Stanislaus County Drought Resilience Plan

Final Drought Resilience Plan

March 2026

This page left blank intentionally.

Acknowledgements

The Stanislaus County Drought Resilience Plan was developed with direct technical assistance from the California Department of Water Resources (DWR) through the County Drought Resilience Planning Assistance Program (CDRPAP). The CDRPAP was developed as Senate Bill 552 was an unfunded mandate. Stantec Consulting Services Inc. (Stantec) was contracted to provide direct technical assistance through CDRPAP.

This plan was developed by Stanislaus County staff in coordination with Stantec. Additional support was provided by the Stanislaus County Water Advisory Committee and the California Department of Water Resources Water Justice Office.

Photo Credit:
Cover Page: Image via Adobe Stock

This page left blank intentionally.

Table of Contents

List of Figures

List of Tables

Acronyms and Abbreviations

°C	degrees Celsius
°F	degrees Fahrenheit
1,2,3-TCP	1,2,3-trochloropropane
2018 Legislation	Senate Bill 606 [Hertzberg] and Assembly Bill 1668 [Friedman], as amended
AB	Assembly Bill
CDAG	County Drought Advisory Group
CDC	Center for Disease Control
CDEC	California Data Exchange Center
CDPR	California Department of Pesticide Regulation
County	Stanislaus County
CV-SALTS	Central Valley Salinity Alternatives for Long-Term Sustainability
CWC	California Water Code
DBCP	dibromo-3-chloropropane
DDW	State Water Board Division of Drinking Water
DRP	Drought Resilience Plan
DWR	California Department of Water Resources
DWWM	Drinking Water Well Mitigation Program
EIDWD	Emergency and Interim Drinking Water Distribution Plan
ESJGA	Eastern San Joaquin Groundwater Authority
FEMA	Federal Emergency Management Agency
GAMA	Groundwater Ambient Monitoring Assessment
GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan
Guidebook	California Department of Water Resources' County Drought Resilience Guidebook
GWO	Groundwater Ordinance
HSC	California Health and Safety Code
HUC	Hydrologic Unit Codes
Legislature	California State Legislature
LTMS/A	long-term mitigation strategies and actions
MID	Modesto Irrigation District
NGO	non-governmental organization
Non-GWB	non-groundwater basin
OES	Office of Emergency Services
OID	Oakdale Irrigation District
PCE	tetrachloroethene
PLSS	Public Land Survey Section
PMT	County Project Management Team
PPIC	Public Policy Institute of California
RFP	request for proposal
SAFER	Safe and Affordable Funding for Equity and Resilience
SB	Senate Bill

SGMA	Sustainable Groundwater Management Act
SJV	San Joaquin Valley
SSJID	South San Joaquin Irrigation District
SSWS	state small water system
State Water Board	California State Water Resources Control Board
State	State of California
STRA	short-term response actions
STRGBA	Stanislaus and Tuolumne Rivers Groundwater Association
SWRCB	California State Water Resources Control Board
TDS	total dissolved solids
TID	Turlock Irrigation District
U.S.	United States of America
USCB	U.S. Census Bureau
USDA	United States Department of Agriculture
USDM	United States Drought Monitor
USFWS	United States Fish and Wildlife Service
WAC	Water Advisory Committee
WASH	Water, Sanitation, and Hygiene Program
WCR	well completion report
WEP	Water and Environmental Program
WSVE	DWR Water Shortage Vulnerability Explorer

This page intentionally left blank.

1.0 Introduction

The Stanislaus County (County) Drought Resilience Plan (DRP) documents how the County, its Water Advisory Committee (WAC) members, and other entities with water supply and drought management responsibilities will address water supply vulnerabilities for two types of systems in the County: domestic wells, as defined in California Health and Safety Code (HSC) Section 116681(i) and California Water Code (CWC) Section 10609.51(d) [HSC 2018, CWC 2021a]; and state small water systems (SSWS), as defined in HSC Section 116275(n) and CWC Section 10609.51(l) [HSC 1996, CWC 2021a]. The County DRP was prepared pursuant to Senate Bill (SB) 552: Drought Planning for Small Water Suppliers, State Small Water Systems, and Domestic Well Communities (Hertzberg 2021; see Section 1.2 for additional detail). This County DRP was developed by the County with funding and technical support provided by the California Department of Water Resources (DWR) Drought Resilience Planning Assistance Program.

1.1 Document Organization

Organization of this document draws from the California Department of Water Resources' *County Drought Resilience Guidebook* (Guidebook) (DWR 2023). The Guidebook is a resource for counties developing a County DRP specifically for SSWSs and domestic wells. Consistent with the Guidebook, the County DRP is organized into seven chapters, as follows:

- **Chapter 1: Introduction** provides an overview of the legislation relating to SB 552 and the development of the County DRP. This chapter also includes background on County demographics, geography, and an overview of domestic wells and SSWSs within the County's jurisdiction.
- **Chapter 2: County Drought and Water Shortage Task Force** provides an overview of the WAC serving as the task force, including its membership, roles, purpose, and meeting frequency.
- **Chapter 3: Drought and Water Shortage Risk Assessment** characterizes the vulnerability of domestic wells and SSWSs within the County to drought and water shortage. This chapter also presents the approach and data used to assess vulnerability. It highlights areas within the County that have a higher risk of drought and water shortage where domestic wells and SSWSs are present. Additionally, data gaps are identified to help inform potential long-term strategies.
- **Chapter 4: Short-Term Response Actions** details the proposed short-term response actions (STRA) for emergency and interim drought solutions, including specific actions, local response triggers, and public engagement.
- **Chapter 5: Long-Term Mitigation Strategies and Actions** details the proposed long-term mitigation strategies and actions (LTMS/A) for improving the water supply resilience of domestic wells and SSWSs.
- **Chapter 6: Implementation Considerations** presents a roadmap for implementing STRA and LTMS/A consistent with the mission and authority of involved agencies. This includes identifying agencies and entities responsible for implementation, the status of implementation, funding, authorization for implementation, and the anticipated schedule. This section also summarizes the level of multi-agency collaboration identified by agencies to support implementation.
- **Chapter 7: References** provides a list of references used in this plan.

1.2 Legislative Requirements

Signed into law September 2021 by Governor Gavin Newsom, SB 552 (Hertzberg 2021)[1] obligated the State of California (State) and local governments to share the responsibility in preparing for and responding to a water shortage event. These new requirements are expected to improve the ability of Californians to manage future droughts and help prevent catastrophic impacts on drinking water for communities vulnerable to the effects of climate change. The bill outlines the new requirements for small water suppliers, county governments, DWR, and the State Water Resources Control Board (State Water Board) to implement more proactive drought planning and better prepare for future water shortage events or dry years.

SB 552 also implements legislation on Water Conservation and Drought Planning (SB 606 [Hertzberg 2018] and Assembly Bill [AB] 1668 [Friedman 2018], as amended; collectively referred to as "2018 Legislation") passed by the California State Legislature (Legislature). The 2018 Legislation provides a new framework for urban water use efficiency; directives for eliminating water waste; additional requirements for strengthening local drought resilience for urban areas, vulnerable small water suppliers, and rural communities; and recommendations for improving agricultural water use efficiency and drought planning.

Water users protected under SB 552 include:

- **Small Water Supplier:** A community water system serving 15 to 2,999 service connections, inclusive, and that provides less than 3,000 acre-feet of water annually (CWC Section 10609.51(k) [CWC 2021a]).
- **Community Water System:** A public water system that serves at least 15 service connections used by yearlong residents or regularly serves at least 25 yearlong residents of the area served by the system, as defined in HSC Section 116275(i) and CWC Section 10609.51(a) [HSC 1996, CWC 2021a].
- **State Small Water System:** A system for the provision of piped water to the public for human consumption that serves at least 5, but not more than 14, service connections and does not regularly serve drinking water to more than an average of 25 individuals daily for more than 60 days out of the year, as defined in HSC Section 116275(n) and CWC Section 10609.51(l) [HSC 1996, CWC 2021a].
- **Domestic Well:** A groundwater well used to supply water for the domestic needs of an individual residence or a water system that is not a public water system and that has no more

[1] In 2018, DWR convened a County Drought Advisory Group (CDAG) to assist in a vulnerability assessment and to develop recommended actions for improving drought planning for small water suppliers and rural communities. The CDAG consisted of representatives from counties and other local agencies, small water systems, tribes, academics, non-profit organizations, and other interested parties. The CDAG's recommendations were provided to the Legislature in March 2021 and served as the basis for SB 552. DWR has also established a standing drought and water shortage interagency task force, in coordination with the State Water Board and other relevant state agencies, to facilitate proactive state planning and coordination for pre-drought planning, emergency response, and post-drought management, consistent with SB 552. The interagency task force, called the Drought Resilience Interagency and Partners Collaborative, serves as a public forum with state and non-state agency members to advance drought strategies and continue building resilience to the increasingly arid conditions California faces. More information is available at: https://water.ca.gov/drip.

than four service connections, as defined in HSC Section 116681(i) and CWC Section 10609.51(d) [HSC 2018, CWC 2021a].

- **Nontransient Noncommunity Water System:** A public water system that is not a community water system and that regularly serves at least 25 of the same persons over six months per year, as defined in HSC Section 116275(k) and CWC Section 10609.51(f) [HSC 1996, CWC 2021a].

For the water users protected under SB 552, this County DRP addresses water shortage vulnerabilities for domestic wells and SSWSs. Other water users protected under SB 552 not included in this County DRP have separate requirements to address water shortage vulnerabilities.

1.2.1 County Agency Requirements

This plan fulfills County requirements for preparation of a plan that includes potential drought and water shortage risk and proposed interim and long-term solutions for domestic wells and SSWSs within the County's jurisdiction (CWC Section 10609.70) [CWC 2021b]. While measures to protect small water suppliers and nontransient noncommunity water systems are not within the scope of this document, this plan considers integration opportunities consistent with the intent of SB 552. Applicable County requirements are:

- Establish a standing County Drought and Water Shortage Task Force (CWC Section 10609.70(a) [CWC 2021b]) (see Chapter 2)
- Develop a plan that considers, at a minimum, each of the following (CWC Section 10609.70(b) [CWC 2021b]):
    1) Consolidations for existing water systems and domestic wells
    2) Domestic well drinking water mitigation programs
    3) Provision of emergency and interim drinking water solutions
    4) Analysis of the steps necessary to implement the plan
    5) Analysis of local, State, and federal funding sources available to implement the plan

1.2.2 State Agency Involvement and Implementation

SB 552 defined a series of requirements for the State Water Board and DWR. These include:

State Water Resources Control Board (CWC Section10609.70(c) [CWC 2021b]):

> *The state board shall work with counties, groundwater sustainability agencies, technical assistance providers, nonprofit organizations, community-based organizations, and the public to address state small water system and domestic well community drought and emergency water shortage resiliency needs, including both of the following:*
>
> > *(1) Proactive communication to domestic well communities before a drought occurs, such as information on local bottled water and water tank providers.*
> >
> > *(2) Funding for installation of basic drought and emergency water shortage resiliency infrastructure, such as well monitoring devices.*

California Department of Water Resources (CWC Section 10609.80(a) [CWC 2021c]):

