.C) will trigger the need for a discretionary groundwater permit unless specifically exempted or unless eligible for a ministerial groundwater permit (see 13.15.030C). Ministerial groundwater permits are specifically for (1) a single family residence with associated well and landscaping when no other uses exist on the property, or (2) for agricultural re-plants. Specific exemptions include applications to construct or develop rainwater harvesting or graywater recycling systems and minor and convenience improvements (see definitions in 13.15.010) which include:

- Changes to existing water supply systems for the purposes of repair or rendering a system more efficient or to add to or improve existing legal uses on a property such as swimming pools (if provided with a cover and initially filled with trucked in water),
- Replacement dwellings (when an existing legal dwelling unit had previously existed on the property),
- Additional potential bedrooms whether or not attached to the single-family dwelling, and replacement of a site's existing well (provided the old well is destroyed and the new well is drilled to the same or smaller diameter as the existing well) are all exempt.

WAA Procedure

The Water Availability Analysis (WAA) uses a screening process for discretionary permit applications (both for new projects and for project modifications that change groundwater use) and determines if a proposal may have an adverse impact on the groundwater basin as a whole or on the water levels of neighboring non-project wells or on surface waters.[2] The WAA also provides procedures for further analysis when screening criteria are exceeded. An important sidelight to the process is public education and awareness. The WAA is based on an application which requires the applicant to gather information about existing non-project groundwater wells and water uses at the applicant's site, to describe planned project well operations, to document existing uses of groundwater on the property, and to estimate future water

[2] For the purposes of this procedure, surface waters are defined to include only those surface waters known or likely to support special status species or surface waters with an associated water right; however, as with all of the procedures in this WAA, there may be unique circumstances that require additional site-specific analysis to adequately evaluate a project's potential impacts on surface water bodies.

demands associated with the proposed project. In addition, other information relating to the geology, proximity to surface water bodies (e.g., river, creeks, etc.), and the location and construction of existing non-project wells located near the applicant's property or project well(s) will also be important to evaluate, as warranted, for the potential for well interference and effects on surface water. County staff can provide assistance to the applicant in obtaining and reviewing the latter information as part of the application data collection process.

WAA Application Procedure

A WAA groundwater permit application may be prepared by the applicant or their agent. (NOTE TO PUBLIC: PBES WILL CREATE/UPDATE AN APPLICATION FORM BASED ON THIS DOCUMENT ONCE APPROVED). **It must be signed by the applicant. If prepared by the applicant's agent, it must contain the letterhead of the agent, the name of the agent, and the agent's signature.** The WAA application contains the following information:

1. The name and contact information of the property owner and the person preparing the application.

2. Site map of the project parcel and adjoining parcels. The map should include: Assessor's Parcel Number (APN), parcel size in acres, location of existing or proposed project well(s) and other water sources, general layout of structures on the subject parcel, location of agricultural development and general location within the county. Approximate locations of existing non-project wells on other parcels within 500 feet of the existing or proposed project well(s) should also be identified based on the applicant's knowledge and available public information. All surface waters within 1500 feet of the existing or proposed project well(s) should also be identified, based on the applicant's knowledge and available public information. County staff can provide assistance to the applicant in obtaining adjacent well location, APNs and parcel size information.

3. A narrative on the nature of the proposed project, including all land uses on the subject parcel, projected future water uses in normal and dry years, details of current and proposed operations related to water use, description of interconnecting plumbing between the various water sources and any other pertinent information.

4. Tabulation of existing water use compared to projected water use for all land uses current and proposed on the parcel. Should the water use extend to other parcels, they should be included in the analysis (see Appendix E for additional information on determining water use screening criteria when multiple parcels are involved). **These estimates should reflect the specific requirements of the applicant's operations.** Guidelines attached in **Appendix B** are an example of one way to calculate projected water demand. The applicant shall use these, other publicly available guidelines, other guidelines that may be provided by the Department of Planning, Building, and Environmental Services (PBES), or project specific estimates, whichever best approximate the proposed water use for the specific project and account for all other existing water uses at the subject parcel(s).

PBES and Public Works (PW) staff will review the application for completeness and reasonableness, review the County's groundwater data management system for additional information about the characteristics of the areas/basin and nearby wells, compare the analysis to the screening criteria, and determine if additional analysis is required. In reviewing available information, County staff will consider:

1. The characteristics of the groundwater area or basin (such as confined or unconfined aquifer system; alluvial or hard rock geological setting) and related aquifer properties; and,
2. The location and present use of all existing non-project wells that are within 500 feet of the project well(s), identifying well depths and construction information for existing wells, if known; and,
3. The distance to surface waters within 500 feet of any Very Low pumping capacity project well(s) or 1500 feet of project well(s) with a capacity greater than 10 gallons per minute (gpm). [3]

Screening Criteria

Applications will be evaluated based on project information, to be provided by the applicant, and available geologic and hydrologic information, to be provided by County staff. As shown in **Table 1,** projects on the Napa Valley Floor and the Milliken-Sarco-Tulucay (MST) that meet the Tier 1 criteria (water use) will generally not be subject to second tier criteria evaluation, unless substantial evidence[4] in the record indicates the need to do so. Parcels in all other areas will generally be required to conduct a Tier 2 evaluation. Projects will be subject to Tier 3 criteria and analysis only when substantial evidence in the record determines the need for such analysis. All criteria are based on information outlined in this procedure, as well as a detailed conceptualization of hydrogeologic conditions in the Napa Valley and substantial evidence in the form of monitoring and hydrologic data, past studies, and well drillers' logs. Procedures for three tiers of screening criteria will be used on each project as designated herein and as needed for projects with unique issues:

---

[3] For the purposes of this WAA, "very low pumping capacity wells" are defined as wells with a casing diameter of six inches or less and an installed pump capable of producing less than 10 gallons per minute (gpm). Pumping capacities referenced throughout this WAA were developed as part of a separate analysis of potential streamflow depletion in unconsolidated alluvial settings. Details of this analysis are provided in a separate Technical Memorandum (LSCE, 2013).

[4] Substantial evidence is defined by case law as evidence that is of ponderable legal significance, reasonable in nature, credible and of solid value. The following constitute substantial evidence: facts, reasonable assumptions predicated on facts; and expert opinions supported by facts. Argument, speculation, unsubstantiated opinion or narrative, or clearly inaccurate or erroneous information do not constitute substantial evidence.

Table 1: Project Screening Criteria Applicability

Tier	Criteria Type	Napa Valley Floor	MST	All Other Areas
1	Water Use	Yes	Yes	Yes
2	Well and Spring Interference	No[1]	No[1]	Yes
3	Groundwater/Surface Water Interaction	No[1]	No[1]	No[1]

1. Further analysis may be required under CEQA if substantial evidence, in the record, indicates a potentially significant impact may occur from the project.

The three tiers of screening criteria are discussed below. **Appendices B-F** provide additional detail.

Tier 1--Water Use Criteria

For projects on the Napa Valley Floor and in the MST, water use criteria will be compared to the water use estimate provided by the applicant in the WAA application. Water use criteria vary according to the location of the project parcel(s). As such, projects must meet the applicable water use criterion, through project revisions or water use estimate refinements, if necessary and reasonable, in order to be considered in compliance with this criterion.

Table 2A presents the water use criteria. Napa Valley Floor areas include all locations that are within the Napa Valley except for areas specified as groundwater deficient areas. Groundwater deficient areas are areas that have been so designated by the Board of Supervisors. PBES staff can assist the applicant with determining which area a project is located in.

Currently the only designated groundwater deficient area in Napa County is the MST Subarea. Areas of the county not within the Napa Valley Floor or the MST Groundwater Deficient Area are classified as All Other Areas. Public Works can assist applicants in determining the correct classification for project parcel(s). **Appendix B** contains a discussion of the origins of these water use criteria.

Table 2A: Water Use Criteria

Project parcel location	Water Use Criteria (acre-feet per acre per year)
Napa Valley Floor	1.0
MST Groundwater Deficient Area	0.3 or no net increase, whichever is less [1]
All Other Areas	Parcel Specific [2]

1. Does not apply to the Ministerial Exemption as outlined in the Groundwater Conservation Ordinance
2. Water use criteria for project shall be considered in relation to the average annual recharge available to project property, as calculated by the applicant or their consultant.

In general, the acceptable water use screening criterion for parcels located on the Napa Valley Floor is 1 acre-foot per acre of land per year (an acre-foot of water is the amount of water it takes to cover one acre of land to a depth of one foot, or 325,851 gallons). Therefore, a 40-acre parcel will meet this criterion if the projected groundwater use would not exceed 40 acre-feet per year.

Areas designated as groundwater deficient areas as defined in the Groundwater Conservation Ordinance will have criteria established for that specific area. For example, the MST Subarea screening criterion is 0.3 acre-feet per acre per year or "no net increase" over existing conditions, whichever is less (see **Appendices B and C**).

Water Use Criterion including Estimated Recharge

The water use criterion for parcels termed All Other Areas (i.e. not located in the Napa Valley Floor or a groundwater deficient area), will be determined on a parcel specific basis. No single criterion can be established for "All Other Areas" due to the uncertainty of the geology, and the increasingly fractured rock aquifer systems in the mountainous and non-Napa Valley areas, including Carneros, Pope Valley, Wooden Valley, and Capell Valley. The project applicant will need to estimate the average annual recharge occurring on the project parcel(s) and consider the amount of recharge relative to the estimation of project water use (e.g., all current and projected water demands for the property on which the planned project is located). The estimate of average annual recharge can be made by various methods including water balance methods. The selected method should be based on data from the parcel or watershed where the proposed project is located. The estimated project water use, including existing and proposed uses of water on the project parcel(s), shall include estimates for normal and dry water years. If an alternative water source will be used for dry years (e.g. trucked in water for non-potable uses), that information shall be provided by the applicant along with the alternate source location and estimated water volume.

Projects on the Napa Valley Floor and in the MST that meet the Tier 1 screening criteria are considered to be in compliance with the standards of the WAA, unless other substantial evidence in the record indicates the need for further evaluation. Projects in "All Other Areas" shall complete Tier 1, and then proceed to Tier 2.

Tier 2--Well and Spring Interference Criterion

When applicable (see **Table 1**), the Tier 2 well interference criterion is presumptively met if there are no non-project wells located within 500 feet[5] of the existing or proposed project well(s). For those projects with neighboring wells located within 500 feet of the project well(s), additional evaluation will be required to assess the potential drawdown in those existing wells resulting from project well operation relative to the Tier 2 criterion described below. Though highly recommended, if the neighboring well is located on a parcel that is also owned by the applicant, the Tier 2 evaluation for that well may be waived, however certain safeguards must be in place to ensure that the water allotment and transfer between parcels is clearly documented and

[5] Distance is measured horizontally from the well.

recorded, especially in cases where the water from more than one parcel will ultimately serve a use on a single parcel (see **Appendix E**).

The potential interference will be determined based on data including the distance between the project well(s) and the neighboring non-project well(s), the hydrogeologic setting, and well construction information and operational configurations for the project well(s). Well construction information and operational configurations provided by the applicant will include:

- the planned pumping rate of well(s)[6],
- well depth(s),
- well screen intervals and
- well seal locations.

Table 2B presents default well interference criteria that the County may apply in the determination of significant adverse effects. The minimum significant drawdown values presented in **Table 2B** are intended for use in cases where information about existing non-project wells is limited or non-existent. However, when the status and configuration of an existing non-project well are known, for example the depths of screen intervals, locations of any annular seals, and/or water levels in the well and the pump depth setting, then site-specific measures of significance should be used. Site-specific measures of significance should also account for known seasonal variations[7] in groundwater elevations in the vicinity of the proposed project and mutual well interference (i.e., interference between the planned project well usage (new and/or existing) and one or more neighboring wells. County staff shall inform the applicant of the site-specific Tier 2 well interference criteria that will be applied in the evaluation of a project before the applicant conducts a site-specific analysis.

Table 2B. Default Well Interference Criteria

Type of wells within 500 ft. screened within the same aquifer as project well	**Estimated Drawdown at Neighboring Non-Project Wells**
Wells with a casing diameter of six inches or less	10 feet
Wells with a casing diameter greater than six inches	15 feet

[6] Estimates of well yield shown on driller's logs are not sufficient for this purpose. The planned pumping rate should be determined based on the pump and related equipment installed, or planned to be installed, in the well and, if available, constant rate aquifer test data for tests conducted for a minimum of 8 hours.

[7] As used here, seasonal variations refer to typical changes over the course of a year.

Low pumping capacity project wells in unconfined aquifers will typically require a minimum amount of information due to the limited drawdown that they induce. [8]

Springs

Napa County enjoys the occurrence of many natural springs, and the potential for planned projects to affect spring flow has been considered. A spring is defined as: "A place where groundwater flows naturally from a rock or the soil onto the land surface or into a body of surface water. Its occurrence depends on the nature and relationship of rocks, esp. permeable and impermeable strata, on the position of the water table, and on the topography" (Jackson, J. 1997. *Glossary of Geology*. American Geological Institute). Springs can be formed by multiple causes, including the interception of groundwater by the land surface; permeability differences that can cause groundwater to emerge; flow from faults or fractures; and drainage from landslides. Springs are ephemeral geologic features which may cease to flow due to natural causes such as changes to flow paths, water level declines, porosity lost by mineral precipitation, or sediment plugging.

Because springs originate as groundwater, springs are eligible for WAA Tier 2 analysis. It is required that any proposed project wells within 1,500 feet[9] of natural springs that are being used for domestic or agricultural purposes be evaluated to assess potential connectivity between the part of the aquifer system from which groundwater is planned to be produced and the spring(s). Springs exist in complex hydrogeologic environments. Other substantial evidence in the record may result in the need for such an analysis even though the spring(s) is located a greater distance from the planned well site. Where evaluation of potential connectivity between the project well(s) and springs is required, site-specific spring interference criteria will be established as appropriate for the springs(s) under consideration.

Although the Tier 2 analyses described above relate to mutual well interference and the avoidance of significant interference, potential pumping effects on springs may result in spring flow depletion. Springs are also commonly observed in locations where little to no quantitative records have been kept relating to the spatial occurrence or temporal variability of spring flow. Therefore, projects located in the vicinity of springs, where potential impacts of pumping are possible but unknown, may require monitoring and further analysis.

Tier 3--Groundwater/Surface Water Interaction Criteria
Tier 3 analysis is only conducted when substantial evidence in the record determines the need for such an analysis.

The groundwater/surface water criteria are presumptively met if the distance standards and project well construction assumptions are met (see **Tables 3, 4, and 5).** The distance standards vary according to groundwater pumping capacity, well construction information and operational

---

[8] For the purposes of this WAA, low pumping capacity wells are defined as wells with a casing diameter of six inches or less and an installed pump capable of producing between 10 gpm up to 30 gpm. As shown in Appendix F, Table F-6, a well pumping 30 gpm continuously for one day in an unconfined aquifer, even in an aquifer with a low hydraulic conductivity, is expected to induce a drawdown of two feet or less at radial distances as small as 25 feet.

[9] Distance is measured horizontally from the well.

configurations for the project well(s), and aquifer properties as described in **Appendix F**. The criteria are also based on a 140-day period to account for the effect of groundwater withdrawal on surface waters throughout the dry season (typically late May through early October).

The distance standards and construction assumptions in **Tables 3, 4, and 5** are provided as examples of conditions that, if applicable, would be expected to preclude any significant adverse effects on surface waters. The distance standards and construction assumptions in **Tables 3, 4, and 5** were developed as part of a separate analysis of streamflow depletion for surface waters and wells in unconsolidated alluvial geologic settings (LSCE, 2013). Project wells located in other geologic settings, particularly consolidated formations more common in locations deemed All Other Areas, will be subject to other distance standards based on site-specific aquifer conditions. Distance standards for project wells completed in consolidated formations will generally be no more restrictive than those shown in **Tables 3, 4, and 5** for hydraulic conductivity values of 0.5 ft/day.

The distance standards and construction assumptions in **Tables 3, 4, and 5** are not intended to serve as absolute setback criteria. Instead, if the proposed project is located in an equivalent geologic setting but does not meet the distance standards and conform to the associated well construction assumptions (See **Tables 3, 4, and 5)**, then additional analysis will be required to determine project impacts relative to site-specific criteria. The site-specific groundwater/surface water interaction criteria will be established as appropriate for the surface water(s) under consideration[10] (see **Appendix F**).

Additional evaluation will be required to identify the potential for impacts of very low pumping capacity wells within 500 feet[11] of surface waters, low pumping capacity wells within 1000 feet of surface waters, and moderate to high pumping capacity wells within 1500 feet of surface waters, as described in **Appendix F**.[12] The potential impacts will be determined based on data including distance(s) between the project well(s) and the surface water features of concern, the hydrogeologic setting, the streambed (or equivalent feature) hydraulic properties, and well construction information and operational configurations for the proposed project wells. Well construction information and operational configurations provided by the applicant will include:

- the planned pumping rate of well(s) [13],
- well depth(s),
- well screen intervals and
- well seal locations.

[10] Site-specific criteria will be developed to address project impacts on beneficial uses of affected surface waters.

[11] Distance is measured horizontally from the well.

[12] For the purposes of this WAA, moderate to high pumping capacity wells are defined as wells with a casing diameter greater than six inches and an installed pump capable of producing more than 30 gpm

[13] Estimates of well yield shown on driller's logs are not sufficient for this purpose. The planned pumping rate should be determined based on the pump and related equipment installed, or planned to be installed, in the well and, if available, constant rate aquifer test data for tests conducted for a minimum of 8 hours.

Very low pumping capacity wells in unconfined aquifers will typically require a minimum amount of information due to the limited potential for surface water flow depletion. Other well types located at distances of 1500 feet or greater from surface waters will also likely require a minimum amount of information, particularly when it can be shown that the project well targets aquifer units not hydraulically connected to surface water.

Table 3. Well Distance Standards and Construction Assumptions; Very low capacity pumping rates (i.e., less than 10 gpm), constructed in unconsolidated deposits in the upper part of the aquifer system (unconfined aquifer conditions).

Aquifer Hydraulic Conductivity (ft/day)	Acceptable Distance from Surface Water Channel			Minimum Surface Seal Depth (feet)	Depth of Uppermost Perforations (feet)
	500 feet	1000 feet	1500 feet		
80	✓			50	100
50	✓			50	100
30	✓			50	100
0.5	✓			50	100

Table 4. Well Distance Standards and Construction Assumptions; Low capacity pumping rates (i.e., between 10 gpm and 30 gpm), constructed in unconsolidated deposits in the upper part of the aquifer system (unconfined aquifer conditions).

Aquifer Hydraulic Conductivity (ft/day)	Acceptable Distance from Surface Water Channel			Minimum Surface Seal Depth (feet)	Depth of Uppermost Perforations (feet)
	500 feet	1000 feet	1500 feet		
80			✓	50	150
50			✓	50	150
30			✓	50	100
0.5		✓		50	100

Table 5. Well Distance Standards and Construction Assumptions; Moderate to high capacity pumping rates (i.e., greater than 30 gpm), constructed in unconsolidated deposits in the upper part of the aquifer system (unconfined aquifer conditions).

Aquifer Hydraulic Conductivity (ft/day)	Acceptable Distance from Surface Water Channel			Minimum Surface Seal Depth (feet)	Depth of Uppermost Perforations (feet)
	500 feet	1000 feet	1500 feet		
80			✓	50	150
50			✓	50	150
30			✓	50	100
0.5			✓	50	100

If distance standards and construction criteria in **Tables 3, 4, and 5** above are not met, project approval may still be possible pending additional analysis (see below).

If the minimum surface seal depth is not met, and if available information does not indicate a hydraulic separation provided by geologic conditions at the site, then these cases would require additional analysis by the applicant. Shorter seals can allow for significant flow into the well from shallow portions of an aquifer, even if the screens are at greater depths.

Additional Analysis Required

If the proposed project exceeds one or more of the screening criteria and the applicant is unable to modify the project (i.e., different location, well construction, water usage, or operations) to meet the screening criteria, then further analysis will be required (see **Appendix F**). Additional analysis will also be required if insufficient information exists in the project application to evaluate conformance with the criteria.

The applicant or the applicant's agent should consult with County staff regarding the required scope of the analysis, which is likely to include consultation with a professional hydrologist, geologist, or engineer, and may include field testing. Projects requiring additional analysis regarding Tier 2 or Tier 3 criteria may be subject to state requirements for preparation by a California registered professional geologist or professional engineer. **Appendix F** describes the additional analyses that will be required if the project screening criteria are applicable and are not met or if substantial evidence in the record indicates that a potentially significant impact may result from the project.

The geology of many areas of Napa County is very complex (LSCE and MBK, 2013). Accurate determination of hydrologic parameters (See **Appendix F**) is important to the additional analyses that may be necessary to evaluate potential well interference or impacts on surface water. Several approaches may be considered. One approach, applicable in areas with unconsolidated aquifer materials, is to estimate aquifer hydraulic conductivity values, based on evaluation and interpretation of lithologic data reported for wells drilled in the vicinity of project or well(s) and published hydraulic conductivity values for similar aquifer materials. This method may be applicable in areas of the Napa Valley Floor where the unconsolidated aquifer system has been previously characterized (LSCE and MBK, 2013). This method is not applicable in areas with consolidated or hard rock aquifer materials, including the MST subarea and All Other Areas, due to the increased likelihood of significant variations in aquifer characteristics over relatively small distances.

The County's preferred method for determining the aquifer hydraulic conductivity or other parameters is by conducting an aquifer test and analyzing aquifer test data. In some cases, pump test data may be recorded by a well driller at the time of well construction and included as part of the Well Completion Report submitted to the California Department of Water Resources. However, these tests are not always conducted to standards that result in meaningful aquifer parameters (i.e., the pumping rate may not be constant, the pumping rate may not be large enough to analyze aquifer parameters, the test may be of too short a duration, and groundwater level measurements may not have been made during the test in the pumped well and one or more observation wells, etc.). If adequate aquifer test data are not available, and there is substantial evidence in the record that the project (including the proposed location, construction and operation of any project wells) regarding potential impacts on neighboring non-project wells or nearby surface waters, then an aquifer test may be required of the applicant's project well(s). A constant rate aquifer test is generally required for projects in All Other Areas, if acceptable test data are not already available. Interpretation of pump test data provided in driller's logs is not intended for consolidated aquifers. Pending the proposed project details, the County may also require installation of a monitoring well or monitoring of a nearby existing non-project well.

As described in the Groundwater Conservation Ordinance, the County may require applicants in groundwater deficient areas to install a water meter to verify actual groundwater usage. In addition to the above screening criteria, if the actual usage exceeds the projected use, or the screening criteria, the applicant may be required to reduce groundwater consumption and/or find alternate water sources (See **Appendix D**).

WAA Application Submittals

WAA applications for all use permits and parcel divisions, as well as for all Groundwater Conservation Ordinance permits must be submitted to the Department of Planning, Building and Environmental Services (PBES), which will consult with the Department of Public Works, and be the conduit for communication between the County and the applicant. All subsequent communication should likewise pass through PBES. Any mitigation measures identified via the additional analysis will become either project modifications to, or conditions of approval for, the proposed project. Details of the use permit, land division, or groundwater ordinance can be obtained from PBES, along with mapping of groundwater deficient areas.

Conclusions

The Napa County Board of Supervisors has long been committed to the preservation of groundwater for agriculture and rural residential uses within the County. It is their belief that through proper management, the excellent groundwater resources found within the County can be sustained for future generations. Several conclusions can be drawn from application of the Water Availability Analysis process to date:

- In the process of conducting the analysis, applicants develop a greater awareness of water use by their project, providing a higher level of awareness and potentially leading to more efficient use of the resource.

- Information submitted by applicants has led to a broader database for future study and management.

- Groundwater use can vary widely depending upon its availability, local hydrogeologic constraints, and periodic hydrologic constraints which may affect the recharge and replenishment of the aquifer system.

- On the Napa Valley Floor and in the MST, the practice of evaluating an applicant's WAA by using screening criteria is an accepted method for making groundwater determinations. Based on the significant information available on Napa County groundwater basins, the screening criteria present a reasonable approach to the process. Because of the variability in parcel conditions in "All Other Areas", these parcels warrant a site-specific analysis, as discussed elsewhere in this document.

- The Water Availability Analysis is based upon the basic premise that each landowner has equal right to the groundwater resource below his or her property, so long as it doesn't significantly impact others. Furthermore, the WAA provides sufficient information and supporting documentation to enable the County to determine whether a proposed project may significantly affect groundwater resources and the reasonable and beneficial uses in the proposed area. By implementing policies to prevent wasteful or harmful use of groundwater, it is intended that sufficient groundwater will be available for both current and future property owners. Ensuring wells are located and constructed so as to avoid impacts on neighboring wells and surface water bodies will minimize neighbor disputes and avoid significant environmental impacts. In summary, this WAA implements a process that recognizes:

    - The current understanding of the occurrence and availability of the County's groundwater resources,

    - The hydrogeologic constraints that can locally affect the utilization of those resources, and

    - The periodic hydrologic constraints that may also affect the utilization of the resource and replenishment of the aquifer system.

Appendix A: Water Availability Analysis Background

At the height of the 1990 drought in Napa County, the Napa County Board of Supervisors and the Napa County Planning Commission became very concerned with the approval of use permits and parcel divisions that would cause an increased demand on groundwater supplies within Napa County. During several Commission hearings, conflicting testimony was entered as to the impact of such groundwater extraction on water levels in neighboring wells. The Commission asked the Department of Public Works to evaluate what potential impact an approval might have on neighboring wells and on the groundwater system as a whole. In order to simplify a very complex analysis, the Department developed a three phase Water Availability Analysis to provide a cost-effective answer to the question.

On March 6, 1991 an interim policy report, prepared by County staff, was presented to and approved by the Commission requiring use permit and parcel division applicants to submit a Water Availability Analysis with their application. The staff policy report provided a procedure by which applicants could achieve compliance with the Commission policy. Oversight of groundwater development within the County's jurisdiction was later refined by the Board of Supervisors approval of Napa County Ordinance No.1162 (Groundwater Conservation Ordinance) on August 3, 1999. A revised staff policy report was subsequently adopted by the Board of Supervisors in August 2007. The 2007 Policy Report updated the Water Availability Analysis procedure and restated the purpose and functionality of the analysis relative to the Groundwater Conservation Ordinance.

In January 2011, as part of the County's Comprehensive Groundwater Monitoring Program initiated in 2009, the County's technical consultant, Luhdorff & Scalmanini, Consulting Engineers, completed a review of the County's Groundwater Conservation Ordinance and procedures, and recommended updating the staff policy report and Water Availability Analysis procedure. The consultant's review found that the initial "phase one" analysis was valuable as a screening process, but that the pump test envisioned in "phase two" was not the best way to assess whether projects exceeding the screening criteria would have detrimental groundwater impacts.

On September 11, 2011, the Board of Supervisors appointed a Groundwater Resources Advisory Committee (GRAC) to assist with development of a groundwater monitoring program, and to recommend updates to the Groundwater Conservation Ordinance, as needed. As part of their work, the GRAC also reviewed changes to this Water Availability Analysis policy report in late 2013.

Appendix B: Estimated Water Use for Specified Land Use

Each project applicant is responsible for determining estimated water usage for their proposed project. While some guidelines are provided below, other industry standards exist, PBES may be able to provide data based on previous applications, and each project has its own unique characteristics. The most appropriate data should be used by the applicant to estimate water use for their specific project.

Guidelines for Estimating Residential Water Use:

The typical water use associated with residential buildings is as follows:

Primary Residence	0.5 to 0.75 acre-feet per year (includes minor to moderate landscaping)
Secondary Residence or Farm Labor Dwelling	0.20 to 0.50 acre-feet per year

Additional Usage to Be Added

1. Add an additional 0.1 acre-feet of water for each additional 1000 square feet of drought tolerant lawn or 2000 square feet of non-xeriscape landscaping above the first 1000 square feet.
2. Add an additional 0.05 acre-feet of water for a pool with a pool cover.
3. Add an additional 0.1 acre-feet of water for a pool without a cover.

Residential water use can be estimated using the typical water uses above. All typical uses are dependent on the type of fixtures and appliances, the amount and type of landscaping, and the number of people living onsite. If a residence uses low-flow fixtures and has appliances installed, is using xeriscape landscaping, and is occupied by two people, the water use estimates will be on the low side of the ranges listed above.

Examples of Residential Water Usage:

Residential water use can vary dramatically from house to house depending on the number of occupants, the number and type of appliances and water fixtures, the amount and types of lawn and landscaping. Two homes sitting side by side on the same block can consume dramatically different quantities of water.

Example 1:

Home #1 is 2500 square feet. Outside the house there is an extensive bluegrass lawn, a lot of water loving landscaping, and a swimming pool with no pool cover. Inside the house all the appliances and fixtures, including toilets and shower-heads, are old and have not been upgraded or replaced by water saving types. The owners wash their cars weekly but they don't have nozzles or sprayers on the hose. They do not shut off the water while they are soaping up the vehicles, allowing the water to run across the ground instead. Water is commonly used as a broom to wash off the driveways, walkways, patio, and other areas. The estimated water usage for Home #1 is 1.2 acre-feet of water per year

Example 2:

Home #2 is also 2500 square feet. Outside of the house there is a small lawn of drought tolerant turf, extensive usage of xeriscape landscaping, and no swimming pool. Inside the house all of the appliances and fixtures, including toilets and showerheads, are of the low flow water saving types. The owners wash their cars weekly, but have nozzles or sprayers on the hose to shut off the water while they are soaping up the vehicles. Driveways, walkways, patios, and other areas are swept with brooms instead of washed down with water. Estimated water usage for Home #2 is 0.5 acre-feet of water per year.

The above are only examples of unique situations. The estimated water use for each project will vary depending on existing parcel conditions.

Guidelines For Estimating Non-Residential Water Usage:

Agricultural:	
Vineyards	
Irrigation Only	0.2 to 0.5 acre-feet per acre per year
Heat Protection	0.25 acre-feet per acre per year
Frost Protection	0.25 acre-feet per acre per year
Irrigated Pastures	4.0 acre-feet per acre per year
Orchards	4.0 acre-feet per acre per year
Livestock (sheep or cows)	0.01 acre-feet per acre per year
Winery:	
Process Water	2.15 acre-feet per 100,000 gal. of wine
Domestic and Landscaping	0.50 acre-feet per 100,000 gal. of wine
Employees	15 gallons per shift
Tasting Room Visitation	3 gallons per visitor
Events and Marketing, with on-site catering	15 gallons per visitor
Industrial:	
Food Processing	31.0 acre-feet per employee per year
Printing/Publishing	0.60 acre-feet per employee per year
Commercial:	
Office Space	0.01 acre-feet per employee per year
Warehouse	0.05 acre-feet per employee per year

Estimates of water use for other categories are available in the technical literature from sources such as the American Water Works Association's Water Distribution Systems Handbook (Mays, 2000).

Parcel Location Factors:

The water use screening criterion for each parcel is based on the location of the parcel. There are three different location classifications: Napa Valley Floor, MST Groundwater Deficient Area, and All Other Areas. Napa Valley Floor areas include all locations that are within the Napa Valley excluding areas designated as groundwater deficient areas. Groundwater deficient areas are areas determined by the Department of Public Works as having a history of insufficient or declining groundwater availability or quality. At present the only designated groundwater deficient area in Napa County is the MST Subarea. Areas of the County not within the Napa Valley Floor and MST Groundwater Deficient Area are classified as All Other Areas. Public Works can assist applicants in determining the appropriate classification for project parcel(s).

Project Parcel Location	Water Use Criteria
Napa Valley Floor	1.0 acre feet per acre per year
MST Groundwater Deficient Area	0.3 acre feet per acre per year or no net increase, whichever is less*
All Other Areas	Parcel Specific
* Does not apply to the Ministerial Exemption as outlined in the Groundwater Conservation Ordinance	

The criterion for the Napa Valley Floor Area was agreed to 1991 by the Board of Supervisors. The criterion of 0.3 acre feet per acre per year for the MST Groundwater Deficient Area was determined using data from the 1977 USGS report on the Hydrology of the MST Subarea (Johnson, 1977). The value is calculated by dividing the "safe annual yield," as determined by the USGS (Johnson, 1977), by the total acreage of the affected area (10,000 acres). The addition of the "no net increase" standard reflects the County's obligation to assess potential cumulative impacts under CEQA. In a groundwater deficient area, any discretionary project that increases groundwater use may contribute to the declining groundwater levels in the aquifer.

