

# **ATTACHMENT 4**

## **PROJECT DESCRIPTION**

### **PROJECT: “Napa County Groundwater/Surface Water Monitoring Facilities to Track Resource Interrelationships and Sustainability”**

#### **Project Purpose, Goals, and Objectives**

##### **Purpose**

The purpose of the proposed project is to install up to six shallow, dual-completion groundwater monitoring facilities adjacent to the Napa River system. The proposed facilities are planned to be located near to existing stream gauging stations and/or near areas where stream monitoring can also be conducted. The proposed groundwater monitoring facilities are also being sited, where possible, adjacent to existing groundwater monitoring facilities (i.e., typically water supply wells constructed to greater depths in the aquifer system). The proposed monitoring wells will enable focused data collection regarding groundwater elevations and water quality to identify and characterize interactions with surface water.

##### **Goals**

The goals of the proposed project are to implement groundwater and surface water monitoring to characterize the interrelationship between these water resources in the Napa Valley. This project will gather the data necessary to: 1) assess the response to surface and groundwater utilization and the potential effect of future climate change and 2) ensure water resources sustainability for the natural environment and future generations. The proposed facilities would enable the collection of new data to augment existing monitoring activities and datasets. This information will be valuable in assessing the status of the County’s groundwater and surface water resources and will provide for improved forecasting of future supplies and effective management of water resources. The proposed monitoring wells will also fill high priority groundwater data gaps previously identified by Napa County.

##### **Objectives**

The objectives of the proposed project 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.

## **Background & Recent Related Studies**

### **Napa County's Comprehensive Groundwater Monitoring Program, Data Review, and Policy Recommendations for Napa County's Groundwater Resources (Comprehensive Groundwater Monitoring Program; 2009 - 2011)**

Groundwater and surface water are highly important natural resources in Napa County. In 2009, Napa County embarked on a countywide project referred to as “Comprehensive Groundwater Monitoring Program, Data Review, and Policy Recommendations for Napa County’s Groundwater Resources” (Comprehensive Groundwater Monitoring Program) to meet identified action items in the 2008 General Plan update (Napa County, 2008). The program emphasizes developing a sound understanding of groundwater conditions and implementing an expanded groundwater monitoring and data management program as a foundation for future coordinated, integrated water resources planning and dissemination of water resources information.

In February 2011, the Napa County Board of Supervisors were presented with 5 technical memorandums (TMs listed below), alongside a comprehensive report, *Napa County Groundwater Conditions and Groundwater Monitoring Recommendations* (LSCE, 2011a) and a stand-alone Executive Summary documenting the results of the overall project (referred to as the Comprehensive Groundwater Monitoring Program). Recommendations were made for next steps in developing better community understanding and management of groundwater resources in Napa County (available at under “Groundwater Reports and Data” at:

<http://www.countyofnapa.org/bos/grac/> ).

<b>Documents Produced for Napa County Comprehensive Groundwater Monitoring Program</b> (available at: <a href="http://www.countyofnapa.org/bos/grac/">http://www.countyofnapa.org/bos/grac/</a> )	
<b>Task Number and Document Title</b>	<b>Reference</b>
Task 1, <i>Napa County Data Management System</i> . TM.	LSCE, 2010
Task 2, <i>Review and Evaluation of Data Collection Procedures and Recommendations for Improvement</i> . TM.	LSCE, 2010
Task 3.2, <i>Conceptual Model Review of Napa Valley Groundwater Model</i> . TM.	LSCE, 2010
Task 3.3, <i>Guidance on Precipitation and Streamflow Monitoring Activities, Napa County, CA</i> . TM.	LSCE, 2010
Task 4, <i>Napa County Groundwater Conditions and Groundwater Monitoring Recommendations</i> . Report.	LSCE, 2011
Task 5, <i>Groundwater Planning Considerations and Review of Napa County Ordinance and Permit Process</i> . TM.	LSCE, 2011

The countywide assessment of data availability and groundwater conditions led to recommendations that the County expand countywide groundwater monitoring and programs that facilitate integrated water resources management and planning and help enable the long-term protection of surface and groundwater resources. Specifically, it was recommended that a near-term priority for groundwater monitoring includes the development and/or expansion of an aquifer-specific groundwater monitoring network, particularly in the Napa Valley Floor, by identifying existing wells with well construction data and constructing new aquifer-specific monitoring wells as needed where data gaps may exist.

**Napa County Updated Conceptualization and Characterization of Hydrogeologic Conditions (2012 and Continuing)**

In January 2012, following the recommendations in the Comprehensive Groundwater Monitoring Program, and under direction by the Board of Supervisors, the County authorized a contract with the team of Luhdorff & Scalmanini, Consulting Engineers (LSCE) and MBK Engineers for work composed of four tasks that will contribute to the successful updated conceptualization and characterization of hydrogeologic conditions in various areas of Napa County; refinement and further characterization of those areas of the greatest recharge potential; and analysis of surface water/groundwater interactions. The tasks include:

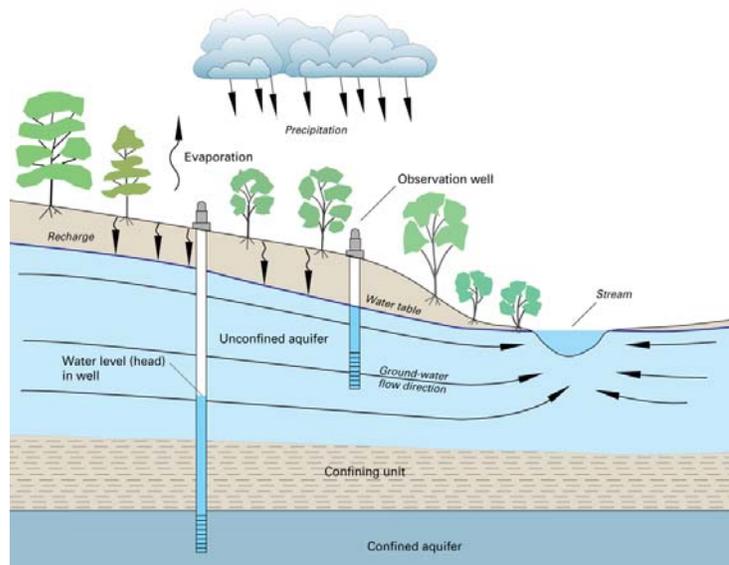
- **Task 1** – Updated Hydrogeologic Characterization and Conceptualization
- **Task 2** – Supplemental Groundwater Monitoring in High Priority Subareas
- **Task 3** – Further Characterization of Areas of Greatest Recharge Potential
- **Task 4** – Develop Guidance to Assist County with Review of Discretionary Projects Pursuant to CEQA with focus on Potential Effect of Groundwater Pumping on Surface Water Courses, Neighboring Wells, and Ecologic Factors

Work completed to date includes essentially all of Task 1, most of Task 2, and a large part of

Task 3. Below are key findings and recommendations stemming from the work conducted to date.

### ***Current Groundwater Monitoring Network Lacks Vertical Specificity to Assess Groundwater/Surface Water Exchange***

Some groundwater monitoring exists in the Napa Valley Floor which is also in relatively close proximity to the river but there needs to be further work to evaluate the relationship between the measured data and the aquifer system. Because of factors associated with currently monitored wells such as unknown well construction and multiple and/or very long screen intervals, groundwater level measurements generally lack the specificity to know whether the measurements represent groundwater levels for: the uppermost portion of the aquifer system, a somewhat deeper portion of the aquifer system (beneath a confining unit), or a blended representation of the aquifer system [the figure illustrates this relationship.]



USGS. 2001. Schematic shows a relatively shallower well completed in an unconfined aquifer and a relatively deeper well completed below a confining unit. The groundwater levels in these wells are illustrated as being different due to their different completion depths within the aquifer system.

It is important that, prior to future work that utilizes a surface water /groundwater modeling tool, a detailed record of actual measured groundwater levels is developed that records how levels vary in response to recharge from the river and/or due to pumping that occurs locally or cumulatively on a larger scale. Specifically, groundwater levels representative of shallower or relatively deeper portions of the aquifer system are likely to vary according to where these recharge and/or discharge (pumping) effects are imposed. Accordingly, it is very important that the well structure of the monitored well be known and can differentiate between stresses on different portions of the aquifer system. Ideally, a shallow monitoring well designed to measure responses near the water table (uppermost portion of the aquifer system) would be coupled with a monitoring well that detects responses in a relatively deeper portion of the aquifer system (i.e., a part of the aquifer that is more typically completed for groundwater production for domestic or agricultural purposes).