> *The department shall take both of the following actions to support implementation of the recommendations of its County Drought Advisory Group:*
>
> *(1) Maintain, in partnership with the state board and other relevant state agencies, the risk vulnerability tool developed as part of the County Drought Advisory Group process and continue to refine existing data and gather new data for the tool, including, but not limited to, data on all of the following:*
>
> *(A) Small water suppliers and nontransient noncommunity water systems serving a school.*
>
> *(B) State small water systems and rural communities.*
>
> *(C) Domestic wells and other self-supplied residents.*
>
> *(2) Update the risk vulnerability tool for small water suppliers and rural communities periodically, by doing all of the following:*
>
> *(A) Revise the indicators and construction of the scoring as more data becomes readily available.*
>
> *(B) Make existing and new data publicly available on the California Open Data internet web portal.*
>
> *(C) In consultation with other relevant state agencies, identify deficits in data quality and availability and develop recommendations to address these gaps.*
>
> *(b) (1) The department, in collaboration with the state board and relevant state agencies, shall establish a standing interagency drought and water shortage task force to facilitate proactive state planning and coordination, both for predrought planning and post-drought emergency response, to develop strategies to enhance collaboration between various fields, and to consider all types of water users.*
>
> *(2) The interagency drought and water shortage task force shall include representatives from local governments, community-based organizations, nonprofit technical assistance providers, the public, and experts in land use planning, water resiliency, and water infrastructure.*

1.3 Purpose of Stanislaus County Drought Resilience Plan

The County DRP documents how the County, WAC members, and other entities with water supply and drought management responsibilities intend to address water supply vulnerabilities of water users protected under SB 552 in the County. It is a single document for ease of reference and future updates. It describes the water shortage vulnerabilities present in the County, the responses to identified vulnerabilities, and the policy, financial, and regulatory considerations necessary for the implementation of the County DRP. Implementation of the County DRP is led in partnership by the Stanislaus County Environmental Resources and the Stanislaus County Office of Emergency Services (OES) in close coordination with other departments, including the Public Health and Planning and Community Development Departments. The County DRP was developed by the County with funding and technical

support provided by DWR's Drought Resilience Planning Assistance Program and conforms to the legislative requirements of SB 552.

1.4 Stanislaus County Overview

Stanislaus County is located in the San Joaquin Valley (SJV) and covers a total area of 1,515 square miles. It is a geographically dynamic region that features the eastern slopes of the Southern Coast Range, fertile farmlands of the Northern SJV, and the foothills of the Sierra Nevada mountains.

The County is characterized by two distinct regions: valley floor and west side. The County has historically been divided by the north-flowing San Joaquin River. The part of the County west of the San Joaquin River (the "west side") has largely remained rural and economically dependent on agricultural activities. Communities in this region include Westley, Patterson, and Newman. The valley floor to the east of the San Joaquin River is part of the larger SJV, known for its fertile soil and extensive agricultural activities. The valley floor has several major towns and cities, including Modesto, Turlock, Ceres, Riverbank, Oakdale, and Waterford. Figure 1-1 shows the County and major cities and towns. The County is located on the ancestral land of the Yokuts and Miwok peoples (Historic Modesto 2025).

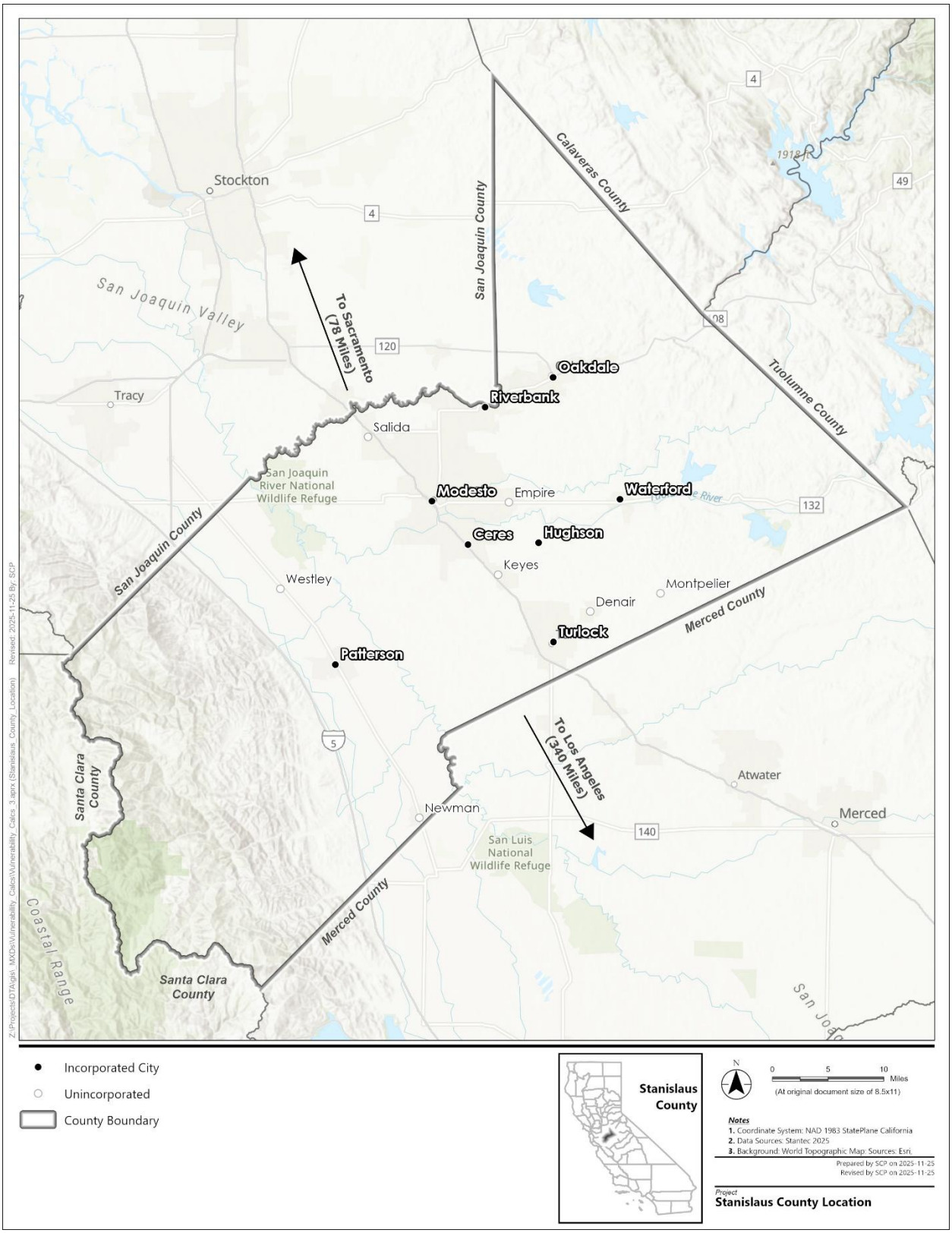


Figure 1-1. Map of Stanislaus County

1.4.1 Demographics

Selected demographics of the County are summarized below per the 2020 Census (USCB 2024) and 2022 American Community Survey (USCB 2023).

- **Population:** The County has a population of 556,972 people, with the majority residing in and around Modesto, which serves as the seat of County government (USCB 2024). Other notable towns include Turlock, Ceres, Riverbank, Oakdale, Patterson, Salida, Newman, and Waterford.
- **Age:** The County has a median age of 35.1 (USCB 2023). Around 26 percent of the population is under 18 years old, while 14 percent is 65 years and over (USCB 2024).
- **Ethnicity:** The two largest ethnic groups in the County are Hispanic or Latino (50.9 percent) and White (Non-Hispanic) (36.2 percent) (USCB 2024).
- **Household Income:** The median household income of the County is $82,758, compared to the median household income in California at $95,521 (USCB 2023).
- **Education:** The County has a lower-than-average percentage of residents 25 years or older with a bachelor's degree or higher at around 21 percent, compared to 37 percent for California overall (USCB 2023).
- **Poverty Level:** About 12.6 percent of the population in the County live below the poverty line, slightly higher than the State average of 12.0 percent. The largest demographic living in poverty are residents under 18 years of age (15.8 percent), followed by those 65 years and older (13 percent) and those between 18 to 64 years of age (10.6 percent) (USCB 2023).

1.4.2 Geography

The County is located in the northern portion of the SJV, extending across a diverse range of geographic features. The County's geography can be broadly divided into two primary areas: valley floor and west side. A diverse range of climates exist within these areas, shaped by factors that include temperature variations, humidity levels, wind and air circulation, soil type and moisture, vegetation, topography, albedo, season and latitude, water availability and evaporation, and rock weathering and soil formation variation within each region. Each of these elements contribute to the unique climate conditions found across the County.

1.4.2.1 Topography

Topography within the County (Figure 1-2) varies significantly, with elevations ranging from a minimum of 17 feet to a maximum of 3,803 feet. This diverse topography influences temperature, precipitation (discussed below), and other climate conditions. The highest elevations are found in the west side of the County in the eastern slopes of the Southern Coast Range. The SJV, which forms the valley floor, is primarily flat, with expansive agricultural land.