No single criterion can be established for "All Other Areas" due to the uncertainty of the geology, and the increased complexity of the fractured rock aquifer systems in the mountainous and non-Napa Valley areas, including Carneros, Pope Valley, Wooden Valley, and Capell Valley. The project applicant will need to estimate the average annual recharge occurring in the project area and consider the amount of recharge relative to the estimation of project water use (e.g., all current and projected water demands for the property on which the planned project is located). The estimated project water use shall include estimates for normal and dry water years for both current and proposed water uses. If an alternative water source will be used for dry years (e.g.

trucked-in water for non-potable uses), that information shall be provided by the applicant including the source and estimated water volume.

The criteria above were reviewed by the County's groundwater consultants in 2011-2013 and are considered to be reasonable indicators on a watershed scale of the levels below which significant environmental impacts would be unlikely to occur. The review was based on existing monitoring data and an updated hydrogeologic conceptualization of the Napa Valley aquifer system (LSCE and MBK, 2013) and is consistent with the County's experience since establishment of the water use criteria in 1991. In addition, these criteria have been successfully applied as part of the WAA procedure since their establishment.

Appendix C: Guidance for MST Subarea Permit Applications

Historical data collected from the monitoring of wells within the MST Subarea over many decades indicate that it may be in overdraft, leading to the conclusion that the existing water users within the basin historically pumped more water from the ground than is being naturally replaced each winter season. To offset the overdraft trend, a recycled water pipeline is being installed, and once operating, its beneficial effects will be measured. However, as no other reasonable water resources currently exist in the MST, to avoid a ban on all new construction, the County has permitted each property owner to develop their property with the uses involving ministerial approvals under Section 13.15.030(C) of the groundwater ordinance, which are limited to a "reasonable" level of water use that may reduce the rate at which the groundwater levels are being lowered.

Single Family Dwellings on Small Parcels In the MST Subarea: The average, single family dwelling will likely use between 0.5 and 0.75 acre-feet of groundwater per year. Using a criterion of 0.3 acre-ft/year/acre, the minimum parcel size able to support the above range is between 1.5 to 2.5 acres. However, in order to ensure that all property owners have viable use of their land, applications for the construction of a single family home in these instances can be approved ministerially if the owner agrees to the conditions outlined in the Groundwater Ordinance. If the conditions are not agreed upon, or if the project involves a secondary dwelling or other groundwater uses not consistent with a single family dwelling, then the project would be subject to the analysis outlined in the WAA report. The County cannot approve the groundwater permit unless the proposed use is off-set by reductions elsewhere, such that the "no net increase" and "fair share"[14] water use screening criterion is met.

Agricultural Development In the MST Subarea: Agriculture in the MST Subarea is not exempt from the groundwater permit process. In these cases, such development will require an application for a groundwater permit and a WAA detailing the existing and proposed water use(s) on the project parcel(s). All new agricultural development in the MST will be required to meter all wells supplying water to the property with periodic reports to the County. The County cannot approve the groundwater permit unless the proposed use is off-set by reductions elsewhere, such that the "no net increase" and "fair share" water use screening criterion is met.

Existing Vineyard, New Primary or Secondary Residence In the MST Subarea: On an application related to a new residence on a parcel with an existing vineyard or residence, the WAA shall include all water use on the property, both existing and proposed. Projects on parcels with an established vineyard will be required to meter all wells supplying water to the property with periodic reports to the County. The County cannot approve the groundwater permit unless the proposed use is off-set by reductions elsewhere, such that the "no net increase" and "fair share" water use screening criterion is met.

Wineries and Other Use Permits In the MST Subarea: On a use permit application, the applicant is required to provide a WAA. Should the application be approved, a specific condition

[14] The "fair share" allotment for water use is based on the parcel(s) location in the Napa Valley Floor, MST Groundwater Deficient Area or All Other Areas (see additional information in Appendix B).

of approval will be required to meter all wells supplying groundwater to the property with periodic reports to the County. It is also possible that water conservation measures will be a condition of approval. All new use permits must meet the criterion for water use for the project parcel. The County cannot approve the groundwater permit unless the proposed use is off-set by reductions elsewhere, such that the "no net increase" and "fair share" water use screening criterion is met.

Appendix D: Water Meters (in Groundwater Deficient Areas Only)

If required, water meters shall measure all groundwater used on the parcel. Additional meters may also be required for monitoring the water use of individual facilities or operations, such as a winery, residence, or vineyard located on the same parcel. If a meter(s) is installed, the applicant shall read the meter(s) and provide the readings to the County Engineer at a frequency determined by the County Engineer. The applicant shall also convey to the County Engineer, or his designated representative, the right to access and verify the operation and reading of the meter(s) at any time.

If the meters indicate that the water consumption of a parcel in the MST Subarea exceeds the fair share amount, the applicant will be required to submit a plan which will be approved by the Director of Public Works to reduce water usage. The applicant may be required to find additional sources of water to reduce their groundwater usage. Additional sources may include using water provided by the City of Napa, the installation of water tanks which are filled by water trucks, or other means which will ensure that the groundwater usage will not exceed the fair share amounts.

The readings from water meters may also be used to assist the County in determining trends in groundwater usage, adjusting baseline water use estimates, and estimating overall groundwater usage in the MST Subarea.

Appendix E: Determining water use numbers with multiple parcels

The Water Availability Analysis is based on the premise that each landowner has equal right to the groundwater resource below his or her property. There will be cases where one person or entity owns multiple contiguous parcels and requests that the total water allotment below all of his or her parcels be considered in the Water Availability Analysis. Determining the total water demand based on multiple contiguous parcels is acceptable; however, to protect future property owners, certain safeguards must be in place to ensure that the water allotment and transfer between parcels is clearly documented and recorded, especially in cases where the water from more than one parcel will ultimately serve a use on a single parcel.

When multiple parcels are involved, the parcels for which the total water usage is being based on must be contiguous and clearly identified on a site plan with the Assessor's parcel numbers noted. The transfer of water from these parcels to the parcel on which the requested use is located must be documented using the form provided by the Department of Public Works. The form must be approved by the County and subsequently recorded by the applicant prior to commencement of any activity authorized by the groundwater permit or other county permit or approval. A condition requiring such will be placed on the use permit, groundwater permit or other permit for approval.

Alternatively, if the method above is not feasible, the applicant may provide an additional analysis for each project parcel, with the understanding that the water use on each individual parcel must not exceed the water use screening criterion for that parcel (see additional information in Appendix B).

Appendix F: Water Availability Analysis Tiers 2 & 3 Screening Criteria & Additional Analysis

County staff will conduct, or require the applicant to conduct, additional analysis of the proposed project according to any screening criteria that are not met. Additional analysis is required for projects that are not located on the Napa Valley Floor or in the MST (i.e. "All Other Areas"). Additional analysis will also be required if insufficient information exists in the project application to judge conformance with one or more of the criteria.

Water Use Evaluation (Tier 1)

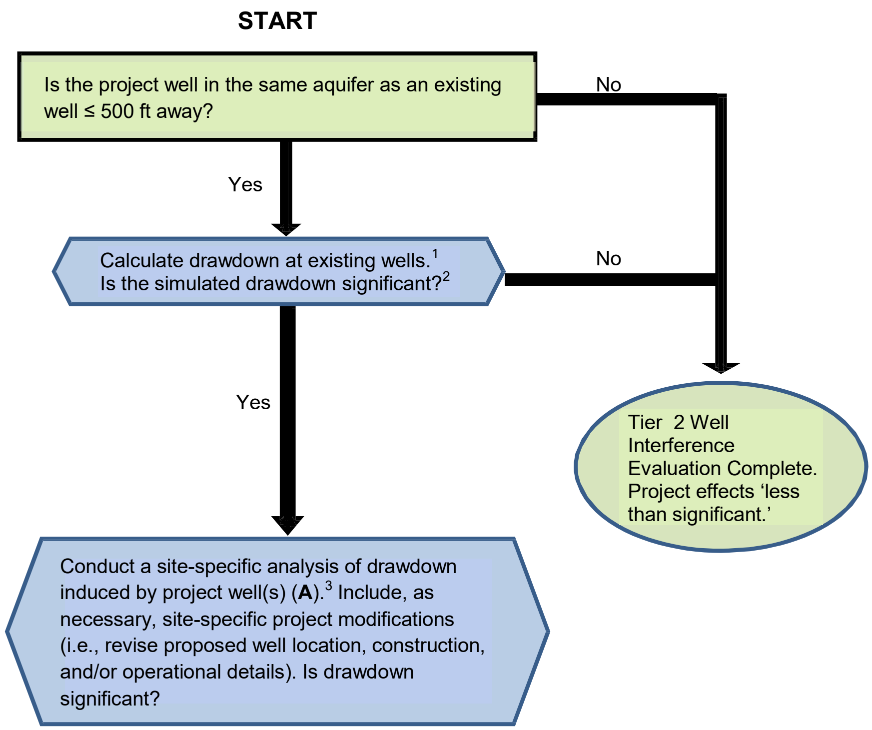
When the proposed project's estimated water demand does not meet the applicable water use criterion, the applicant will be encouraged to first revise the project and/or refine the water use estimate based on project details not adequately reflected in the water use screening criterion. County staff will then review the revised estimate and determine if the acceptable water use criterion has been met.

Well and Spring Interference Evaluation (Tier 2)

The Tier 2 well interference criterion is presumptively met if there are no non- project wells located within 500 feet of the existing or proposed project well(s). When a project well is within 500 feet of a neighboring non-project well(s) additional analysis of well interference will be required (see **Figure F-1**) for projects located in "All Other Areas". It may also be required for the Napa Valley Floor and the MST when substantial evidence in the record indicates the need to do so under CEQA. The analysis will first determine whether the existing or proposed project and non-project wells are, or are proposed to be, screened in the same aquifer unit and, if so, whether any drawdown induced in the non-project well(s) may constitute a significant adverse effect. **Table F-1** provides standard well interference criteria for induced drawdown in a non-project well that will be used in the absence of site-specific information regarding the susceptibility of existing non-project wells to drawdown induced by project well(s). Site-specific susceptibility information would include the pump depth setting and construction of project and non-project wells.

The Tier 2 spring interference criterion is presumptively met if no natural springs in use for domestic or agricultural purposes are located within 1,500 feet of any proposed project wells. When a project well is within 1,500 feet of a natural spring additional analysis of connectivity between the part of the aquifer system from which groundwater is planned to be produced and spring(s). When additional analysis is required, site-specific spring interference criteria will be established as appropriate for the springs(s) under consideration.

FIGURE F-1. WAA Additional Analysis Decision Tree (as shown, for well interference evaluation), where designated A = applicant responsibility, C = County staff responsibility



[1] Drawdown to be calculated using industry standard method(s) appropriate to the aquifer under consideration, such methods include the Theis Equation applicable for confined or unconfined aquifers (**A** or **C**).

[2] See Table F-1 or similar, superseding criteria provided by County staff (C).

[3] This site-specific analysis may include an aquifer test or an alternative study at the proposed well site to refine aquifer properties used in drawdown calculations and must include details of the project well(s) construction and operation relative to the site hydrogeology and any known information concerning the construction of any existing non-project wells under consideration (**A**).

The additional analysis will consider site-specific information including:

- the distance between the project well(s) and any existing non-project wells within 500 feet or natural springs within 1,500 feet;
- depth, screen intervals, and pump design flow rate for project well(s);
- depth, screen intervals, and pumping capacity/well type for the existing non- project well(s) or elevation and historical records of spring production;
- site hydrogeology (including aquifer units accessed by the project well and by existing non-project well(s) or natural springs and aquifer hydraulic properties (see **Tables F-2 and F-3**).

Data collected for the analysis will initially come from the WAA application, including information about existing non-project wells and site hydrogeology provided by County staff. These data will be used to calculate drawdown at any existing non-project wells, completed in the same aquifer unit, resulting from planned operation of the project well(s). Drawdown will be calculated using industry standard methods appropriate to the aquifer unit under consideration; such methods include the Theis Equation applicable for confined or unconfined aquifers (Theis, 1935).

If the initial calculated drawdown exceeds the Tier 2 well interference criteria, the applicant shall be required to submit a site-specific analysis prepared by a qualified professional demonstrating that the proposed project will not have an adverse effect (direct, indirect, or cumulative), on groundwater resources or neighboring non-project wells. This site-specific analysis may include an aquifer test or an alternative study at the proposed well site to refine aquifer properties used in drawdown calculations. The site-specific analysis may also demonstrate less than significant impacts by proposing modifications to the location, construction, or operation of project well(s).

If available data indicate a possible hydraulic connection between the project well(s) and any identified springs, an analysis of the hydraulic connection induced by the project well(s) will be conducted. Potential spring flow depletion induced by the project well(s) will be compared to site-specific spring interference criteria to determine if they constitute a significant adverse effect. The site-specific spring interference criteria will be established as appropriate for the spring(s) under consideration. Depending on site-specific concerns, more or less restrictive criteria may be required.

Table F-1 presents well interference criteria that the County may apply in the determination of significant adverse effects. The minimum significant drawdown values presented in **Table F-1** are intended for use in cases where information about existing non-project wells is limited or nonexistent. However, when the status and configuration of an existing non-project well are known, for example the depths of screen intervals, locations of any annular seals, and/or water levels in the well and the pump depth setting, then site-specific measures of significance should be used. Site-specific measures of significance should also account for known seasonal variations[15] in groundwater elevations in the vicinity of the proposed project and mutual well interference (i.e., interference between the planned project well usage (new and/or existing) and one or more neighboring wells). County staff shall inform the applicant of the site-specific Tier 2 well interference criteria that will be applied in the evaluation of a project before the applicant conducts a site-specific analysis.

[15] As used here, seasonal variations refer to typical changes over the course of a year.

Table F-1. Default Well Interference Criteria	
Type of wells within 500 ft. screened within the same aquifer as project well	**Estimated Drawdown at Neighboring Non-Project Wells**
Wells with a casing diameter of six inches or less	10 feet
Wells with a casing diameter greater than six inches	15 feet

Groundwater/Surface Water Interaction Evaluation (Tier 3)

When Tier 3 analysis is required[16], it shall be conducted as described below. The analysis will first determine whether the project well(s) are, or are proposed to be, screened in an aquifer unit hydraulically connected to the surface water(s) within the applicable distance specified by **Tables 3, 4, and 5** for unconsolidated aquifers (see also Figure F-2). If a hydraulic connection does exist, even one of limited temporal extent, then an analysis of the streamflow or surface water depletion induced by the project well(s) will be conducted. The streamflow depletion induced by the project well(s) will be compared to site-specific groundwater/surface water interaction criteria to determine if they constitute a significant adverse effect. The site-specific groundwater/surface water interaction criteria will be established as appropriate for the surface water(s) under consideration. Depending on the temporal extent of hydraulic connection and the special status species and/or surface water rights under consideration, more or less restrictive criteria may be required, up to and including no measurable streamflow depletion.

The additional analysis will consider site-specific information including:

- the distance between the proposed well and naturally-present surface water bodies within 1500 feet;
- depth, screened intervals, seal depths, and pumping capacity of applicant's well(s);
- site hydrogeology (including aquifer zones accessed by proposed well and existing wells and aquifer hydraulic properties (see **Tables F-2, F-3 and F-4**); and
- streambed (or equivalent feature) hydraulic properties.

Data collected for the analysis will initially come from the WAA application, including information about existing non-project wells and site hydrogeology provided by County staff. The evaluation will include calculation of streamflow depletion due to planned operation of the project well(s). Streamflow depletion will be calculated using industry standard methods appropriate to the

[16] Tier 3 analysis may be required under CEQA if substantial evidence, in the record, indicates a potentially significant impact may occur from the project.

aquifer under consideration; such methods include the Hantush Equation applicable for aquifers hydraulically connected with surface waters (Hantush, 1965).[17] If the initial calculated streamflow depletion exceeds the groundwater/surface water interaction criteria, the applicant shall be required to submit a site-specific analysis prepared by a qualified professional demonstrating that the proposed project will not have an adverse effect (direct, indirect, or cumulative), on surface water resources. This site-specific analysis may include an aquifer test or an alternative study at the proposed well site to refine aquifer properties used in streamflow depletion calculations. The site-specific analysis may also demonstrate less than significant impacts by proposing modifications to the location, construction, or operation of project well(s).

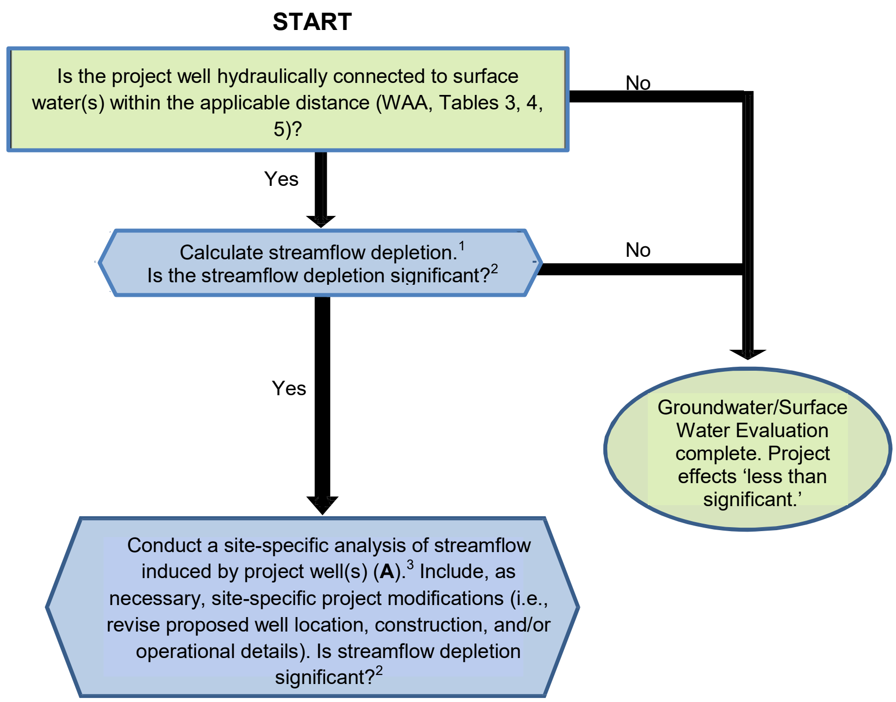
Modifications to the proposed project will be considered acceptable in satisfying the criteria where project well(s) can be shown to have a sufficient geologic or hydraulic separation from the surface water(s) that would prevent the well from causing streamflow depletion at least as much as would be expected at the minimum distance specified by the WAA Tables 3, 4, and 5. The California Department of Water Resources (DWR) and U.S. Bureau of Reclamation (USBR) allow for similar exemptions when considering the potential effect on surface water flows of groundwater pumping proposed for water transfers involving groundwater substitution pumping in the Sacramento Valley. Some example circumstances for exception to the stated criteria (based on DWR and USBR, 2013) include:

- Sufficient information, including site-specific geologic or hydrologic data, is provided to demonstrate that the well does not have significant hydraulic connection to the surface water system;
- The well's uppermost perforations are planned to be deeper than recommended (see **Tables 3, 4, 5**) and there is demonstration of low permeability deposits overlying the zone from which extraction is proposed to occur (i.e., a confining unit at least 20 feet thick exists above the depth of the uppermost perforation). In this case a somewhat lesser distance from the surface channel may be considered, pending the well type and planned well operations;
- The well's uppermost perforations are planned to be shallower than recommended (see **Tables 3, 4, 5**) and there is demonstration of low permeability deposits overlying the zone from which extraction is proposed to occur (i.e., a confining unit at least 40 feet thick exists above the depth of the uppermost perforation). In this case a somewhat lesser distance from the surface channel may be considered, pending the well type and planned well operations;
- The project well is a moderate to high pumping capacity well and the uppermost perforations are located no shallower than 150 feet deep, the perforations may be shallower (e.g., 100 feet deep), if there is a total of at least 50 percent fine-grained

[17] Streamflow depletion is to be calculated using industry standard method(s) appropriate to the aquifer and surface water source under consideration, such methods include the Hantush Equation applicable for unconfined aquifers with a direct hydraulic connection to a surface water body (Hantush, 1965).

materials in the interval above 100 feet below ground surface (bgs), and at least one fine-grained layer that exceeds 40 feet in thickness in the interval above 100 feet bgs.

FIGURE F-2. WAA Additional Analysis Decision Tree (as shown, for groundwater/surface water evaluation), where designated A = applicant responsibility, C = County staff responsibility



[1] Streamflow depletion to be calculated using industry standard method(s) appropriate to the aquifer under consideration, such methods include the Hantush Equation applicable for aquifers hydraulically connected with surface waters (**A** or **C**).

[2] Streamflow depletion criteria will be determined according to site-specific conditions (C).

[3] This site-specific analysis may include an aquifer test or an alternative study at the proposed well site to refine aquifer properties used in drawdown calculations and must include details of the project well(s) construction and operation relative to the site hydrogeology and any known information concerning the surface water(s) under consideration (**A**).

Data Needs for Additional Analysis

Hydrogeologic information at or in the vicinity of the subject parcel may be available from previous activities, or may be reasonably estimated from prior work conducted by the County. Previous activities may include (but are not limited to) aquifer tests, well completion reports with lithologic logs, water level, and well yield data collected on the parcel, and water level data collected as part of other groundwater monitoring activities. County staff will determine whether and how to best include such data in the WAA evaluation process. If no geologic information exists in the vicinity of the subject parcel, additional analysis may be required of the applicant.

The hydrogeologic information needed for WAA evaluation may include the aquifer storage coefficient, specific yield, hydraulic conductivity, transmissivity, and aquifer thickness. The aquifer storage coefficient for confined aquifers, or storativity, is defined as the volume of water that can be drained from a unit area of aquifer materials per unit decline in head. The storage coefficient can be calculated by multiplying the aquifer thickness and specific storage. In unconfined aquifers a similar property is represented by the specific yield of the aquifer materials.[18] Specific yield is defined as the volume of water that can be drained from a unit area of an unconfined aquifer in response to a unit decline in the water table elevation. **Table F-2** presents a range of values for specific yield for a variety of potential aquifer materials. In a confined aquifer the specific storage of aquifer materials can be calculated as the storage coefficient multiplied by aquifer thickness, where the storage coefficient is the volume of water produced by a unit volume of aquifer material per unit decline in head. **Table F-3** presents a range of possible specific storage values for potential aquifer materials. Storage coefficients for confined aquifers typically range from $5x10^{-5}$ to $5x10^{-3}$ (Todd, 2005). Specific yield for unconfined aquifers typically range from 0.1 to 0.3 (Lohman, 1972).

Table F-2. Representative Specific Yield[1] Ranges for Selected Earth Materials
(adapted from Walton, 1970)

Sediment	**Specific Yield**
Clay	0.01 – 0.10
Sand	0.10 – 0.30
Gravel	0.15 – 0.30
Sand and Gravel	0.15 – 0.25
Sandstone (e.g., Great Valley formation)	0.05 – 0.15
Shale (e.g., Great Valley formation)	0.005 – 0.05

[1]Specific yield can be considered equivalent to the storage coefficient for unconfined aquifers where aquifer compressibility is negligible.

Table F-3. Representative Specific Storage Ranges for Selected Materials
(adapted from Batu, 1998)

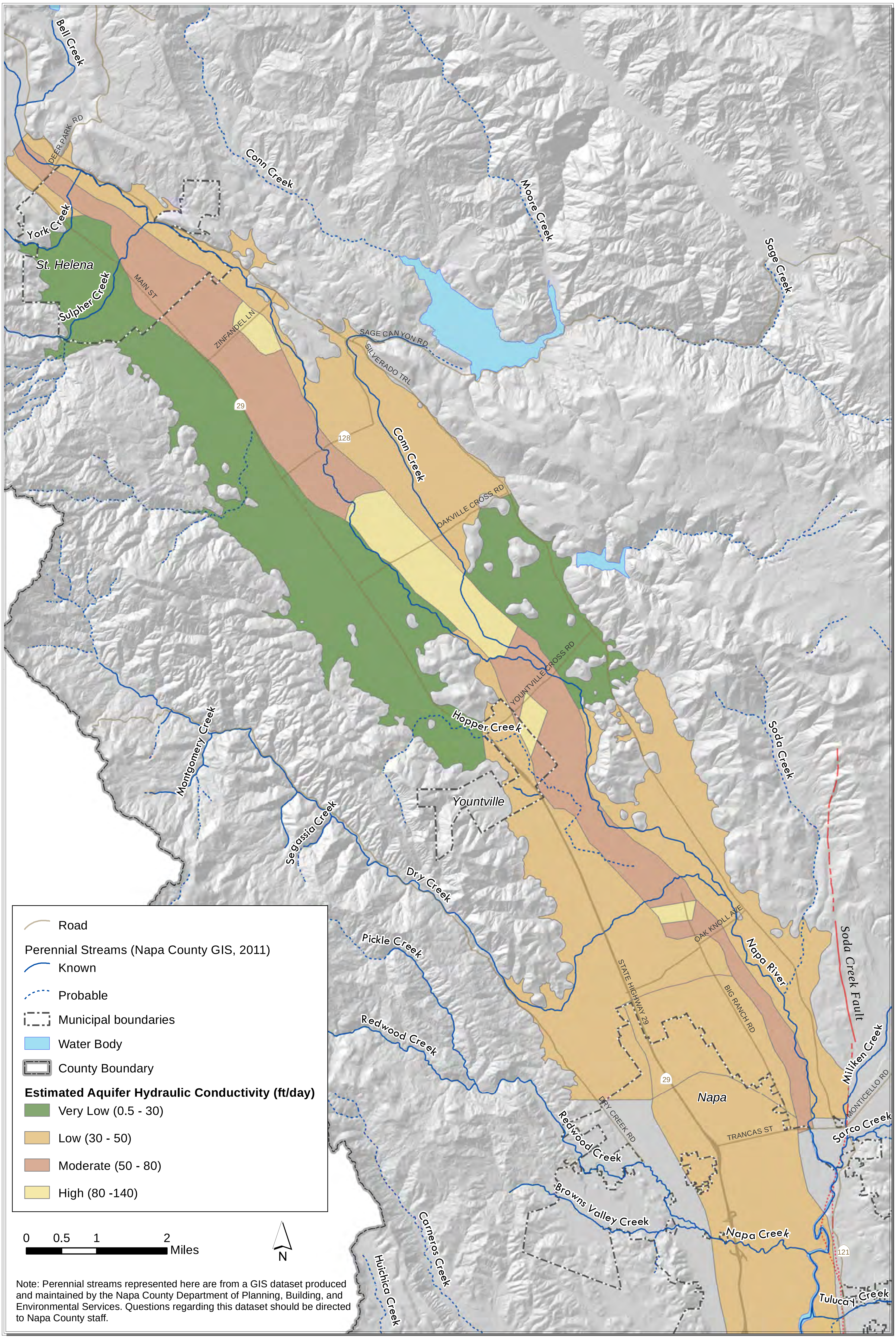
Material	**Specific Storage (ft^{-1})**		
Loose Sand	$1.5x10^{-4}$	to	$3.1x10^{-4}$
Dense Sand	$3.9x10^{-5}$	to	$6.2x10^{-5}$
Dense Sandy Gravel	$1.5x10^{-5}$	to	$3.1x10^{-5}$
Rock, fissured	$1x10^{-6}$	to	$2.1x10^{-5}$

[18] An unconfined aquifer is defined by a water table that occurs where pore space pressures coincide with atmospheric pressure and where water released from aquifer storage occurs in large part due to the draining of saturated pore spaces in the aquifer material.

Transmissivity is another frequently used aquifer parameter. Transmissivity is defined as the capacity of the aquifer to transmit water across its entire thickness, calculated as the product of the aquifer hydraulic conductivity and the aquifer thickness. **Table F-4** presents representative hydraulic conductivity values found in the literature. Hydraulic conductivity ranges for the alluvial aquifer system have been mapped in Napa Valley by the US Geological Survey (USGS) (Faye, 1973), with more recent interpretations provided here based on a review of well driller's logs and other geologic data available through 2011 (LSCE and MBK, 2013). These ranges for hydraulic conductivity are depicted in **Figure F-3** and described in **Table F-5**, as interpreted by the County's groundwater consultants. Recent hydrogeologic investigations performed for the County have also produced maps and cross sections of subsurface geologic conditions which may be consulted for the determination of aquifer thickness in the vicinity of a proposed project (LSCE and MBK, 2013).

Table F-4. Representative Hydraulic Conductivity Ranges for Selected Materials (adapted from Leap, 1999 and Batu, 1998)

Material	**Hydraulic Conductivity (ft/day)**		
Gravel (Alluvium)	10^{1}	to	10^{5}
Sand (Alluvium)	10^{-1}	to	10^{3}
Silty Sand (Alluvium)	10^{-2}	to	10^{2}
Silt (Alluvium)	10^{-4}	to	1
Sandstone (e.g. Great Valley formation)	10^{-5}	to	10^{-1}
Shale (e.g., Great Valley formation)	10^{-8}	to	10^{-4}
Fractured Basalt (e.g., Sonoma Volcanics)	10^{-2}	to	10^{2}



Note: Perennial streams represented here are from a GIS dataset produced and maintained by the Napa County Department of Planning, Building, and Environmental Services. Questions regarding this dataset should be directed to Napa County staff.

Path: X:\2011 Job Files\11-090\GIS\Task 4\Fig 7_2 Conductivity Zones.mxd

LUHDORFF & SCALMANINI CONSULTING ENGINEERS

Figure F-3
Estimated Alluvial Aquifer Hydraulic Conductivity Ranges, Napa Valley Floor

Table F-5. Representative Hydraulic Conductivity values for WAA analysis of Napa Valley Floor unconsolidated alluvial aquifer materials[3]

Hydraulic Conductivity, K, class	**Hydraulic Conductivity range[1], ft./day**	**Hydraulic Conductivity value, ft./day** (used for scenario results)
high	80 - 140	80
moderate	50 - 80	50
low	30 - 50	30
very low[2]	0.5 - 30	0.5, 10

[1] Hydraulic conductivity range have been developed from mapped values from Faye (1973) and interpretations based on a review of well driller's logs and other geologic data available through 2011 (LSCE and MBK, 2013).

[2] A hydraulic conductivity value of 0.5 ft./day was applied for calculations of groundwater and surface water interaction (Tables 3, 4 and 5). A hydraulic conductivity value of 10 ft./day was applied for calculations of well interference (Table 2B and F1).

[3]Representative hydraulic conductivity values shown here are applicable to the unconsolidated alluvial aquifer materials in the Napa Valley Floor and not aquifer zones beneath the Napa Valley Floor alluvium or outside of the Napa Valley Floor.

County staff will review well construction permits and records for wells within 500 feet of the proposed project. Information about existing wells within 500 feet of the proposed project site will include the following as available: the location of those wells relative to the project well(s), total depth, depth of screened intervals, annular seal depths, the geologic or lithologic record made as part of well construction, the elevation of the static water level in the well post-construction, the elevation of water levels while pumping, and the pump depth setting.

Tables F-6 to F-9 present, for comparison purposes, the results of scenarios intended to represent the groundwater drawdown experienced in the vicinity of a proposed project after a 24-hour continuous pumping period. The results in **Tables F-6 and F-7** indicate that drawdown in a confined aquifer would be greater than drawdown in an unconfined aquifer for a given pumping rate. These results also indicate that wells pumping at rates less than 30 gallons per minute (gpm) for periods of time less than 24-consecutive hours will likely have negligible drawdown effects at distances beyond 25 feet in a confined aquifer.

These scenarios are presented for comparison purposes. Actual drawdown due to well interference will have to be calculated using well construction information and site-specific hydrogeologic information and/or values from **Tables F-2, F-3, F-4 and F-5** that are applicable to site-specific conditions.