### ***Extent and Nature of Groundwater/Surface Water Interactions in Napa County Largely Unknown***

The extent and nature of groundwater/surface water interactions in Napa County are largely unknown outside of the MST area. As discussed in LSCE's Napa County Comprehensive Groundwater Monitoring Program report, Task 3.3, *Guidance on Precipitation and Streamflow*

*Monitoring Activities, Napa County, CA.* (2010d), groundwater levels throughout much of the Napa Valley are within 5 to 20 feet (bgs) during times of seasonally high groundwater levels in the spring. These shallow groundwater conditions may result from a close hydraulic connection between groundwater and surface water stream channels for at least part of the year; however, little or no data exist to discern this relationship. In a closely connected groundwater and surface water system, relatively small changes in groundwater levels have the potential to greatly influence surface water resources. During periods of low flow, groundwater level declines could result in decreasing stream baseflow conditions. Given the increasing pressure on natural resources and land use, and since it is important to better understand water resource availability to meet projected increases in annual water demands (2020 and 2050 projections), monitoring of near-stream shallow groundwater conditions in key locations can contribute to this understanding.

## **Project Need and Justification**

The proposed project will facilitate improved understanding of the manner in which the stream/aquifer system responds to utilization of the County's surface and groundwater resources and the potential effects due to climate change. The proposed groundwater monitoring facilities and the instrumentation proposed to be installed at the groundwater monitoring locations and at stream monitoring stations (existing and/or new stations) will help quantify exchanges of water between the surface water channel and the adjacent shallow alluvial aquifer sediments. The proposed facilities will also provide the data that will improve the information used to assess the status of the County's surface and groundwater resources and will provide for improved forecasting of future supplies and effective management of water resources.

## **Summary of Project Tasks**

The proposed project is to install shallow groundwater monitoring facilities and groundwater and surface water instrumentation at up to six locations adjacent to (within one-quarter mile of) the Napa River system. Each site is planned to include the following features (see details in the **Appendix 4A, below**):

- Two nested piezometers, at different depths, installed in a single borehole and equipped with automated data collection instrumentation to continuously record groundwater levels and basic water quality parameters of temperature and electrical conductivity;
- Located near an existing stream gauging station and/or near an area where stream stage and water quality monitoring can be conducted;
- Located in the vicinity of existing groundwater monitoring facilities (i.e., typically water supply wells constructed to greater depths in the aquifer system); and
- Located on property readily accessible to the County for construction of the proposed facilities, access for data collection, and ongoing monitoring following the grant period.

The proposed monitoring wells constructed near the monitored surface waterway will provide dedicated monitoring sites for collection of water elevation and quality data to identify and characterize interactions between groundwater and surface water resources. Constructing new monitoring wells will provide controlled groundwater monitoring locations with detailed

lithologic and construction details that can be used for long-term data collection and monitoring as funding allows. The proposed monitoring wells will be among the first monitoring wells constructed in the County to address high priority groundwater data gaps already identified.

### **Technical Feasibility of Project**

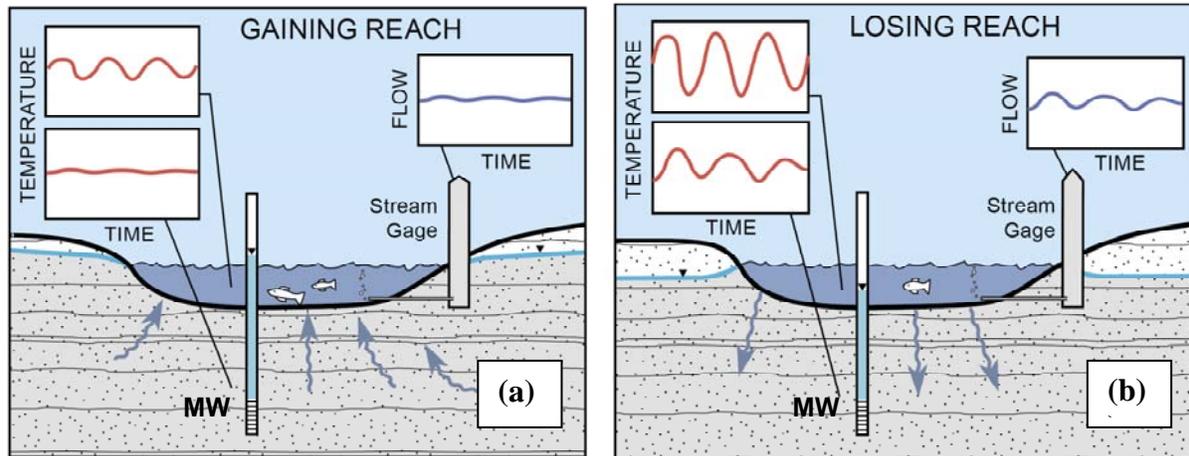
This project will employ the installation and utilization of groundwater and surface water monitoring facilities at six selected locations along the length of the Napa Valley. Monitoring well construction will include drilling and detailed lithologic logging of all boreholes and completion of dedicated nested, but isolated piezometers. Each piezometer will be equipped with automated instrumentation to monitor and record water levels and water quality parameters of temperature and electrical conductivity. Adjacent surface water monitoring facilities will be utilized, constructed, or augmented to monitor and record surface water level, temperature, and conductivity. In combination, these facilities will provide highly useful data to help Napa County and its communities to better understand the relationships between groundwater and surface water resources in various parts of the Napa Valley Subbasin, and particularly the Napa River system.

### **Groundwater/Surface Water Data Utility**

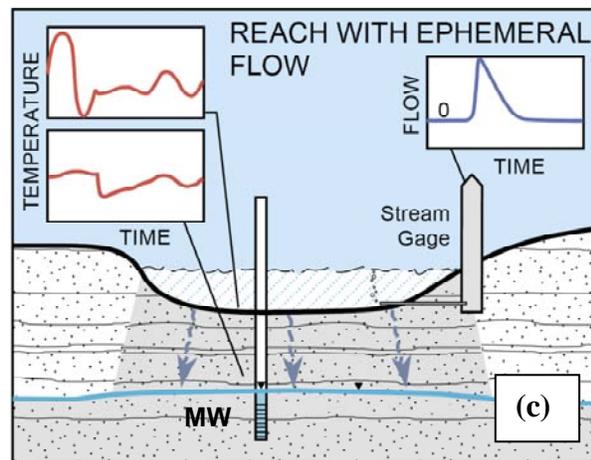
Earlier work performed by the County as part of prior studies and current efforts to update the Conceptualization and Characterization of Hydrogeologic Conditions and the resulting recommendations discussed above, identified data gaps at locations within the County. Leveraging this prior and current work, specific sites have been identified for the proposed monitoring facilities as part of this project. Preliminary maps were prepared of the potential sites to identify existing stream gauges, existing monitoring wells, and the proximity of County-accessible land. On June 22, 2012, a field trip was conducted, that included County staffs, and a representative from Napa County Resource Conservation District (NCRCD), and two geohydrologists from Luhdorff & Scalmanini, Consulting Engineers, to visit the sites and assess their suitability for the proposed monitoring facilities. Since that field trip, County staff has been in contact with landowners and managers and others concerning letters authorizing access to and construction at the proposed monitoring sites (see also Att#5\_LGA12\_NapaCnty\_WrkPln\_1of2).

All proposed groundwater and surface water data collection activities will be performed according to the standard procedures described below. The proposed project utilizes techniques and methods that are well-documented and field-tested.

Jim Constantz and David Stonestrom (USGS publications including Circular 1260 in 2003 and Fact Sheet 2004-3010 in 2004 and later works) have done conducted research involving the use of temperature to study stream-groundwater exchanges. They report “heat is transported by water moving between streams and their underlying sediments, as well as by conduction. Moving water changes the propagation of daily and annual temperature fluctuations into the streambed. This additional, *advective*, transport of heat imparts distinctive thermal patterns to gaining versus losing streams.”