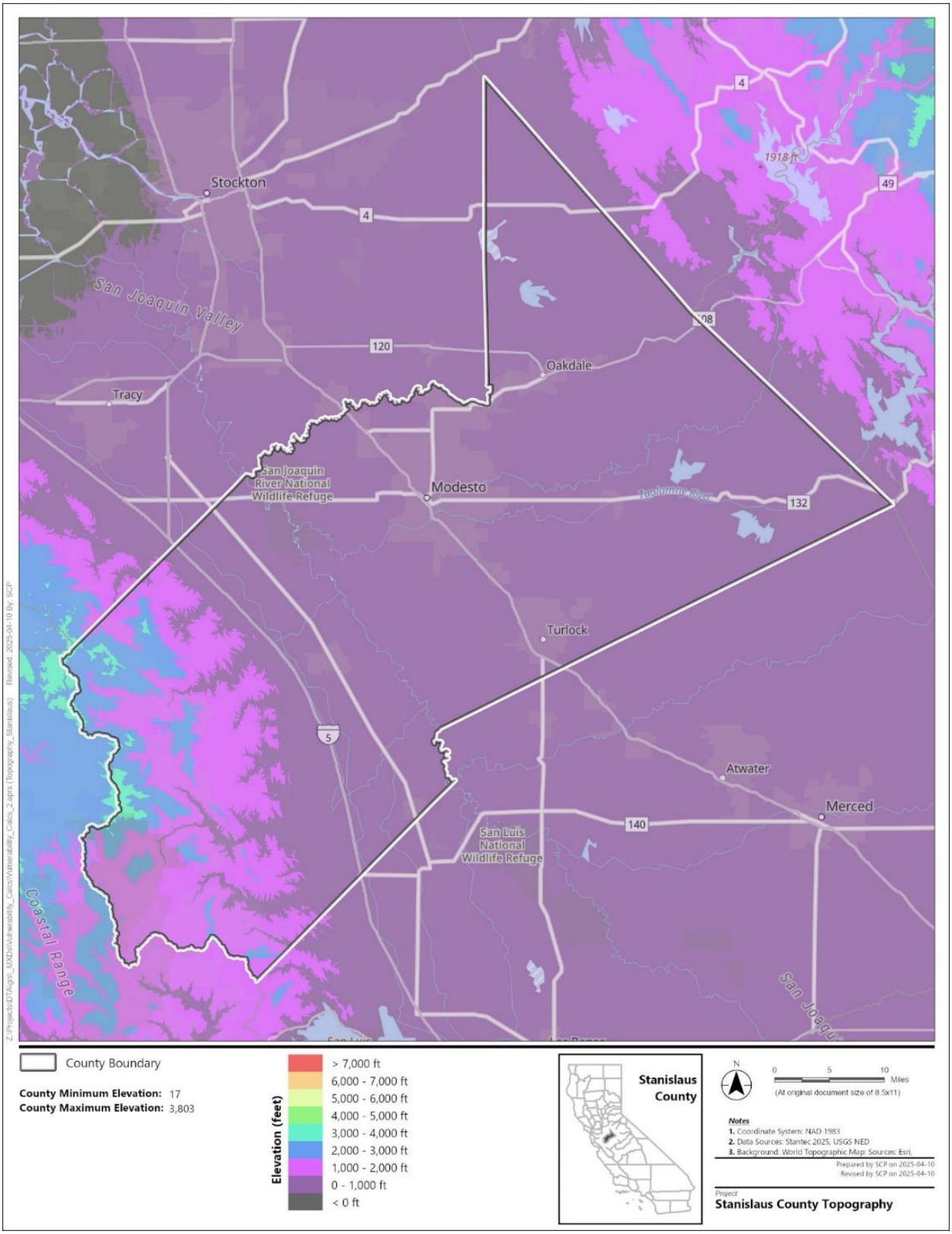


Figure 1-2. Topography of Stanislaus County

1.4.2.2 Precipitation

Precipitation within the County is highly seasonal. Most of the precipitation occurs between November and April, with almost no precipitation occurring during the summer. The County experiences considerable variation in precipitation due to its two distinct geographic regions: SJV floor and eastern steps of the Southern Coast Range. Precipitation data, sourced from the California Data Exchange Center (CDEC), is based on monthly accumulated inches of rainfall. Not all CDEC stations provide annual precipitation figures, so only selected monitoring sites with available monthly and annual data for each region have been included.

The CDEC monitoring site chosen for the valley floor region of the County is located at Modesto Irrigation District, at an elevation of 91 feet. Modesto, situated in the SJV, reports an average annual precipitation of approximately 13 inches (DWR 2024a). The western boundary of the County features the lower steps of the Southern Coast Range and includes the Diablo Canyon CDEC monitoring station. Located approximately 15 miles due west of Newman, California, the Diablo Canyon station's historical data shows average annual precipitation of 20 inches (DWR 2024b).

The SJV area receives between 8 inches to 20 inches of rainfall annually, with significant variability from year to year. This variability is influenced by atmospheric rivers, which transport moisture from tropical regions and contribute 20 percent to 50 percent of California's precipitation. While some atmospheric rivers help replenish water supplies, others can cause severe flooding and landslides (CEC 2021).

1.4.2.3 Hydrology

Hydrologic Unit Codes (HUC) is a system developed by the United States (U.S.) Geological Survey to classify and manage watersheds across the United States, with the hierarchy indicated by the number of digits in the code. This system organizes watersheds into six levels of classification within six two-digit fields, each representing a different scale of hydrologic units. The fourth level of classification – referred to as HUC 8 – has been applied to this County DRP for planning purposes. Figure 1-3 shows the eight HUC-8 hydrologic subregions within the County. These include the Rock Creek-French Camp Slough, Upper Stanislaus, Upper Calaveras California, San Joaquin Delta, Upper Tuolumne, Upper Merced, Lower San Joaquin River, and Middle San Joaquin-Lower Chowchilla.

There are several rivers within the County, with the San Joaquin River, Stanislaus River, and Tuolumne River being the three largest. The headwaters of these three rivers originate in the high Sierra Nevada Mountains. Significant reservoirs in the County include Turlock Lake, Modesto Reservoir, and Woodward Reservoir, with capacities of 50,000 acre-feet, 29,000 acre-feet, and 36,000 acre-feet, respectively. Originally constructed in 1913, Turlock Lake functions as a balancing reservoir for irrigation demands for Turlock Irrigation District (TID) customers. The lake receives water from Tuolumne River. Also filled by the Tuolumne River, the Modesto Reservoir is operated by Modesto Irrigation District (MID) and provides additional storage for its agricultural and municipal customers. Woodward Reservoir is filled by the Stanislaus River and is operated by South San Joaquin Irrigation District (SSJID). Woodward Reservoir provides additional storage for its agricultural and municipal customers. Earthen canal systems associated with each facility allow for aquifer recharge, helping maintain local groundwater uses by cities, unincorporated communities, and domestic well and SSWS users.

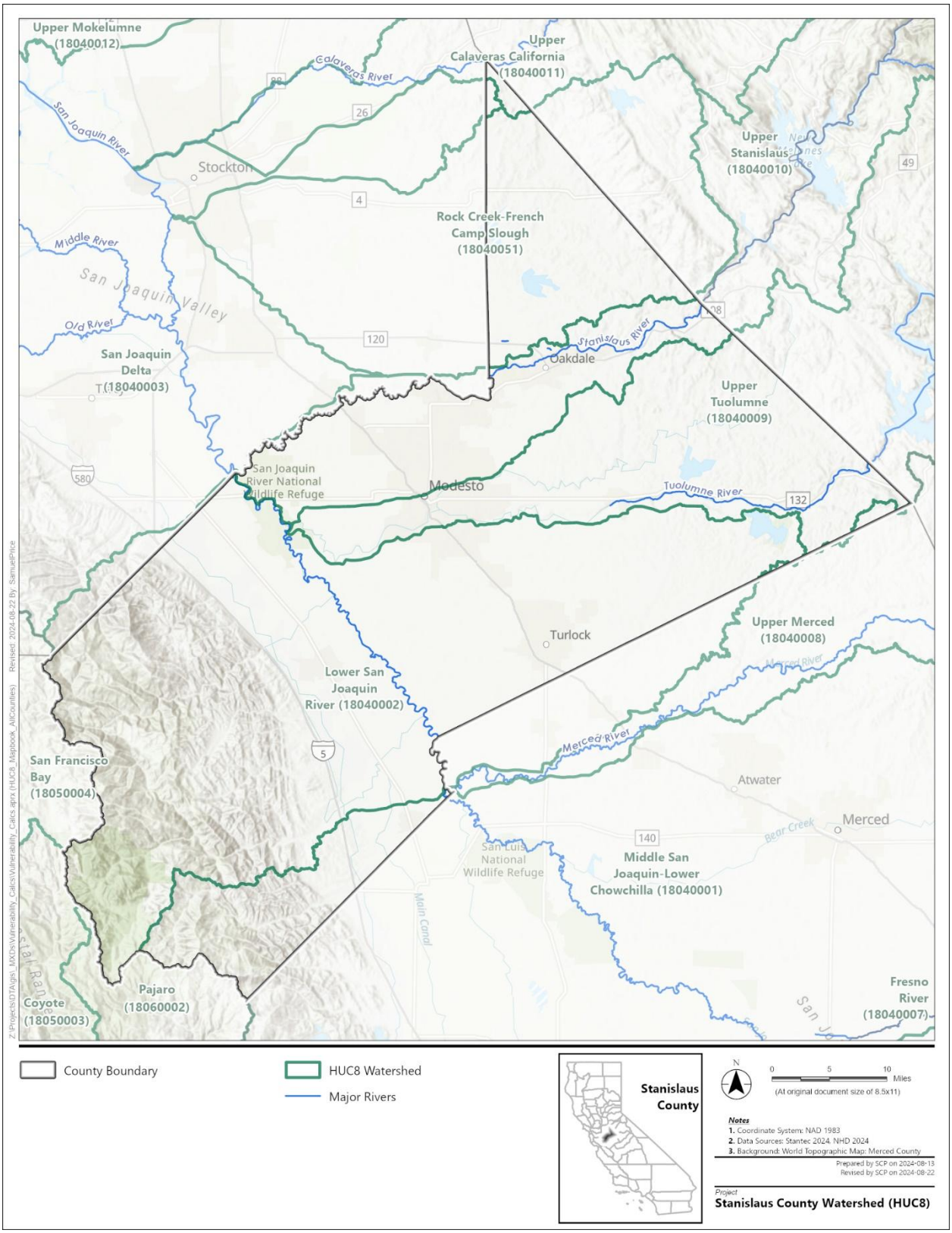


Figure 1-3. Hydrologic Subregions Within Stanislaus County

1.4.2.4 Geology

In the County, the Modesto Subbasin and Turlock Subbasin are in the northeastern SJV, where valley-fill sediments overlie consolidated, westward-dipping sedimentary units and basement rock of the Sierra Nevada Mountains (DWR 2024c, DWR 204d). Older units crop out in the eastern subbasin and dip west-southwest into the SJV below younger units. The surface geology of the Modesto Subbasin and Turlock Subbasin shows relatively older units in the east and younger units in the west.

The SJV is a large, northwest-trending structural trough in the southern Central Valley, extending up to 200 miles long and 70 miles wide, and filled with marine and continental sediments up to 6 miles thick (Burrow et al. 2004). It evolved during the Cenozoic era from tectonic activity and changes in sea level and climate (Bartow 1991). Tectonic processes included basin subsidence, uplift of the Sierra Nevada and Coast Ranges, and associated deformation. The Modesto Subbasin and Turlock Subbasins are within the northern Sierran block, which extends from the Stockton arch in the north to Fresno in the south. Deformation in this region consists mostly of a southwest tilt and minor late Cenozoic normal faulting. The normal faulting is mostly within the foothills, a result of the valley side of the Sierra block subsiding faster than the Sierra Nevada was rising.

1.4.2.5 Land-Use & Ownership

As shown in Figure 1-4, the valley region of the County is predominantly agricultural, with major urban and suburban development concentrated around Modesto and Turlock. In the west side region, urban areas such as Westly, Patterson, and Newman are situated amidst the base of the eastern slopes of the Southern Coast Range, where agriculture also plays a significant role. The County's key agricultural products include almonds, daily products, and poultry (Stanislaus County 2023). Established in 1987, the San Joaquin River National Wildlife Refuge is owned and managed by the U.S. Fish and Wildlife Service. The refuge is situated where three major rivers – Tuolumne, Stanislaus, and San Joaquin – join in the SJV (USFWS 2024). The Department of Defense owns land near Patterson, which is primarily used for military training, operations, and land conservation (LCI 2025). There are small areas of owned land on the valley floor and a larger section on the west side of the County in the Southern Coast Range. Additionally, the Bureau of Land Management owns small parcels of land on the west side of the County, also within the Southern Coast Range.

