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WATER RESOURCES EVALUATION OF THE EAST SOLANO HOMES, JOBS, AND CLEAN ENERGY INITIATIVE

PREPARED FOR

SOLANO COUNTY

DEPARTMENT OF RESOURCE MANAGEMENT

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EXECUTIVE SUMMARY

On February 14, 2024, California Forever submitted an initiative to the Solano County Board of Registrars (California Forever, 2024a) to change land use zoning in the Solano County General Plan to allow the construction of a new community. The East Solano Homes, Jobs and Clean Energy Initiative, outlines a Project to be developed in Eastern Solano County. The Project area encompasses approximately 17,500 acres and is proposed to be built out in phases with an initial population of 50,000 and 15,000 jobs expanding to a population of 400,000 over the next 50 years. Luhdorff & Scalmanini, Consulting Engineers (LSCE) have completed an evaluation of some of the potential effects on water resources within the County resulting from development of the new community (herein referred to as the Project). This evaluation is not a Water Supply Assessment (Senate Bill 610) or a Water Supply Verification (Senate Bill 221) as defined by California law.

The evaluation is not intended to be an exhaustive review of predicted effects of the Project, but rather is intended primarily to help identify potential water supply-related issues of importance and provide an overview of some of the important considerations related to water resources that should be analyzed and addressed in greater detail if the Project proceeds. At the time of completion of this evaluation (mainly during April and May 2024) limited information was available on land use zoning included in different Project phases, Project water demands and supplies, and how the proposed Project water use efficiency will be achieved. Due to the uncertainty of planned Project characteristics and associated water supplies and demands, the evaluation incorporated various assumptions and assessed a range of Project land and water use parameters to evaluate potential effects of the Project on water resources. The evaluation considered information contained in the statement on anticipated water demands and supplies released by the California Forever on June 18, 2024; however, the claims included in the June 2024 statement are not legally binding.

Physical Setting

The Project is located entirely within Solano County and primarily within the Solano Subbasin of the Sacramento Valley Groundwater Basin, extending partially into the Suisun-Fairfield Valley Groundwater Basin. The Solano Subbasin has been categorized by DWR as a medium-priority subbasin and Groundwater Sustainability Agencies (GSAs) within the Subbasin have prepared a Groundwater Sustainability Plan (GSP) to ensure sustainable management of groundwater in the Subbasin. The Project is located in close proximity to Suisun Bay and the Sacramento-San Joaquin Delta and in a region of Solano County that is sparsely populated with historical land uses and land covers consisting mainly of a mixture of grassland vegetation, much of which is used for grazing, and agricultural crops. Current and recent land uses within the Project boundary consist primarily of grain and hay crops and pasture.

For purposes of understanding and managing groundwater in the Solano Subbasin, there are two primary aquifer zones. The majority of groundwater use within the Solano Subbasin is derived from the shallower Alluvial/Upper Tehama aquifer zone. The deeper Basal Tehama aquifer zone is not utilized for water supply throughout the entire Solano Subbasin, but primarily only used for municipal supply in the vicinity of Vacaville and Dixon. The Basal Tehama zone is not believed to be a viable groundwater producing zone in the Project area.

Water Sources and Uses

Both groundwater and surface water serve as sources of supply for water users in Solano County and Solano Subbasin. There are many existing beneficial uses and users of groundwater within Solano County including for domestic, urban, agricultural, and industrial uses, and also a variety of ecological and ecosystem uses. Public water purveyors typically utilize the appropriative right to use groundwater. The appropriation of groundwater is only allowed if it will not result in groundwater overdraft. The Solano Subbasin GSP considers the needs of all beneficial users of water in the Subbasin in defining sustainability, including groundwater dependent ecosystems (GDEs). Considerable areas of likely GDEs have been identified in the vicinity of the Project, including areas of critical habitat for threatened and endangered species.

Surface water is the dominant source of supply in the southern part of the Subbasin with greater reliance on groundwater in the northern parts of the Subbasin. The places of use designated for surface water provided through the Solano Project and the State Water Project do not include any areas within the Project boundary. On April 26, 2024, the Delta Watermaster, sent a letter to the County summarizing the surface water rights associated with parcels owned by California Forever affiliated entities. No parcels within the Project boundary are known to have riparian water rights. Appropriative surface water rights totaling 5,336 acre-feet per year (AFY) were identified to be associated with parcels owned by California Forever and affiliates; however, the places of use for these appropriative rights are outside of the Project footprint. The likelihood of successfully petitioning to change the place and purpose of use of these rights is not certain, and potential obstacles in petitioning to change the place and purpose of use of appropriative rights currently located within the Legal Delta are unknown.

Surface water located in areas where groundwater is very shallow has the potential to be directly connected to the groundwater system with potential for regional groundwater pumping to deplete surface water. Depletions of surface water caused by groundwater extraction, and potential impacts on surface water beneficial users, including environmental users, are a required consideration in the Solano Subbasin GSP. Many of the surface water features in the vicinity of the Project area have the potential to be connected to groundwater.

Evaluation of Potential Project Effects

An existing numerical groundwater flow model developed during preparation of the Solano Subbasin GSP (the Solano Subbasin Integrated Hydrologic Model [Solano IHM]) was used to evaluate a range of potential impacts of the new community on groundwater resources. Some of the potential effects of the Project on water resources were evaluated using Solano IHM, including comparing simulated groundwater levels and water budgets under different Project configurations and water demand, water source, and climate change assumptions. Because of the limited detail on water demands and supplies provided in the Initiative, more than 20 different model scenarios were simulated to consider potential impacts of the Project under a range of assumptions. The evaluation of effects on groundwater resources from the Project involved comparing results from modeling conducted with and without the Project over a future projected period.

Total baseline simulated annual water demand within the Solano Subbasin is about 370,000 AFY and total simulated annual demand within the Project area is about 6,200 AFY. Groundwater pumping for the entire Solano Subbasin under the baseline condition is estimated to be about 140,000 AFY. Most of the baseline water demand within the Project area is met by groundwater suggesting existing groundwater pumping unrelated to the Project that is occurring within the Project area. Potential climate change conditions increase simulated demands by about 20 percent (for the Subbasin and Project area), including commensurate increases in groundwater pumping. Simulated water demands and groundwater pumping for an initial Project phase of 50,000 residents include modest increases in total water demand and groundwater pumping of between about 2,000 and 7,000 AFY, depending on the Project assumptions. Simulated conditions for the final Project buildout of 400,000 residents include much greater increases in total water demand of between about 40,000 and 70,000 AFY, depending on the Project assumptions. Simulated increases in groundwater pumping range from 20,000 and 70,000 AFY, which translates to increases in groundwater pumping across the Solano Subbasin of between 15 and 50 percent, depending on the Project assumptions. The potential increases in groundwater pumping within the Project area result in corresponding increases in stream seepage (depletion of streamflow) in the Subbasin by estimated amounts of about 5,000 to 18,000 AFY and reductions in net subsurface groundwater outflow from the Subbasin by about 4,000 to 20,000 AFY. Model simulations suggest potential increases in subsurface groundwater flow into the Project area of between 10,000 and 40,000 AFY as a result of increased groundwater pumping associated with the Project.

Summary of Water Resources Evaluation

The results of the assessment suggest that potential groundwater pumping associated with the Project may result in minor increases in Subbasin groundwater pumping for the initial Project phase with potential for substantial and significant increases in groundwater pumping under the final Project buildout condition, depending on the water demand characteristics and water supply sources of the final Project buildout condition. Overall, interpretation of the results from the model scenarios indicates that potential increases in groundwater pumping will likely result in a range of potential effects on water resources in the area that should be considered. These potential effects would largely be caused by lowering of groundwater levels in the vicinity of the Project (both within and adjacent to the Project area) and associated changes in groundwater flow gradients.

The review of conditions and evaluation of potential Project effects highlight the following areas of potential concern relating to the potential effects on water resources in the vicinity of the Project.

- Potential for stream depletion and impacts to interconnected surface water. The evaluation suggests that increased groundwater pumping associated with the Project has the potential to substantially and significantly increase stream seepage resulting in the depletion of nearby streamflows. This potential impact on interconnected surface water is an important consideration related to groundwater sustainability in the Solano Subbasin GSP. Potential stream depletion and impacts to interconnected surface water have important implications for surface water beneficial users and habitat conservation areas, including habitat for threatened and endangered species in the area.

- Potential for saline water intrusion. There is potential for groundwater pumping to induce saline water intrusion into and through the groundwater system from nearby surface water bodies with higher salinity such as Delta watercourses, nearby tidal marshes/wetlands, Suisun Bay, or other nearby surface water bodies with higher salinity. Increased stream depletion resulting from increased groundwater pumping could involve increased seepage of higher salinity surface water.
- Potential for impacts on groundwater dependent ecosystems (GDEs). Because of the shallow groundwater level conditions that exist in the area supporting ecologic species, large areas of habitat, native vegetation, and wetlands have been mapped as likely GDEs. Potential lowering of groundwater levels as a result of groundwater pumping associated with the Project could have important effects on GDE health in the area. Consideration of impacts of lowering groundwater levels on GDEs and other groundwater beneficial users are a key consideration in the Solano Subbasin GSP and are also of great importance to habitat conservation areas.
- Potential for substantial altering of subsurface flows to/from the Solano Subbasin. Project model scenarios suggest that increased groundwater pumping associated with the Project has the potential to substantially and significantly alter the magnitude of net subsurface groundwater flows to/from the Solano Subbasin, potentially impacting adjacent groundwater subbasins/basins, an important consideration related to groundwater sustainability as defined in the Solano Subbasin GSP. Additionally, groundwater pumping within the Project area has the potential to alter subsurface flows to/from the Project area with the Project potentially resulting in substantial increases of groundwater flow into the Project area from adjacent areas, which could impact groundwater conditions adjacent to the Project area, including in adjacent basins/subbasins. Altering of subsurface flows between basins/subbasins could impact the long-term sustainability of other basins/subbasin and could also affect actions necessary within the Solano Subbasin to ensure the long-term sustainable management of the Subbasin.
- Potential challenges associated with feasibility of conducting recharge activities and conjunctive use. Recent information released by California Forever on planned Project water demands and supplies presents water management concepts involving conjunctive use of groundwater and surface water, including the suggestion of conducting groundwater recharge and storage utilizing recycled water and other available supplies, especially during wetter periods. It is notable that the fine-grained nature of geologic materials in the vicinity of the Project may limit the capacity to recharge and store groundwater. Furthermore, available data on groundwater levels in the vicinity of the Project suggest that groundwater levels are generally relatively shallow indicating limited thickness of the unsaturated zone available for groundwater to be recharged or stored. The combination of these conditions is likely to present some important challenges to implementing such proposed activities that should be considered.
- Potential need for treatment of groundwater to meet drinking water quality standards. Available data on groundwater quality conditions in the vicinity of the Project indicate potential for elevated concentrations of arsenic (and potentially some other constituents) above the drinking water MCL to occur in wells planned to serve the Project. While groundwater can be treated to address most water quality issues, the potential for this need should be noted. The potential for groundwater pumping within the Project area to induce migration of groundwater from any areas of impaired or contaminated groundwater should be considered.

While this water resources evaluation is not intended to evaluate anticipated impacts of all of the details of the Project (most of which were not available at the time of the evaluation), it does highlight important considerations that should be addressed through more detailed analysis if the Project proceeds. Such analyses should consider effects of the Project on water resources and beneficial users of water in areas across the Solano Subbasin and Suisun-Fairfield Valley Basin as well as adjacent groundwater subbasins and basins that may be affected by increased pumping associated with the Project.

1. INTRODUCTION AND BACKGROUND

In response to Solano County Department of Resource Management's (County) request, Luhdorff & Scalmanini, Consulting Engineers (LSCE) have prepared this technical memorandum (TM) summarizing an evaluation of some of the potential effects on water resources within the County resulting from development of a new community (herein referred to as the Project) proposed by California Forever as described in the amended East Solano Homes, Job, and Clean Energy Initiative (Initiative) document submitted to the Solano County Registrar of Voters on February 14, 2024 (California Forever, 2024a). The evaluation includes an assessment of possible effects on water resources in the County and vicinity of the Project including analysis of potential effects on groundwater levels and overall water budgets in the County under different Project demands and water supply source possibilities, with consideration of potential impacts on groundwater quality (including from proximity to regulated contamination sites and from saline water intrusion) resulting from the Project. This TM is not a Water Supply Assessment (Senate Bill 610) or a Water Supply Verification (Senate Bill 221) as defined by California law, nor is it intended to satisfy or otherwise address any requirements for a Water Supply Assessment or Water Supply Verification.

The evaluation is not intended to be an exhaustive review of predicted effects of the Project, but rather is intended primarily to help identify potential water supply-related issues of importance and provide an overview of some of the important considerations related to water resources that should be analyzed and addressed in greater detail if the Project proceeds. The technical analysis of the Project is based on Project information included in the Initiative submittal utilizing available information on groundwater conditions and hydrogeology, especially information contained in the Solano Subbasin Groundwater Sustainability Plan (GSP) developed in 2022 and approved by the California Department of Water Resources (DWR) in January 2024. Additional consideration was given to information provided on the Project website (www.eastsolanoplan.com) during the evaluation with recognition that this information is not explicitly included in the Initiative and reliance on this information should be considered accordingly. Most of the Project area is located within the Solano Subbasin. Technical analyses of the Project relied heavily on application of the Solano Integrated Hydrologic Model (Solano IHM) developed during preparation of the Solano Subbasin GSP to evaluate simulated groundwater levels and water budgets under different Project configurations and water demand, water source, and climate change assumptions.

1.1. Project Overview

On February 14, 2024, California Forever submitted an initiative to the Solano County Board of Registrars (California Forever, 2024a) to change land use zoning in the Solano County General Plan to allow the construction of a new community. The East Solano Homes, Jobs and Clean Energy Initiative, outlines a Project to be developed in Eastern Solano County (**Figures 1-1a and 1-1b**). The Project area encompasses approximately 17,500 acres and is proposed to be built out in phases with an initial population of 50,000 and 15,000 jobs expanding to a population of 400,000 over the next 50 years. The description of the Project in the Initiative submittal and on the Project website (https://eastsolanoplan.com) includes proposed water infrastructure design that combines various water sources to meet drinking water, irrigation, and public safety needs while emphasizing water reuse by combining local water sources from nearby surface water rights, onsite stormwater, recycled water generated by the community, and available groundwater. More recent information provided on the Project website (https://eastsolanoplan.com/faq/water) states that the Project expects to use 50 percent less water (per capita) than nearby communities and will also utilize recycled water to meet up to 30 percent of the new community water demands.

At the time of the analyses summarized in this TM (mainly during April and May 2024), limited information was available on land use zoning included in different Project phases, Project water demands and supplies, and how the proposed Project water use efficiency will be achieved. Due to the uncertainty of planned Project characteristics and associated water supplies and demands, the analyses conducted to evaluate the Project incorporated various assumptions and assessed a range of Project land and water use parameters to evaluate potential effects of the Project on water resources. During the period while these analyses were being completed, additional information related to the Project was periodically released by California Forever, including information on anticipated water demands, planned transitioning of land uses on California Forever parcels, and available water sources. On June 18, while this TM was being prepared, California Forever released a statement detailing the conclusions from some of their water demand and supply projections (CA Forever, 2024b). The statement released by California Forever provides a very high-level overview of anticipated or potential water demands and supplies, but the statement is not a legal binding document or a Water Supply Assessment pursuant to California law. Much of the analysis conducted by LSCE was completed before the release of this information. Several additional analyses were conducted in an effort to incorporate some of the newly-provided information.

On April 11, 2024, Solano County provided GIS data representing the Project extent and parcels owned by California Forever and its known affiliate entities including Flannery Associates, Ranchlands, and others. These data files were used in conjunction with maps in the amended Initiative submitted on February 14, 2024 to evaluate water resources in the vicinity of the Project and other parcels owned by California Forever affiliates. A version of these parcel data from February 29, 2024 was used in many of the technical analyses described in this TM because it was the most current at the time the work was conducted. These earlier parcel data include a total area of 60,799 acres believed to have been acquired or be under purchase agreement to be acquired by California Forever and its affiliates. Updated data provided by Solano County indicate a slightly higher total of 62,940 acres are believed to have been acquired or be under purchase agreement to be acquired by California Forever and its affiliates as of May 17, 2024. Some of the analyses described in this TM that rely on or incorporate the parcels owned by California Forever affiliates are based on the data representing the extent of parcels owned by California Forever affiliates as of February 29, 2024s.

1.2. Setting

The Project is located entirely within Solano County and primarily within the Solano Subbasin of the Sacramento Valley Groundwater Basin, extending partially into the Suisun-Fairfield Valley Groundwater Basin (**Figure 1-1a**). The Solano Subbasin has been categorized by DWR as a medium-priority subbasin and Groundwater Sustainability Agencies (GSAs) within the Subbasin have prepared a GSP to ensure sustainable management of the Subbasin. The Suisun-Fairfield Valley Basin is a low-priority basin and to date no GSP has been developed for the basin. Key water management entities within the Solano Subbasin, based on information in the GSP, are shown on **Figure 1-1a.** Land uses in the Solano Subbasin can be broadly classified into three categories: agricultural, urban, and native vegetation. Agricultural land uses represent the largest fraction of the Subbasin with considerable areas of grasslands, wetlands, and urban uses. Current urban land uses are concentrated around the cities of Vacaville, Rio Vista, and Dixon and to a lesser extent around Walnut Grove and Isleton (**Figure 1-2**).

The Project is located in a region of Solano County that is sparsely populated with historical land uses and land covers consisting mainly of a mixture of grassland vegetation, much of which is used for grazing, and agricultural crops. The Project is located near established cities and infrastructure, City of Fairfield and Travis Air Force Base to the northwest and City of Rio Vista to the southeast. The Project is in close proximity to Suisun Bay and the Sacramento-San Joaquin Delta (Delta).

Most of the Project area topography is relatively flat; however, south of the project area is the Montezuma Hills, which is an area of relatively higher elevation. **Figure 1-3** displays the relationship of the Project to 100- and 500-year flood areas mapped by the Federal Emergency Management Agency (FEMA). Flood risks within the Project area are limited to along stream channels, with larger areas of flood risks found around the Project area in lower elevation areas along nearby Delta water bodies.

1.3. Hydrogeology

Water managers in Solano County have long recognized the value of groundwater management and have commissioned various studies as part of their efforts to characterize and manage Solano County's groundwater resources sustainably. The hydrogeologic conceptualization of the Solano Subbasin, including the area where the Project is located, is described in detail in the Solano Subbasin GSP (LSCE, 2021). This conceptualization includes descriptions of the groundwater system and hydrogeologic setting including topography, surface water bodies, soils, regional and structural geologic setting and features, extent of the groundwater subbasin (laterally and vertically), identification and discussion of configuration and characterization of major aquifers and aquitards, presentation of groundwater recharge and discharge areas, and identification of surface water and imported water supply sources.

For purposes of understanding and managing groundwater conditions in the Solano Subbasin, there are two primary aquifer zones defined: 1) the relatively shallower Alluvial Aquifer and Upper Tehama zone, and 2) the relatively deeper Basal Tehama zone. The Quaternary alluvium, Montezuma, and Upper Tehama geologic formations have similar hydrogeologic characteristics and behave as a hydraulically connected aquifer zone and represent a single primary aquifer within the Solano Subbasin referred to as the Alluvial Aquifer and Upper Tehama zone (Alluvial/Upper Tehama zone). The majority of groundwater use within the Solano Subbasin is derived from the shallower Alluvial/Upper Tehama zone. The Basal Tehama zone, which coincides with the Basal Tehama formation is generally found at great depth and under confined (i.e., under pressure) conditions within the Solano Subbasin. The Basal Tehama zone is not utilized for water supply throughout the entire Solano Subbasin, but primarily only used in the vicinity of Vacaville and Dixon. The main groundwater-bearing geologic units in the Suisun-Fairfield Valley Basin include the Tertiary Sonoma Volcanics, Pleistocene alluvium, and Recent (Quaternary) alluvium. The Pleistocene alluvium is the main water-yielding unit in the Basin, although the Recent (Quaternary) alluvium provides some water to wells in the north, and many of the deeper wells in the western portion of the Basin are constructed in the Sonoma Volcanics.

Most of the nonmarine sedimentary deposits in Solano County are attributed to the Tehama Formation. The Tehama Formation extends to the base of freshwater in the Project area. **Figures 1-4 a-c** illustrates the surficial geology of Solano County. The locations of geologic cross sections developed across the Solano Subbasin and included in the Solano Subbasin GSP are shown on **Figure 1-5**. Two of these cross sections traverse the vicinity of the Project area, including cross sections 3-3' and 4-4'. A hydrostratigraphic interpretation of the subsurface crossing the Project area from Suisun Bay going eastward across Solano County to the Delta is provided in cross section 3-3' in **Figure 1-6,** and a cross section extending south to north (cross section 4-4') located to the east of the Project area is presented in **Figures 1-7a and b**. These cross sections illustrate the relative thicknesses of the various geologic units described above that occur within Solano County. Limited information on subsurface geology has been developed for the Project area, especially at great depths; but, geologic mapping and lithologic logs included on geologic cross sections in the vicinity of the Project indicate that much of the Project area is underlain by consolidated or relatively fine-grained materials within the Montezuma and Tehama Formations. Airborne Electromagnetic Surveys conducted by DWR (https://data.cnra.ca.gov/dataset/aem) in the Project area also suggest that subsurface geologic materials in the area up to depths of 500 to 600 feet deep tend to be fine-grained. The fine-grained nature of these sediments may limit the ability to produce significant quantities of groundwater in and around the Project area.

The Basal Tehama zone, which is utilized as a groundwater source by some municipal water providers in the more northern parts of the Solano Subbasin, is not believed to be a viable groundwater producing zone in the Project area. The Basal Tehama's presence within the Project area is uncertain due to limited data at greater depths, but available information suggests it is either absent or very thin and, if present, is likely finer-grained than in more northern areas of the Subbasin and below the base of the freshwater zone. **Figure 1-8** presents the estimated depth to the bottom of the Upper Tehama Deposits (from the Solano Subbasin GSP) and **Figure 1-9** displays the estimated elevation to base of freshwater in the vicinity of the Project (as presented in the GSP). More details on the hydrogeology of Solano County and the Solano Subbasin are described in the GSP.

Average annual groundwater extraction under the current (as of the date of the GSP) land use and also the future land use condition used in GSP analyses were both estimated to be about 170,000 acre-feet per year (AFY). Average annual groundwater extraction under the current (as of the date of the GSP) land use with 2070 climate change condition was estimated to be 180,000 AFY; average annual groundwater extraction under the future land use condition with 2070 climate change factors applied was estimated to be 190,000 AFY. The future land use conditions assumed in the GSP included some assumed urban growth consistent with the County's Orderly Growth Initiative with transitioning of some other land uses and crop patterns consistent with historical trends. The future land use condition did not include significant urban growth in the southern part of the Subbasin or contemplation of a new community as described in the Initiative.

The Sustainable Yield of the Solano Subbasin as reported in the GSP was estimated at 190,000 AFY, including an estimated Sustainable Yield of the Alluvial Aquifer and Upper Tehama zone of about 180,000 AFY and an estimated Sustainable Yield of about 8,300 AFY for the Basal Tehama zone. The estimated Sustainable Yield is based on simulated Subbasin-wide groundwater pumping estimates that do not cause significant and unreasonable adverse impacts in the Subbasin related to the six sustainability indicators of groundwater level declines, groundwater storage depletion, groundwater quality degradation, land subsidence, depletion of interconnected surface water, and sea water intrusion. Ongoing refinements to the groundwater model used to estimate the Sustainable Yield of the Subbasin during the GSP preparation have the potential to change the simulated estimates of historical, current, and projected groundwater pumping, which may translate to changes in the estimated Sustainable Yield in the Subbasin. Ultimately, groundwater sustainability in the Subbasin is defined based on avoidance of significant and unreasonable adverse impacts for the six sustainability indicators, as defined in the GSP using a network of Representative Monitoring Sites distributed throughout the Subbasin. The determination of whether the Subbasin is being managed sustainably is ultimately based on tracking of groundwater conditions as opposed to the total volume of groundwater pumping.

1.4. Land Use Summary

A map from the California Department of Conservation Farmland Mapping and Monitoring Program (FMMP, 2020) presenting information from Important Farmland Series Maps is presented as **Figure 1-10**. This program categorizes agricultural land according to soil quality and irrigation status as shown on **Figure 1-10**. Key farmland categories identified in the FMMP data are listed below.

- Prime Farmland – best combination of physical/chemical characteristics able to sustain long-term agricultural production; must have been irrigated for agricultural production during most recent four years
- Farmland of Statewide Importance – similar to Prime Farmland, but with minor shortcomings such as greater slope or less soil moisture storage capability; must have been irrigated for agricultural production during most recent four years
- Unique Farmland – farmland of lesser quality soils used for agricultural production; must have been irrigated for agricultural production during most recent four years
- Farmland of Local Importance – land of local importance to local agricultural economy as determined by local representatives
- Grazing Land – land on which existing vegetation is suited to the grazing of livestock; category developed in cooperation with groups interested in the extent of grazing activities

Lands must have been irrigated for agricultural production within the most recent four years (prior to the survey date) to be designated as Prime Farmland, Farmland of Statewide Importance, or Unique Farmland. Most of the lands within the Project area have been designated as Grazing Land (**Figure 1-10**).

Recent cropping information from the United States Department of Agriculture (USDA) for 2022 are summarized in **Table 1-1** for the Project area and also for parcels owned by California Forever affiliates (as of 05/17/2024) located outside the Project boundary for the purpose of providing an overview of some of the more common agricultural crops in the area. The spatial patterns highlighted in these data are presented in **Figure 1-11**. The USDA land use data are based on remote sensing information derived for 30 meter by 30 meter cells. Although the USDA data provide relatively complete spatial coverage of the Project area and vicinity, the methods used in developing these data have limitations in their ability to distinguish some land use/crop types. A land use or crop is determined for each 30 meter cell, which can result in variability of crop or land use types across a given field. The stated accuracy of cropping information in the USDA 2022 data is approximately 81 percent. As a result there are known inaccuracies in the USDA data, although they can be helpful in providing a high-level indication of cropping patterns. Although the USDA data indicate the presence of citrus, grapes, rice, and some other crops within the Project area, these crops are not believed to exist within the Project area.

Table 1-1. Land Use Summary – USDA Cropscape (based on USDA data for 2022)

Land Use/Crop Type	Within Project Area (Acres)	On CA Forever Parcels (as of 5/17/24) Outside Project Area (Acres)
Citrus/Subtropics	3	11
Double Crops	1	83
Fruit Trees	35	71
Grains/Cotton	2,816	13,511
Grapes	12	140
Grasses	134	5,264
Grassland/Pasture	12,307	23,222
Non-Agricultural	1,754	4,299
Nut Trees	157	2,480
Rice	11	58
Seeds/Beans	69	686
Vegetables	120	224
Total Area	**17,426**	**50,052**

Cropping in the region (based on 2022 cropland land use data from DWR) are depicted on **Figure 1-12.** Although DWR cropping data generally do not capture non-agricultural land, the accuracy of these data in identifying specific crops is much greater, typically greater than 95 percent. However, the DWR data focus on irrigated cropping. Furthermore, the data are processed to the field scale to provide a more realistic representation of cropping than exists in the USDA data. **Table 1-2** summarizes current cropland within the Project area and on other parcels acquired by California Forever and its affiliate entities based on DWR cropland mapping data for 2022. Current and recent land uses within the Project boundary consist primarily of grain and hay crops and pasture with significant areas indicated as idle agriculture. A large fraction of the Project area is indicated in the DWR data as unclassified or not identified in the survey, suggesting it is not likely to be currently or recently cropped and irrigated. Most of the areas identified as idle, unclassified, or not identified in survey are believed to be in a fallow period between hay and grain crop cycles or used for active seasonal sheep and cattle grazing. DWR cropping data suggest parcels owned by California Forever affiliates located outside the Project boundary have similar crops with grain and hay crops and pasture representing the largest area with significant additional idle agricultural land. Smaller areas of field crops, orchards, and vineyards also exist on these parcels.

Table 1-2. Land Use Summary – DWR Cropland Mapping (based on DWR data for 2022)		
Land Use/Crop Type	**Within Project Area (Acres)**	**On CA Forever Parcels (as of 5/17/24) Outside Project Area (Acres)**
Deciduous Fruits and Nuts	150	2,241
Field Crops		622
Grain and Hay Crop	1,421	7,615
Idle	2,717	8,416
Native		
Pasture	682	4,509
Urban Unspecified		18
Vineyard		101
Unclassified	991	578
Not identified in Survey	11,466	25,953
Total Area	**17,426**	**50,052**

Collectively these different datasets present a characterization of the land uses within and around the Project area and on parcels owned by California Forever affiliates. Substantial acreage within the Project area and on California Forever parcels appears to currently be grassland and pasture used for grazing. DWR cropland mapping data suggest a large number of acres may not be irrigated based on the omission of these areas from the DWR cropland data.

1.5. Water Sources and Uses

Both groundwater and surface water serve as sources of supply for water users in Solano County and Solano Subbasin. **Figure 1-13** modified from the Solano Subbasin GSP to show the Project area and California Forever parcels, presents the primary water sources for areas of the Subbasin based on recent available data. Surface water is the dominant source of supply in the southern part of the Subbasin with greater reliance on groundwater in the northern parts of the Subbasin. The map from the GSP does not include water source information for most of the Project area and California Forever parcels. As discussed below, no surface water rights are known to exist in association with California Forever parcels located within the Project area and the Project area is not within the places of use designated for the Solano Project and the State Water Project.

1.5.1. Groundwater

In California, the right to use groundwater generally falls into two categories: overlying or appropriative[1]. Property owners have the right to extract groundwater for use on overlying land. In times of groundwater scarcity, all overlying users must reduce their water use to ensure all overlying users have some water to

[1] This section provides a brief overview of some key characteristics and considerations related to the right to use groundwater in California; however, it is not intended to be an authoritative or comprehensive legal description of groundwater rights.

use; there is no seniority to overlying users. When available groundwater is in excess of the needs of overlying users, surplus groundwater may be appropriated for use by non-overlying users or for use on non-overlying lands. The appropriation of groundwater is only allowed if it will not result in groundwater overdraft. Public water purveyors typically utilize the appropriative right. There are many existing beneficial uses and users of groundwater within Solano County including for domestic, urban, agricultural, and industrial uses, and also a variety of ecological and ecosystem uses. The Solano Subbasin GSP establishes Sustainable Management Criteria that consider the needs of all beneficial users of water in the Subbasin, including groundwater dependent ecosystems (GDEs). GDEs are "ecological communities or species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface" as defined in GSP Regulations (CCR Title 23 §351).

The spatial distribution of different well types in the Subbasin illustrates the locations and level of reliance on groundwater for domestic, agricultural, public supply, and industrial uses. Domestic and agricultural wells exist throughout the Subbasin, although notably higher and lower well-density areas are evident in the County. **Figures 1-14 through 1-17** are maps illustrating the number and depth of wells per Public Land Survey System section by well type for domestic, agricultural, public supply, and industrial wells, based on Well Completion Report (WCR) records maintained by DWR. Most existing wells in the Project area are domestic wells and there are also a small number of public and agricultural wells in the Project area. In the Solano Subbasin GSP potential GDE communities were identified by comparing land use and depth to groundwater maps to identify likely locations of GDE communities, where groundwater is sufficiently shallow to serve as a source of water to ecosystem communities. **Figures 1-18 to 1-20** present likely GDE areas by habitat, vegetation, and wetland types mapped in the Subbasin.

1.5.2. Surface Water

Surface water supplies in the Solano Subbasin and Solano County come from two primary sources: the Solano Project (Lake Berryessa) and direct diversions from surface water bodies, mostly from the Delta. Additional surface water supplies are provided by the State Water Project for use by the cities of Vacaville, Fairfield, Vallejo, and Benicia. Lake Berryessa is a major reservoir in the Putah Creek watershed and serves as a surface water source through the Solano Project supplying surface water to areas of Solano County. The Solano Project provides the source for much of the surface water supply for agricultural users in the northern and central parts of the Subbasin, but also to other areas of the County. The Solano County Water Agency (SCWA) delivers Solano Project water in accordance with contracts with its Member Agencies, which include City of Dixon, City of Rio Vista, City of Vacaville, City of Fairfield, Suisun City, City of Benicia, City of Vallejo, Solano Irrigation District (SID), Maine Prairie Water District (MPWD), and Reclamation District 2068. As a result, the area served by Solano Project water lies within the boundaries of these Member Agencies along with the University of California at Davis and California State Prison – Solano. The places of use designated for the Solano Project and the State Water Project do not include any areas within the Project boundary.

Surface Water Diversions and Rights

Diversions of surface water represent a considerable source of water in the Subbasin. Locations of surface water points of diversion available from State Water Resources Control Board (SWRCB) electronic Water

Rights Information Management System (eWRIMS) data are presented on **Figure 1-21** developed for the Solano Subbasin GSP. California surface water rights can be broadly grouped into two main categories – riparian water rights and appropriative water rights - although other types of water rights exist.[2]

Riparian rights are typically associated with parcels of land adjacent to a surface water body. The riparian right entitles the parcel owner to use a reasonable amount of water that would naturally flow in the watercourse for beneficial use on the parcel. The riparian right requires no permit, license, or government approval. A riparian right holder is only entitled to directly divert water for beneficial use on the parcel adjacent to the water body; water diverted under a riparian right cannot be stored for later use or used on land outside of the watershed.

To divert and use water on a parcel not adjacent to the watercourse from which it was diverted or to store water for longer periods (e.g., beyond the season when it was diverted), an appropriative water right is needed. Appropriative water rights are categorized as pre-1914 or post-1914 based on the date the right was first established. A pre-1914 appropriative water right has an established water right showing water put to beneficial use before December 19, 1914, with water use occurring without substantial interruption since. A pre-1914 appropriative water rights holder is not required to obtain approval from the SWRCB to put water to beneficial use or to change the point of diversion, the place of use, and the purpose of use.

Post-1914 appropriative water rights are issued by the SWRCB through registrations and applications and a post-1914 appropriative water right holder may not increase the amount of water diverted and used, the rate of the diversion, nor change the season in which it is diverted. Any changes to the point of diversion and the place or purpose of use, the water right holder must obtain approval from the SWRCB through a Petition of Change process. Pre- and post-1914 appropriative rights are similar, but post-1914 rights are subject to a greater degree of scrutiny and regulation from the SWRCB. The post-1914 right is junior to the pre-1914 right, while both have a junior status to a riparian right.

On April 26, 2024, the Delta Watermaster, sent a letter to the County summarizing the water rights associated with parcels owned by California Forever affiliated entities. The Delta Watermaster's letter (**Appendix A)** details the appropriative, pre-1914, and riparian water rights and associated points of diversion (POD), place of use, and purpose of use associated with these parcels. The summary was based on an initial review of information received by the SWRCB eWRIMS and addresses only surface water rights and the historical use of those rights related to lands purchased by California Forever and its affiliates. Appropriative water rights totaling 5,336 acre-feet per year (AFY) were identified to be associated with parcels owned by California Forever and affiliates.

Figure 1-22 displays the active water rights associated with the parcels known to be owned by California Forever and its affiliates as of the date of this assessment. There are 11 points of diversion located within these parcels, which are associated with two appropriative water rights and eight riparian rights. Each of the water rights and points of diversion associated with parcels owned by California Forever affiliates have

[2] This section provides a brief overview of some key characteristics and considerations related to the right to use surface water in California; however, it is not intended to be an authoritative or comprehensive legal description of surface water rights.

restrictions governing their place and purpose of use. Riparian water rights are not transferable, and water diverted through a riparian right cannot be used on parcels that are not adjacent to a waterbody, unless specifically transferred to such a parcel during a parcel subdivision. No parcels within the Project boundary are known to have riparian water rights. **Table 1-2** summarizes the known active appropriative and riparian water rights associated with parcels owned by California Forever affiliates. The place of use for these appropriative rights are outside of the Project footprint. Of the two identified active appropriative water rights associated with California Forever parcels, the largest right totaling 5,330 AFY is associated with parcels located within the designated Legal Delta. The likelihood of successfully petitioning to change the place and purpose of use of these rights is not certain, and potential obstacles in petitioning to change the place and purpose of use of appropriative rights currently located within the Legal Delta are unknown.

On June 18, 2024, California Forever released a statement describing surface water rights acquired for the Project (CA Forever, 2024b). Although the June 2024 statement is not a legally binding document, the current places of use for some of these surface water rights based on the information provided by California Forever are presented in **Figure 1-23**. The volumes and places of use of water rights claimed to have been acquired for the Project in the June 18, 2024 statement have not been reviewed with respect to any physical or legal restrictions that may affect their security and potential use for the Project.

<u>Interconnected Surface Water</u>

Surface water located in areas where groundwater is very shallow has the potential to be directly connected to the groundwater system with potential for regional groundwater pumping to deplete surface water. Depletions of surface water caused by groundwater extraction, and potential impacts on surface water beneficial users, including environmental users, are a required consideration in the Solano Subbasin GSP. As part of the Solano Subbasin GSP, the nature of interactions between groundwater and surface water were characterized and identified and the results are presented in **Figure 1-24**. Areas where groundwater is typically found very close to the ground surface (at less than ten feet below ground surface) suggests a likely direct connection between the groundwater and surface water, although characterizing the nature of the connection (i.e., gaining or losing) commonly requires a greater level of local analysis. As the depth to water increases from 10 to 20 feet, the potential for direct interconnection decreases. At depths greater than 20 feet, groundwater is more likely to be disconnected from surface water. As shown in **Figure 1-24**, many of the surface water features in the vicinity of the Project area have the potential to be connected to groundwater.

2. SUMMARY OF MODELING OF POTENTIAL PROJECT EFFECTS

An existing groundwater flow model, the Solano Subbasin Integrated Hydrologic Model (Solano IHM), was used to simulate some of the potential impacts of the new community on groundwater resources. Solano IHM is a numerical model that was developed during preparation of the Solano Subbasin GSP and is based on the Integrated Water Flow Model (IWFM) platform. DWR continues to support ongoing development and improvement of the IWFM code. On their website DWR describes the IWFM program's value to water resources management and planning[3].

> *It calculates groundwater flows, soil moisture movement in the topsoil, stream flows, land surface flows and flow exchange between the groundwater, streams and land surface as generated by rainfall, agricultural irrigation, and municipal and industrial water use. IWFM also calculates agricultural water demands based on crop types, crop acreages, soil types, irrigation methods and rainfall rates, as well as the municipal and industrial water demands based on population and per-capita water use rates. IWFM is a powerful tool that can help water managers understand the historical evolution of the surface and subsurface water flows within their basin, and to plan the use of groundwater and surface water to meet future agricultural, municipal and industrial water demands.*

The Solano IHM is an integrated groundwater and surface water model developed for the purpose of conducting sustainability analyses within Solano Subbasin. The model utilized foundational elements of the DWR SVSim regional model for the Sacramento Valley (DWR, 2020a) and was refined locally for improved application in the Subbasin area. Key model refinements made during development of the Solano IHM include, but are not limited to, extending of the simulation period through water year (WY) 2018, refinement of land use conditions based on recent land use mapping information, review and modification to land use crop coefficients based on local remote sensing energy balance data, refinement of surface water supplies and diversions, and enhancements to the sediment textural model used for aquifer parameterization. After conducting refinements, the Solano IHM was calibrated using local groundwater level and streamflow data. The Solano IHM has a historical simulation period spanning WY 1985 through 2018, although the base period used for model calibration and results analysis was 1991 through 2018. Detailed documentation associated with the development of the Solano IHM is included in Appendix 5B of the Solano Subbasin GSP (LSCE, 2021).

Some of the potential effects of the Project on water resources were evaluated using Solano IHM, including comparing simulated groundwater levels and water budgets under different Project configurations and water demand, water source, and climate change assumptions. The sensitivity of the model to changes in select model parameters was also evaluated. Because of the limited detail on water demands and supplies provided in the Initiative, more than 20 different model scenarios were simulated to consider potential impacts of the New Community under a range of assumptions. The evaluation of effects on groundwater resources from the Project involved comparing results from modeling conducted with and without the Project over a future projected period. The most current IWFM code (v2015.2.1443) was used in the modeling and incorporates recent bug fixes and code enhancements, some of which affect simulation results and lead to minor differences from the historical model results presented in the GSP and GSP annual reporting. Results from the modeling analyses are summarized with a focus on changes in the water budget and groundwater levels at the scale of the Solano Subbasin and for the Project area.

[3] https://water.ca.gov/Library/Modeling-and-Analysis/Modeling-Platforms/Integrated-Water-Flow-Model

2.1. Baseline Model Scenario Development

Solano IHM baseline scenarios (without the Project), including for historical and projected model periods, developed as part of the GSP preparation were updated with recent hydrology, land use, and boundary heads. The updated historical model period spans 33 years including WY 1991-2023, reflecting both wet and dry climatic periods. The historical model served as the foundational starting point for simulating future conditions with projected future model scenarios, both with and without the Project. As part of GSP annual reporting conducted since submittal of the GSP, many of the historical model inputs had previously been updated for recent years through WY 2023 with a focus on reflecting recent land use changes and surface water deliveries. Some additional historical model inputs (e.g., boundary heads) were updated for recent years through WY 2023 as part of this assessment as described below.

The Solano IHM projected future model scenario developed during the process of preparing the GSP in 2022 includes simulation of more than 50 years of hypothetical future hydrology based on the most recent 50 years of observed hydrology. The projected future model scenario developed for this analysis includes a 49-year simulation period of representative hydrology identified as WYs 2024-2072. Baseline projected future model scenarios (without the Project) were updated to be consistent with any changes made to the historical model, including changes to initial and boundary head conditions. The projected future model scenario used in the GSP development assumed incremental changes in future land use over the projected simulation period. In this analysis, a baseline projected model was developed with static land use applied over the entirety of the projected future simulation period, applying land use conditions from WY 2023. Maintaining static land use over the entire simulation period in the baseline scenario facilitated more direct comparisons between simulated conditions with and without the Project. Refinements were also made to model boundary head conditions for the projected future model, as needed, although the model boundary is a considerable distance outside the Solano Subbasin and from the Project area and boundary head conditions are not anticipated to exert a strong influence on simulated conditions within the Solano Subbasin and Project area. The baseline projected future model also included one scenario to evaluate the potential influence of climate change on future conditions. **Table 2-1** lists the unique baseline model scenarios developed and used in this analysis.