The uniqueness of the proposed project is the application and use of temperature to study stream-groundwater exchanges<sup>1</sup>. These are schematically shown in the Fact Sheet 2004-3010 by figures included here as (a), (b), and (c). Figures (a) and (b), respectively, show examples of gaining and losing reaches of a stream where diurnal temperature fluctuations in and beneath the gaining reach are muted compared to temperatures in and beneath the losing reach. Figure (c) shows an example with an ephemeral stream where high rates of infiltration increase heat transport and create a rapid thermal response.



These techniques and methods to implement the installation of groundwater facilities that are designed specifically to collect the data needed to identify mechanisms for and quantify exchanges of water between the river channel and the underlying groundwater system, including the response of the system to utilization of the County’s surface and groundwater resources. The data collected as part of this project will provide data to more definitively evaluate groundwater/surface water interrelationships. These relationships can be characterized using spatial and temporal comparisons of groundwater elevations, stream stage, and basic water quality of groundwater and surface water resources at monitoring sites. Additional discussion on the long-term need for and value of the proposed project is also provided below.

<sup>1</sup> Jim Constantz and David Stonestrom (USGS publications including Circular 1260 in 2003 and Fact Sheet 2004-3010 in 2004 and later works) have done conducted research involving the use of temperature to study stream-groundwater exchanges. They report “heat is transported by water moving between streams and their underlying sediments, as well as by conduction. Moving water changes the propagation of daily and annual temperature fluctuations into the streambed. ....This additional, *advective*, transport of heat imparts distinctive thermal patterns to gaining versus losing streams.”

## **Technical Methods and Analyses**

Well construction in Napa County is permitted through the County's Planning, Building and Environmental Services Department. A qualified California licensed professional well drilling contractor (C-57 license) will be selected through a competitive screening process. The drilling contractor will be responsible for adherence to trade-specific health and safety measures during drilling, installation, and site cleanup. Subsurface materials will be described and logged in the field by a California professional geologist or under his/her direct supervision. The description of subsurface samples will follow the American Society for Testing and Materials (ASTM) Unified Soil Classification System (USCS). Material samples will be archived for a minimum of one year from the date of retrieval.

A California licensed professional (licensed land surveyor or civil engineer with land surveying experience) will perform all necessary surveying of the reference elevations of the new facilities. To ensure adequate measurement accuracy and precision, the horizontal and vertical position of the top of the well casings of the new monitoring wells will be determined in accordance with the National Oceanic and Atmospheric Administration's (NOAA) *National Geodetic Survey User Guidelines for Single Base Real Time GNSS Positioning* (Henning, 2010) using a professional-grade global navigation satellite system. Wellhead elevations will be determined with an accuracy of 0.01 foot and their horizontal position will be determined with an accuracy of 0.02 foot.

Field calibration of all instrumentation for the continuous recording of temperature and electrical conductivity will be conducted and verified at the time of installation following the manufacturer's instructions using standard solutions. Additional instrumentation calibration and verification will be conducted according to manufacturer instructions at the time of the baseline water sampling event and at appropriate time intervals during the period of data collection (see also Att#5\_LGA12\_NapaCnty\_WrkPln\_1of2).

## **Data Collection and Evaluation**

Data analyses will include preparation of groundwater level and stream stage hydrographs, groundwater level contour maps, tabulation and figures illustrating groundwater and surface water quality data (including baseline general mineral and metals analyses for groundwater samples, trend analyses of groundwater and surface water temperature and electrical conductivity data, and statistical analyses) and comparative evaluations in view of spatial and temporal considerations.

Tools for assessing the groundwater and surface water data collected as part of the proposed project may include analytical procedures such as:

- Interpretative analyses of spatial and temporal relationships between groundwater and surface water monitoring sites;
- Statistical analyses to assess groundwater and surface water relationships; and
- Analytical modeling.

Quarterly, or possibly more frequently (pending calibration checks described in the Work Plan

(Att#5\_LGA12\_NapaCnty\_WrkPln\_1of2), data collection procedures will be reviewed and modified as needed. As spatial and temporal data records expand during the course of the project, it is anticipated that a greater level of statistical and interpretive analyses can be performed to strengthen understanding of the groundwater/surface water system and develop project conclusions.

### **Supporting Groundwater Management Plans' Goals and Objectives**

The goal of Napa County's Groundwater Ordinance/GWMP-Equivalent program is to maximize the long-term beneficial use of the county's groundwater resources, while enhancing environmental quality, and protecting the public health, safety, and welfare of the citizens of Napa County. Other goals imbedded in the Groundwater Ordinance are for the County of Napa to govern the management and extraction of the resource within its jurisdiction in order to protect the health, safety, and welfare of the citizens of Napa County. The objectives of the proposed project are strongly aligned with those of the GWMP-Equivalent; specifically the collection of data that will 1) help identify mechanisms for and quantify exchanges of water between the river channel and the underlying groundwater system, including the response of the system to utilization of the County's surface and groundwater resources, and 2) establish baseline conditions that will facilitate assessment of the potential effects due to future climate change.

It is further anticipated that Napa County's CASGEM program (developed in accordance with Water Code Section 10920 *et seq.*) will be benefited by the incorporation of the proposed facilities, such that they represent an important part of the stream/ groundwater system and will enhance the State's evaluation of long-term and seasonal trends within the groundwater basins and subbasins in Napa County.

The countywide monitoring program is in the process of being updated by the County with the assistance of the Napa County Groundwater Resources Advisory Committee, Center for Collaborative Policy, and hydrogeologists from LSCE (see Att#3\_LGA12\_NapaCnty\_GWMP\_1of5), and also <http://www.countyofnapa.org/bos/grac/>). The countywide program also will locally benefit from the proposed facilities.

### **Collaboration with Other Local Public Agencies and Outreach Programs**

Napa County intends to collaborate with other local public agencies (including the Napa County Flood Control and Water Conservation District and the Napa County Resource Conservation District [NCRCD]) in the installation and data gathering process (see attachments Att#2\_LGA12\_NapaCnty\_EligDoc\_2of3 and Att#2\_LGA12\_NapaCnty\_EligDoc\_3of3). The County will also work with the City of St. Helena and the Napa County Flood Control and Water Conservation District to locate wells on public property (see Att#4\_LGA12\_NapaCnty\_ProjD\_2of3). The County will hold regularly scheduled meetings with collective technical staff from each entity involved in order to disseminate relevant data and to ensure the project goals and objectives are being met. Napa County will be reporting groundwater data from the new monitoring wells to DWR through the term of the project and possibly longer as funding allows. Napa County will coordinate with the USGS on surface water monitoring information collected by the County at USGS stations and with the NCRCD about

surface water monitoring collected at other stations.

Public outreach is an essential component of any water resources planning program. Napa County considers groundwater to be a vital water supply source for residential, commercial and agricultural users. In that light, the County will offer a web site page (and related links) devoted to this and other groundwater related efforts in Napa County. This information may be placed within existing sites such as <http://www.countyofnapa.org/bos/grac/> or <http://www.napawatersheds.org> or may be a newly created web resource within the County's website (<http://www.countyofnapa.org>). Information about the project funded with LGA grant funds would include project related reports, including data analyses and findings.

The County is currently working with the Center for Collaborative Policy in the preparation of a countywide groundwater Outreach and Education Plan (see Att#5\_LGA12\_NapaCnty\_WrkPln\_1of2) that will facilitate information sharing and education about the county's groundwater resources, including an understanding of what is known from currently available data and what activities are planned to better understand and ensure these resources are sustained for future generations and the health of the natural environment. The CCP has a facilitation agreement with DWR to aid in the set up and facilitation of the GRAC (see Att#4\_LGA12\_NapaCnty\_ProjD\_3of3). The Watershed Information Center and Conservancy (WICC) Board of Napa County, whose mission, vision and guiding principles are highly aligned with these essential outreach components, is well positioned to be an integral part of the public outreach planning process. It is envisioned that the WICC Board and its website (<http://www.napawatersheds.org>) would be utilized to implement various public outreach components. Annual joint meetings of the WICC Board and the Napa County Groundwater Resources Advisory Committee (GRAC) are presently conducted to facilitate and coordinate the mission and work of both County advisory committees.

The Napa County Groundwater Resources Advisory Committee (GRAC) (discussed in Att#3\_LGA12\_NapaCnty\_GWMP\_1of5) plays a key role in the successful implementation of the County's Comprehensive Groundwater Monitoring Program, including actions taken to implement the recommendations made as part of this program. The 15-member committee appointed by the County Board of Supervisors has committed to a three-year term and holds regular public meetings every other month. At this time, the committee's term extends through December 2014. The proposed LGA project would be implemented during the GRAC's work. Accordingly, the County fully intends to provide regular briefings at the GRAC meetings, which are open and publically noticed. The GRAC's background, activities, presentations, and action minutes for all GRAC meetings are posted at <http://www.countyofnapa.org/bos/grac/>.