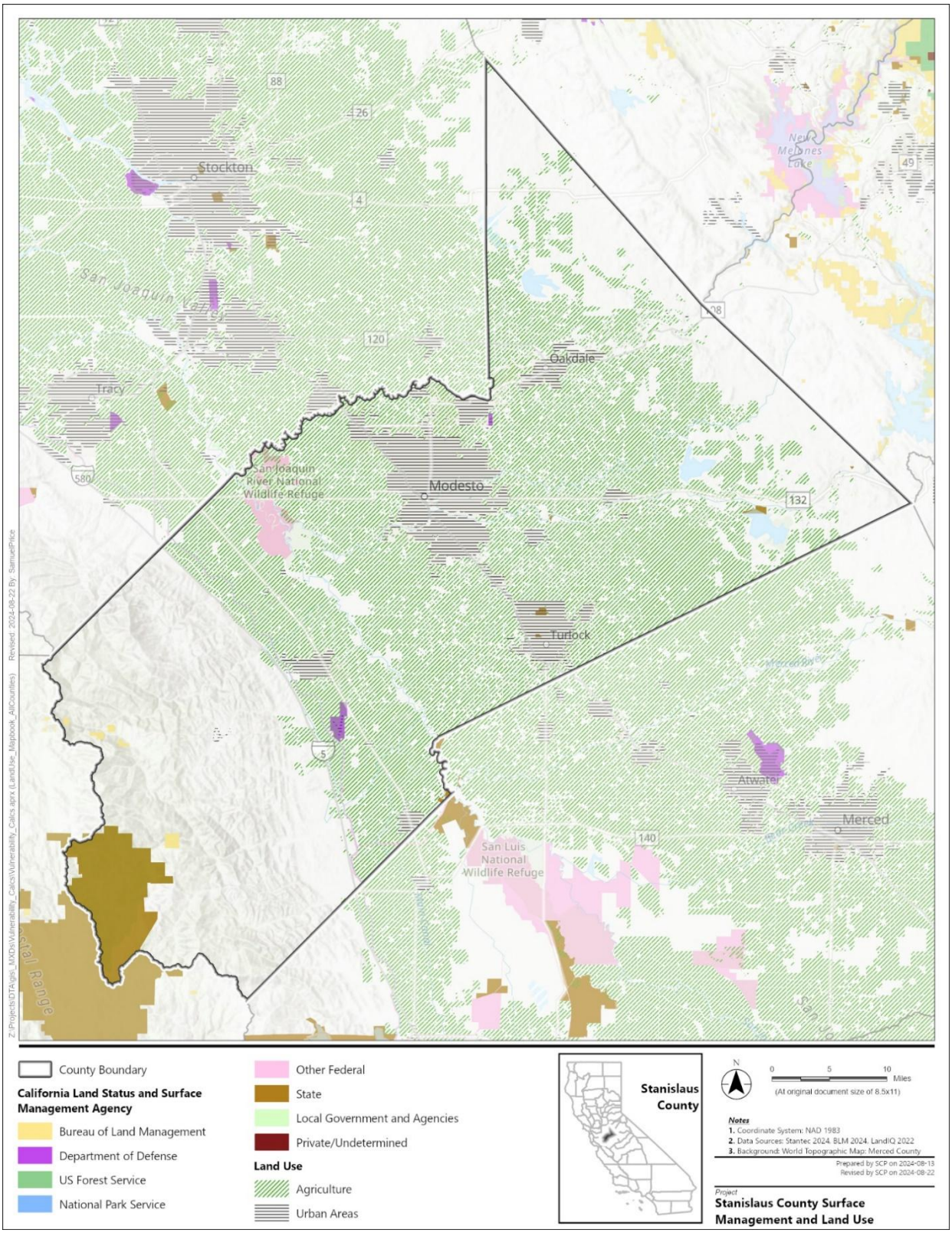


Figure 1-4. Land Use and Ownership Within Stanislaus County

1.4.3 Water Landscape: Supply, Use, and Management

Availability and use of groundwater and surface water supplies for domestic, industrial, agricultural, and environmental uses in the County are significantly influenced by climate, geography, and water rights. With a Mediterranean climate that yields a diverse array of agricultural crops, water resources availability in the region is substantially dependent on snowmelt from the Upper Stanislaus River and San Joaquin River watersheds and the availability of imported water via the California Aqueduct and the Delta-Mendota Canal. Management of water supplies is accomplished through a range of local public agencies, including the County, local municipalities, private water companies, and Groundwater Sustainability Agencies (GSA). In all, there are 201 public water systems in the County, with 61 serving community populations and 140 serving non-community populations (State Water Board 2020).

1.4.3.1 Groundwater

Groundwater is the source of a significant portion of Stanislaus County's water supply, which is drawn from several Bulletin 118 groundwater basins located within the boundaries of Stanislaus County. A Bulletin 118 basin is a designated groundwater basin defined by the State of California and published in the State's Groundwater Bulletin. This publication offers comprehensive details on the occurrence, characteristics, and management of groundwater.

In 2014, the Legislature passed the *Sustainable Groundwater Management Act* (SGMA), which established a framework for local groundwater management. SGMA led local public agencies, pursuant to CWC Section 10721(n), to form GSAs in high- and medium-priority basins and develop Groundwater Sustainability Plans (GSP) to avoid undesirable results and mitigate overdraft within 20 years. Under SGMA, local agencies bear primary responsibility for ensuring groundwater sustainability, while the DWR and the State Water Board provide oversight. This collaborative management structure seeks to protect groundwater for current and future use by communities, farms, and the environment.

The County contains four California Groundwater (Bulletin 118) Subbasins:

- SJV – Eastern San Joaquin (DWR Basin Number 5-022.01), located in northern Stanislaus County
- SJV – Modesto (DWR Basin Number 5-022.02), located between the Stanislaus and Tuolumne rivers
- SJV – Turlock (DWR Basin Number 5-022.03), located between the Tuolumne and Merced rivers
- SJV – Delta-Mendota (DWR Basin Number 5-022.07), located west of the San Joaquin River and east of the basement rock of the Southern Coast Range.

The SJV – Eastern San Joaquin (DWR Basin Number 5-022.01) and SJV – Delta-Mendota (DWR Basin Number 5-022.07) are both critically overdrafted and given a high SGMA priority. The SJV – Modesto (DWR Basin Number 5-022.02) and SJV – Turlock (DWR Basin Number 5-022.03) are identified as high SGMA priority regions. Collectively, these 4 groundwater subbasins include 13 GSAs within the County (identified in Figure 1-5). These subbasins cover approximately 971,971 acres, including 109,090 acres in northern Stanislaus County; 250,385 acres in Modesto; 218,249 acres in Turlock; and 394,247 acres in the west side of Stanislaus County.

Of the four groundwater subbasins present within Stanislaus County, two subbasins have been categorized as "High" (Critical Overdraft) priority. This classification indicates that, on average, the rate of water extraction exceeds the rate of natural recharge within these basins. Overdraft can lead to land

subsidence, which can damage infrastructure and reduce aquifer storage capacities. It also threatens groundwater levels and drinking water quality, especially for communities with shallow wells. The remainder of the groundwater resources include fractured rock regions, whose supply is dependent on atmospheric conditions.

1.4.3.2 Groundwater Sustainability Plans

Within Stanislaus County, the SJV – Eastern San Joaquin (DWR Basin Number 5-022.01) subbasin is managed by three GSAs:

- Eastside San Joaquin GSA is a four-member agency with areas in both Calaveras and Stanislaus Counties. Of the four members, two are within Stanislaus County jurisdiction: Rock Creek Water District and Stanislaus County.
- Oakdale Irrigation District (OID) GSA is a single-member agency with areas in both San Joaquin and Stanislaus Counties.
- South San Joaquin GSA is a three-member agency with areas in both San Joaquin and Stanislaus Counties. Of the three members, one is within Stanislaus County jurisdiction: SSJID.

These three GSAs are members of the Eastern San Joaquin Groundwater Authority, a joint powers authority formed by 16 GSAs within the Eastern San Joaquin Subbasin (ESJGA 2025). The Eastern San Joaquin Groundwater Authority developed the Eastern San Joaquin GSP, which was approved by DWR on July 6, 2023. The 2024 GSP Amendment and First Periodic Evaluation (2025) is still under review (DWR 2025a).

The SJV – Modesto (DWR Basin Number 5-022.02) subbasin is managed by two GSAs:

- County of Tuolumne GSA is responsible for the portion of the Modesto subbasin in Tuolumne County.
- Stanislaus and Tuolumne Rivers Groundwater Basin Association GSA is a seven-member agency with areas solely within Stanislaus County. The seven members include Stanislaus County, City of Modesto, City of Oakdale, City of Waterford, City of Riverbank, OID, and MID (STRGBA 2025).

The Stanislaus and Tuolumne Rivers Groundwater Basin Association GSA, in partnership with the County of Tuolumne GSA, developed the Modesto Subbasin GSP, which was approved by DWR on February 27, 2025.

The SJV – Turlock (DWR Basin Number 5-022.03) subbasin is managed by two GSAs:

- East Turlock Subbasin GSA is a five-member agency with areas in both Stanislaus and Merced counties. Of the five members, two are within Stanislaus County jurisdiction: Eastside Water District and Stanislaus County (ETSGA 2025).
- West Turlock Subbasin GSA is a 10-member agency with two associate agencies, with areas in both Stanislaus and Merced counties (Turlock Subbasin 2025). Of the 10 member agencies, seven are within Stanislaus County jurisdiction: City of Ceres, City of Hughson, City of Modesto, City of Turlock, Stanislaus County, Denair Community Services District, and TID. The two associate agencies are located within Stanislaus County jurisdiction: City of Waterford and Keyes Community Services District.

The East Turlock Subbasin GSA and West Turlock Subbasin GSA jointly developed the Turlock Subbasin GSP, which was approved by DWR on February 27, 2025.

The SJV – Delta-Mendota (DWR Basin Number 5-022.07) subbasin is managed by 23 GSAs, seven of which are located, at least partially, within Stanislaus County:

- West Stanislaus Irrigation District GSA is a three-member agency with areas in both Stanislaus and San Joaquin counties. Grayson Community Services District and Westley Community Service District are located solely within Stanislaus County. West Stanislaus Irrigation District has areas in both Stanislaus and San Joaquin counties.
- City of Patterson GSA is a single-member agency located solely within Stanislaus County.
- Patterson Irrigation District GSA is a single-member agency located solely within Stanislaus County.
- Northwestern Delta-Mendota GSA is a two-member agency with areas in both Stanislaus and Merced counties. The two members are Stanislaus County and Merced County, which manage the portion of the GSA within their respective jurisdictions.
- DM-II GSA is a two-member agency with areas in Stanislaus, San Joaquin, and Merced counties. Del Puerto Water District has areas in all three counties. Oak Flat Water District is located solely within Stanislaus County.
- City of Newman GSA is a single member agency located solely within Stanislaus County.
- San Joaquin River Exchange Contractors GSA is a four-member agency with areas in Stanislaus, Merced, Fresno, and Madera counties. Of the four member agencies, only Central California Irrigation District is located (partially) within Stanislaus County jurisdiction.

All 23 GSAs in the subbasin adopted a new, single, coordinated GSP which will serve as a roadmap for the GSAs to achieve groundwater sustainability (DWR 2025b). The GSP addressed deficiencies identified by DWR in March 2023 and was submitted to the State Water Resources Control Board in 2024 to determine if it meets the minimum requirements of the GSP regulations.

1.4.3.3 Surface Water

Surface water is the other major source of water supply in Stanislaus County, including the Tuolumne, Stanislaus, and San Joaquin rivers, each playing a vital role in regional water supply and management. The Tuolumne River is a major source for both MID and TID, providing essential water for agricultural irrigation, municipal use, and environmental flows. The Stanislaus River supports the OID and SSJID, contributing significantly to irrigation and groundwater recharge efforts. Meanwhile, the San Joaquin River is crucial for flood management and environmental management, further enhancing the County's integrated water resource system.