Table 2-1. Baseline Model Scenarios

Model Scenario	Simulation Period (WY)	Land Use Conditions	Climate Change Assumption
Historical	1991-2023, actual hydrology	1991-2023, variable	Not included
Projected Baseline	2024-2072, representative hydrology	2023, static, without Project	Not included
Projected Baseline with Climate Change	2024-2072, representative hydrology	2023, static, without Project	2070 Dry Extreme Warming scenario

Additional details about the development of the baseline model scenarios and assumptions within are presented below.

2.1.1. Historical Model Scenario

The historical Solano IHM model scenario, developed as part of the GSP preparation, was updated with recent hydrology, land use, and boundary heads. As part of GSP annual reporting conducted since submittal of the GSP, many of the historical model inputs have been updated for recent years through WY 2023 with a focus on reflecting recent land use changes and surface water deliveries. The primary update to the historical model as part of this work was updating of boundary head water levels for recent years through WY 2023.

Boundary heads were updated using water year index matching. For recent years (WY 2022-2023), water year indices were compared to the base period water years (WY 1991-2021) and the closest matching year was selected as a surrogate for each additional year of the simulation. The water level trends for surrogate years were then applied to the calibrated boundary heads to extend the time series through WY 2023.

The historical model provided foundational output important for use in establishing the starting point and initial conditions for simulating future conditions with projected future model scenarios.

2.1.2. Baseline Projected Future Model Scenario

The Solano IHM projected future model scenario includes simulation of a hypothetical future hydrology based on the most recent 50 years of observed hydrology. Baseline projected future model scenarios (without the Project) were updated to be consistent with any changes to the historical model, including changes to initial and boundary head conditions. The projected future model scenario used in the GSP development assumed incremental changes in future land use over the 50-year projected simulation. In this scope of work, a baseline model was developed with static land use applied over the entirety of the projected future simulation period, utilizing land use conditions from WY 2023. Maintaining static land use over the entire simulation period in the baseline scenario simplified the model input file development and facilitated easier comparisons between simulated conditions with and without the Project.

2.1.3. Baseline Projected Future Model Scenario with Climate Change

A climate change scenario was developed for the baseline projected future model to evaluate the potential influence of climate change on future conditions. Adjustments to the projected future hydrology were performed following DWR's Resource Guide on climate change in GSP development (DWR, 2018) using climate change adjustment factors provided by DWR for use in developing GSPs through the DWR SGMA Data Viewer (https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#waterbudget). Using the DWR-provided climate adjustment factors, adjustments were made to evapotranspiration (ET), precipitation, and surface water inflow model inputs to account for the potential effects of 2070 mean (or central tendency) climate change conditions for the Drier Extreme Warming (DEW) condition (DWR, 2020b). The climate change adjustment factors provided by DWR were calculated from data developed for the Variable Infiltration Capacity (VIC) model as described in the DWR Resource Guide and on the SGMA Data Viewer.

For ET and precipitation adjustments, monthly change factors were averaged across the VIC grids in the Solano IHM model domain and applied to the individual precipitation and ET inputs. For surface water inflow adjustments, monthly streamflow change factors were summarized from the United States Geologic Survey Hydrologic Unit Code (HUC) 8 watersheds covering the majority of the Solano IHM model domain and applied to individual surface water inflows in the model. For each of the model inputs adjusted in the climate change scenarios (e.g., ET, precipitation, surface water inflow), the baseline projected inputs were multiplied by the 2070 DEW change factors corresponding to the specific historical water year type that was used as a surrogate year in the projected simulations. The average change factors applied by model input and water year type in the 2070 DEW climate change scenario are presented in **Table 2-2**.

As indicated in **Table 2-2**, on average the climate change adjustments tend to increase ET, decrease precipitation, and increase stream inflow volumes by varying degrees. From a water budget standpoint, increases in ET will tend to increase the water demands, decreases to precipitation will tend to decrease water supplies while also increasing demands, and increases to stream inflows will tend to increase water supplies.

Table 2-2. Climate Change Adjustment Factors (by Data Type and Water Year Type)

Water Year Type	No Adjustment	Climate Change 2070 Drier Extreme Warming (DEW)		
		Evapotranspiration	Precipitation	Stream Inflow
Wet (W)	1.00	1.18	0.94	1.31
Above Normal (AN)	1.00	1.19	0.86	1.23
Below Normal (BN)	1.00	1.19	0.88	1.25
Dry (D)	1.00	1.18	0.89	1.18
Critical (C)	1.00	1.18	0.92	0.95
AVERAGE	**1.00**	**1.18**	**0.90**	**1.18**

2.2. Project Model Scenario Development

Four main projected future model scenarios including the Project were developed for evaluating potential effects of the Project under different assumed Project characteristics. All projected future scenarios use a 2023 land use condition outside of the Project area. Within the Project area, two land use conditions were developed: an initial Project phase and a final Project buildout. Key characteristics of the Project were simulated primarily through modifications to the Urban Land Use feature in the Root Zone package of Solano IHM. Important model input parameters considered for representation of the Project in scenarios included the following:

- Urban area and land use
- Population
- Per capita water use
- Impervious area
- Fraction of applied water that is re-used; fraction that becomes return flow
- Water source information

Because very limited detail on the expected water use and water supplies for the Project were included in the initiative submittal (and were not available at the time most of the modeling analyses were conducted), the Project scenarios relied on reasonable assumptions and were designed to estimate a range of potential effects from the Project under different potential Project characteristics. Additional model runs were conducted for these scenarios to test the sensitivity of certain assumptions and parameters.

Climate change scenarios were developed for both the initial phase and final buildout scenarios, using the 2070 central tendency DEW condition developed by DWR. Additional details about the development of the Project model scenarios and assumptions within are described below.

On June 18, 2024, California Forever released a Water Post (CA Forever, 2024b) with additional information on anticipated per capita water demands, although these stated anticipated per capita demands are not legally binding. Several additional model runs were conducted to evaluate conditions under these updated assumptions. **Table 2-3** lists the different Project model scenarios developed and used in this analysis and characteristics of each, including additional variants of model scenarios conducted to evaluate effects from a range of model assumptions.

Table 2-3. Project Model Scenarios					
Model Scenario	**Simulation Period (WY)**	**Land Use Conditions**	**Basic Project Assumptions**	**Climate Change Assumption**	**Additional Sensitivity Scenarios**
Projected With Project, Initial Phase	2024-2072, representative hydrology	2023 with Initial Phase Project, static	50,000 residents, 125 gpcd, with recycled water	Not included	71 gpcd & 113 gpcd; no recycled water; appropriative surface water rights; 25%, 50%, 75%, 100% surface water
Projected With Project, Final Buildout	2024-2072, representative hydrology	2023 with Final Buildout Project, static	400,000 residents, 162 gpcd, with recycled water	Not included	100,000, 200,000, 300,000 population; 93 gpcd & 113 gpcd; no recycled water; appropriative surface water rights; 25%, 50%, 75%, 100% surface water
Projected With Project, Initial Phase and Climate Change	2024-2072, representative hydrology adjusted for climate change	2023 with Initial Phase Project, static	50,000 residents, 125 gpcd, with recycled water	2070 Dry Extreme Warming scenario	NA
Projected With Project, Final Buildout and Climate Change	2024-2072, representative hydrology adjusted for climate change	2023 with Final Buildout Project, static	400,000 residents, 162 gpcd, with recycled water	2070 Dry Extreme Warming scenario	NA

2.2.1. Projected Future Model Scenario with Initial Project Phase

The initial phase of the Project assumes a partial buildout of the planned community presented in the February 14, 2024 Initiative.

2.2.1.1. Project Area & Land Use

It was assumed that the initial phase of development would be concentrated along the Highway 113 corridor through the Project area where there is proposed to be a mix of residential and non-residential zoning. The area selected for modeling of the initial Project includes approximately 5,500 acres of primarily neighborhood mixed use zoning, in addition to industrial, commercial, manufacturing, and open space zoning areas (**Figure 2-1**). All areas outside of this initial Project area were kept at their WY 2023 land use condition.

As a finite element model, Solano IHM has irregularly shaped model elements that do not necessarily align with the Project boundary or zoning areas. The model elements included in the initial Project area were updated in accordance with the zoning proposed in the Initiative. The February 14, 2024 Initiative included detailed descriptions of each zoning district within the planned community. These descriptions were used to match each zoning district with the most appropriate land use category in the Solano IHM to most accurately simulate the demand within each zoning district. Incorporation of new land use types within Solano IHM was not conducted for this analysis and would not likely improve the modeling given the limited information available about the Project at the time of this analysis. **Table 2-4** summarizes the land use classifications used for simulating each zoning district within Solano IHM. The selection of the most appropriate land use class for the modeling was based on interpretation of the likely characteristics of each zoning district, with special consideration of likely water demand and use characteristics.

Table 2-4 – Land Use Classification of Project Zoning Districts in Solano IHM

Project Zoning District	Land Use Classification Used in Solano IHM
Commercial Mixed Use	Urban
Existing Conservation and Mitigation Lands	Native
Industry and Technology	Urban
Maker and Manufacturing	Urban
Neighborhood Mixed Use	Urban
Open Space	33% Native, 33% Pasture[1], 33% Wheat[2]
Travis Compatible Infrastructure	Native

[1] Pasture was selected as the most appropriate land use type to simulate turf demands

[2] Wheat was selected to represent agricultural activities within this zoning district as it was the dominant land use type in the area before development of the Project

2.2.1.2. Population

The initial community population was assumed to include 50,000 people, based on information provided in the February 14, 2024 Initiative.

2.2.1.3. Per Capita Water Use

Per capita water use was estimated based on California water use efficiency standards for residential use, as well as the percentage of each zoning class within the initial phase development. In Solano IHM, per capita water use includes all urban sectors (i.e., residential, commercial, industrial, etc.). The February 14, 2014 Initiative emphasized the plan for the new community to be highly efficient in terms of water use, but no details were given to outline water use standards. As a result, the per capita water use used in this scenario was based on a number of assumptions, which are described below.

The calculation of per capita water use in this scenario first considered the 2030 goal for indoor residential use set forth in California Water Code 10609.4 of 42 gpcd (gallons per capita per day). Assuming 70 percent of residential use is indoor while 30 percent is outdoor, total residential use was determined to be 60 gpcd (42 gpcd/0.7 = 60 gpcd). The urban land use by sector in the initial Project phase is comprised of 52 percent residential use, so the total urban per capita use was scaled up to 125 gpcd (60 gpcd/0.48 = 125 gpcd). An additional scenario assuming 71 gpcd representing an extremely water efficient Project was also conducted.

Following release of the anticipated per capita water use values by California Forever on June 18, 2024 (CA Forever, 2024b), although the stated anticipated per capita demands are not legally binding, an additional scenario was developed assuming a total urban per capita water use of 113 gpcd consistent with the California Forever statement.

Within Solano IHM, per capita urban water use is varied by month throughout the simulation. The monthly per capita urban water use for the Project was varied around the mean per capita value based on trends in monthly water use for nearby cities (Vacaville, Dixon, and Rio Vista). The highest per capita water use occurs during the summer months when outdoor water use is highest, while indoor per capita water use is relatively stable throughout the year.

2.2.1.4. Impervious Area

The fraction of impervious area within urban areas was determined based on an area-weighted average related to the urban sectors contained within each model element of the Project area. Each zoning district was assigned an impervious area fraction (Washburn et al., 2010) that most closely reflected the activities occurring within that sector. Based on the February 14, 2024 Initiative, the density of residential development was assumed to be 20 units per acre.

2.2.1.5. Return Flow

Within IWFM, indoor urban applied water is assumed to be 100 percent return flow (i.e., 100 percent of indoor urban water use goes to the wastewater treatment plant). A fraction of outdoor applied water can be specified to become return flow. The reuse fraction specified for urban applied water only pertains to outdoor use, not indoor use. In the Project scenarios, the fraction of applied water that is reused or becomes return flow (as runoff) was assumed to be zero, consistent with a zero-loss, highly efficient outdoor water use.

2.2.1.6. Water Sources

2.2.1.6.1. Groundwater

No explicit surface water source for the community is presented in the February 14, 2024 Initiative. Although appropriative water rights have been identified to be associated with parcels owned by California Forever and its affiliates, the likelihood of successfully petitioning to change the place and purpose of use of these rights is not certain. Therefore, the most basic Project model scenario assumed that all water for the community will come from groundwater pumping.

2.2.1.6.2. Surface Water

Additional sensitivity scenarios were developed to evaluate potential use of surface water within the community. It was assumed that surface water would be imported from outside of the model domain. Multiple scenarios were run to evaluate different volumes of surface water imported to supply 25, 50, 75, and 100 percent of Project demand.

An additional scenario was run to test the impacts of potential use of appropriative rights A013148 and A027251 for Project water supply. Appropriative right A013148 allows a maximum annual diversion of 5,330 AFY during the period from April 15 through October 15 from the Lindsay Slough. This diversion was spread across the months of April through October and the volume was split 80 percent for urban supply and 20 percent for agricultural supply. Appropriative right A027251 allows a maximum diversion of 6 AFY during the period from November 1 through April 30 from an unspecified source. This diversion was spread across the months from November through April and the entire volume was used for urban supply.

2.2.1.6.3. Recycled Water

An additional scenario was run to test the effects of potential use of recycled water within the Project area. The February 14, 2024 Initiative specifically identifies recycled water as an opportunity to offset non-potable water demand (Page 62 – CA Forever, 2024a). To simulate recycled water use, it was assumed that return flow of indoor urban water could be recycled for reuse to meet outdoor demands. A fixed recycled water capacity of 25 percent of the average monthly indoor urban use was assumed to be available for reuse. The assumption of 25 percent recycled water capacity was based on consideration of information on recycled water as a fraction of wastewater provided in the statewide reporting of recycled water by the SWRCB (https://www.waterboards.ca.gov/water_issues/programs/recycled_water/volumetric_annual_reporting.html). In the modeling, recycled water was used to meet outdoor demands up to this volume or, in months when outdoor demand is lower than this volume, up to the total outdoor demand volume.

2.2.2. Projected Future Model Scenario with Initial Project Phase and Climate Change

The projected future model scenario with the initial Project phase and climate change utilizes the projected future model scenario with the initial Project phase described in the previous section as well as the 2070 DEW climate change factors described for the baseline scenario. The climate change factors presented in **Table 2-2** were applied to the projected hydrology inputs in the same way as described above.

2.2.3. Projected Future Model Scenario with Final Project Buildout

The final buildout of the Project assumes a complete buildout of the planned community as presented in the February 14, 2024 Initiative.

2.2.3.1. Project Area & Land Use

The final buildout of the Project is stated as 17,500 acres in the February 14, 2024 Initiative. Due to the nature of the model grid in the area of the Project, the elements included as part of the Project area sum to 18,015 acres, and the acreages of different land uses within these elements were adjusted to most accurately reflect the various zoning districts within the planned community (**Figure 2-2**). The Solano IHM has irregularly shaped model elements that do not necessarily align with the Project boundary or zoning areas. As a result, the area of the model elements included as the Project area in the simulation is slightly greater than described in the Initiative; however, the population and acres of land use types within the elements are intended to reflect the zoning in the Initiative as accurately as possible. Each zoning district was simulated according to the land use classifications listed in **Table 2-4**. All areas outside of the planned community final buildout maintained WY 2023 land use conditions.

2.2.3.2. Population

The final buildout community population was assumed to include 400,000 people. Sensitivity scenarios were also run to evaluate final populations of 100,000, 200,000, and 300,000 people.

2.2.3.3. Per Capita Water Use

Per capita water use was estimated based on California water use efficiency standards for residential use, as well as the percentage of each zoning class within the final Project buildout. In Solano IHM, per capita water use includes all urban sectors (i.e., residential, commercial, industrial, etc.). The February 14, 2024 Initiative emphasized the plan for the new community to be highly efficient in terms of water use, but no details were given to outline water use standards. As a result, the per capita water use used in this scenario was based on a number of assumptions, which are described below.

The calculation of per capita water use in this scenario first considered the 2030 goal for indoor residential use set forth in California Water Code 10609.4 of 42 gpcd (gallons per capita per day). Assuming 70 percent of residential use is indoor while 30 percent is outdoor, total residential use was determined to be 60 gpcd (42 gpcd/0.7 = 60 gpcd). The urban land use by sector in the final Project buildout is comprised of 63 percent residential use, so the total urban per capita use was scaled up to 162 gpcd[4] (60 gpcd/0.37 = 162 gpcd). An additional scenario assuming 93 gpcd representing an extremely water efficient Project was also conducted.

Following release of the anticipated per capita water use values on June 18, 2024 (CA Forever, 2024b), an additional scenario was developed assuming a total urban per capita water use of 113 gpcd.

Within Solano IHM, per capita urban water use is varied by month throughout the simulation. The monthly per capita urban water use for the Project was varied around the mean per capita value based on trends in monthly water use for nearby cities (Vacaville, Dixon, and Rio Vista). The highest per capita water use

[4] Though the calculation of per capita water use was based on California water use standards and trends, as well as Project land use classifications, it is noted that the calculated 162 gpcd value is equal to what was reported for per capita use in the City of Vacaville 2020 UWMP (City of Vacaville, 2023).

occurs during the summer months when outdoor water use is highest, while indoor per capita water use is relatively stable throughout the year.

2.2.3.4. Impervious Area

The fraction of impervious area within urban areas was determined based on an area-weighted average related to the urban sectors contained within each model element of the Project area. Each zoning district was assigned an impervious area fraction (Washburn et al., 2010) that most closely reflected the activities occurring within that sector. Based on the February 14, 2024 Initiative, the density of residential development was assumed to be 20 units per acre (CA Forever, 2024a – page 3).

2.2.3.5. Return Flow

Within IWFM, indoor urban applied water is assumed to be 100 percent return flow. A fraction of outdoor applied water can be specified to become return flow (runoff). The reuse fraction specified for urban applied water only pertains to outdoor use, not indoor use. As a result, the fraction of applied water that is reused or becomes return flow was assumed to be zero in order to simulate zero-loss, highly efficient outdoor water use.

2.2.3.6. Water Sources

2.2.3.6.1. Groundwater

No explicit surface water source for the community is presented in the February 14, 2024 Initiative. Although appropriative water rights have been identified to be associated with parcels owned by California Forever and its affiliates, the likelihood of successfully petitioning to change the place and purpose of use of these rights is not certain. Therefore, the most basic Project model scenario assumed that all water for the community will come from groundwater pumping.

2.2.3.6.2. Surface Water

Additional sensitivity scenarios were developed to evaluate potential use of surface water within the community. It was assumed that surface water would be imported from outside of the model domain. Multiple scenarios were run to evaluate different volumes of surface water imported to supply 25, 50, 75, and 100 percent of Project demand.

An additional scenario was run to test the impacts of potential use of appropriative rights A013148 and A027251 for Project water supply. Appropriative right A013148 allows a maximum annual diversion of 5,330 AFY during the period from April 15 through October 15 from the Lindsay Slough. This diversion was spread across the months of April through October and the volume was split 80 percent for urban supply and 20 percent for agricultural supply. Appropriative right A027251 allows a maximum diversion of 6 AFY during the period from November 1 through April 30 from an unspecified source. This diversion was spread across the months from November through April and the entire volume was used for urban supply.

2.2.3.6.3. Recycled Water

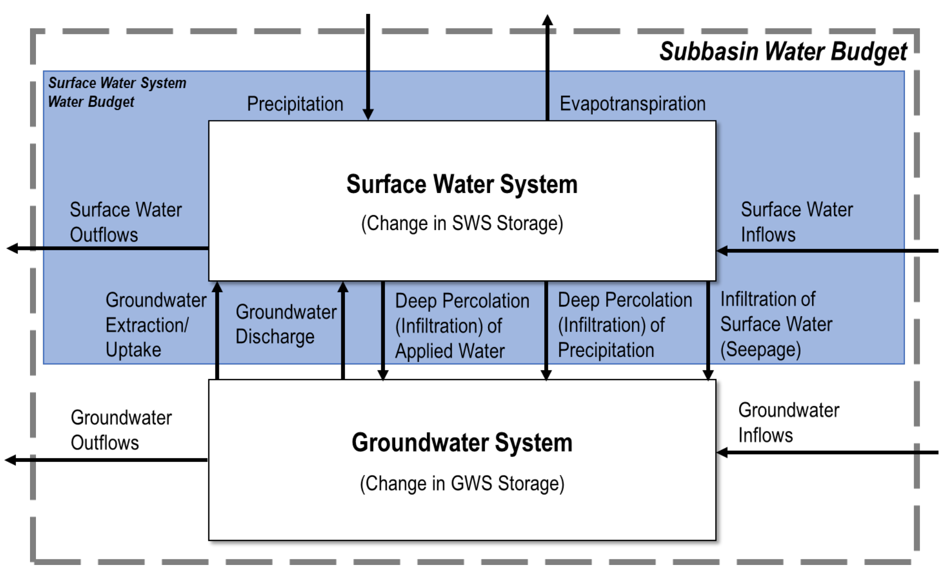
An additional scenario was run to test the effects of potential use of recycled water within the Project area. The February 14, 2024 Initiative specifically identifies recycled water as an opportunity to offset non-potable water demand (Page 62 – CA Forever, 2024a). To simulate recycled water use, it was assumed that return flow of indoor urban water could be recycled for reuse to meet outdoor demands. A fixed recycled water capacity of 25 percent of the average monthly indoor urban use was assumed to be available for reuse. The assumption of 25 percent recycled water capacity was based on consideration of information on recycled water as a fraction of wastewater provided in the statewide reporting of recycled water by the SWRCB (https://www.waterboards.ca.gov/water_issues/programs/recycled_water/volumetric_annual_reporting.html). In the modeling, recycled water was used to meet outdoor demands up to this volume or, in months when outdoor demand is lower than this volume, up to the total outdoor demand volume.

2.2.4. Projected Future Model Scenario with Final Project Buildout and Climate Change

The projected future model scenario with the final Project buildout and climate change utilizes the projected future model scenario with the final Project buildout described in the previous section as well as the 2070 DEW climate change factors described for the baseline scenario. The climate change factors presented in **Table 2-2** were applied to the projected hydrology inputs in the same way as described above.

2.3. Summary of Model Simulation Water Budget Results

The section below summarizes key water budget results from the different model simulations. A diagram of components of the water budget is presented below.



The water budget results presented in this section are key water budget components including total water demand, groundwater pumping (groundwater extraction), subsurface flows (net of groundwater inflows and outflows), stream seepage (net of infiltration of surface water and groundwater discharge), deep percolation (sum of deep percolation of applied water and precipitation), and change in groundwater storage. Stream seepage is a metric that is important for evaluating stream depletion associated with groundwater pumping. All water budget results are rounded to two significant digits consistent with the typical uncertainty associated with the methods and sources used in the model input. Simulated water budget results are prepared for the Solano Subbasin and for just the area of the Project.

It is important to consider potential effects of the Project on water budgets for the larger Solano Subbasin since the effects on water resources from the Project are likely to extend beyond the boundary of the Project area. Because there are no streams simulated in the model within the Project area (streams exist, but are not represented in the model), no stream seepage is simulated within the Project area in any of the model scenarios; however, potential effects of the Project on stream seepage and other water budget components may be observed in results for the entire Subbasin.

2.3.1. Baseline Scenarios

A summary of simulated annual water budget results for the Solano Subbasin and Project area under the baseline model scenarios (without the Project) are presented in **Table 2-5**. Total baseline simulated annual water demand within the Subbasin is about 370,000 AFY and total simulated annual demand within the Project area is about 6,200 AFY. Most of the baseline water demand within the Project area is met by groundwater suggesting existing groundwater pumping unrelated to the Project that is occurring within the Project area. The influence of the potential climate change condition (2070 drier extreme warming scenario) on key water budget components is evident in simulated baseline scenario results. Total water demands and groundwater pumping for the Subbasin are estimated to increase by almost 30 percent under the climate change condition and Project area demands and pumping are estimated to increase by just over 20 percent. Under the baseline condition subsurface flows to/from the Solano Subbasin are simulated to be a net outflow to adjacent groundwater subbasins/basins of approximately -71,000 AFY on average; with climate change the Subbasin subsurface outflow is decreased to -48,000 AFY. Within the Project area baseline subsurface flows are simulated as a net inflow from adjacent areas of about 4,400 AFY with that value increasing to approximately 6,100 AFY under the climate change condition. Net stream seepage is estimated to increase substantially with climate change from a baseline condition with a net discharge of groundwater to surface water of -5,000 AFY to a net positive stream seepage (surface water discharging to groundwater) of about 76,000 AFY. This increase in stream seepage (stream depletion) is likely a result of the combination of increased demands (more groundwater pumping) and increased surface water inflows in the climate change scenario. Deep percolation is also reduced under the climate change scenario because of the drier conditions and decreased precipitation.

The average annual change in groundwater storage is estimated to be positive for the baseline condition, with that transitioning to a slight annual decrease in the climate change scenario. It is notable that the characteristics and setting of the Solano Subbasin result in more limited changes in groundwater storage under a range of scenarios because of the effect on other water budget components that serve to limit the effect on groundwater levels. For example, increased stream seepage and decreased net outflow of groundwater tend to compensate for increases in groundwater demand without major changes to groundwater levels, although the changes in these other components is an important effect and is a consideration in sustainable groundwater management and the definition of groundwater sustainability. In accordance with the Sustainable Groundwater Management Act (SGMA), sustainable groundwater management must consider effects on all beneficial users (including environmental and surface water users) within the Subbasin and also effects on adjacent subbasins/basins.

Table 2-5. Annual Water Budget Results: Baseline Model Scenarios

Scenario Description	Baseline: Solano Subbasin	Baseline with Climate Change: Solano Subbasin	Baseline: Project Area	Baseline with Climate Change: Project Area
Component	(AFY)	(AFY)	(AFY)	(AFY)
Total water demand	370,000	480,000	6,200	7,500
Groundwater pumping	-140,000	-180,000	-6,200	-7,400
Subsurface flows	-71,000	-48,000	4,400	6,100
Stream seepage	-5,000	76,000	0	0
Deep percolation	220,000	150,000	1,900	1,200
Change in groundwater storage	2,600	-200	100	-20

2.3.2. Initial Project Phase Scenarios

Simulated water budget results for initial Project scenarios are presented in **Tables 2-6a and 2-6b** and shown in **Figures 2-3 and 2-4**. Comparing initial Project scenarios to the baseline scenario suggest potential for the Project to result in varying degrees of increased groundwater pumping in the Subbasin directly related to the increase pumping within the Project area. Simulations of a range of initial Project phase scenarios suggest modest potential increases in pumping ranging from 2,400 AFY to 7,000 AFY, depending on the scenario assumptions. These modest increases in pumping also result in some small changes to other water budget components at the Solano Subbasin scale, including increases in net stream seepage with decreased volumes of groundwater discharging to surface water of up to 4,000 AFY. For the Project area, there are also increases in subsurface inflow to the Project area of up to about 7,000 AFY. These increased inflows are a result of the increased pumping simulated to occur within the Project area.

Table 2-6a. Solano Subbasin Annual Water Budget Results: Initial Project Phase							
Scenario Description	**Baseline** (no Project)	**Initial Project** (125 gpcd, 100% GW)	**Initial Project** (125 gpcd, 100% GW, recycled water)	**Initial Project** (71 gpcd, 100% GW)	**Initial Project** (71gpcd, 100% GW, recycled water)	**Initial Project** (113 gpcd, 100% GW, recycled water)	**Initial Project** (125 gpcd, appropriative SW rights + GW)
Component	(AFY)	(AFY)	(AFY)	(AFY)	(AFY)	(AFY)	(AFY)
Total water demand	370,000	380,000	380,000	370,000	370,000	380,000	380,000
Groundwater pumping	-140,000	-150,000	-150,000	-150,000	-150,000	-150,000	-150,000
Subsurface flows	-71,000	-69,000	-70,000	-70,000	-71,000	-70,000	-71,000
Stream seepage	-5,000	-1,000	-2,200	-2,500	-3,800	-2,500	-3,700
Deep percolation	220,000	220,000	220,000	220,000	220,000	220,000	220,000
Change in groundwater storage	2,600	2,500	2,500	2,500	1,500	2,500	2,600

Table 2-6b. Project Area Annual Water Budget Results: Initial Project Phase							
Scenario Description	**Baseline** (no Project)	**Initial Project** (125 gpcd, 100% GW)	**Initial Project** (125 gpcd, 100% GW, recycled water)	**Initial Project** (71 gpcd, 100% GW)	**Initial Project** (71gpcd, 100% GW, recycled water)	**Initial Project** (113 gpcd, 100% GW, recycled water)	**Initial Project** (125 gpcd, appropriative SW rights + GW)
Component	(AFY)	(AFY)	(AFY)	(AFY)	(AFY)	(AFY)	(AFY)
Total water demand	6,200	13,000	13,000	10,000	10,000	13,000	13,000
Groundwater pumping	-6,200	-13,000	-11,000	-10,000	-8,100	-10,000	-8,600
Subsurface flows	4,400	11,000	9,100	8,500	6,400	8,500	6,400
Stream seepage	0	0	0	0	0	0	0
Deep percolation	1,900	2,100	2,100	1,700	1,700	1,900	2,300
Change in groundwater storage	100	30	40	40	50	40	70

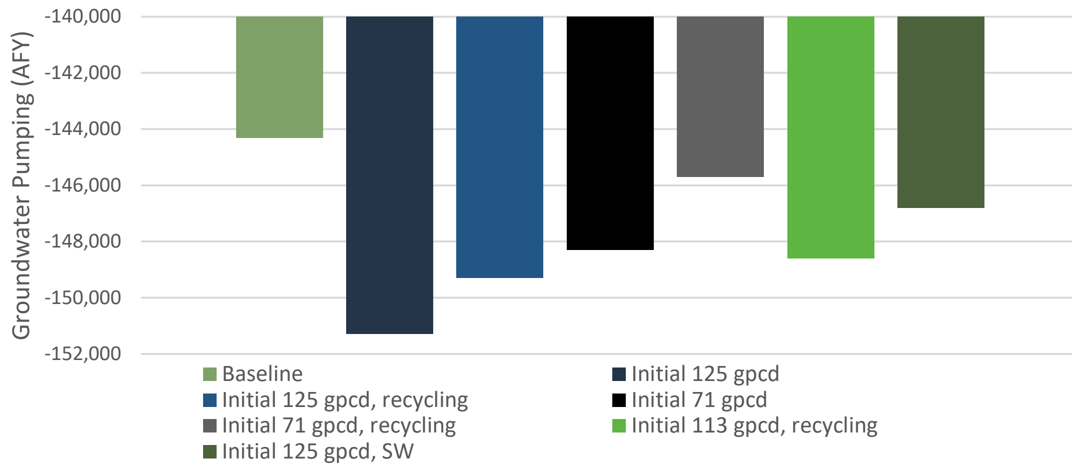


Figure 2-3a. Solano Subbasin Water Budget Results: Initial Project Phase Groundwater Pumping

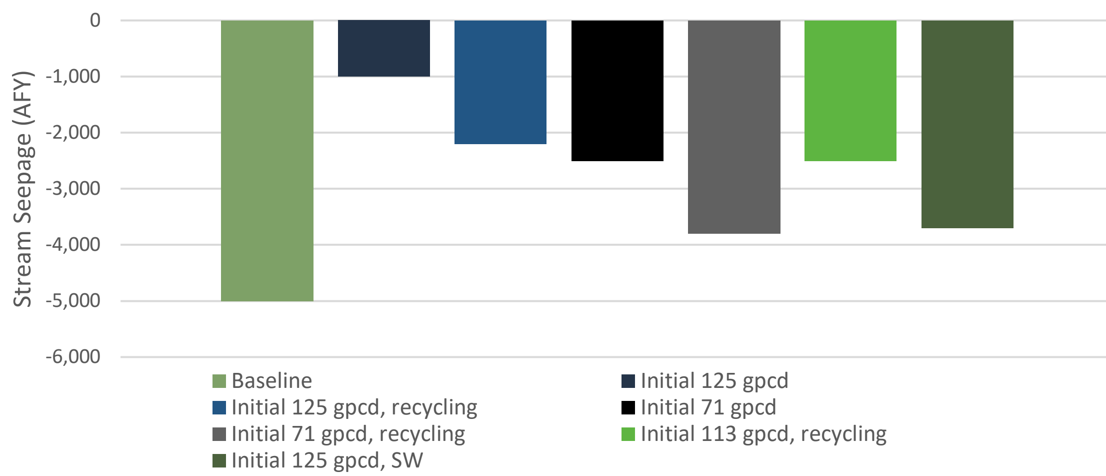


Figure 2-3b. Solano Subbasin Water Budget Results: Initial Project Phase Stream Seepage

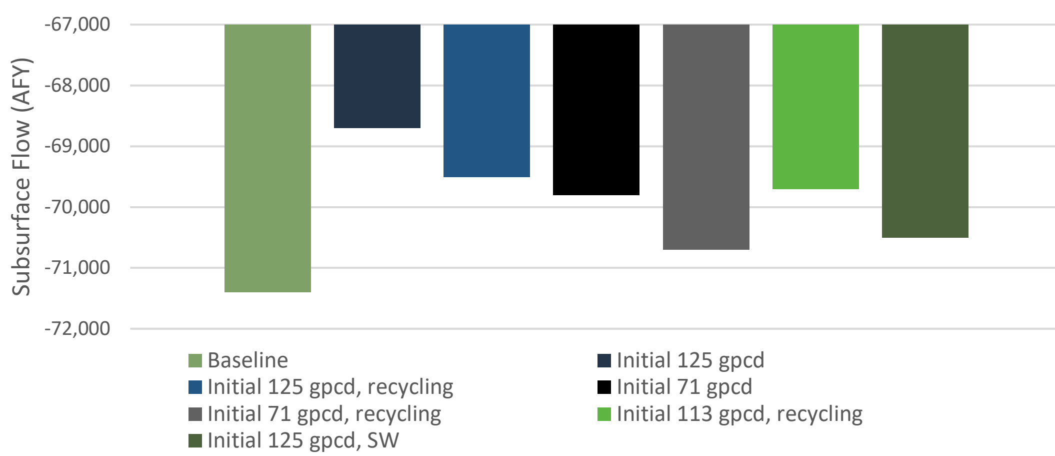


Figure 2-3c. Solano Subbasin Water Budget Results: Initial Project Phase Subsurface Flow

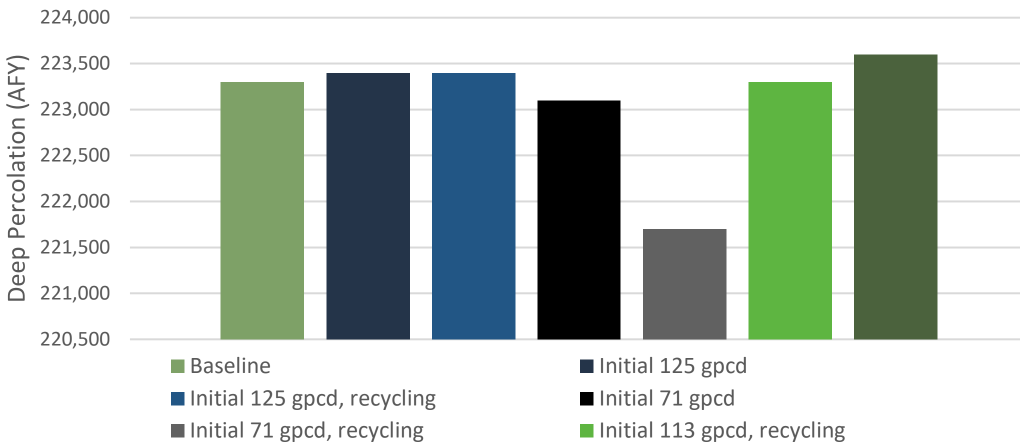


Figure 2-3d. Solano Subbasin Water Budget Results: Initial Project Phase Deep Percolation

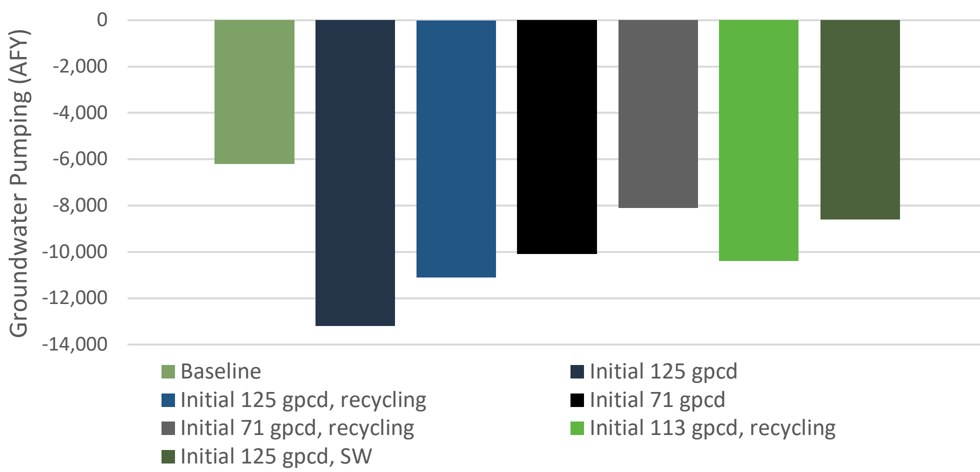


Figure 2-4a. Project Area Water Budget Results: Initial Project Phase Groundwater Pumping

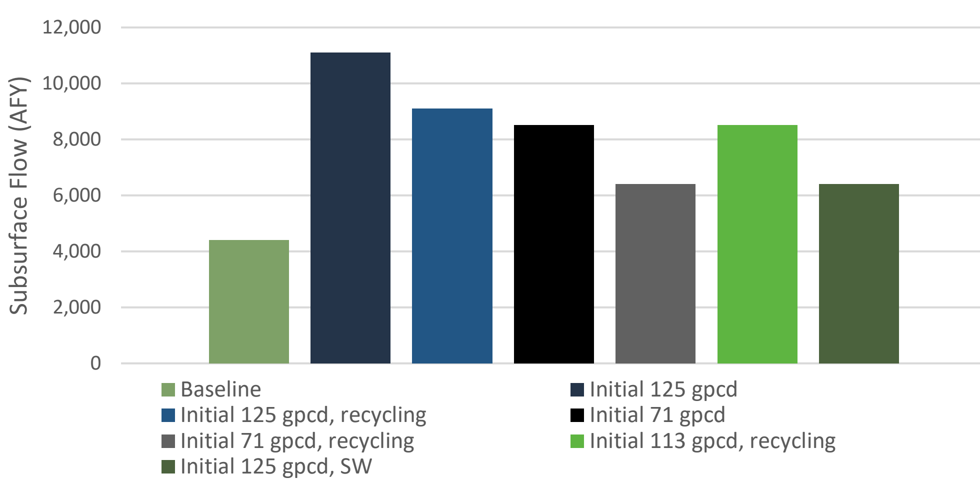


Figure 2-4b. Project Area Water Budget Results: Initial Project Phase Subsurface Flow

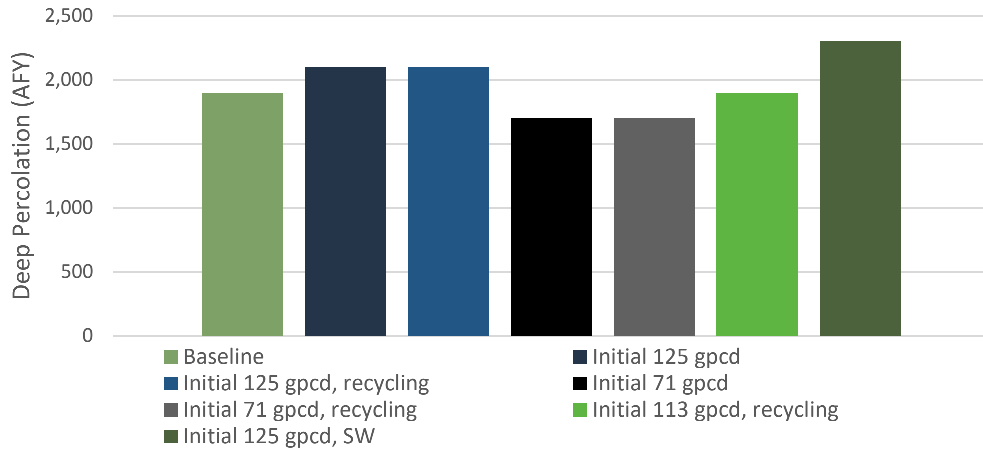


Figure 2-4c. Project Area Water Budget Results: Initial Project Phase Subsurface Flow

2.3.3. Final Project Buildout Scenarios

Simulated water budget results for final Project buildout scenarios are presented in **Tables 2-7a and 2-7b** and shown in **Figures 2-5 and 2-6**. Comparing final Project buildout scenarios to the baseline scenario suggest potential for the Project, at final buildout, to result in substantial increases in groundwater pumping in the Subbasin directly related to simulated increases in pumping within the Project area. Most of the final Project buildout scenarios do not assume a large volume of surface water supply, since the ability to secure these water sources is not certain at this time. Simulations of a range of final Project buildout scenarios suggest potential increases in pumping ranging from 16,000 AFY to almost 70,000 AFY. The smallest increase in pumping is for the scenarios with a very low per capita demand assumption with recycled water. The greatest increase in pumping is for a scenario with a higher per capita demand (a value similar to per capita use in Vacaville and some other nearby cities) with the entire supply reliant on groundwater. The final Project buildout scenarios suggest that the simulated water recycling results in reductions in the need for water supplies of almost 22,000 AFY.

All final Project buildout scenarios tested simulate increases of between 5,000 and 18,000 AFY in stream seepage. These simulated increases in stream seepage are reflective of stream depletion resulting from simulated groundwater pumping associated with the Project. Model simulations also highlight potential for notable increases in subsurface groundwater flow into the Project area and decreases in the net subsurface outflow of groundwater from the Subbasin, depending on the volume of groundwater pumping simulated for the Project. In the final Project buildout scenarios, a significant fraction of the groundwater pumped for the Project is derived from outside of the Project area, primarily through increased subsurface inflows to the Project area.