## **Long-Term Need, Value, and Funding for Ongoing Use of the Monitoring Facilities**

### **Long-Term Need and Value**

Napa County will use the information obtained from this effort and the continued monitoring of the groundwater basins in Napa County to assess the impact of groundwater pumping and groundwater recharge in the County. The groundwater information is needed immediately because of findings in the 2050 Napa Valley Water Resources Study (West Yost Associates, 2005, see [http://www.napawatersheds.org/app\\_pages/view/4282](http://www.napawatersheds.org/app_pages/view/4282)). The 2050 Study was based on

data received from the various agencies and other sources, and used a combination of population projections and land-use projections to estimate the potential future water demands. The results of the 2050 Study illustrate the need for integrated water resources planning on a countywide basis. Based on estimated surface and groundwater supply availability (the certainty of which was constrained in many areas due to data limitations), the study indicated supply deficits for the Main Basin (includes the incorporated and unincorporated areas in the vicinity of Calistoga, St. Helena, Yountville, Napa, and American Canyon) for multiple and single-dry water years, and projected deficits for 2020 and 2050 for all water year types. Specifically, the study predicted that the unincorporated water demand in the Main Basin will exceed the available supply by 1,340 acre-feet per year (afa) in 2020 and by 5,640 afa in 2050. By improving the groundwater level monitoring network, the potential increased demand on the groundwater basin and any potential for associated effects on surface water can be accurately assessed. The additional information on stream/groundwater exchange provided by the proposed facilities will be needed to make informed groundwater decisions in the future and ensure water resources sustainability for the natural environment and future generations. The proposed facilities will also improve forecasting of future supplies and effective management of water resources.

### **Funding for Ongoing Use of the Monitoring Facilities**

The up-front installation of monitoring facilities is cost prohibitive for many public agencies, particularly ones without a unified water supplier such as Napa County. Once installed, the proposed groundwater monitoring facilities would be less costly to maintain and costs can be annualized over budget cycles. Over the long-term, it is expected that monitored data from the installed facilities would be incorporated into the countywide monitoring network and program and also in the Napa County CASGEM program. Accordingly, Napa County will be reporting groundwater data from the new monitoring wells to DWR semi-annually as part of those programs. However, groundwater data from these facilities will not be collected on as frequent a basis as required for the duration of this project. Similarly, because of the importance of monitoring both groundwater and interrelated surface water resources, Napa County will coordinate with the USGS on stream monitoring information collected by the County at or near USGS stations and with the Napa County Flood Control and Water Conservation District about the stream monitoring information collected at other stations. These data include stream stage, groundwater levels, and temperature and electrical conductivity (for both surface and groundwater). DWR will be provided access to the facilities as required under the grant agreement.

To the greatest extent possible, funding for the ongoing monitoring and maintenance of the groundwater and surface water facilities and instrumentation provided through this grant would be provided by Napa County, the Napa County Flood Control and Water Conservation District, and/or partnering agencies as part of existing monitoring programs (both groundwater and surface water) on an as needed basis as budgets allow.

In addition to the groundwater data being provided to DWR, the groundwater and surface water data collected as a part of the proposed project will be regularly uploaded to the County's Groundwater Data Management System (DMS) developed in 2010 for the ongoing data storage, regular data uploads, and periodic analysis and reporting of groundwater data. Further details on the DMS can be found on the County's GRAC website (<http://www.countyofnapa.org/bos/grac/>) under "Groundwater Reports and Data" via the "Data Management System" link. As part of the

project, additional stream gauging information will be added to the DMS.

# **Appendix**

## Project Site Descriptions

## Appendix 4A: Detailed Site Descriptions

The proposed project is to install shallow groundwater monitoring facilities and groundwater and surface water instrumentation at up to six locations adjacent to (within one-quarter mile of) the Napa River system. Detailed site descriptions are provided below.

### Site 1: Napa River at Napa

Located within the City of Napa, Site 1 is the southernmost proposed project site. The proposed monitoring well location is 120 feet west of the mainstem Napa River, within the Napa-Sonoma Valley Basin, Napa Valley Subbasin (LSCE, 2011) (**Figures 4A-1, 4A-2, and 4A-3**). The Milliken-Sarco-Tulucay (MST) subarea, which has experienced well-documented declines in groundwater levels, lies to the east of the Napa River at the same location. The broad scale hydrogeologic investigation of the Napa Valley being conducted by Luhdorff & Scalmanini, Consulting Engineers (LSCE, 2012) and previous investigations of Napa Valley and the MST area conducted by the U.S Geological Survey (Kunkel and Upson, 1960; Farrar and Metzger, 2003) have generally found that alluvial deposits increase in thickness to the west of the MST area and the Napa River. Previous investigations have not examined the extent to which this geologic distinction affects interactions between groundwater and surface water in the area.

Site 1 provides the opportunity to evaluate groundwater/surface water interrelationships in the alluvial aquifer network adjacent to the MST area where available data are relatively sparse. Three existing regulated monitoring well sites exist in the vicinity of Site 1. These existing sites are shallow monitoring well networks constructed for environmental contaminant remediation projects with data from semi-annual monitoring published through the State Water Resources Control Board (SWRCB) GeoTracker Program. Water level data from monitoring wells at these sites show stable to slightly increasing shallow groundwater levels over the past decade. Investigation through the proposed project will enable the County to determine the extent to which surface water from the Napa River may be contributing to that trend as compared to other potential groundwater sources such as subsurface flow and groundwater recharge from contributing areas elsewhere in the Napa Valley.

An existing stage gauging station on the Napa River at the Lincoln Avenue bridge is operated by the Napa County Flood Control and Water Conservation District (Flood District) and has a period of record dating to 10/6/2000. Records from the existing stage gauge show that river water levels there are tidally influenced. Although the site is operational and provides adequate data for flood management purposes, the instrument is not sufficiently accurate to detect variations in stage that would be significant for determining the timing and magnitude of surface groundwater-surface water interactions. In addition to water temperature and electrical conductivity instrumentation, a pressure transducer will be installed at this location to provide more accurate and precise river stage data to meet project needs.

## **Site 2: Dry Creek at Washington Street**

Dry Creek drains portions of the Mayacama Mountains west of Napa Valley before crossing the valley floor, flowing generally eastward towards its confluence with the Napa River. The proposed monitoring well site is located approximately one-half mile east of the contact point between the Napa Valley alluvium and the volcanic strata outcropped at the base of the Mayacamas Mountains, as determined by the valley-wide hydrogeologic characterization being conducted by LSCE (**Figure 4A-4**). The Flood District operates a stage and flow gauge in Dry Creek 110 feet from the proposed monitoring well site. The proposed monitoring well location is on a public road right-of-way.

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

Between the Town of Yountville and the City of Napa, the Napa River flows near the eastern edge of the Napa Valley floor. Site 3 will monitor groundwater and surface water interrelationships by making use of an existing USGS stream gauging site at Oak Knoll Ave (USGS ID# 11458000). The USGS Napa River gauge has been in operation since October 1929, with a continuous period of record dating to 1959. In addition to stage height, water temperature and specific conductance were monitored at the site during water years 1977–1993 and 1978–1993, respectively.

A monitoring well will be constructed in the County right-of-way along Oak Knoll Avenue to the west of the river where the alluvial deposits are more expansive (**Figure 4A-5**). The proposed site for monitoring well construction is 365 feet from the Napa River and approximately 900 feet from a geologic cross section bisecting the Napa Valley floor (work currently being completed by LSCE; **Figure 4A-2**).

## **Site 4: Napa River at Yountville Cross Road**

North and east of the Town of Yountville, the Napa River meanders across the Napa Valley floor between the Yountville Hills, outcroppings of Tertiary volcanic and sedimentary geologic formations. Site 4 will incorporate an existing Flood District stream gauging site on the mainstem Napa River. A monitoring well will be constructed 300 feet southwest of the Napa River along a County owned right-of-way (**Figure 4A-6**). The proposed monitoring well will be approximately 0.4 miles north of a well in the Napa County groundwater level monitoring network with semi-annual measurements dating to 10/17/1978. This currently monitored well was constructed as a private irrigation supply well with a single screened interval from 20 feet to 120 feet below ground surface in the alluvial aquifer.