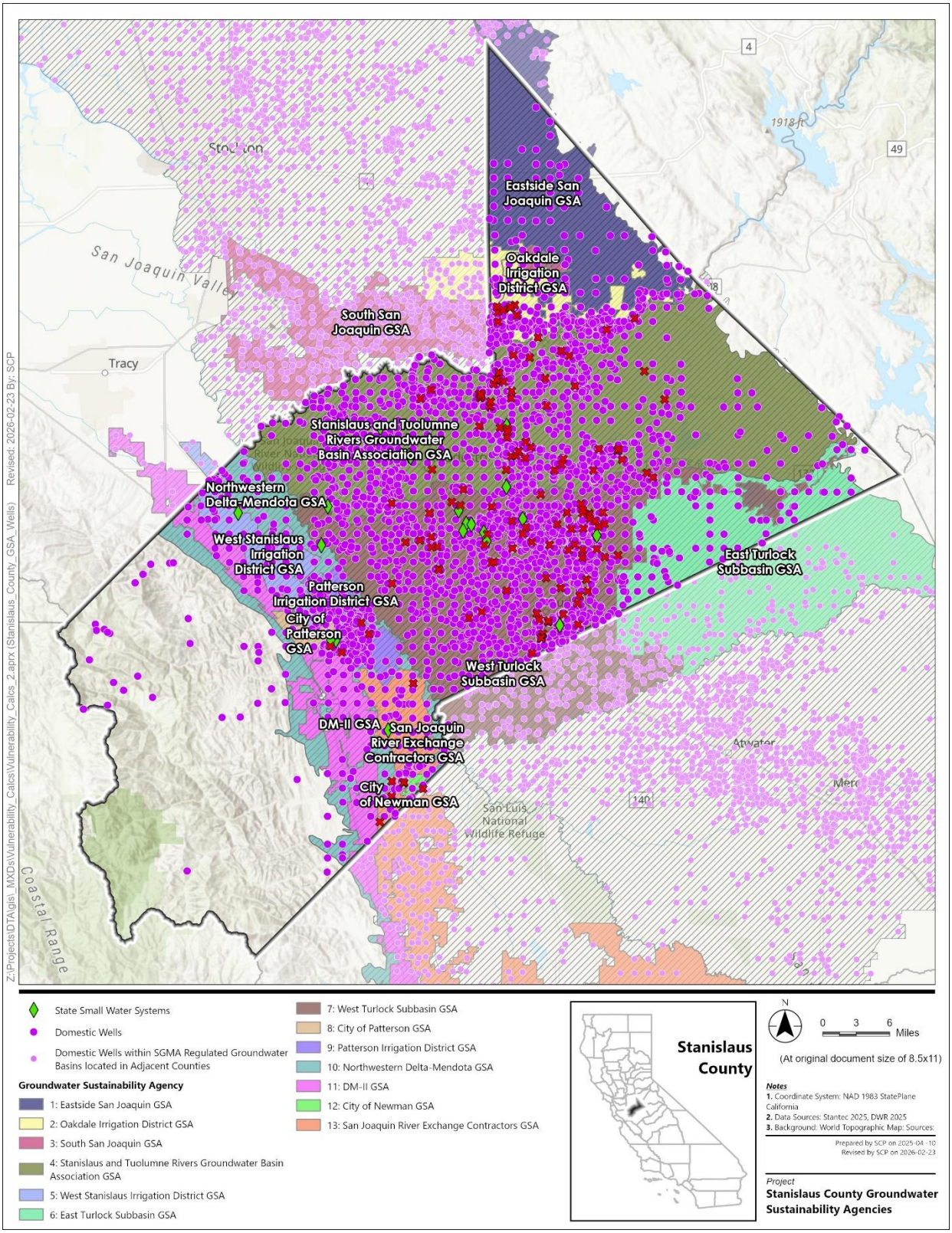


Figure 1-5. Groundwater Sustainability Agencies Within Stanislaus County

1.4.4 Water Systems Within Stanislaus County's Jurisdiction

CWC Section 10609.70 requires the County DRP include domestic wells and SSWSs (CWC 2021b). Figure 1-6 shows the location of domestic wells and SSWSs within the County, and Table 1-1 summarizes how many domestic wells and SSWSs are in the Bulletin 118 basins and fractured rock areas.

There is a key distinction between pre- and post-1977 wells (Table 1-1). Starting in 1977, well completion reports (WCR) became a State requirement, resulting in more consistent documentation. Prior to that, record-keeping was incomplete and unreliable, which means wells drilled before 1977 may have missing or inaccurate records. In contrast, post-1977 wells are more likely to have comprehensive, official reports available. This distinction is crucial for classifying abandoned wells, as their classification depends on the availability of documentation, which is more reliable for post-1977 wells. Thus, this study will consider the numbers of wells post-1977, where there are 7,752 recorded domestic wells present within the County. It is also important to note that the County is home to four basins (Table 1-1). Some of these basins extend only partially into the County.

Approximately 54 domestic wells, or about 1 percent of all domestic wells in the County, are located in fractured rock areas. None of the County's 20 SSWSs are located in fractured rock areas of the Southern Coast Range. Domestic well locations are derived from DWR WCRs. SSWS well locations are derived from Stanislaus County database. While the DWR WCR dataset was the most comprehensive record of domestic wells available at the time this County DRP was developed, it should not be considered a complete and accurate count of all active wells supplying water for domestic use in the County.

Historical data collected by the State through receipt of WCRs by well drillers show there are more than 9,200 domestic wells and 20 SSWSs within the County. The State segments this data by wells installed since 1977 and those installed before 1977. This separation is tied to, in part, a consideration of a groundwater well's assumed useful life span. These pre-1977 wells have been included for planning purposes as they 1) represent potential water demands within the County, and 2) a potential data gap to confirm, among other things, if the well has been appropriately abandoned for public safety and water quality protection purposes.

Figure 1-6 shows the location of domestic wells and SSWSs within the County by Bulletin 118 groundwater basin and by fractured rock areas. Table 1-1 summarizes the volume of domestic wells and SSWSs that are within Bulletin 118 groundwater basins and fractured rock areas. As groundwater basins and subbasins are traditionally based on the hydrogeologic boundaries—rivers, fractured rock areas, and others—and not County boundaries, this figure and table show domestic wells outside the County to demonstrate additional water supply demands within this shared water supply.

Table 1-1. Summary of Groundwater Basins, Domestic Wells, and State Small Water Systems in Stanislaus County

Bulletin 118 Basin ID	Groundwater Basin Name	SGMA Priority	Domestic Wells Drilled After 1977[1]	Domestic Wells Drilled Before 1977[1]	State Small Water Systems[1]	Domestic Wells in Basin but Outside County
5-022.01	SJV – Eastern San Joaquin (*Critically Overdraft*)	High	885	219	0	10,002
5-022.02	SJV – Modesto	High	2,775	619	4	3
5-022.03	SJV – Turlock	High	3,052	575	12	1,634
5-022.07	SJV – Delta-Mendota (*Critical Overdraft*)	High	986	66	4	1,601
N/A	Fractured Rock Areas	N/A	54	3	0	N/A
Total			**7,752**	**1,482**	**20**	**13,240**

Note:
1. Information presented in Table 1-1 and Figure 1-6 are based on WCRs and Stanislaus County SSWS database. Geographic information on WCRs may be inaccurate and/or place the well not at the actual well location. As a result, the number of domestic wells may be overestimated, and the placement of wells may not reflect actual locations.

Key:
N/A = not applicable
SGMA = Sustainable Groundwater Management Act
SJV = San Joaquin Valley
WCR = Well completion reportsTable 1-2 summarizes domestic wells, SSWSs, and the inventory of dry wells as self-reported to the State via its Dry Well Reporting System, by GSA and fractured rock areas. Reported dry wells in California are based on the Dry Well Reports submitted by users online via the States Dry Well Reporting System (DWR 2025c). This dataset was accessed in March 2025 and includes dry well reports from 2014 to present. In Stanislaus County, the earliest reported outage was in October 2014, and the latest was in January 2024. Within the County, there are 152 household dry well reports, primarily in alluvial groundwater basins. Of the 152 reports, 19 have a status of interim solutions, 1 has a status of outage, 23 have a status of resolved, and 109 that have a status of undefined. While DWR seeks to verify and update submitted data, the voluntary nature of reporting and other limitations may affect accuracy. Consequently, the data may over- or under-represent wells that have gone dry due to declining water levels, as opposed to those affected by mechanical or operational well failures. In addition, reports are received from multiple sources and there are occasionally errors and omissions that can create duplicate entries, non-household water supply reporting, and under-reporting. For example, missing information or no data for a given county does not necessarily mean there are no household water shortages in the county—rather, only that none have been reported to the State.

Table 1-2. Summary of Groundwater Basins, Domestic Wells, and State Small Water Systems in Stanislaus County by GSA and Fractured Rock Areas

Map ID	GSA ID	GSA Name	Partial or Full	Post 1977[1]	Pre 1977[1]	Reported Dry Wells[2]	Wells in Basin (Not in County)	SSWS[1]
1	288	Eastside San Joaquin GSA	Partial	249	42	0	1,377	0
2	228	Oakdale Irrigation District GSA	Partial	632	175	9	299	0
3	249	South San Joaquin GSA	Partial	4	2	0	1,997	0
4	192	Stanislaus and Tuolumne Rivers Groundwater Basin Association GSA	Full	2,775	619	54	0	4
5	13	West Stanislaus Irrigation District GSA	Partial	93	7	0	14	1
6	238	East Turlock Subbasin GSA	Partial	149	15	0	294	0
7	225	West Turlock Subbasin GSA	Partial	2,903	560	76	1,340	12
8	66	City of Patterson GSA	Full	46	3	0	0	0
9	17	Patterson Irrigation District GSA	Full	464	19	4	0	2
10	214	Northwestern Delta-Mendota GSA	Partial	114	10	3	4	0
11	301	DM-II GSA	Partial	68	5	0	59	0
12	57	City of Newman GSA	Full	18	8	0	0	0
13	10	San Joaquin River Exchange Contractors GSA	Partial	165	13	6	1,035	1
N/A	N/A	Area not covered by GSA	N/A	72	4	0	N/A	0
Total Alluvial Groundwater				7,698	1,479	152	6,419	20
Total Fractured Rock Groundwater				54	3	0	0	0
Total				**7,752**	**1,482**	**152**	**6,419**	**20**

Notes and Sources:

1. Information presented in Table 1-2 and Figure 1-5 are based on WCRs and Stanislaus County SSWS database. Geographic information on WCRs may be inaccurate and/or place the well not at the actual well location. As a result, the number of domestic wells may be overestimated, and the placement of wells may not reflect actual locations.
2. DWR 2025c

Key:

GSA = Groundwater Sustainability Agency

N/A = not applicable

SSWS = state small water system

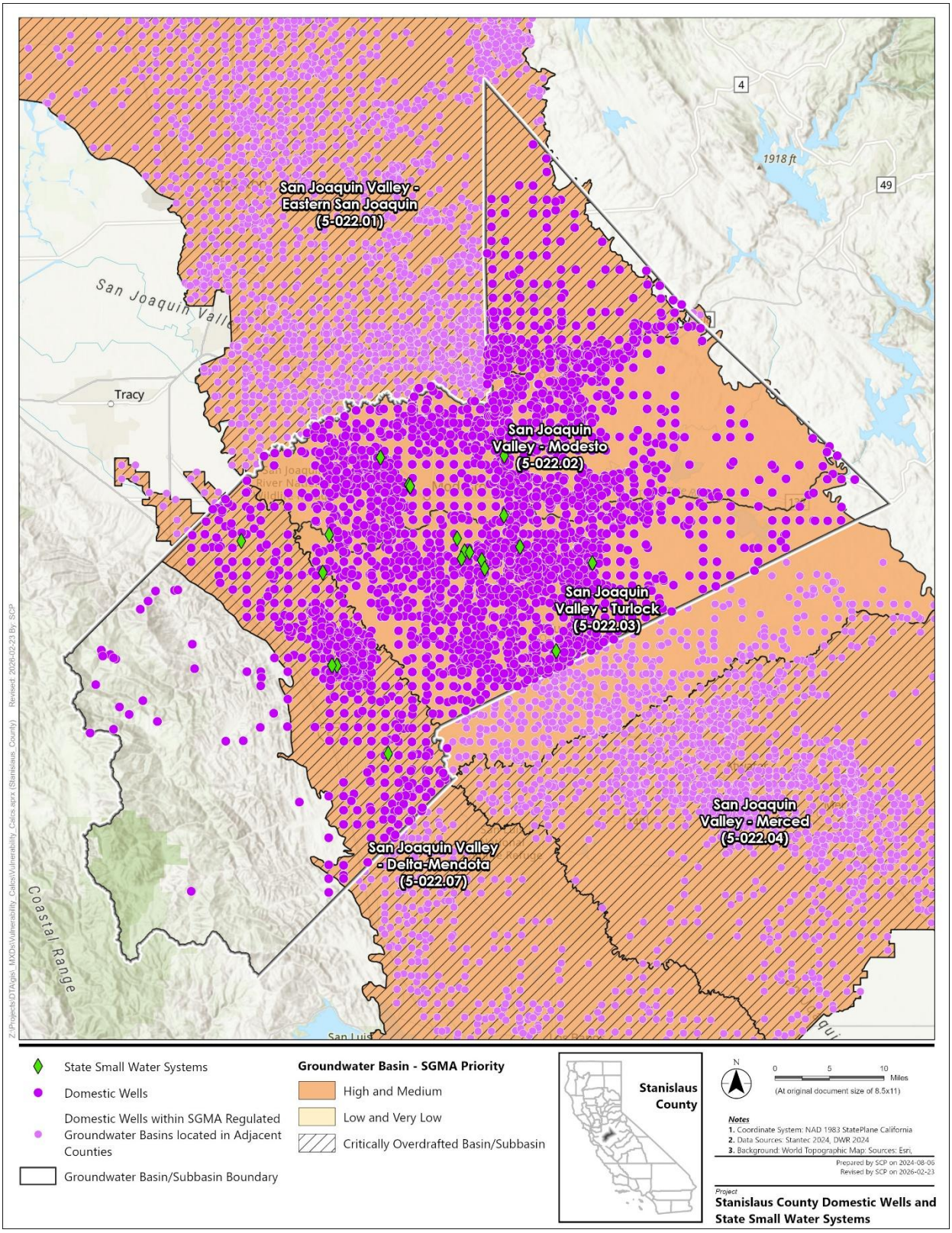


Figure 1-6. Locations of Domestic Wells and State Small Water Systems in Stanislaus County

2.0 County Drought and Water Shortage Task Force

2.1 Introduction

An objective of the Legislature and the Governor, through the enactment of SB 552, is to promote consistent implementation and continuous progress towards facilitating drought and water shortage preparedness for SSWS and domestic well communities. To advance this objective, the legislature required counties to establish a standing county drought and water shortage task force or implement an alternative process designed to inform and engage interested parties. Stanislaus County has elected to utilize its existing WAC to fulfill the role and responsibilities of the task force consistent with SB 552. The following sections provide an overview of the legislative framework and the decision-making process that supports implementation of this plan.

2.2 Legislative Direction

In September 2021, SB 552 (Hertzberg 2021) was enacted to address, among other things, water shortage risks faced by small water suppliers and domestic well users during drought and water shortage events. Under SB 552, counties are required to prepare a DRP to achieve meaningful and long-term improvements in water resilience for domestic well and SSWS communities.

Passage of SB 552 mandates establishment of a standing task force or other alternative process to support continued practices of drought planning and improving long-term water resilience for domestic wells and SSWSs. The legislature provided two options under CWC Section 10609.70(a)(1) or (a)(2) [CWC 2021]:

> *(a)(1) A county shall establish a standing county drought and water shortage task force to facilitate drought and water shortage preparedness for state small water systems and domestic wells within the county's jurisdiction, and shall invite representatives from the state and other local governments, including groundwater sustainability agencies, and community-based organizations, local water suppliers, and local residents, to participate in the task force.*
>
> *(a)(2) a county may establish an alternative process that facilitates drought and water shortage preparedness for state small water systems and domestic wells within the county's jurisdiction. The alternative process shall provide opportunities for coordinating and communicating with the state and other local governments, community-based organizations, local water suppliers, and local residents on a regular basis and during drought or water shortage emergencies.*

The County's WAC serves as the task force consistent with CWC 10690.70(a)(1) [CWC 2021].

2.3 Water Advisory Committee

Founded in 2014, the County WAC is comprised of one member of the County Board of Supervisors, appointees from each Supervisorial district, County staff, local community organizations, community at large members, and a representative of the County's Agricultural Advisory Board. The Committee was formed the same year the County adopted a Groundwater Ordinance (GWO) (County Code Chapter 9.37) to manage groundwater extraction sustainably, especially concerning new wells and the export of groundwater outside the County (Stanislaus County 2014). The GWO codifies requirements,

prohibitions, and exemptions that assure sustainable groundwater extraction from new wells. The ordinance framework is structured primarily on the principles of SGMA.

The Water Advisory Committee's mission statement is as follows (Stanislaus County 2025a):

> *To evaluate the status of the groundwater resources of Stanislaus County in order to identify and develop programs and practices that ensure a reliable and sustainable groundwater supply for the benefit of its citizens, present and future, and to make recommendations to the County Board of Supervisors to adopt public policy that empowers such identified actions.*

2.4 Purpose

In compliance with the State law and as the regulatory agency for domestic wells and SSWSs in Stanislaus County, the Department of Environmental Resources, through its Groundwater Resources Division, confers with the WAC to implement the County DRP. The WAC evaluates the status of the groundwater resources of Stanislaus County to identify and develop programs and practices that provide reliable and sustainable groundwater supply for the benefit of its citizens, present and future, and to make recommendations to the County Board of Supervisors. The WAC additionally serves as a mechanism to communicate and coordinate with representatives from County departments and divisions, groundwater sustainable agencies, public water systems, and other key agencies and organizations with expertise to help SSWSs and domestic wells within the County's jurisdiction plan for and respond to drought or water shortage conditions.

The WAC is intended to:

- Advise County staff in the development of the County DRP to facilitate drought and water shortage preparedness for SSWSs and domestic wells within the County's jurisdiction.
- Facilitate communication and coordination on a regular basis, as well as during drought or water shortage emergencies, among staff or relevant County departments, local water agencies, local water suppliers, groundwater sustainability agencies, and others representing the concerns of SSWSs and domestic wells.
- Provide recommendations to the County Board of Supervisors on the development of the County DRP, the implementation of the County DRP once adopted by the Board of Supervisors, and advise on other matters relating to planning for or responding to drought and water shortages affecting SSWSs and domestic wells.
- Share findings and recommendations related to drought and water shortage planning efforts with the public.
- Monitor drought conditions to make recommendations for initiating reasonable short-term response actions according to established plans, including the County DRP.
- Identify data gaps and necessary actions (including potential needed capacity development and resource acquisition) to gather missing data for better drought and water shortage planning.
- Pursue funding opportunities for advancing planning for water resilience and response to water shortage events.

- Encourage and implement long-term (advance) planning that anticipates budget and policy needs and trigger points for future actions.

2.5 Decision-Making Structure

Implementation of the County DRP is supported through a decision-making structure that includes the County Board of Supervisors, County staff, and the WAC. This structure is intended to provide for a County DRP that is comprehensive, effective, and aligned with the needs of the County, and accomplishes its objectives for County residents, businesses, and the environment. Below are the key components of the decision-making structure for the County DRP. Figure 2-1 presents the organization framework, described in further detail below.

2.5.1 Board of Supervisors

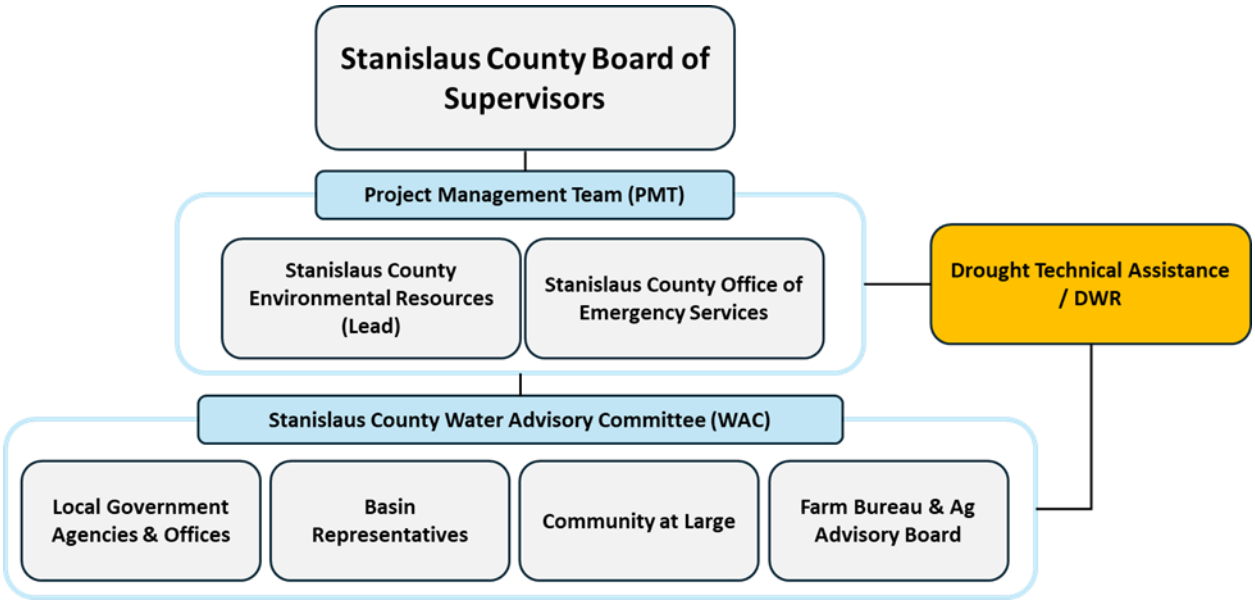
The Board of Supervisors is the primary decision-making body for the County and authorizes adoption and implementation of the County DRP. The County Project Management Team (PMT) and the WAC provide informational briefings and recommendations to the Board of Supervisors.

2.5.2 Project Management Team

The PMT is led by and comprised of staff from the Department of Environmental Resources, as well as staff from the County OES and other County departments/divisions, as necessary. The PMT consults with the WAC to prepare and implement the County DRP, consistent with direction of the Board of Supervisors. The PMT also consults with GSAs located within the County's jurisdiction and other State agencies, and responds to other interested parties.

2.5.3 Water Advisory Committee

The WAC serves as an advise-and-consult body to the County Department of Environmental Resources' Groundwater Resources Division on the implementation of the County DRP. Recommendations provided by the WAC pursuant to its mission are carried forward to the Board of Supervisors, where applicable.