Table F-6: Simulated effect of a project well on water levels at an existing non-project well after one day of pumping at the stated flow rate in a confined aquifer

30 gpm Scenarios, calculated drawdown (ft)					
aquifer thickness = 75 ft. time = 1 day		distance between project well and existing non project well (ft)			
Specific Storage	Hydraulic Conductivity (ft./day)	**25**	**50**	**100**	**500**
0.0005	10	5.3	4.4	3.6	1.6
0.001	10	4.8	4.0	3.1	1.2

Table F-7: Simulated effect of a project well on water levels at an existing non-project well after one day of pumping at the stated flow rate in a confined aquifer

100 gpm Scenarios, calculated drawdown (ft)					
aquifer thickness = 75 ft. time = 1 day		distance between project well and existing non-project well (ft)			
Specific Storage	Hydraulic Conductivity (ft./day)	**25**	**50**	**100**	**500**
0.0005	10	13.6	11.5	9.4	4.5
0.001	10	12.5	10.4	8.3	3.5

Table F-8: Simulated effect of a project well on water levels at an existing non-project well after one day of pumping at the stated flow rate in an unconfined aquifer

30 gpm Scenarios, calculated drawdown (ft)					
aquifer thickness = 75 ft. time = 1 day		distance between project well and existing non-project well (ft)			
Specific Storage	Hydraulic Conductivity (ft./day)	**25**	**50**	**100**	**125**
0.1	80	0.4	0.3	0.2	n/a
0.1	50	0.6	0.4	n/a	n/a
0.1	30	0.9	0.6	n/a	n/a
0.1	10	2.0	n/a	n/a	n/a

"n/a" denotes cases where Theis equation results are not available due to mathematical constraints on valid parameter values.

Table F-9: Simulated effect of a project well on water levels at an existing non-project well after one day of pumping at the stated flow rate in an unconfined aquifer

100 gpm Scenarios, calculated drawdown (ft)					
aquifer thickness = 100 ft. time = 1 day		distance between project well and existing non-project well (ft)			
Specific Storage	Hydraulic Conductivity (ft./day)	**25**	**50**	**100**	**125**
0.1	80	1.1	0.8	0.6	0.5
0.1	50	1.6	1.2	n/a	n/a
0.1	30	2.4	1.7	n/a	n/a
0.1	10	5.5	n/a	n/a	n/a

"n/a" denotes cases where Theis equation results are not available due to mathematical constraints on valid parameter values.

Example Applications of Additional Analysis Methods

Example 1: *Addition of a commercial tasting room facility with 10 acres of new vineyard and landscaping to an existing winery in a non-groundwater deficient area. The project involves construction of a new well proposed to be 30 feet from an existing six-inch diameter non-project well.*

Is well proposed to be completed in the same aquifer as an existing well ≤ 500 ft. away?

Yes, County well construction records indicate that the existing non-project well was constructed to a total depth of 160 feet in an unconfined aquifer, with a total screened interval of 80 feet throughout the older alluvium that is also mapped in the vicinity of the proposed well.

Calculate drawdown at all existing wells within 500 ft. of the proposed well. Is the calculated drawdown significant?

Yes, 10.9 feet of drawdown is calculated at the existing non-project well, based on available information about the existing well and the hydrogeology of the site (see **Table F-10**). This amount of drawdown exceeds the default well interference criterion of 10 feet and represents a potentially significant impact on groundwater resources.

Table F-10. Example 1: Drawdown calculated at an existing non-project well as a result of pumping a proposed well at 300 gallons per minute, where hydraulic conductivity = 30 ft./day, storage coefficient = 0.02, and aquifer thickness = 80 feet.

	Distance between Proposed Well and Existing Well (ft.)	**Calculated Drawdown in Existing Well (ft.)[1]**
Initial Project Well Location	30	10.9
Alternate Project Well Location A	50	9.0
Alternate Project Well Location B	70	7.7

[1] Drawdown at an existing non-project well as a result of pumping the project well calculated using the Theis Equation.

Conduct a site-specific analysis of drawdown induced by project well(s). Include, as necessary, site-specific project modifications (i.e., revise proposed well location, construction, and/or operational details).

Is simulated drawdown significant (see Table F-1)?

No, after reviewing the site's existing and proposed infrastructure the project applicant modified the proposed well location to a location 50 feet away from the existing non-project well. Calculated drawdown values at the existing wells using the same available information about the existing wells, site hydrogeology, and the new proposed well location show less than significant drawdown at the existing non-project well (i.e., 9.0 feet). The applicant's groundwater use permit was approved on the condition of adherence to the revised well location and County standards for well construction.

Example 2: *Modification of an existing 40-year old irrigation well on a 12-acre parcel. The parcel also includes a primary, single-family residence with an existing (or available) connection to a public water supply system. The applicant proposes installing a new 80 gallon per minute pump to supply irrigation water for 10 acres of replanted winegrapes on lands which had not been actively farmed for several years. The applicant proposes operating the pump for 3 days at a time during the irrigation season. One existing non-project well is located 50 feet from the applicant's project well on one adjacent parcel and another existing non-project well is located 120 feet from the applicant's project well on another adjacent parcel. Both non-project wells are six-inch diameter wells.*

Is well proposed to be completed in the same aquifer as an existing well ≤ 500 ft. away?

Yes, well construction records provided by the applicant (or available from the County) indicate that the applicant's existing well is constructed to a total depth of 140 feet, with a total screened interval of 60 feet, in the older, unconsolidated alluvium.

County well construction records indicate that the existing non-project 50 feet from the project well was constructed to a total depth of 115 feet, with a total screened interval of 50 feet throughout the older alluvium.

Calculate drawdown at all existing wells within 500 ft. of the proposed well. Is the calculated drawdown significant?

No, 5.8 feet of drawdown is calculated to occur at the existing non-project well, based on available information about the existing well and the hydrogeology of the site (see **Table F-11**). This amount of drawdown does not exceed the default well interference criterion of 10 feet and represents a less than significant impact on groundwater resources. The applicant's groundwater use permit was approved contingent upon the proposed pumping duration.

Table F-11. Example 2: Drawdown calculated at an existing non-project well as a result of pumping the applicant's existing project well, where hydraulic conductivity = 10 ft./day, storage coefficient = 0.1, and aquifer thickness = 60 feet.

	Applicant's well pumping rate (gpm)	**Applicant's well seasonal pumping duration (days)**	**Calculated Drawdown in Existing Well (ft.)[1]**
Initial Proposal	80	3	5.8

[1] Drawdown calculated using the Theis Equation at an existing non-project well as a result of pumping the applicant's existing project well located 50 feet away.

Definitions

Aquifer – A geologic formation, group of formations, or part of a formation that contains sufficient saturated permeable material to yield significant quantities of water to wells and springs.

Aquifer Unit - One part of a number of units that comprise a larger aquifer system.

Hydraulic Conductivity – The capacity of subsurface materials to permit flow through interconnected pores, fractures, or other void spaces, subject to intrinsic properties of the fluid. As applied in this WAA, hydraulic conductivity is equivalent to saturated hydraulic conductivity.

Specific Storage– an aquifer hydraulic property which is the volume of water that can be drained from a unit volume of aquifer materials per unit decline in head.

Specific Yield – an aquifer hydraulic property which is the volume of water that can be drained from a unit area of an unconfined aquifer in response to a unit decline in the water table elevation.

Storage Coefficient (also Storativity) – an aquifer hydraulic property which is the volume of water released or added to aquifer storage per unit surface area of a confined aquifer per unit change in head.

Substantial Evidence - Defined by case law as evidence that is of ponderable legal significance, reasonable in nature, credible and of solid value. The following constitute substantial evidence: facts, reasonable assumptions predicated on facts; and expert opinions supported by facts. Argument, speculation, unsubstantiated opinion or narrative, or clearly inaccurate or erroneous information do not constitute substantial evidence.

Surface Water - For the purposes of this procedure, surface waters are defined to include only those surface waters known or likely to support special status species or surface waters with an associated water right; <u>however, as with all of the procedures in this WAA, there may be unique circumstances that require additional site-specific analysis to adequately evaluate a project's potential impacts on surface water bodies</u>.

Transmissivity – an aquifer hydraulic property which reflects the capacity of the aquifer to transmit water across its entire thickness, calculated as the product of the aquifer hydraulic conductivity and the aquifer thickness.

References

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

Batu, V. 1998. Aquifer Hydraulics: A Comprehensive Guide to Hydrogeologic Data Analysis, John Wiley & Sons, New York, 727p.

California Department of Water Resources and U.S. Bureau of Reclamation, Mid-Pacific Region. 2013. Draft Technical Information for Preparing Water Transfer Proposals.

Cooper, H.H. and C.E. Jacob, 1946. A generalized graphical method for evaluating formation constants and summarizing well field history, Am. Geophys. Union Trans., vol. 27, pp. 526-534.

Faye, R.E. 1973. Ground-water hydrology of northern Napa Valley California. Water Resources Investigations 13-73, US Geological Survey, Menlo Park, CA, 64p.

Hantush, M.S. 1965. Wells near streams with semipervious beds. Journal of Geophysical Research 70, no. 12: 2829-2838.

Johnson, M.J. 1977. Ground-water hydrology of the Lower Milliken-Sarco-Tulucay Creeks area, Napa County, California. US Geological Survey Water Resources Investigation; 77-82.

Luhdorff & Scalmanini Consulting Engineers (LSCE). 2013. Approach for evaluating the potential effects of groundwater pumping on surface water flows and recommended well siting and construction criteria, Final Technical Memorandum.

LSCE and MBK Engineers (MBK). 2013. Updated characterization and conceptualization of hydrogeologic conditions in Napa County.

Leap, D.I. 1999. Geological Occurrence of Groundwater,*in* The Handbook of Groundwater Engineering, J.W. Delleur (ed.). CRC Press,

Lohman, S.W. 1972. Ground-water hydraulics, US Geological Survey Prof. Paper 708, 70p.

Mays, L.W. ed. 2000. Water Distribution Systems Handbook, American Water Works Association, McGraw-Hill, New York

Theis, C.V. 1935. The relation between the lowering of the piezometric surface and the rate and duration of discharge of a well using groundwater storage: Transactions of the American Geophysical Union, v. 16, p. 519-524.

Todd, D.K. and L.M. Mays. 2005. *Groundwater Hydrology*, Third edition, John Wiley & Sons, New York. 636p.

Walton, W.C. 1970. *Groundwater Resource Evaluation*. McGraw-Hill Book Company. 664p., In Driscoll, F. G. 1986. *Groundwater and Wells*. Second edition. U.S. Filter/Johnson Screens.

NAPA VALLEY GROUNDWATER SUSTAINABILITY:

A BASIN ANALYSIS REPORT FOR THE NAPA VALLEY SUBBASIN

APPENDIX J:

Communication and Education Plan

COMMUNICATION AND EDUCATION PLAN

August 23, 2012

I. Purpose and Overview

The purpose of this plan is to serve as a strategic guide for the public communication and education activities of the Napa County Groundwater Resources Advisory Committee (GRAC). The **communication goal** of the plan is to ensure that interested parties, and Napa County residents as a whole, are well-informed of the deliberations and activities of the GRAC. The **education goal** of the plan is to increase the understanding of groundwater resources so that interested parties and Napa County residents as a whole have a factual basis for discussion and decision making. Key elements of this plan include a set of objectives and guiding principles, a list of potential audiences and partners, and fundamental messages. A series of communication and education strategies are also provided. The last element of the plan includes a recommendation for periodic evaluation of the plan's implementation and effectiveness.

II. Objectives

A. Ensure that interested parties and residents as a whole are aware of the GRAC's work, schedule, progress, and deliberations, and have opportunities to provide input.
B. Expand participation in the County's voluntary groundwater level monitoring efforts and potential optional groundwater quality monitoring.
C. Establish a common understanding of groundwater resources in the County, including conditions and trends evidenced by monitoring data and scientific analyses.
D. Support informed public dialogue and policy decision-making regarding groundwater resources in Napa County.
E. Establish consensus from the GRAC members on the Communication and Education Plan and its purpose.

III. Guiding Principles

A. Be proactive and utilize GRAC member's existing networks to help locate appropriate well owners.
B. Partner with interested groups and individuals to leverage existing communication networks and programs.
C. Provide information and materials in a timely manner, allow interested parties to provide input and participate.
D. Characterize messages and activities, so that interested parties in different areas hear the same messages.

E. Tailor messages and materials to different audiences to increase their effectiveness.

IV. Priorities

The following is a prioritized list of communication and education actions:

1) Develop a GRAC brochure (folded 11x17 tabloid) and informative slip-sheets (8.5x11 maps, current activities, report summaries, staff contacts and GRAC membership…).
2) Actively reach out to well owners to participate in voluntary groundwater level monitoring in high priority sub-areas.
3) Utilize outreach and education to attract well owners to participate in the voluntary groundwater level monitoring program.
4) Identify education and communication partners and partnerships (particularly those identified in the 2010 Groundwater Stakeholder Assessment).
5) Maintain and promote use of GRAC website (http://www.countyofnapa.org/bos/grac/).

V. Audiences and Partners

Groundwater resource issues involve a broad range of geographical and interest-based audiences and partners. Below is a partial list of likely audiences:

1) Well owners who voluntarily participate in groundwater level monitoring and water quality monitoring (which may become available at a later date);
2) Landowners and other interested parties in under represented groundwater basins identified by the CA Dept. of Water Resources (Pope Valley, Clearlake Pleistocene Volcanic Area, and Berryessa Valley groundwater basins);
3) Landowners and other interested parties in the Napa-Sonoma Valley groundwater basin, including the Milliken-Sarco-Tulocay, Angwin, Carneros, Calistoga, St. Helena, Yountville, and Napa sub-areas;
4) County residents (incorporated and unincorporated);
5) Agricultural and wine industry groups;
6) Environmental and park/open-space groups;
7) Residential and commercial developers;
8) Community groups interested in water resources;
9) Landowner/Homeowner groups and associations;
10) Public agencies (local, regional, state, federal); and
11) Elected officials.

In general, messages and materials will need to be addressed to County residents as a whole. However, in many cases information should be tailored to specific audiences. Additional special audiences will need identification; for example the elderly, minorities, non-English speakers and disadvantaged communities[1].

Some members of the audiences listed above may choose to support the GRAC's communication and education efforts, thereby becoming GRAC partners in outreach. In the 2010 Stakeholder Assessment (see GRAC website), several organizations volunteered to use their existing networks to help share information and news with their constituencies. Creating partnerships with these organizations and use of their networks will be critical to maximizing the efficiency and effectiveness of GRAC outreach efforts. Additional partners will be solicited as GRAC activities are developed.

VI. Partners

Various partners in groundwater education and communication **may** include: local growers, geologists, well drillers, professional groups and associations in priority areas throughout the County. GRAC members will utilize existing contacts as partners in education and outreach.

Partners may also include press and media outlets throughout Napa County including: local newspapers, radio and television stations.

VII. Messages

The GRAC will identify several key messages to be used for outreach and education. Examples of global messages regarding groundwater are:

a. Groundwater is a vital water source for residential, commercial and agricultural users in Napa County.

b. Napa County has a number of unique and hydrologically distinctive groundwater subareas.

c. The Napa Valley Floor (St. Helena, Yountville, and Napa areas), except for the Milliken-Sarco-Tulocay (MST) Subarea, generally has stable long term trends and a shallow depth to groundwater level (10-30 feet below ground surface).

d. High priority subareas and monitoring needs will be determined as part of the GRAC's work plan.

1 CAL. PRC 75005(g) "Disadvantaged community" means a community with a median household income less than 80% of the statewide average. "Severely disadvantaged community" means a community with a median household income less than 60% of the statewide average.

e. Ground-water systems are dynamic and adjust continually to short-term and long-term changes in climate, ground-water withdrawal, and land use.

f. A common fact-based understanding of groundwater resources in the County supports more informed public dialogue and public-policy decision-making. While observation helps to identify concerns, factual information and thoughtful technical analyses provides the foundation for informed decision-making.

Examples of messages that will need to be tailored to match the objectives and purpose of the GRAC may include:

a. The importance of better understanding of county-wide hydrogeologic conditions in order to better understand groundwater priority areas within Napa County.

b. How to participate in voluntary groundwater level monitoring and optional water quality monitoring.

c. How groundwater information will be used and refined as resources and monitoring information becomes available.

d. What kind of groundwater data will be gathered, when and by whom, and how will it be used?

e. What is the confidentiality of the data collected?

f. What are the benefits to and incentives for, participants in the voluntary monitoring program?

g. The importance of voluntary groundwater level data is to help anticipate future groundwater issues.

h. Groundwater level data is primarily collected within the Napa Valley Floor Subareas, leaving the rest of the County unaccounted for.

i. Groundwater quality monitoring data is more spatially distributed than groundwater level data.

Additional messages will be developed as needed for specific areas, special audiences, specific groundwater topics and actions undertaken by the GRAC.

VIII. Communication and Education Strategies

This section identifies seven primary communication and education strategies that provide a framework for more specific activities. Each strategy includes information on supporting materials, audiences that would benefit, next step timelines, potential constraints and potential partners.

1. Develop a standardized series of general promotional and educational brochures (press materials), as well as activity/topic-specific materials as needed.

Materials: GRAC brochure (folded 11x17 tabloid) and informative slip-sheets (8.5x11 maps, current activities, report summaries, staff contacts and GRAC membership…), informational letters to current and potential groundwater level monitoring volunteers, newsletter articles to targeted groups, answers to frequently asked questions (all in electronic and hard copy)
Special Target Audiences: county residents and others as appropriate
Next Steps & Timelines: general promotional materials during 3rd quarter of 2012, activity and topic-specific materials in coordination with the GRAC's work plan
Constraints: need for subject matter expertise, graphic design and printing
Potential partners: none, GRAC members will work with County staff to develop materials (staff may enlist graphical support, outside printing)

2. GRAC members periodic briefing of the geographical or interest-based groups they represent, participate in, or serve as appointed members on the GRAC.

Materials: standard promotional materials mentioned above; PowerPoint presentations with talking points about work plan, progress, and milestones
Special Target Audiences: constituencies represented on the GRAC, regional and sub-regional groups, community-based groups, groups listed as potential partners
Next Steps & Timelines: identify initial dates for briefings, prepare materials, assign appropriate GRAC members
Constraints: need for consistent messaging and characterization of the GRAC's activities
Potential partners: organizations that GRAC members participate in, potential partners listed above, the GRAC members themselves

3. GRAC members and County staff conduct an annual round of briefings for elected officials and agency executive officers, including but not limited to members of the Watershed Information Center and Conservancy (WICC) Board of Napa County.

Materials: standard promotional materials mentioned above
Special Target Audiences: state legislative representatives, county supervisors, mayors and council members, federal and state agency executive officers and staff

Next Steps & Timelines: identify appropriate period for briefings and schedule well in advance (e.g., Joint GRAC-WICC meeting-July 26, 2012), identify appropriate briefing format and appropriate group (staff/GRAC members) to conduct briefings, develop key messages and supporting materials
Constraints: limited availability of elected officials and agency executive officers
Potential partners: none (GRAC members will work with County staff)

4. GRAC hosting of public workshops or other public events. Including events that may coincide with the rollout of key deliverables, such as the County's monitoring program, revised pump test protocols and related revisions to the groundwater ordinance, and groundwater sustainability objectives.

Materials: special announcements; materials to support the event activities
Special Target Audiences: Napa County residents as a whole, perhaps with identical workshops in the northern and southern parts of the County. Collaborate with industry groups to develop workshop topics. Potential topics may include best sustainable practices and water use efficiency. Showcase examples of better sustainable practices.
Next Steps & Timelines: agree upon deliverables that will need a public rollout component, the type of public input desired (e.g., comment on draft, comment on final), and a corresponding timeframe (See GRAC Work Plan)
Constraints: advance scheduling and publicity required to ensure turnout, significant logistical and administrative work, and associated costs.
Potential partners: WICC, other local organizations or educational groups listed above as potential partners

5. Use the GRAC's website (http://www.countyofnapa.org/bos/grac/) as an informational clearinghouse for materials associated with the GRAC meetings and general communication and education efforts.

Materials: standard promotional materials mentioned above, special meeting/workshop materials developed, and posting of existing materials developed for regular GRAC meetings and activities
Special Target Audiences: all audiences
Next Steps & Timelines: continual, the website has been official and functioning since June, 2011, redesign of the site as needed to accommodate the assimilation of information over time
Constraints: organization and accessibility as documents accumulate, staffing resources and expertise for upkeep and maintenance
Potential partners: none (County staff will maintain the website)

6. Development and maintenance of an interested-parties email and address distribution list, including denotation of parties that express an interest in partnering with the GRAC.

Materials: email and address data management software, and existing news, promotional and educational materials
Special Target Audiences: individual interested parties
Next Steps & Timelines: develop and solicit initial list during 3rd quarter of 2012, with ongoing expansion and maintenance
Constraints: staffing resources needed to maintain up-to-date entries
Potential partners: none (County staff will develop and maintain the list)

7. Proactively develop and regularly utilize relationships with key public relations, press and media outlets for the purpose of sharing news and information.

Materials: meeting synopses, statements developed by the GRAC, telephone calls, talking points, frequently asked questions
Special Target Audiences: Napa County residents as a whole
Next Steps & Timelines: County staff to identify and contact major press and media outlets as needed
Constraints: inability to control final product, need to adhere to GRAC Media Protocol
Potential partners: See potential list above

IX. Evaluation

As part of its normal business, the GRAC will periodically evaluate the effectiveness of its communication and education efforts, and revise this plan accordingly.

NAPA VALLEY GROUNDWATER SUSTAINABILITY:

A BASIN ANALYSIS REPORT FOR THE NAPA VALLEY SUBBASIN

APPENDIX K:

Groundwater Resources in Napa County, Monitoring for Sustainability and Napa County's Voluntary Groundwater Level Monitoring Program (outreach brochure)

Napa County's Voluntary Groundwater Level Monitoring Program

The Voluntary Groundwater Level Monitoring Program measures groundwater levels in spring and fall. These measurements improve the understanding of groundwater for both the well owner and the County. A network of privately volunteer wells, along with publicly owned wells, provide a greater understanding of our aquifers. The program is strengthened by expanding the voluntary well network to areas where data is lacking or nonexistent.

Well owners who participate in the program:

- Receive accurate groundwater level readings twice per year *(spring and fall*);
- See seasonal and long-term groundwater level trends for their well;
- Receive water quality data for their well *(if testing is agreed to and conducted);* and
- Receive notification if anyone submits a public records request for information.

The County currently monitors wells throughout our community and is not in need of additional wells at this time. However, if you are interested in volunteering your well for County monitoring, please contact us, as we periodically update our monitoring network. The County publishes an annual report on the status of overall groundwater conditions.

Do it Yourself (DIY) Groundwater Level Monitoring

Napa County has a Groundwater Self-Monitoring Program. This DIY program offers training and a special hand-held sonic measuring device to determine the depth to water in most wells.

How do I borrow the tool from the County?

1. Contact County staff and indicate your interest ,
2. Napa County Resource Conservation District staff will demonstrate the equipment at your well and help with initial tool calibration,
3. Then borrow the equipment seasonally to measure your water level.

Reserve the tool or learn more:
Charles Schembre,
707-252-4189 x113,
charles@naparcd.org
Jeff Sharp, 707-259-5936,
jeff.sharp@countyofnapa.org

FAQ'S

Why should I measure water depth in my well?
To know how water depth changes over the course of the year and better understand how the groundwater reservoir beneath your land responds to winter recharge and use over the dry months. Measurements are best taken in spring and fall over multiple years to see long-term trends in recharge.

Will someone curtail my well use if I participate?
No. The Voluntary Groundwater Level Monitoring Program is a non-regulatory, voluntary program that measures the depth to groundwater (level only). Groundwater use is not being measured or monitored as part of the program.

Will my well information be kept confidential?
Napa County will make every effort to maintain the confidentiality of a well owner's information. However, such information may be accessed through a public records request. In such a case the County will notify the well owner.

How long is the voluntary groundwater level monitoring program going to last?
The monitoring is intended to be long-term, however an individual well owner may leave the program at any time.

Who is eligible to participate?
If your well is in an area where data is lacking and well construction information is available, your well may be eligible to participate in the program.

How will the collected information be used?
The information will be used to monitor and track groundwater levels to help the County understand relationships between surface water and groundwater, maintain a centralized data management system, and improve the accuracy and reliability of relevant water resource models.

Groundwater Resources in Napa County

Monitoring for Sustainability

The Importance of Groundwater in Napa County

Groundwater is water below ground contained in formations known as aquifers, which supply significant quantities of water to wells and springs. **Groundwater is a vital source of water supply in Napa County**. Many residents, businesses and agriculture reply on groundwater, as do fish, wildlife and natural habitats. These water demands make it essential that we:

- Preserve the quality and availability of local and imported water supplies;
- Sustain groundwater supplies and meet water needs during drought conditions;
- Anticipate and avoid potential negative environmental effects due to groundwater use; and
- Anticipate and avoid adverse changes in long-term groundwater availability and quality.

What we know

Napa County and other public agencies have been monitoring groundwater resources since the mid 1900s. Based on long-term data and recent studies by the County's consultants, Luhdorff & Scalmanini Consulting Engineers (LSCE) and MBK Engineers, the County continues to:

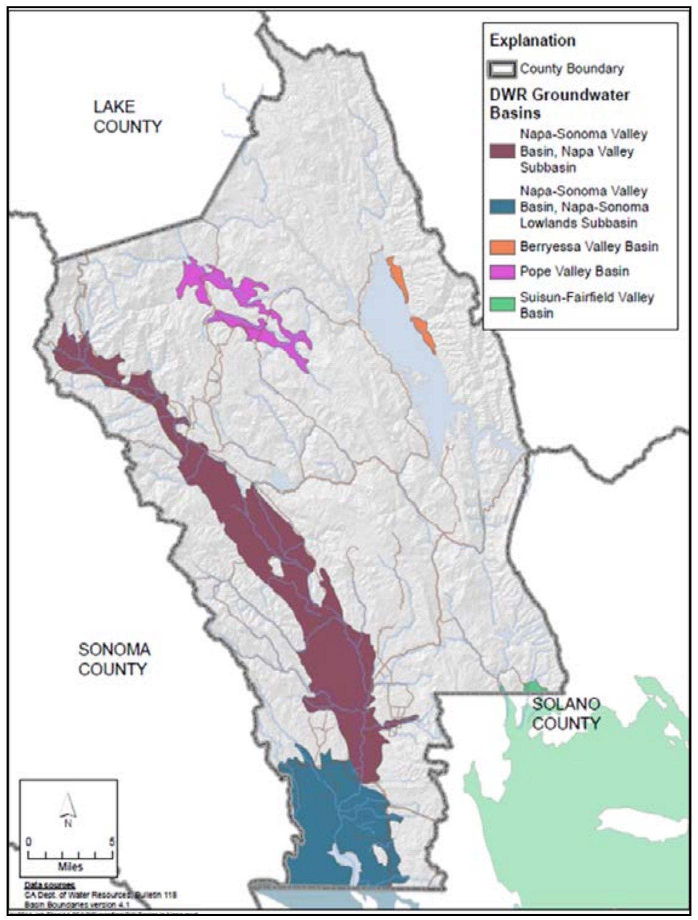
- Expand voluntary groundwater monitoring in key locations to provide better data and fill data gaps;
- Develop and implement better groundwater data collection procedures;
- Report on annual groundwater conditions and trends;
- Estimate the rates of aquifer replenishment and study groundwater and surface water interaction;
- Update groundwater basin water budgets and models; and
- Implement actions in compliance with the Sustainable Groundwater Management Act (SGMA).

What Are We Trying to Learn?

- How does groundwater move through our aquifer system?
- What is the overall status of the ground water aquifers within the county?
- What are the amounts of loss and replenishment to creeks, rivers and aquifers?
- What are the key relationships between ground water surface water in our creeks, rivers, and lakes?

DWR Groundwater Basins

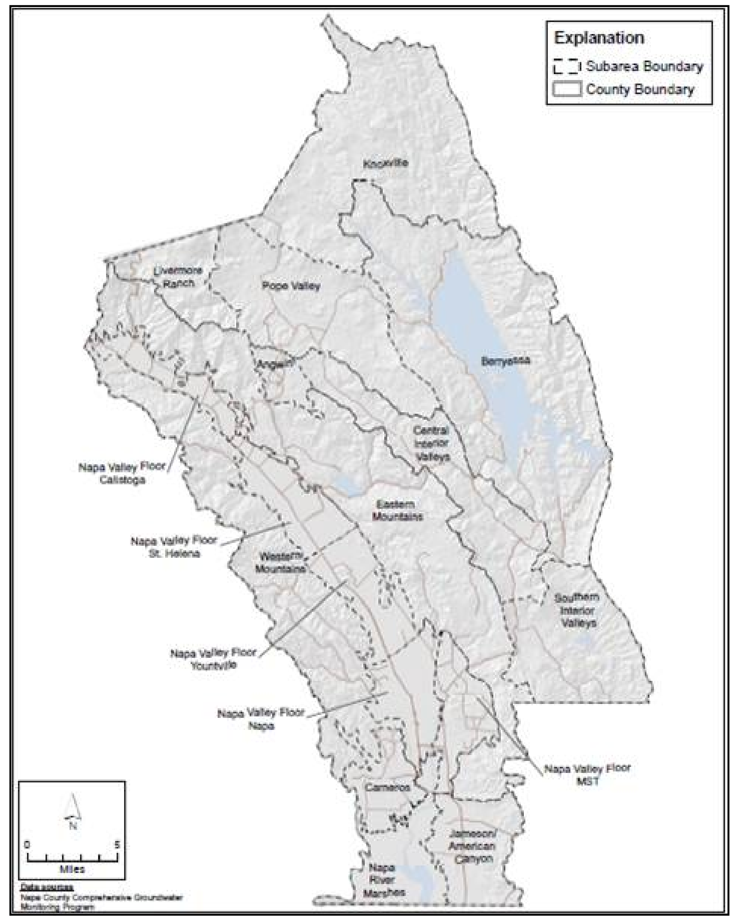
The Department of Water Resources (DWR) collects, summarizes, and evaluates groundwater data. DWR has defined 5 alluvial groundwater basins in Napa County (see map). The 2014 Sustainable Groundwater Management Act (SGMA) sets basin management priorities based upon those basin boundaries. The Napa Valley Sub-basin is designated a Medium Priority basin under SGMA.



DWR Groundwater Basin Map

Groundwater Subareas

Groundwater conditions outside of DWR designated basins are also important in Napa County. To improve our understanding of groundwater throughout the county, seventeen subareas have been designated. These subareas are used for local planning and are based upon watershed boundaries, groundwater basin boundaries, and other data. There are five subareas covering the floor of the Napa Valley. Other subareas include the MST, Carneros, Angwin, eastern/western mountains, interior valleys, among others.



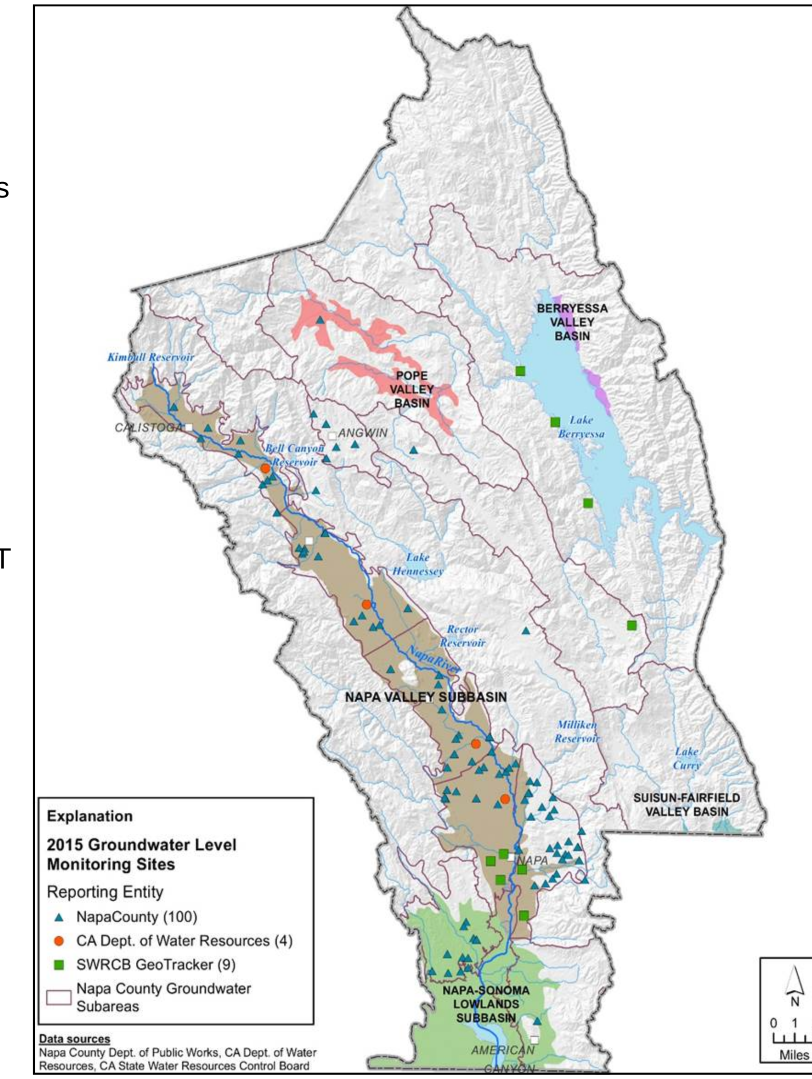
Napa Groundwater Subareas Map

Groundwater Levels and Trends

Based on recent studies and on-going bi-annual monitoring of groundwater levels in nearly 100 volunteered wells, level trends in the Napa Valley Sub-basins of the Napa-Sonoma Valley Groundwater Basin are stable in the majority of wells with long-term records. Although some wells show a response to drought conditions, levels in recent drought years are generally higher than those during the 1976 to 1977 drought.