An existing stage gauging station at the Yountville Cross Road bridge is maintained by the Flood District and has a period of record dating to 10/6/2000. Although the site is operational and provides adequate data for flood management purposes, the instrument is not sufficiently accurate to detect variations in stage that would be significant for determining the timing and magnitude of surface groundwater-surface water interactions. In addition to water temperature and electrical conductivity instrumentation, a more accurate pressure transducer will be included with the instrumentation installed for the proposed project.

## **Site 5: Napa River at Rutherford Road**

Between the Yountville Hills and Zinfandel Lane, the Napa River generally flows through the center of Napa Valley, crossing Rutherford Road northeast of Rutherford. Groundwater and surface water monitoring will be conducted in the vicinity of the Rutherford Road crossing in the public right-of-way along Rutherford Road. The proposed monitoring well site is 120 feet from the Napa River (**Figure 4A-7**). Stream gauging infrastructure does not currently exist at this site. Instruments will be installed at the Rutherford Road bridge for the proposed project according to standard methods, as described elsewhere in this proposal (see Att#8\_LGA12\_NapaCnty\_QA\_1of2).

## **Site 6: Napa River at St. Helena**

As it flows past the City of St. Helena, the Napa River remains on the northeastern edge of the valley floor. A USGS gauging station (ID# 11456000) near the Pope Street bridge records river stage. The USGS stage gauge at St. Helena has been in operation since October 1929, with a continuous period of record dating to 1939. In addition to stage height, water temperature was monitored at the site during water years 1958 –1979.

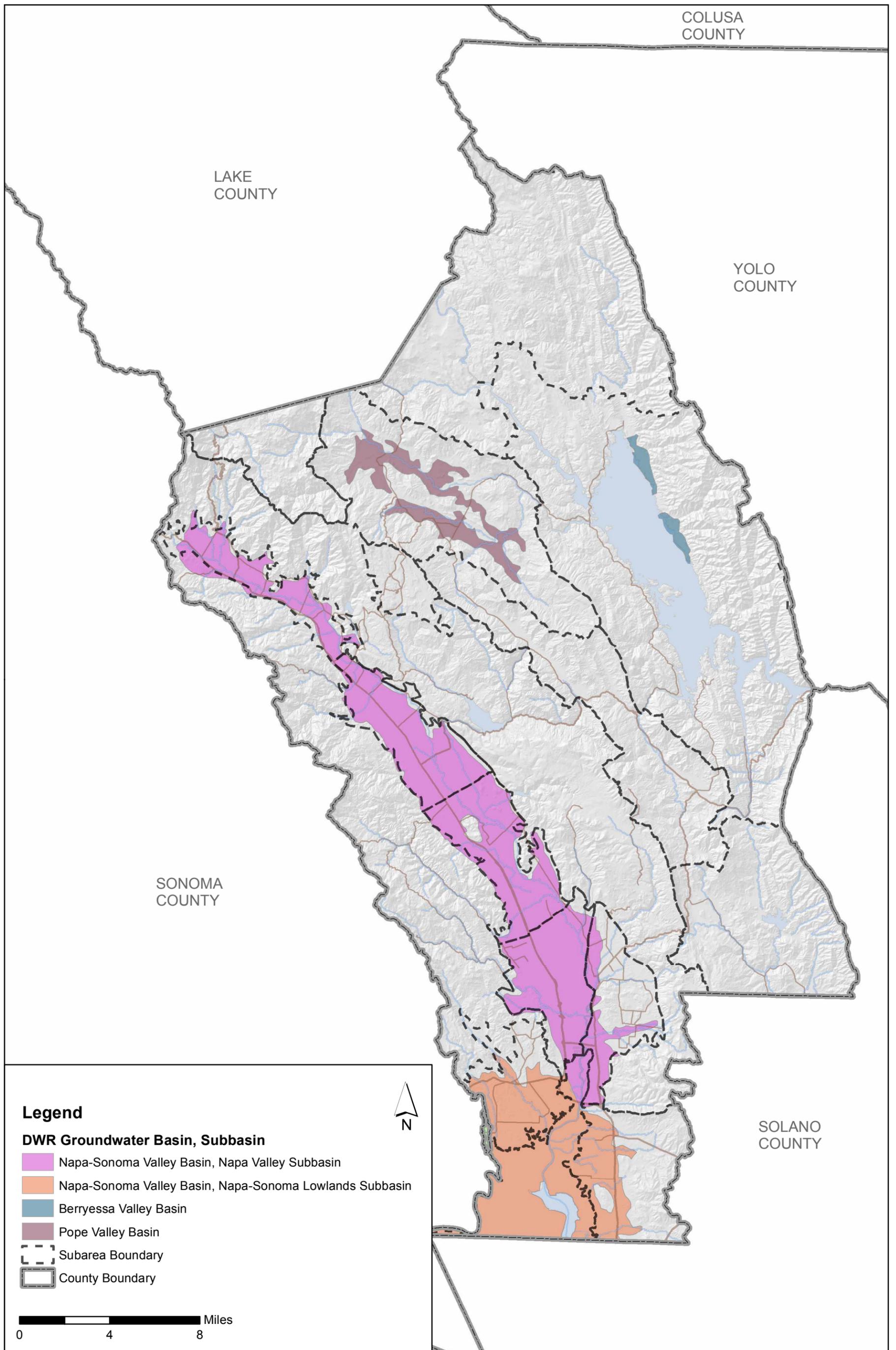
The proposed monitoring well location is on City of St. Helena property 80 feet from the Napa River (**Figure 4A-8**).

Boring logs from two public supply wells drilled within a half-mile of the proposed monitoring well site in a similar topographic setting indicate that the depth of alluvium at the proposed site will be approximately 40 to 50 feet. Additional analysis of hydrographs and boring logs from any shallow wells in the vicinity will be performed prior to monitoring well construction in order to account for the likely range of water table elevations at the drilling site.

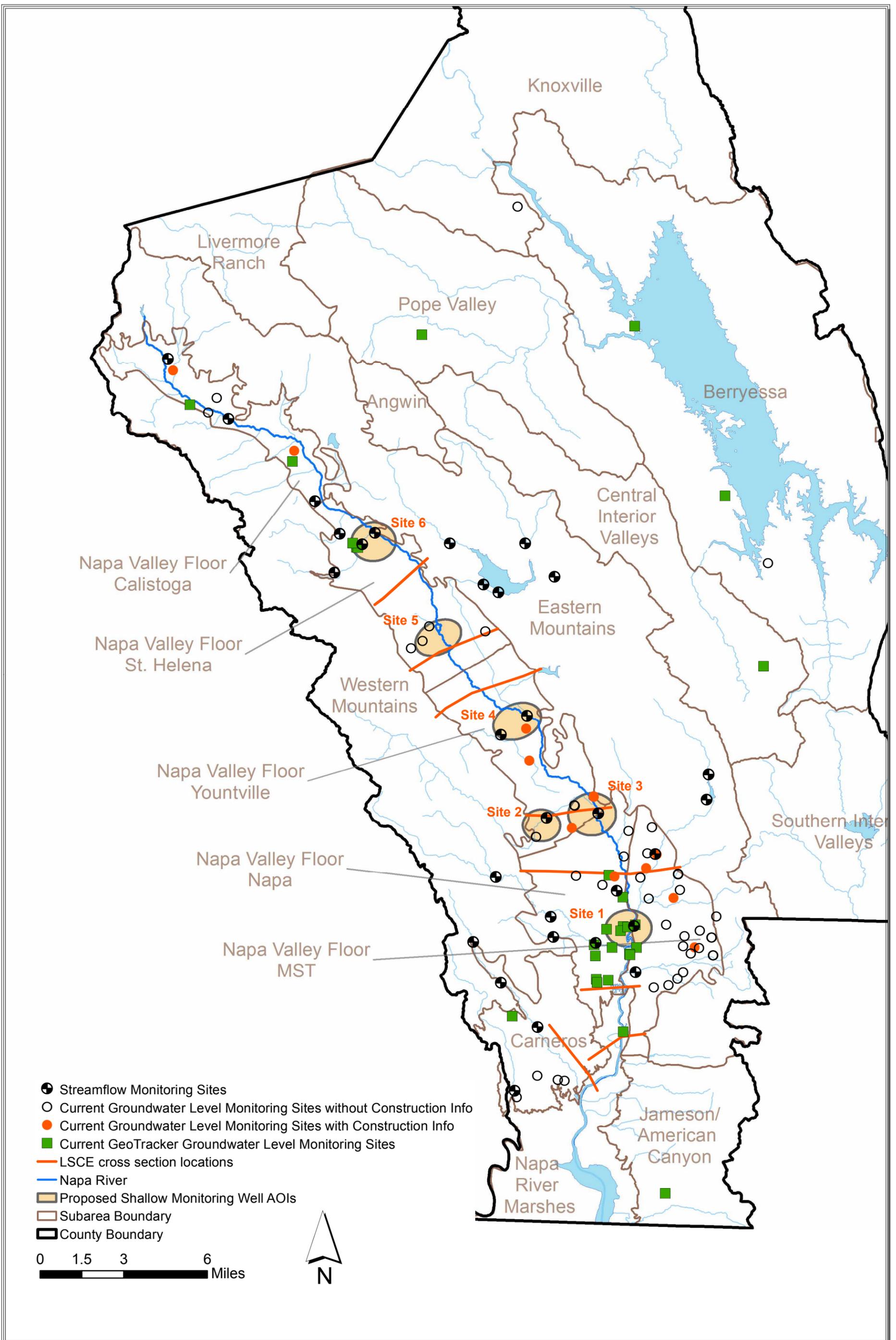
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Farrar, C.D. and L. F. Metzger. 2003. Ground-water resources in the Lower Milliken-Sarco-Tuluca Creek area, southeastern Napa County, California, 2000-2002. USGS. Water-Resources Investigations Report 03-4229.