Table 2-7a. Solano Subbasin Annual Water Budget Results: Final Project Buildout							
Scenario Description	**Baseline** (no Project)	**Final Project** (162 gpcd, 100% GW)	**Final Project** (162 gpcd, 100% GW, recycled water)	**Final Project** (93 gpcd, 100% GW)	**Final Project** (93 gpcd, 100% GW, recycled water)	**Final Project** (113 gpcd, 100% GW, recycled water)	**Final Project** (162 gpcd, appropriative SW rights + GW)
Component	(AFY)	(AFY)	(AFY)	(AFY)	(AFY)	(AFY)	(AFY)
Total water demand	370,000	440,000	440,000	410,000	410,000	420,000	440,000
Groundwater pumping	-140,000	-210,000	-190,000	-180,000	-160,000	-170,000	-210,000
Subsurface flows	-71,000	-51,000	-59,000	-58,000	-67,000	-65,000	-53,000
Stream seepage	-5,000	23,000	10,000	13,000	300	3,300	20,000
Deep percolation	220,000	240,000	240,000	230,000	230,000	230,000	240,000
Change in groundwater storage	2,600	2,500	2,500	2,500	1,500	2,500	2,600

Table 2-7b. Project Area Annual Water Budget Results: Final Project Buildout							
Scenario Description	**Baseline** (no Project)	**Final Project** (162 gpcd, 100% GW)	**Final Project** (162 gpcd, 100% GW, recycled water)	**Final Project** (93 gpcd, 100% GW)	**Final Project** (93 gpcd, 100% GW, recycled water)	**Final Project** (113 gpcd, 100% GW, recycled water)	**Final Project** (162 gpcd, appropriative SW rights + GW)
Component	(AFY)	(AFY)	(AFY)	(AFY)	(AFY)	(AFY)	(AFY)
Total water demand	6,200	75,000	75,000	44,000	44,000	53,000	75,000
Groundwater pumping	-6,200	-75,000	-54,000	-44,000	-22,000	-31,000	-70,000
Subsurface flows	4,400	53,000	31,000	35,000	14,000	19,000	47,000
Stream seepage	0	0	0	0	0	0	0
Deep percolation	1,900	22,000	22,000	8,800	8,800	13,000	22,000
Change in groundwater storage	100	50	180	20	130	150	160

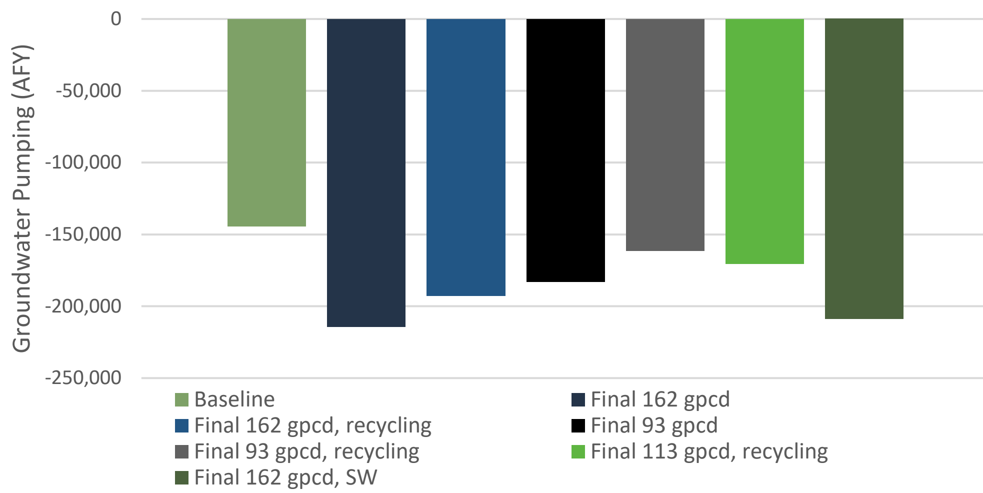


Figure 2-5a. Solano Subbasin Water Budget Results: Final Project Buildout Groundwater Pumping

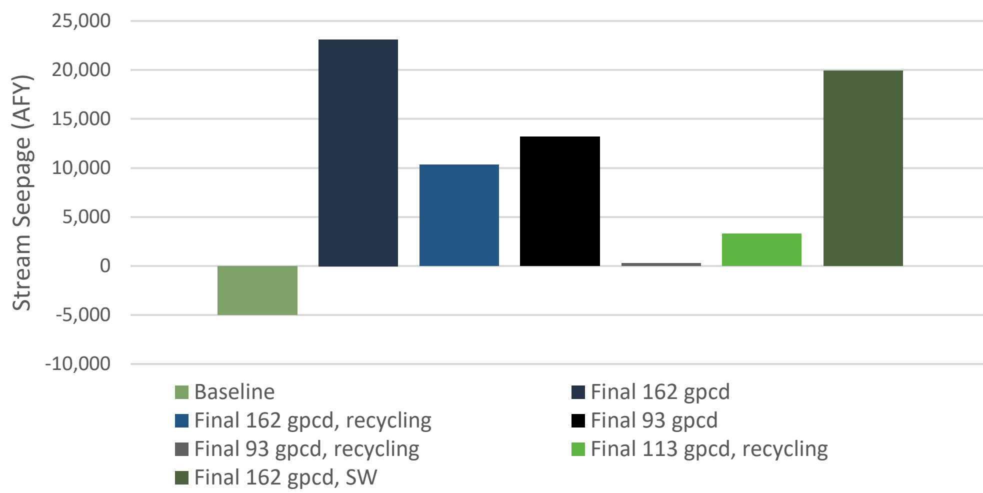


Figure 2-5b. Solano Subbasin Water Budget Results: Final Project Buildout Stream Seepage

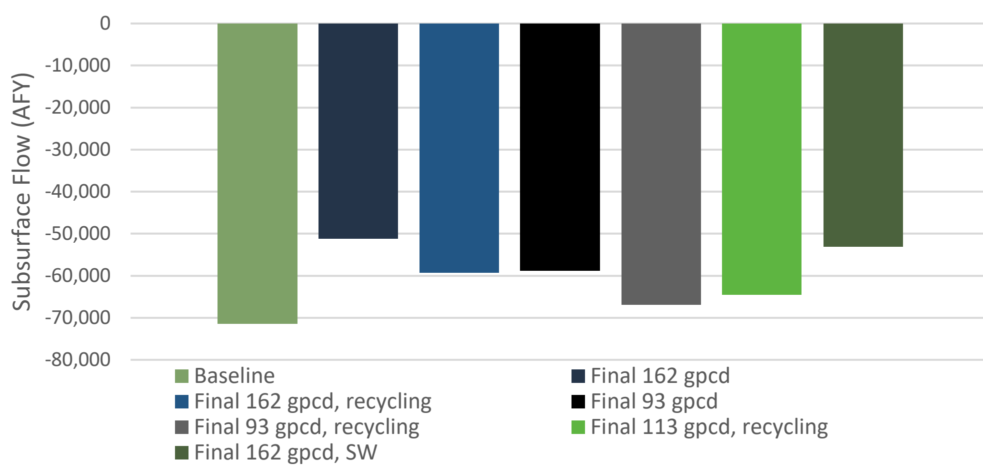


Figure 2-5c. Solano Subbasin Water Budget Results: Final Project Buildout Subsurface Flow

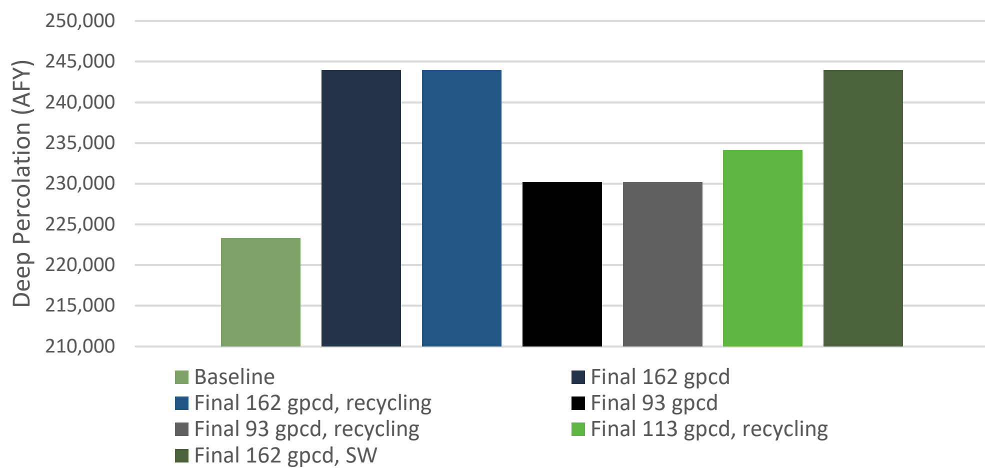


Figure 2-5d. Solano Subbasin Water Budget Results: Final Project Buildout Deep Percolation

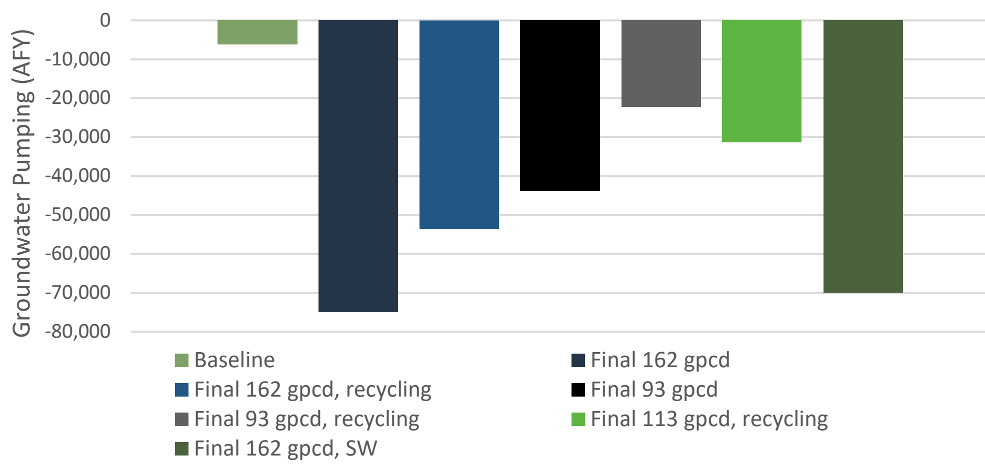


Figure 2-6a. Project Area Water Budget Results: Final Project Buildout Groundwater Pumping

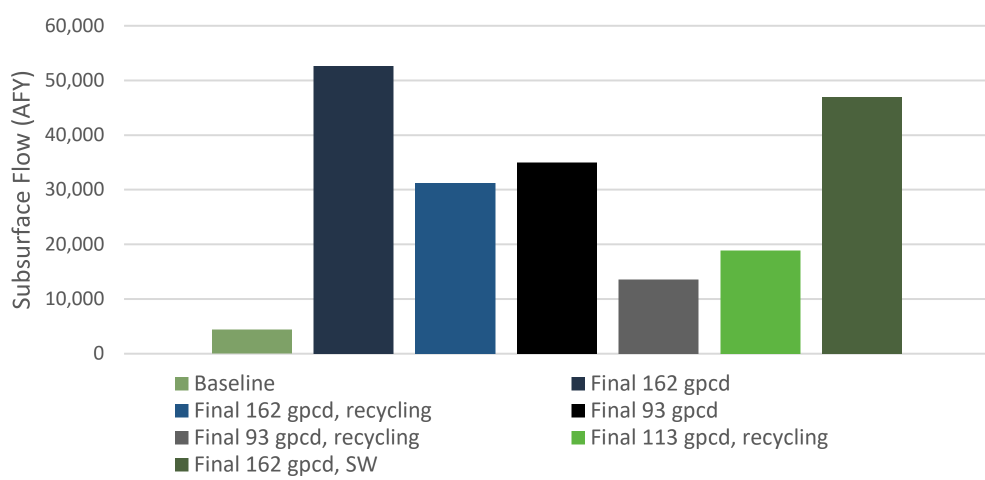


Figure 2-6b. Project Area Water Budget Results: Final Project Buildout Subsurface Flow

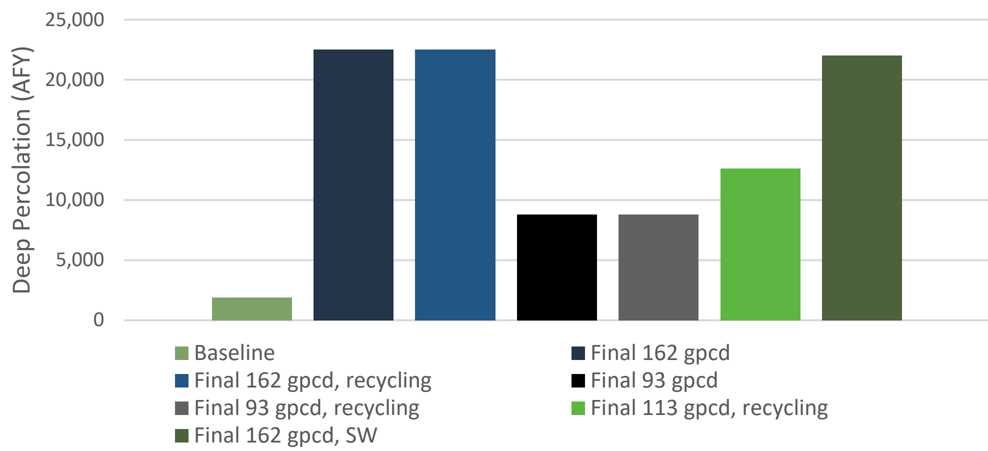


Figure 2-6c. Project Area Water Budget Results: Final Project Buildout Deep Percolation

2.3.4. Climate Change Scenarios

A summary of water budget results from model simulations with assumed climate change are presented in **Tables 2-8a and 2-8b** and in **Figures 2-7 and 2-8**. Comparisons of different model scenarios with and without climate change highlight the substantial impact climate change could have on water demands and supplies in the Solano Subbasin. These effects are most apparent in reviewing simulated water budgets for the entire Solano Subbasin, including increases in total water demand of about 110,000 AFY, increases in groundwater pumping of about 40,000 AFY, and increases in stream seepage of more than 20,000 AFY with corresponding decreases in streamflow. groundwater pumped for the Project is derived from outside of the Project area, primarily through increased subsurface inflows to the Project area.

Table 2-8a. Solano Subbasin Annual Water Budget Results: Climate Change Scenarios

Scenario Description	**Baseline** (no Project, no CC)	**Baseline** (no Project, 2070 CC)	**Initial Project** (125 gpcd, 100% GW)	**Initial Project with Climate Change** (125 gpcd, 100% GW, 2070 CC)	**Final Project** (162 gpcd, 100% GW)	**Final Project with Climate Change** (162 gpcd, 100% GW, 2070 CC)
Component	(AFY)	(AFY)	(AFY)	(AFY)	(AFY)	(AFY)
Total water demand	370,000	480,000	380,000	490,000	440,000	550,000
Groundwater pumping	-140,000	-180,000	-150,000	-190,000	-210,000	-250,000
Subsurface flows	-71,000	-50,000	-69,000	-46,000	-50,000	-26,000
Stream seepage	-5,000	76,000	-1,000	80,000	23,000	100,000
Deep percolation	220,000	150,000	220,000	150,000	240,000	170,000
Change in groundwater storage	2,600	-200	2,500	-500	1,600	-1,600

Table 2-8b. Project Area Annual Water Budget Results: Climate Change Scenarios						
Scenario Description	**Baseline** (no Project, no CC)	**Baseline with Climate Change** (no Project, 2070 CC)	**Initial Project** (125 gpcd, 100% GW)	**Initial Project with Climate Change** (125 gpcd, 100% GW, 2070 CC)	**Final Project** (162 gpcd, 100% GW)	**Final Project with Climate Change** (162 gpcd, 100% GW, 2070 CC)
Component	(AFY)	(AFY)	(AFY)	(AFY)	(AFY)	(AFY)
Total water demand	6,200	7,500	13,000	15,000	75,000	76,000
Groundwater pumping	-6,200	-7,400	-13,200	-14,000	-75,000	-76,000
Subsurface flows	4,400	6,100	11,000	13,000	53,000	56,000
Stream seepage	0	0	0	0	0	0
Deep percolation	1,900	1,200	2,100	1,300	23,000	20,000
Change in groundwater storage	100	-20	30	-60	50	-70

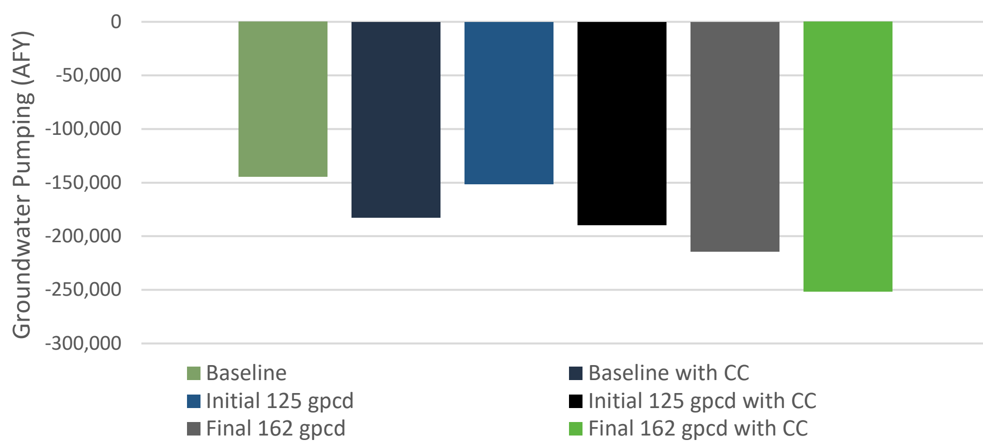


Figure 2-7a. Solano Subbasin Water Budget Results: Climate Change Scenarios Groundwater Pumping

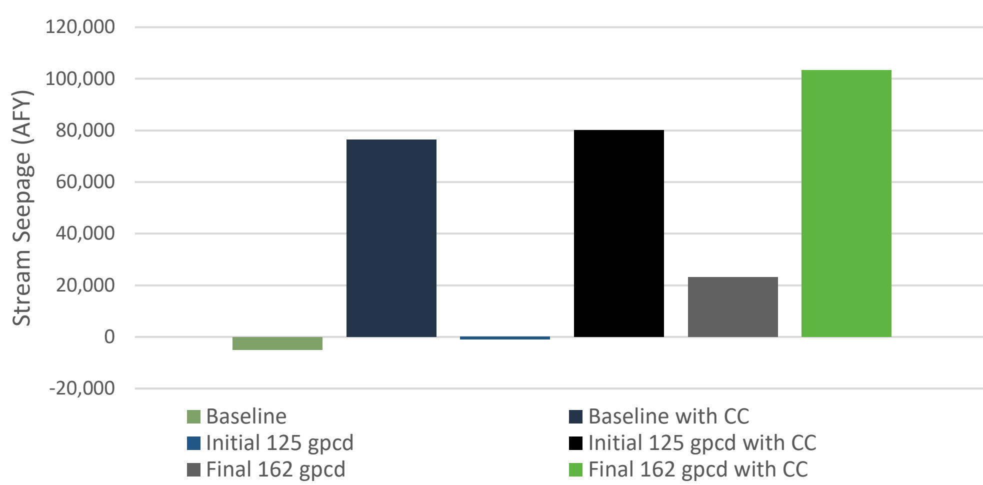


Figure 2-7b. Solano Subbasin Water Budget Results: Climate Change Scenarios Stream Seepage

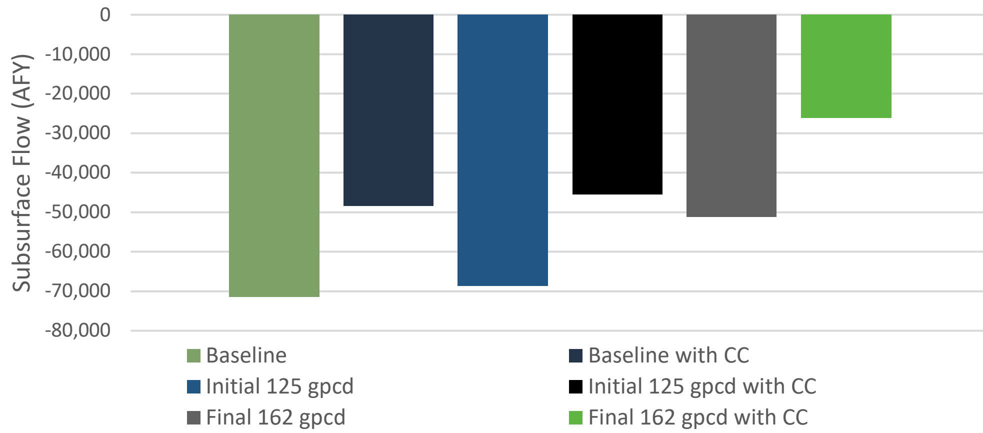


Figure 2-7c. Solano Subbasin Water Budget Results: Climate Change Scenarios Subsurface Flow

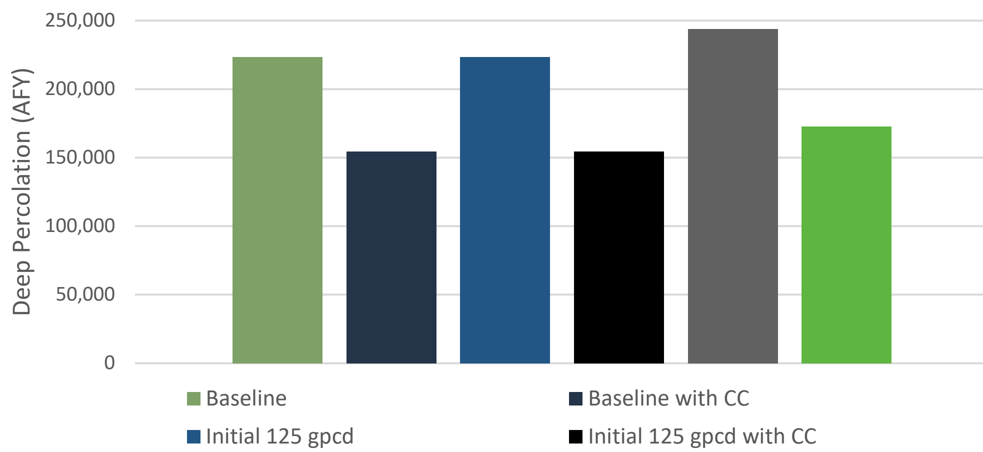


Figure 2-7d. Solano Subbasin Water Budget Results: Climate Change Scenarios Deep Percolation

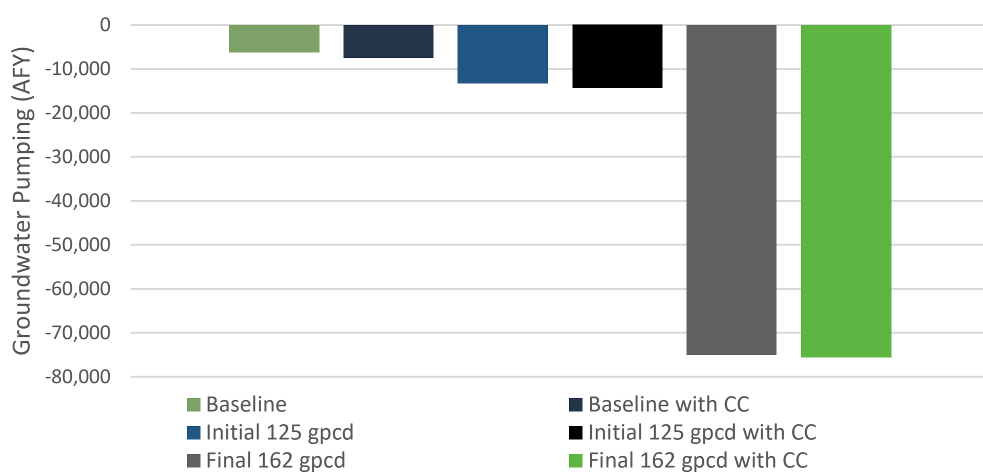


Figure 2-8a. Project Area Water Budget Results: Climate Change Scenarios Groundwater Pumping

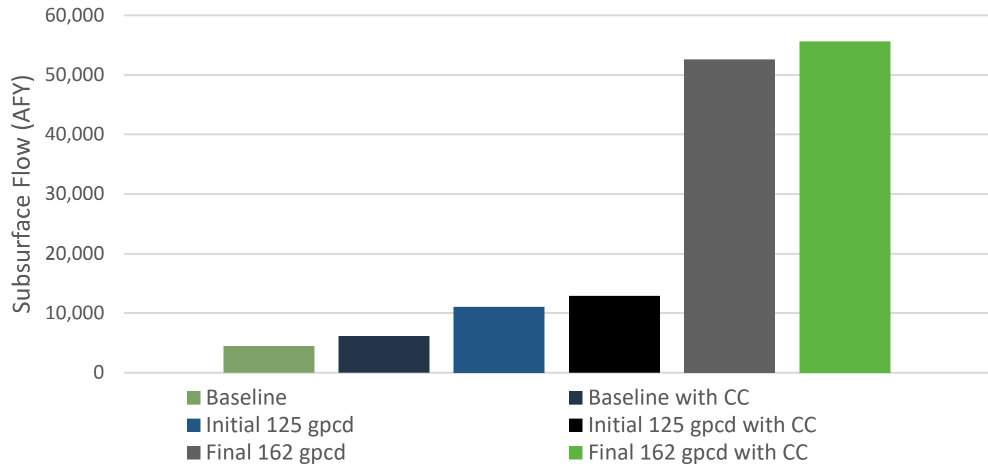


Figure 2-8b. Project Area Water Budget Results: Climate Change Scenarios Subsurface Flow

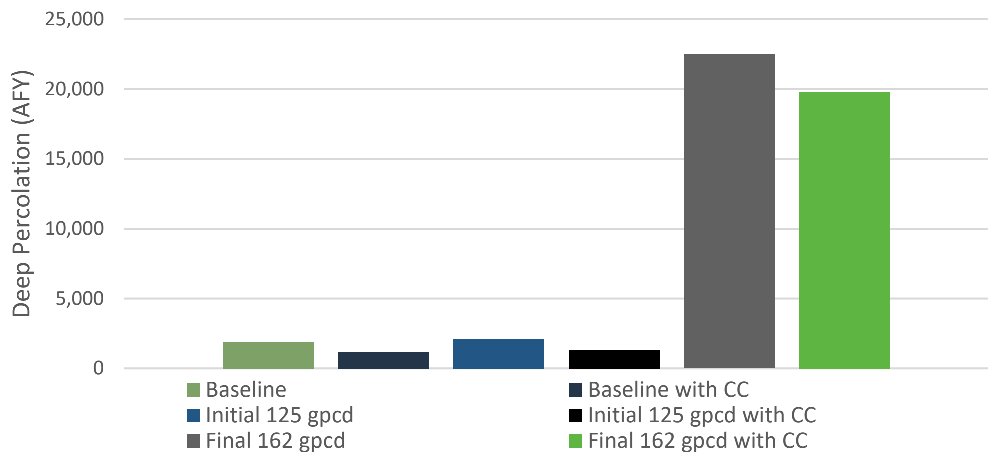


Figure 2-8c. Project Area Water Budget Results: Climate Change Scenarios Deep Percolation

2.4. Summary of Potential Project Effects on Groundwater Levels

Consideration of potential effects on groundwater levels is based on review of historical groundwater level conditions and simulated groundwater levels for different Project scenarios. The assessment of potential effects on groundwater levels focuses on groundwater level conditions within the Alluvial Aquifer and Upper Tehama zone because of the limited potential for groundwater production from the Basal Tehama in the Project area.

2.4.1. Historical Groundwater Elevations

Prevailing historical groundwater flow directions in the County within the Alluvial Aquifer and Upper Tehama zone tend to be from west/northwest to east/southeast away from the English Hills and Montezuma Hills towards the Sacramento River and Delta. Overall long-term trends in groundwater levels are stable in the County with some declining levels evident in localized areas in the northwestern part of the Solano Subbasin, to the north of the Project area. Groundwater levels have historically responded to local precipitation conditions, exhibiting declines during drought periods and recovery during and after wet periods with annual seasonal fluctuations observed throughout the region as a result of the cyclic trends in groundwater pumping for urban and agricultural uses during the spring and summer dry months (irrigation season).

Figure 2-9 is a map of groundwater elevation contours for the Alluvial/Upper Tehama Zone for Spring 2023 from the Solano Subbasin and Solano County Annual Report. The map shows an area of relatively higher groundwater levels in and around the Project area with relatively lower values to the west/southwest and east/southeast. Groundwater flow gradients interpreted from the contour map suggest that the prevailing groundwater flow in the vicinity of the Project area tends to be away from the Project area to both the southwest (towards the Suisun Bay and adjacent lowland areas) and to the southeast in the direction of Rio Vista. However, it should be recognized that limited data on current and historical groundwater levels in the area are available, and these limitations result in uncertainty in interpretation of groundwater flow gradients. The pattern of relatively higher groundwater elevations towards the interior of the Project area is likely a reflection of the somewhat higher ground surface elevations within the Project area in comparison to areas to the west/southwest and east/southeast. Although there are limited or no recent groundwater level data for the Montezuma Hills area to the south of the Project, groundwater elevations may be higher in this area than shown in **Figure 2-9** because of the elevated topography. The potentially higher groundwater elevations in the Montezuma Hills area may cause some northerly flow of groundwater towards and within the vicinity of the Project area, although there is still likely a stronger historical/current flow gradient to the west/southwest and east/southeast from the Project area towards lower elevation areas.

Available historical groundwater level data in the Project vicinity, including contour maps of depth to groundwater in the GSP, suggest shallow groundwater conditions likely exist across large parts of the Project area. As noted above, these shallow groundwater conditions likely support GDEs and interconnected surface water. Historical depths to groundwater vary across the Project area ranging from less than 10 feet below ground surface to greater than 50 feet. The shallowest groundwater conditions tend to exist in the northern part of the Project area with increasing depths towards the south in the direction of the Montezuma Hills. Historical depths to groundwater can vary by water year and water year type, although historically depths to groundwater have been relatively shallow in the area across all water year types.

2.4.2. Simulated Groundwater Elevations

Groundwater elevation contours were generated for groundwater levels simulated though modeling for a variety of time periods and model scenarios. Simulated levels in model layer 4 (zone from approximately 100 feet to 250 feet) provide a representation of conditions in the Alluvial/Upper Tehama Zone for interpreting simulated groundwater levels for different model scenarios. **Figures 2-10a and 2-10b-** display simulated fall (at the end of the water year) groundwater elevations under the baseline future condition (no Project) during a representative above normal water year (2059) and a critically dry water year (2046). These figures provide an example representation of simulated fall season baseline future conditions in the Project vicinity during specific water years (and year types) for the purpose of comparing with results from model runs with the Project to evaluate potential effects of the Project on groundwater levels.

Figures 2-11a and b present the simulated groundwater elevations in the same two water years (2059 and 2046) from a final Project buildout model scenario assuming 113 gpcd water demand with implementation of some water recycling. This model scenario is intended to align with water demand projections provided by California Forever in the June 18, 2024 statement (CA Forever, 2024b), although these stated anticipated per capita demands made by California Forever are not legally binding. Simulated groundwater elevations for this model scenario show a large area of lowered groundwater levels in and around the Project, especially in the southeastern and southwestern parts of the Project area (and surroundings) with the magnitude and extent of depressed groundwater levels increasing during very dry conditions. Simulated groundwater elevations within the Project area drop below mean sea level and result in an increase in the gradient of flow between the Project and adjacent surface water bodies of the Delta and Suisun Bay. **Figures 2-12a and b** present the simulated changes in groundwater elevations relative to the simulated baseline conditions for water years 2059 (above normal) and 2046 (critical) for the final Project buildout scenario with 113 gpcd demand and recycled water. Simulated changes in groundwater elevation for these two years under the specific final Project buildout scenario assumptions suggest potential for groundwater pumping associated with the Project to have effects on groundwater levels of greater than 10 feet (lowering) across large areas of the Project with somewhat lesser effects extending outside the Project area.

Figures 2-13a and b present the simulated groundwater elevations in 2059 and 2046 from a final Project buildout model scenario assuming a higher water demand of 162 gpcd with implementation of some water recycling. This model scenario is intended to align with water demands similar to current urban demands for the City of Vacaville and other nearby cities, while also incorporating some water recycling. Simulated groundwater elevations for this model scenario show similar patterns as other scenarios with a more expanded area of lowered groundwater levels in and around the Project corresponding with the higher water demand simulated. **Figures 2-14a and b** present the simulated changes in groundwater elevations relative to the simulated baseline conditions for water years 2059 and 2046 for the final Project buildout scenario with 162 gpcd demand and recycled water. Simulated changes in groundwater elevation for these two years under this final Project buildout scenario suggest potential for groundwater pumping associated with the Project to have effects on groundwater levels in excess of 30 feet (lowering) in some parts of the Project area with effects of greater than 10 feet (lowering) extending outside of the Project area.

3. ASSESSMENT OF GROUNDWATER QUALITY CONDITIONS AND POTENTIAL EFFECTS

3.1. Current Groundwater Quality Conditions

In the Solano Subbasin GSP, the characterization of groundwater conditions focuses on five key constituents of interest relating to the beneficial use of groundwater in the Subbasin: total dissolved solids (TDS), chloride, nitrate, arsenic, and hexavalent chromium (chromium-6). These constituents were identified for tracking in the GSP because of their greater potential for presenting broader regional groundwater quality concerns in the Subbasin extending beyond localized or site-specific conditions. All these constituents are naturally occurring in the environment, although their occurrence and concentrations in groundwater can be affected by anthropogenic activities. This section describes existing groundwater quality conditions in the Subbasin and in the vicinity of the Project area for key chemical constituents with additional discussion of known groundwater contamination sites. The section below also includes a discussion of potential considerations of groundwater quality conditions in relation to the Project and development of groundwater in the area for use by the Project.

3.1.1. Arsenic

Arsenic is commonly found as a naturally occurring constituent in groundwater; however, like many other chemicals, arsenic can exist at elevated concentrations which can be related to land use practices occurring at the surface, most notably from point source contamination. Arsenic has a primary drinking water maximum contaminant level (MCL) of 10 micrograms per liter (µg/L). Primary MCLs are established for human health reasons. A groundwater quality study conducted by the U.S. Geological Survey (USGS) as part of the Groundwater Ambient Monitoring and Assessment (GAMA) program for the Southern Sacramento Valley, encompassing the Project area, found arsenic concentrations above the MCL in eight percent of wells sampled (Bennett et al., 2011). These higher concentrations are believed to be from natural sources and tended to occur near major river channels and in the Delta where naturally low dissolved oxygen concentrations in groundwater produce reducing geochemical conditions that increase the solubility of arsenic (Bennett et al., 2011).

Figure 3-1 displays available information on the maximum historical concentration of arsenic in groundwater sampled from wells in the vicinity of the Project. As shown in the map figure, areas of elevated arsenic concentrations in groundwater exist in the region with many wells in Rio Vista and other wells within and around the Project area having arsenic concentrations above the drinking water MCL. There is potential that groundwater produced with the Project area may require treatment for arsenic for use as a drinking water supply.

3.1.2. Chloride

Chloride concentrations generally represent a major component of TDS in groundwater. In addition to providing a general measure of salinity, chloride concentrations can be particularly informative in monitoring for migration of brackish or saline groundwater from discrete depth zones or geologic units and also can inform the detection of intrusion from adjacent brackish or higher-salinity surface water bodies such as may exist within the Delta or Suisun Bay. Chloride concentrations in drinking water systems are regulated by the SWRCB under established secondary MCLs with a recommended concentration level of 250 milligrams per liter (mg/L), an upper concentration of 500 mg/L, and a short-term level of 600 mg/L. Secondary MCLs are established for aesthetic reasons such as for taste or odor instead of human health reasons.

Figure 3-2 displays available information on the maximum historical chloride concentrations in groundwater from wells in the vicinity of the Project. These data show that chloride concentrations above the MCL exist to the north, west, and within the Project boundary. These sites are point source site locations and not considered a result of brackish or saline intrusion. The City of Rio Vista located southeast of the Project is entirely reliant on groundwater, and due to close proximity to the Delta, saline intrusion into groundwater in this area is a concern for the City. To date, chloride concentrations in City wells have remained below the MCL.

Sea water intrusion is one of the six sustainability indicators that DWR requires Subbasins to identify and monitor. The Solano Subbasin determined that sea water intrusion was not applicable to the Subbasin as the Subbasin is not located along a coastline and elevated concentrations of chloride have not been historically measured. The GSP did identify chloride as a constituent of concern for monitoring of potential intrusion of saline water in the Delta into the groundwater system. If indications of increasing chloride concentrations were to occur in the Subbasin, the Subbasin would reevaluate the need for more explicitly incorporating potential sea water intrusion impacts.

Simulated groundwater conditions under different Project scenarios, as shown on **Figures 2-10 through and 2-14,** highlight the potential for groundwater pumping associated with the Project to lower groundwater levels in and around the Project area. New pumping patterns that may result from the production of groundwater for the Project would likely affect groundwater flow gradients around the Project area, which could result in a reversal or steepening of flow gradients between the Project area and the surface water bodies in the Delta and towards Suisun Bay. Such changes could increase the potential for saline water intrusion into the groundwater system. If this were to occur, Rio Vista and other areas between the Project and the Delta/Suisun Bay water bodies would likely experience effects of increased salinity before it would be observed within the Project area.

3.1.3. Hexavalent Chromium

Like arsenic, chromium-6 is a naturally occurring constituent in groundwater and can especially be associated with serpentinite rocks and other geologic formations containing chromium (SWRCB, 2017b). Chromium can also occur in groundwater as result of localized contamination from industrial processes; however, chromium-linked industrial processes are not known to be associated with any regulated soil and groundwater remediation sites (i.e., GeoTracker sites) in the Solano Subbasin and in the vicinity of the Project. In April 2024, the State of California adopted a new primary MCL for chromium-6 of 10 µg/L.

Figure 3-3 displays available information on the maximum historical chromium-6 concentration in groundwater from wells in the vicinity of the Project. Chromium-6 is not as commonly tested in wells as some other constituents like arsenic, chloride, nitrate, and TDS, and there are limited available data on chromium-6 concentrations in groundwater within and surrounding the Project area. However, available data suggest concentrations of chromium-6 in groundwater in the vicinity of the Project are likely below 10 ug/L. Some higher concentrations of chromium-6 exist in groundwater in the northern part of the Solano Subbasin.

3.1.4. Nitrate

Nitrate is one of the most common groundwater contaminants and is generally the water quality constituent of greatest concern in agricultural areas where application of fertilizers containing nitrogen can lead to elevated nitrate levels in groundwater. Additionally, nitrate is a constituent of concern in groundwater near dairy or other large-scale livestock operations or where large volumes of septic or municipal wastewater discharges to groundwater exist. Natural concentrations of nitrate in groundwater are generally low, and elevated levels usually indicate impacts from land use activities. Nitrate presents health concerns at high concentrations and is regulated in public drinking water systems. The primary drinking water MCL for nitrate (as nitrogen [N]) is 10 mg/L.

Figure 3-4 displays available data on the maximum historical concentration of nitrate (as N) in groundwater from wells in the vicinity of the Project. There are limited current data on nitrate within the Project area, but historical nitrate concentrations in the vicinity of the Project area are below the MCL for most wells tested. Wells at two sites within the Project area have exhibited concentrations of nitrate above the MCL (10 mg/L) Several localized areas, although no widespread occurrence of high nitrate levels is evident within or in close proximity to the Project. Elevated concentrations of nitrate exist in wells in the northern part of the Solano Subbasin and north of the Project.

Simulated groundwater conditions under different Project scenarios, as shown on **Figures 2-10 through 2-14**, highlight the potential for groundwater pumping associated with the Project to lower groundwater levels in and around the Project area. New pumping patterns that may result from the production of groundwater for the Project would likely affect groundwater flow gradients around the Project area, which could result in a steepening of flow gradients between the Project area and adjacent areas. Such changes could increase potential for and rate of migration of higher nitrate water from any existing areas of elevated nitrate in groundwater depending on the location, depth, and magnitude of any changes in groundwater gradients resulting from the Project.

3.1.5. Total Dissolved Solids

TDS is a general measure of salinity and overall water quality. Elevated salinity in groundwater can be a result of land use activities, but TDS can also be naturally-occurring, where subsurface geologic materials are derived from marine sediments or where groundwater is influenced from higher salinity water such as the Delta. The secondary MCL for TDS includes a recommended value of 500 mg/L, an upper value of 1,000 mg/L, and a short-term value of 1,500 mg/L. Secondary MCLs are established for aesthetic reasons such as taste and odor, but they do not represent health-based standards.

Figure 3-5 displays available data on the maximum historical TDS concentrations in groundwater from wells in the vicinity of the Project. TDS concentrations in many wells in the Project vicinity are above the recommended MCL of 500 mg/L, but generally below the upper MCL or 1,000 mg/L. There are some notable areas of clustered wells with high TDS concentrations in the vicinity of the Project, including within the Project area and to the north, south, and west of the Project area.

3.1.6. Point-Source Regulated Contamination Sites

In addition to the groundwater quality conditions described above, the Subbasin has many known areas of groundwater contamination or other activities that have the potential to impair groundwater and are under the oversight of regulatory agencies. **Figure 3-6** and **Figure 3-7** display the locations of these regulated sites by status (closed or open). Closed sites mean that a request to close the case has been approved by the regulating agency and the risk for future contamination has been deemed to be gone or at a reasonably low level. Open sites have not received closure approval and therefore may have uncontrolled contamination or ongoing remediation and monitoring of a known contamination hazard under the oversight of a regulatory agency. Closure of a site does not necessarily mean that all contamination has been removed or remediated at the site. As a result, changes to conditions or activities at or around a site may still have potential to exacerbate contamination in groundwater through leaching or inducing migration of contaminants in the subsurface.

There is one open site within the Project area, referred to as Regulated Facility-1 (RF-1) in this TM and on **Figure 3-6**. The site is a 110-acre drilling mud management facility with an open remediation status beginning November 1, 1999. The facility includes six closed basins, three active double-lined basins, three planned basins, one "clean closed" former truck washout area, two borrow area basins, an industrial water supply well, and a corrective action groundwater extraction well network. Samples from the groundwater wells have elevated levels of specific conductance, TDS, sulfate, chloride, and Total Petroleum Hydrocarbon as diesel (TPD-d), and reports indicate groundwater impacts extend beyond the facility and the extent has not been fully delineated. Additional groundwater extraction wells are planned in accordance with the corrective action.