Elsewhere in the County long-term groundwater level records are more limited, with the exception of the Milliken-Sarco-Tulucay (MST) Subarea. Groundwater level declines observed in the MST Subarea as early as the 1960s and 1970s have stabilized since about 2008. The observation that groundwater level responses differ within the MST Subarea and even within the north, central, and southern sections of this subarea indicate that localized conditions, whether geologic or anthropogenic in nature, might be the primary influence on conditions in the subarea.

Over the past 5 years, Napa County has developed a more focused understanding of the geology that controls the occurrence and availability of groundwater and doubled the number and distribution of wells that it monitors. Additionally, the County has constructed dedicated monitoring facilities in key locations designed specifically to provide data on the interactions between groundwater and surface water.



Groundwater Monitoring Network Map

Groundwater Quality

While there is limited long-term data is available on groundwater quality, overall quality appears to be good except in select areas in the most northern and southern parts of the County. Areas near Calistoga exhibit geothermal influences and the southern lowlands of the County exhibit elevated levels of naturally occurring dissolved solids and chlorides, likely due to their proximity to San Pablo Bay. Additional groundwater quality monitoring is currently underway and also planned for the upcoming year.

Contact Information and Resources

More Information:

Learn more about Napa County's groundwater resources, levels, trends and reports at:

http://www.napawatersheds.org/groundwater

Join the Napa County Groundwater Email List:

http://www.countyofnapa.org/groundwater

Scan with your phone to sign up for the groundwater list serve

For Questions Contact:

Patrick Lowe
Patrick.Lowe@countyofnapa.org

Jeff Sharp
Jeff.Sharp@countyofnapa.org

Napa County Department of Public Works, Natural Resources Conservation
804 First St. Napa CA 94559
707-259-8600

NAPA VALLEY GROUNDWATER SUSTAINABILITY:

A BASIN ANALYSIS REPORT FOR THE NAPA VALLEY SUBBASIN

APPENDIX L:

Draft Napa Valley Subbasin Basin Analysis Report: Public Comments and Responses and Frequently Asked Questions About Groundwater in Napa County

Comments Received Between 11/3/2016 and 11/11/2016

Date	Commenter		Comment	Response
November 3, 2016	Gary Margadant, WICC Public Workshop, verbal comments	2.1	WICC look into the flow bypass requirements for dams for Conn, Rector and Bale creeks and believes the municipalities should release water to keep the stream from going dry.	Comment not related to Basin Analysis Report.
November 3, 2016	Gordon Evans, WICC Public Workshop, verbal comments	2.2	Appreciated responses to his comments from the September 22 WICC workshop. a) With respect to the river system, commented that swimming holes are dry/shallow or covered with algae; can no longer kayak the river; previously Chinook salmon could be seen from the Zinfandel Lane bridge. b) Said the hillsides were mostly lush woodlands dotted with modest vineyards; now, deforestation, runoff and siltation and over-pumping of groundwater has devastated our riparian areas that were once the Napa River and led to loss of flora and fauna and carbon sequestration. c) Stated the title of WICC includes the words watershed and conservancy and not to lose sight of those words when making recommendations on the Sustainable Groundwater Management Act (SGMA) alternative to the Board of Supervisors. Wishes to paint a historical picture and what has transpired overtime.	See responses to 1.15 and 2.31.

November 3, 2016	Chris Malan, Atlas Peak Rd., WICC Public Workshop, verbal comments	2.3	Presented an SF Chronicle article "Fisheries Hit Hard by Vast Sea Change." Stated the SF Bay Estuary is a premier estuary. We can no longer recreate in the upper reaches of the Napa River because there is no water, or if there is water, it is polluted pools. She said she could kayak the river seven years ago and that it is not possible today. She commented that everyone who lives in Napa is responsible for what happens to the bay and that there is a law that says the municipalities should be releasing water below their dams.	Acknowledge article shown to WICC. With respect to comments regarding conditions of the Napa River system, see responses to Comments 2.34 and 2.35.
November 3, 2016	Pam Smithers, WICC Public Workshop, verbal comments	2.4	Clarified that the WICC will not be making recommendations today but is rather serving as a conduit for public comments and discussion on the SGMA process and Basin Analysis Report. Everyone is welcome to comment individually.	The WICC's role is community education and outreach related to groundwater and that is why the discussion on SGMA and the Basin Analysis Report is set up in a public workshop format.
November 3, 2016	Scott Sedgley, WICC Public Workshop, verbal comments	2.5	The members of the Council take what they hear at these meetings back to their respective organizations and municipalities, and are effective at that level to lobby for things to happen.	Comment acknowledged. No action/response required.
November 3, 2016	Audience comment, WICC Public Workshop, verbal comments	2.6	Asked for clarification of the model used by the County to look at the hydrologic impacts of vineyard development related to the general plan update. David Graves answered it was the MIKE SHE from DHI (Danish Hydrologic Institute). Mr. Lowe noted that information about that model is available in the technical appendices for the General Plan Update of 2008.	Comment acknowledged. No action/response required.
November 3, 2016	Audience comment, WICC Public Workshop, verbal comments	2.7	When the alternate plan (report) is submitted to the Board of Supervisors on December 13th, and if they choose not to submit it, running past the due date, what are the repercussions?	If the Board requests minor changes, the Report could be approved as amended and submitted to DWR. More substantial changes would need to be returned to the Board for approval on Dec. 20th. If the Board's decision is to abandon the Alternative path, an expedited process would need to get underway to create a Groundwater Sustainability Agency (GSA) by June 30, 2017 to meet the SGMA deadline and to ensure that eligibility for DWR grant funding would not be lost. Technical work would likely be delayed for some time while the political, financial, and administrative process of forming the agency were resolved and implemented. The County would allocate resources and priorities to ensure we met the 2022 deadline for submitting a GSP.
November 3, 2016	Mike Hackett, WICC Public Workshop, verbal comments	2.8	Asked what assumptions were used to determine the future scenario in the report.	The future scenario was based upon modeled precipitation, evapotranspiration, and current and projected land use trends in the Napa Valley Subbasin. See also section 6.7.2 Projected Subbasin Water Budget Results of the Basin Analysis Report.

November 3, 2016	Chris Benz, Napa Sierra Club, WICC Public Workshop, verbal comments	2.9	Expressed appreciation for the work that went into the analysis. Commented on the discrepancy between the calculated water budget showing an increase of 6,000 AFY and what is observed which is stable groundwater levels and that there is significant uncertainty of the upland runoff, surface water outflow and baseflow components of the model. Can you give us an idea of how much uncertainty there is in the estimates (+ or – how many AFY)? What type and location of additional monitoring would help determine upland inflow contributions to the basin? Our local concern is that change in the ground cover on the hillsides (deforestation) could affect the inflow of rainwater into the basin. How can we look at this in greater detail now and in the future?	The basin characterization used in the report for the Valley Floor could be expanded in the future to look more closely at geology in the hillsides to further inform hillside input components in the model. See also responses to Comments 2.24, 2.25, and 2.26.
November 3, 2016	Gary Margadant, WICC Public Workshop, verbal comments	2.10	Gary Margadant asked a couple of questions on behalf of a person who needed to leave. Is pond evaporation included in the analysis and is climate change considered in the report? Will the dredging of the Napa River have any effect on the absorption of water into the ground? Mr. Margadant expressed concern with the problem areas found inside the valley, i.e. Petra Dr. What type of criteria is used to determine these problem areas? He suggests other problem areas: Dunaweal Rd., somewhere near St. Helena, and Dry Creek Rd. at Orchard Ave. Asked if extensive discussions about proposed winery use of groundwater is enough for the County to revisit SGMA and the sustainable use of groundwater? Are the change and/or clustering of well drilling permits in an area an indication that there is going to be a problem? The groundwater level charts shown in the 2016 CASGEM report, fig. 2.6, show depths 40-130' and that those areas are the problem areas. Is that what is used to determine these problem areas or is it just complaint driven? The Grand Jury Report of 2014-15 says that Napa County should develop contingency planning for a sustained drought. This report is focused only on the Napa Valley Subbasin.	The root zone model accounted for water surfaces (such as ponds) where mapped by DWR as part of land use surveys. Climate change has been considered as part of the Subbasin Water Budget analysis particularly for the Projected Water Budget Scenario (see Section 6.7.2). Dredging of the Napa River, which occurs in the most southern part of the Subbasin in the tidal reach of the river, was not considered as part of the analysis. In areas such as Petra Drive where groundwater level trends are atypical of overall Subbasin conditions, further study may be warranted and there is the potential for designation as a management area. The Petra Drive area and the study currently underway there are discussed in Section 7.6. The Basin Analysis Report does focus on the Napa Valley Subbasin as required by SGMA. However, hydrologic inputs from the contributing watersheds to the Subbasin are also included in the analysis of the basin conditions. The County has previously responded to the Grand Jury Report (dated June 2, 2015).

			Suggests that the Board of Supervisors revise their response to the Grand Jury saying that this process will address that need. Santa Clara and Orange County are doing a great job with groundwater and that Napa County should look to them to see what management is being done. Will submit additional written comments.	Acknowledged. The County and its consultants are aware of the groundwater management approaches being used on the Santa Clara and Orange County areas. For example, see Vicki Kretsinger Grabert, T. N. Narasimhan, *California's evolution toward integrated regional water management: a long-term view*, Hydrogeology Journal (2006) 14: 407–423. This article includes details relating to these two areas.
November 3, 2016	Gordon Evans, WICC Public Workshop, verbal comments	2.11	The report emphasizes the need for monitoring and sharing of water data. He appreciated finally getting his well monitored for the self-monitoring program. He wants to help the County to help us all, but he has heard these comments/remarks "depends if we are interested in a particular well or area," "we don't want to incur extra expense," "the County will except data and reports but may not do anything," "hillside data is not required by the State. Maybe if there is enough interest we will do that," and "people are afraid to turn data over to the County." He would like to know how serious the County is about the voluntary well monitoring program? He said that when a neighbor's well failed, he went to the Assessor's office and looked at the 'parcel report' which stated there was not a groundwater problem. That statement on the parcel report was apparently put on the report by a third party vendor to mean no study was conducted; which was confusing for the casual observer or one who may purchase the parcel. A common down to earth common sense explanation of the data and numbers is needed.	The County appreciates all public interest in the countywide groundwater monitoring program administered by the County and also the County's and the GRAC's efforts in recent years to promote broader engagement by the public in the countywide program and/or in the self-monitoring program. The countywide program was evaluated to identify data gaps (LSCE, 2011) and actions were implemented to address those data gaps (LSCE, 2013, 2014, 2015, 2016). These "gaps" include areas in the County where wells are in a certain location or constructed within a particular part of the groundwater system in order to accomplish data collection that addresses specific monitoring objectives. Mr. Evan's comments indicate that these specific monitoring needs for the countywide program may not be fully understood by the general public. The County wishes to fill data gaps with data from wells that are constructed in a manner that will provide meaningful data that addresses objectives. Acknowledged. As Mr. Evans is aware, this terminology was clarified in the County system several years ago at his suggestion. David Graves commented in response to Mr. Evans during the WICC Workshop saying that the Groundwater Resources Advisory Committee (GRAC) spent a lot of time discussing data confidentiality and many in the community are concerned about their static well level data being widely available to anyone.

November 3, 2016	Chris Malan, WICC Public Workshop, verbal comments	2.12	If we have undesirable results in a medium or high priority basin you must do a groundwater management plan. Moving forward with an Alternate Plan in March before DWR regulations and BMPs were approved is putting the cart before the horse, not knowing what the management tools are. A GSP will map out what we will have to do to manage the aquifer sustainably. DWR has determined the Napa Valley Subbasin is in moderate decline since 1950. The monitoring data show that. All of the charts should show a regression line showing the decline overtime on recharge and groundwater levels. We are dewatering the mainstem near St. Helena. The Alternative is wishy-washy on management and does not provide distinctive management tools and objectives to reach a sustainable yield. The public wants management and groundwater for their children. The Alternative plan says there is a big problem with groundwater quality, particularly with boron, arsenic, nutrients/nitrogen – why do we want that to get worse? We have land subsidence (albeit under a foot) in several areas of the County - the land is sinking. She will submit more comments. She would like the report to be peer reviewed. More public involvement is needed. An ad-hoc group was formed but she was not asked to be on it – it included no environmental groups, which was a gap. She would like the report to project the trajectory we are on given land use and where we are headed, for example the thousands of acres of deforestation and losing our recharge.	See response to Comment 2.52.

November 3, 2016	Michelle Benvenuto, WICC Public Workshop, verbal comments	2.13	She commented on the ad-hoc committee mentioned by Chris Malan. Ms. Benvenuto clarified that if the reference was to the Groundwater Resources Advisory Committee (GRAC), that committee was formed via an application process and was appointed by the Board of Supervisors and included the Sierra Club and 15 members representing a broad spectrum of the community. Only two positions on the GRAC were held by the wine industry.	Comment acknowledged. No action/response required.
November 3, 2016	Chris Malan, WICC Public Workshop, verbal comments	2.14	Responded to Ms. Benvenuto saying that the GRAC was pre SGMA and the document references an ad-hoc committee and she doesn't know what that reference referred to.	Comment acknowledged. No action/response required.
November 3, 2016	Pam Smithers, WICC Public Workshop, verbal comments	2.15	It is very important that we pick the right wells to represent the basin, referencing Table 7-2 in the report. Some of these selected wells are newer wells and/or are right on the river. Is it possible to select other additional wells that are not so close to the river given the need to understand the upland runoff component and achieve the goal to select wells to study the surface flow interaction of the basin? Do the selected wells fulfill that need/goal? The report talks about declines in some wells. Do we need less wells near the river, or should we add more wells that show decline, to those that we are setting minimum thresholds? The County should commit more money to fill some of the data gaps that are mentioned in the report (e.g. a well in the south area to measure salinity). A larger distribution of these special wells across the basin where thresholds are monitored would show the public that we are representing the entire basin with these selected wells. If money is a constraint, consider adding more of these wells over time. She noted that the 6,000AFY projected excess of water in the basin is only 2.5% of the total inflows to the basin. If that number is wrong we could be in trouble. Is the 6,000 number high enough given the assumption that land use is being held constant at 2011 levels? 6,000 seems like a slim "positive" number.	See responses to 2.46 and 2.52

November 3, 2016	Steve Donoviel, WICC Public Workshop, verbal comments	2.16	Added that a stratified randomized selection of the wells in the network would be a better representation of the basin as a whole. Why aren't the hills being monitored? That is where the future growth and deforestation will occur. The valley floor is sold-out. It is short-sighted not to sample the hillsides too.	As reported in the *Napa County Comprehensive Groundwater Monitoring Program, 2015 Annual Report and CASGEM Update*, there are 113 sites monitored in Napa County; which include hillside wells. Monitoring is conducted by the County, DWR, and others. The monitoring network is continually being evaluated to assess additional data needs to ensure groundwater resource sustainability. Chapter 10 of the Basin Analysis Report presents recommendations for focused areas where additional groundwater monitoring is recommended.
	Patrick Lowe, WICC Public Workshop, verbal comments	2.17	Comment to Council and meeting attendees—the County staff and its consultants have answers to all of the questions raised and these will be provided in the response to comments table. He pointed out that the State DWR will be the ultimate arbitrator whether or not the basin is sustainable. The job of the County is to provide the State with the information they have requested in order to make that assessment.	Comment was informational for WICC and meeting attendees.
	Pam Smithers, WICC Public Workshop, verbal comments	2.18	Complemented staff and the consultants for making refinements to the document and water budget based upon comments received at the last meeting WICC workshop, adding that those changes show that the County and its team are really listening to the comments received and lends to the trust of the public.	Comment acknowledged. No action/response required.
	Kimberly Richard, WICC Public Workshop, verbal comments	2.19	Asked why the role of deforestation on soil moisture is left out of the scope of analysis for the Basin Analysis Report? Deforestation plays a role in climate, groundwater and hillside erosion. She would like more detail than what was provided in the response from the September 22nd meeting; where it was stated that deforestation is out of the scope of the analysis. Please elaborate more on why deforestation was not included since it plays a vital role.	The root zone model component of the water budget is spatially limited to the Napa Valley Subbasin. Ongoing or upcoming conversions from forest to vineyards are occurring in the uplands, outside of the Subbasin. Upland runoff and subsurface inflow components from the hillsides are components of the water budget and are based on the output of the California Basin Characterization Model (BCM) (which also considers climate change). Ongoing or upcoming conversions from forest to vineyards in the uplands are considered by the water budget as far as they are captured by the BCM land use inputs.
November 4, 2016	Stephen Donoviel, Letter to Patrick Lowe and Jeff Sharp, Re: WICC Meeting/Workshop of November 3, 2016	2.20	From the LSCE staffs comments and the summary posted on WICC website, it appears that no valid or reliable conclusions can be drawn or certified to the state about major areas of the Napa County ground water sustainability per state and federal expectations but only for those areas served by the alluvial river valley, viz., the Napa Valley Subbasin.	The Sustainable Groundwater Management Act requires GSPs or Alternatives for medium and high priority groundwater basins as delineated and ranked by the State Department of Water Resources (DWR). The Basin Analysis Report was prepared for the Napa Valley Subbasin, a medium priority basin that DWR has delineated and is not intended to address groundwater sustainability for the entire County.

November 6, 2016	Mike Hackett, Email to David Graves, Re: WICC/Alternative Ground Water Plan	2.21	What was the reasoning for selecting the alternate plan? (…) What individual or group came to that determination?	Following a public hearing and at the direction of its Board of Supervisors, Napa County prepared this Basin Analysis Report, an Alternative Submittal per the requirements of the California Water Code. It provides an analysis of basin conditions and demonstrates that the basin has operated within its sustainable yield over a period of at least 10 years. The Basin Analysis Report is required to accomplish the same (or identical) goals as a GSP within the framework of SGMA. An Alternative to a GSP does not require the formation of a Groundwater Sustainability Agency, which allows for a more cost effective use of existing resources through the Board of Supervisors and WICC. The Board of Supervisors determined that this was the fastest path to move forward with meaningful monitoring and proactive measures, while meeting the requirements of the Act in the most cost efficient way possible. SGMA requires submittal of an Alternative, such as the Basin Analysis Report, by January 1, 2017, which is five years in advance of when a GSP is required. Following its submittal to the state, DWR will conduct a review of the Basin Analysis Report, which will allow for additional public comment. An early submission to DWR sets local groundwater thresholds and establishes required monitoring and reporting well in advance of the 2022 timeline established by SGMA for a GSP. The Basin Analysis Report must be reviewed and updated by 2022 and every five years thereafter, and annual groundwater monitoring/implementation updates are also required by DWR. If minimum thresholds are not being met, then actions will be required to ensure the long-term sustainability of the Napa Valley Subbasin.
November 6, 2016	Mike Hackett, Email to David Graves, Re: WICC/Alternative Ground Water Plan	2.22	We need and will continue to demand an ongoing process like a sustainable groundwater plan.	The Basin Analysis Report is functionally equivalent to a GSP for the Napa Valley Subbasin.
November 6, 2016	Mike Hackett, Email to David Graves, Re: WICC/Alternative Ground Water Plan	2.23	L&S appear to have cherry picked data and modeling to support the alternate plan, which is disturbing enough. But more scary is that their future assumptions are based on current conditions: like no increased development. (…) We have the demand for 5,000 more acres of conversion from forest to vineyard in the pipeline right now.	All available historical and current data were evaluated for the Basin Analysis Report, including (but not limited to) data from the current 113 groundwater level monitoring locations, of which 45 locations have a period of record of over 10 years, 25 locations over 30 years, and 11 locations over 50 years. The demand of 5,000 acres of conversion from forest to vineyard cited by the commenter is believed to be based on the County General Plan. The number presented in the general plan is a conservative upper limit that was estimated for EIR purposes by projecting trends from the height of development leading up to 2006; however, the actual rate of development has been much lower. In addition, this number represented the countywide vineyard acreage trend, while the Subbasin itself has already been largely built out. Ongoing or upcoming conversions from forest to vineyards in the uplands are considered by the water budget as far as they are captured by the California Basin Characterization Model (BCM) land use inputs.
November 7, 2016	Chris Benz, Sierra Club Napa Group, Email to Patrick Lowe, Re: Comments on Basin Analysis Report	2.24	Please give the error, in terms of +/- amount of ac-ft/year, for each of the quantities used to calculate the water budget and groundwater level, as well as the error in the final quantities for the change in storage volume and for the change in groundwater level.	Table 10-1 (Summary of Recommended Implementation Steps) in the Basin Analysis Report includes item 22 to evaluate and address uncertainties in historical water budgets to improve calibration of budget components and reduce uncertainty of projected future water budgets. Results of this evaluation will include quantification of uncertainties.

November 7, 2016	Chris Benz, Sierra Club Napa Group, Email to Patrick Lowe, Re: Comments on Basin Analysis Report	2.25	Please list the data needed to improve the accuracy of the "upland runoff" and "surface water outflow and baseflow" values.	Table 10-1 in Chapter 10 of the Basin Analysis Report summarizes recommended implementation steps, and includes item 17: Coordinate with RCD and others regarding current stream gaging and supplemental needs for SGMA purposes; consider areas that may also benefit from nearby shallow nested groundwater monitoring wells (similar to LGA SW/GW facilities).
November 7, 2016	Chris Benz, Sierra Club Napa Group, Email to Patrick Lowe, Re: Comments on Basin Analysis Report	2.26	Please list specific locations for ideal monitoring sites (which could be public or private wells) that could be used to determine if changes in hillside watershed land use (e.g. deforestation for vineyard conversion/housing development) will have an effect on upland runoff into the subbasin. In other words, wells in which specific locations would be able to measure changes in upland runoff.	See response to Comment 2.25.
November 9, 2016	Gordon Evans Letter to WICC, Re: WICC Special Meeting, 9/22/16 & 11/3/16	2.27	The CA Dept. of Water Resources has not yet even finalized Best Management Practices (BMP's) for Groundwater Sustainability Plans (GSP's), (see: http://www.water.ca.gov/ groundwater/sgm/pdfs/BMP Framework Draft 2016-10::28.pdf), so how can the Board of Supervisors even vote on an Alternative that must be functionally equivalent to a GSP?	Best Management Practices (BMPs) are guidance documents, not regulations, which aim to aid communities in implementing useful procedures, community activities, and other actions which will assist in improving groundwater sustainability. They are not required to be adopted in full, and some BMPs have no applicability to specific situations, whereas other BMPs may be very useful. DWR's Draft BMPs are already available and are not expected to change greatly as they go through the State approval process. Alternatives to GSPs are due to DWR on January 1, 2017. The Basin Analysis Report was written in accordance with the Groundwater Sustainability Plan Emergency Regulations that were finalized and published in August 2016. DWR publishes final BMPs for sustainable management of groundwater on January 1, 2017. Until then, the draft BMPs will inform the Basin Analysis Report (Alternative to GSP). The commenter also fails to recognize the adaptability of the Basin Analysis Report (BAR or Report). The Board of Supervisors will continue (as they have for several years) to receive an annual update on the latest groundwater monitoring results, changes to practices and regulations, and other possible improvements to how groundwater is monitored. The County does not believe that skipping the option to submit a BAR and move forward now on the many proposed actions in the Report, and instead waiting until 2022 to adopt a full GSP, is in the best interest of the County and its residents simply because final BMPs are not yet approved by DWR.

November 9, 2016	Gordon Evans Letter to WICC, Re: WICC Special Meeting, 9/22/16 & 11/3/16	2.28	The County's Consulting Engineers, Luhdorff & Scalmanini, have presented extensive data purporting to justify that that there's no groundwater availability problem, based on historical usage and current models. However, these engineering studies don't go forward. Even if one accepts those figures, they fail to note the demand for 5,000 more acres of conversion from forest to vineyard in the application process right now. Also ignored are 113 additional wells, many of which are already on line.	The water budget results that are presented in the DRAFT Basin Analysis Report include a 10 year projection of baseline Subbasin water budget results. As per the GSP regulations, the most recent land use development trend is utilized for the projected water budget future condition. In addition, changes in the water demand within the Subbasin were applied to evaluate the projected scenarios, along with modeled climate change from the US Geological Survey Basin Characterization Model (Flint and Flint, 2013). The water budget has been updated to include projects approved or in process through 2016, and now considers the rate of projected development through 2025. This results in an ongoing average annual increase in demand for new wineries of 12 acre-feet/year, and for new vineyards of 2 acre-feet/year average within the Subbasin. Upland runoff and subsurface inflow components of the water budget were based on the output of the U.S. Geological Survey California Basin Characterization Model (BCM)(Flint and Flint, 2013). Ongoing or upcoming conversions from forest to vineyards in the uplands are considered by the water budget as far as they are captured by the BCM land use inputs. In recent years, approximately 40 wells have been added to the groundwater level monitoring network that currently consists of 113 wells. These wells have existed prior to being added to the monitoring network and do not represent additional demand. The demand of 5,000 acres of conversion from forest to vineyard cited by the commenter is believed to be based on the County General Plan. The number presented in the General Plan is a conservative upper limit that was estimated for EIR purposes by projecting trends from the height of development leading up to 2006; however, the actual rate of development has been much lower. In addition, this number represented the countywide vineyard acreage trend, while the Subbasin itself has already been largely built out.
November 9, 2016	Gordon Evans Letter to WICC, Re: WICC Special Meeting, 9/22/16 & 11/3/16	2.29	Another glaring problem that is not discussed is the future quality of water, whether it be from groundwater sources (increased levels of toxic elements) or reservoirs which are subject to accelerated runoff from newly-deforested hillsides, which include siltation and chemical runoff from vineyards. These problems can be mitigated by current technology, but at what cost to the taxpayer, let alone the environment?	Groundwater quality monitoring in the Napa Valley Subbasin consists of 81 sites with data collected primarily at sites regulated by the SWRCB through the Division of Drinking Water and the Geotracker program, and data from other public agencies are available as well (including DWR and the U.S. Geological Survey) where available. The Basin Analysis Report discusses water quality in section 4.1.3; groundwater quality records from representative monitoring sites provide information on important constituents whose concentrations influence the quality of water for irrigation and human consumption. Despite the lack of long-term historical groundwater quality records in Napa County (a situation that is common throughout CA), available data suggest that groundwater is generally of good quality throughout most subareas. However, poor groundwater quality does, exist in the south and the north-central parts of the County. This includes concentrations of **naturally** occurring metals such as arsenic, iron, and manganese that exceed drinking water standards in those areas. Naturally occurring elevated levels of boron are also prevalent in most subareas. Subareas south of the Napa Valley Floor, such as the Carneros and Napa River Marshes outside of the Napa Valley Subbasin, have poor quality water due to naturally elevated levels of salinity and chloride. The Calistoga Subarea of the Napa Valley Floor has poor quality water in many wells due to hydrothermal conditions that result in higher concentrations of metals. Nitrate concentrations are not a concern throughout the county, but tend to be somewhat higher in agricultural areas in the Napa Valley Floor. The Basin Analysis Report identifies representative monitoring sites which include locations for ongoing monitoring and reporting of groundwater quality as one of the sustainability indicators.
November 9, 2016	Chris Malan, Institute for Conservation Advocacy, Research and Education (ICARE). Letter to WICC, Re: The Napa Valley Groundwater Sub-basin Analysis, NVGSA aka,	2.30	It (the Basin Analysis Report) assumes a false baseline of groundwater surface elevation: historically groundwater surface elevation in Calistoga was at 0 feet at mean sea level. Now groundwater is 10 feet below the surface in Calistoga and there is on-going dewatering of the Napa River from Calistoga to the City limits of Napa since 2004 and yearly thereafter including April to October 2016.	Figure 4-6 of the Basin Analysis Report shows groundwater level elevation records for the vicinity of Calistoga. Spring groundwater levels for monitoring locations within 5 miles of Calistoga show stable spring groundwater level elevations since the 1980s.

	Groundwater Sustainable Plan-Alternative			
November 9, 2016	Chris Malan, ICARE. Letter to WICC, Re: The Napa Valley Groundwater Sub-basin Analysis, NVGSA aka, Groundwater Sustainable Plan-Alternative	2.31	LS reports that a monitoring well in St. Helena, Site #5 is showing on-going dewatering of the Napa River. This is an undesirable result impacting the public trust requiring a GSP.	The commenter makes a foundational error~~,~~ by requiring SGMA to resolve undesirable results that have occurred historically. For instance, the County acknowledges that the Napa River still faces many challenges, and in fact is taking many actions to address those challenges in the context of the TMDL, stormwater program, many miles of river restoration projects, and other activities. SGMA must address future undesirable results occurring from groundwater pumping exceeding the sustainable yield. While climate variability is described in the Report as a key contributing factor for low or no baseflow during dry periods, the effects of climate on the river system will be tracked with measurements at the 16 representative wells selected to assess potential streamflow depletion. Figure 4-46 of the Basin Analysis Report shows that, at Site 5, water level data indicate that the river was hydraulically connected to shallow groundwater during the first half of the year, until flows in the river ceased in July, and again in December 2015 as storms generated runoff leading to renewed flow in the river. Based on the analyses of surface water and groundwater interconnections, including the relationship of this connection to seasonal and annual groundwater elevation fluctuations (Chapter 4), measurable objectives for the streamflow sustainability indicator are set at 16 wells in the Subbasin (Table 7-7). These objectives represent the mean fall groundwater level elevations that occurred historically. These objectives represent the fall groundwater elevations within which groundwater elevations are reasonably likely to fluctuate during fall without exacerbating baseflow depletion. These measureable groundwater elevation objectives also serve as proxies for many other sustainability indicators, as shown in Table 7-2. (Measurable objectives and minimum thresholds are shown together in Table 7-11.) Because the data indicate that the interaction of groundwater and the river has been unchanged over a long period of time, this is not an undesirable result (as defined by SGMA) that must be corrected after the SGMA accountability date of January 1, 2015. SGMA provides that a plan or alternative submittal is not required to address undesirable results that occurred before and have not been corrected by January 1, 2015. However, the local Agency or the Groundwater Sustainability Agency have the discretion to set measurable objectives and the timeframes for achieving them. (Section 10727.2). Chapter 4 of the report describes the historical conditions of the Napa River System that occurred prior to January 1, 2015. The report also describes the river system being “considered the most sensitive sustainability indicator in the Napa Valley Subbasin, the measurable objectives and minimum thresholds discussed below [*in the Report*] are recommended to ensure groundwater sustainability or improve groundwater conditions, and provide ongoing monitoring targets devised to address potential future effects on surface water. The duration of annual no flow days varies from year-to-year and increases during extended droughts as during recent years. SGMA does not require a return to pre-development conditions, nor would decreased groundwater pumping necessarily have a significant impact on the duration and frequency of no flow days. The Basin Analysis Report provides measurable objectives and minimum thresholds at 18 specific monitoring sites within the Subbasin. Groundwater levels at 16 of these sites will be regularly evaluated and used to ensure that streamflow conditions are maintained or improved with respect to historical observations.