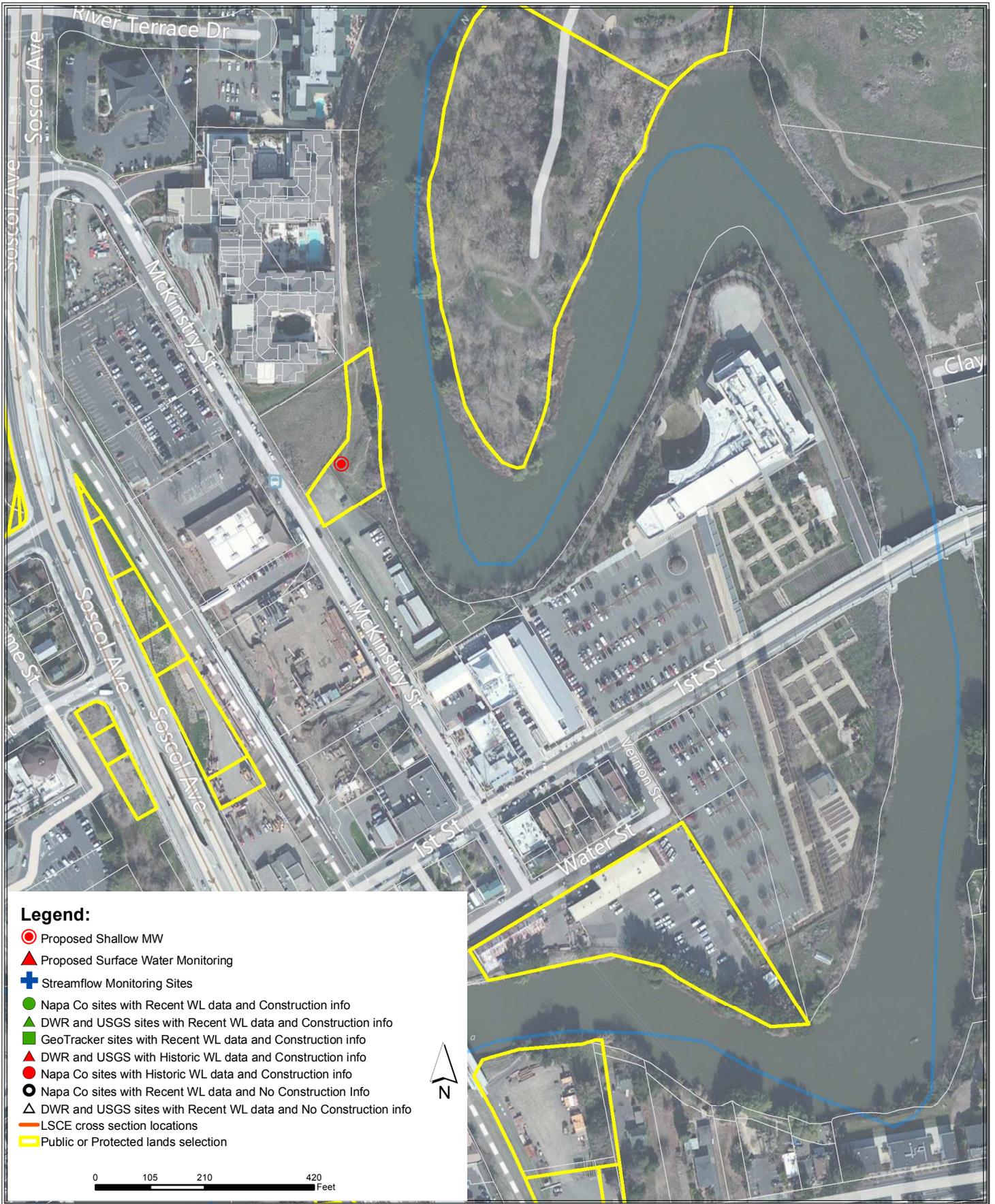
Kunkel, F. and J.E. Upson. 1960. Geology and groundwater in Napa and Sonoma Valleys Napa and Sonoma Counties California. U.S. Geological Survey Water Supply Paper 1495.