Key: Ag = Agricultural; DWR = California Department of Water Resources; PMT = Project Management Team; WAC = Water Advisory Committee

Figure 2-1. Stanislaus County Drought Resilience Plan Organizational Chart

2.6 Water Advisory Committee Responsibilities

The WAC, among its other duties, serves to promote consistent implementation and continuous progress towards facilitating drought and water shortage preparedness for SSWS and domestic well communities in the County. As an advise-and-consult body to the County Department of Environmental Resources' Groundwater Resources Division, its members are expected to:

- Review progress on the development of the County DRP, review and make recommendations on the County DRP, and assist in the subsequent implementation of the County DRP.
- Review and advise on current drought conditions and potential risk factors using tools provided by State agencies, identify drought-related issues that will impact County residents, and help develop short-term actions and long-term strategies to address identified issues.
- Disseminate WAC findings and recommendations to their respective agencies and organizations to provide information, as well as seek feedback that can be shared during WAC meetings and working sessions.
- Attend scheduled WAC meetings in January, May, and September, or as conditions merit (Stanislaus County 2025a).
- Facilitate coordination and communication during drought or water shortage emergencies.

2.7 Communication and Engagement

Consistent with CWC Section 10609.70(a)(1), the County of Stanislaus provided opportunities for coordinating and communicating with the State and other local governments, community-based organizations, local water suppliers, and local residents on a regular basis and during drought or water shortage emergencies (CWC 2021). The County of Stanislaus has implemented the following strategy:

2.7.1 Website

The County maintains a Groundwater Resources page to serve as a comprehensive resource for up-to-date information on regional groundwater resources and tools to report problems, receive information, or participate in sustainable groundwater management (Stanislaus County 2025b). The following activities have been established to support engagement and implementation of the County DRP:

- Established a new webpage as a subdirectory of the Groundwater Resources page at: https://www.stancounty.com/er/groundwater/. Informational resources within this page include:
  - Final Stanislaus County DRP
  - Link to DWR's County Drought Resilience Planning Assistance Program and details associated with SB 552 (DWR 2023a).
  - Link to DWR's Water Shortage Vulnerability Explorer Tool (DWR 2023b).
  - Link to DWR's Dry Well Reporting System (DWR 2025).
  - Link to download and submit a form for landowners to self-report a problem with their well (Stanislaus County 2025c).
  - Link to the County WAC meetings and meeting summaries (Stanislaus County 2025a)
  - Contacts

3.0 Drought and Water Shortage Risk Assessment

A drought and water shortage risk assessment (referred to as a risk assessment) was prepared in development of the County DRP as directed in CWC Section 10609.70(b) [CWC 2021]. This risk assessment evaluated how potential hazards intersect with the County's domestic well and SSWS assets, and other community assets, to characterize the vulnerability of domestic wells and SSWSs to water supply shortage. The outcomes from the risk assessment helped inform response plans with short-term actions to employ when a water supply shortage occurs and long-term mitigation strategies and actions that reduce the vulnerability to water shortages. This chapter presents the risk assessment results for Stanislaus County.

The risk assessment presented in this County DRP does not replace the regulatory requirements of the Federal Emergency Management Agency (FEMA).[2] The County DRP could make the County eligible for FEMA's Pre-Disaster Mitigation and Hazard Mitigation Grant programs. However, if a jurisdiction is also seeking approval of the drought and/or water shortage risk assessment within the Local Hazard Mitigation Plan, it should follow the requirements outlined in the FEMA *Local Mitigation Planning Handbook* (FEMA 2013).

3.1 Terminology

The County DRP adopted the following definitions from the FEMA *Local Mitigation Planning Handbook* (FEMA 2013) within the context of drought and water shortage planning:

- **Community assets**: The people, structures, facilities, and systems that have value to the community. The minimum assets considered as part of the SB 552 plan include domestic wells, SSWSs, and populations relying on those water supplies.
- **Hazard**: A source of harm or difficulty created by meteorological, environmental, geological, hydrological, or other event conditions. In the context of SB 552, hazards are the natural, human-made, and social processes that can lead to water shortages in the County.
- **Impact**: The consequences or effects of a hazard related to drought and water shortages on the community and its assets.
- **Risk**: The potential for damage, loss, or other impacts (e.g., water shortage) created by the interaction of natural hazards with community assets and their physical and social vulnerabilities.
- **Risk Assessment**: Product or process that collects information and assigns values to risks for the purpose of informing priorities, developing or comparing courses of action, and informing decision-making.
- **Vulnerability**: Characteristics of community assets or population that make them susceptible to damage from a given hazard. This includes both physical vulnerability and social vulnerability.

[2] The County DRP could make the County eligible for FEMA's Pre-Disaster Mitigation and Hazard Mitigation Grant programs. However, if a jurisdiction is also seeking approval of the drought and/or water shortage risk assessment within the Local Hazard Mitigation Plan, it should follow the requirements outlined in the FEMA *Local Mitigation Planning Handbook* (FEMA 2013).

3.2 Risk Assessment Methodology

The nature and severity of hazards that can cause water shortages vary at regional and local scales due to differences in conditions, such as precipitation patterns, groundwater levels, topography, geology, infrastructure, regulatory frameworks, and other conditions. Communities lacking access to reliable water sources are most vulnerable to water shortage caused by such hazards. To address this, a thorough risk assessment was completed that considered many physical and social hazard indicators. The results and findings of that risk assessment were then used by the County and WAC to develop actions and strategies to address water shortages (see Chapters 4 and 5).

The risk assessment was completed following the four steps outlined below.

1. **Describe Major Hazards in the County:** Drought, climate change, and water quality hazards were summarized and described.
2. **Complete Draft Risk Assessment using DWR Water Shortage Vulnerability Explorer:** The DWR Water Shortage Vulnerability Explorer (WSVE) Tool was used to (a) identify areas within the County where domestic wells and SSWSs are vulnerable to water supply shortages, and (b) characterize the hazards driving vulnerability (DWR 2023). This information was included in a draft risk assessment. The County and WAC reviewed the draft risk assessment, provided feedback, and identified data gaps. Additional details on the WSVE Tool and how it was applied in the risk assessment are included below.
3. **Revise the Draft Risk Assessment:** County and WAC feedback on the draft risk assessment was used to develop a revised risk assessment.
4. **Incorporate Results of Revised Risk Assessment into County DRP:** Information from the revised risk assessment was included in the County DRP (Section 3.4). Findings from the revised risk assessment were used by the County and WAC to develop short-term actions and long-term strategies to improve water supply sustainability (Chapter 4 and 5).

Developed by DWR in collaboration with the County Drought Advisory Group (CDAG), the WSVE Tool is an online geospatial tool that quantifies hazards using spatially visualized indicators. There are both indicators of physical vulnerability (Table 3-1) and social vulnerability (Table 3-2). These indicators were selected by DWR and CDAG to reflect hazards that could make a domestic well or SSWS vulnerable to water supply shortage.

The WSVE Tool calculates both a total physical vulnerability score and a total social vulnerability score, each combining the associated individual indicators. The process used by the WSVE Tool to calculate those total scores is summarized below.

- The total physical vulnerability score was calculated at the Public Land Survey Section[3] (PLSS) scale by normalizing the indicator value between 0 and 1, with 1 representing the highest possible vulnerability. Normalized scores were multiplied by a weighting factor from 1 to 5 that was assigned by DWR and CDAG to capture how some indicators contribute more to water shortage vulnerability than others.

[3] A Public Land Survey Section is a geographic delineation of an area equivalent to one square mile.

- The total social vulnerability score was calculated at the Census Block Group[4] scale by normalizing the indicator value between 0 and 1 and summing the values together without additional weighting.

DWR periodically revises the WSVE Tool to incorporate improved data and/or updated methodology. Data for the risk assessment was accessed in July 2025 and used the 2024 methodology (DWR 2023). The detailed methodology that describes the WSVE Tool indicators and corresponding values, data sources, and weighting factors is available on the California Natural Resource Agency's Open Data Portal (CNRA 2023).

Table 3-1. Water Shortage Vulnerability Explorer Tool Indicators Used in the Development of Physical Vulnerability Score

Indicator Name and Code[1]	Indicator Description
Indicators Related to Climate Change	
Absolute Projected Temperature Shift (RC1a)	**Metric:** Projected change in maximum temperatures by mid-century (2034-2064). **Impact on risk:** Increased temperatures could increase water supply demands from customers, evapotranspiration, and others, thereby increasing the risk of drought and/or water shortage impacts.
Sea Level Rise Impacts Through Saltwater Intrusion into Coastal Aquifers (RC1b)	**Metric:** Spatial extent of projected 1-meter sea level rise by 2040 into coastal aquifers. **Impact on risk:** Increased risk when exposed to current and future saltwater intrusion.
Rescaled Climate Change Projections of Wildfire Risk by Mid-Century (RC1c)	**Metric**: Projected area burned by mid-century (2035–2064). **Impact on risk:** Projected risk to wildfire as influenced by climate change, which is already a major risk to water supply.
Indicators Related to Current Environmental Conditions and Events	
2024 Precipitation (RC2a)	**Metric:** If water year 2024 precipitation was less than 70 percent of average historical. **Impact on risk:** Wells sensitive to reduced precipitation in a dry year increases physical vulnerability.
Multiple Dry Years (RC2aa)	**Metric:** Count of dry years within the last five years (2020–2024). **Impact on risk:** A higher count suggests a greater immediate risk for water supply vulnerability
U.S. Forest Service Wildfire Hazard (RC2b)	**Metric:** U.S. Forest Service Wildfire Hazard Potential Zones. **Impact on risk:** A heightened risk contributes to physical vulnerability of water sources, including groundwater.
Fractured Rock Areas (RC2c)	**Metric:** Fractured rock area within the PLSS. **Impact on risk:** Water availability in fractured rock areas is more difficult to monitor and therefore more uncertain for those relying on this as a source of water.

[4] A Census Block Group is a geographic unit with a population between 600 and 3,000 people that are a smallest geographical unit that the U.S. Census Bureau publishes data collected from a fraction of households.

Indicator Name and Code[1]	Indicator Description
SWRCB Water Quality Aquifer Risk (RC2i)	**Metric:** SAFER Needs Assessment 2024 water quality composite score. **Impact on risk:** Increased contamination creates an increased risk during dry periods or other water shortages, especially in cases where systems have no other water source.
Subsidence (RC2d)	**Metric:** Amount of subsidence as measured by remote sensing. **Impact on risk:** Subsidence problems increase the risks of shortage issues.
Presence of Saltwater Intrusion (RC2e)	**Metric:** Presence of saltwater intrusion into coastal aquifer. **Impact on risk:** Increased water quality challenge.
Overdrafted Basin (RC2f)	**Metric:** SGMA critically overdrafted groundwater basin. **Impact on risk:** Groundwater in decline would increase risk to water shortage and drought.
Chronic Declining Water Levels (RC2g)	**Metric:** Amount of declining groundwater levels over the last 20 years (water years 2003–2024). **Impact on risk:** Declining levels indicate increased risk.
Amount of Irrigated Agriculture (RC2j)	**Metric:** Proportion of irrigated agriculture in PLSS. **Impact on risk:** May indicate competing demand for groundwater supplies, which could create higher risk for small suppliers during a drought or water shortage event.
Indicators Related to Infrastructure Susceptibility	
Domestic Well Susceptibility in Alluvial Basins (RC3a)	**Metric:** Dry well susceptibility in alluvial basins. **Impact on risk:** Density-based indicator, offers an estimate of the likelihood that domestic wells may go dry if the current trends in groundwater condition persists.
Fractured Rock Area Competing Demand (RC3c)	**Metric:** Density of well completion reports. **Impact on risk:** Higher densities of domestic wells in these fractured rock areas increases the vulnerability of experiencing well outages, particularly in dry periods.
Record of Shortage	
Reported Household Outage on Domestic Well (RC5a)	**Metric:** Presence of one or more households with reported outages in PLSS. **Impact on risk:** Increased risk in areas that have already experienced outages.