November 9, 2016	Chris Malan, ICARE. Letter to WICC, Re: The Napa Valley Groundwater Sub-basin Analysis, NVGSA aka, Groundwater Sustainable Plan-Alternative	2.32	(The Basin Analysis Report) has misleading information about groundwater quality-LS states that groundwater quality is poor in many areas, (especially American Canyon and Jamison Canyon and Carneros-due to sea water intrusion) into the aquifer due to boron, arsenic, nitrates, salt and heavy metals but then dismisses the importance of declining groundwater quality. Some areas are beyond the level allowed for drinking water in arsenic.	The Basin Analysis Report states that groundwater quality data show stable conditions between 2009 and 2015 compared to the conditions reported previously with data through 2008 (LSCE, 2011). Water quality standard exceedances in the Napa Valley Floor subareas and Napa Valley Subbasin were limited to the naturally-occurring constituent arsenic, with 4 of 26 sites showing maximum concentrations above the arsenic MCL of 10 µg/L. (See also Comment 2.12) The measurable objective for maintaining or improving groundwater quality is based on groundwater sample concentrations remaining above water quality objectives and groundwater quality at concentrations similar to and/or improved compared to historical observations in the groundwater basin. One representative well (06N04W27L002M, also referred to as 6N/4W-27L2) has a historical groundwater quality record. Other wells in Table 7-8 that have long groundwater level monitoring records are proposed to be added to track groundwater quality trends at locations representative of basin conditions. Beginning in spring 2017, groundwater quality sampling on an annual basis will incorporate these wells in the ongoing monitoring program. Measurable objectives for the newly designated representative wells will be re-evaluated after baseline water quality conditions are established (approximately three years of sampling and analysis of conditions). An example of measurable objectives for nitrate-nitrogen is shown in Table 7-8. The presence of long term, naturally occurring contaminants is not defined as an undesirable result by SGMA.
November 9, 2016	Chris Malan, ICARE. Letter to WICC, Re: The Napa Valley Groundwater Sub-basin Analysis, NVGSA aka, Groundwater Sustainable Plan-Alternative	2.33	(The Basin Analysis Report) dismisses and omits information about the root zone modeling outcomes-LS discusses root zone modeling on the valley floor but ignores the upper watershed value of root zone absorption for the water budget. This allows LS to not model the impacts of deforestation on groundwater recharge impacting the NVSB.	The root zone model and the overall water budget presented in the Basin Analysis Report were developed for the extent of the Napa Valley Subbasin. The root zone model does not cover upland areas outside of the Subbasin. Upland runoff and subsurface inflow components of the water budget were based on the output of the California Basin Characterization Model (BCM), and impacts of upland land use changes are considered as far as they are captured by the BCM land use inputs.
November 9, 2016	Chris Malan, ICARE. Letter to WICC, Re: The Napa Valley Groundwater Sub-basin Analysis, NVGSA aka, Groundwater Sustainable Plan-Alternative	2.34	(The Basin Analysis Report) ignores the Public Trust Doctrine that guarantees the right to fish, swim and recreate by dismissing the dewatering of the Napa River and streams due to groundwater pumping for agriculture. If an aquifer is listed with the DWR as high or moderate priority for a GSP/GSA, and there are undesirable results, a GSP, is required to achieve sustainable year-to-year safe yield, or the State takes over groundwater management.	Reaches of the Napa River have over many decades (since the 1930s) experienced low to no-flow conditions during the summer-to-fall period for a variety of reasons. Changes in streamflow over the years has been impacted by: • seasonal rainfall, • small dams (both legal and illegal) that have been constructed to block streamflow in the hills; • withdrawal of surface water (both legal and illegal) from the creeks, and • elimination of valley floor wetlands and reduced infiltration areas from development as far back as the 1800s. The duration of annual no flow days varies from year-to-year and increases during extended droughts as during recent years. SGMA does not require return to pre-development conditions, nor would decreased groundwater pumping necessarily have a significant impact on the duration and frequency of no flow days. The Basin Analysis Report provides measurable objectives and minimum thresholds at 18 specific monitoring sites within the Subbasin. Groundwater levels at 16 of these sites will be regularly evaluated and used to ensure that streamflow conditions are maintained or improved with respect to historical observations.

November 9, 2016	Chris Malan, ICARE. Letter to WICC, Re: The Napa Valley Groundwater Sub-basin Analysis, NVGSA aka, Groundwater Sustainable Plan-Alternative	2.35	(The Basin Analysis Report) fails to adequately discuss ' undesirable results' required by SGMA such as: chronic lowering of groundwater levels, unreasonable and significant depletion of supply or storage, significant or unreasonable degraded groundwater quality, depletion of interconnected surface water that has adverse impacts on beneficial uses of water, unreasonable or significant sea water intrusion, unreasonable or significant land subsidence (see chart 4-3 on page 60 of the NVSBA on land subsidence): In the NVSBA all of these undesirable results are current and on-going in this aquifer since January 1, 2015. Because 'undesirable results' are present now in this basin, the County is required to do a Groundwater Sustainable Plan, GSP, by 2020 for critically over-drafted aquifers and 2022 for medium to high priority aquifers, and a Groundwater Sustainable Agency, GSA, by June 2017.	The report defines undesirable results in Chapter 7 and provides findings related to the six sustainability indicators (the items listed by the commenter), which are discussed in greater detail in Chapter 4. The report acknowledges "at some locations during the summer to fall period, the historical occurrence of diminished baseflow could be considered an undesirable result." SGMA provides that a plan or alternative submittal is not required to address undesirable results that occurred before and have not been corrected by January 1, 2015. However, the local Agency or the Groundwater Sustainability Agency have the discretion to set measurable objectives and the timeframes for achieving them. (Section 10727.2). Chapter 4 of the report describes the historical conditions of the Napa River System that occurred prior to January 1, 2015. The report also describes the river system being "considered the most sensitive sustainability indicator in the Napa Valley Subbasin, the measurable objectives and minimum thresholds discussed below [*in the Report*] are recommended to ensure groundwater sustainability or improve groundwater conditions, and provide ongoing monitoring targets devised to address potential future effects on surface water."
November 9, 2016	Chris Malan, ICARE. Letter to WICC, Re: The Napa Valley Groundwater Sub-basin Analysis, NVGSA aka, Groundwater Sustainable Plan-Alternative	2.36	The MST aquifer is in critical overdraft, but the DWR doesn't recognize the MST for SGMA regulation implementation, or in other words, MST is outside the SGMA boundaries. Yet, there are portions of a alluvial aquifer that qualify the MST for SGMA regulation of pumping groundwater.	See response to 1.5
November 9, 2016	Chris Malan, ICARE. Letter to WICC, Re: The Napa Valley Groundwater Sub-basin Analysis, NVGSA aka, Groundwater Sustainable Plan-Alternative	2.37	(The Basin Analysis Report) mischaracterizes the water budget elements for determining safe yield-discusses that grape vine production is at 20,000/valley floor/acres and holding and ignores the recharge area in the hills where the majority of the wine grape industry expansion is occurring causing thousands of acres of deforestation and conversion to wine grapes consequently impacting groundwater recharge (to the valley floor) and many areas in the hills loosing wells due to depleting aquifers.	Proposed development of vineyards are predominantly located in the uplands, outside of the Napa Valley Subbasin. Infiltration and groundwater recharge in uplands are not considered an inflow to the Napa Valley Subbasin by the Water Budget presented in the Basin Analysis Report. However, upland runoff and uplands subsurface inflow (from mountain-front recharge) are inflows and inputs into the Subbasin water budget. An increase in upland surface water runoff would increase the inflow to the Napa Valley Subbasin and would not decrease infiltration/recharge within the Subbasin. Management of groundwater in hillsides surrounding the Napa Valley Subbasin is not the subject of the Basin Analysis Report, nor is it required under the SGMA.

November 9, 2016	Chris Malan, ICARE. Letter to WICC, Re: The Napa Valley Groundwater Sub-basin Analysis, NVGSA aka, Groundwater Sustainable Plan-Alternative	2.38	(The Basin Analysis Report) fails to account for the major use of groundwater at 60% during drought-causing dewatering of streams	Table 6-11 of the Basin Analysis Report lists the sources of applied water that are considered in the sustainable yield analysis, including groundwater pumping. Figures 5-2 and 5-4 show estimated annual Napa Valley Subbasin agricultural and municipal water use from 1988 to 2015, by source of supply, including groundwater.
November 9, 2016	Chris Malan, ICARE. Letter to WICC, Re: The Napa Valley Groundwater Sub-basin Analysis, NVGSA aka, Groundwater Sustainable Plan-Alternative	2.39	(The Basin Analysis Report) fails to project or analysis groundwater use impacts into the future due to expanding vineyards, wineries and municipal needs of surface water all impacting groundwater recharge	The water budget results that are presented in the Basin Analysis Report include a 10 year projection of future conditions in the Subbasin water budget results. As per the GSP regulations, most recent land use trend is utilized for the projected future baseline condition. The water budget has been updated to include projects approved or in process through 2016, and now considers the rate of projected development through 2025. This results in an ongoing average annual increase in demand for new wineries of 12 acre-feet/year, and for new vineyards of 2 acre-feet/year average within the Subbasin. Although homes, vineyards, and wineries are almost universally more water efficient than any time in their histories, the Report does not attempt to take credit for this known decrease in water use. Vineyard practices in particular, including use of vine specific watering technology and underground applications have greatly reduced the amount of water used for irrigation. Thus, while we account for new uses, we conservatively do not take credit for extensive conservation efforts. There is no current evidence that the County possesses that indicates the municipalities with wells (Yountville and St. Helena) intend to greatly increase their groundwater pumping; the County will nonetheless monitor the use of municipal wells and will discuss it with the Board of Supervisors should pumping rate increases occur over an extended period of time.
November 9, 2016	Chris Malan, ICARE. Letter to WICC, Re: The Napa Valley Groundwater Sub-basin Analysis, NVGSA aka, Groundwater Sustainable Plan-Alternative	2.40	The Alternative (GSP Alternative/Basin Analysis Report) quickly dismisses vineyard development impacts on groundwater recharge as it relates to drainage tiles preventing groundwater recharge, and states there is no available information on erosion control plan tiles. This is a false statement. All erosion control plans are available through the County Planning and Conservation Department files to determine tile impacts on storm water discharges and l (the) loss to groundwater aquifer recharge.	Erosion Control Plans (ECPs) are required for agricultural projects involving grading and earthmoving activities on slopes over 5%, which does not apply within the vast majority of the Subbasin due to the flat topography. Therefore, ECPs that would include information on tile drains are not available for those areas.
November 9, 2016	Chris Malan, ICARE. Letter to WICC, Re: The Napa Valley Groundwater Sub-basin Analysis, NVGSA aka, Groundwater Sustainable Plan-Alternative	2.41	The Alternative (GSP Alternative/Basin Analysis Report) is using old data on land use (2008) on vineyard development in the county unincorporated, hence the recharge considerations by LS are incorrect.	The Subbasin Water Budget presented in the DRAFT Basin Analysis report utilized DWR land use data from 2011 for pumping and recharge estimates under current condition. The water budget has been updated to include projects approved or in process through 2016, and now considers the rate of projected development through 2025. This results in an ongoing average annual increase in demand for new wineries of 12 acre-feet/year, and for new vineyards of 2 acre-feet/year average within the Subbasin.

November 9, 2016	Chris Malan, ICARE. Letter to WICC, Re: The Napa Valley Groundwater Sub-basin Analysis, NVGSA aka, Groundwater Sustainable Plan-Alternative	2.42	Figure 5.2 shows that since 1988 surface flows have declined steadily as groundwater pumping increases, as evidence that a GSP is required as groundwater continues to be a primary source of water for vineyards, as surface water availability declines	Figure 5-2 shows annual agricultural irrigation water use by source of supply; surface water, groundwater, and recycled water. The portion of irrigation water use supplied by groundwater increased over time as the portion of irrigation water use supplied by surface water decreased. Figure 5-2 does not show a decline in surface water flows.
November 9, 2016	Chris Malan, ICARE. Letter to WICC, Re: The Napa Valley Groundwater Sub-basin Analysis, NVGSA aka, Groundwater Sustainable Plan-Alternative	2.43	A GSP requires management tools implemented vs. GSP-Alt has recommendation pending/on-going and doesn't have to report to DWR for another 5 years	The commenter is mistaken regarding reporting frequency to DWR. Annual reports are required to be submitted to DWR following submittal of an alternative or a GSP. Napa County will have submitted a number of annual reports to DWR before other entities (who are submitting GSPs) have even submitted their first GSP. Napa County staff have annually reported groundwater monitoring conditions to the Board of Supervisors in a public forum for many years, which will continue. SGMA also requires that a GSP or an alternative be updated every 5 years, which means the next full update of the Basin Analysis Report would be due by 2022.
November 9, 2016	Chris Malan, ICARE. Letter to WICC, Re: The Napa Valley Groundwater Sub-basin Analysis, NVGSA aka, Groundwater Sustainable Plan-Alternative	2.44	This GSP-Alternative makes management recommendations for sustainable yield-out of 26 recommendations, 9 are complete, 14 are to be address and 9 are in the process while a GSP requires management tools to be implemented with deadlines for successful implementation with results by 2022. This GSP-Alternative allows a five year pass on groundwater sustainability if approved.	The Basin Analysis Report alternative provides many sustainability recommendations. Nearly all of the recommendations previously made in the 2011 groundwater conditions report (LSCE, 2011) have been implemented, but there are also many new actions proposed in the Report that are looking forward. The submittal of an alternative does not allow a "five year pass" on groundwater sustainability. See response to 2.43. As explained in several Chapters of the Report, it is the intent of this Report to set forth guidance and actions now that maintain or improve groundwater conditions in the Napa Valley Subbasin.
November 9, 2016	Chris Malan, ICARE. Letter to WICC, Re: The Napa Valley Groundwater Sub-basin Analysis, NVGSA aka, Groundwater Sustainable Plan-Alternative	2.45	Because the NVGSB/GSP/Alternative recommends on-going monitoring and not getting going on the develop(ment) of a Groundwater Sustainable Plan, undesirable results will continue to damage our precious watershed for generations to come. Additionally, Napa County runs the risk of the State stepping in to manage our over-drafted aquifers.	The commenter's statement is incorrect. Chapter 7 establishes measurable objectives and minimum thresholds as required by SGMA for the purposes of avoiding significant and unreasonable undesirable results. As explained in that Chapter and elsewhere in the report, these metrics will be regularly tracked and evaluated for the purpose of maintaining or improving groundwater conditions. The commenter also overstates the role of the State in this matter. It is expected that the Alternative Plan will be submitted to DWR on or before January 1, 2017, as required by SGMA. The State is required to review, comment, and approve or reject the plan. If they have any questions, needed clarifications, or have objections, the County will have the opportunity to resolve those concerns. Should the State reject the plan in its entirety, the County would then go down the path of creating a Groundwater Sustainability Agency and preparing a Groundwater Sustainability Plan by the 2022 deadline. As the County is moving forward with these allowable options, the specter of a State takeover is very unlikely given that this is intended as a measure of last resort

November 9, 2016	Pam Smithers, WICC Board Member, Re: Comments on Draft Napa Valley Groundwater Sustainability: Basin Analysis Report for the NV Sub-basin	2.46	This (The Water Budget) calculation –inflows of 236,000 acre feet, out -flows of 230,000 acre feet - leaves only 6,000 acre feet in net annual positive change in sub-basin storage. This net change is only 2.5% of total inflows. The calculations depend on many assumptions, any one of which may be incorrect. The margin of error is very slim. The assumptions should be listed, and explained in detail, next to the Budget numbers. Even better would be several Water Budgets prepared, side by side, under different assumptions.	The Basin Analysis Reports lists assumptions and uncertainties of water budget components in Table 6-10. The water budget results show an average annual change in Subbasin storage of 6,000 acre-feet per year over the base period from 1988 to 2015. Figure 6-24 shows that estimated year-to-year changes in Subbasin storage can be as large as 60,000 acre-feet. The average value of 6,000 acre-feet per year is a small fraction of the total inflows and outflows, indicating that the water budget has been nearly balanced over the base period (showing an average increase), which is consistent with the results from the independent Groundwater Level Change in Storage Analysis presented in section 6.8 of the Basin Analysis report. However, as the comment indicates, a small relative error of major water budget inflow and outflow components would have a measurable effect on the average annual change in Subbasin storage. To address this issue, Table 10-1 (Summary of Recommended Implementation Steps) in the Basin Analysis Report includes item 22: “Evaluate and address uncertainties in historical water budgets to improve calibration of budget components and reduce uncertainty of projected future water budgets.” This will also be reviewed by DWR as a part of their determination of basin sustainability.
November 9, 2016	Pam Smithers, WICC Board Member, Re: Comments on Draft Napa Valley Groundwater Sustainability: Basin Analysis Report for the NV Sub-basin	2.47	The (Water Budget) calculations assume land uses have been constant since 2011. This needs further explanation, with County Planning Dept. data to prove the conclusion. This should be done for both the sub-basin and the uplands (which matter, see below).	The Subbasin Water Budget presented in the DRAFT Basin Analysis report utilized DWR land use data from 2011 for pumping and recharge estimates under current condition. The water budget has been updated to include projects approved or in process through 2016, and now considers the rate of projected development through 2025. This results in an ongoing average annual increase in demand for new wineries of 12 acre-feet/year, and for new vineyards of 2 acre-feet/year average within the Subbasin. Upland runoff and subsurface inflow components of the water budget are based on the output of the California Basin Characterization Model (BCM)(Flint and Flint, 2013), and impacts of upland land use changes are considered as far as they are captured by the BCM land use inputs.
November 9, 2016	Pam Smithers, WICC Board Member, Re: Comments on Draft Napa Valley Groundwater Sustainability: Basin Analysis Report for the NV Sub-basin	2.48	The majority of the inflow to the basin (145,000 AF or 61% of total inflows) is reported as due from upland runoff (infiltration which eventually makes its way to the basin). This number is reported in italics, as not completely proven/correct. If this number is wrong by only 5%, we have a negative number for annual change in sub-basin storage, i.e. more water is being taken out of the sub-basin than going into. Therefore, this reported infiltration number which is the majority of the inflow to the sub-basin needs more work to assure correctness with the margin of error allowed by the Budget (2.5%).	The water budget results slide (p. 36) of the November 3, 2016 presentation “Napa Valley Groundwater Sustainability: A Basin Analysis Report for the Napa Valley Subbasin (Draft)” shows the Upland Runoff (inflow) and Surface Water Outflow and Baseflow (outflow) italicized. The note on the bottom of that slide indicates that italicized values are more uncertain than others. This is explained by their absolute magnitude, and is not meant to indicate that their relative uncertainty is quantifiably worse than other components.
November 9, 2016	Pam Smithers, WICC Board Member, Re: Comments on Draft Napa Valley Groundwater Sustainability: Basin Analysis Report for the NV Sub-basin	2.49	When forests are removed for vineyard installation, the water budget calculation changes. More data is necessary to prove that forest conversion to vineyard is not a factor. Use aerial mapping (or County Planning Dept. records) to prove the assumption that forest conversion has been minor since 2011. With forest conversion, more water makes its way into the surface water (an outflow) than infiltration (inflow). Any slight change to the surface water outflow number will result in a negative net change to sub-basin storage.	See response to Comment 2.37.

November 9, 2016	Pam Smithers, WICC Board Member, Re: Comments on Draft Napa Valley Groundwater Sustainability: Basin Analysis Report for the NV Sub-basin	2.50	Recycled Water as an Input to the Water Budget: Our obligation is to prove we have achieved groundwater sustainability over the last 10 or more years. Recycled water is used as an inflow to the water budget, yet recycled water has only been actually used in the valley within the last few years. This apparent contradiction should be clarified and explained.	Section 5.2 of the Basin Analysis Report describes the water supplies and utilization by sector. As described in the Report, recycled water has been utilized for agriculture and municipal use throughout the evaluated base period from 1988 to 2015. Although outside of the Napa Valley Subbasin, the recent construction of the MST and Carneros recycled water pipelines will increase the use of recycled water in those areas by about 1000 acre-ft per year in Napa County.
November 9, 2016	Pam Smithers, WICC Board Member, Re: Comments on Draft Napa Valley Groundwater Sustainability: Basin Analysis Report for the NV Sub-basin	2.51	Use of 1988 as beginning year of base period: Using 1988 as the base year seems odd, like cherry picking, because it results in a 28 year study period (1988-2016). To avoid the appearance of cherry picking a dry year as your beginning base year, the analysis should be done with either a 30 year base period (1986-a wet year), or a 25 year base period.	A base period of time must be selected so that it is a representative period of study for groundwater basin conditions, with minimal bias that might result from the selection of a wet or dry period or significant changes in other conditions including land use and water demands. The study period selected for the Basin Analysis Report spans from water years 1988 to 2015. This period was selected on the basis of the following criteria: long-term mean annual water supply; inclusion of both wet and dry stress periods, antecedent dry conditions, adequate data availability, and inclusion of current cultural conditions and water management conditions in the basin. A shift of the base period would not satisfy these criteria.
November 9, 2016	Pam Smithers, WICC Board Member, Re: Comments on Draft Napa Valley Groundwater Sustainability: Basin Analysis Report for the NV Sub-basin	2.52	Numbers and placement of wells being relied upon: We need more wells placed (or private wells located) away from the Napa River. The newest ten wells were all placed near the river, which is where groundwater accumulates. Table 7-1 lists “representative monitoring sites”, which includes the 10 (out of 18) wells which were located near the river, placed there specifically to study the interaction of groundwater and surface water (“designated surface/groundwater facility). While studying this interaction is critical, these wells should not dominate the list of “representative monitoring sites”. These wells must “typify conditions in the sub basin”. Either add more wells to this list, or remove some and select more wells further away from the river basin.	Table 10-1 in Chapter 10 of the Basin Analysis Report summarizes recommended implementation steps, and includes ongoing item 3.1b: Develop and/or expand aquifer specific groundwater monitoring network in Napa Valley Floor, Pope Valley and Carneros Subareas by identifying existing wells with well construction data and constructing new aquifer-specific monitoring wells as needed where data gaps may exist.
November 9, 2016	Pam Smithers, WICC Board Member, Re: Comments on Draft Napa Valley Groundwater Sustainability: Basin Analysis Report for the NV Sub-basin	2.53	Data Gaps: The study mentions in Section 4 the fact that many data gaps exist. This means not enough well data in certain areas of the valley. We should take every opportunity to use existing private wells that have been volunteered up by their owners to be included in this study. Not doing so robs us of valuable data, and it gives the appearance of cherry picking wells that will yield favorable results.	See response to 2.52

November 9, 2016	Pam Smithers, WICC Board Member, Re: Comments on Draft Napa Valley Groundwater Sustainability: Basin Analysis Report for the NV Sub-basin	2.54	Data Gaps: Additional water gages along the river should also be considered for measuring surface flow.	Table 10-1 in Chapter 10 of the Basin Analysis Report summarizes recommended implementation steps, and includes item 17: Coordinate with RCD and others regarding current stream gauging and supplemental needs for SGMA purposes; consider areas that may also benefit from nearby shallow nested groundwater monitoring wells (similar to LGA SW/GW facilities).
November 9, 2016	Pam Smithers, WICC Board Member, Re: Comments on Draft Napa Valley Groundwater Sustainability: Basin Analysis Report for the NV Sub-basin	2.55	Size of Report: The report, at 1100 pages, is too long. No one can examine a report of this size, in fact, I doubt many have actually read the entire document. There should be an executive summary section that lays out layman terms the big ideas with the assumptions used, and references to the tables and graphs. As a board member, I attended both workshops, and also spent about 6-8 hours studying the Report. In all fairness to the public, this report is far too long for the average citizen to read and understand.	The Report includes the information required by DWR to demonstrate the sustainability of the basin. The main text of the Basin Analysis Report is less than 250 pages, excluding figures and appendices; the Report includes a 30-page executive summary at its beginning.
November 10, 2016	Gary Margadant, Letter to WICC Board, Re: WICC Special Meetings, 9/22/16, 11/3/16, Comments on NAPA VALLEY GROUNDWATER SUSTAINABILITY – A BASIN ANALYSIS REPORT FOR THE NAPA VALLEY GROUNDWATER SUBBASIN (DRAFT PLAN)	2.56	The Water Availability Analysis (WAA) developed by Napa County Department of Public Works and adopted by the Board of Supervisors on May 12, 2015. I specifically refer to tables 1, 2A and 2B describing Project Screening Criteria, Water Use Criteria and Default Well Interference Criteria. The footnote to Table 1 (Further analysis may be required under CEQA if substantial evidence, in the record, indicates a potentially significant impact may occur from the project.) This is a very telling for any resolution of groundwater problems falling outside the table direction. It requires the gathering of data and evidence, placed in the record, before any County Action is initiated to counteract or change any applicability criteria. My point here is the difficulty in approaching the County with a Groundwater problem you have in the Napa Valley Floor. It appears to be very difficult and requires you to amass substantial evidence before Napa County will hear your plea. But, If you are off the floor and in the hillsides, then and investigation based on the Tier 2 requirements is straightforward and Required.	The commenter's statement regarding the WAA guidance is acknowledged. The Valley Floor and the hillside areas are very different hydrogeologic settings. The WAA intends to provide a consistent approach for applications submitted for comparable areas. For example, two hillside area discretionary project applications will be assessed for project water use and potential impacts of that use similarly. However, other factors unique to either project may result in additional analyses being required, such as the potential for well to well or well to stream interference

			The evidence will be gathered as a requirement of the project. This dichotomy does not describe a sound management process for residents throughout Napa County. The county can do better and show consistency across the whole area of their purview.	
November 10, 2016	Gary Margadant, Letter to WICC Board, Re: WICC Special Meetings, 9/22/16, 11/3/16, Comments on NAPA VALLEY GROUNDWATER SUSTAINABILITY – A BASIN ANALYSIS REPORT FOR THE NAPA VALLEY GROUNDWATER SUBBASIN (DRAFT PLAN)	2.57	The Board of Supervisors (BOS) responded to the Napa County Grand Jury on June 2, 2015 concerning questions about the management of Groundwater and Recycled Water. I refer you to the Board of Supervisors response to Findings 3 and 4 and the Recommendations 1, 2 and 3. For the findings, the BOS did not deal directly with the questions and avoided any discussion of county efforts for sustainability as described in the GRAC Objectives previously listed: "......overarching goal of developing sustainability objectives is to protect the groundwater resources of Napa County for all the people who live and work here, regardless of the source of their water supply....." The BOS approved and adopted this language in their acceptance of this GRAC report, but it is a shame that their follow up has not been more rigorous in the need to help residents with guidance and analytical efforts. Without help, it is difficult to understand the nature of the groundwater problems in their experience and make an educated attempt at Groundwater Sustainability. The BOS needs to revisit their response to the Grand Jury if their overarching goal is Sustainability in the Whole of Napa County, not just the Valley Floor covered by the Basin Analysis. The board needs to broaden their approach to all areas of Napa County with consistent direction and effective use of their staff in the Department of Public Works and PBES. These departments are full of qualified talent to manage these Groundwater difficulties	The County previously responded to the Grand Jury Report.

November 10, 2016	Gary Margadant, Letter to WICC Board, Re: WICC Special Meetings, 9/22/16, 11/3/16, Comments on NAPA VALLEY GROUNDWATER SUSTAINABILITY – A BASIN ANALYSIS REPORT FOR THE NAPA VALLEY GROUNDWATER SUBBASIN (DRAFT PLAN)	2.58	In previous comments before WICC, I have discussed areas of Groundwater difficulties within the Napa Valley Basin, particularly Petra Drive, Dry Creek Road and Orchard Avenue and Dunaweal Lane. I have reviewed the LIDAR maps in two documents in the appendices of the Basin Report: 1) Part 1 of 2, Updated Hydrogeologic Conceptualization & Characterization of Condition, January 13, Fig 7-9, Calculation depth of Groundwater in spring 2010. 2) Casgem Update, 2015 Annual Report, March 2016, Fig 2-6. Spring 2010, calculated Depth of Groundwater. In each of these maps, areas of groundwater depth are depicted in colors throughout the Basin. In 1), the yellow areas show a depth of 40'-250' , with grey of 20' - 30'. In 2), the yellow area show a depth of 40' - 132'. These maps indicate areas of deep difficulty in the location of Groundwater, defining for the county where sustainability issues will bubble to the surface and residents will be looking for guidance and assistance. If the county were to overlay these maps with Parcel Maps, they will immediately know who might be affected by this deep water source that is not typical of the majority of the Valley Floor Basin. These would immediately become areas of concern with the possible need for sustainable management. Petra Drive has entered that area of concern due to the concentration of wells in a somewhat Residential neighborhood with nearby commercial wineries and the nature of the underlying groundwater geology. The close proximity of the Beau Vigne (formerly Van de Heyden) and the resulting pressure on the groundwater supplies is noted in the Water Availability Analysis (WAA) provided by the project Permit Modification request. The WAA relies on the valley floor definition of the WAA Tier 1 available groundwater at 1 acre-foot of water per acre of land in the project, yet if the project location was located to the east by 1300 feet, it would no longer be in the valley floor basin. Rather it would be in the hills and subject to Tier 2 of the WAA and require greater analysis of the available ground water and interference of	In areas such as Petra Drive where groundwater level trends are atypical of overall Subbasin conditions, further study may be warranted and there is the potential for designation as a management area. The Petra Drive area and the study currently underway in that vicinity are discussed in Section 7.6 of the Report.

			adjacent wells within 500 feet. As you can see by the WAA and the diagram of the 500' radius circle around the existing well, there are 13 adjacent wells within that circle, yet none of the wells will be analyzed for interference. The groundwater is considered sufficient for all wells based on the Tier 1 criteria. So this is the current process, but I fail to see how this method will meet the definition of Sustainability and meet the goals of GRAC. The county needs to step up and meet the SGMA goals with a different organization and goals. This current regime bodes ill for the residents of the valley, especially in those in areas of deep groundwater location within the Napa Valley Sub Basin.	Since 2009, the County has implemented a Comprehensive Groundwater Monitoring Program which has included far more than simply monitoring groundwater. The activities undertaken and completed by the County during the past 7 years surpass what has been accomplished in many other medium and high priority basins statewide to understand conditions in those basins and comply with SGMA. See Report Executive Summary, and Chapters 1, 9, and 10 of the Report.
November 11, 2016	Bernadette Brooks, Email to WICC Board, Re: SGMA Basin analysis comments	2.59	One key comment and concern I have is that the models and report as presented look backward in time and rely on a similar pattern for Napa Basin going forward. While I am not sure any of us has definitive information on what climate change will bring to Napa Valley I feel it would be a mistake for us not to look at a worst case scenario and somewhere in between before we talk ourselves into thinking that Napa Valley's water supply is in good shape for the next 5 -10 years. As data input behind my concern please see a short but very informative article at the link below by the Colorado River Research Group that talks about the considerable effects of temperature change more so than precipitation levels on water supply. While they are specifically looking at the Colorado River the concerns can be applied to most western water basins. I am especially concerned as the presented Water Budget model relies heavily on Upland Runoff as input and practically stable groundwater pumping for irrigation. Both of these factors will probably change considerably with increasing temperatures. In addition we need to anticipate more reductions in imported water allowances. So I would like to see the SGMA report include both a mention of the climate change factors and present, a conservative at least, future Water Budget scenario taking them into consideration. I think this is important for future planning and governance of our water supply.	Climate change is a component considered in the Basin Analysis Report. The root zone model component of the Subbasin water budget utilizes precipitation as well as evapotranspiration as hydrologic model inputs. Evapotranspiration (ET) is a function of temperature. Projected Subbasin water budgets rely on projected hydrologic inputs for precipitations, and ET/temperature. The baseline condition for future water budgets that is presented in this report is based on the “warm and moderate rainfall” climate change projection of the U.S. Geological Survey Basin Characterization Model (BCM)(Flint and Flint, 2013). In addition to the “warm and moderate rainfall” baseline condition, an alternative “hot and low rainfall” future climate scenario from the BCM was applied to the Subbasin Water Budget to evaluate future scenarios of hydrologic uncertainty associated with projections of climate change.