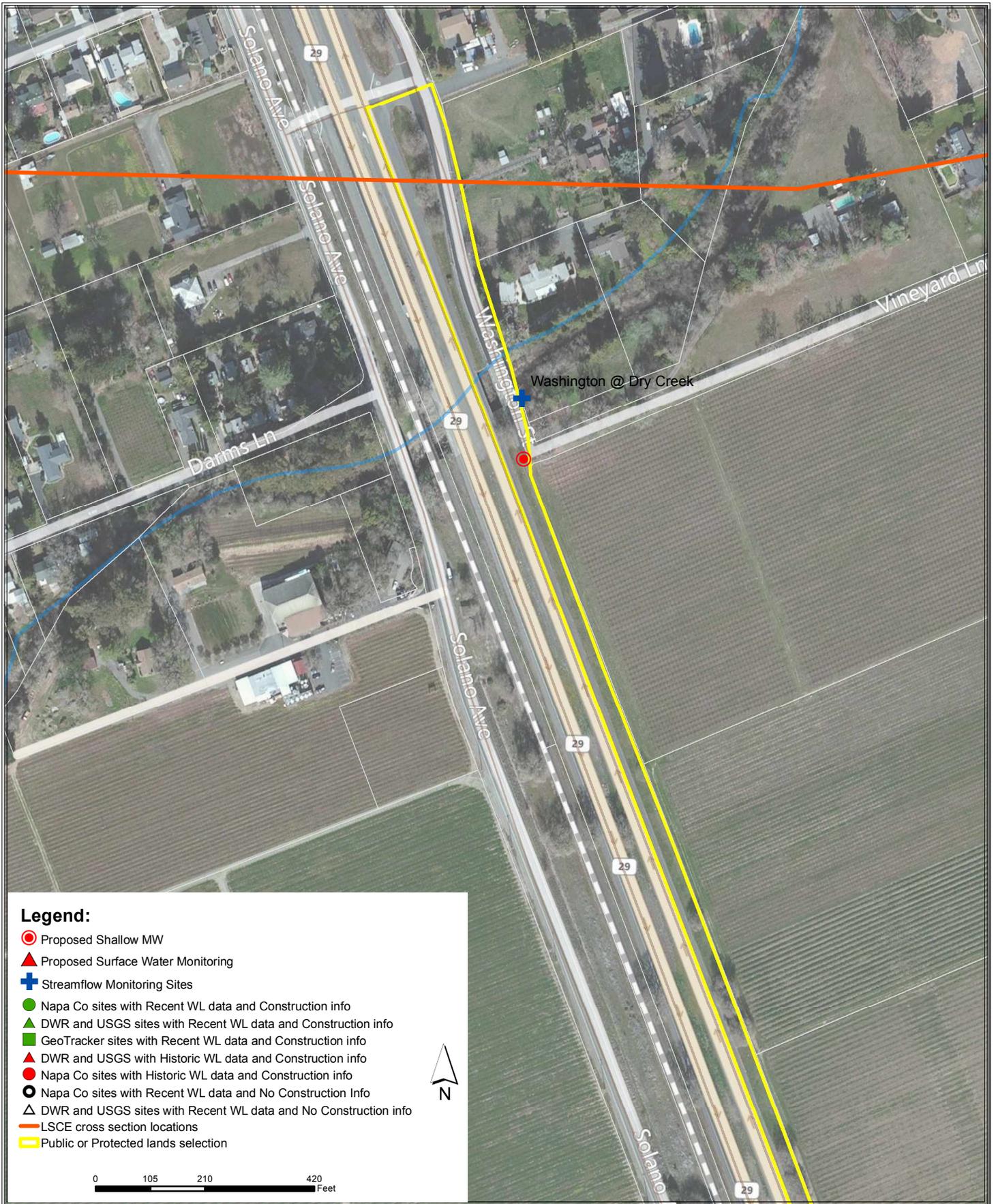
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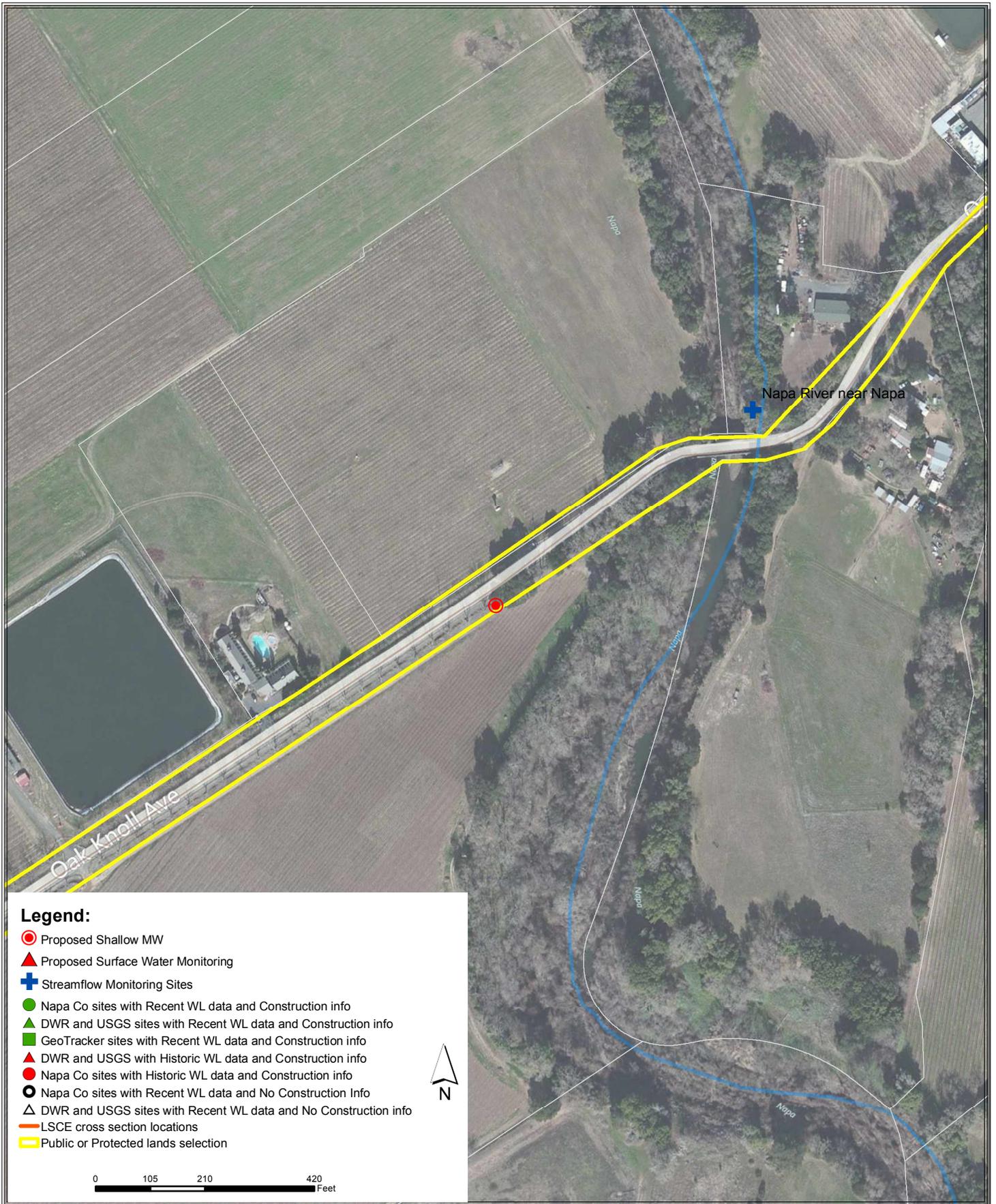
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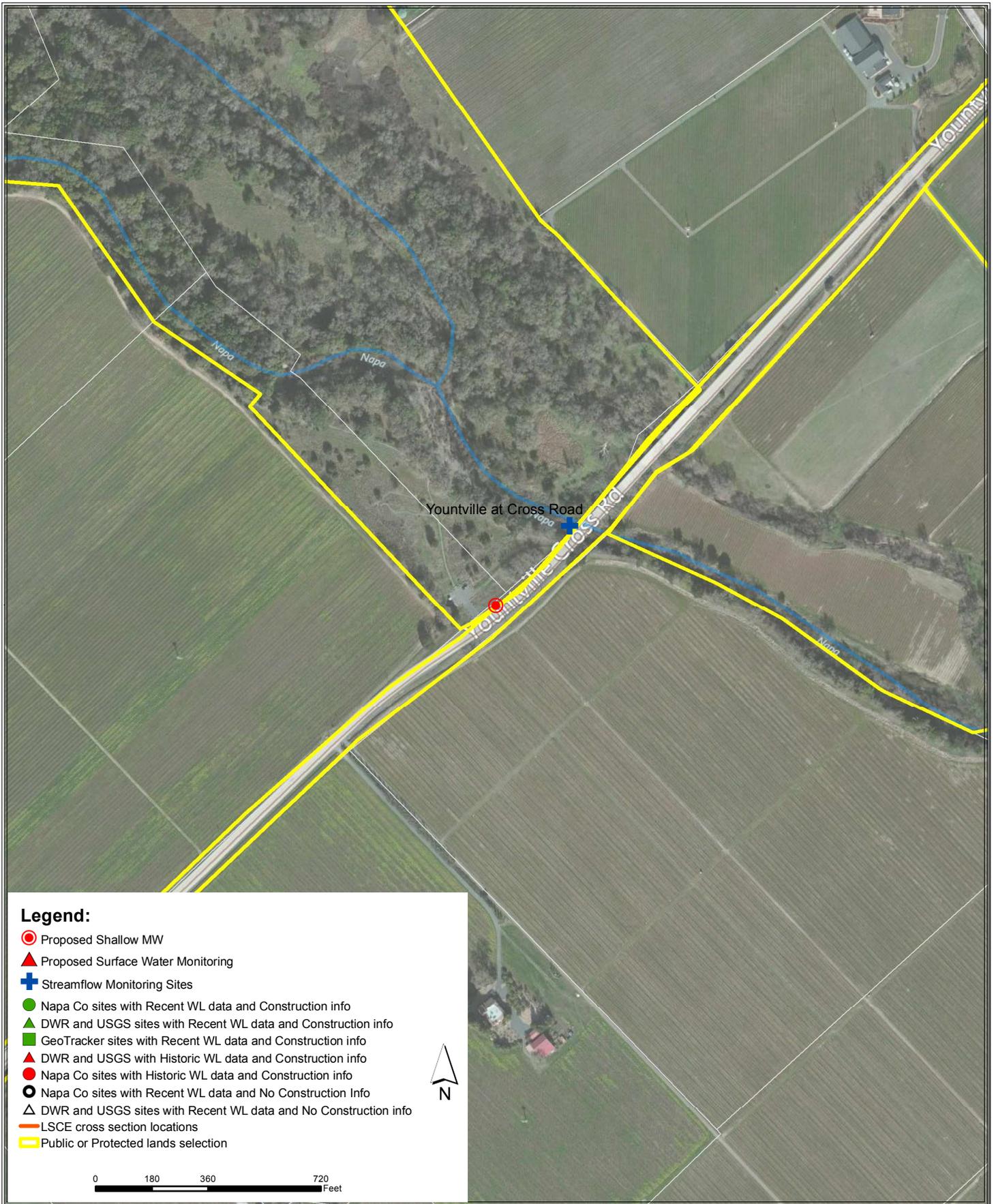