There are four open or other sites, RF-2/RF-3, RF-4, RF-5, and RF-6 within 10,000 feet of the proposed community. RF-2 and RF-3 correspond to the same land disposal facility approximately 1,400 feet from the southwest corner of the Project area. The site is a 160-acre waste treatment, storage, and disposal facility which historically accepted liquids, sludges, and solids from oil and gas exploration and petroleum refining. There are two compacted clay barriers and a slurry wall, but groundwater pollution has persisted outside barriers. Groundwater quality data show elevated levels of TDS, chloride, sulfate, sodium, and boron. The site was closed in 1991 by excavating wastes and installing groundwater wells and recovery trenches. There is currently a detection/corrective monitoring program due to the presence of contaminants in the groundwater. As of March 26, 2009, groundwater mitigation was determined to be under control and no further monitoring is being conducted. RF-4 located about a quarter-mile (approximately 1,300 feet) east of the community is an inactive site needing evaluation. RF-5 is a National Pollutant Discharge Elimination System (NPDES) site located about 1.5 miles (about 8,000) feet east of the community. The site is a publicly owned treatment facility requiring sampling and analysis for perfluoroalkyl and polyfluoroalkyl substances (PFAS), which began in 2021. RF-6 is a former Regional Water Quality Control Board (RWQCB) evaluation site located a little over a mile (about 6,000 feet) to the southeast. The facility operated as a gas gathering station compressing and dehydrating natural gas. On September 18, 2002, the RWQCB concurred that no further action was required at the site.

The presence of open and closed regulated facilities with known subsurface and/or groundwater contamination in the vicinity of the Project area and any potential effects from changes to land use activities and groundwater pumping associated with the Project should be considered as part of future detailed analyses of potential Project effects, should the Project proceed.

4. SUMMARY OF WATER RESOURCES EVALUATION

In summary the Project consists of converting areas from current uses consisting primarily of grazing and agricultural uses to a fully serviced community providing homes, water, utilities, jobs and public services for an initial population of 50,000 with a final buildout of 400,000. To estimate the potential effects of the Project on local water resources, a groundwater model (Solano IHM) previously developed during the preparation of the Solano Subbasin GSP was modified and a series of assumptions were applied based on information available at the time of the assessment (mostly in April 2024) to simulate a range of potential Project water use and supply scenarios. The model scenarios considered a range of potential Project characteristics for an initial Project phase consisting of community of 50,000 people and a final Project buildout of 400,000 people based on limited available information about the Project. A high-level review of existing surface water rights associated with parcels owned by California Forever affiliates that may potentially be used to supply water for the Project was also conducted based on a review of SWRCB records and parcels known to have been acquired by California Forever and its affiliates. Lastly, groundwater quality conditions in the area were reviewed, including an assessment of potential for effects on groundwater quality resulting from the Project water demands.

The results of the assessment suggest that potential groundwater pumping associated with the Project may result in minor increases in Subbasin groundwater pumping for the initial Project phase with potential for substantial and significant increases in groundwater pumping under the final Project buildout condition, depending on the water demand characteristics and water supply sources of the final Project buildout condition. Overall, interpretation of the results from the model scenarios indicates that potential increases in groundwater pumping will likely result in a range of potential effects on water resources in the area that should be considered. These potential effects would largely be caused by lowering of groundwater levels in the vicinity of the Project (both within and adjacent to the Project area) and associated changes in groundwater flow gradients.

The review of conditions and evaluation of potential Project effects conducted by LSCE highlight the following areas of potential concern relating to the potential effects on water resources in the vicinity of the Project.

- <u>Potential for stream depletion and impacts to interconnected surface water</u>. Project model scenarios suggest that increased groundwater pumping associated with the Project has the potential to substantially and significantly increase stream seepage resulting in the depletion of nearby streamflows. This potential impact on interconnected surface water is an important consideration related to groundwater sustainability as defined in the Solano Subbasin GSP. Stream depletion and impacts to interconnected surface water have important potential implications related to impacts on habitat conservation areas, including habitat for threatened and endangered species in the area.
- <u>Potential for saline water intrusion</u>. There is potential for groundwater pumping to induce saline water intrusion into and through the groundwater system from nearby surface water bodies with higher salinity such as Delta watercourses, nearby tidal marshes/wetlands, Suisun Bay, or other nearby surface water bodies with higher salinity. Increased stream depletion resulting from increased groundwater pumping could involve increased seepage of higher salinity surface water.
- <u>Potential for impacts on groundwater dependent ecosystems (GDEs)</u>. Because of the shallow groundwater level conditions that exist in the area supporting ecologic species, large areas of habitat, native vegetation, and wetlands have been mapped as likely GDEs. Potential lowering of

groundwater levels as a result of groundwater pumping associated with the Project could have important effects on GDE health in the area. Consideration of impacts of lowering groundwater levels on GDEs and other groundwater beneficial users are a key consideration in the Solano Subbasin GSP and are also of great importance to habitat conservation areas.

- Potential for substantial altering of subsurface flows to/from the Solano Subbasin. Project model scenarios suggest that increased groundwater pumping associated with the Project has the potential to substantially and significantly alter the magnitude of subsurface groundwater flows to/from the Solano Subbasin, potentially impacting adjacent groundwater subbasins/basins, an important consideration related to groundwater sustainability as defined in the Solano Subbasin GSP. Additionally, groundwater pumping within the Project area has the potential to alter subsurface flows to/from the Project area, with Project model scenarios suggesting potential for pumping associated with the Project to result in substantial increases of groundwater flow into the Project area from adjacent areas, which could impact areas adjacent to the Project area, including in adjacent basins/subbasins. Altering of subsurface flows between basins/subbasins could impact the long-term sustainability of other basins/subbasin and could also affect actions necessary within the Solano Subbasin to ensure the long-term sustainable management of the Subbasin.
- Potential challenges associated with feasibility of conducting recharge activities and conjunctive use. Recent information released by California Forever on planned Project water demands and supplies presents water management concepts involving conjunctive use of groundwater and surface water, including the suggestion of conducting groundwater recharge and storage utilizing recycled water and other available supplies, especially during wetter periods. It is notable that the fine-grained nature of geologic materials in the vicinity of the Project may limit the capacity to recharge and store groundwater. The quality of water proposed to be recharged would need to be assessed for compatibility with recharge goals as naturally occurring constituents may be mobilized if geochemical conditions change and increase the mobility of trace metals such as arsenic or chromium-6. Furthermore, available data on groundwater levels in the vicinity of the Project suggest that groundwater levels are generally relatively shallow indicating limited thickness of the unsaturated zone available for groundwater to be recharged or stored. The combination of these conditions is likely to present some important challenges to implementing such proposed activities that should be considered.
- Potential need for treatment of groundwater to meet drinking water quality standards. Available data on groundwater quality conditions in the vicinity of the Project indicate potential for elevated concentrations of arsenic (and potentially some other constituents) above the drinking water MCL to occur in wells planned to serve the Project. While groundwater can be treated to address most water quality issues, the potential for this need should be noted. The potential for groundwater pumping within the Project area to induce migration of groundwater from any areas of impaired or contaminated groundwater should be considered.

While this evaluation is not intended to assess anticipated impacts of all of the details of the Project (most of which were not available at the time of the analysis), it does highlight important considerations that should be addressed through more detailed analysis if the Project proceeds. Such analyses should consider effects of the Project on water resources and beneficial users of water in areas across the Solano Subbasin and Suisun-Fairfield Valley Basin as well as adjacent groundwater subbasins and basins that may be affected by increased pumping associated with the Project.

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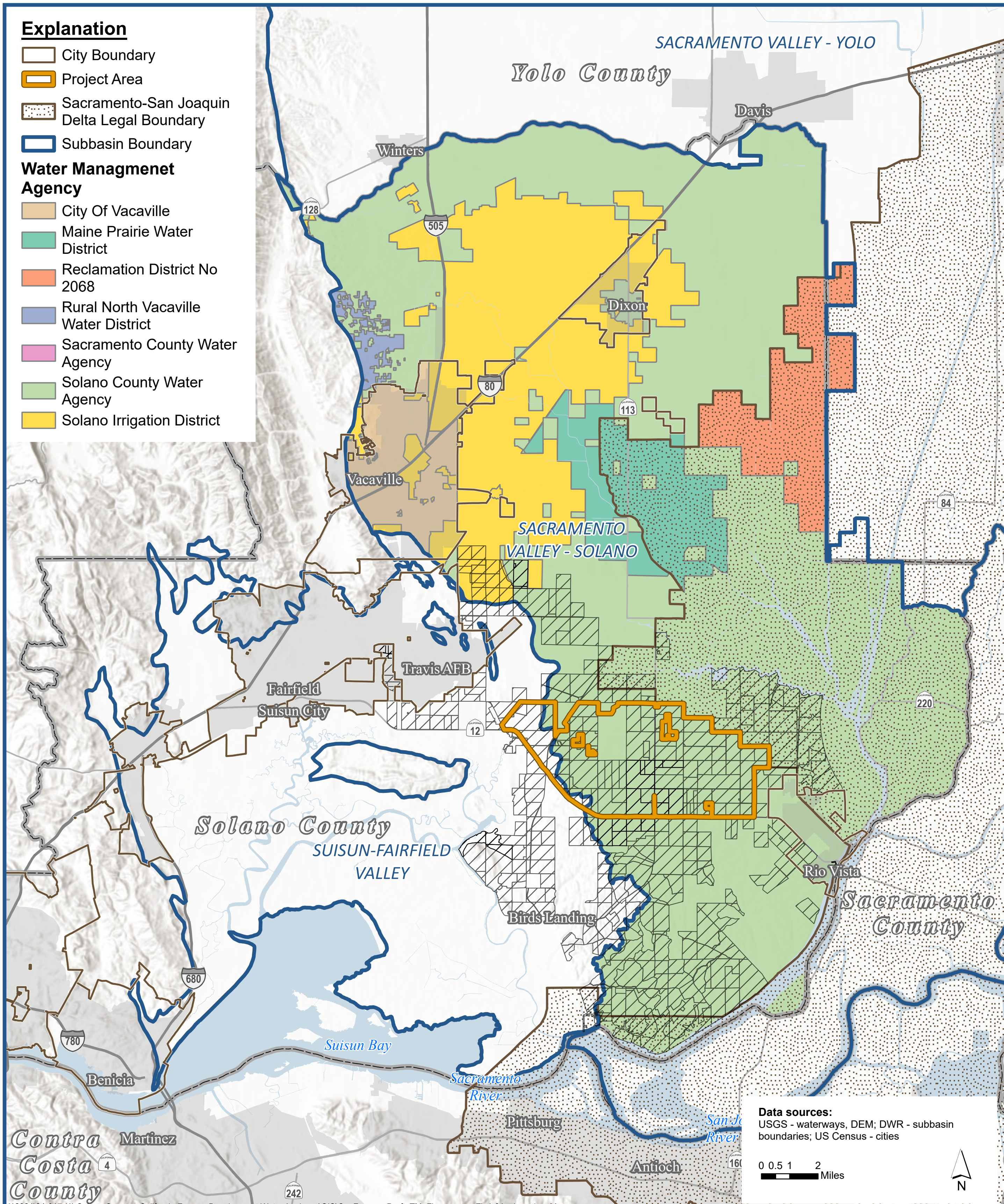
FIGURES

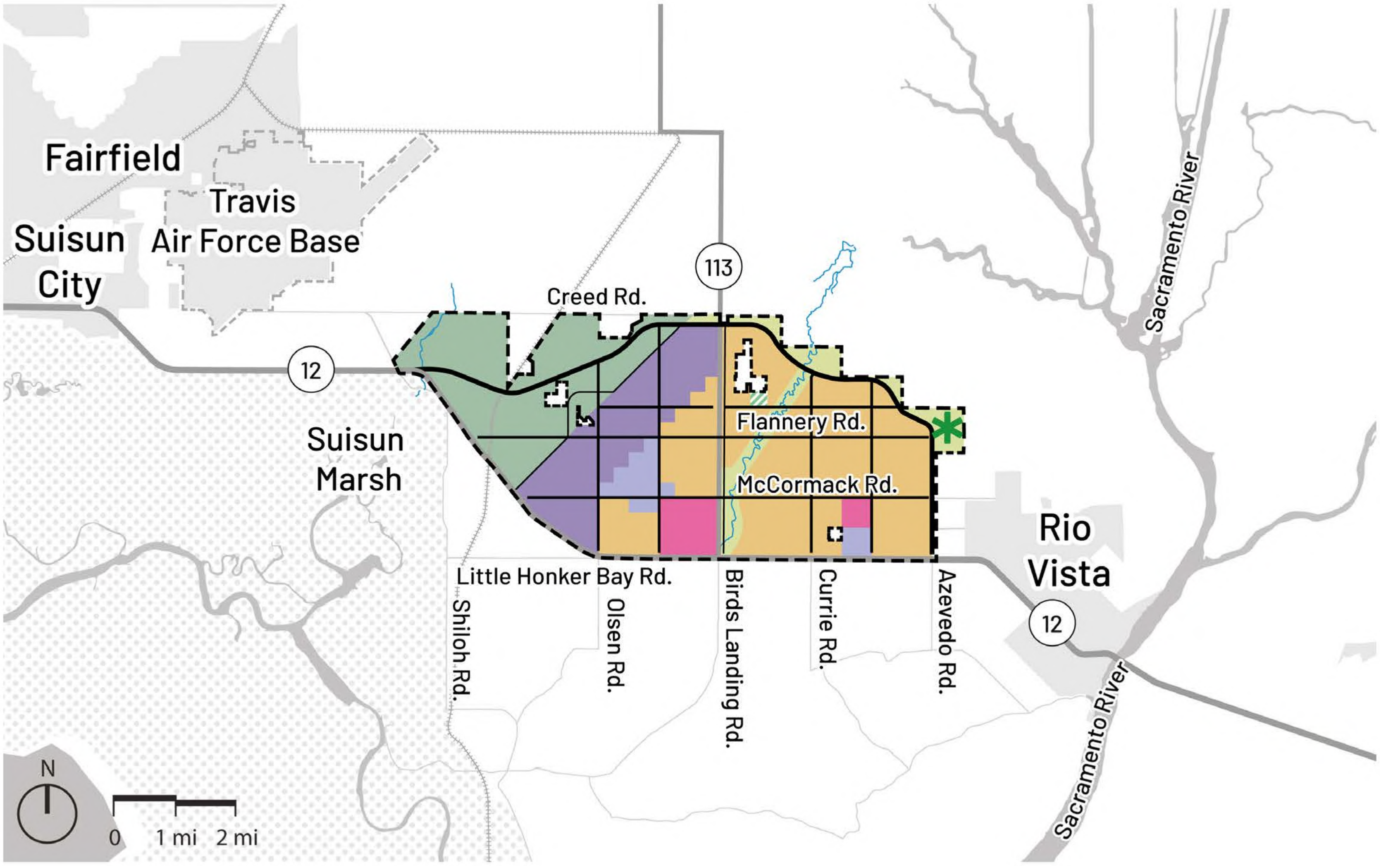


Luhdorff & Scalmanini
Consulting Engineers

Location Map

Figure 1-1a

Water Resources Evaluation
East Solano Homes, Jobs, and Clean Energy Initiative, Solano County



** The New Community is required to provide at least 4,000 acres of open space (approximately 22% of total acreage). Of that, approximately 1,384 acres are shown as "Open Space" on the map, 712 acres are included in the Rio Vista Parkland to the east of the New Community, and an additional 1,904 acres will be distributed through the other zones during neighborhood design (these are not shown yet).*

Legend

- Commercial Mixed Use
- Industry & Technology
- Maker & Manufacturing
- Neighborhood Mixed Use
- Travis Compatible Infrastructure
- Open Space*
- Major Arterial: North Boulevard (Conceptual Location)
- Minor Arterial: Primary Boulevard (Conceptual Location)
- Collector 1 + 2: Access Boulevard (Conceptual Location)
- Specific Plan Boundary
- Existing Highway
- Existing Road
- Railroad
- River
- Existing Conservation and Mitigation Lands
- Intermittent Stream

Source: East Solano Homes, Jobs, and Clean Energy Initiative (February 14, 2024), Figure SP-3

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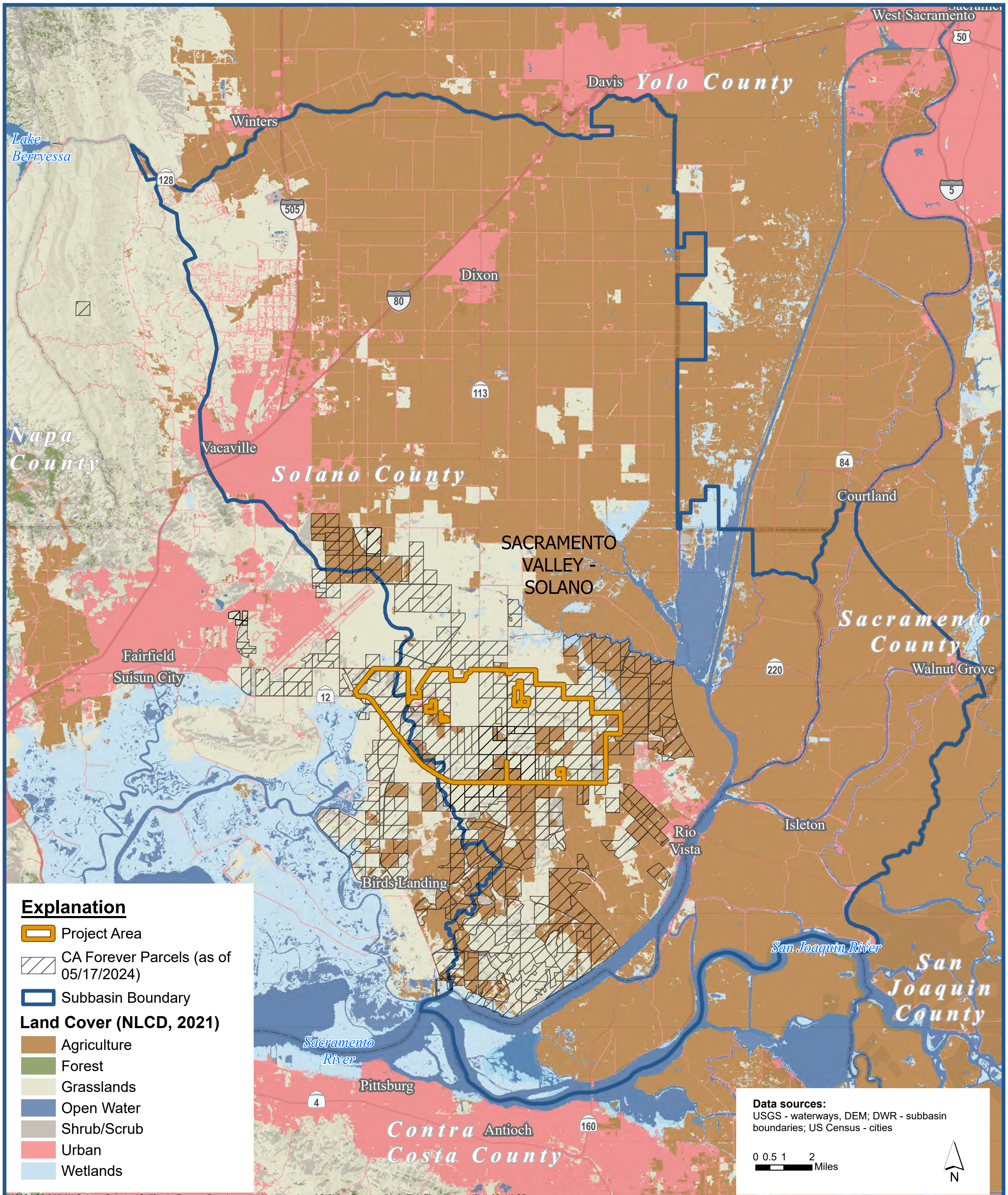
Map of Project Area from the Initiative

Figure 1-1b

Water Resources Evaluation
East Solano Homes, Jobs, and Clean Energy Initiative, Solano County



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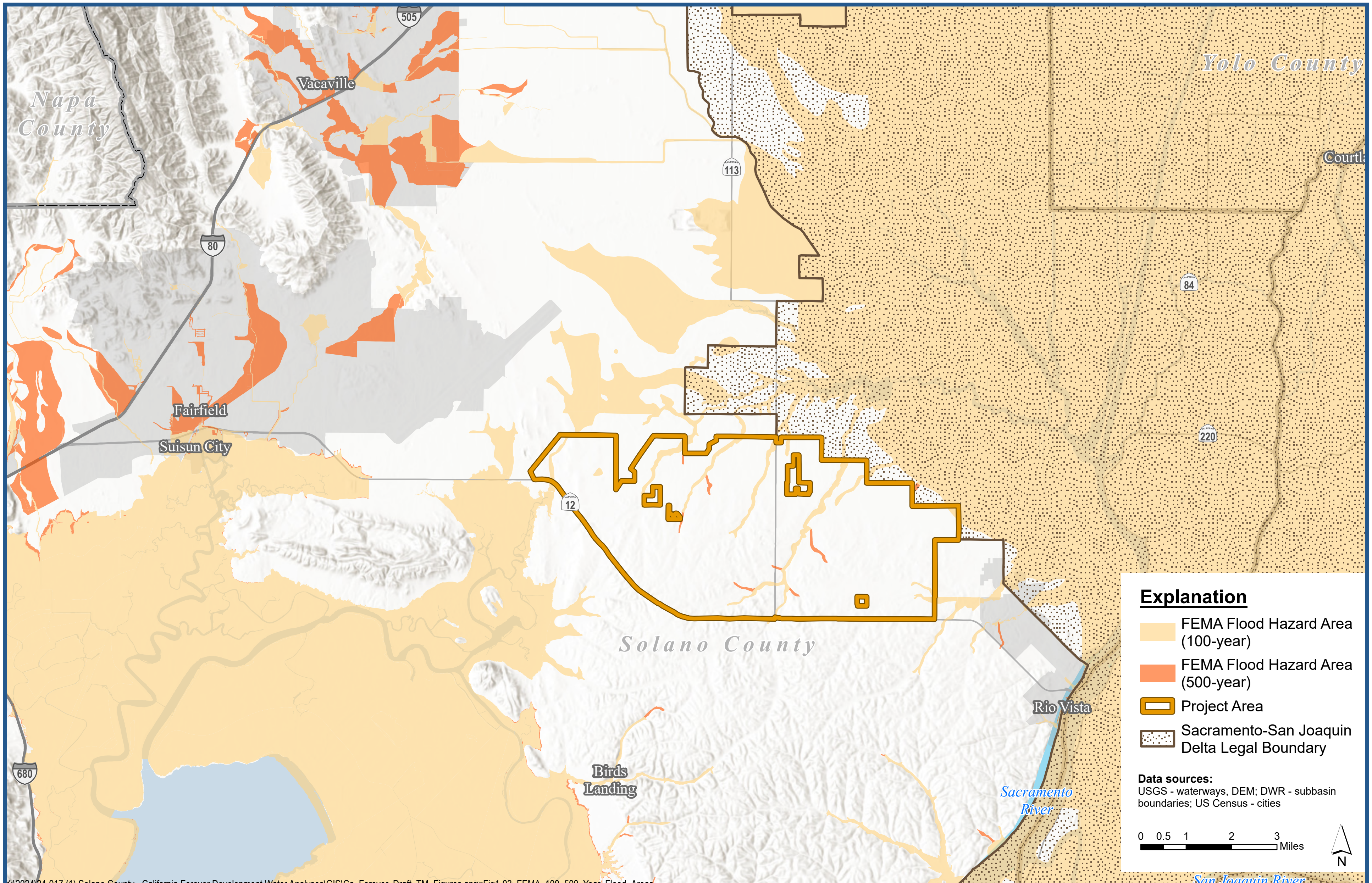
National Land Cover Dataset (NLCD)

Figure 1-2

Water Resources Evaluation
East Solano Homes, Jobs, and Clean Energy Initiative, Solano County



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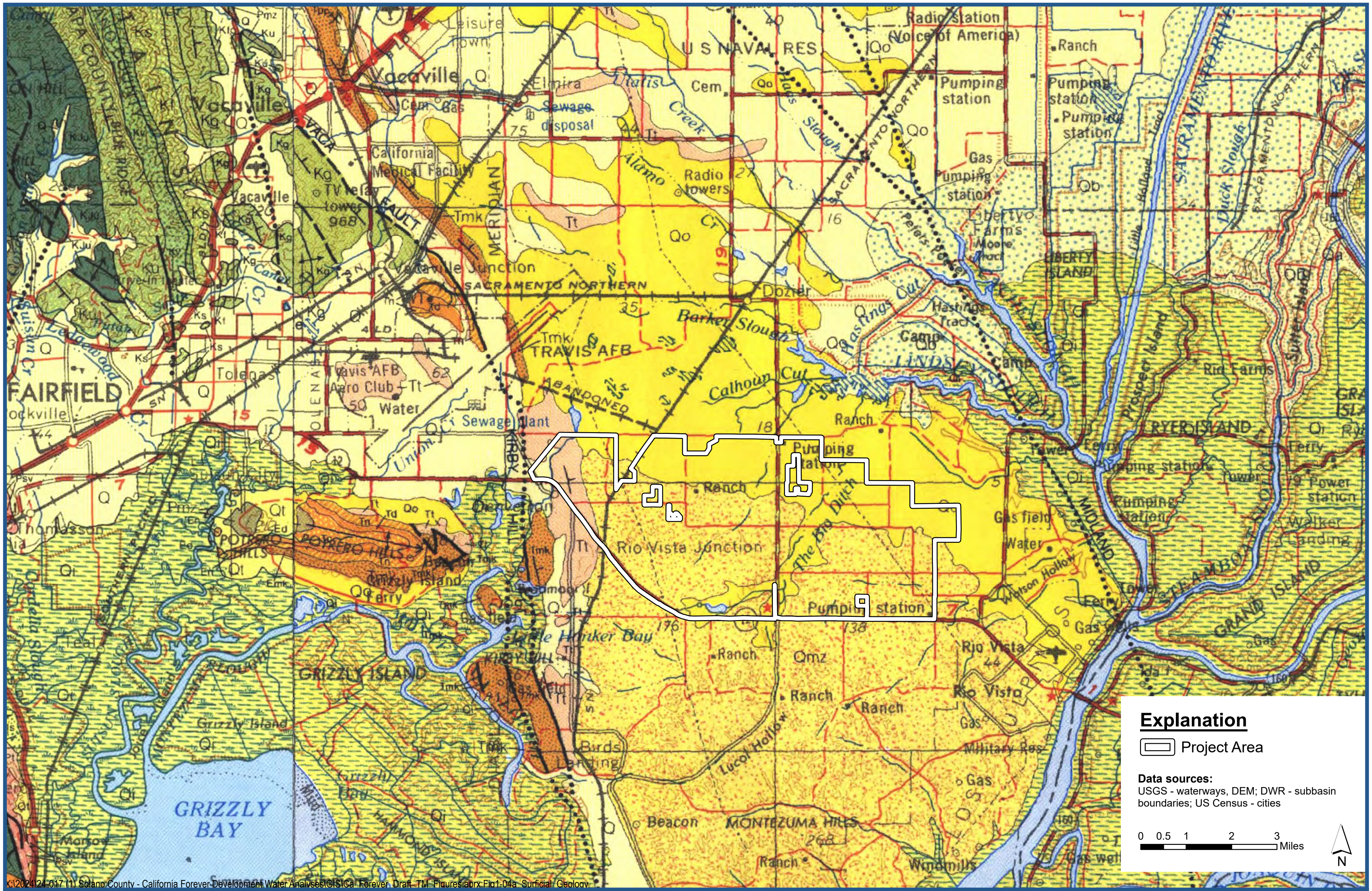
Federal Emergency Management Agency- 100- and 500-year flood areas

Water Resources Evaluation
East Solano Homes, Jobs, and Clean Energy Initiative, Solano County

Figure 1-3



Surficial Geology

Water Resources Evaluation
East Solano Homes, Jobs, and Clean Energy Initiative, Solano County

Figure 1-4a

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Q	Alluvium
t	Mine and dredge tailings
Qa	levee and channel deposits
Qb	Basin deposits (Alluvium)
Qi	Intertidal deposits (Peaty mud)
Qs	Dune Sands
Ql	Lake Deposits
Qo	Older Alluvium
Qg	Glacial Deposits
Qm	Modesto Formation (Alluvium)
Qr	Riverbank Formation (Alluvium)
Qmr	Modesto-Riverbank Formations (Arkosic alluvium)
Qmz	Montezuma Formation (Poorly consolidated, clayey sand)
Qtl	Turlock Lake Formation (Sand, silt, and gravel)
Qrb	Red Bluff Formation (Gravel in reddish, silty or sandy matrix)
QTnm	North Merced Gravel (This pediment veneer)

Tt	Tehama Formation (Sand, silt, and volcaniclastic rocks)
Tl	Laguna Formation (Consolidated alluvial deposits)
Tsp	San Pablo Group (Marine sandstone and shale)
Tm	Mehrten Formation (Andesitic conglomerate, sandstone, and breccia)
Tvs	Valley Springs Formation (Rhyolitic tuff and sedimentary rocks)
Tmk	Markley Sandstone (Marine)
Tn	Nortonville Shale (Marine)
Td	Domengine Sandstone (Marine)
Tc	Capay Formation (Marine sandstone)
Tg	"Auriferous" Gravels
Ti	Ione Formation (Quartzose sandstone and kaolinitic clay)
Tmz	Martinez Formation (Marine quartzose sandstone)

Tlt	Lawlor Tuff
Tvd	Dacite, rhyodacite domes
Tet	Eureka Valley Tuff
Ttm	Table Mountain Latite
Tpp	Putnam Peak Basalt

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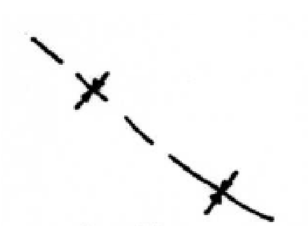
Surfical Geology Legend

Water Resources Evaluation
East Solano Homes, Jobs, and Clean Energy Initiative, Solano County

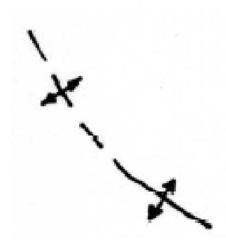
Figure 1-4b

Kg Guinda Formation (Marine sandstone)

Kc Chico Formation (Marine sandstone, shale, and conglomerate)



Synclinal fold
(Dashed where inferred" dotted where concealed by younger rocks or water.)



Anticlinal fold
(Dashed where inferred" dotted where concealed by younger rocks or water.)

Fault
(Solid where well located: dashed where approximately located; queried where continuation or existence is uncertain: except for the offshore area, faults are dotted where concealed by younger rocks or water. Arrows show relative or apparent direction of movement. U, upthrown side and D, downthrown side, relative or apparent.)

Contact
(Observed or dashed where approximately located; queried where gradational or inferred.)

Geological Map Adapted from:
Graymer, R.W., Jones, D.L., and Brabb, E.E.:U.S.Geological Survey, Geologic map and map database of northeastern San Francisco Bay region, California, scale 1:100,00

Wagner, D.L., Jennings, C.W., Bedrossian, T.L., and Bortugno, E.J. : California Division of Mines and Geology Regional Geologic Map 1A, scale 1:250,000.

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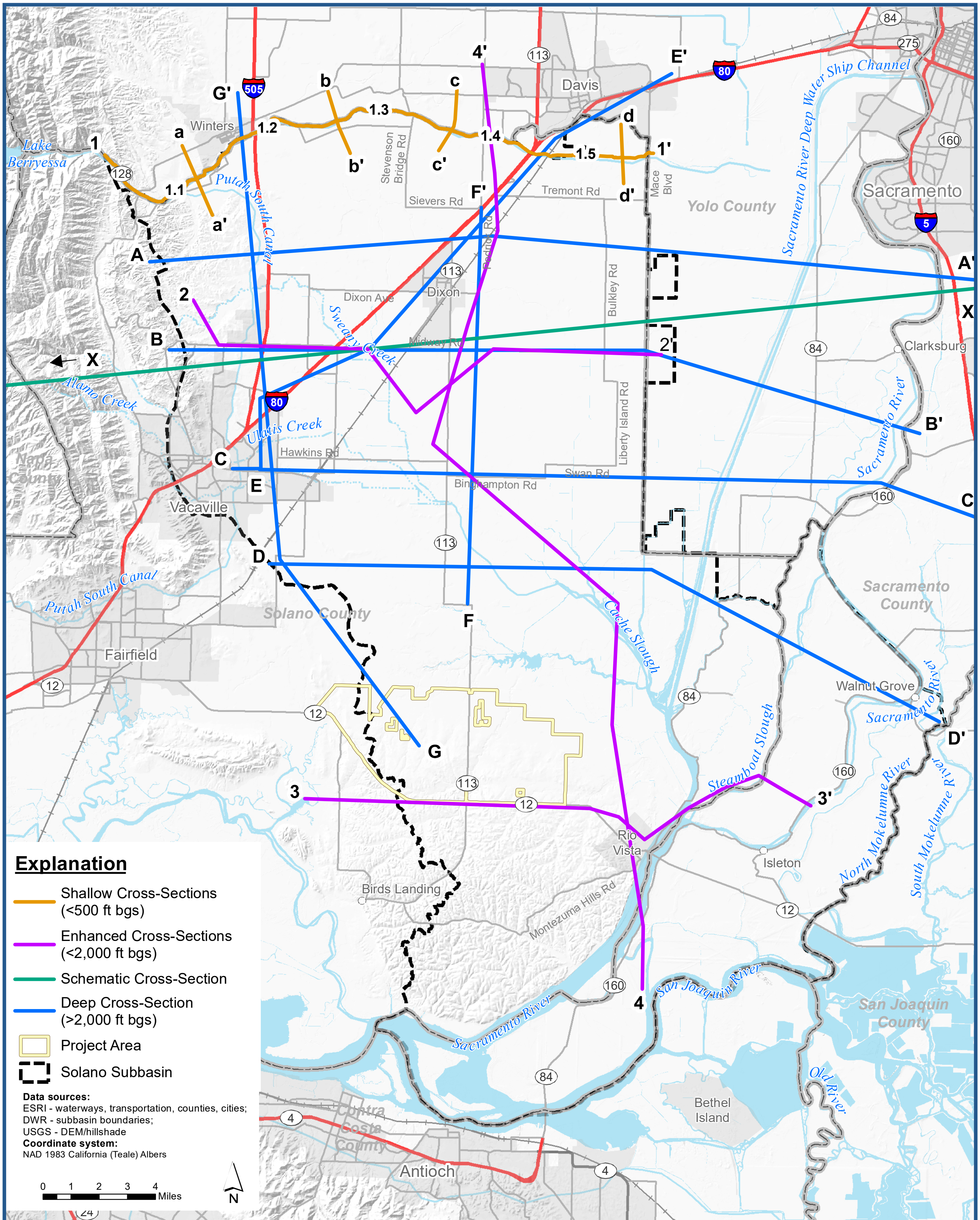
Surfical Geology Legend

Water Resources Evaluation
East Solano Homes, Jobs, and Clean Energy Initiative, Solano County

Figure 1-4c

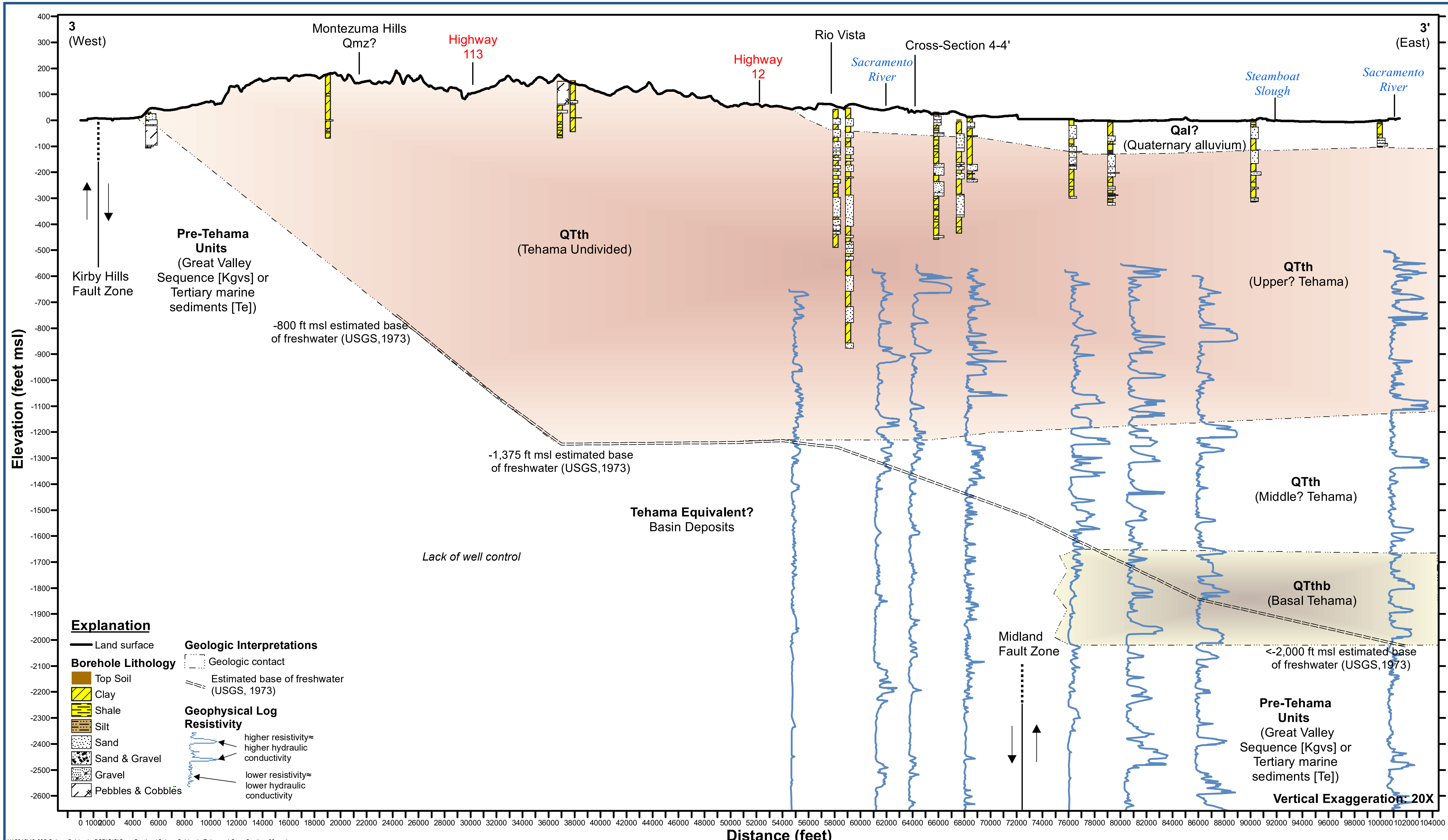


Geologic Cross-Section Location Map (from Solano Subbasin GSP)

Figure 1-5

Water Resources Evaluation
East Solano Homes, Jobs, and Clean Energy Initiative, Solano County

LSCE TEAM



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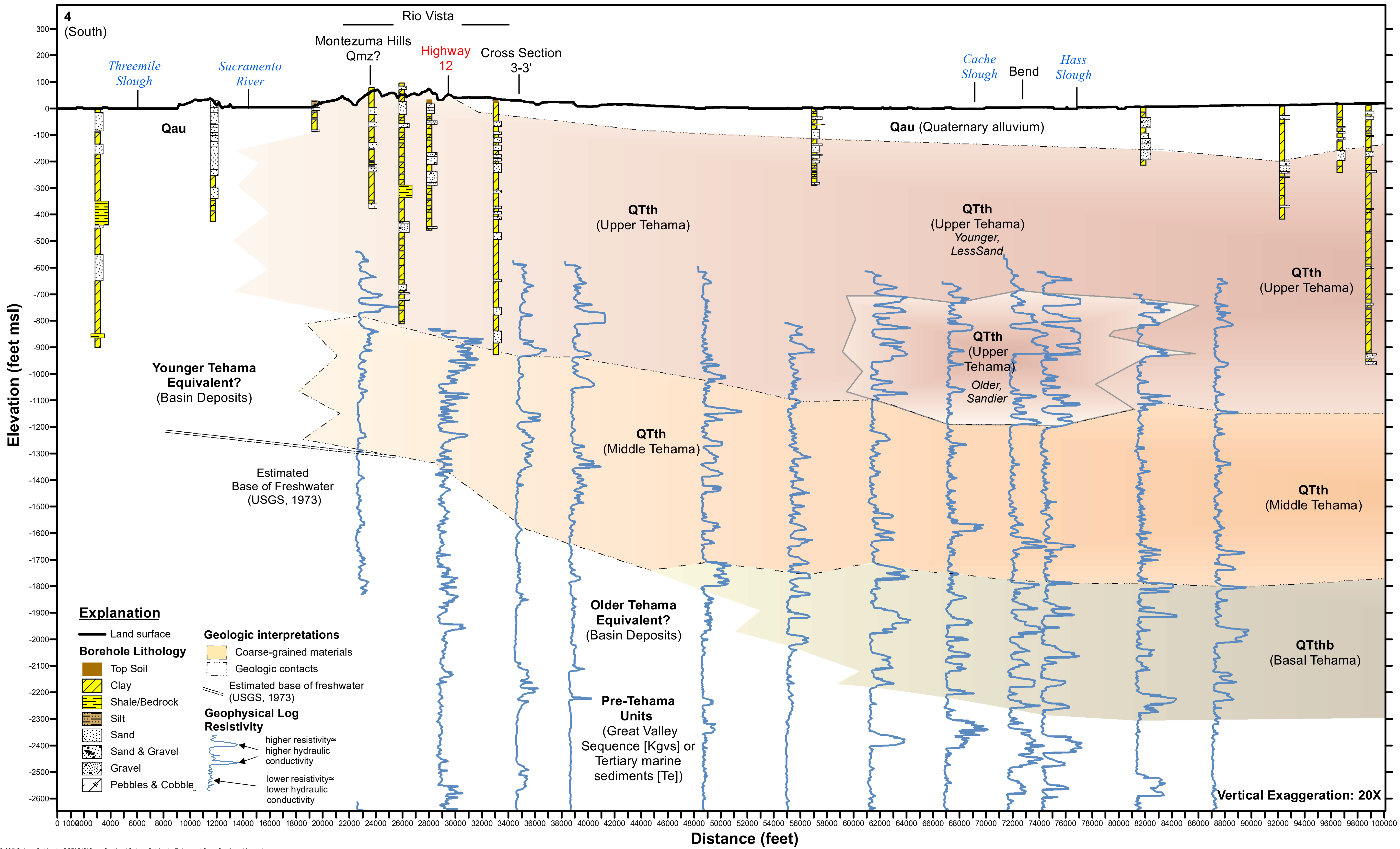
Solano Subbasin Geologic Cross-Section 3-3'