			(http://www.coloradoriverresearchgroup.org/uploads/4/2/3/6/42362959/crrg_climate_change.pdf)	
11/21/2016	Yemia Hashimoto, SF Bay Regional Water Board, Email to Patrick Lowe, Re: Water Board Comments on the October 2016 Draft Napa Valley Groundwater Sustainability-Basin Analysis Report	2.60	Data Gaps: We concur with Section 10.2 recommendations in the Basin Analysis Report that groundwater monitoring gaps be addressed. Our concern is that if these data gaps are not addressed, Napa County would not be able to identify future Study Areas, as is described in Section 7.6. Therefore, please indicate if specific locations are currently prioritized for monitoring, and/or how these locations would be identified. For example, we note data gaps in the northern region, near Calistoga, including Napa River tributaries, where the monitoring network is much less dense. Please consider focusing future investigation/monitoring to address data gaps in the Dry, Milliken, Sulphur, Mill, and Richie Creek tributary areas, which are of particular interest for preservation of groundwater base flow and aquatic species habitat.	The 2013 Napa County Groundwater Monitoring Plan ranked and prioritized improvements or expansions of groundwater level monitoring in each of the designated subareas in Section 2.3.4 (Groundwater Monitoring Priorities). Six subareas (including the NVF-Calistoga, NVF-MST, NVF-Napa, NVF-St. Helena, NVF-Yountville, and Carneros Subareas) were given a relatively higher priority. This relative prioritization was based on such factors as data scarcity, the need to improve the spatial distribution of the currently collected data, current population and groundwater utilization relative to other parts of the county, and /or the need to improve understanding of groundwater/surface water interaction. 10 additional dedicated monitoring wells were installed and have been monitored since 2014 to collect data and ascertain the relative importance of baseflow and its interrelationship with the groundwater system along the river system. Going forward, a total of 18 representative monitoring sites will be monitored to achieve measurable objectives, or specific quantifiable goals for maintaining or improving groundwater conditions, and to inform the five-year updates of the Basin Analysis Report. As reported in the Napa County Comprehensive Groundwater Monitoring Program, 2015 Annual Report and CASGEM Update, there are 113 sites monitored throughout Napa County, by the County, DWR, and others. The well monitoring network is continually being evaluated and updated to assess additional data needs to ensure groundwater resources sustainability, including areas within the Dry, Milliken, Sulphur, Mill, and Richie Creek tributary areas that the commenter mentioned. Section 10.2 of the Basin Analysis Report specifies that additional wells are of interest in the St. Helena Subarea, northern part of the Yountville Subarea, and the southern part of the Napa Subarea. Figure 10- 1 shows the current distribution of monitoring wells, including monitoring wells used to compute groundwater levels and the change in groundwater storage in the alluvial aquifer system and the distribution of other currently monitored wells. Additional wells are also of interest to monitor conditions in older formations underlying the alluvial aquifer system. The County has the opportunity, through Conditions of Approval on new and modified discretionary permits, to obtain additional wells and monitoring data by requiring new permittees to monitor and record water level and extraction data, and provide the County access to project wells and data when it is needed to maintain or expand the monitoring network.
11/21/2016	Yemia Hashimoto, SF Bay Regional Water Board, Email to Patrick Lowe, Re: Water Board Comments on the October 2016 Draft Napa Valley Groundwater Sustainability-Basin Analysis Report	2.61	Management Areas: We recognize that the County has identified a Study Area that overlaps a portion of the southeastern Napa Valley Subbasin and the MST area, where future growth and activity is anticipated. Please explain the difference between a Study Area and a Management Area. Please also explain if/how the approach to investigate or manage these areas is affected by Napa County's decision to not form a SGMA Groundwater Sustainability Agency (GSA) for the Napa Valley Subbasin.	SGMA defines a "management area" as an area within a basin for which the Plan (in this case, the Basin Analysis Report in Section 7.6) may identify different minimum thresholds, measurable objectives, monitoring, or projects and management actions based on differences in water use sector, water source type, geology, aquifer characteristics, or other factors (GSP regulations; Article 2, Section 351). Within the Napa Valley Subbasin, there is an area where groundwater level trends are different than those that are typical of groundwater level trends for the overall groundwater basin. This area, referred to in the Basin Analysis Report as the Study Area, is not considered to be representative of the overall Napa Valley Subbasin. At this time, there are no Management Areas that have been defined in the Napa Valley Subbasin. The investigation described in Section 7.6 of the Basin Analysis Report will determine whether a Management Area is warranted.
11/21/2016	Yemia Hashimoto, SF Bay Regional Water Board, Email to Patrick Lowe, Re: Water Board Comments on the October 2016 Draft	2.62	a) Undesirable Results, Minimum Thresholds: We concur with the statement in the Basin Analysis Report that the "river system is considered the most sensitive sustainability indicator in the Napa Valley Subbasin" and that the historical occurrence of diminished stream base flow could be considered an undesirable result. Because this	a) The thresholds for streamflow depletion and other sustainability indicators represent the lowest static groundwater level elevation that has occurred historically in the fall and an elevation below which additional streamflow depletion is likely to occur, i.e., expand the duration of annual no flow days in some reaches of the Napa River. These thresholds represent the lowest static groundwater elevation to which groundwater levels may reasonably be lowered at the end of a dry season without exacerbating streamflow depletion. Therefore, undesirable results could occur if groundwater levels do not recover from threshold levels to near-average spring groundwater levels through the following wet

	Napa Valley Groundwater Sustainability-Basin Analysis Report		undesirable result is a pre-SGMA condition, the Basin Analysis Report recommends measurable objectives and minimum thresholds to protect against only future undesirable results. Therefore, the report should elaborate on the details of the minimum thresholds for protecting against future worsening of this undesirable result. For instance, the report states that the minimum threshold is not a long term value, but did not provide sufficient exceedance timeframe details. What is the time interval within which it is acceptable for the minimum threshold to be exceeded, and how is it determined? b) Furthermore, the report should explain the consequences of a minimum threshold exceedance (i.e., if there is an exceedance, what is the next step?) and the difference between a GSA and non-GSA entity's ability to respond to an exceedance of threshold values, and implement a corrective action, if any.	season. These objectives represent the mean fall groundwater level elevations that occurred historically. These objectives represent the fall groundwater elevations within which groundwater elevations are reasonably likely to fluctuate during fall without exacerbating baseflow depletion. These measureable groundwater elevation objectives also serve as proxies for many other sustainability indicators, as shown in Table 7-2. (Measurable objectives and minimum thresholds are shown together in Table 7-11.) Because the data indicate that the interaction of groundwater and the river has been unchanged over a long period of time, this (as defined by SGMA) is not an undesirable result that must be corrected after the SGMA accountability date of January 1, 2015. SGMA provides that a plan or alternative submittal is not required to address undesirable results that occurred before and have not been corrected by January 1, 2015. However, the local Agency or the Groundwater Sustainability Agency have the discretion to set measurable objectives and the timeframes for achieving them. (Section 10727.2). Chapter 4 of the report describes the historical conditions of the Napa River System that occurred prior to January 1, 2015. Yes, the report describes the river system being "considered the most sensitive sustainability indicator in the Napa Valley Subbasin, the measurable objectives and minimum thresholds discussed below [*in the Report*] are recommended to ensure groundwater sustainability or improve groundwater conditions, and provide ongoing monitoring targets devised to address potential future effects on surface water. The duration of annual no flow days varies from year-to-year and increases during extended droughts as during recent years. SGMA does not require return to pre-development conditions, nor would decreased groundwater pumping necessarily have a significant impact on the duration and frequency of no flow days. The Basin Analysis Report provides measurable objectives and minimum thresholds at 18 specific monitoring sites within the Subbasin. Groundwater levels at 16 of these sites will be regularly evaluated and used to ensure that streamflow conditions are maintained or improved with respect to historical observations. See also response to 2.34.b) The Basin Analysis Report is functionally equivalent to a GSP, and provides measurable objectives, or specific quantifiable goals for maintaining or improving groundwater conditions, for streamflow depletion and other sustainability indicators. Section 9.5 of the Basin Analysis Report outlines groundwater management strategies; implementation of the monitoring and reporting actions outlined in Chapter 8 and elsewhere in this Report over time may require the incremental implementation of a variety of management strategies or actions to ensure the long-term sustainability of the Napa Valley Subbasin. Actions may include future changes to local land use controls, well permitting, groundwater metering and usage limits, changes to County ordinances, and direct coordination with other municipal agencies to effectively protect and sustain groundwater and surface water resources; all of which are within the authority of the County Board of Supervisors. As evident by results in this Report, the Napa Valley Subbasin has been operating within its sustainable yield for more than 20 years and far-reaching management actions are not necessary at this time.

11/21/2016	Yemia Hashimoto, SF Bay Regional Water Board, Email to Patrick Lowe, Re: Water Board Comments on the October 2016 Draft Napa Valley Groundwater Sustainability-Basin Analysis Report	2.63	Future Assumptions: The report should elaborate on how other stakeholders are obligated to follow any of the Basin Plan Report requirements, considering there is no GSA. It (The Basin Analysis Report) should also address the following: • How were recycled water and future stormwater projects addressed and how might they affect future management of the Basin in terms of water quantity (i.e. water levels) and water quality? • How was climate change addressed and might it affect future basin management and sustainability? • What assumptions were made about future increases in groundwater use? If groundwater is fully allocated, how will the Napa Valley Subbasin address additional land use changes that create demands on additional groundwater extraction? What land use and population growth assumptions were included?	See response to 2.62(b) Section 5.2 of the Basin Analysis Report describes the water supplies and utilization by sector. As described in the Report, recycled water has been utilized for agriculture and municipal use throughout the evaluated base period from 1988 to 2015. Recycled water use is reflected in the water budget based on the use of recycled water reported by the municipalities in the Subbasin and by the use of recycled water for irrigation as calculated by the Root Zone Model and is informed by the source of water supply assigned for irrigated land use units in the Department of Water Resources' land use surveys and by the delivery area for the Town of Yountville Recycled Water Distribution System. Projected baseline water supply is based on most recent imported surface water deliveries. Although outside of the Napa Valley Subbasin, the recent construction of the MST and Carneros recycled water pipelines will increase the use of recycled water in those areas in Napa County by about 1000 acre-ft. The root zone model component of the Subbasin water budget utilizes precipitation as well as evapotranspiration as hydrologic model inputs. Evapotranspiration (ET) is a function of temperature. Projected Subbasin water budgets rely on projected hydrologic inputs for precipitation, and ET/temperature. The baseline condition for future water budgets that is presented in this report includes climate change projections from the most recent regional climate models and is based on the "warm and moderate rainfall" climate change projection of the U.S. Geological Survey Basin Characterization Model (BCM)(Flint and Flint, 2013). In addition to the "warm and moderate rainfall" baseline condition, an alternative "hot and low rainfall" future climate scenario from the BCM was conservatively applied to the Subbasin Water Budget to evaluate future scenarios of hydrologic uncertainty associated with projections of climate change. Projected baseline water demand presented in the DRAFT Basin Analysis report was based on most recent municipal demand rates and DWR land use data from 2011 for pumping and recharge estimates under current condition. The water budget has been updated to include projects approved or in process through 2016, and now considers the rate of projected development through 2025. This results in an ongoing average annual increase in demand for new wineries of 12 acre-feet/year, and for new vineyards of 2 acre-feet/year average within the Subbasin. Projected municipal demand is conservatively projected to be constant, at rates that are based on the most recent 5 year averages.

11/21/2016	Yemia Hashimoto, SF Bay Regional Water Board, Email to Patrick Lowe, Re: Water Board Comments on the October 2016 Draft Napa Valley Groundwater Sustainability-Basin Analysis Report	2.64	Monitoring: We believe the Basin Analysis Report should provide a commitment to continually improving the Napa Valley monitoring network and refining baseline conditions. We note that the threshold monitoring network is comprised of 18 representative monitoring sites; however, 113 groundwater level, 81 groundwater quality, and 5 groundwater-surface water interaction cluster wells are also monitored. Please consider including a process for nominating additional representative monitoring wells based on data gaps and uncertainties related to specific monitoring objectives and minimum thresholds and other criteria to detect potential undesirable results.	All wells within the monitoring network (113) are monitored and the data from the entire network is analyzed annually. The Basin Analysis Report describes the criteria by which special representative monitoring sites were selected in Section 7.3 (Representative Monitoring Sites); SGMA defines “representative monitoring” as “a monitoring site within a broader network of sites that typifies one or more conditions within the basin or an area of the basin” (GSP regulations; Article 2, Section 351). In accordance with SGMA regulations, the Basin Analysis Report identifies 18 representative monitoring sites for monitoring sustainability indicators throughout the Subbasin. This subset of monitoring sites is for the purpose of monitoring groundwater conditions that are representative of the basin or an area of the basin (Article 5, Section 354.36) and for the establishment of sustainability objectives and minimum thresholds. Going forward, these 18 representative monitoring sites will be monitored to achieve measurable objectives, or specific quantifiable goals for maintaining or improving groundwater conditions, and to inform the five-year updates of the Basin Analysis Report. The other approximately 95 wells in the County that are monitored will continue to be monitored, with groundwater conditions reported annually to the public and County Board of Supervisors, and they will also inform the five-year updates of the Basin Analysis Report. Future updates of the Basin Analysis Report (or annual reports) may adopt additional representative monitoring sites using the criteria mentioned above, if new data suggest additional sites are need.
11/21/2016	Yemia Hashimoto, SF Bay Regional Water Board, Email to Patrick Lowe, Re: Water Board Comments on the October 2016 Draft Napa Valley Groundwater Sustainability-Basin Analysis Report	2.65	Reporting: Please explain how the monitoring data, inclusive of threshold and baseline data, is to be made available to agencies such as ours, and/or the public.	Section 8.5 of the Basin Analysis Report discusses regular, annual data submittals to DWR, and specifically for SGMA purposes. Monitoring data stored in the County’s Data Management System will be submitted to DWR electronically (GSP regulations; Sections 354.40, 356.2). A copy of the monitoring data included in the Annual Report (see Report Section 8.6.4) will be submitted electronically as required on forms provided by DWR. The County understands that DWR is working on guidance that will describe the formatting requirements needed to submit data to DWR. DWR will make forms and instructions for submitting Plans, reports, and other information available on its website.

Comments on Draft Basin Analysis Report Received Prior to 11/3/2016

Date	Commenter		Comment	Response
September 22, 2016	Gary Margadant (Verbal comment at WICC Workshop)	1.1	Gary Margadant referred to the Napa County Grand Jury Report 2014-15 and commented that the report said the County had no groundwater contingency plans for the drought and no means of monitoring groundwater usage.	Regarding Finding F1 from the Napa County Grand Jury report "Management of Groundwater and Recycled Water: Is Napa County in Good Hands?" (dated March 31, 2015). The Napa County Board of Supervisors' Response (dated June 2, 2015) notes that "the County has invested significant resources to ensure an adequate understanding of our groundwater resources. This is evident in the Napa County Comprehensive Groundwater Monitoring Program 2014 Annual Report and CASGEM Update. The monitoring program provides an 'early warning system' to provide sufficient time to respond should a significant problem develop." The response continues by noting the County's decision to develop this Basin Analysis Report as an Alternative to a Groundwater Sustainability Plan. With respect to the Napa Valley Subbasin, the Basin Analysis Report identifies representative monitoring sites that will be used to monitor sustainability indicators, including: chronic lowering of groundwater levels, reduced groundwater storage, seawater intrusion, degraded groundwater quality, land subsidence, and streamflow depletion. Minimum thresholds (in feet above mean sea level) to avoid chronic lowering of groundwater levels, land subsidence, reduced groundwater storage, and streamflow depletion are provided in the Basin Analysis Report for sixteen representative monitoring sites (and one additional representative monitoring site that is too far from the Napa River and is not used for streamflow depletion); minimum thresholds to avoid degraded groundwater quality (e.g., for nitrate) are provided in this document for seven representative monitoring sites; a minimum threshold to avoid seawater intrusion is provided in this document for one representative monitoring site (for TDS concentration). Measurable objectives, or specific quantifiable goals for maintaining or improving groundwater conditions, are provided in the Basin Analysis Report for streamflow depletion and other sustainability indicators, again using 16 of the representative monitoring sites. The measurable objective to maintain or improve groundwater quality is set for seven representative monitoring sites; for one representative monitoring site to avoid seawater intrusion; and for 17 of the representative monitoring sites for avoiding chronic lowering of groundwater levels, reducing groundwater storage, and land subsidence. Outside the Napa Valley Subbasin, the County has implemented conditions for monitoring groundwater usage, when warranted, for discretionary projects that use groundwater as a source of supply. The Sustainable Groundwater Management Act of 2014 (SGMA) does not require that the County, or any agency, monitor all groundwater use in its jurisdiction in order to achieve sustainability of groundwater resources.
September 22, 2016	Gary Margadant (Verbal comment at WICC Workshop)	1.2	Mr. Margadant mentioned the Petra Dr. area and development of a winery in the area. Mr. Margadant would like a comparison of the Petra Dr. area to that of the hillside areas, and noted the 1 ac/ft/ac/year water allotment on the valley floor. He also noted that there are 13 wells along Petra Dr. within 500' of the proposed winery development. Mr. Margadant said there is no monitoring well nearby.	Water levels in northeastern Napa Subarea wells monitored by the County east of the Napa River have stabilized since 2009, though declines were observed over approximately the prior decade. To ensure continuation of the current stable groundwater levels, a further study in this area was approved by the Napa County Board of Supervisors. The study is designed to examine existing and future water use in the area, sources of groundwater recharge, and the geologic setting to address questions regarding the potential for long-term effects. The study will also investigate the potential influence of previously documented groundwater cones of depression in the MST subarea on the Study Area both east and west of the Napa River. The County will evaluate the study results to determine if potential groundwater management measures or controls (similar to those that have been successfully implemented in the MST) or a Management Area designation are warranted. The County's monitoring network includes two wells (Napa County Wells 182 and 228) on Petra Drive. Regarding the recent approval of a winery use permit modification request (the modification of an existing winery) near Petra Drive was "approvable" from a groundwater perspective because the modification actually proposed a decrease in groundwater use. The County recognizes there are several other proposed projects and modifications to existing projects in this area. These projects are all being requested to demonstrate "no net increase" in groundwater, or a reduction in use. Those that cannot achieve that standard are being required to do additional studies beyond the normal Valley Floor Water Availability Analysis Tier 1 standard in order to prove that adequate groundwater is available.

September 22, 2016	Gary Margadant (Verbal comment at WICC Workshop)	1.3	Mr. Margadant also mentioned the 2015 monitoring report and 108 wells, of which 61 are less than two years old; concluding that 56% of the wells do not come close to the 10 year period that is required for looking at sustainability.	The Basin Analysis Report provides, in Chapter 3, a list of currently monitored wells and their periods of record. In addition, dozens of additional wells have been monitored in the Napa Valley Subbasin and Napa Valley Floor at various times in the past and provide data that have been used to understand historical conditions, as described in the 2011 Napa County Groundwater Conditions and Groundwater Monitoring Recommendations Report that is among the appendices to the Basin Analysis Report. While the County has worked to expand its monitoring network in recent years to address data gaps, that effort does not imply that previously available data are not useful for understanding conditions in the Subbasin. The state regulations for Groundwater Sustainability Plans (GSPs) and Alternatives to GSPs specifically call for using the best available data to evaluate sustainability, while acknowledging that data gaps may be present. The state regulations also define sustainability in terms of conditions present throughout a basin or subbasin, in part to avoid over reliance on any single measurement which may reflect a localized or temporary condition (e.g., temporary groundwater level drawdown resulting from a nearby well). The Basin Analysis Report identifies representative monitoring sites for monitoring sustainability indicators throughout the Subbasin now and into the future. Of those, 7 monitoring sites have periods of record from at least 1988 to present. 10 additional dedicated monitoring sites have been monitored since 2014. Going forward, a total of 18 representative monitoring sites will be monitored to achieve measurable objectives, or specific quantifiable goals for maintaining or improving groundwater conditions, and to inform the five-year updates of the Basin Analysis Report. As reported in the *Napa County Comprehensive Groundwater Monitoring Program, 2015 Annual Report and CASGEM Update*, there are 113 sites monitored in Napa County, by the County, DWR, and others. The monitoring network is continually being evaluated to assess additional data needs to ensure groundwater resources sustainability. Chapter 10 of the Basin Analysis Report presents recommendations for focused areas where additional groundwater monitoring is recommended.
September 22, 2016	Gary Margadant (Verbal comment at WICC Workshop)	1.4	Mr. Margadant mentioned recharge, saying the RCD has changed its position on deep ripping, concluding it changes recharge rate due to changes in the soil properties and compaction.	The USDA Natural Resources Conservation Service sent a letter to the Napa County Resource Conservation District in June, 2016, giving recommendations on changing Hydrologic Soil Groups after the ripping of shallow soils. The summary of finding states "that upon ripping to 36 inches deep the Hydrologic Soil Group (HSG) of the following soils would change from D to C: Hambright, Lodo, Maymen and Millsholm. The HSG for the Kidd soil would change from D to B. Increases in (ripped) soil depth from less than to more than 20 inches can change HSG even without changes in saturated hydrologic conductivity (Ksat)". In general, ripping can lower the potential for runoff, and increase the rate of infiltration. The Sustainable Yield Analysis that is presented in the Basin Analysis Report includes a Subbasin Water Budget that already assumes runoff to be negligible within the Subbasin due to the flat topography and soil saturated hydraulic conductivity values that are generally higher than average monthly precipitation by more than an order of magnitude. The soils mentioned in the letter by NRCS do not generally occur in the Subbasin, but in the surrounding hillsides/uplands. In the Subbasin Water Budget, runoff from upland areas is represented by the mass balance modeling approach of the USGS California Basin Characterization Model (BCM). The BCM utilizes the NRCS soil data to estimate available soil-water storage, but does not utilize the Hydrologic Soil Group which is used to associate runoff curve numbers.
September 22, 2016	Gordon Evans (Verbal comment at WICC Workshop, and 10/28/16 letter to WICC Board of Directions, Re: WICC Special Meeting 9/22/16)	1.5	Gordon Evans, Atlas Peak Rd., noted that there are a number of wells in decline and 3 total failures in the last couple of years. Mr. Evans said to look at the Napa Valley subbasin only is myopic and doesn't take into account the recharge the MST "basin" and hillside watersheds provide to the lowest aquifer in the subbasin.	Water levels in northeastern Napa Subarea wells monitored by the County east of the Napa River have stabilized since 2009, though declines were observed over approximately the prior decade. To ensure continuation of the current stable groundwater levels, a further study in this area was approved by the Napa County Board of Supervisors. The study is designed to examine existing and future water use in the area, sources of groundwater recharge, and the geologic setting to address questions regarding the potential for long-term effects. The study will also investigate the potential influence of previously documented groundwater cones of depression in the MST subarea on the Study Area both east and west of the Napa River. The majority of the MST is located outside a DWR-designated groundwater basin. The County will evaluate the study results to determine if potential groundwater management measures or controls (similar to those that have been successfully implemented in the MST) or a Management Area designation are warranted. The Sustainable Groundwater Management Act requires GSPs or Alternatives for medium and high priority groundwater basins as delineated and ranked by the State Department of Water Resources (DWR). The hillsides do not fall within the Napa Valley Subbasin that DWR has delineated. However, the hillsides are included in the Napa Valley Subbasin water budget by

				incorporating uplands runoff and subsurface inflow. Because the hillsides do not act as a basin, but instead as thousands of discrete subareas based on local geography, it is not scientifically or economically practical to "study the hillsides".
September 22, 2016	Gordon Evans (Verbal comment at WICC Workshop, and 10/28/16 letter to WICC Board of Directions, Re: WICC Special Meeting 9/22/16)	1.6	Mr. Evans mentioned the conclusion and recommendations in the Grand Jury 2014-15 Report and the Board of Supervisor's responses; saying the conclusions and the recommendations by the Grand Jury have largely not been followed by the Board of Supervisors and no contingency plans are in place for groundwater like there are for earthquakes and floods.	See response to 1.1
September 22, 2016	Gordon Evans (Verbal comment at WICC Workshop, and 10/28/16 letter to WICC Board of Directions, Re: WICC Special Meeting 9/22/16)	1.7	Mr. Evans stated that even if one assumes that the groundwater models show there is no current groundwater deficiency there is no monitoring beyond the subbasin and the Board of Supervisors response has been "will include significant outreach and input from the public." Mr. Evans said contrary to statements by Patrick Lowe, no one has been in contact with him despite repeated inquiries to Mr. Lowe and Jeff Sharp over the years.	Wells in the CASGEM monitoring network are a subset of the larger Napa County network and are distributed across all five Napa Valley Floor Subareas (Calistoga, St. Helena, Yountville, Napa, and MST), as well as the Carneros, Angwin, Eastern Mountains, and Western Mountains Subareas. The Basin Analysis Report identifies representative monitoring sites for monitoring sustainability indicators throughout the Subbasin. Going forward, these 18 representative monitoring sites will be monitored to achieve measurable objectives, or specific quantifiable goals for maintaining or improving groundwater conditions, and to inform the five-year updates of the Basin Analysis Report. The other approximately 95 wells in the County that are monitored will also continue to be monitored, and groundwater conditions will be reported annually to the County Board of Supervisors. Mr. Evans was contacted by Napa County regarding groundwater questions and the voluntary well monitoring network on September 25, 2015, September 30, 2015, October 27, 2015, and October 29, 2015. The Napa Resource Conservation Dist. (RCD) contacted Mr. Evans regarding participation in the groundwater self-monitoring program on June 16, 2016. Napa County has followed up with Mr. Evans on October 19, 2016, October 21, 2016 and October 26, 2016. Mr. Evans well site was visited by County and RCD staff on October 24, 2016 to measure his well and calibrate a sonic level measuring device so that he can self-monitor his well in the future. The County will continue to solicit input from the public on future updates of the Basin Analysis Report.
September 22, 2016	Gordon Evans (Verbal comment at WICC Workshop, and 10/28/16 letter to WICC Board of Directions, Re: WICC Special Meeting 9/22/16)	1.8	Mr. Evans quoted the 2014-15 Grand Jury report: "In contrast to the County's position, the well drillers reported that wells on the Valley floor must be drilled to depths of 300-750 feet and in some cases over 1,000 feet to find water vs. a drilling depth of 100-200 feet or less in previous years. They still find water on the Valley floor 90-95% of the time, just at lower depths. The well drillers agree that it is far less certain that water will be found on the county's hillsides. Drillers that were interviewed said finding water there is a 50-50 proposition and that reports of wells drying up are not uncommon." Mr. Evans said that common sense and experience tell us water flows downhill. Mr. Evans stated that the MST "basin" is in	Overall groundwater levels in the main Napa Valley Subbasin have been stable for decades. Groundwater conditions outside the Napa Valley Subbasin are more variable, such as in the Milliken-Sarco-Tulucay area and in hillside areas. In addition to the effects of the recent drought, the productivity of an individual well can depend on a number of things including the depth and serviceable life of the well, local aquifer properties, and amount and rate of nearby pumping from surrounding wells. In limited areas, such as the northeastern Napa Subarea, where groundwater levels have declined, or where seasonal variability is high, newer wells may be deeper to produce at dependable rates. Water levels in northeastern Napa Subarea wells monitored by the County east of the Napa River have stabilized since 2009, though declines were observed over approximately the prior decade. To ensure continuation of the current stable groundwater levels, a further study in this area was approved by the Napa County Board of Supervisors. The study is designed to examine existing and future water use in the area, sources of groundwater recharge, and the geologic setting to address questions regarding the potential for long-term effects. The study will also investigate the potential influence of previously documented groundwater cones of depression in the MST subarea on the Study Area both east and west of the Napa River. The County will evaluate the study results to determine if potential groundwater management measures or controls (similar to those that have been successfully implemented in the MST) or a Management Area designation are warranted. With regards to the MST, it is in fact one of the most monitored areas of the county, with data dating back many decades. There are significant land use controls in place in the area (the County has not approved a discretionary project in the MST

			depletion and continues to decline with no groundwater management planning.	that couldn't meet the "no net increase" standard since 2004), and significant effort has gone into constructing a recycled water pipeline to the area, that became operational just this year. While groundwater levels in the MST area are far from recovered, data indicates a stabilization of water levels in most areas, and it is hoped that the recycled water will continue this recovery. The County will not be in a position to relax the strict land use standards and groundwater permit requirements in the area until it does.
September 22, 2016	Gordon Evans (Verbal comment at WICC Workshop, and 10/28/16 letter to WICC Board of Directions, Re: WICC Special Meeting 9/22/16)	1.9	Mr. Evans believes we do not qualify for a SGMA plan alternative because we do have more than ten years of undesirable results as previously defined, especially in areas around and feeding the Subbasin.	In response to the 2014 Sustainable Groundwater Management Act, Napa County has prepared this Alternative Submittal, Basin Analysis Report, per the requirements of Water Code Section 10733.6 (b)(3) where an analysis of basin conditions demonstrates that the basin has operated within its sustainable yield over a period of at least 10 years. The Basin Analysis Report will be submitted to the State Department of Water Resources (DWR) for evaluation. DWR will issue a written assessment of the Report which will include a determination of the status of the Report (i.e. approved, incomplete, or inadequate).
September 22, 2016	Gordon Evans (Verbal comment at WICC Workshop, and 10/28/16 letter to WICC Board of Directions, Re: WICC Special Meeting 9/22/16)	1.10	Mr. Evans said the hills and the upper watersheds need management and must be included with any groundwater sustainability planning because if one doesn't manage those recharge areas, especially those being deforested, one is not managing for long-term sustainability.	The Sustainable Groundwater Management Act requires GSPs or Alternatives for medium and high priority groundwater basins as delineated and ranked by the State Department of Water Resources (DWR). The hillsides do not fall within the Napa Valley Subbasin that DWR has delineated. However, the hillsides are included in the Napa Valley Subbasin water budget by incorporating uplands runoff and subsurface inflow. Because the hillsides do not act as a basin, but instead as thousands of discrete subareas based on local geography, it is not scientifically or economically practical to "study the hillsides" However, Napa County does have significant land use controls in the hillsides, including large minimum parcel sizes (generally 160 acres), use restrictions, and CEQA evaluations required of all discretionary projects. The Planning, Building, and Environmental Services Department (PBES) and the Board of Supervisors will continue to monitor land uses and may or may not choose to make changes regarding tree removal and other uses. However, changes to these land use controls are not required in order to complete this basin analysis.
September 22, 2016	Scott Sedgley (Verbal comment at WICC Workshop)	1.11	Mr. Sedgley added that as we move into the future, the hillsides need to be brought into the same scrutiny, particularly those sensitive areas surrounding our reservoirs, and pledged to work on improving ordinances affecting conditions in those areas. … there is more to be done to include the entirety watershed including both groundwater and surface water.	The 2017 biennial Napa County Watershed Symposium will be a focused effort to bring together watershed experts to explore the hillside area issues regarding groundwater and water quality concerns.
September 22, 2016	Kenneth Leary (Verbal comment at WICC Workshop)	1.12	Mr. Leary noted that every well should be monitored and that everyone should participate, whether they want to or not, in order to grow the scope of our understanding.	While SGMA could provide the Board of Supervisors the authority to regulate each individual and municipal well, such action is not supported as being needed by the existing data. "Every well" is not needed for a comprehensive monitoring plan. Outreach for monitoring is conducted continually by the County and each potential monitoring well is sent to the County's groundwater consultant to assess if the well would meet specific objectives of the monitoring program. Additional wells are not needed in some areas where existing geographic coverage is sufficient. The County is working with the Resource Conservation District to promote the use of sonic self-monitoring instruments and is training and assisting well owners on the use of the devise so they can borrow a portable unit from the County (http://www.napawatersheds.org/app_pages/view/7819). In order to ensure that the County does have all the needed coverage, proposed recommendation number 23 requires that project wells associated with new discretionary permits be made available to the County monitoring program upon request.