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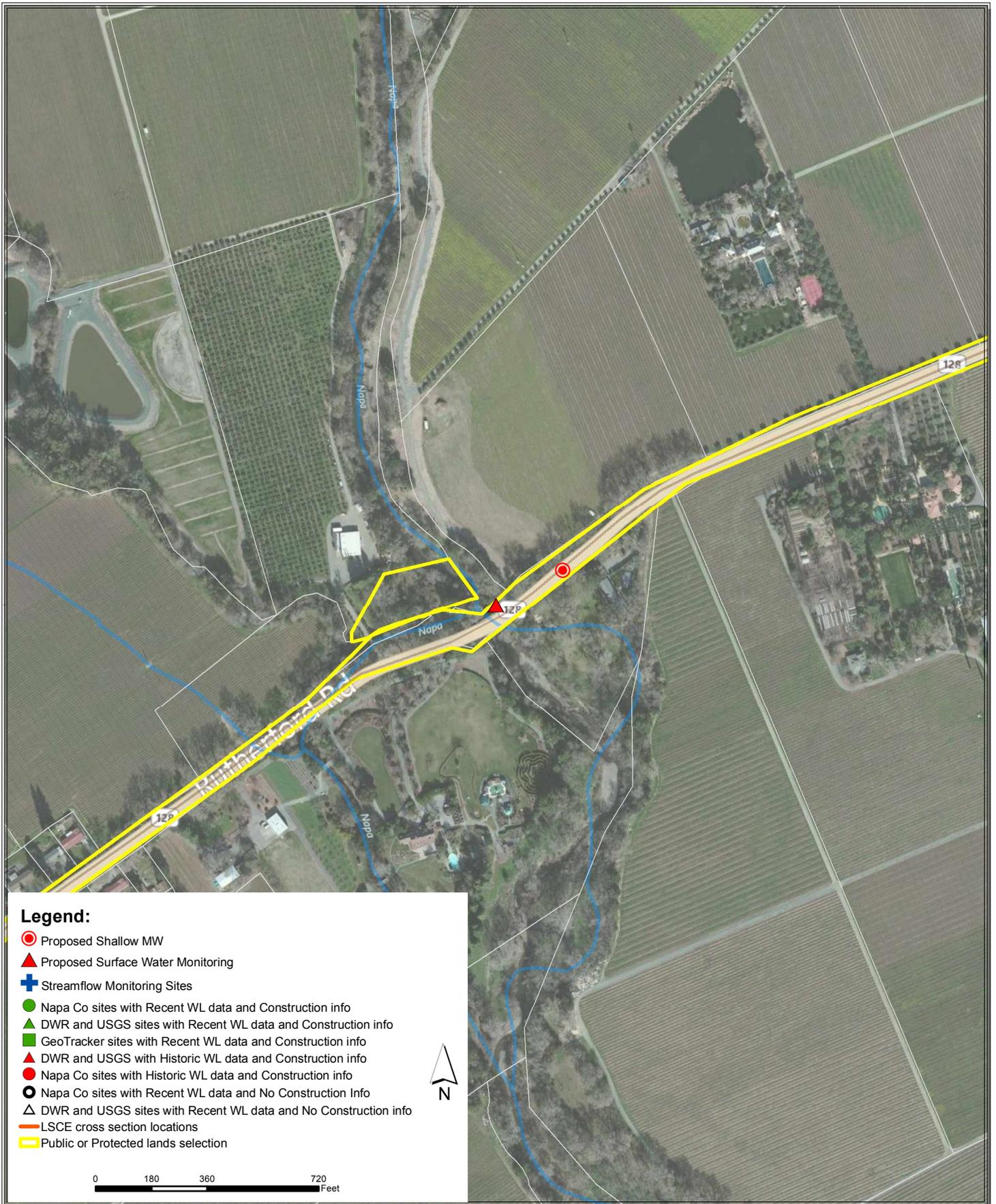
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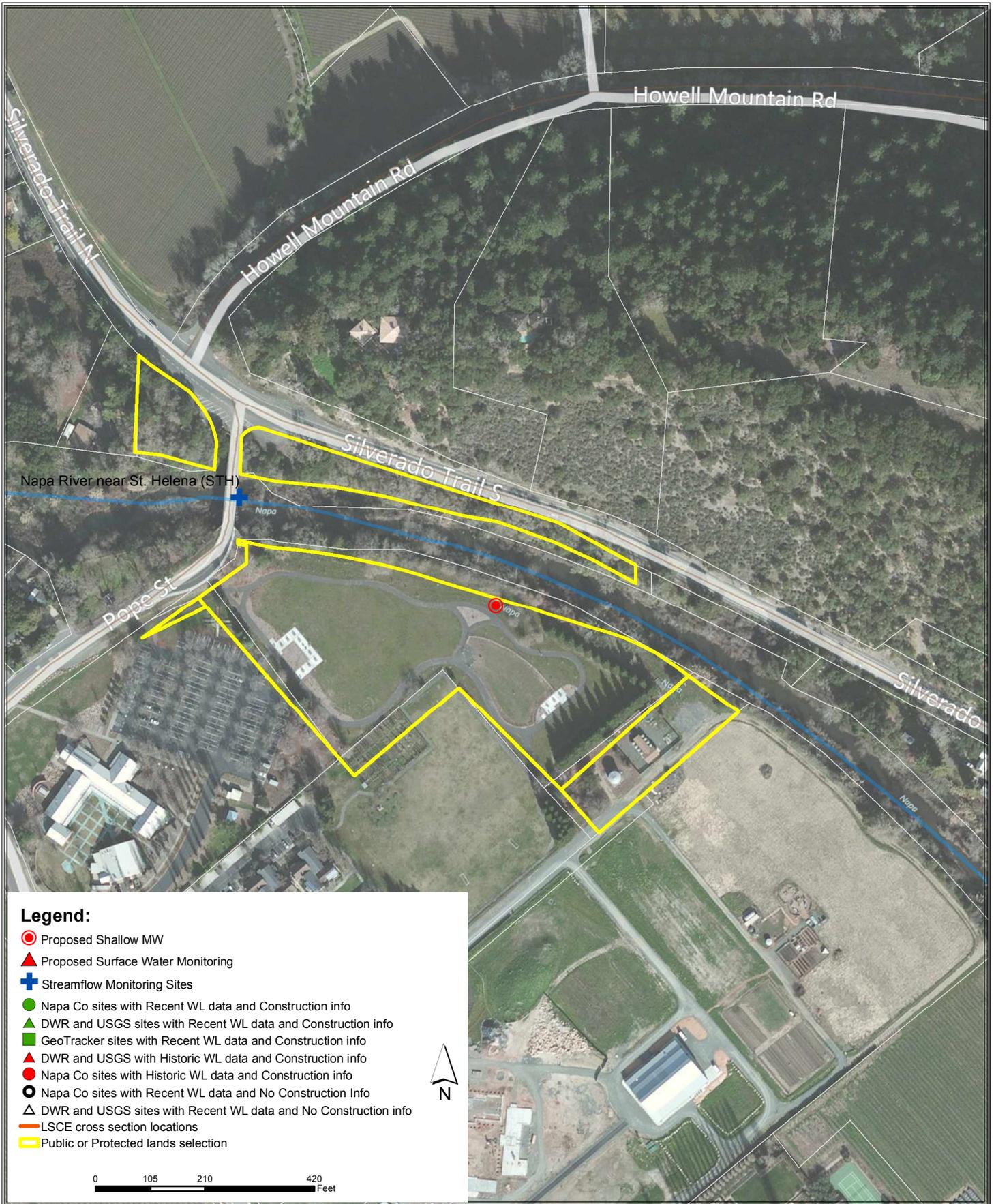
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