Water Resources Evaluation
East Solano Homes, Jobs, and Clean Energy Initiative, Solano County

Figure 1-6



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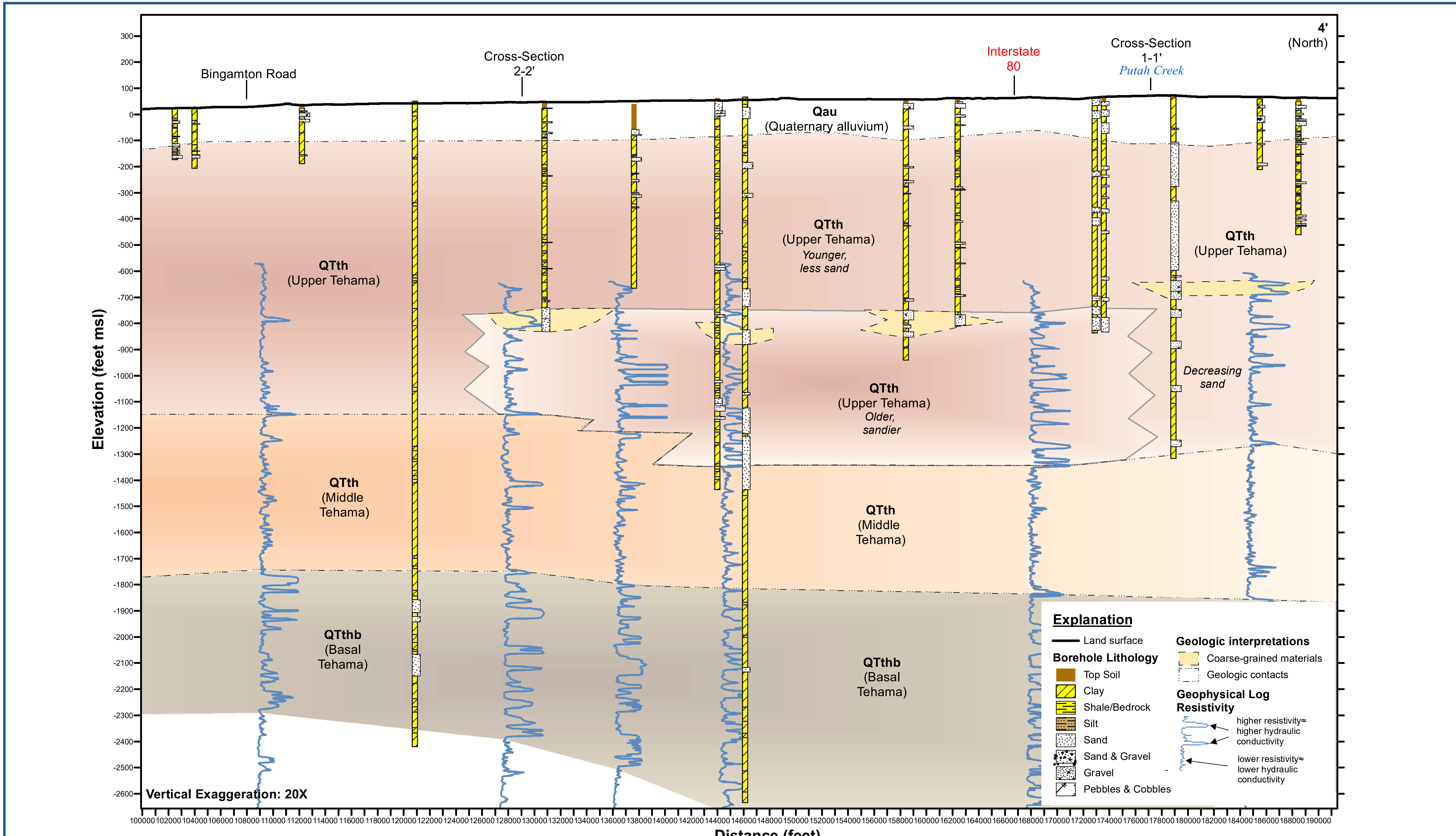
SOLANO SUBBASIN GROUNDWATER SUSTAINABILITY PLAN

LSCE Team

Solano Subbasin Geologic Cross-Section 4-4' (segment 1 of 2)

Figure 1-7a

Water Resources Evaluation
East Solano Homes, Jobs, and Clean Energy Initiative, Solano County



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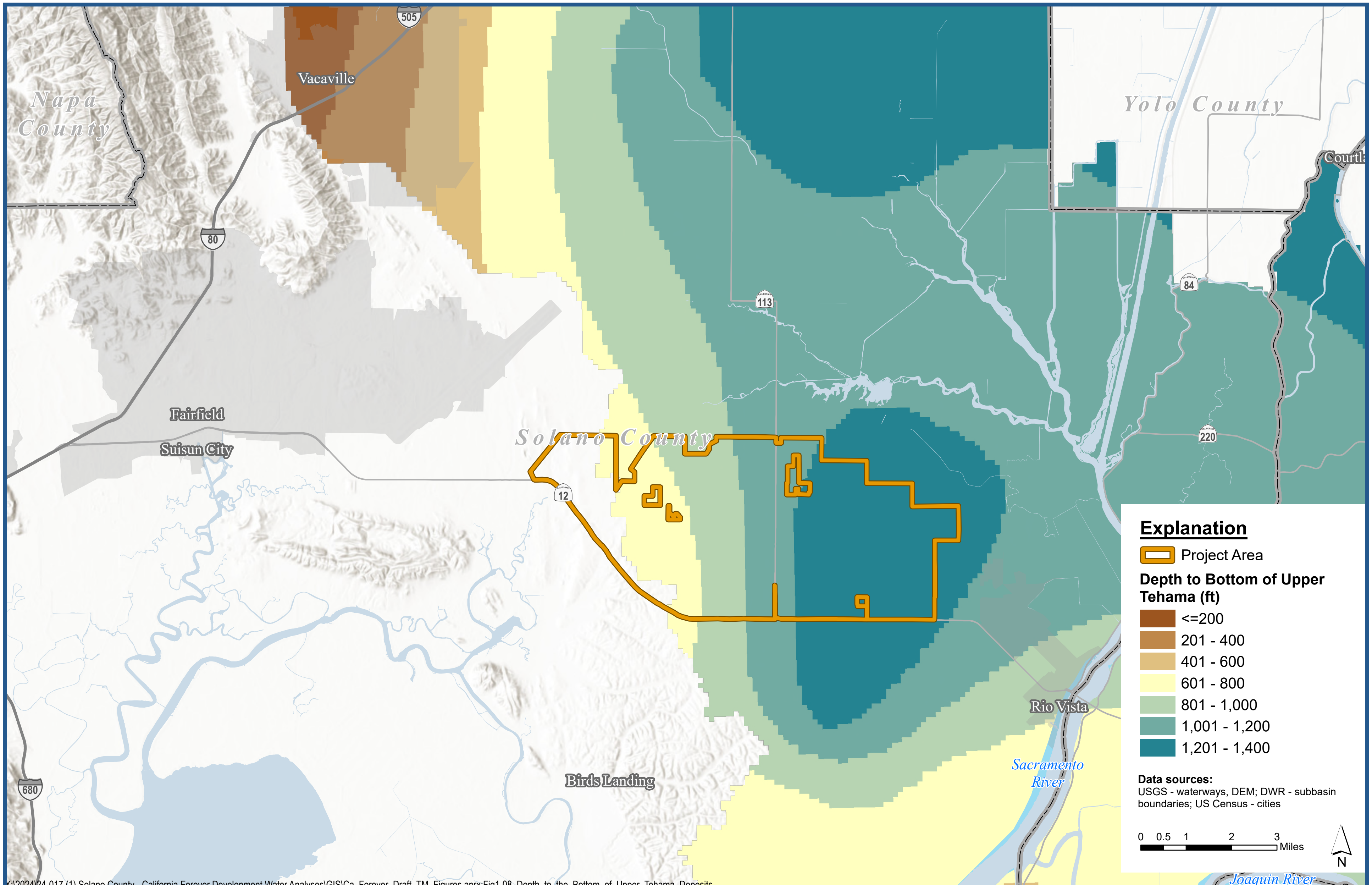
LSCE Team

Solano Subbasin Geologic Cross-Section 4-4' (segment 2 of 2)

Figure 1-7b

Water Resources Evaluation
East Solano Homes, Jobs, and Clean Energy Initiative, Solano County



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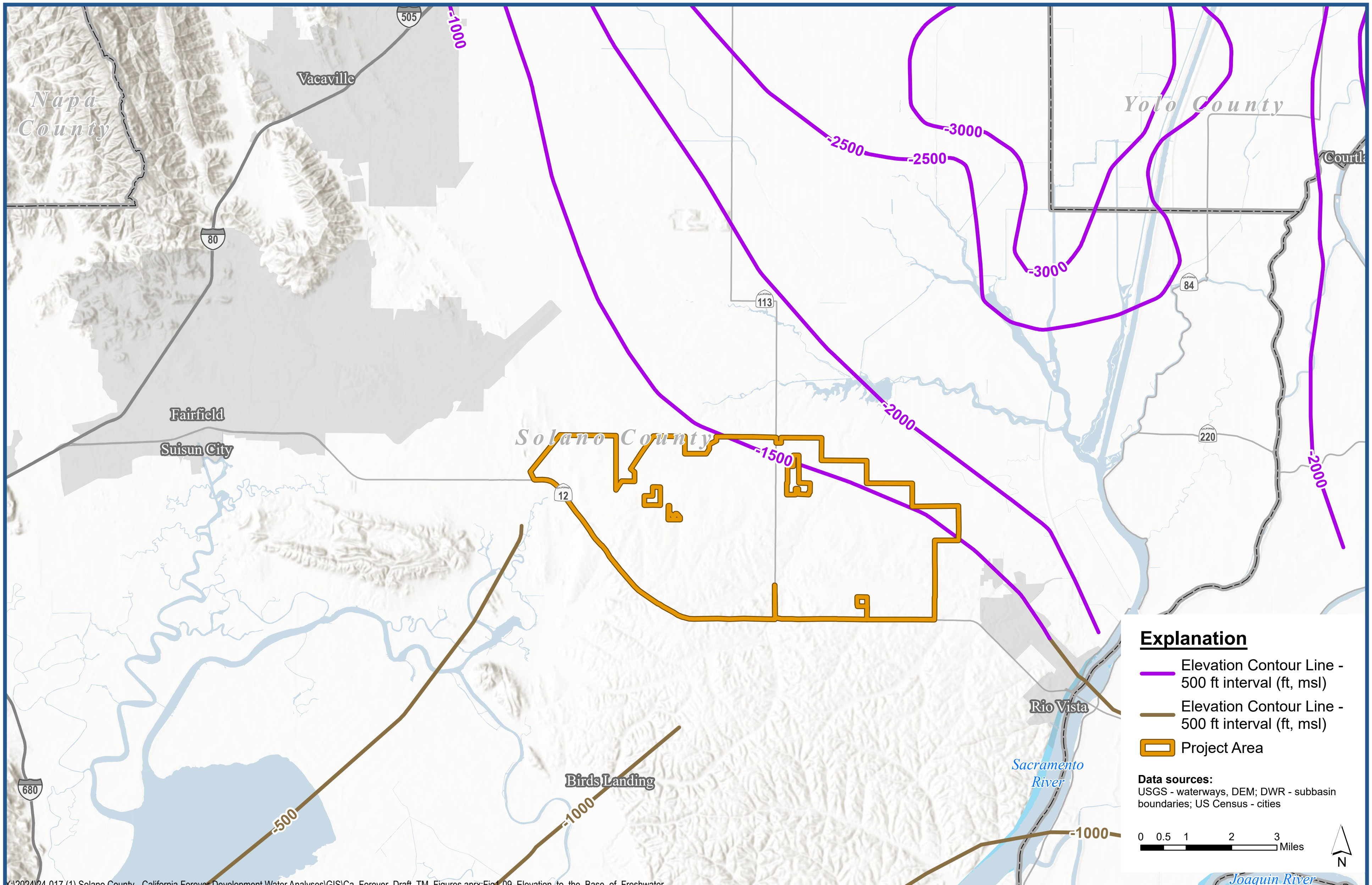
Depth to the Bottom of Upper Tehama Deposits

Figure 1-8

Water Resources Evaluation
East Solano Homes, Jobs, and Clean Energy Initiative, Solano County



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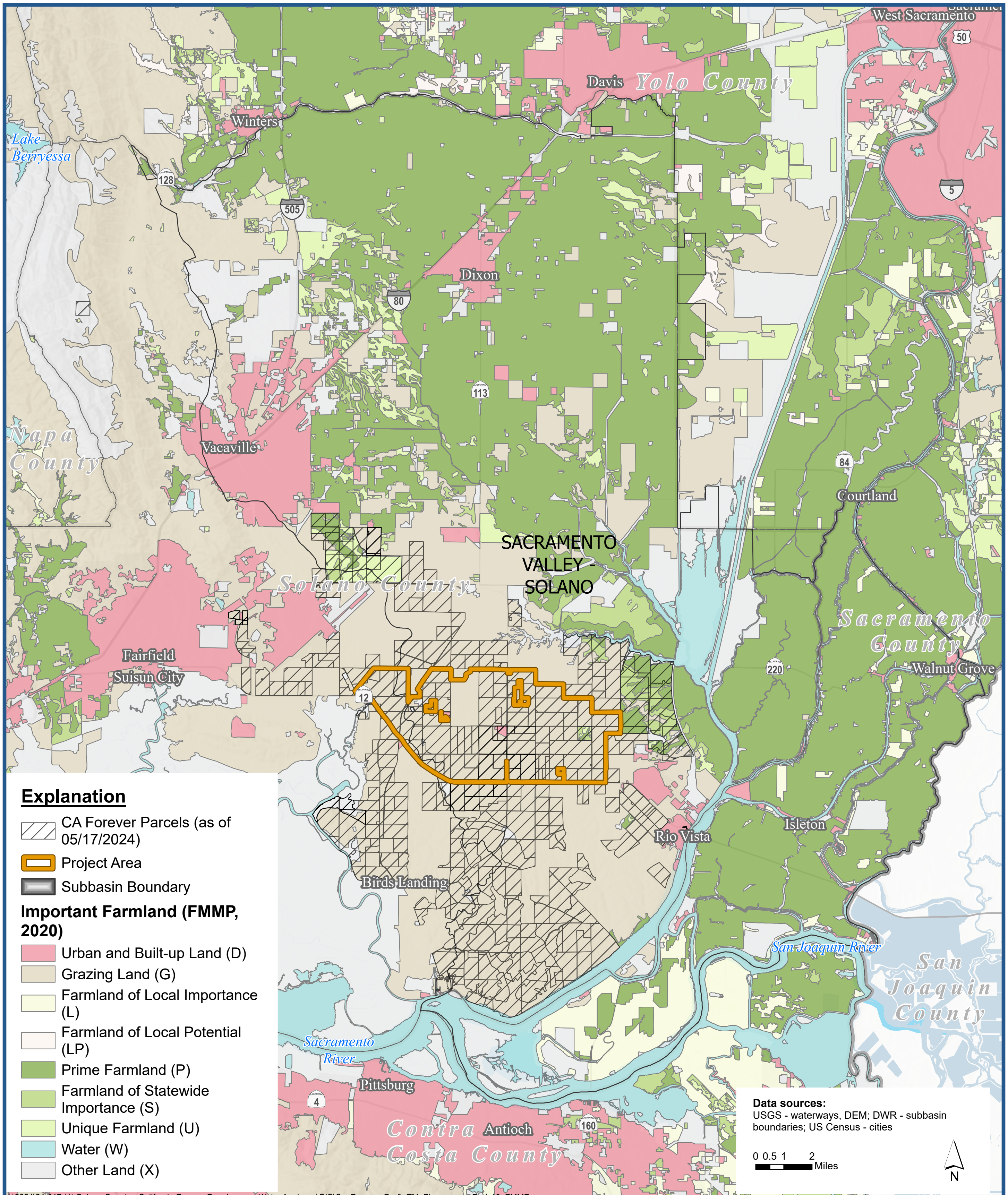
Elevation to the Base of Freshwater

Water Resources Evaluation
East Solano Homes, Jobs, and Clean Energy Initiative, Solano County

Figure 1-9



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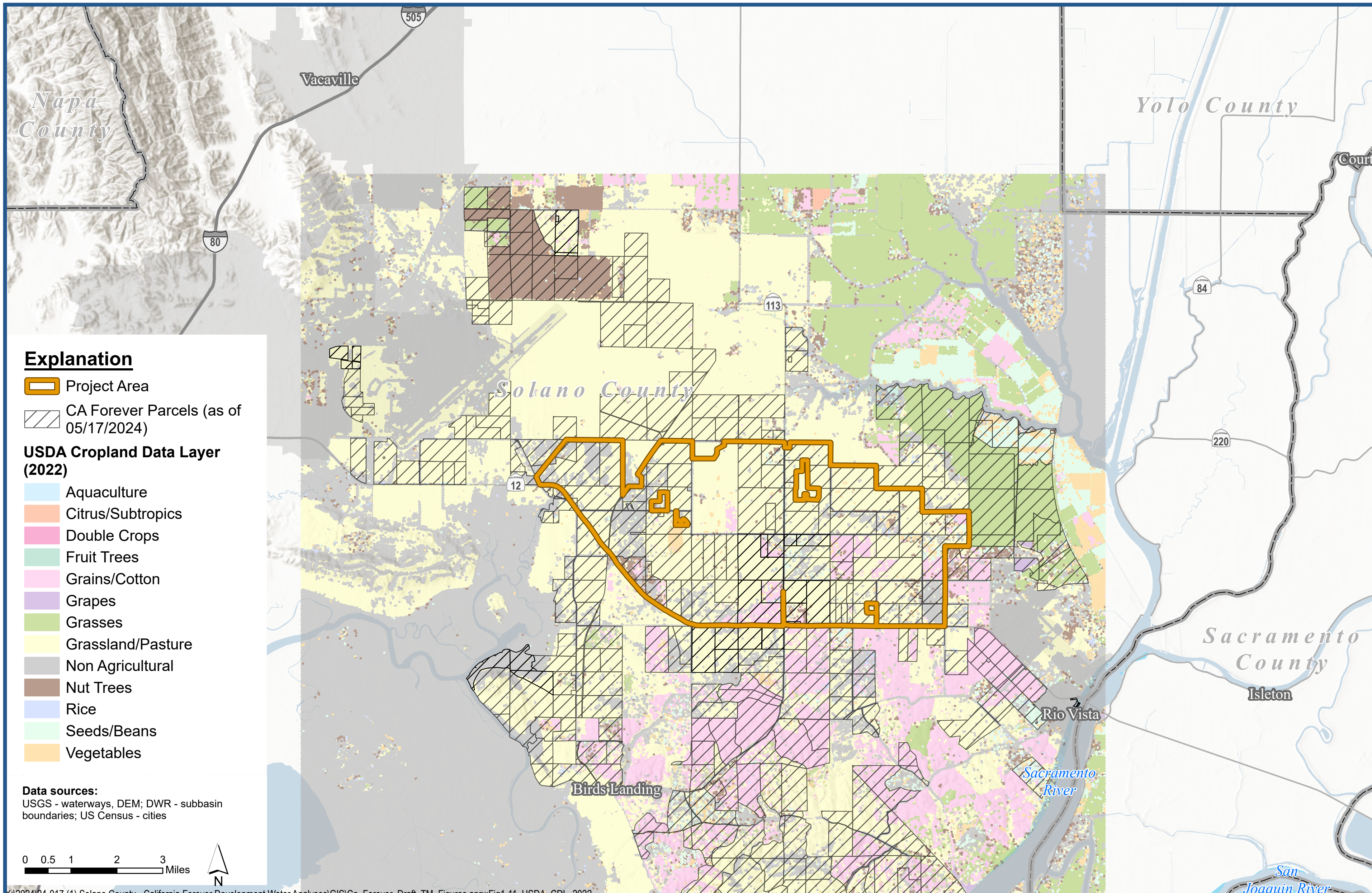
Farmland Monitoring and Mapping Program (FMMP)

Figure 1-10

Water Resources Evaluation
East Solano Homes, Jobs, and Clean Energy Initiative, Solano County



Explanation

- Project Area
- CA Forever Parcels (as of 05/17/2024)

USDA Cropland Data Layer (2022)

- Aquaculture
- Citrus/Subtropics
- Double Crops
- Fruit Trees
- Grains/Cotton
- Grapes
- Grasses
- Grassland/Pasture
- Non Agricultural
- Nut Trees
- Rice
- Seeds/Beans
- Vegetables

Data sources:
USGS - waterways, DEM; DWR - subbasin boundaries; US Census - cities

0 0.5 1 2 3 Miles

N

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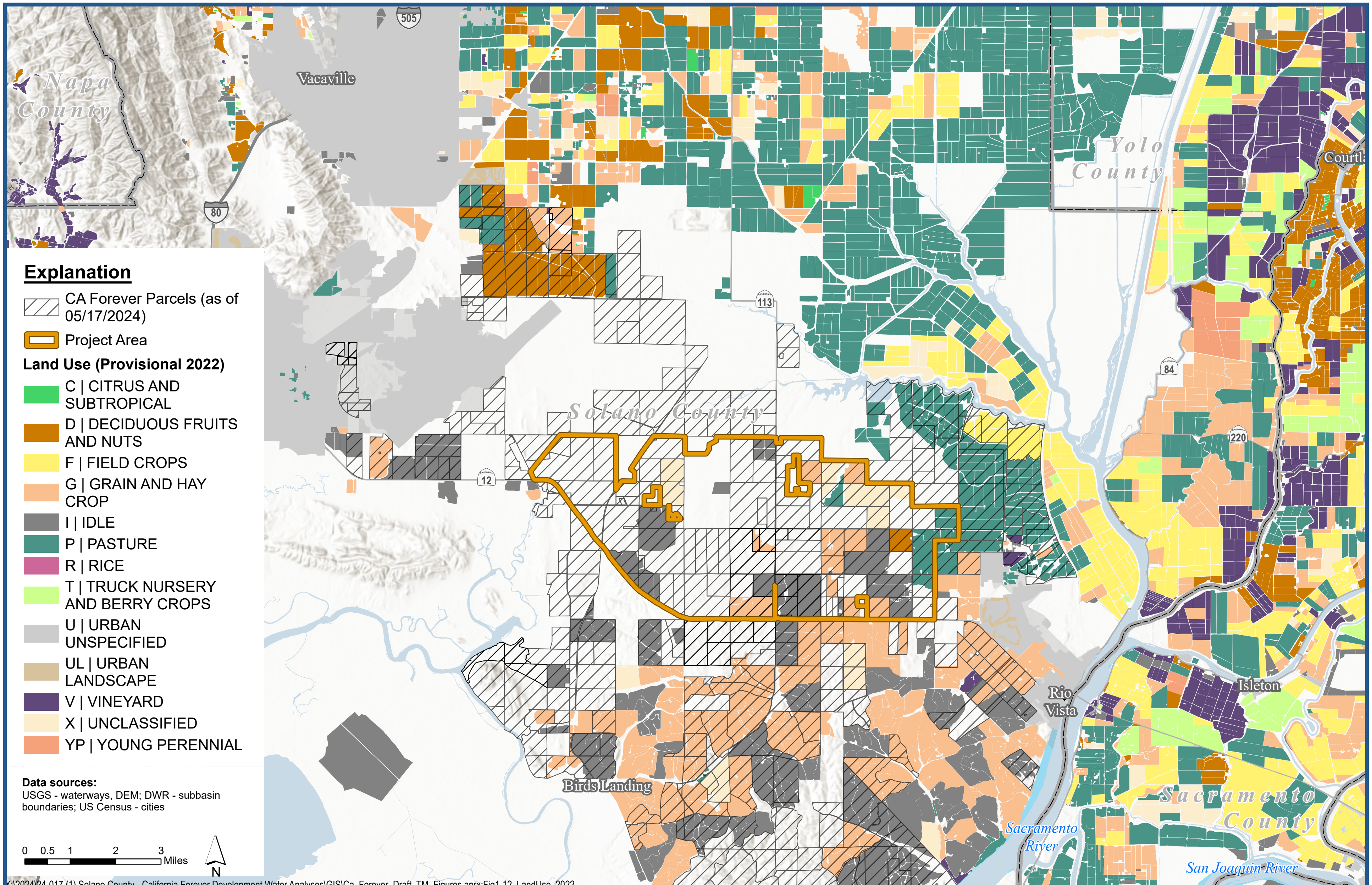
USDA Cropland Data Layer (2022)

Water Resources Evaluation
East Solano Homes, Jobs, and Clean Energy Initiative, Solano County

Figure 1-11



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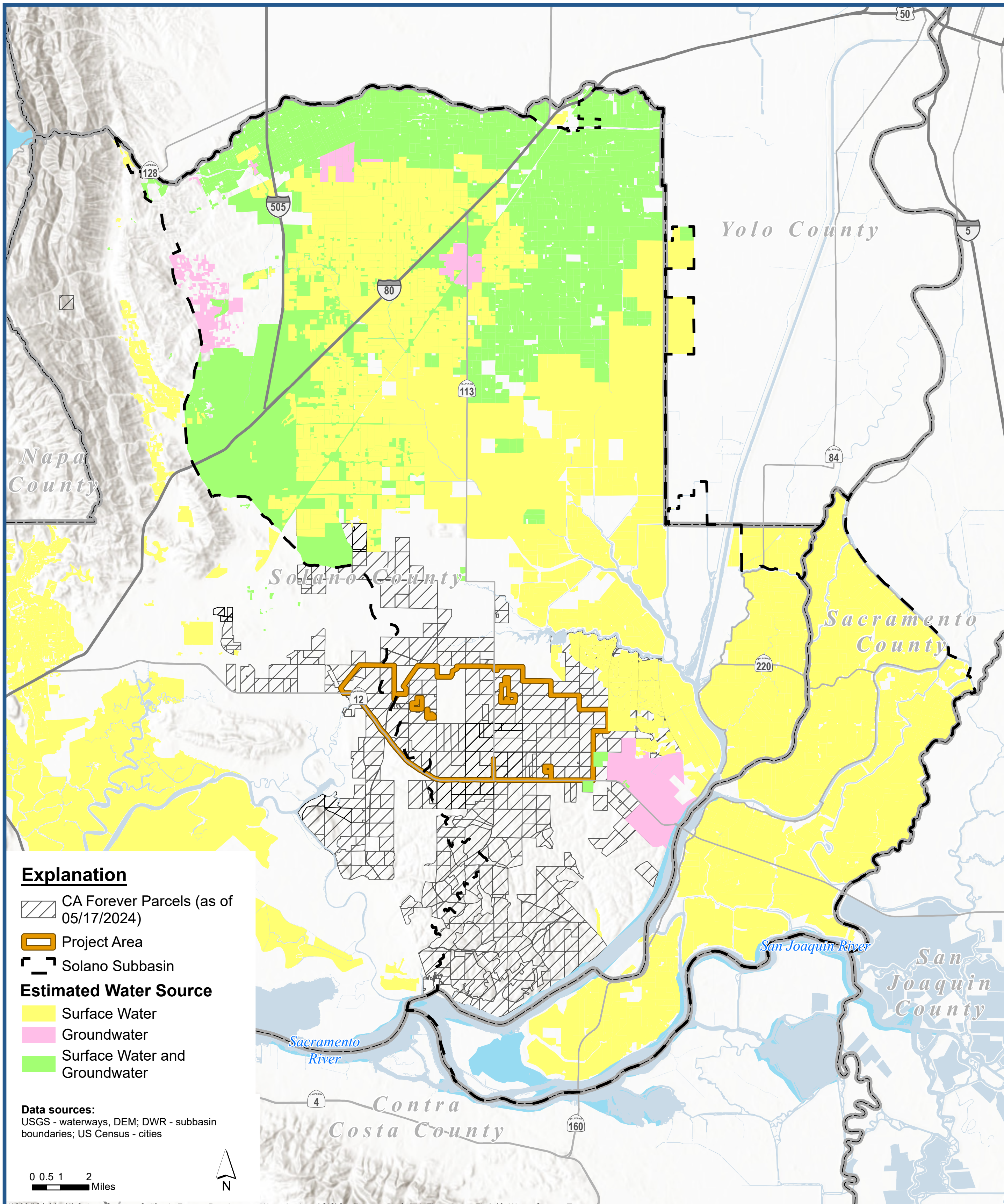
Land Use 2022 (DWR)

Figure 1-12

Water Resources Evaluation
East Solano Homes, Jobs, and Clean Energy Initiative, Solano County



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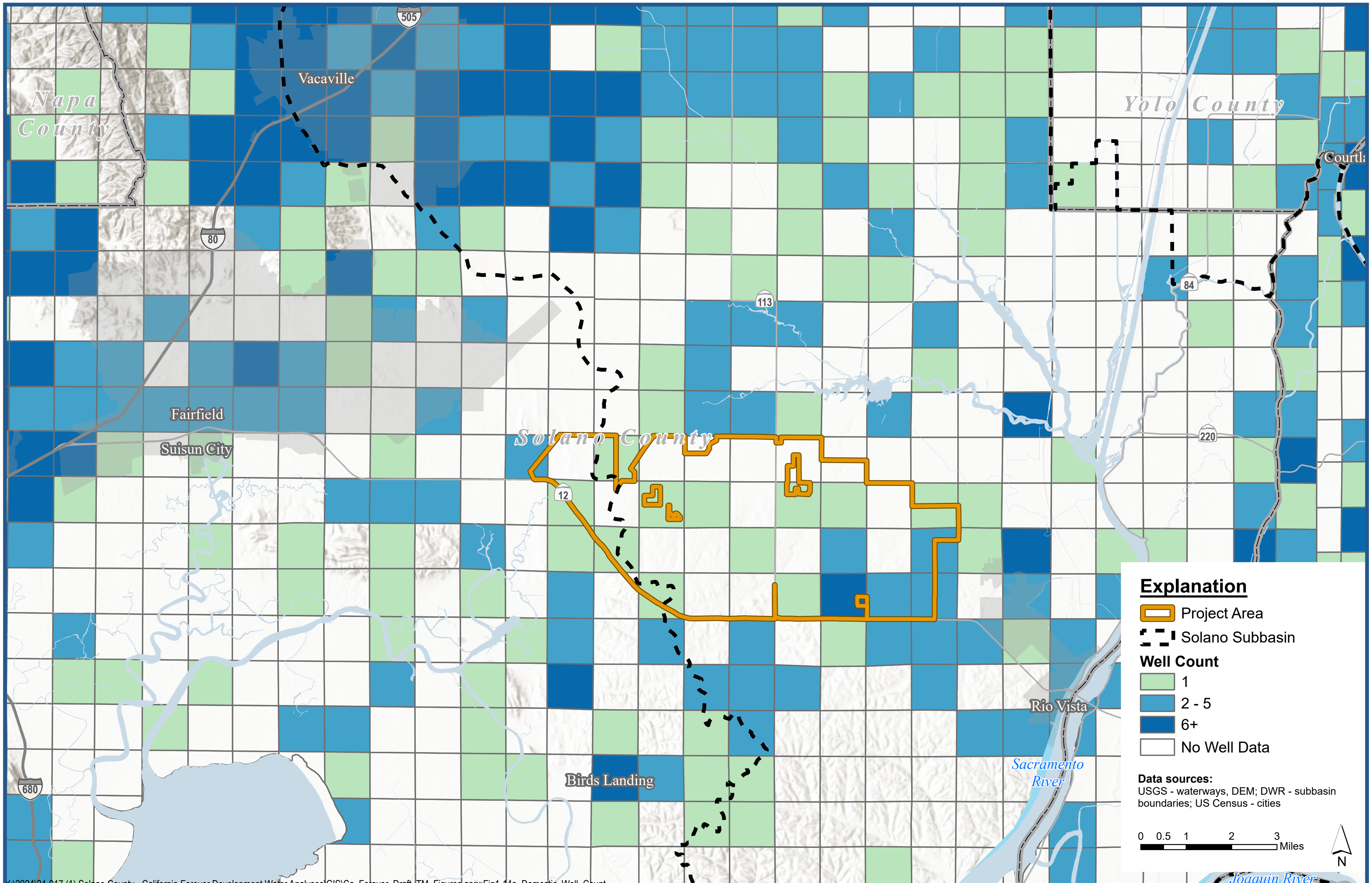
Water Source Type

Figure 1-13

Water Resources Evaluation

East Solano Homes, Jobs, and Clean Energy Initiative, Solano County



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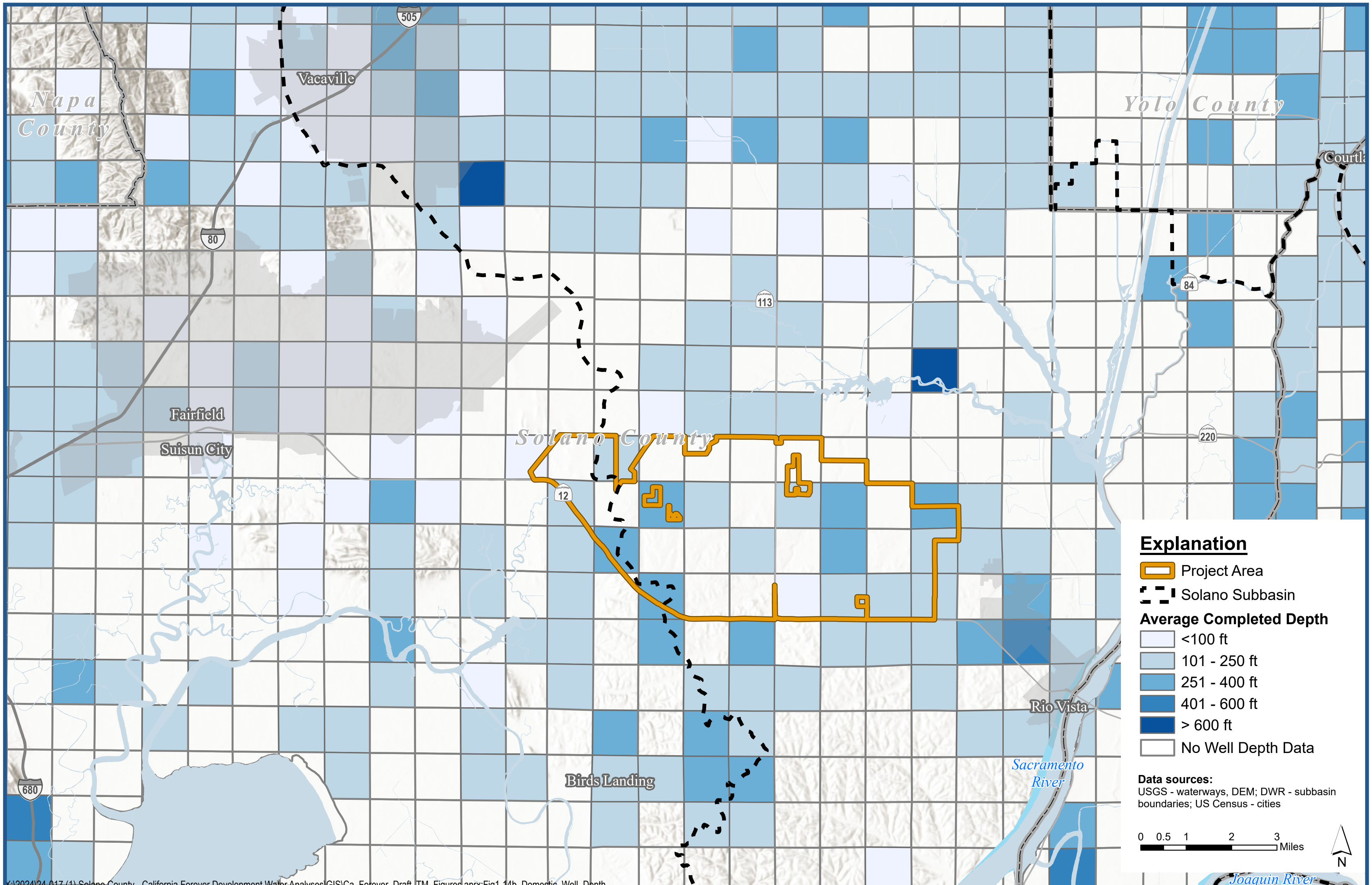
Domestic Well Count by Section

Water Resources Evaluation
East Solano Homes, Jobs, and Clean Energy Initiative, Solano County

Figure 1-14a



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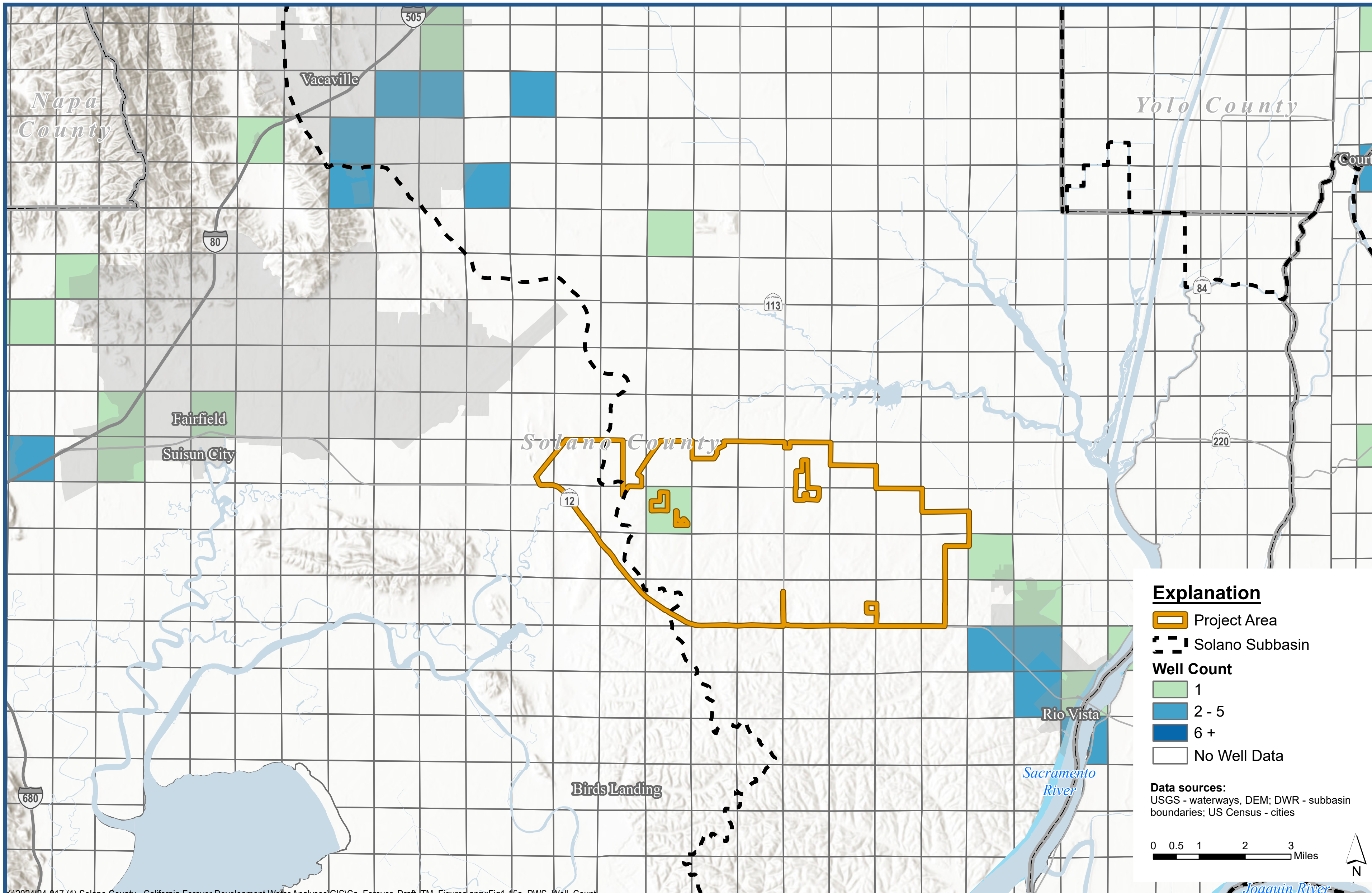
Average Domestic Well Depth by Section

Water Resources Evaluation
East Solano Homes, Jobs, and Clean Energy Initiative, Solano County