September 22, 2016	Susan Boswell (Verbal comment at WICC Workshop)	1.13	Susan Boswell said we need more quantifiable data in regard to best management practices that are already currently in place, and that this applies not only to agriculture but other areas of the community as well.	The Basin Analysis Report provides a summary of recommended implementation steps that includes recommendations for optimization and expansion of existing monitoring networks, as well as providing support to landowners in implementing best sustainable practices by soliciting information on and widely sharing best practices with regard to water use in vineyards, wineries, and other agricultural/commercial applications.
September 22, 2016	Susan Boswell (Verbal comment at WICC Workshop)	1.14	Ms. Boswell … wondered how winter cover crops in the valley might foster a better source of groundwater recharge and that there may be other things out there that we are doing that could provide better quantifiable data.	The Basin Analysis Report provides a summary of recommended implementation steps that include the evaluation of strategic recharge opportunities, particularly along the Napa Valley Subbasin margin and in consideration of hydrogeologic factors in the near-to mid-term, as well as ongoing efforts to improve scientific understanding of groundwater recharge and groundwater-surface water interactions.
September 22, 2016	Pamela Smithers (Verbal comment at WICC Workshop)	1.15	Ms. Smithers said that maintaining the current status of the river is not enough, noting that in the past the river flowed year-round in the area of St Helena and now it is often dry late in the year. Ms. Smithers suggested that our starting point should be at time when the river flowed.	Reaches of the Napa River have over many decades (since the 1930s) experienced low to no-flow conditions during the summer-to-fall period for a variety of reasons. Changes in stream flow over the years has been impacted by: • seasonal rainfall, • small dams (both legal and illegal) that have been constructed to block stream flow in the hills; • withdrawl of surface water (both legal and illegal) from the creeks, • elimination of valley floor wetlands and reduced infiltration areas from development as far back as the 1800s. The duration of annual no flow days varies from year-to-year and increases during extended droughts as during recent years. SGMA does not require return to pre-development conditions, nor would decreased groundwater pumping necessarily have a significant impact on these duration of no flow days. The Basin Analysis Report provides measurable objectives and minimum thresholds at 18 monitoring sites. Groundwater levels at 16 of these sites will be regularly evaluated and used to ensure that streamflow conditions are maintained or improved with respect to historical observations. Surface water and groundwater are connected; therefore, seasonal and year to year variability in precipitation and other factors have affected both surface water and groundwater. Since at least the 1930s, periods of no flow days have been observed in the Napa River system, particularly during drier years. Based on the analyses of surface water and groundwater interconnections, including the relationship of this connection to seasonal and annual groundwater elevation fluctuations, the Basin Analysis Report uses 16 wells (and other data including stream gage data) in the Subbasin to monitor groundwater level impact on the Napa River. As long as the fall water levels in these 16 wells remains above the determined level, (the “minimum threshold”), the contribution of groundwater to flow in the Napa River is determined to be no less than has occurred historically in the fall. On average, it is preferable for fall water levels in these wells to approximate their individual measureable objective, which is a level higher than the minimum threshold. While the County specifically monitors groundwater and surface water conditions and, through the Basin Analysis Report, sets threshold values for determining if/when groundwater levels are changing in ways that could exacerbate streamflow depletionin the Napa River, ultimately the duration of annual no flow days are impacted by a wide array of factors, and varies from year-to-year.

September 22, 2016	Pamela Smithers (Verbal comment at WICC Workshop)	1.16	Ms. Smithers had a question about the use of irrigation as an input in the water budget and also asked how recycled water is being calculated in the water budget.	The Root Zone Model is a component of the Subbasin water budget. Irrigation is an input/inflow to the root zone soil moisture. The Root Zone Model assumes that irrigation is only applied when needed to supplement precipitation to meet the crop demand (evapotranspiration, ET). However, from the perspective of the overall Subbasin water budget, irrigation is an output/outflow through ET. Recycled water use is reflected in the water budget based on the use of recycled water reported by the municipalities in the Subbasin and by the use of recycled water for irrigation as calculated by the Root Zone Model and is informed by the source of water supply assigned for irrigated land use units in the Department of Water Resources' land use surveys and by the delivery area for the Town of Yountville Recycled Water Distribution System.
September 22, 2016	Kimberly Richard (Verbal comment at WICC Workshop)	1.17	Kimberly Richard questioned how the root zone model and soil moisture is affected by deforestation and asked how important the trees are in maintaining the resulting groundwater recharge. Ms. Richard asked how important is it to reduce deforestation to maintain healthy soil moisture.	The Root Zone Model presented in the Basin Analysis Report treats each mapped land use type with its rooting depth and crop type individually, resulting in groundwater recharge and irrigation demand calculations for more than 16,000 land use units comprising the entire Napa Valley Subbasin. The model is reliant on the resolution of the available land use data. And does not account for individual trees. However, changes in vegetation/land use over the evaluated base period are captured in the Root Zone Model by interpolation of Department of Water Resources' land use maps between 1987 and 2011. The specific effects of deforestation on soil moisture were outside of scope of the Basin Analysis Report.
September 22, 2016	Pamela Smithers (Verbal comment at WICC Workshop)	1.18	Pamela Smithers suggested separating the presentation of the surface water component into surface water and recycled water to make it more clear to the public which supply is being used.	Recycled water use within the Subbasin is listed in Chapter 5 (5.2 Water Supplies and Utilization by Sector) of the Basin Analysis Report. Estimates for recycled water use for irrigation are presented with the Root Zone Model results in Chapter 6 (6.5.6 Root Zone Model Results).
September 22, 2016	Tosha Comendant (Verbal comment at WICC Workshop)	1.19	Tosha Comendant commented on the 1988-2015 base-period used for the analysis and asked if any sensitivity analysis was conducted to see if adjusting the period 5 years one way or the other influenced the results shown.	A base period of time must be selected so that it is a representative period of study for groundwater basin conditions, with minimal bias that might result from the selection of a wet or dry period or significant changes in other conditions, including land use and water demands. The study period selected for the Basin Analysis Report spans from water years 1988 to 2015. This period was selected on the basis of the following criteria: long-term mean annual water supply; inclusion of both wet and dry stress periods; antecedent dry conditions; adequate data availability; and inclusion of current cultural conditions and water management conditions in the basin. A shift of the base period would not satisfy these criteria. A sensitivity analysis on the base period was not performed.
October 28, 2016	Gordon Evans Letter to WICC Board of Directions, Re: WICC Special Meeting 9/22/16	1.20	I'm concerned about the County's attempt to "fast track" an Alternative to the state-mandated requirements of SGMA (CA Sustainable Groundwater Management Act). …While these responses by the BOS (and WICC's symbolic nod to conducting a "Public Workshop") may technically comply with the State requirements for Public Input and the SGMA Alternative submission deadline, they are certainly not in keeping with the spirit of the State guidelines. They are little more than a transparent attempt to "kick the can down the road" and utilize the Alternative option as a "Hail Mary" to manipulate selected data and avoid the far more stringent requirements of a full-blown State-mandated Groundwater Management Plan and the formation of a Groundwater	See response to 1.9

			Management Agency within the County.	
October 28, 2016	Gordon Evans Letter to WICC Board of Directions, Re: WICC Special Meeting 9/22/16	1.21	Today's WICC Agenda statement that "… the Napa Valley Subbasin… has operated within its sustainable yield for a period of 10 years or more and is being managed consistent with the goals of SGMA and CA DWR regulations" is self-serving and misleading at best. The data provided in an elaborate and extremely complicated presentation by the County's Consulting Engineers, Luhdorff & Scalmanini, is narrowly focused on a small geographical area, utilizes figures from a very narrow time frame (2008-10) and does not take into account whatsoever any surface runoff or recharge factors from the surrounding areas.	The 9/22/16 presentation *Napa Valley Groundwater Sustainability: A Basin Analysis Report for the Napa Valley Subbasin (Draft)* focused on the geographic subject area of the Napa Valley Subbasin, and included surface water and groundwater data for the selected 28-year base period from 1988 to 2015. Runoff and recharge from the surrounding areas are incorporated in the Napa Valley Subbasin water budget.
October 28, 2016	Gordon Evans Letter to WICC Board of Directions, Re: WICC Special Meeting 9/22/16	1.22	In summary, Napa County cannot say that groundwater is stable and make a case for the AGSP because there are more than 10 years of data that show we have dry (or greatly diminished flow in) streams and river beds, salt water intrusion, water quality degradation, wells going dry, land subsidence (along the Napa River) and specie and habitat extirpation. SGMA defines these as "undesirable results," primarily due to increased groundwater pumping over time and not enough recharge. Recharge originates in the hills, where unabated clearcutting and rampant vineyard development continue. The San Francisco Regional Water Quality Control Board cited well water availability and the lack of flows in the Napa River in their Triennial Report last Fall. Ample evidence and documentation show that our groundwater is in depletion, and this will continue in the absence of diligent management and planning.	See responses to Comments 1.5, 1.7, 1.8, 1.9, and 1.10. The Triennial Report referenced in this comment, San Francisco Bay Basin Water Quality Control Plan 2015 Triennial Review Staff Report, December 2015[1], does not include an analysis or evaluation of groundwater conditions in the Napa Valley Subbasin or of lack of flow in the Napa River. While the report does not address the points claimed by Mr. Evans, the San Francisco Bay Basin Plan (dated March 20, 2015) does note that low flow conditions during the spring and dry season (along with stressful water temperatures and fish migration barriers) in the Napa River do "exert a significant negative influence" on juvenile steelhead (Section 7.8.4.1). However, that section does not refer to any data that are inconsistent with what is presented in the Basin Analysis Report, nor does the Basin Plan identify groundwater conditions as the cause of low flows in the River.

[1] (http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/planningtmdls/basinplan/web/docs/Triennial_Review/Appendix%20B%202015%20triennial%20review%20staff%20report%20-%2012-15.pdf, accessed November 1, 2016)

October 31, 2016	Chris Benz, Napa Group, Sierra Club, Email: Comments on Napa Valley Basin Analysis Report	1.23	We request that the report clarify the discrepancy between the calculated water budget (an annual increase of 5900 acre-feet/year as given on page 111) and the observed stability in groundwater levels. As this discrepancy calls into question the validity of the budget, it should be discussed in greater detail and, ideally, corrected, so that the calculated value for water storage reflects what is observed. From page 113: Data on groundwater levels in the Subbasin show stable trends during the base period. The average annual change in storage volume calculated by the water budget suggests an accrual of water within the subbasin that is not consistent with the stable spring to spring groundwater levels observed. The most likely explanations for this discrepancy are that inflows are overstated, outflows are understated, or some combination of the two.	The Subbasin water budget and the groundwater level change in storage analyses are two independent analyses that inform the sustainable yield estimate. Any effort to quantify Subbasin conditions is subject to some uncertainty. Uncertainties in the water budget and groundwater level changes in storage are addressed in the Basin Analysis Report (Sections 6.6 and 6.9). Over the base period from 1988 to 2015, the water budget estimates average annual total Subbasin inflows to be 235,400 acre-feet/year, and estimates average annual total Subbasin outflows to be 229,500 acre-feet/year. The difference between the estimated average annual inflows and outflows are 5,900 acre-feet/year (i.e., 2.5% of average annual inflows and 2.6% of average annual outflows). It is not necessary that the water budget be brought into exact agreement with observed groundwater level changes in order to move forward with management efforts; however, further clarifications will be made to the Basin Analysis Report to clarify sources of uncertainty. Chapter 10 of the Basin Analysis Report provides a summary of recommended implementation steps that includes recommendations for reducing uncertainties of water budget components and projected future water budgets. Further calibration of water budget components based on ongoing data collection will reduce uncertainties of previously estimated water budget components and projected future water budgets.
October 31, 2016	Chris Benz, Napa Group, Sierra Club, Email: Comments on Napa Valley Basin Analysis Report	1.24	We commend the recognition that the Napa River system is considered to be the most sensitive indicator of sustainable groundwater usage. From page 131: Since the river system is considered the most sensitive sustainability indicator in the Napa Valley Subbasin, the measurable objectives and minimum thresholds discussed below are recommended to ensure groundwater sustainability or improve groundwater conditions, and provide ongoing monitoring targets devised to address potential future effects on surface water. However, a river flow gauging site is not included as one of the "representative monitoring sites". Is it possible to include a site that measures river flow and sets Minimum Thresholds and Measurable Objectives for this site?	The Basin Analysis Report provides measurable objectives and minimum thresholds at 18 monitoring sites. Groundwater levels at 16 of these sites will be regularly evaluated and used to ensure that streamflow conditions are maintained or improved with respect to historical observations. In addition, Chapter 10 of the Basin Analysis Report presents a summary of recommended implementation steps that includes the following recommendation "Coordinate with the Resource Conservation District and others regarding current stream gaging and supplemental needs for SGMA purposes; consideration of areas that may also benefit from nearby shallow nested groundwater monitoring wells (similar to LGA SW/GW facilities)". This includes potential establishment of new streamflow gage sites. Surface water levels and surface water flow data will continue to be included as part of the County's monitoring of surface water and groundwater interactions in the future. However, establishing a stream gage as a representative monitoring site would likely limit the ability of the County to effectively evaluate Subbasin conditions when in dry water years, such as during the recent drought, there is no surface water to monitor during parts of the year at some monitoring sites. Establishing representative monitoring sites at wells will allow the County to more comprehensively track Subbasin conditions, even at times when streams are dry.

October 31, 2016	Chris Benz, Napa Group, Sierra Club, Email: Comments on Napa Valley Basin Analysis Report	1.25	In addition to managing the Napa Valley Subbasin, we encourage the County to expand monitoring of wells to hillside locations (making use of volunteered wells) to further define Napa County's groundwater situation and provide data for use in creating sound groundwater policies for the entire County.	See response to 1.11.

A Tradition of Stewardship
A Commitment to Service

Did you know?.....Some Answers to Frequently Asked Questions about Groundwater in Napa County

1. **If groundwater conditions are so good, why did my well go dry?**
   - Overall groundwater levels in the main Napa Valley Subbasin have been stable for decades. Groundwater conditions outside the Napa Valley Subbasin are more variable, such as in the Milliken-Sarco-Tulucay (MST) area. In addition to the effects of the recent drought, the productivity of an individual well can depend on a number of things including the depth and serviceable life of the well, local aquifer properties, and amount and rate of nearby pumping from surrounding wells.

2. **If depth to groundwater is so shallow, why do wells seem to be getting deeper to find water?**
   - Generally, groundwater levels across the Napa Valley Subbasin have been stable for decades. In limited areas, newer wells may be deeper to produce at dependable rates. This would include areas where seasonal variability is high, or the Northeastern Napa Subarea where water level declines in wells monitored by the County east of the Napa River were observed over approximately the decade prior to 2009, but have since stabilized.

3. **Why are streams that used to flow in the summer now dry?**
   - Reaches of the Napa River have over many decades (since the 1930s) experienced low to no-flow conditions during the summer-to-fall period for a variety of reasons. Stream flow is very depedent on seasonal rainfall, small dams (both legal and illegal) that have been constructed to block stream flow, withdrawals of surface water (both legal and illegal) from the creeks, as well as reduced groundwater discharge into the stream channel. The duration of annual no flow days varies from year-to-year and increases during extended droughts as during recent years.

4. **Why aren't the hillsides included? Aren't they important too?**
   - The Sustainable Groundwater Management Act (SGMA) requires that Groundwater Sustainability Plans (GSPs) or Alternatives to a GSP be developed for medium and high priority groundwater basins as delineated and ranked by the State Department of Water Resources (DWR). The hillsides do not fall within the Napa Valley Subbasin that the Basin Analysis Report addresses. Because the hillsides do not act as a basin, but instead as thousands of discrete subareas based on local geography, it is not scientifically or economically practical to "study the hillsides". However, the hillsides are included in the Napa Valley Subbasin water budget by incorporating uplands runoff and subsurface inflow.

5. **What about the MST and Carneros, why aren't they included? How will we know what's going on in those areas/subbasins that are already having problems?**
   - The Sustainable Groundwater Management Act requires that Groundwater Sustainability Plans (GSPs) or Alternatives to a GSP be developed for medium and high priority groundwater basins as delineated and ranked by the State Department of Water Resources (DWR). The MST and Carneros Subareas are not state-defined basins, but they are subareas that Napa County has established based on watershed boundaries and the County's environmental resource planning areas for the purposes of local planning, understanding, and studies. With regards to the MST, it is one of the most monitored areas of the county, with data dating back many decades. There are significant land use controls in place in the area (the county has not approved a discretionary project in the MST that couldn't meet the "no net increase" standard since 2004), and significant effort has gone into constructing a recycled water pipeline to the area, that became operational just this year (2016). The Carneros Subarea partly overlaps with the Napa-

Sonoma Lowlands Subbasin which is a DWR-designated very low priority Subbasin for which a GSP or Alternative is not required. Updates on groundwater conditions in the MST and Carneros Subareas have been and will continue to be included in the County's Annual Groundwater Monitoring Reports.

6. What about drain tiles throughout the vineyards in the valley? Did you look at them and don't they have an impact on groundwater?

- The practice of actively draining shallow groundwater from the root zone to benefit crop health at certain stages of growth has the potential to affect the water use requirement of crops in the Napa Valley Subbasin. No public data on the location, distribution, and construction of drain tile systems in the Subbasin are available at present. Nevertheless, given the prevalence of farm ponds across the valley and the incentive to reuse water when possible, the water budget described in the Basin Analysis Report assumes that drain discharges are not discharged to streams but are retained in ponds, with negligible losses, for later application to a crop. From that assumption, the conceptual approach is that water pumped from the drain networks serves to offset groundwater pumping that would otherwise occur later in the same season. The stored drain tile water is then assumed to be groundwater extracted prior to the need for irrigation, but is nevertheless accounted for by the Root Zone Model by a portion of what it calculates as pumping demand later in the season.

7. Since surface water and groundwater are connected, isn't groundwater pumping dewatering the Napa River and threatening our remaining native fish populations?

- The Basin Analysis Report finds that overall, groundwater levels in the Napa Valley Subbasin have been stable for decades, demonstrating that current groundwater pumping has not contributed to chronic depletions of groundwater storage and that pumping has likely been below the sustainable yield for the Subbasin. Surface water and groundwater are connected; therefore, seasonal and year to year variability in precipitation and other factors have affected both surface water and groundwater. Since at least the 1930s, periods of no flow days have been observed in the Napa River system, particularly during drier years. Based on the analyses of surface water and groundwater interconnections, including the relationship of this connection to seasonal and annual groundwater elevation fluctuations, the Basin Analysis Report uses 16 wells (and other data including stream gage data) in the Subbasin to monitor groundwater level impact on the Napa River. As long as the fall water levels in these 16 wells remains above the determined level, (the "minimum threshold"), the contribution of groundwater to flow in the Napa River is determined to be no less than has occurred historically in the fall. On average, it is preferable for fall water levels in these wells to approximate their individual measureable objective, which is a level higher than the minimum threshold.

8. Are you doing anything about well problems in the county like the Petra Dr/Soda Canyon area?

- Water levels in northeastern Napa Subarea wells monitored by the County east of the Napa River have stabilized since 2009, though declines were observed over approximately the prior decade. To ensure continuation of the current stable groundwater levels, a further study in this area was approved by the Napa County Board of Supervisors. The study is designed to examine existing and future water use in the area, sources of groundwater recharge, and the geologic setting to address questions regarding the potential for long-term effects. The study will also investigate the potential influence of previously documented groundwater cones of depression in the MST Subarea on the Study Area both east and west of the Napa River. The County will evaluate the study results to determine if potential groundwater management measures or controls (similar to those that have been successfully implemented in the MST) or a Management Area designation are warranted.

9. Why are we doing this alternative instead of creating a GSA and then a GSP?

- Following a public hearing and at the direction of its Board of Supervisors, Napa County prepared this Basin Analysis Report, an Alternative Submittal per the requirements of the California Water Code. It provides an analysis of basin conditions and demonstrates that the basin has operated within its sustainable yield over a period of at least 10 years. The Basin Analysis Report is required to accomplish the same (or identical) goals as a GSP within the framework of SGMA. An Alternative to a GSP does not require the formation of a Groundwater Sustainability Agency, which allows for a more cost effective use of existing resources through the Board of Supervisors and WICC.
- SGMA requires submittal of an Alternative submittal, such as the Basin Analysis Report, by January 1, 2017, which is five years in advance of when a GSP is required. Following its submittal to the state, DWR will conduct a review of the Basin Analysis Report, which will allow for additional public comment. An early submission to DWR sets local groundwater thresholds and establishes required monitoring and reporting well in advance of the 2022 timeline established by SGMA for a GSP. The Basin Analysis Report must be reviewed and updated by 2022 and every five years thereafter, and annual groundwater monitoring/implementation updates are also required by DWR. If minimum thresholds are not being met, then actions will be required to ensure the long-term sustainability of the Napa Valley Subbasin.

10. Will the Basin Analysis Report be updated over time--is this a living document?

- Annually, the latest groundwater monitoring data are presented to the Board of Supervisors in a public meeting, as has been done for the past several years. This monitoring data will allow us to update and, if necessary, make changes to our planning efforts around groundwater issues. Every five years, or more often if changing conditions warrant, the County will formally prepare an updated Basin Analysis Report to assess whether the basin is in compliance with the California Water Code. The report will evaluate the sustainability of the basin in terms of sustainability indicators, corresponding measurable objectives, and minimum thresholds. The report will further provide an assessment of the adequacy of monitoring data for evaluating whether the basin has continued to be operated within its sustainable yield.

11. How will the Basin Analysis Report be used to inform and guide County policy on groundwater/water, land use and others?

- The County seeks to implement its water resources goals and policies through various Water Resources Action Items stated in the 2008 General Plan Update. Napa County regulates groundwater usage and well development through its Code of Ordinances, Title 13 Water, Sewers, and Services. The ordinances are a means to ensure that these General Plan objectives are managed effectively. The Basin Analysis Report will inform County staff in the implementation of existing County policies. In addition, the County will continue to evaluate the results of ongoing groundwater monitoring efforts and results from the study of groundwater conditions in the Petra Dr./Soda Canyon area to determine if potential groundwater management measures or controls (similar to those that have been successfully implemented in the MST) or a Management Area designation are warranted.

12. Where can I find additional information about groundwater in Napa County?

- Visit the Watershed Information & Conservation Council (WICC) website at: http://www.napawatersheds.org/groundwater

13. How was the hydrologic base period selected for the study of groundwater conditions?

- A base period of time must be selected so that it is a representative period of study for groundwater basin conditions, with minimal bias that might result from the selection of a wet or dry period or significant changes in other conditions including land use and water demands. The study period selected for the Basin Analysis Report spans from water years 1988 to 2015. This period was selected on the basis of the following criteria: long-term mean annual water supply; inclusion of both wet and dry stress periods; antecedent dry conditions; adequate data availability; and inclusion of current cultural conditions and water management conditions in the basin.

14. How are projected future conditions evaluated?

- The Basin Analysis Report includes a 10-year projection of the Napa Valley Subbasin water budget. The most recent land use development trend is utilized for the projected water budget future condition. The water budget includes projects approved or in process through 2016, and considers the rate of projected development through 2025. In addition, modeled climate change from the U.S. Geological Survey Basin Characterization Model (Flint and Flint, 2013) was applied to evaluate the projected scenarios.

NAPA VALLEY GROUNDWATER SUSTAINABILITY:

A BASIN ANALYSIS REPORT FOR THE NAPA VALLEY SUBBASIN

APPENDIX M:

Alternative Elements Guide: NAPA VALLEY GROUNDWATER SUSTAINABILITY

A BASIN ANALYSIS REPORT FOR THE NAPA VALLEY SUBBASIN

Alternative Elements Guide - *Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin*

California Code of Regulations - GSP Regulation Sections	*GSP Elements*	*Document which attachment(s) contains the applicable GSP Element.*	*Document which section(s), page number(s), or briefly describe why that GSP Element does not apply to the entity.*
Article 5 - Plan Contents			
SubArticle 1	**Administrative Information**		
§ 354.4.	**General Information**		
	(a) An executive summary written in plain language that provides an overview of the Plan and description of groundwater conditions in the basin.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Executive Summary
	(b) A list of references and technical studies relied upon by the Agency in developing the Plan. Each Agency shall provide to the Department electronic copies of reports and other documents and materials cited as references that are not generally available to the public	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 1.1.3 and Chapter 11
§ 354.6.	**Agency Information**		
	When submitting an adopted Plan to the Department, the Agency shall include a copy of the information provided pursuant to Water Code Section 10723.8, with any updates, if necessary, along with the following information:	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 1.3
	(a) The name and mailing address of the Agency.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 1.3
	(b) The organization and management structure of the Agency, identifying persons with management authority for implementation of the Plan.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 1.3
	(c) The name and contact information, including the phone number, mailing address and electronic mail address, of the plan manager.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 1.3
	(d) The legal authority of the Agency, with specific reference to citations setting forth the duties, powers, and responsibilities of the Agency, demonstrating that the Agency has the legal authority to implement the Plan.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 1.3
	(e) An estimate of the cost of implementing the Plan and a general description of how the Agency plans to meet those costs.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Chapter 9
§ 354.8.	**Description of Plan Area**		
	Each Plan shall include a description of the geographic areas covered, including the following information:	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Chapter 1, Section 2.1, Section 5.1, and Section 6.1.4
	(a) One or more maps of the basin that depict the following, as applicable:	-	
	(1) The area covered by the Plan, delineating areas managed by the Agency as an exclusive Agency and any areas for which the Agency is not an exclusive Agency, and the name and location of any adjacent basins.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Figure 2-1
	(2) Adjudicated areas, other Agencies within the basin, and areas covered by an Alternative.		Not applicable, as described in Chapter 1
	(3) Jurisdictional boundaries of federal or state land (including the identity of the agency with jurisdiction over that land), tribal land, cities, counties, agencies with water management responsibilities, and areas covered by relevant general plans.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Figure 2-1
	(4) Existing land use designations and the identification of water use sector and water source type.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Figure 6-14 and Figure 6-16
	(5) The density of wells per square mile, by dasymetric or similar mapping techniques, showing the general distribution of agricultural, industrial, and domestic water supply wells in the basin, including de minimis extractors, and the location and extent of communities dependent upon groundwater, utilizing data provided by the Department, as specified in Section 353.2, or the best available information.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Figure 2-2c
	(b) A written description of the Plan area, including a summary of the jurisdictional areas and other features depicted on the map.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 2.1
	(c) Identification of existing water resource monitoring and management programs, and description of any such programs the Agency plans to incorporate in its monitoring network or in development of its Plan. The Agency may coordinate with existing water resource monitoring and management programs to incorporate and adopt that program as part of the Plan.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Chapter 3 and Appendix C
	(d) A description of how existing water resource monitoring or management programs may limit operational flexibility in the basin, and how the Plan has been developed to adapt to those limits.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Sections 7.6, 9.2, 9.5, and 9.6
	(e) A description of conjunctive use programs in the basin.		Not Applicable

California Code of Regulations - GSP Regulation Sections	***GSP Elements***	***Document which attachment(s) contains the applicable GSP Element.***	***Document which section(s), page number(s), or briefly describe why that GSP Element does not apply to the entity.***
	(f) A plain language description of the land use elements or topic categories of applicable general plans that includes the following:		
	(1) A summary of general plans and other land use plans governing the basin.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Chapter 5
	(2) A general description of how implementation of existing land use plans may change water demands within the basin or affect the ability of the Agency to achieve sustainable groundwater management over the planning and implementation horizon, and how the Plan addresses those potential effects.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Chapter 5
	(3) A general description of how implementation of the Plan may affect the water supply assumptions of relevant land use plans over the planning and implementation horizon.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 9.5.1
	(4) A summary of the process for permitting new or replacement wells in the basin, including adopted standards in local well ordinances, zoning codes, and policies contained in adopted land use plans.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 9.3
	(5) To the extent known, the Agency may include information regarding the implementation of land use plans outside the basin that could affect the ability of the Agency to achieve sustainable groundwater management.		Not Applicable
	(g) A description of any of the additional Plan elements included in Water Code Section 10727.4 that the Agency determines to be appropriate.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 9.2
§ 354.10.	**Notice and Communication**		
	Each Plan shall include a summary of information relating to notification and communication by the Agency with other agencies and interested parties including the following:		
	(a) A description of the beneficial uses and users of groundwater in the basin, including the land uses and property interests potentially affected by the use of groundwater in the basin, the types of parties representing those interests, and the nature of consultation with those parties.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 1.2
	(b) A list of public meetings at which the Plan was discussed or considered by the Agency.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 1.2.1
	(c) Comments regarding the Plan received by the Agency and a summary of any responses by the Agency.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Appendix L
	(d) A communication section of the Plan that includes the following:		
	(1) An explanation of the Agency's decision-making process.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 1.2.2
	(2) Identification of opportunities for public engagement and a discussion of how public input and response will be used.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 1.2.3 and Section 9.4.1
	(3) A description of how the Agency encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 9.4
	(4) The method the Agency shall follow to inform the public about progress implementing the Plan, including the status of projects and actions.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 9.4

California Code of Regulations - GSP Regulation Sections	*GSP Elements*	*Document which attachment(s) contains the applicable GSP Element.*	*Document which section(s), page number(s), or briefly describe why that GSP Element does not apply to the entity.*
SubArticle 2	**Basin Setting**		
§ 354.14.	**Hydrogeologic Conceptual Model**		
	(a) Each Plan shall include a descriptive hydrogeologic conceptual model of the basin based on technical studies and qualified maps that characterizes the physical components and interaction of the surface water and groundwater systems in the basin.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 2.2, Section 2.3
	(b) The hydrogeologic conceptual model shall be summarized in a written description that includes the following:	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 2.3
	(1) The regional geologic and structural setting of the basin including the immediate surrounding area, as necessary for geologic consistency.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 2.3
	(2) Lateral basin boundaries, including major geologic features that significantly affect groundwater flow.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 2.3
	(3) The definable bottom of the basin.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 2.3
	(4) Principal aquifers and aquitards, including the following information:	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 2.3
	(A) Formation names, if defined.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 2.3
	(B) Physical properties of aquifers and aquitards, including the vertical and lateral extent, hydraulic conductivity, and storativity, which may be based on existing technical studies or other best available information.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 2.3
	(C) Structural properties of the basin that restrict groundwater flow within the principal aquifers, including information regarding stratigraphic changes, truncation of units, or other features.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 2.3
	(D) General water quality of the principal aquifers, which may be based on information derived from existing technical studies or regulatory programs.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 4.1.3
	(E) Identification of the primary use or uses of each aquifer, such as domestic, irrigation, or municipal water supply.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Chapter 5
	(5) Identification of data gaps and uncertainty within the hydrogeologic conceptual model	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 6.6
	(c) The hydrogeologic conceptual model shall be represented graphically by at least two scaled cross-sections that display the information required by this section and are sufficient to depict major stratigraphic and structural features in the basin.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Figures 2-5a, 2-5b, 2-6, 2-7, 2-8, 2-9, 2-10, 2-11, 2-12, 2-13
	(d) Physical characteristics of the basin shall be represented on one or more maps that depict the following:		
	(1) Topographic information derived from the U.S. Geological Survey or another reliable source.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Figure 2-2a
	(2) Surficial geology derived from a qualified map including the locations of cross-sections required by this Section.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Figures 2-4a and 2-4b
	(3) Soil characteristics as described by the appropriate Natural Resources Conservation Service soil survey or other applicable studies.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Figure 6-18
	(4) Delineation of existing recharge areas that substantially contribute to the replenishment of the basin, potential recharge areas, and discharge areas, including significant active springs, seeps, and wetlands within or adjacent to the basin.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Figures 2-17 and 2-19
	(5) Surface water bodies that are significant to the management of the basin.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Figure 2-1 and Figure 2-2a