Figure 1-14b



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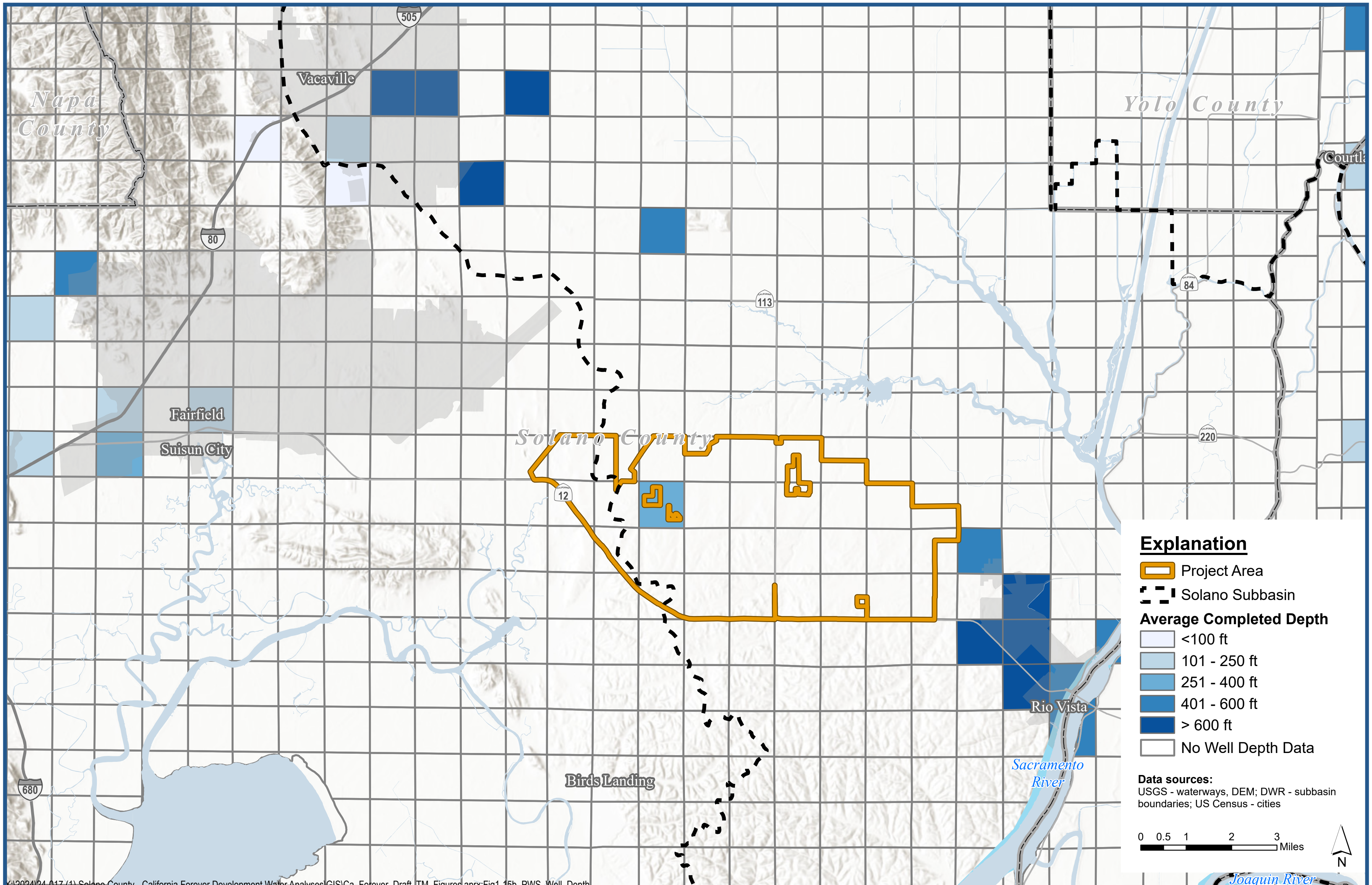
Public Water Supply Well Count by Section

Water Resources Evaluation
East Solano Homes, Jobs, and Clean Energy Initiative, Solano County

Figure 1-15a



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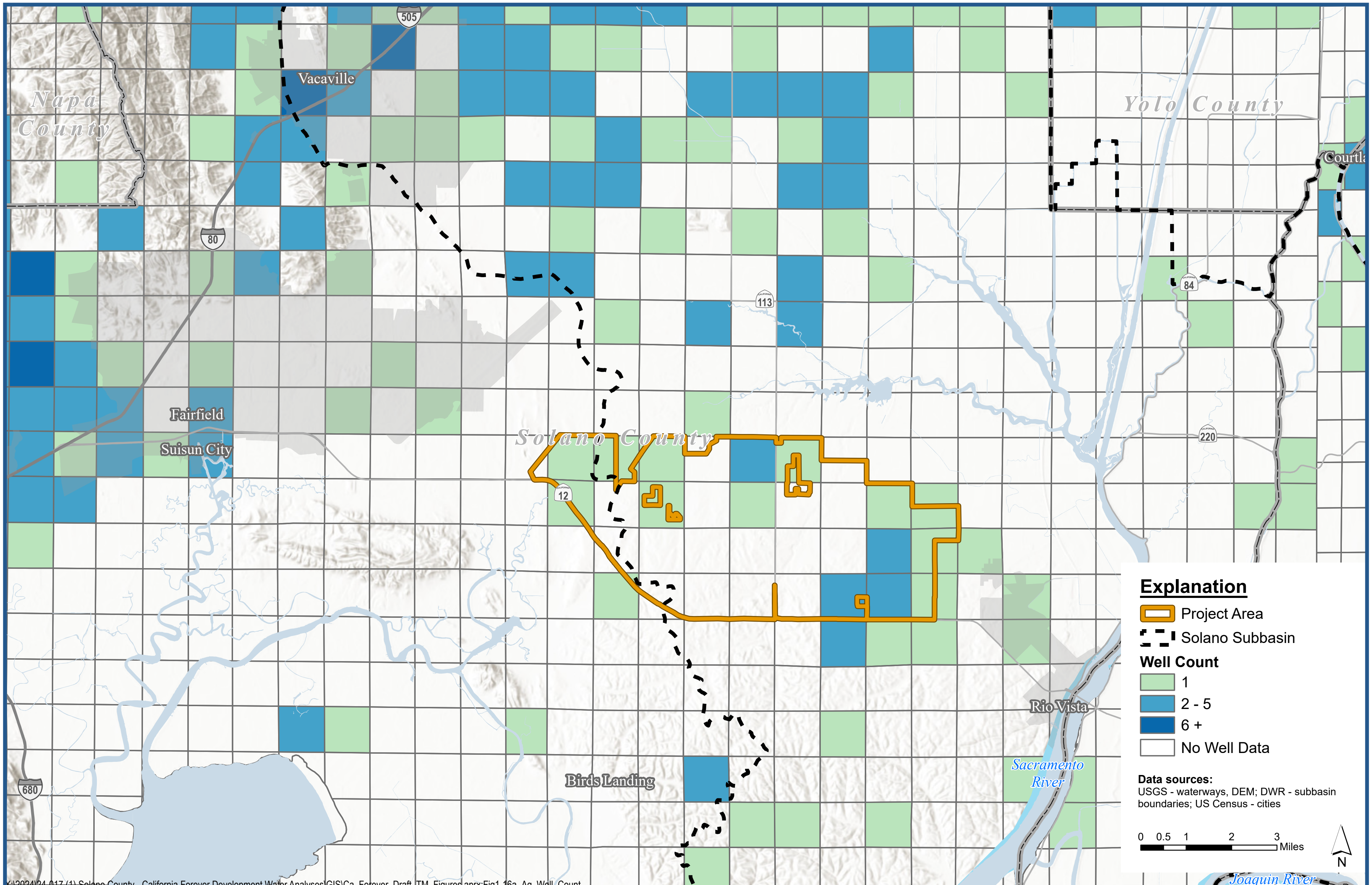
Average Public Water Supply Well Depth by Section

Water Resources Evaluation
East Solano Homes, Jobs, and Clean Energy Initiative, Solano County

Figure 1-15b



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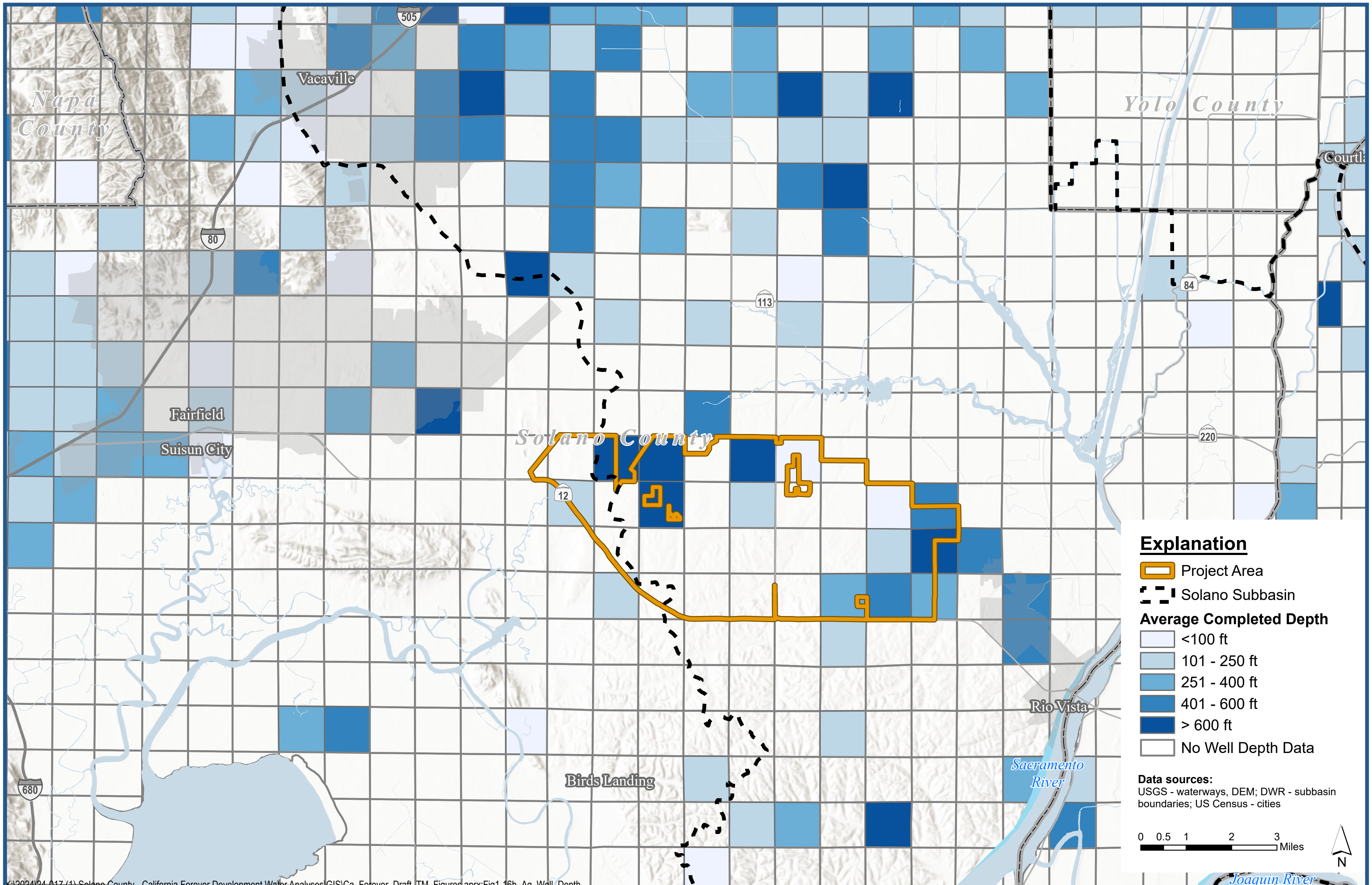
Agricultural Well Count by Section

Water Resources Evaluation
East Solano Homes, Jobs, and Clean Energy Initiative, Solano County

Figure 1-16a



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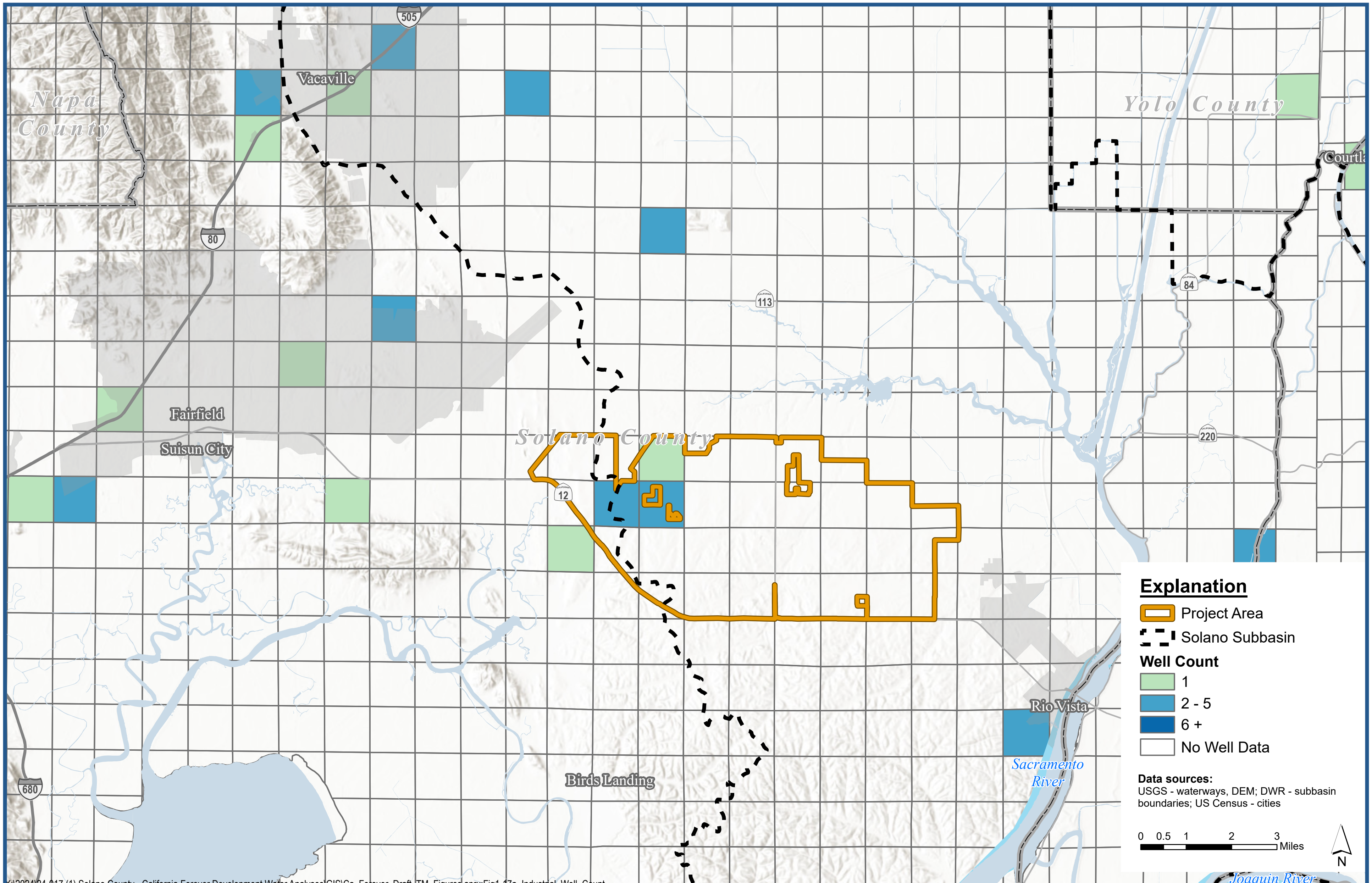
Average Agricultural Well Depth by Section

Water Resources Evaluation
East Solano Homes, Jobs, and Clean Energy Initiative, Solano County

Figure 1-16b



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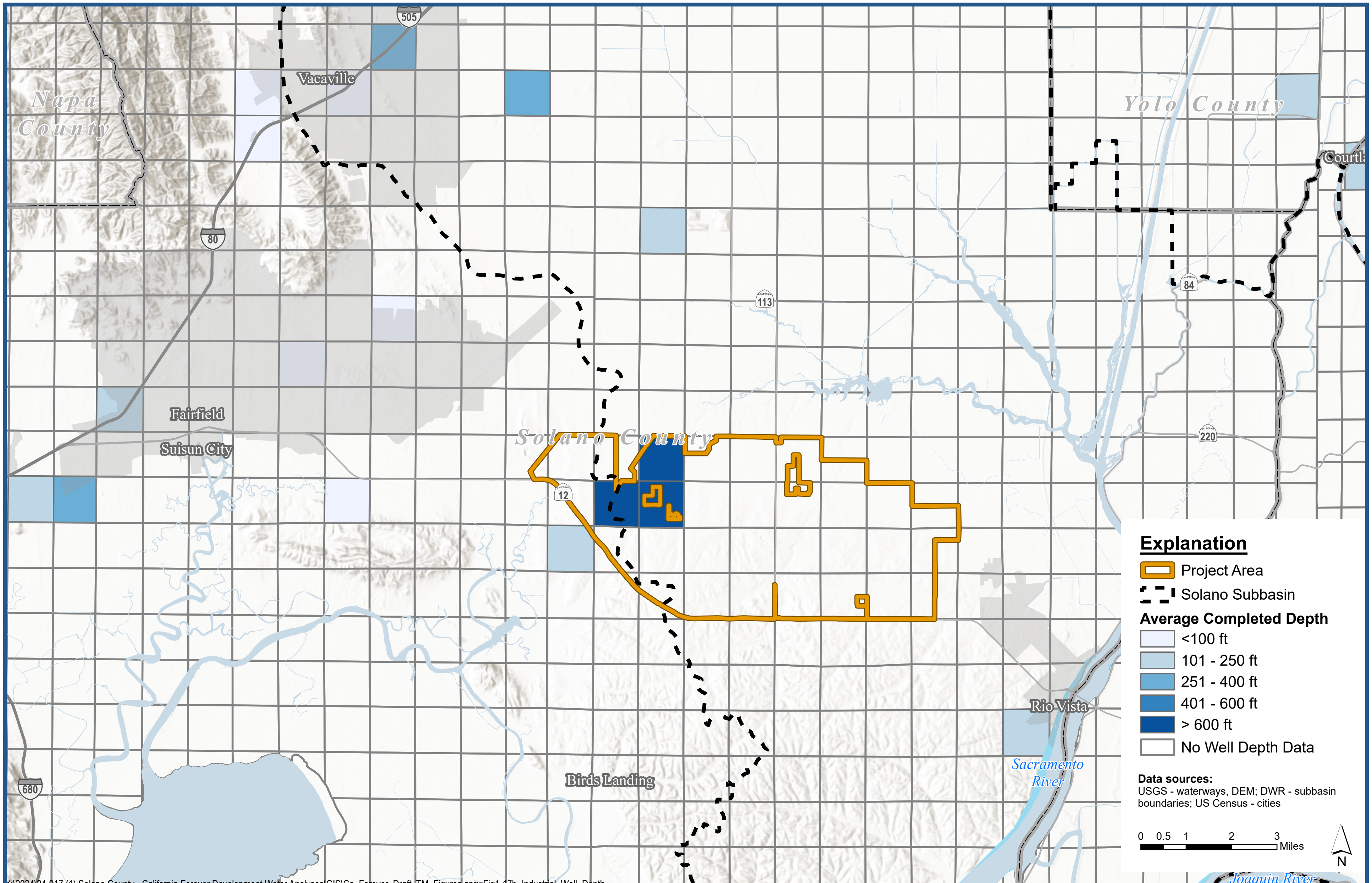
Industrial Well Count by Section

Water Resources Evaluation
East Solano Homes, Jobs, and Clean Energy Initiative, Solano County

Figure 1-17a



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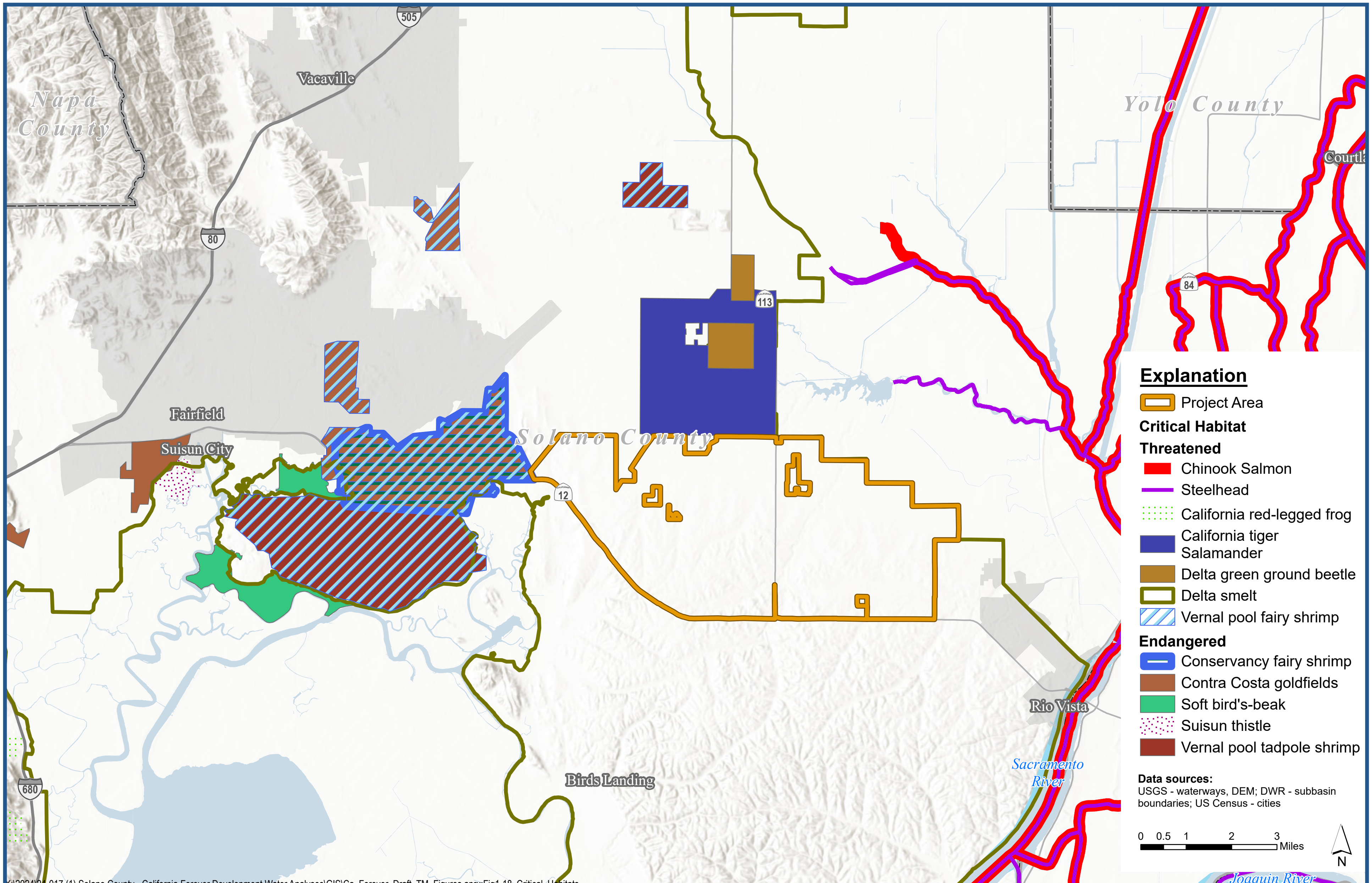
Average Industrial Well Depth by Section

Water Resources Evaluation
East Solano Homes, Jobs, and Clean Energy Initiative, Solano County

Figure 1-17b



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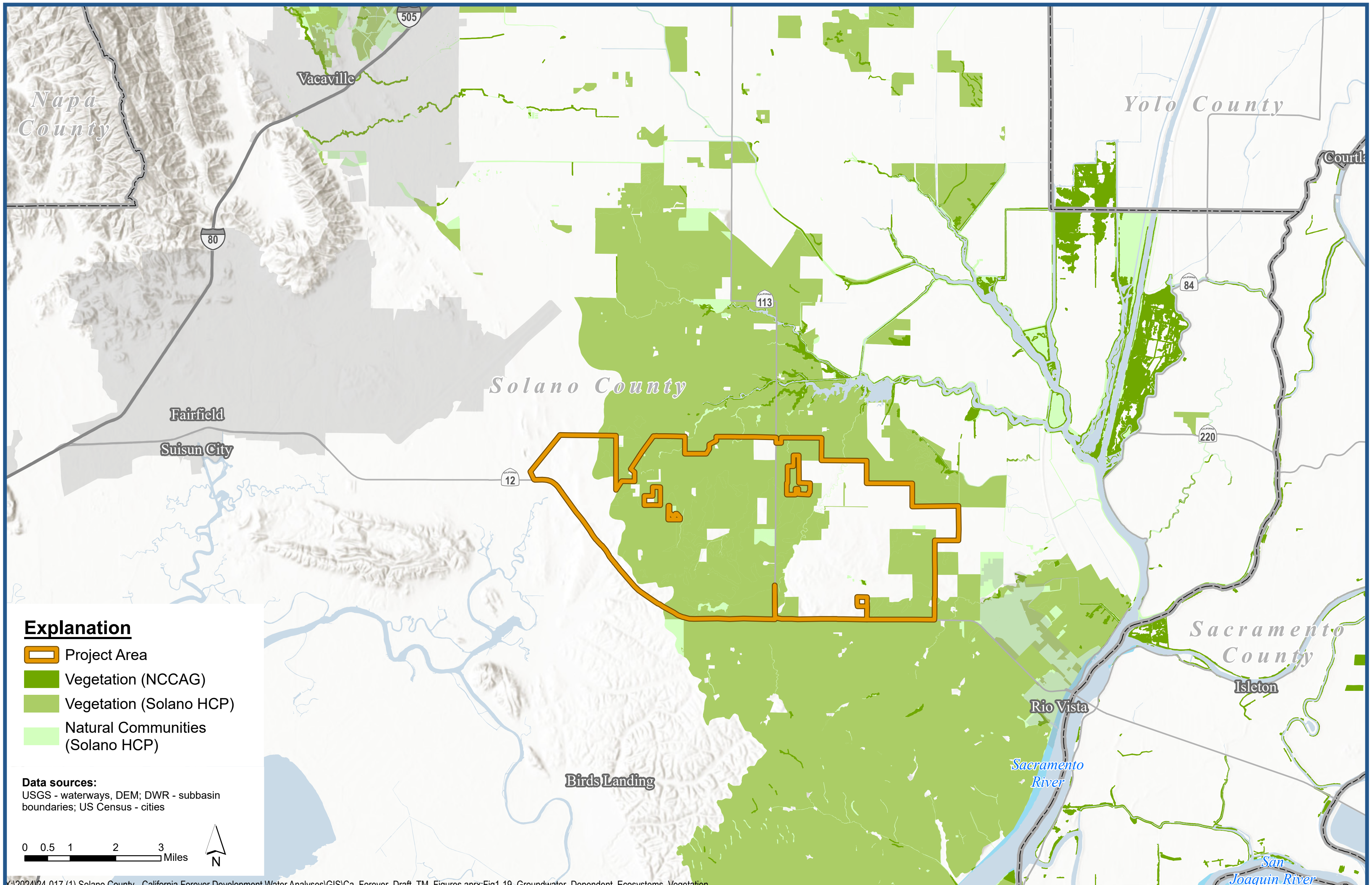
Critical Habitats

Water Resources Evaluation
East Solano Homes, Jobs, and Clean Energy Initiative, Solano County

Figure 1-18



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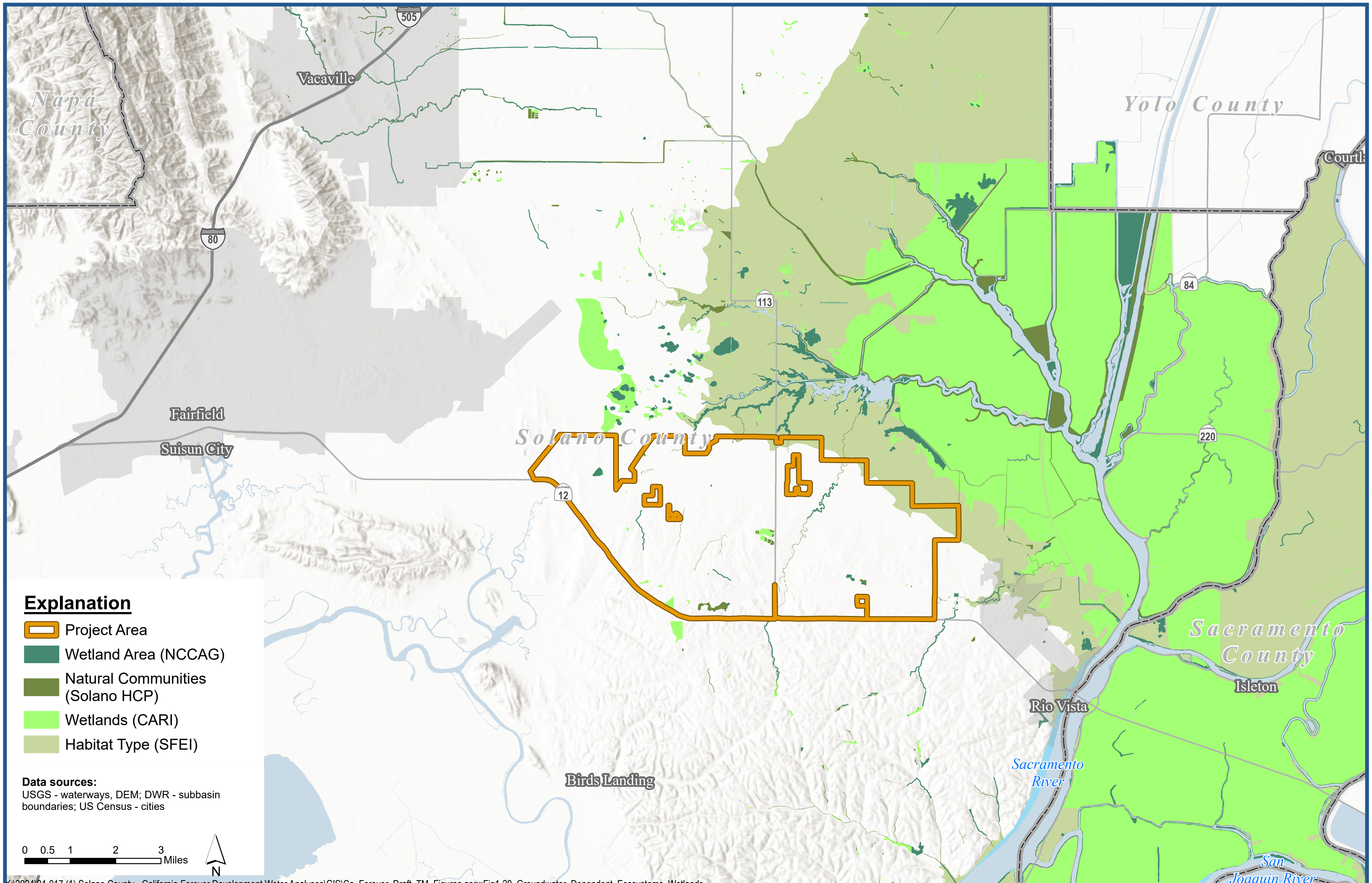
Groundwater Dependent Ecosystems-Vegetation

Water Resources Evaluation
East Solano Homes, Jobs, and Clean Energy Initiative, Solano County

Figure 1-19



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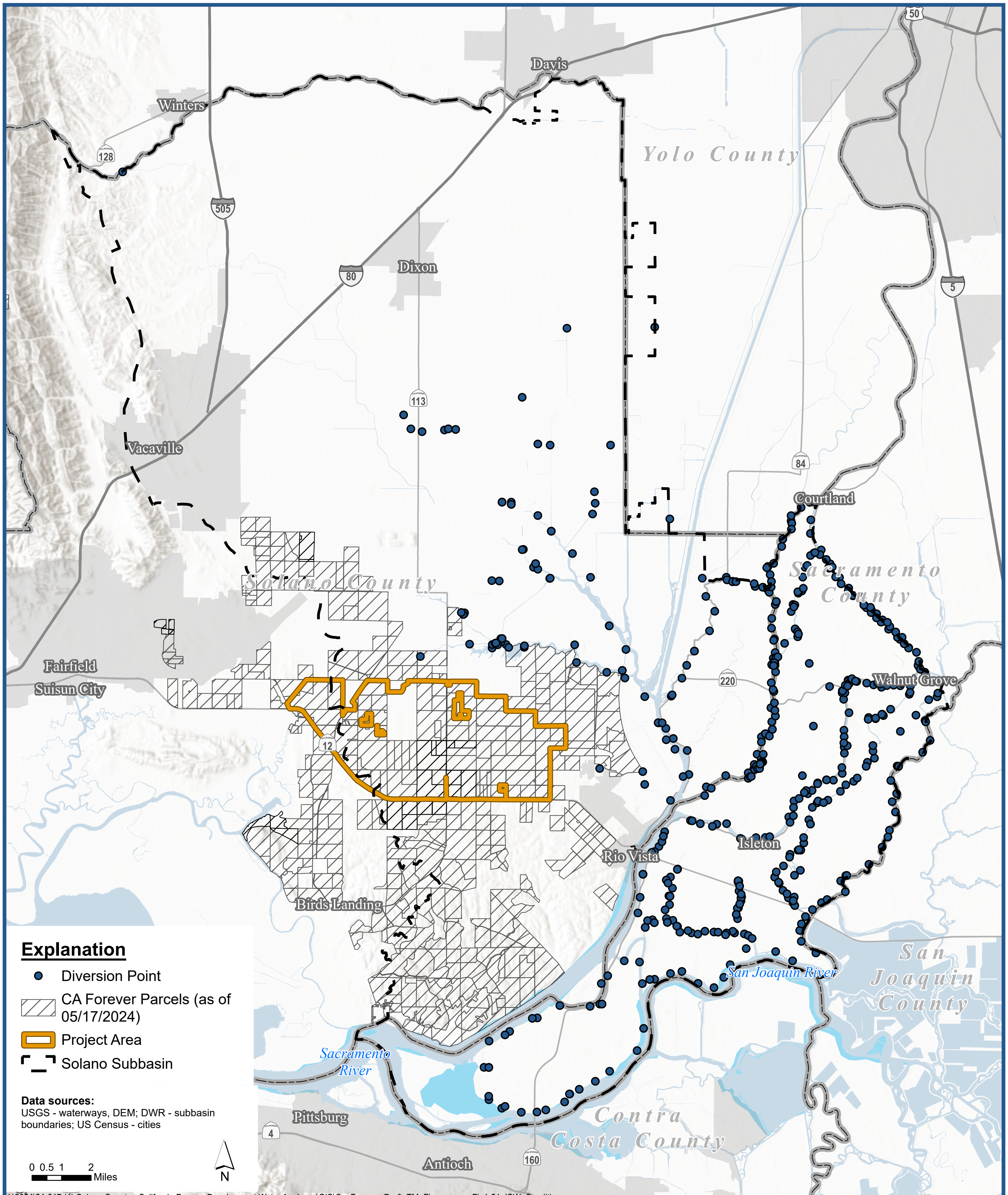
Groundwater Dependent Ecosystems-Wetlands

Water Resources Evaluation
East Solano Homes, Jobs, and Clean Energy Initiative, Solano County

Figure 1-20



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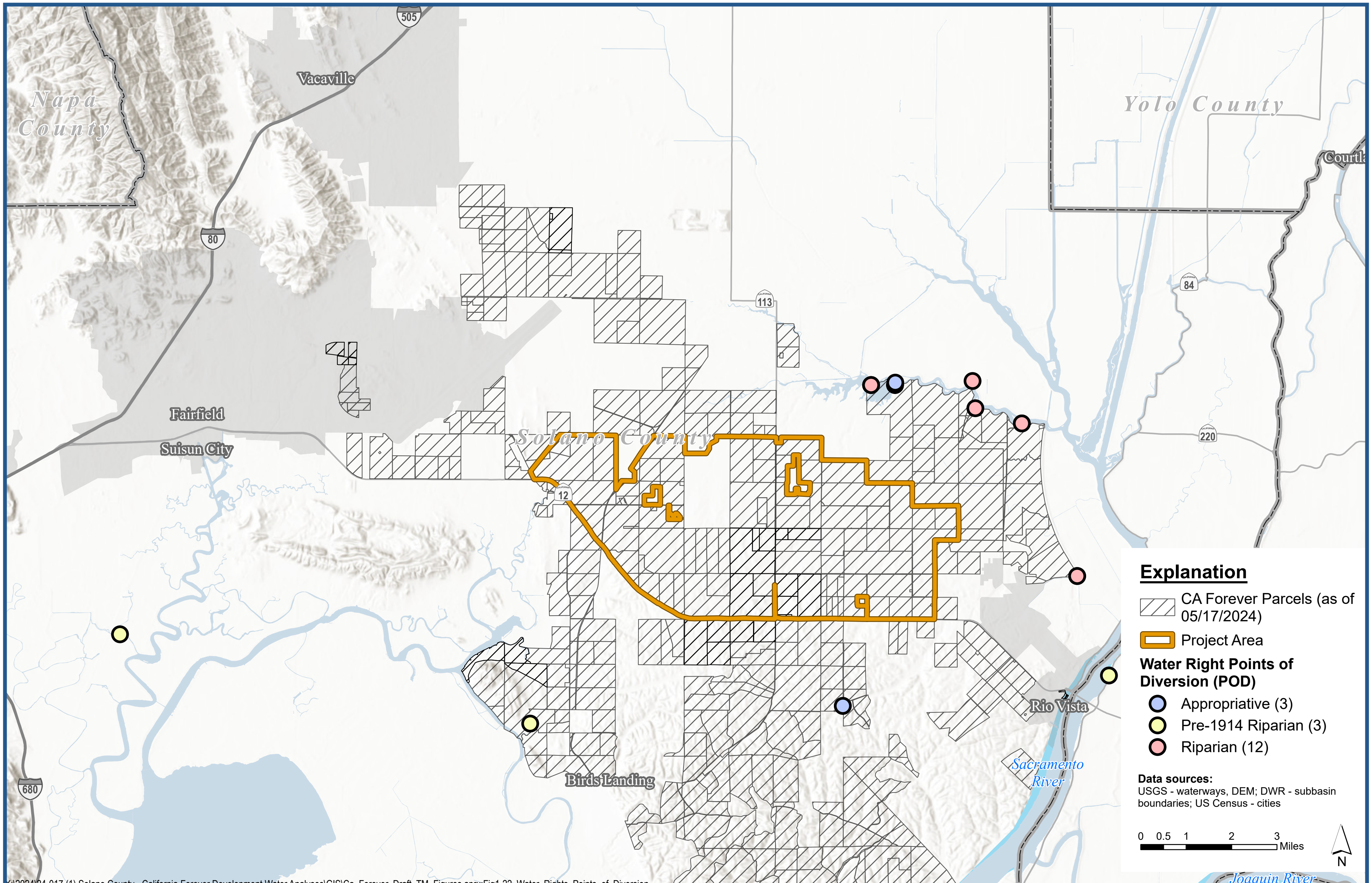
Interconnected Surface Water Conditions

Figure 1-21

Water Resources Evaluation
East Solano Homes, Jobs, and Clean Energy Initiative, Solano County



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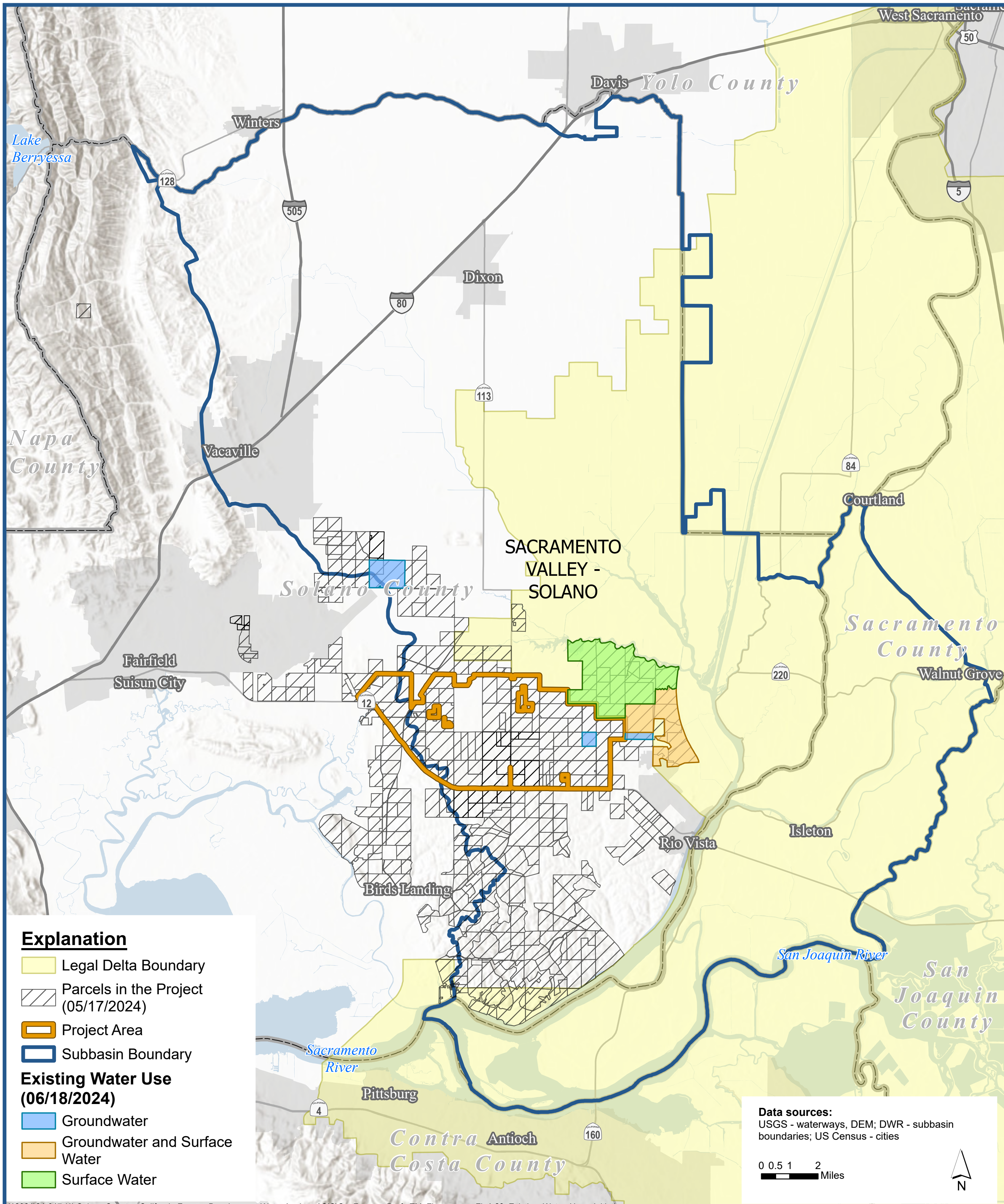
Water Rights Points of Diversion

Water Resources Evaluation
East Solano Homes, Jobs, and Clean Energy Initiative, Solano County

Figure 1-22



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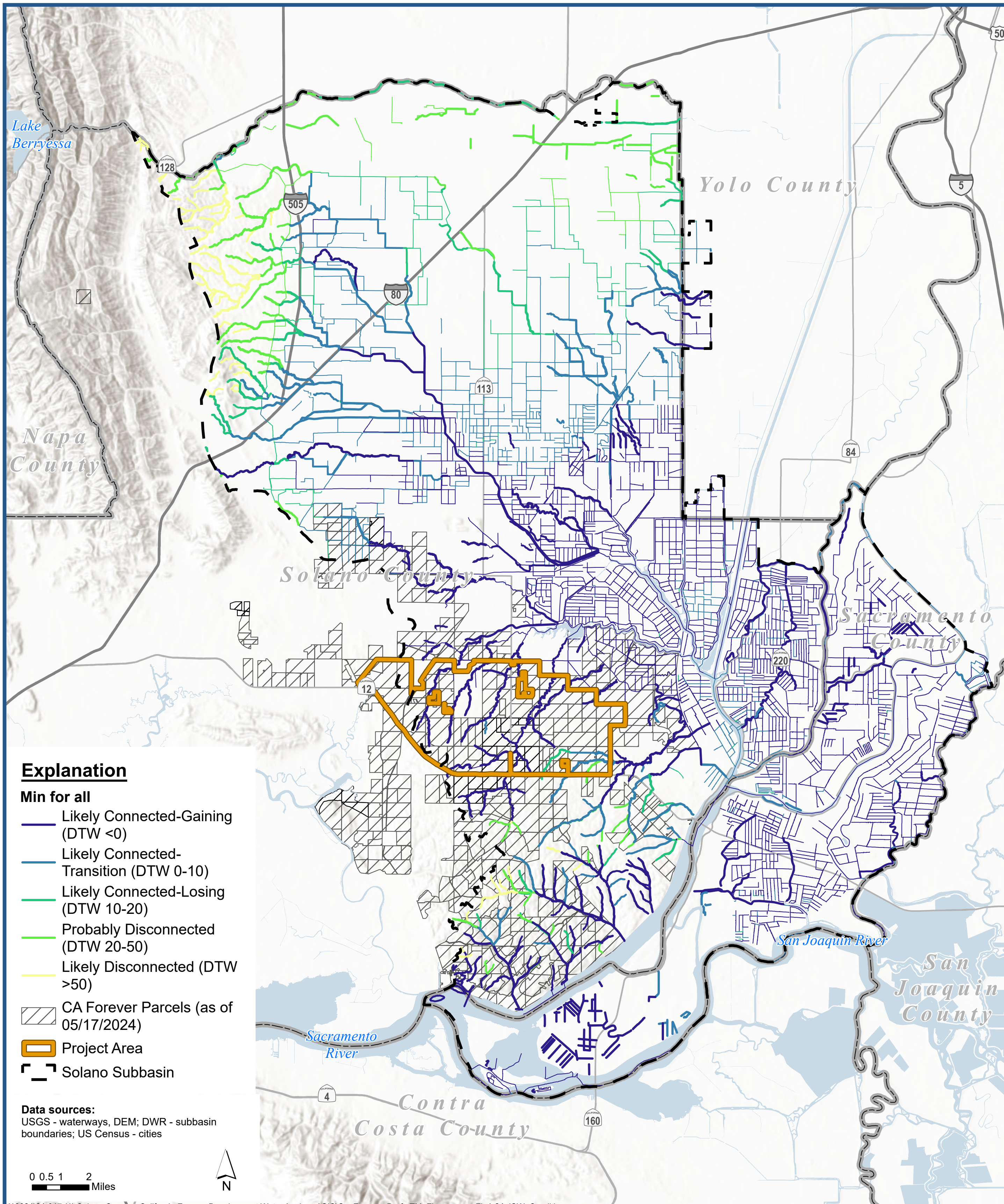
Existing Water Uses Noted Available for Use by Project (from CA Forever release on June 18, 2024)

Water Resources Evaluation
East Solano Homes, Jobs, and Clean Energy Initiative, Solano County

Figure 1-23



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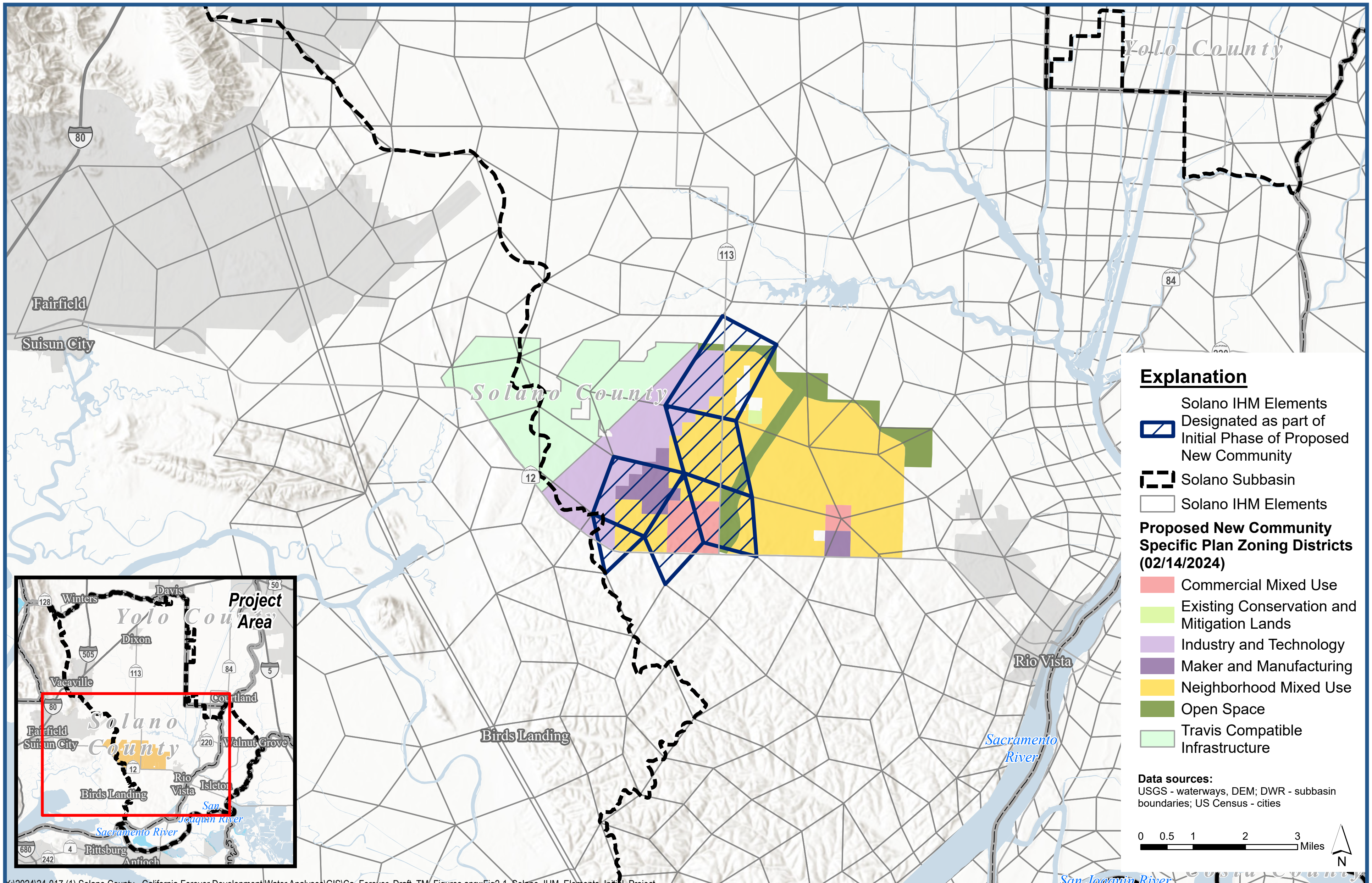
Interconnected Surface Water Conditions

Water Resources Evaluation
East Solano Homes, Jobs, and Clean Energy Initiative, Solano County

Figure 1-24



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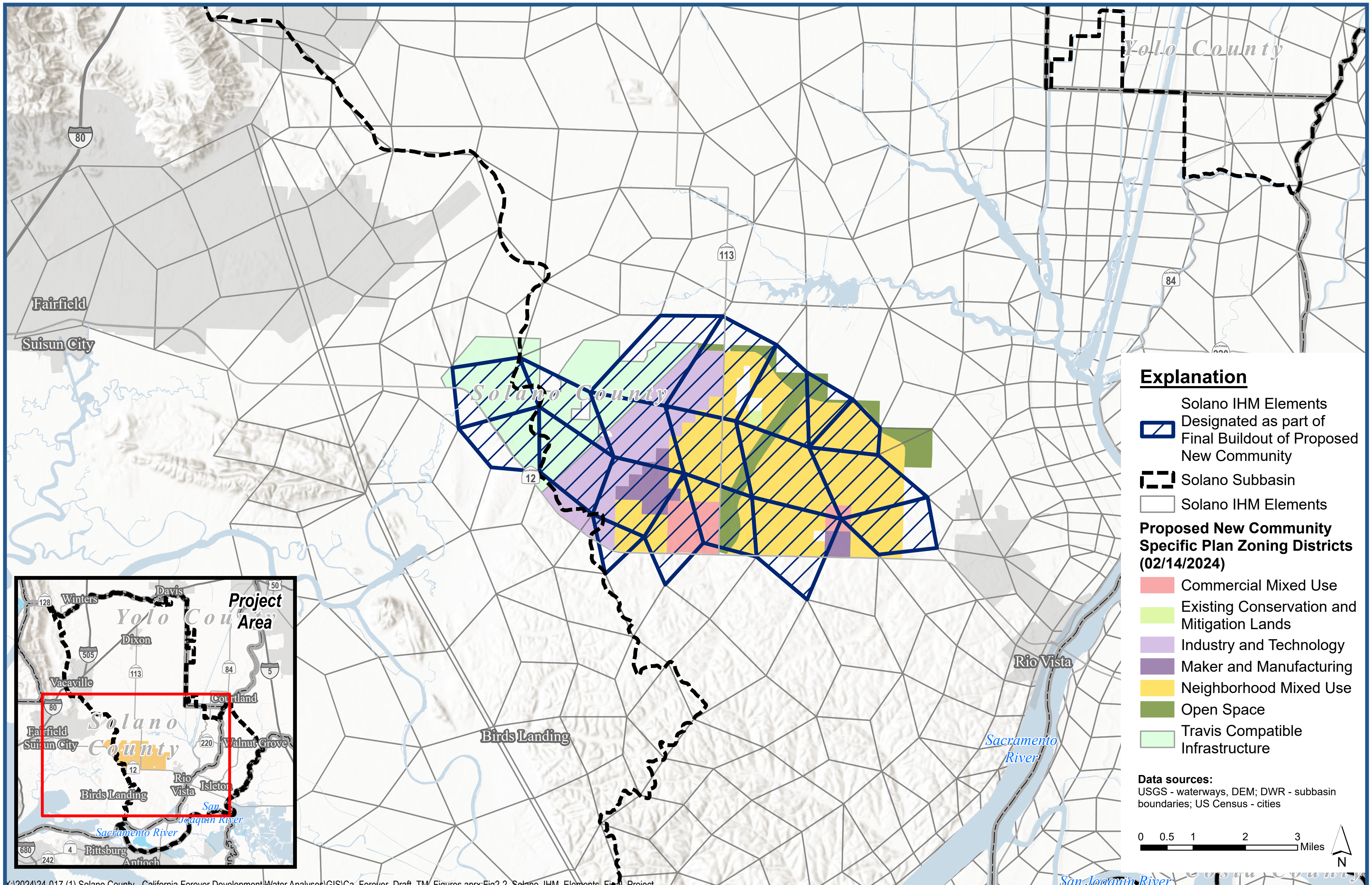
Solano IHM Elements Designated as part of Initial Phase of Proposed New Community

Water Resources Evaluation
East Solano Homes, Jobs, and Clean Energy Initiative, Solano County

Figure 2-1



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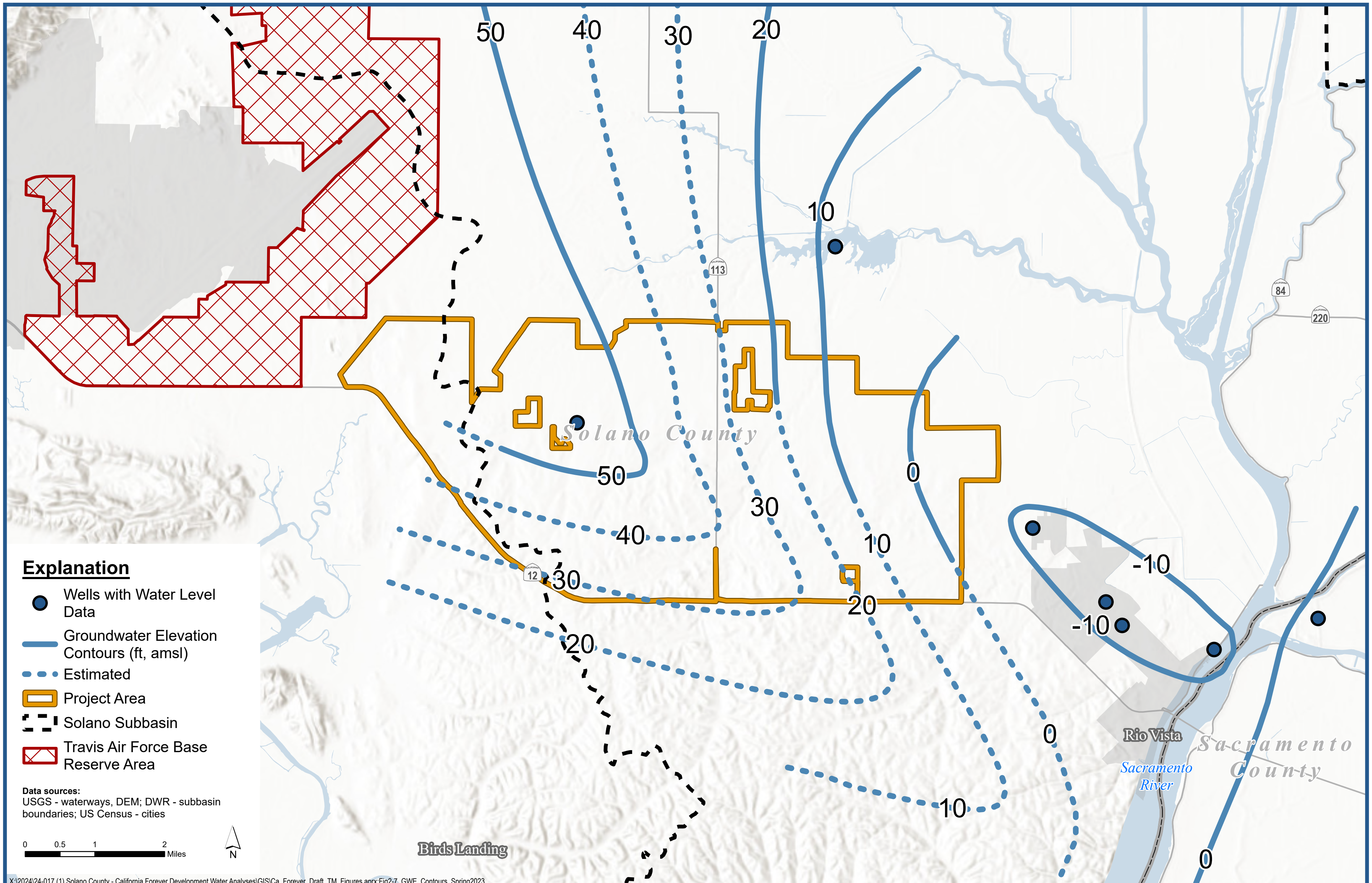
Solano IHM Elements Designated as part of Final Buildout of Proposed New Community

Figure 2-2

Water Resources Evaluation
East Solano Homes, Jobs, and Clean Energy Initiative, Solano County



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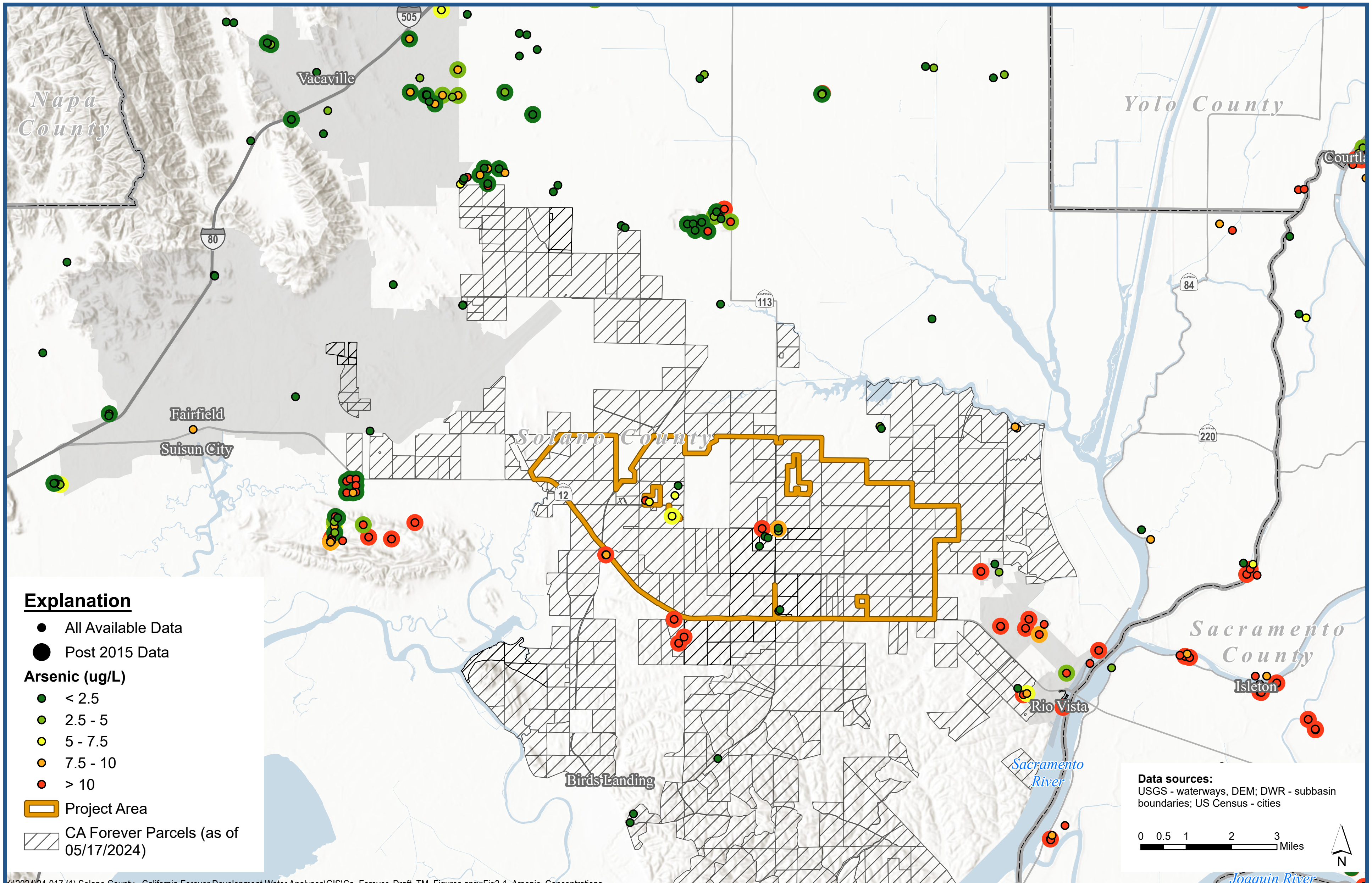
Groundwater Elevation Contours - Spring 2023

Water Resources Evaluation
East Solano Homes, Jobs, and Clean Energy Initiative, Solano County

Figure 2-9



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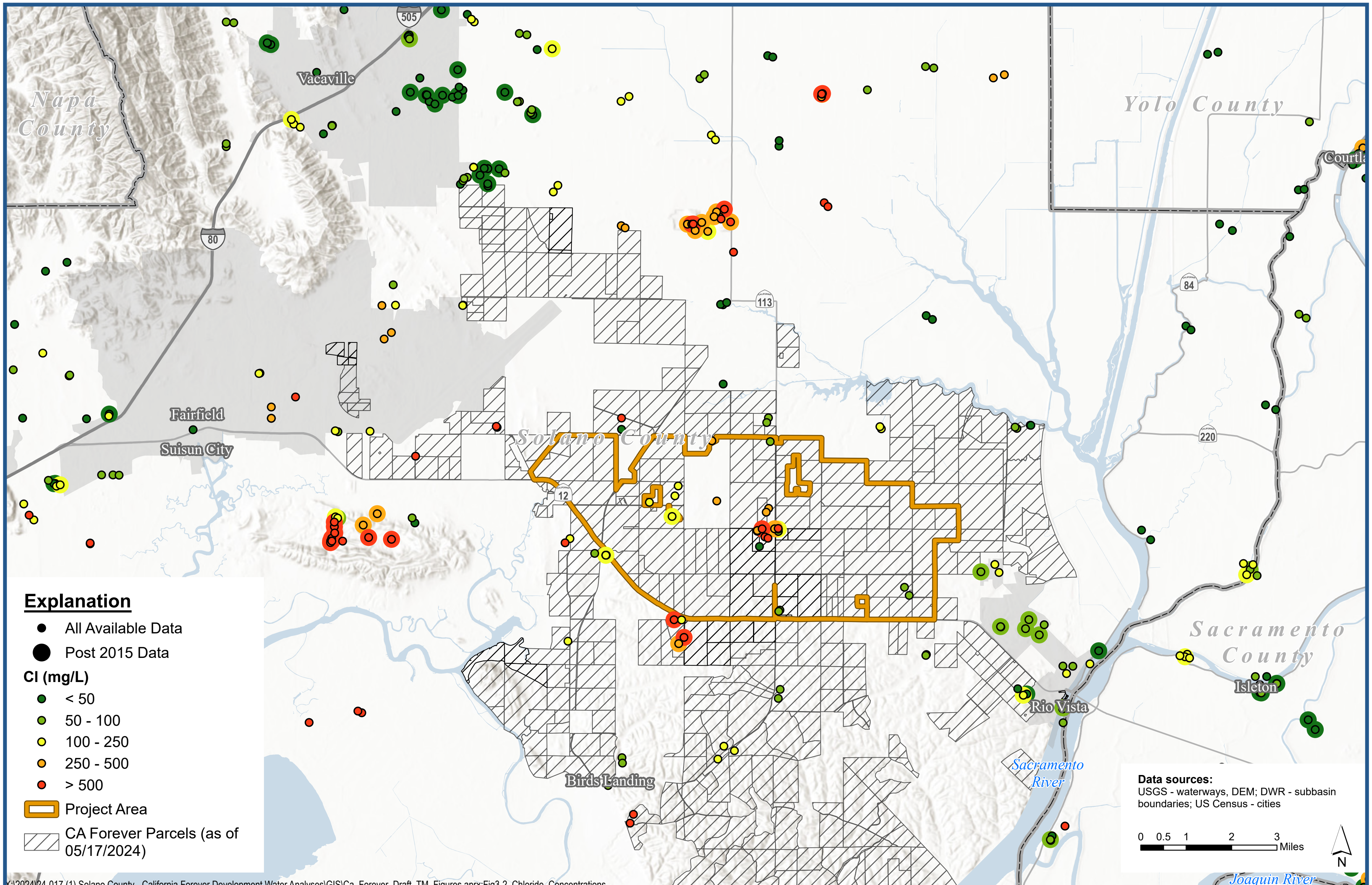
Maximum Arsenic Concentration

Water Resources Evaluation
East Solano Homes, Jobs, and Clean Energy Initiative, Solano County

Figure 3-1



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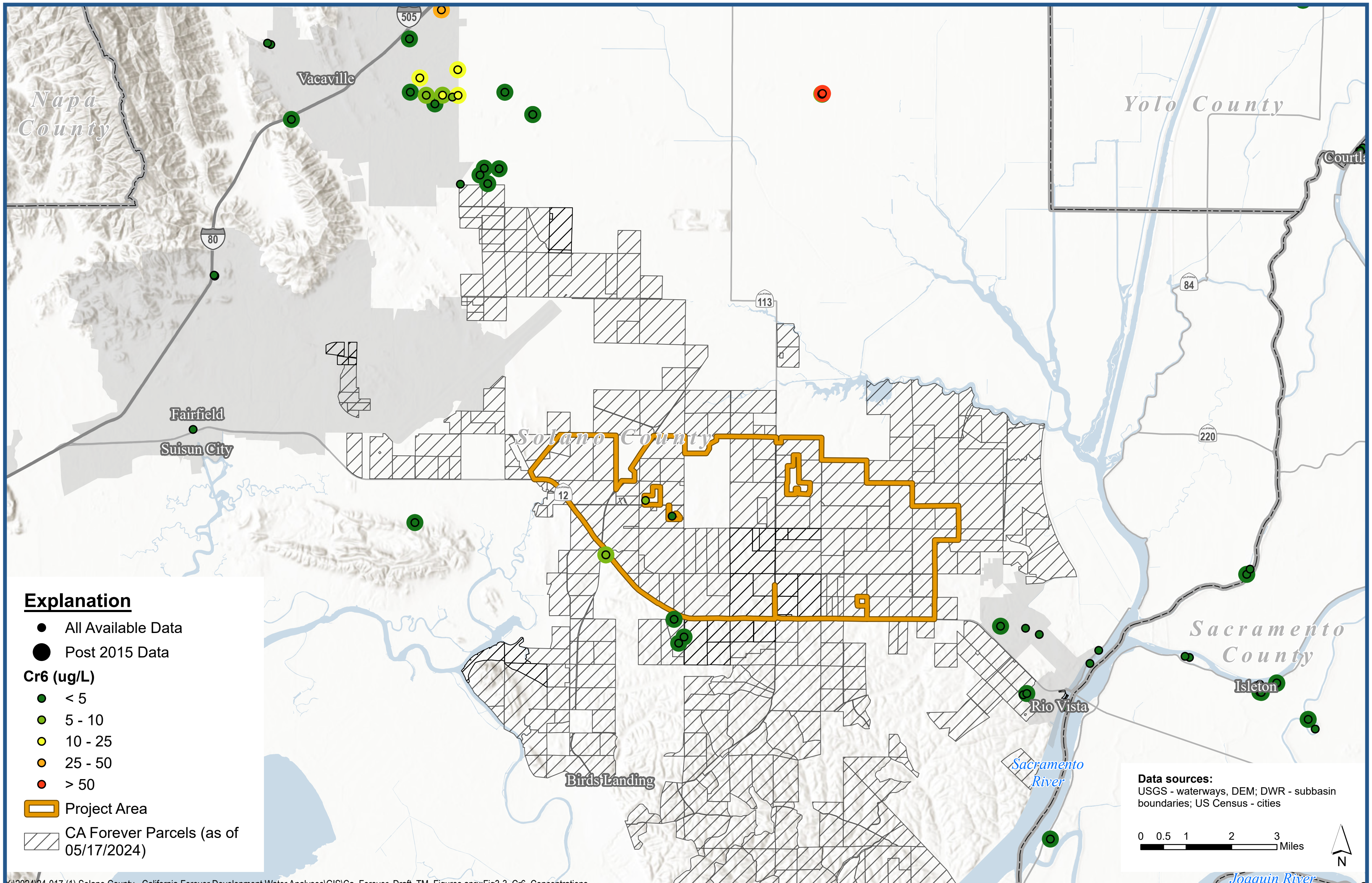
Maximum Chloride Concentration

Water Resources Evaluation
East Solano Homes, Jobs, and Clean Energy Initiative, Solano County

Figure 3-2



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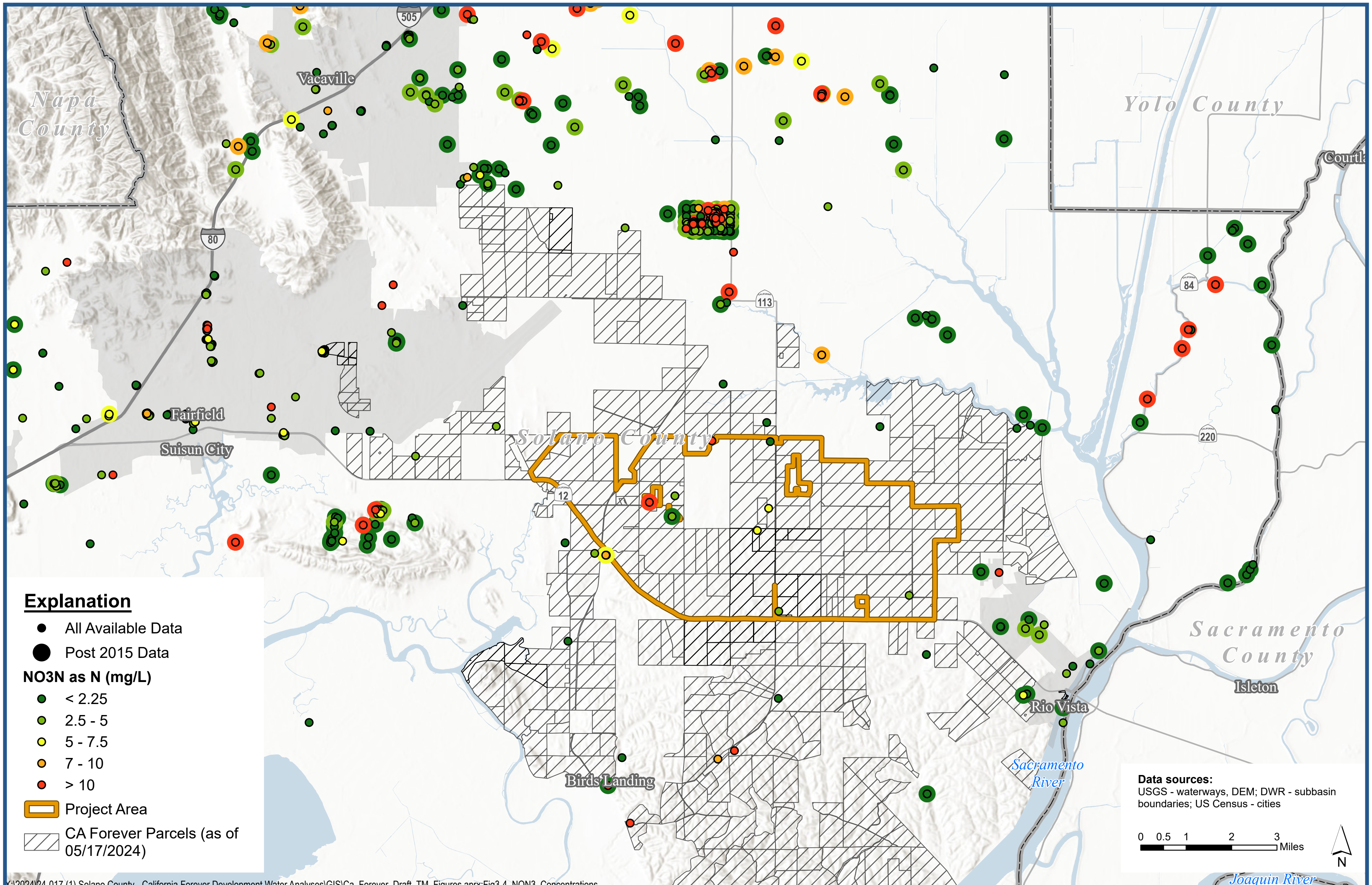
Maximum Chromium-6 Concentration

Water Resources Evaluation
East Solano Homes, Jobs, and Clean Energy Initiative, Solano County

Figure 3-3



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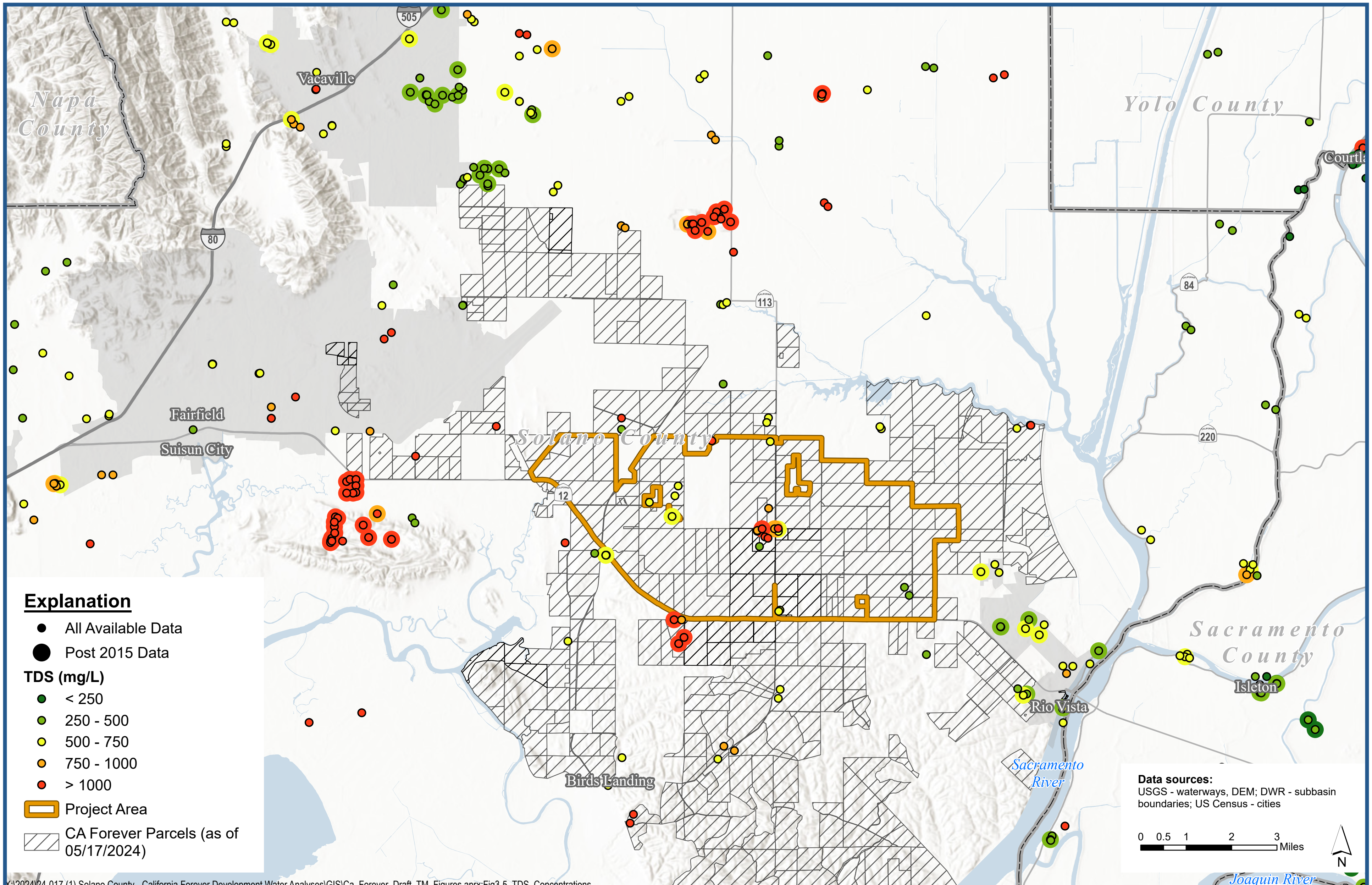
Maximum Nitrate as N Concentration

Water Resources Evaluation
East Solano Homes, Jobs, and Clean Energy Initiative, Solano County

Figure 3-4



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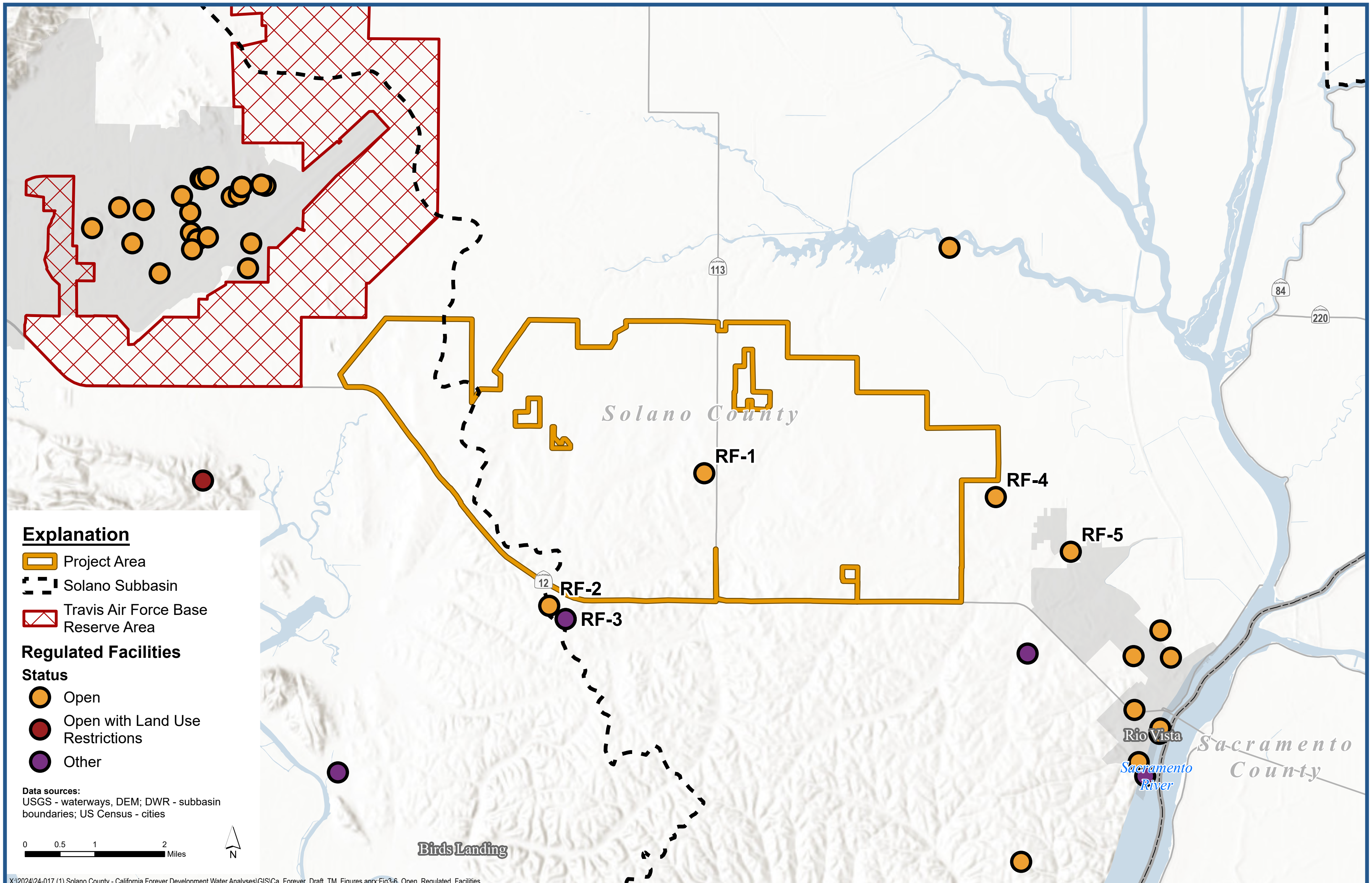
Maximum Total Dissolved Solids Concentration

Water Resources Evaluation
East Solano Homes, Jobs, and Clean Energy Initiative, Solano County

Figure 3-5



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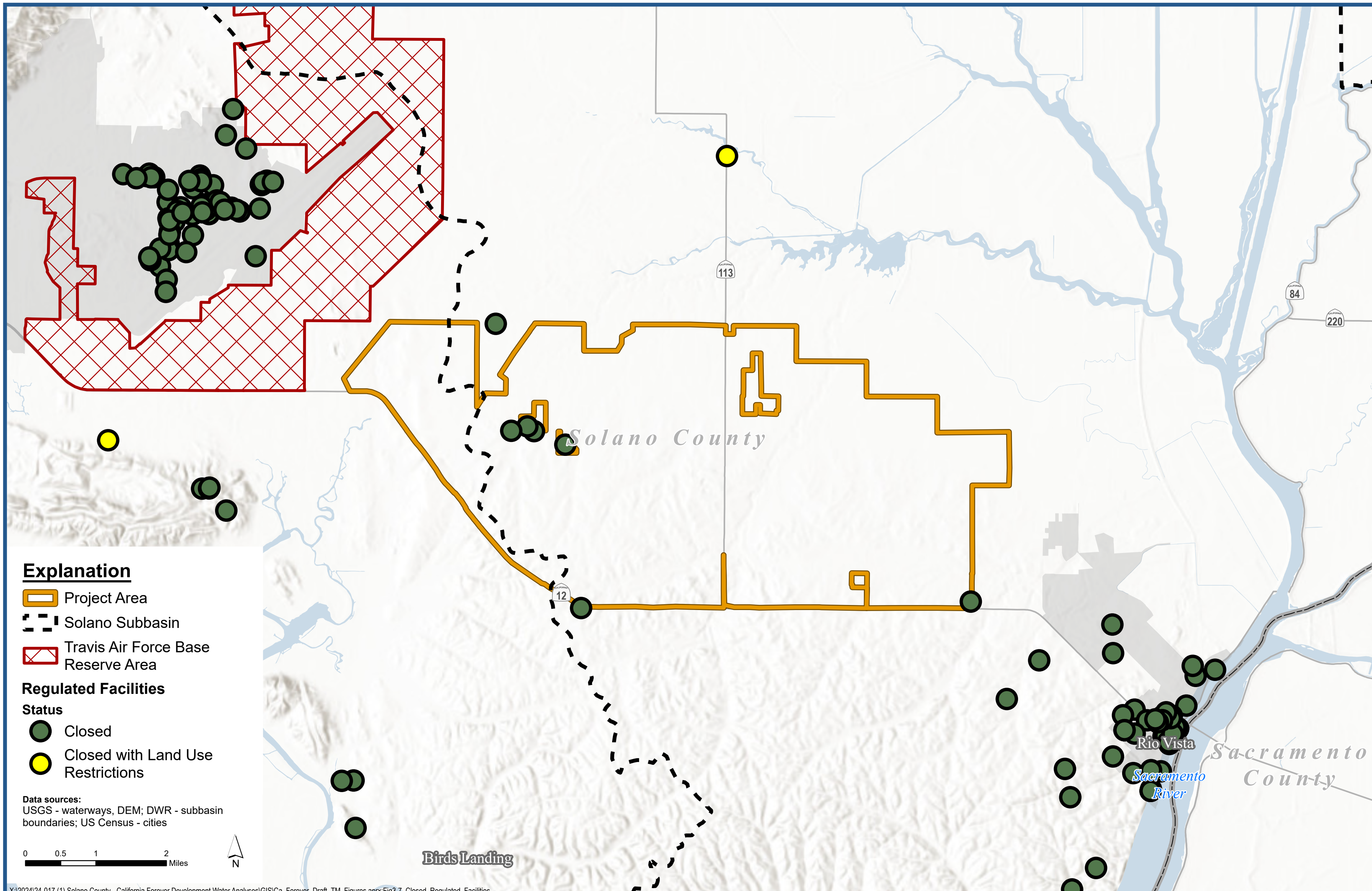
Open Regulated Facilities near Proposed Community