California Code of Regulations - GSP Regulation Sections	*GSP Elements*	*Document which attachment(s) contains the applicable GSP Element.*	*Document which section(s), page number(s), or briefly describe why that GSP Element does not apply to the entity.*
§ 354.16.	**Groundwater Conditions**		
	Each Plan shall provide a description of current and historical groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes the following:		
	(a) Groundwater elevation data demonstrating flow directions, lateral and vertical gradients, and regional pumping patterns, including:	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 4.1.1 and 4.1.2
	(1) Groundwater elevation contour maps depicting the groundwater table or potentiometric surface associated with the current seasonal high and seasonal low for each principal aquifer within the basin.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin", "Napa County Groundwater Conditions and Groundwater Monitoring Recommendations"	Basin Analysis Report Figures 4-4 and 4-5, Appendix B Figures 7-1 and 7-2; Napa County Groundwater Conditions Report Figure 4-8
	(2) Hydrographs depicting long-term groundwater elevations, historical highs and lows, and hydraulic gradients between principal aquifers.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Figure 4-3a, 4-3b, 4-6, and 4-7
	(b) A graph depicting estimates of the change in groundwater in storage, based on data, demonstrating the annual and cumulative change in the volume of groundwater in storage between seasonal high groundwater conditions, including the annual groundwater use and water year type.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Figures 6-28a and 6-28b
	(c) Seawater intrusion conditions in the basin, including maps and cross-sections of the seawater intrusion front for each principal aquifer.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 4.3
	(d) Groundwater quality issues that may affect the supply and beneficial uses of groundwater, including a description and map of the location of known groundwater contamination sites and plumes.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Sections 4.1.3 and 4.1.4
	(e) The extent, cumulative total, and annual rate of land subsidence, including maps depicting total subsidence, utilizing data available from the Department, as specified in Section 353.2, or the best available information.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 4.4
	(f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Figure 4-19 and Appendix B Figures 7-8
	(g) Identification of groundwater dependent ecosystems within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 4.7
§ 344.18.	**Water Budget**		
	(a) Each Plan shall include a water budget for the basin that provides an accounting and assessment of the total annual volume of groundwater and surface water entering and leaving the basin, including historical, current and projected water budget conditions, and the change in the volume of water stored. Water budget information shall be reported in tabular and graphical form.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Chapter 5 and Sections 6.4, 6.5, 6.6, and 6.7
	(b) The water budget shall quantify the following, either through direct measurements or estimates based on data:		
	(1) Total surface water entering and leaving a basin by water source type.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Sections 6.6 and 6.7
	(2) Inflow to the groundwater system by water source type, including subsurface groundwater inflow and infiltration of precipitation, applied water, and surface water systems, such as lakes, streams, rivers, canals, springs and conveyance systems.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Sections 6.6 and 6.7
	(3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Sections 6.6 and 6.7
	(4) The change in the annual volume of groundwater in storage between seasonal high conditions.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Sections 6.7 and 6.8 (Note: the water budget results (Section 6.7) are based on an October to September water year approach. The groundwater level change in storage analysis (Section 6.8) compares seasonal high groundwater level conditions.)
	(5) If overdraft conditions occur, as defined in Bulletin 118, the water budget shall include a quantification of overdraft over a period of years during which water year and water supply conditions approximate average conditions.		Not Applicable
	(6) The water year type associated with the annual supply, demand, and change in groundwater stored.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Sections 6.7, 6.8, and 6.10
	(7) An estimate of sustainable yield for the basin.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 6.10

California Code of Regulations - GSP Regulation Sections	*GSP Elements*	*Document which attachment(s) contains the applicable GSP Element.*	*Document which section(s), page number(s), or briefly describe why that GSP Element does not apply to the entity.*
	(c) Each Plan shall quantify the current, historical, and projected water budget for the basin as follows:		
	(1) Current water budget information shall quantify current inflows and outflows for the basin using the most recent hydrology, water supply, water demand, and land use information.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Chapter 5 and Sections 6.6 and 6.7
	(2) Historical water budget information shall be used to evaluate availability or reliability of past surface water supply deliveries and aquifer response to water supply and demand trends relative to water year type. The historical water budget shall include the following:	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Chapter 5 and Sections 6.6 and 6.7
	(A) A quantitative evaluation of the availability or reliability of historical surface water supply deliveries as a function of the historical planned versus actual annual surface water deliveries, by surface water source and water year type, and based on the most recent ten years of surface water supply information.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 5.2
	(B) A quantitative assessment of the historical water budget, starting with the most recently available information and extending back a minimum of 10 years, or as is sufficient to calibrate and reduce the uncertainty of the tools and methods used to estimate and project future water budget information and future aquifer response to proposed sustainable groundwater management practices over the planning and implementation horizon.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Chapter and Sections 6.6 and 6.7
	(C) A description of how historical conditions concerning hydrology, water demand, and surface water supply availability or reliability have impacted the ability of the Agency to operate the basin within sustainable yield. Basin hydrology may be characterized and evaluated using water year type.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 6.10
	(3) Projected water budgets shall be used to estimate future baseline conditions of supply, demand, and aquifer response to Plan implementation, and to identify the uncertainties of these projected water budget components. The projected water budget shall utilize the following methodologies and assumptions to estimate future baseline conditions concerning hydrology, water demand and surface water supply availability or reliability over the planning and implementation horizon:	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Sections 6.3 and 6.7.2
	(A) Projected hydrology shall utilize 50 years of historical precipitation, evapotranspiration, and streamflow information as the baseline condition for estimating future hydrology. The projected hydrology information shall also be applied as the baseline condition used to evaluate future scenarios of hydrologic uncertainty associated with projections of climate change and sea level rise.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Sections 6.3 and 6.7.2
	(B) Projected water demand shall utilize the most recent land use, evapotranspiration, and crop coefficient information as the baseline condition for estimating future water demand. The projected water demand information shall also be applied as the baseline condition used to evaluate future scenarios of water demand uncertainty associated with projected changes in local land use planning, population growth, and climate.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 6.7.2
	(C) Projected surface water supply shall utilize the most recent water supply information as the baseline condition for estimating future surface water supply. The projected surface water supply shall also be applied as the baseline condition used to evaluate future scenarios of surface water supply availability and reliability as a function of the historical surface water supply identified in Section 354.18(c)(2)(A), and the projected changes in local land use planning, population growth, and climate.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 6.7.2
	(d) The Agency shall utilize the following information provided, as available, by the Department pursuant to Section 353.2, or other data of comparable quality, to develop the water budget:		
	(1) Historical water budget information for mean annual temperature, mean annual precipitation, water year type, and land use.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Sections 6.1, 6.4, 6.5, 6.6, and 6.7
	(2) Current water budget information for temperature, water year type, evapotranspiration, and land use.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Sections 6.1, 6.2, 6.4, 6.5, 6.6, and 6.7
	(3) Projected water budget information for population, population growth, climate change, and sea level rise.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Sections 6.1, 6.3, 6.4, 6.5, 6.6, and 6.7
	(e) Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow. If a numerical groundwater and surface water model is not used to quantify and evaluate the projected water budget conditions and the potential impacts to beneficial uses and users of groundwater, the Plan shall identify and describe an equally effective method, tool, or analytical model to evaluate projected water budget conditions.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 6.4
	(f) The Department shall provide the California Central Valley Groundwater-Surface Water Simulation Model (C2VSIM) and the Integrated Water Flow Model (IWFM) for use by Agencies in developing the water budget. Each Agency may choose to use a different groundwater and surface water model, pursuant to Section 352.4.		
§ 344.20.	**Management Areas**		
	(a) Each Agency may define one or more management areas within a basin if the Agency has determined that creation of management areas will facilitate implementation of the Plan. Management areas may define different minimum thresholds and be operated to different measurable objectives than the basin at large, provided that undesirable results are defined consistently throughout the basin.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 7.6
	(b) A basin that includes one or more management areas shall describe the following in the Plan:		
	(1) The reason for the creation of each management area.		Not Applicable
	(2) The minimum thresholds and measurable objectives established for each management area, and an explanation of the rationale for selecting those values, if different from the basin at large.		Not Applicable
	(3) The level of monitoring and analysis appropriate for each management area.		Not Applicable
	(4) An explanation of how the management area can operate under different minimum thresholds and measurable objectives without causing undesirable results outside the management area, if applicable.		Not Applicable

California Code of Regulations - GSP Regulation Sections	*GSP Elements*	*Document which attachment(s) contains the applicable GSP Element.*	*Document which section(s), page number(s), or briefly describe why that GSP Element does not apply to the entity.*
	(c) If a Plan includes one or more management areas, the Plan shall include descriptions, maps, and other information required by this Subarticle sufficient to describe conditions in those areas.		Not Applicable
SubArticle 3	**Administrative Information**		
§ 354.24.	**Sustainability Goal**		
	Each Agency shall establish in its Plan a sustainability goal for the basin that culminates in the absence of undesirable results within 20 years of the applicable statutory deadline. The Plan shall include a description of the sustainability goal, including information from the basin setting used to establish the sustainability goal, a discussion of the measures that will be implemented to ensure that the basin will be operated within its sustainable yield, and an explanation of how the sustainability goal is likely to be achieved within 20 years of Plan implementation and is likely to be maintained through the planning and implementation horizon.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 7.1
§ 354.26.	**Undesirable Results**		
	(a) Each Agency shall describe in its Plan the processes and criteria relied upon to define undesirable results applicable to the basin. Undesirable results occur when significant and unreasonable effects for any of the sustainability indicators are caused by groundwater conditions occurring throughout the basin.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 7.2
	(b) The description of undesirable results shall include the following:		
	(1) The cause of groundwater conditions occurring throughout the basin that would lead to or has led to undesirable results based on information described in the basin setting, and other data or models as appropriate.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 7.2
	(2) The criteria used to define when and where the effects of the groundwater conditions cause undesirable results for each applicable sustainability indicator. The criteria shall be based on a quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the basin.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 7.2
	(3) Potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 7.2
	(c) The Agency may need to evaluate multiple minimum thresholds to determine whether an undesirable result is occurring in the basin. The determination that undesirable results are occurring may depend upon measurements from multiple monitoring sites, rather than a single monitoring site.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 7.2
	(d) An Agency that is able to demonstrate that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin shall not be required to establish criteria for undesirable results related to those sustainability indicators.		Not Applicable
§ 354.28.	**Minimum Threshold**		
	(a) Each Agency in its Plan shall establish minimum thresholds that quantify groundwater conditions for each applicable sustainability indicator at each monitoring site or representative monitoring site established pursuant to Section 354.36. The numeric value used to define minimum thresholds shall represent a point in the basin that, if exceeded, may cause undesirable results as described in Section 354.26.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 7.4
	(b) The description of minimum thresholds shall include the following:	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 7.4
	(1) The information and criteria relied upon to establish and justify the minimum thresholds for each sustainability indicator. The justification for the minimum threshold shall be supported by information provided in the basin setting, and other data or models as appropriate, and qualified by uncertainty in the understanding of the basin setting.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 7.4
	(2) The relationship between the minimum thresholds for each sustainability indicator, including an explanation of how the Agency has determined that basin conditions at each minimum threshold will avoid undesirable results for each of the sustainability indicators.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 7.4
	(3) How minimum thresholds have been selected to avoid causing undesirable results in adjacent basins or affecting the ability of adjacent basins to achieve sustainability goals.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 7.4
	(4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 7.4
	(5) How state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the Agency shall explain the nature of and basis for the difference.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 7.4
	(6) How each minimum threshold will be quantitatively measured, consistent with the monitoring network requirements described in Subarticle 4.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 7.4

California Code of Regulations - GSP Regulation Sections	*GSP Elements*	*Document which attachment(s) contains the applicable GSP Element.*	*Document which section(s), page number(s), or briefly describe why that GSP Element does not apply to the entity.*
	(c) Minimum thresholds for each sustainability indicator shall be defined as follows:		
	(1) Chronic Lowering of Groundwater Levels. The minimum threshold for chronic lowering of groundwater levels shall be the groundwater elevation indicating a depletion of supply at a given location that may lead to undesirable results. Minimum thresholds for chronic lowering of groundwater levels shall be supported by the following:	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 7.4.4
	(A) The rate of groundwater elevation decline based on historical trends, water year type, and projected water use in the basin.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 7.4.4
	(B) Potential effects on other sustainability indicators.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 7.4.4
	(2) Reduction of Groundwater Storage. The minimum threshold for reduction of groundwater storage shall be a total volume of groundwater that can be withdrawn from the basin without causing conditions that may lead to undesirable results. Minimum thresholds for reduction of groundwater storage shall be supported by the sustainable yield of the basin, calculated based on historical trends, water year type, and projected water use in the basin.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 7.4.4
	(3) Seawater Intrusion. The minimum threshold for seawater intrusion shall be defined by a chloride concentration isocontour for each principal aquifer where seawater intrusion may lead to undesirable results. Minimum thresholds for seawater intrusion shall be supported by the following:	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 7.4.3
	(A) Maps and cross-sections of the chloride concentration isocontour that defines the minimum threshold and measurable objective for each principal aquifer.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Figures 4-58, 4-64
	(B) A description of how the seawater intrusion minimum threshold considers the effects of current and projected sea levels.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 7.4.3
	(4) Degraded Water Quality. The minimum threshold for degraded water quality shall be the degradation of water quality, including the migration of contaminant plumes that impair water supplies or other indicator of water quality as determined by the Agency that may lead to undesirable results. The minimum threshold shall be based on the number of supply wells, a volume of water, or a location of an isocontour that exceeds concentrations of constituents determined by the Agency to be of concern for the basin. In setting minimum thresholds for degraded water quality, the Agency shall consider local, state, and federal water quality standards applicable to the basin.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 7.42
	(5) Land Subsidence. The minimum threshold for land subsidence shall be the rate and extent of subsidence that substantially interferes with surface land uses and may lead to undesirable results. Minimum thresholds for land subsidence shall be supported by the following:	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 7.42
	(A) Identification of land uses and property interests that have been affected or are likely to be affected by land subsidence in the basin, including an explanation of how the Agency has determined and considered those uses and interests, and the Agency's rationale for establishing minimum thresholds in light of those effects.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 7.4.4
	(B) Maps and graphs showing the extent and rate of land subsidence in the basin that defines the minimum threshold and measurable objectives.		Not Applicable
	(6) Depletions of Interconnected Surface Water. The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results. The minimum threshold established for depletions of interconnected surface water shall be supported by the following:	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 7.4.1
	(A) The location, quantity, and timing of depletions of interconnected surface water.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 4.2
	(B) A description of the groundwater and surface water model used to quantify surface water depletion. If a numerical groundwater and surface water model is not used to quantify surface water depletion, the Plan shall identify and describe an equally effective method, tool, or analytical model to accomplish the requirements of this Paragraph.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 4.2
	(d) An Agency may establish a representative minimum threshold for groundwater elevation to serve as the value for multiple sustainability indicators, where the Agency can demonstrate that the representative value is a reasonable proxy for multiple individual minimum thresholds as supported by adequate evidence.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 7.4
	(e) An Agency that has demonstrated that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin, as described in Section 354.26, shall not be required to establish minimum thresholds related to those sustainability indicators.		

California Code of Regulations - GSP Regulation Sections	*GSP Elements*	*Document which attachment(s) contains the applicable GSP Element.*	*Document which section(s), page number(s), or briefly describe why that GSP Element does not apply to the entity.*
§ 354.30.	**Measurable Objectives**		
	(a) Each Agency shall establish measurable objectives, including interim milestones in increments of five years, to achieve the sustainability goal for the basin within 20 years of Plan implementation and to continue to sustainably manage the groundwater basin over the planning and implementation horizon.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 7.5
	(b) Measurable objectives shall be established for each sustainability indicator, based on quantitative values using the same metrics and monitoring sites as are used to define the minimum thresholds.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 7.5
	(c) Measurable objectives shall provide a reasonable margin of operational flexibility under adverse conditions which shall take into consideration components such as historical water budgets, seasonal and long-term trends, and periods of drought, and be commensurate with levels of uncertainty.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 7.5
	(d) An Agency may establish a representative measurable objective for groundwater elevation to serve as the value for multiple sustainability indicators where the Agency can demonstrate that the representative value is a reasonable proxy for multiple individual measurable objectives as supported by adequate evidence.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 7.5
	(e) Each Plan shall describe a reasonable path to achieve the sustainability goal for the basin within 20 years of Plan implementation, including a description of interim milestones for each relevant sustainability indicator, using the same metric as the measurable objective, in increments of five years. The description shall explain how the Plan is likely to maintain sustainable groundwater management over the planning and implementation horizon.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 8.6.5
	(f) Each Plan may include measurable objectives and interim milestones for additional Plan elements described in Water Code Section 10727.4 where the Agency determines such measures are appropriate for sustainable groundwater management in the basin.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 7.2
	(g) An Agency may establish measurable objectives that exceed the reasonable margin of operational flexibility for the purpose of improving overall conditions in the basin, but failure to achieve those objectives shall not be grounds for a finding of inadequacy of the Plan.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 7.5
SubArticle 4	**Monitoring Networks**		
§ 354.34.	**Monitoring Network**		
	(a) Each Agency shall develop a monitoring network capable of collecting sufficient data to demonstrate short-term, seasonal, and long-term trends in groundwater and related surface conditions, and yield representative information about groundwater conditions as necessary to evaluate Plan implementation.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Chapter 3
	(b) Each Plan shall include a description of the monitoring network objectives for the basin, including an explanation of how the network will be developed and implemented to monitor groundwater and related surface conditions, and the interconnection of surface water and groundwater, with sufficient temporal frequency and spatial density to evaluate the affects and effectiveness of Plan implementation. The monitoring network objectives shall be implemented to accomplish the following:		
	(1) Demonstrate progress toward achieving measurable objectives described in the Plan.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Chapter 3 and Section 8.6
	(2) Monitor impacts to the beneficial uses or users of groundwater.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Chapter 3
	(3) Monitor changes in groundwater conditions relative to measurable objectives and minimum thresholds.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Chapter 3
	(4) Quantify annual changes in water budget components.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Chapter 3 and Section 8.6
	(c) Each monitoring network shall be designed to accomplish the following for each sustainability indicator:		
	(1) Chronic Lowering of Groundwater Levels. Demonstrate groundwater occurrence, flow directions, and hydraulic gradients between principal aquifers and surface water features by the following methods:	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Chapter 3
	(A) A sufficient density of monitoring wells to collect representative measurements through depth-discrete perforated intervals to characterize the groundwater table or potentiometric surface for each principal aquifer.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Chapter 3
	(B) Static groundwater elevation measurements shall be collected at least two times per year, to represent seasonal low and seasonal high groundwater conditions.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Chapter 3
	(2) Reduction of Groundwater Storage. Provide an estimate of the change in annual groundwater in storage.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Chapter 3
	(3) Seawater Intrusion. Monitor seawater intrusion using chloride concentrations, or other measurements convertible to chloride concentrations, so that the current and projected rate and extent of seawater intrusion for each applicable principal aquifer may be calculated.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Chapter 3

California Code of Regulations - GSP Regulation Sections	***GSP Elements***	***Document which attachment(s) contains the applicable GSP Element.***	***Document which section(s), page number(s), or briefly describe why that GSP Element does not apply to the entity.***
	(4) Degraded Water Quality. Collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Chapter 3
	(5) Land Subsidence. Identify the rate and extent of land subsidence, which may be measured by extensometers, surveying, remote sensing technology, or other appropriate method.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Chapter 3
	(6) Depletions of Interconnected Surface Water. Monitor surface water and groundwater, where interconnected surface water conditions exist, to characterize the spatial and temporal exchanges between surface water and groundwater, and to calibrate and apply the tools and methods necessary to calculate depletions of surface water caused by groundwater extractions. The monitoring network shall be able to characterize the following:	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Chapter 3
	(A) Flow conditions including surface water discharge, surface water head, and baseflow contribution.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Chapter 3
	(B) Identifying the approximate date and location where ephemeral or intermittent flowing streams and rivers cease to flow, if applicable.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Chapter 3
	(C) Temporal change in conditions due to variations in stream discharge and regional groundwater extraction.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Chapter 3
	(D) Other factors that may be necessary to identify adverse impacts on beneficial uses of the surface water.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Chapter 3
	(d) The monitoring network shall be designed to ensure adequate coverage of sustainability indicators. If management areas are established, the quantity and density of monitoring sites in those areas shall be sufficient to evaluate conditions of the basin setting and sustainable management criteria specific to that area.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Chapter 3
	(e) A Plan may utilize site information and monitoring data from existing sources as part of the monitoring network.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Chapter 3
	(f) The Agency shall determine the density of monitoring sites and frequency of measurements required to demonstrate short-term, seasonal, and long-term trends based upon the following factors:	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Chapter 3
	(1) Amount of current and projected groundwater use.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Chapter 3
	(2) Aquifer characteristics, including confined or unconfined aquifer conditions, or other physical characteristics that affect groundwater flow.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Chapter 3
	(3) Impacts to beneficial uses and users of groundwater and land uses and property interests affected by groundwater production, and adjacent basins that could affect the ability of that basin to meet the sustainability goal.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Chapter 3
	(4) Whether the Agency has adequate long-term existing monitoring results or other technical information to demonstrate an understanding of aquifer response.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Chapter 3
	(g) Each Plan shall describe the following information about the monitoring network:	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Chapter 3
	(1) Scientific rationale for the monitoring site selection process.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Chapter 3
	(2) Consistency with data and reporting standards described in Section 352.4. If a site is not consistent with those standards, the Plan shall explain the necessity of the site to the monitoring network, and how any variation from the standards will not affect the usefulness of the results obtained.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Chapter 3
	(3) For each sustainability indicator, the quantitative values for the minimum threshold, measurable objective, and interim milestones that will be measured at each monitoring site or representative monitoring sites established pursuant to Section 354.36.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Chapter 3
	(h) The location and type of each monitoring site within the basin displayed on a map, and reported in tabular format, including information regarding the monitoring site type, frequency of measurement, and the purposes for which the monitoring site is being used.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Chapter 3
	(i) The monitoring protocols developed by each Agency shall include a description of technical standards, data collection methods, and other procedures or protocols pursuant to Water Code Section 10727.2(f) for monitoring sites or other data collection facilities to ensure that the monitoring network utilizes comparable data and methodologies.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Chapter 3
	(j) An Agency that has demonstrated that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin, as described in Section 354.26, shall not be required to establish a monitoring network related to those sustainability indicators.		

California Code of Regulations - GSP Regulation Sections	*GSP Elements*	*Document which attachment(s) contains the applicable GSP Element.*	*Document which section(s), page number(s), or briefly describe why that GSP Element does not apply to the entity.*
§ 354.36.	**Representative Monitoring**		
	Each Agency may designate a subset of monitoring sites as representative of conditions in the basin or an area of the basin, as follows:		
	(a) Representative monitoring sites may be designated by the Agency as the point at which sustainability indicators are monitored, and for which quantitative values for minimum thresholds, measurable objectives, and interim milestones are defined.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 7.3
	(b) Groundwater elevations may be used as a proxy for monitoring other sustainability indicators if the Agency demonstrates the following:		
	(1) Significant correlation exists between groundwater elevations and the sustainability indicators for which groundwater elevation measurements serve as a proxy.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Sections 4.2.3, 7.4, and 7.5
	(2) Measurable objectives established for groundwater elevation shall include a reasonable margin of operational flexibility taking into consideration the basin setting to avoid undesirable results for the sustainability indicators for which groundwater elevation measurements serve as a proxy.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 7.5
	(c) The designation of a representative monitoring site shall be supported by adequate evidence demonstrating that the site reflects general conditions in the area.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 7.3
§ 354.38.	**Assessment and Improvement of Monitoring Network**		
	(a) Each Agency shall review the monitoring network and include an evaluation in the Plan and each five-year assessment, including a determination of uncertainty and whether there are data gaps that could affect the ability of the Plan to achieve the sustainability goal for the basin.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 8.6
	(b) Each Agency shall identify data gaps wherever the basin does not contain a sufficient number of monitoring sites, does not monitor sites at a sufficient frequency, or utilizes monitoring sites that are unreliable, including those that do not satisfy minimum standards of the monitoring network adopted by the Agency.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 8.6.5, 9.6, 10.2
	(c) If the monitoring network contains data gaps, the Plan shall include a description of the following:	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 4.5 and Appendix C
	(1) The location and reason for data gaps in the monitoring network.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 4.5 and Appendix C
	(2) Local issues and circumstances that limit or prevent monitoring.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 4.5 and Appendix C
	(d) Each Agency shall describe steps that will be taken to fill data gaps before the next five-year assessment, including the location and purpose of newly added or installed monitoring sites.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 10.2 and Appendix C
	(e) Each Agency shall adjust the monitoring frequency and density of monitoring sites to provide an adequate level of detail about site-specific surface water and groundwater conditions and to assess the effectiveness of management actions under circumstances that include the following:		
	(1) Minimum threshold exceedances.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 10.2 and Appendix C
	(2) Highly variable spatial or temporal conditions.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 10.2 and Appendix C
	(3) Adverse impacts to beneficial uses and users of groundwater.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 10.2 and Appendix C
	(4) The potential to adversely affect the ability of an adjacent basin to implement its Plan or impede achievement of sustainability goals in an adjacent basin.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 10.2 and Appendix C
§ 354.40.	**Reporting Monitoring Data to the Department**		
	Monitoring data shall be stored in the data management system developed pursuant to Section 352.6. A copy of the monitoring data shall be included in the Annual Report and submitted electronically on forms provided by the Department.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 8.5

California Code of Regulations - GSP Regulation Sections	*GSP Elements*	*Document which attachment(s) contains the applicable GSP Element.*	*Document which section(s), page number(s), or briefly describe why that GSP Element does not apply to the entity.*
SubArticle 5	**Projects and Management Actions**		
§ 354.44	**Projects and Management Actions**		
	a) Each Plan shall include a description of the projects and management actions the Agency has determined will achieve the sustainability goal for the basin, including projects and management actions to respond to changing conditions in the basin.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 9
	(b) Each Plan shall include a description of the projects and management actions that include the following:		
	(1) A list of projects and management actions proposed in the Plan with a description of the measurable objective that is expected to benefit from the project or management action. The list shall include projects and management actions that may be utilized to meet interim milestones, the exceedance of minimum thresholds, or where undesirable results have occurred or are imminent. The Plan shall include the following:	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Chapter 9
	(A) A description of the circumstances under which projects or management actions shall be implemented, the criteria that would trigger implementation and termination of projects or management actions, and the process by which the Agency shall determine that conditions requiring the implementation of particular projects or management actions have occurred.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Chapter 9
	(B) The process by which the Agency shall provide notice to the public and other agencies that the implementation of projects or management actions is being considered or has been implemented, including a description of the actions to be taken.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Chapter 9
	(2) If overdraft conditions are identified through the analysis required by Section 354.18, the Plan shall describe projects or management actions, including a quantification of demand reduction or other methods, for the mitigation of overdraft.		Not Applicable
	(3) A summary of the permitting and regulatory process required for each project and management action.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Chapter 9
	(4) The status of each project and management action, including a time-table for expected initiation and completion, and the accrual of expected benefits.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Chapter 9
	(5) An explanation of the benefits that are expected to be realized from the project or management action, and how those benefits will be evaluated.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Chapter 9
	(6) An explanation of how the project or management action will be accomplished. If the projects or management actions rely on water from outside the jurisdiction of the Agency, an explanation of the source and reliability of that water shall be included.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Chapter 9
	(7) A description of the legal authority required for each project and management action, and the basis for that authority within the Agency.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Chapter 9
	(8) A description of the estimated cost for each project and management action and a description of how the Agency plans to meet those costs.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Chapter 9
	(9) A description of the management of groundwater extractions and recharge to ensure that chronic lowering of groundwater levels or depletion of supply during periods of drought is offset by increases in groundwater levels or storage during other periods.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Sections 9.2, 9.5, and 9.6
	(c) Projects and management actions shall be supported by best available information and best available science.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Chapter 9
	(d) An Agency shall take into account the level of uncertainty associated with the basin setting when developing projects or management actions.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Chapter 9
Article 7	**Annual Reports and Periodic Evaluations by the Agency**		
§ 356.2	**Annual Reports**		
	Each Agency shall submit an annual report to the Department by April 1 of each year following the adoption of the Plan. The annual report shall include the following components for the preceding water year:		
	(a) General information, including an executive summary and a location map depicting the basin covered by the report.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Sections 8.6.4
	(b) A detailed description and graphical representation of the following conditions of the basin managed in the Plan:	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Sections 8.6.4
	(1) Groundwater elevation data from monitoring wells identified in the monitoring network shall be analyzed and displayed as follows:	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Sections 8.6.4
	(A) Groundwater elevation contour maps for each principal aquifer in the basin illustrating, at a minimum, the seasonal high and seasonal low groundwater conditions.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Sections 8.6.4
	(B) Hydrographs of groundwater elevations and water year type using historical data to the greatest extent available, including from January 1, 2015, to current reporting year.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Sections 8.6.4
	(2) Groundwater extraction for the preceding water year. Data shall be collected using the best available measurement methods and shall be presented in a table that summarizes groundwater extractions by water use sector, and identifies the method of measurement (direct or estimate) and accuracy of measurements, and a map that illustrates the general location and volume of groundwater extractions.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Sections 8.6.4

California Code of Regulations - GSP Regulation Sections	*GSP Elements*	*Document which attachment(s) contains the applicable GSP Element.*	*Document which section(s), page number(s), or briefly describe why that GSP Element does not apply to the entity.*
	(3) Surface water supply used or available for use, for groundwater recharge or in-lieu use shall be reported based on quantitative data that describes the annual volume and sources for the preceding water year.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Sections 8.6.4
	(4) Total water use shall be collected using the best available measurement methods and shall be reported in a table that summarizes total water use by water use sector, water source type, and identifies the method of measurement (direct or estimate) and accuracy of measurements. Existing water use data from the most recent Urban Water Management Plans or Agricultural Water Management Plans within the basin may be used, as long as the data are reported by water year.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Sections 8.6.4
	(5) Change in groundwater in storage shall include the following:		
	(A) Change in groundwater in storage maps for each principal aquifer in the basin.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Sections 8.6.4
	(B) A graph depicting water year type, groundwater use, the annual change in groundwater in storage, and the cumulative change in groundwater in storage for the basin based on historical data to the greatest extent available, including from January 1, 2015, to the current reporting year.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Sections 8.6.4
	(c) A description of progress towards implementing the Plan, including achieving interim milestones, and implementation of projects or management actions since the previous annual report.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Sections 8.6.4
§ 356.4	**Periodic Evaluation by Agency**		
	Each Agency shall evaluate its Plan at least every five years and whenever the Plan is amended, and provide a written assessment to the Department. The assessment shall describe whether the Plan implementation, including implementation of projects and management actions, are meeting the sustainability goal in the basin, and shall include the following:		
	(a) A description of current groundwater conditions for each applicable sustainability indicator relative to measurable objectives, interim milestones and minimum thresholds.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 8.6.5
	(b) A description of the implementation of any projects or management actions, and the effect on groundwater conditions resulting from those projects or management actions.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 8.6.5
	(c) Elements of the Plan, including the basin setting, management areas, or the identification of undesirable results and the setting of minimum thresholds and measurable objectives, shall be reconsidered and revisions proposed, if necessary.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 8.6.5
	(d) An evaluation of the basin setting in light of significant new information or changes in water use, and an explanation of any significant changes. If the Agency's evaluation shows that the basin is experiencing overdraft conditions, the Agency shall include an assessment of measures to mitigate that overdraft.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 8.6.5
	(e) A description of the monitoring network within the basin, including whether data gaps exist, or any areas within the basin are represented by data that does not satisfy the requirements of Sections 352.4 and 354.34(c). The description shall include the following:		
	(1) An assessment of monitoring network function with an analysis of data collected to date, identification of data gaps, and the actions necessary to improve the monitoring network, consistent with the requirements of Section 354.38.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 8.6.5
	(2) If the Agency identifies data gaps, the Plan shall describe a program for the acquisition of additional data sources, including an estimate of the timing of that acquisition, and for incorporation of newly obtained information into the Plan.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 8.6.5
	(3) The Plan shall prioritize the installation of new data collection facilities and analysis of new data based on the needs of the basin.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 8.6.5
	(f) A description of significant new information that has been made available since Plan adoption or amendment, or the last five-year assessment. The description shall also include whether new information warrants changes to any aspect of the Plan, including the evaluation of the basin setting, measurable objectives, minimum thresholds, or the criteria defining undesirable results.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 8.6.5
	(g) A description of relevant actions taken by the Agency, including a summary of regulations or ordinances related to the Plan.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 8.6.5
	(h) Information describing any enforcement or legal actions taken by the Agency in furtherance of the sustainability goal for the basin.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 8.6.5
	(i) A description of completed or proposed Plan amendments.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 8.6.5
	(j) Where appropriate, a summary of coordination that occurred between multiple Agencies in a single basin, Agencies in hydrologically connected basins, and land use agencies.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 8.6.5
	(k) Other information the Agency deems appropriate, along with any information required by the Department to conduct a periodic review as required by Water Code Section 10733.	"Napa Valley Groundwater Sustainability: A Basin Analysis Report For The Napa Valley Subbasin"	Section 8.6.5