Water Resources Evaluation
East Solano Homes, Jobs, and Clean Energy Initiative, Solano County

Figure 3-6



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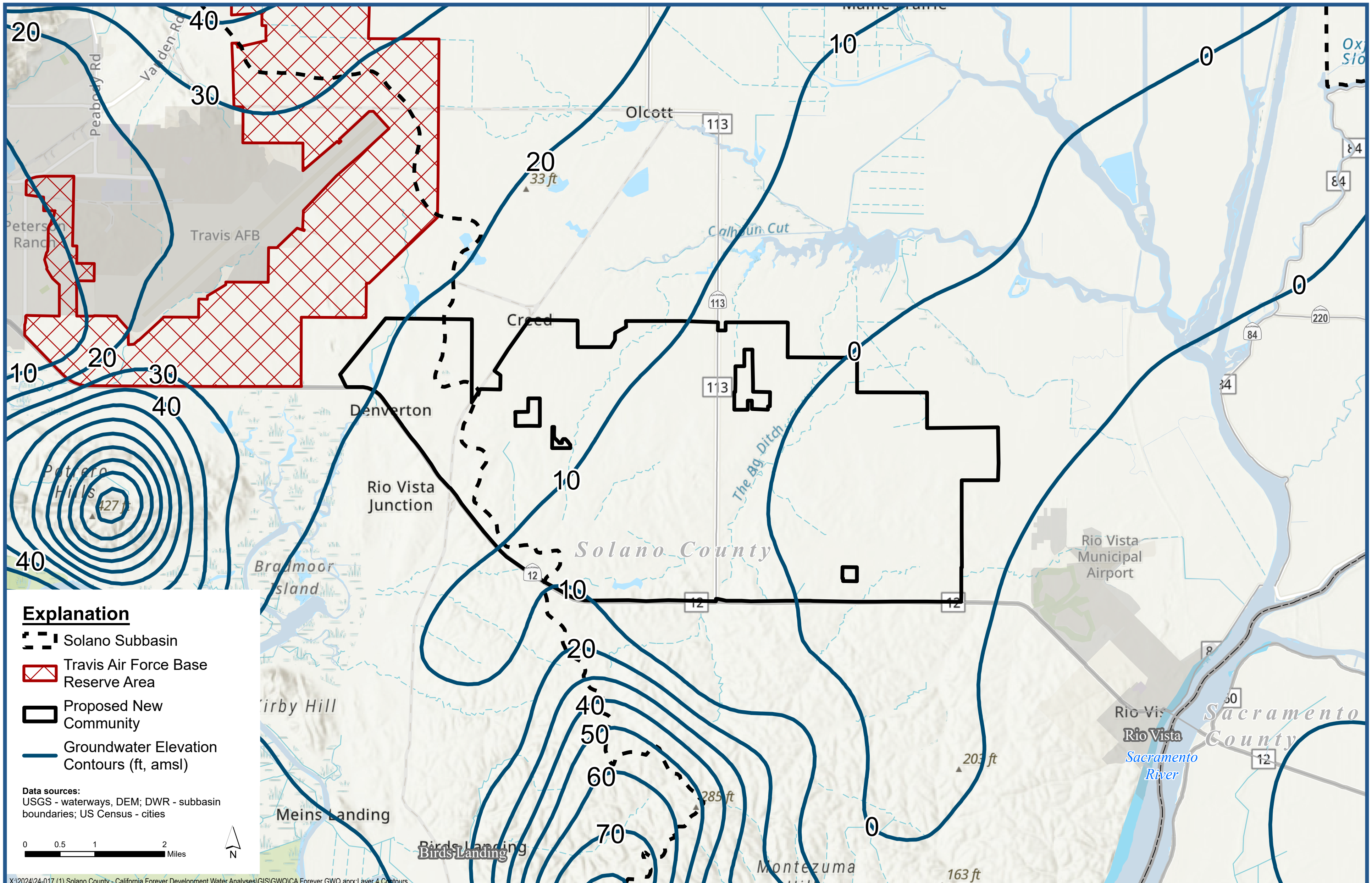
Closed Regulated Facilities near Proposed Community

Water Resources Evaluation
East Solano Homes, Jobs, and Clean Energy Initiative, Solano County

Figure 3-7



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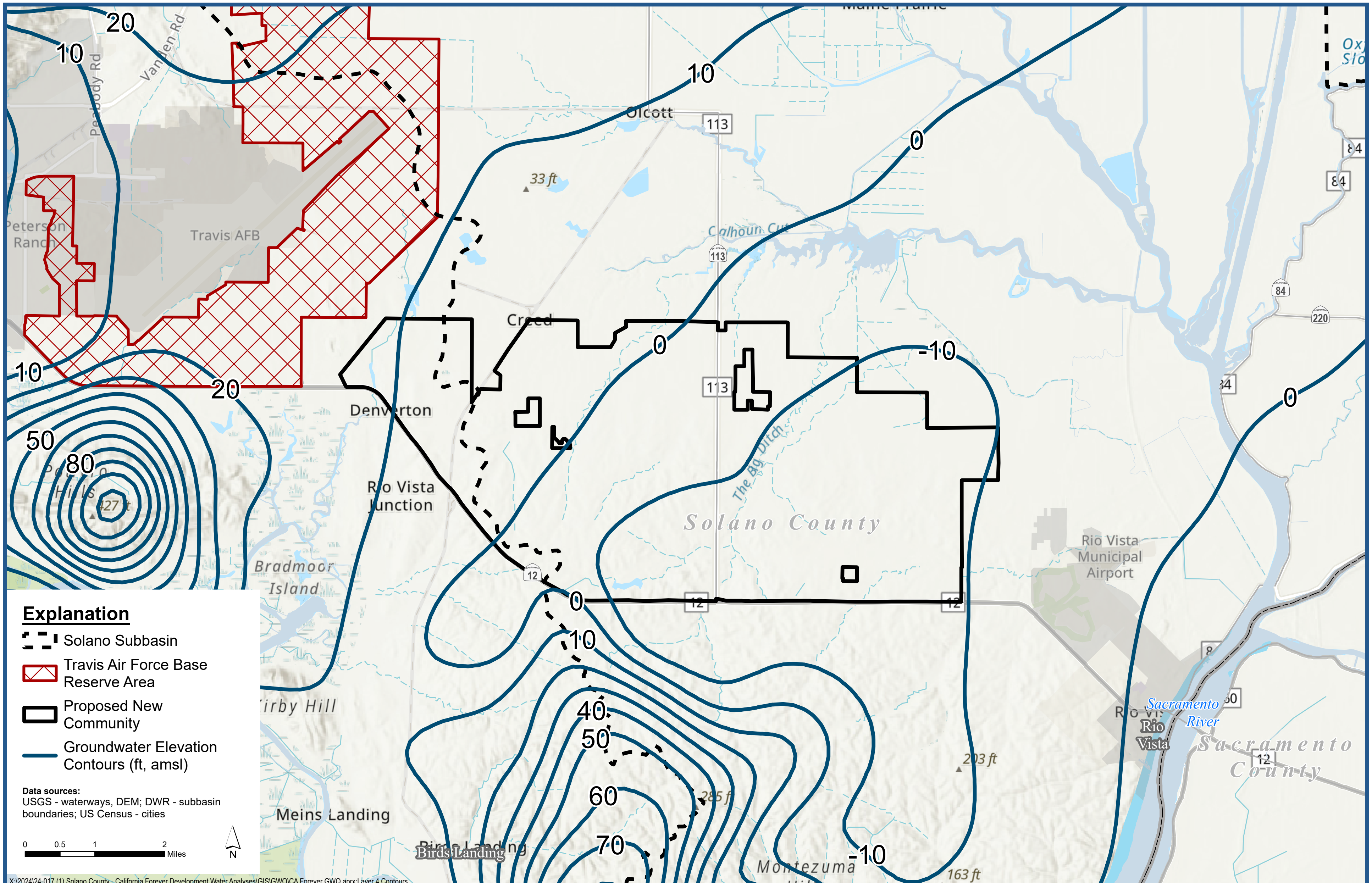
Simulated Groundwater Elevations - Baseline Conditions: Fall 2059 (Above Normal Year), Model Layer 4

Water Resources Evaluation
East Solano Homes, Jobs, and Clean Energy Initiative, Solano County

Figure 2-10a



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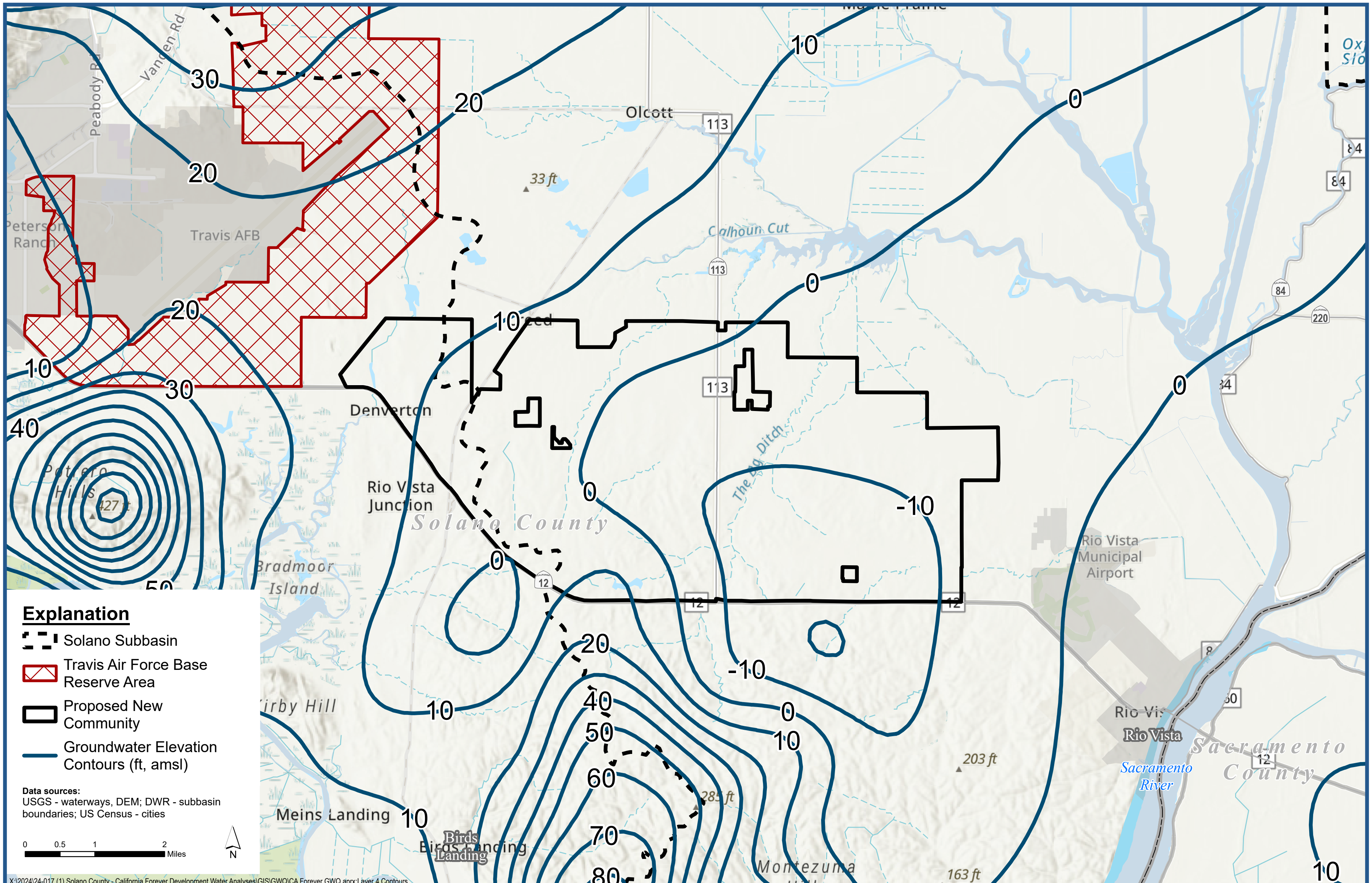
Simulated Groundwater Elevations - Baseline Conditions: Fall 2046 (Critical Year), Model Layer 4

Water Resources Evaluation
East Solano Homes, Jobs, and Clean Energy Initiative, Solano County

Figure 2-10b



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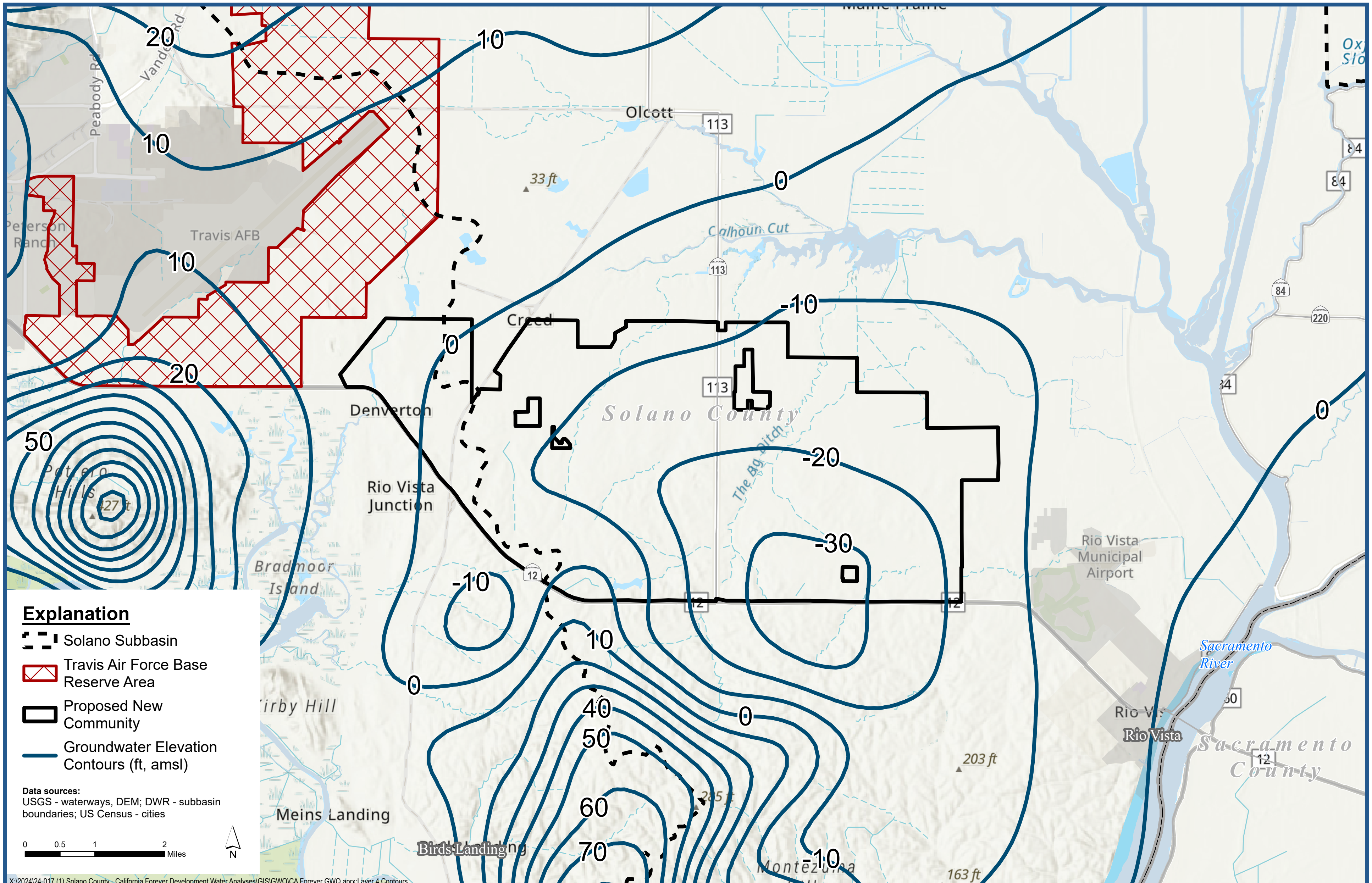
Simulated Groundwater Elevations - Final Project Buildout (113 gpcd)
Fall 2059 (Above Normal Year), Model Layer 4

Water Resources Evaluation
East Solano Homes, Jobs, and Clean Energy Initiative, Solano County

Figure 2-11a



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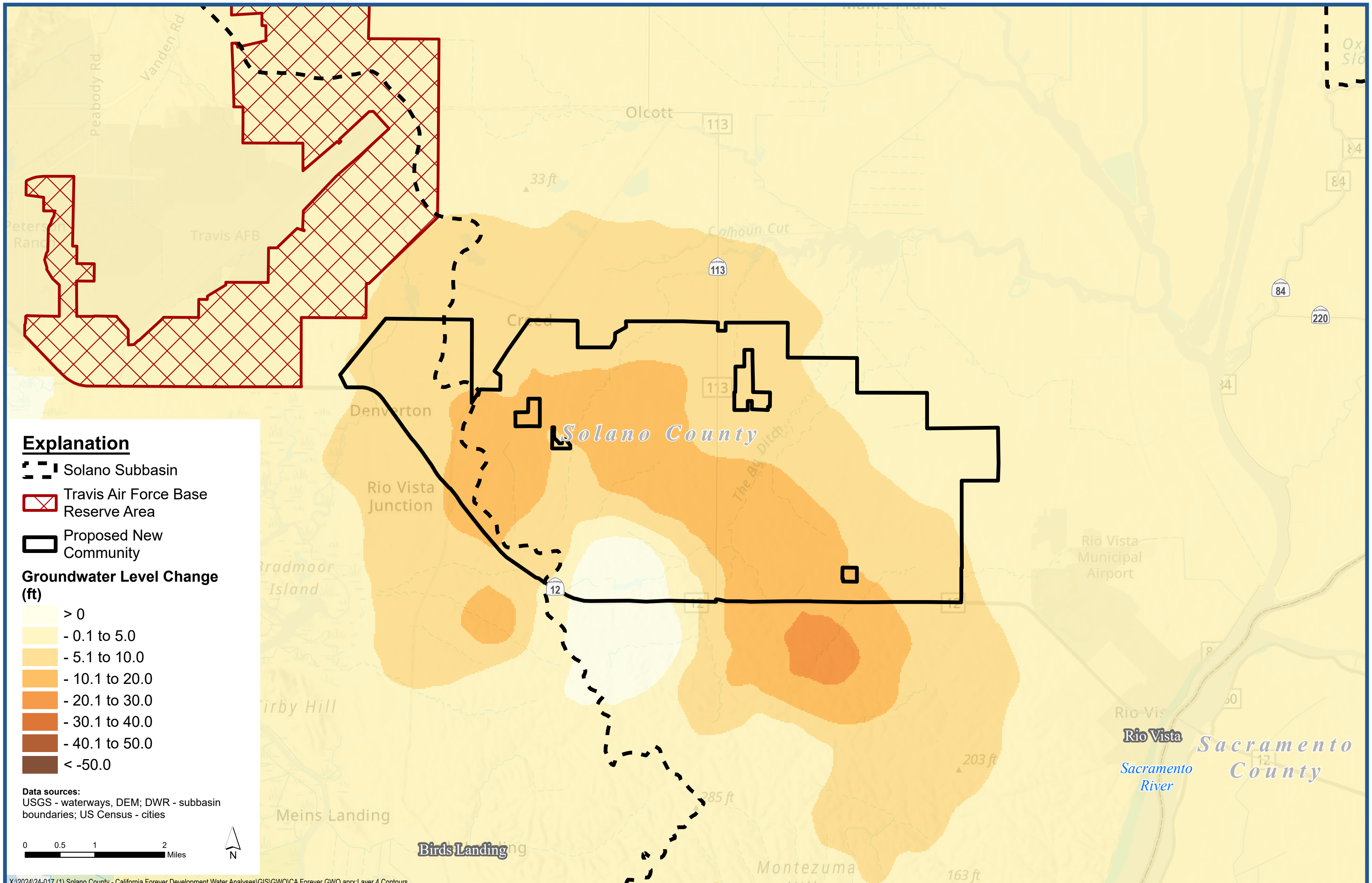
Simulated Groundwater Elevations - Final Project Buildout (113 gpcd)
Fall 2046 (Critical Year), Model Layer 4

Water Resources Evaluation
East Solano Homes, Jobs, and Clean Energy Initiative, Solano County

Figure 2-11b



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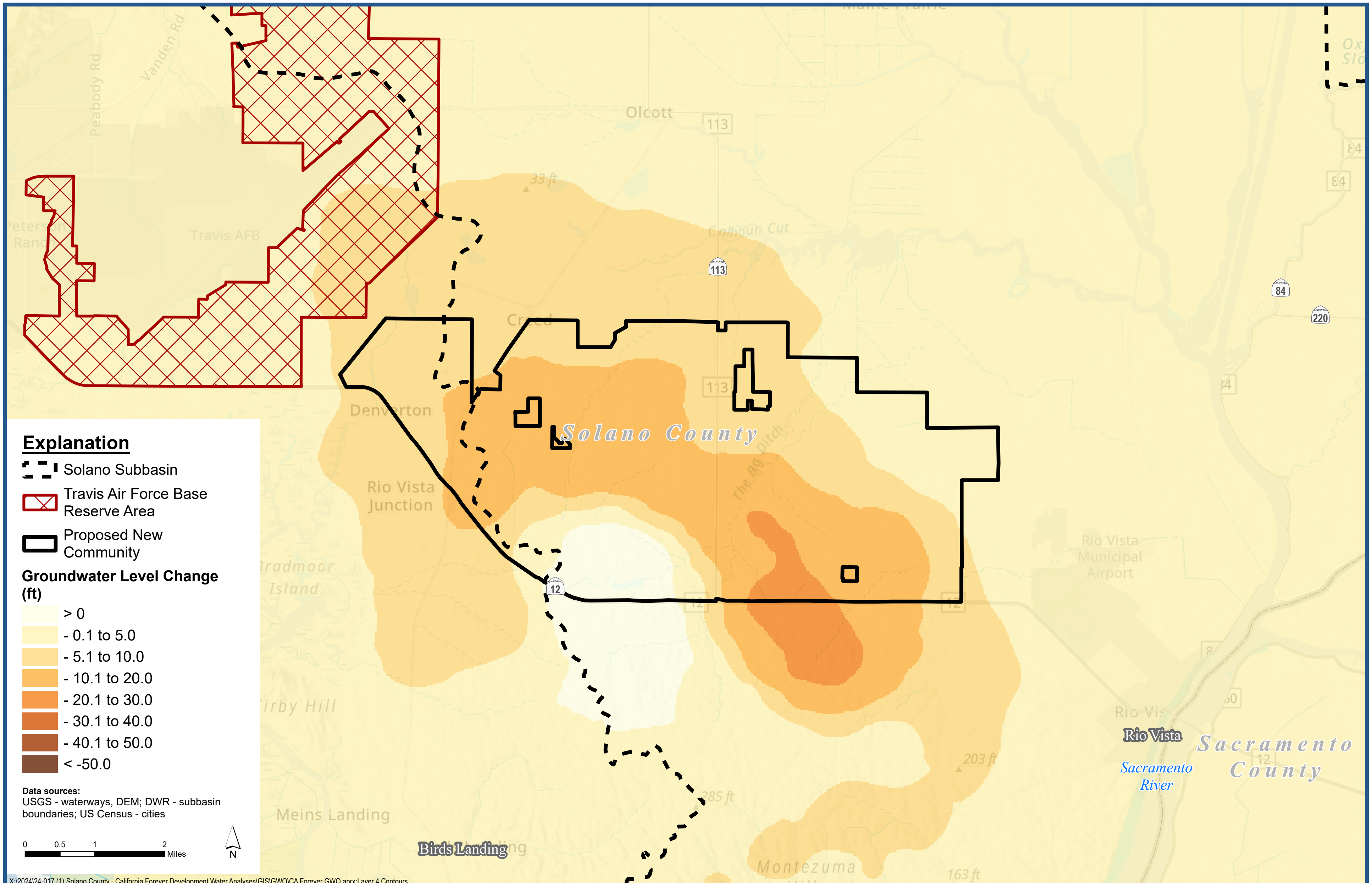
Simulated Change in Groundwater Levels - Final Project Buildout (113 gpcd)
Fall 2059 (Above Normal Year), Model Layer 4

Water Resources Evaluation
East Solano Homes, Jobs, and Clean Energy Initiative, Solano County

Figure 2-12a



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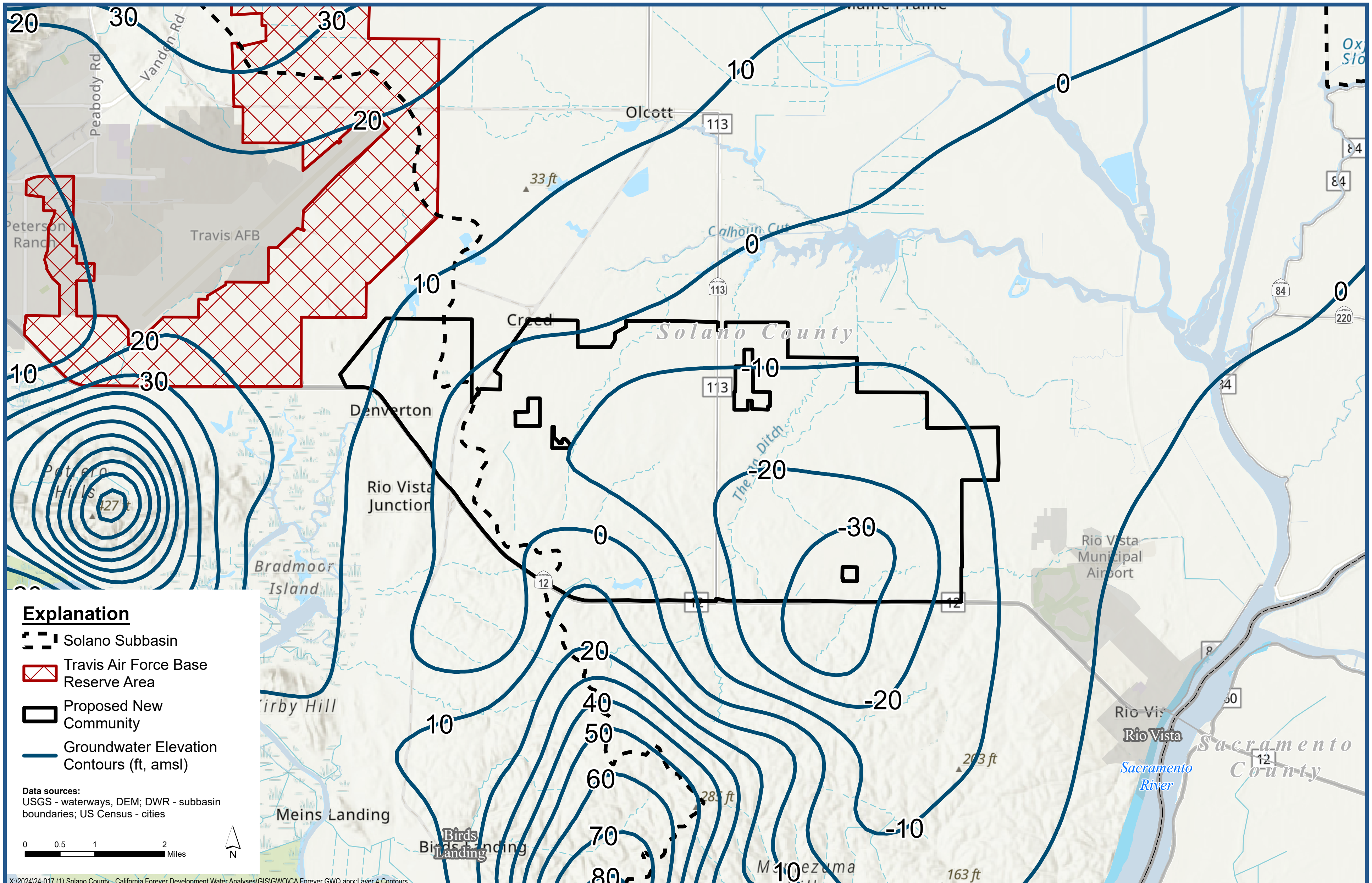
Consulting Engineers

Simulated Change in Groundwater Levels - Final Project Buildout (113 gpcd)
Fall 2046 (Critical Year), Model Layer 4

Water Resources Evaluation
East Solano Homes, Jobs, and Clean Energy Initiative, Solano County

Figure 2-12b



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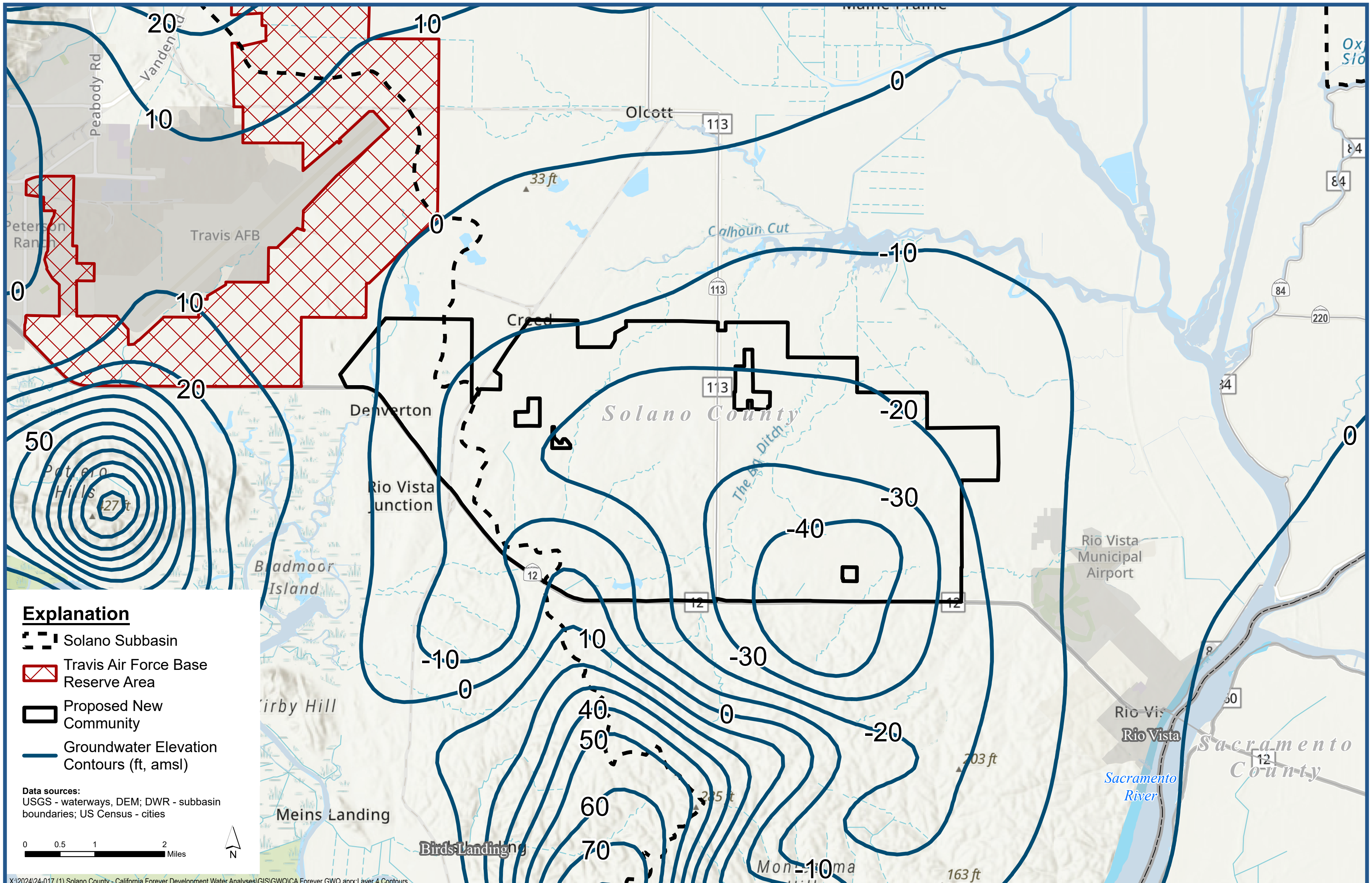
Simulated Groundwater Elevations - Final Project Buildout (162 gpcd)
Fall 2059 (Above Normal Year), Model Layer 4

Water Resources Evaluation
East Solano Homes, Jobs, and Clean Energy Initiative, Solano County

Figure 2-13a

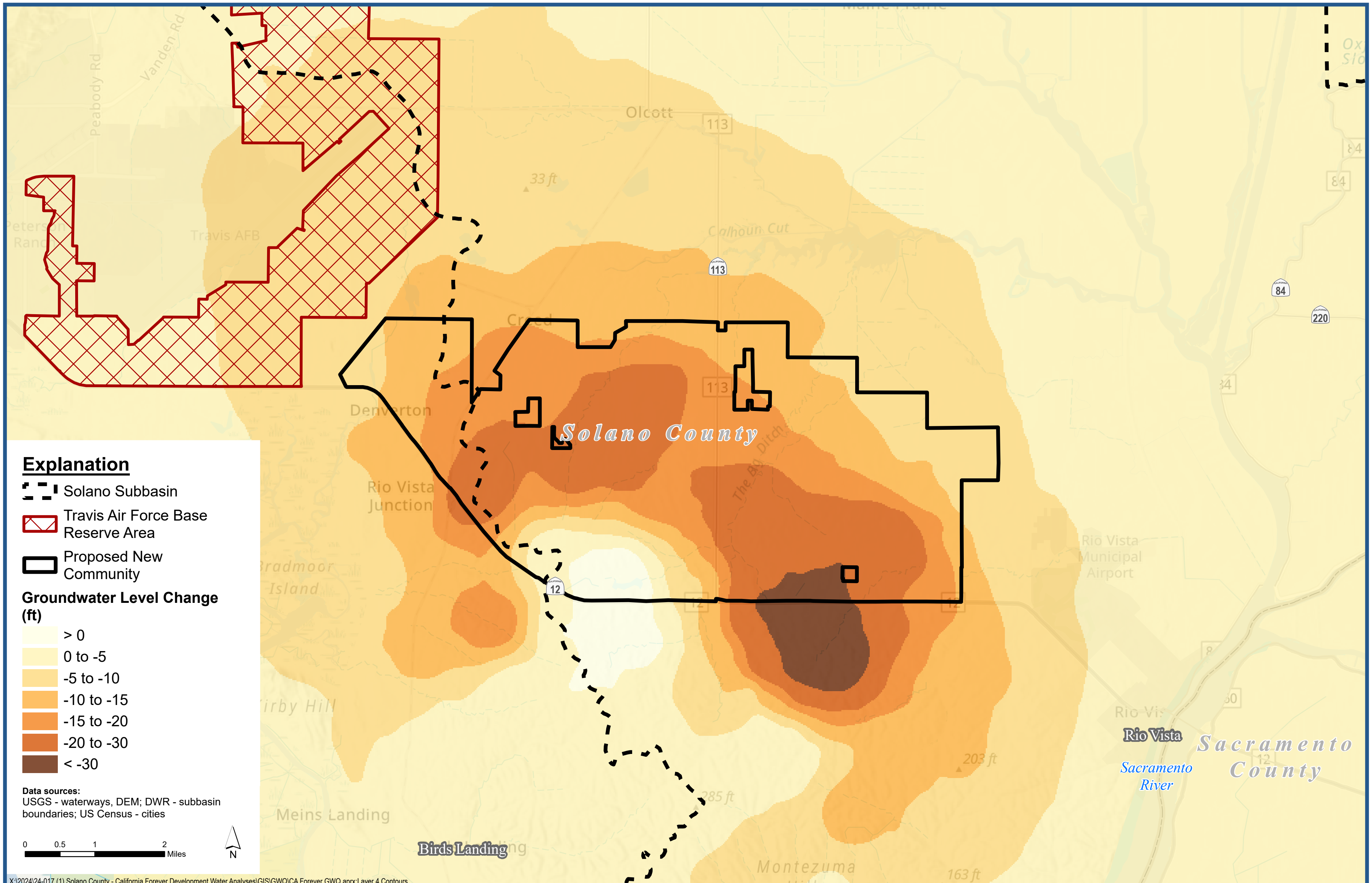


Luhdorff & Scalmanini Consulting Engineers

Simulated Groundwater Elevations - Final Project Buildout (162 gpcd)
Fall 2046 (Critical Year), Model Layer 4

Water Resources Evaluation
East Solano Homes, Jobs, and Clean Energy Initiative, Solano County

Figure 2-13b

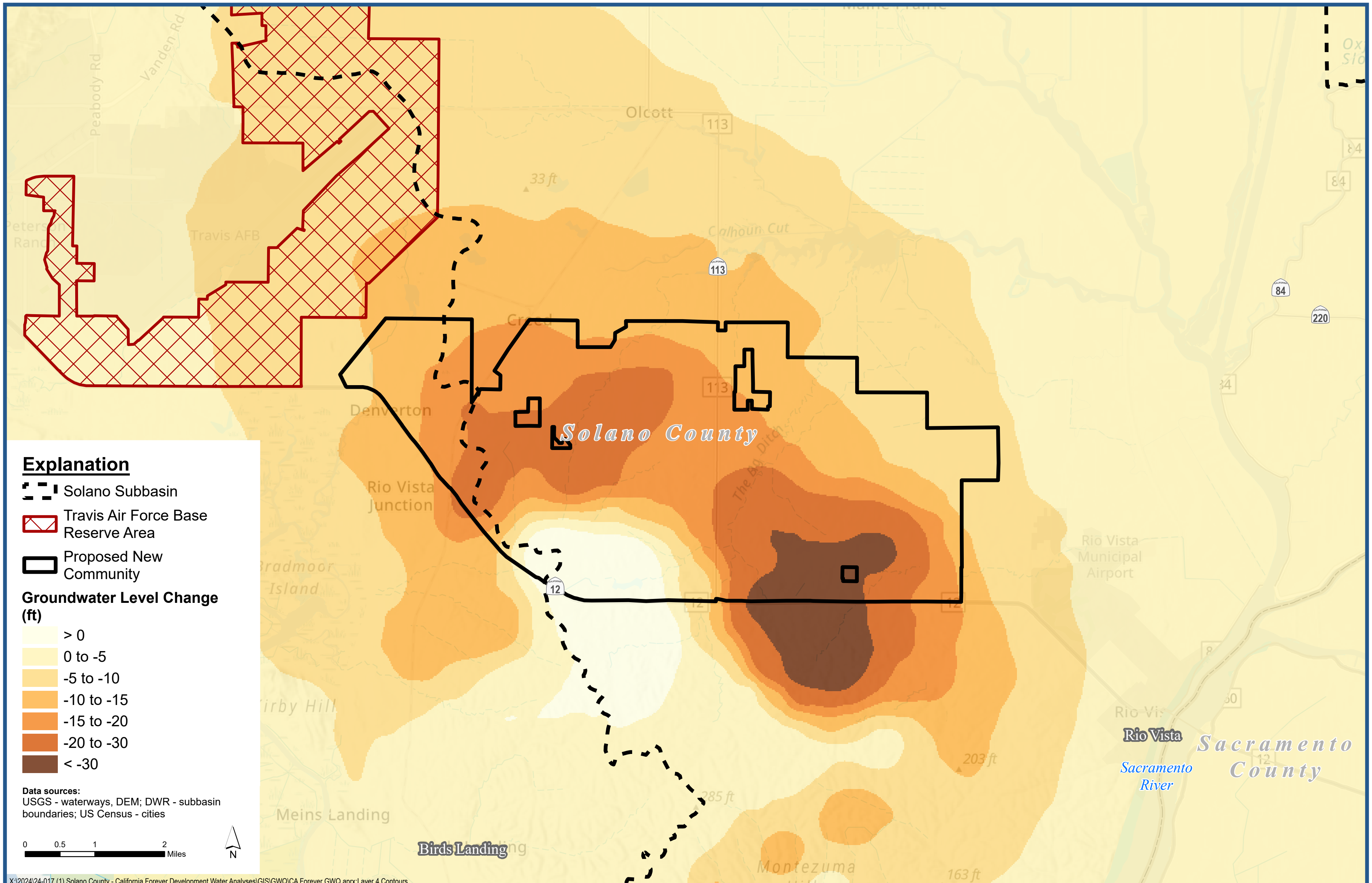


Luhdorff & Scalmanini Consulting Engineers

Simulated Change in Groundwater Levels - Final Project Buildout (162 gpcd) Fall 2059 (Above Normal Year), Model Layer 4

Water Resources Evaluation
East Solano Homes, Jobs, and Clean Energy Initiative, Solano County

Figure 2-14a



Luhdorff & Scalmanini Consulting Engineers

Simulated Change in Groundwater Levels - Final Project Buildout (162 gpcd) Fall 2046 (Critical Year), Model Layer 4

Water Resources Evaluation
East Solano Homes, Jobs, and Clean Energy Initiative, Solano County

Figure 2-14b

APPENDIX A

April 26, 2024 Letter from SWRCB on Flannery and Associates Water Rights

LSCE