Note:
[1] Abbreviations are included next to Indicator Name (i.e., "RC1a") for clarity to underlying methodology
Key:
PLSS = Public Land Survey Section
SAFER = Safe and Affordable Funding for Equity and Resilience Program
SGMA = Sustainable Groundwater Management Act
SWRCB = State Water Resources Control Board

Table 3-2. Water Shortage Vulnerability Explorer Tool Indicators Used in the Development of Social Vulnerability Score

Indicator Name	Indicator Description
Socioeconomic Status	*Communities with higher poverty levels, higher unemployment, and/or lower per capita income are more vulnerable to water supply shortages or impacts from those shortages. They may lack the resources to purchase water, temporarily relocate, or upgrade well infrastructure.*
Poverty Level	Percent of persons below poverty level.
Unemployment	Percent of persons aged 16 years of age or older that are unemployed.
Per Capita Income	Per capita income.
Language and Education	*Communities with lower education and/or English language proficiency are more vulnerable to water supply shortages or impacts from those shortages.*
Education Attainment	Percent of persons without a high school diploma.
English Language Proficiency	Percent of persons who speak little to no English.
Demographics	*Communities with higher populations that are elderly, younger than 18, disabled, or in a single-parent household are more vulnerable to water supply shortages or impacts from those shortages.*
Elderly Population	Percent of persons 65 years of age or older.
Non-Adult Population	Percent of persons 17 years of age or younger.
Minority Population	Percent of persons that are in a minority population.
Disability	Percent of persons 5 years of age or older with a disability.
Single Parent Households	Percent of single-parent households.
Housing and Transportation	*Communities where more people live in housing with multiple units or mobile homes, crowded conditions, or do not have vehicle access are more vulnerable to water supply shortages or impacts from those shortages.*
Multi-Unit-Housed Population	Percent of persons living in a multi-unit structure.
Mobile Home-Housed Population	Percent of persons living in a mobile home.
Crowded Conditions	Percent of persons living in conditions with more than one person per room.
No Vehicle Access	Percent of households with no vehicle available.
Race and Ethnicity	
Persons of Color	Percent of persons that identify with a race other than White or identify ethnically as Hispanic or Latino.

3.3 Hazards in Stanislaus County

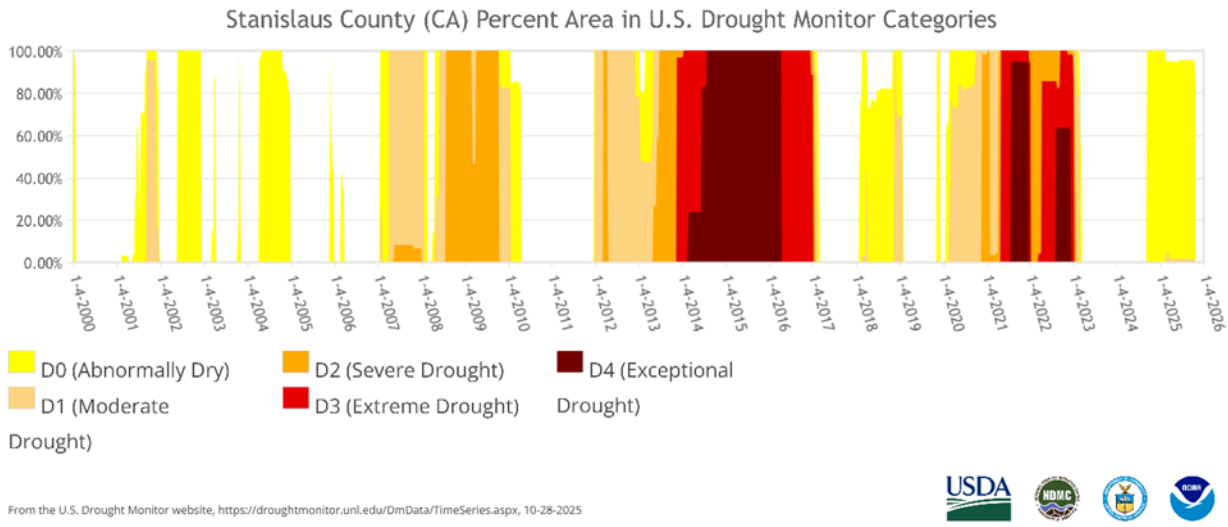
This section summarizes the recent drought, projected climate change, current water quality, and groundwater hazards in the County. Section 3.4 provides more details on the vulnerabilities related to these hazards.

3.3.1 Drought

California has the nation's most variable climate, and droughts are a recurring feature (PPIC 2021). Very wet and very dry years are common, while "normal" years—widely used to describe historical average precipitation—are rare. One dry year does not constitute a drought. Droughts occur when two or more successive years are very dry and reservoirs and groundwater reserves are depleted. Significant recent droughts occurred in 1976 to 1977, 1987 to 1992, 2007 to 2009, and 2012 to 2016. The past two decades have been exceptionally warm and dry, and included the hottest drought (2012 to 2016) in the State's recorded history. Warming is making droughts more intense. Communities that rely on shallow wells are especially vulnerable to dry conditions.

As shown in Figure 3-1, the analysis by the U.S. Drought Monitor shows the frequency and duration of droughts in Stanislaus County since 2000 (USDM 2025). The figure highlights the cyclical nature of droughts in the County, where periods of "Exceptional Drought" are followed by periods without drought. Another element to highlight is that droughts can manifest rapidly, sometimes in the span of a single year. This demonstrates that drought is an important hazard for the risk assessment.

The U.S. Drought Monitor is produced through a partnership between the National Drought Mitigation Center at the University of Nebraska-Lincoln, the United States Department of Agriculture, and the National Oceanic and Atmospheric Administration. It tracks drought conditions nationwide and includes results in tabular and map-based results weekly. The program's authors use several dozen indicators to assess drought, including precipitation, streamflow, reservoir levels, temperature and evaporative demand, soil moisture, and vegetation health. Because the drought monitor depicts both short- and long-term drought conditions, the authors look at data for multiple timeframes. The final map produced each week represents a summary of the story being told by all the pieces of data. Results are expressed through the following intensities: No Drought; Abnormally Dry (D0), Moderate Drought (D1), Severe Drought (D2), Extreme Drought (D3), and Exceptional Drought (D4).



Source: USDM 2025.

Figure 3-1. Occurrence of Drought in Stanislaus County

3.3.2 Climate Change

According to California's Fourth Climate Change Assessment, climate change has increased both average temperatures and the frequency and intensity of heat waves or extreme heat events (CEC 2021). While global temperature increases of 1 degree Celsius (°C) to 2°C (1.8 degrees Fahrenheit [°F] to 3.6°F) are anticipated, local observed increases that affect neighborhoods and ecosystems are more variable and often of greater magnitude.

The SJV Region Report subsection predicted changes over this century to include higher average temperatures, with approximate increases of 2.2°C to 2.7°C (4.0°F to 5.0°F) under leveling greenhouse gas concentrations, or 4.4°C (8°F) under increasing greenhouse gas concentrations (Fernandez-Bou et al. 2021).

Droughts in California are triggered by a lack of large winter storms, and water shortages are further exacerbated by high temperatures, which increase the evaporative loss of water from soils, rivers, canals, and reservoirs. Drought conditions, particularly when persisting for several years, can cause mental and physical stress in people, reduce the number of workable farm-labor days, and lead to deteriorated air and water quality (Greene 2018).

Historical data show that daily precipitation extremes have intensified in most areas of the country, including California. As the atmosphere continues to warm, extreme precipitation events could become more frequent, since storms can hold about 6 percent to 7 percent more water for every 1°C (1.8 °F) of warming. Climate model simulations that consider such effects suggest this trend will continue. Simulations of future climate indicate only modest changes in annual precipitation accumulation, with some shifts in the seasonality of precipitation that may be relevant for water management (e.g., less precipitation from November through January, and possibly more during February through May).

Anthropogenic climate change has contributed to the increase in areas burned in wildfires in the State. Specifically, rising temperatures and increased periodic droughts increase the likelihood of wildfires. Wildfires can damage infrastructure and cause water quality issues, including those discussed in Section 3.3.3.

3.3.3 Water Quality

The County faces various water quality concerns regarding its surface and groundwater resources.

3.3.3.1 Surface Water

The main surface water source for the County are the Stanislaus, Tuolumne, and San Joaquin rivers. These rivers originate in the Sierra Nevada Mountains. Water bodies and pollutants that exceed protective water quality standards are placed on the California's *Clean Water Act* Section 303(d) list. In California, this determination is governed by the Water Quality Control Policy for developing California's *Clean Water Act* Section 303(d) list (State Water Board 2024a). The County has 20 water bodies on the 303(d) list (Table 3-3, Figure 3-2). Each of these water bodies/segments are considered Category 5, where the standards are not met and a total maximum daily load is required, but not yet completed, for at least one of the pollutants being listed for the segment.

Table 3-3. 303(d) Listed Water Bodies/Segments in Stanislaus County

Map Label	Waterbody Name	303(d) List Category	Impaired[1]	Threatened[2]
NA	Modesto Reservoir	5	Y	N
NA	Turlock Lake	5	Y	N
NA	Woodward Reservoir	5	Y	N
13	Del Puerto Creek (Stanislaus County)	5	Y	N
6	Dry Creek (tributary to Tuolumne River at Modesto, East Stanislaus County)	5	Y	N
11	Grayson Drain (at outfall)	5	Y	N
14	Harding Drain	5	Y	N
10	Hospital Creek (San Joaquin and Stanislaus Counties)	5	Y	N
9	Ingram Creek (from confluence with Hospital Creek to Highway 33 crossing)	5	Y	N
8	Ingram Creek (from confluence with San Joaquin River to confluence with Hospital Creek)	5	Y	N
5	Langworth Pipeline (Stanislaus County)	5	Y	N
15	Levee Drain (Stanislaus County)	5	Y	N
2	Littlejohns Creek	5	Y	N
3	Lone Tree Creek	5	Y	N
17	Newman Wasteway	5	Y	N
16	Orestimba Creek (above Kilburn Road)	5	Y	N
1	Rock Creek (Stanislaus County)	5	Y	N
4	Stanislaus River, Lower	5	Y	N
7	Tuolumne River, Lower (Don Pedro Reservoir to San Joaquin River)	5	Y	N
12	Westley Wasteway (Stanislaus County)	5	Y	N

Notes:

[1] Impaired waters are waterbodies not fully supporting their designated uses under the *Clean Water Act*.

[2] A *Clean Water Act* Section 303(d)-listed impaired water is a waterbody that is impaired or threatened and needs a total maximum daily load restoration plan.

Key: NA = not applicable; N = No; Y = Yes

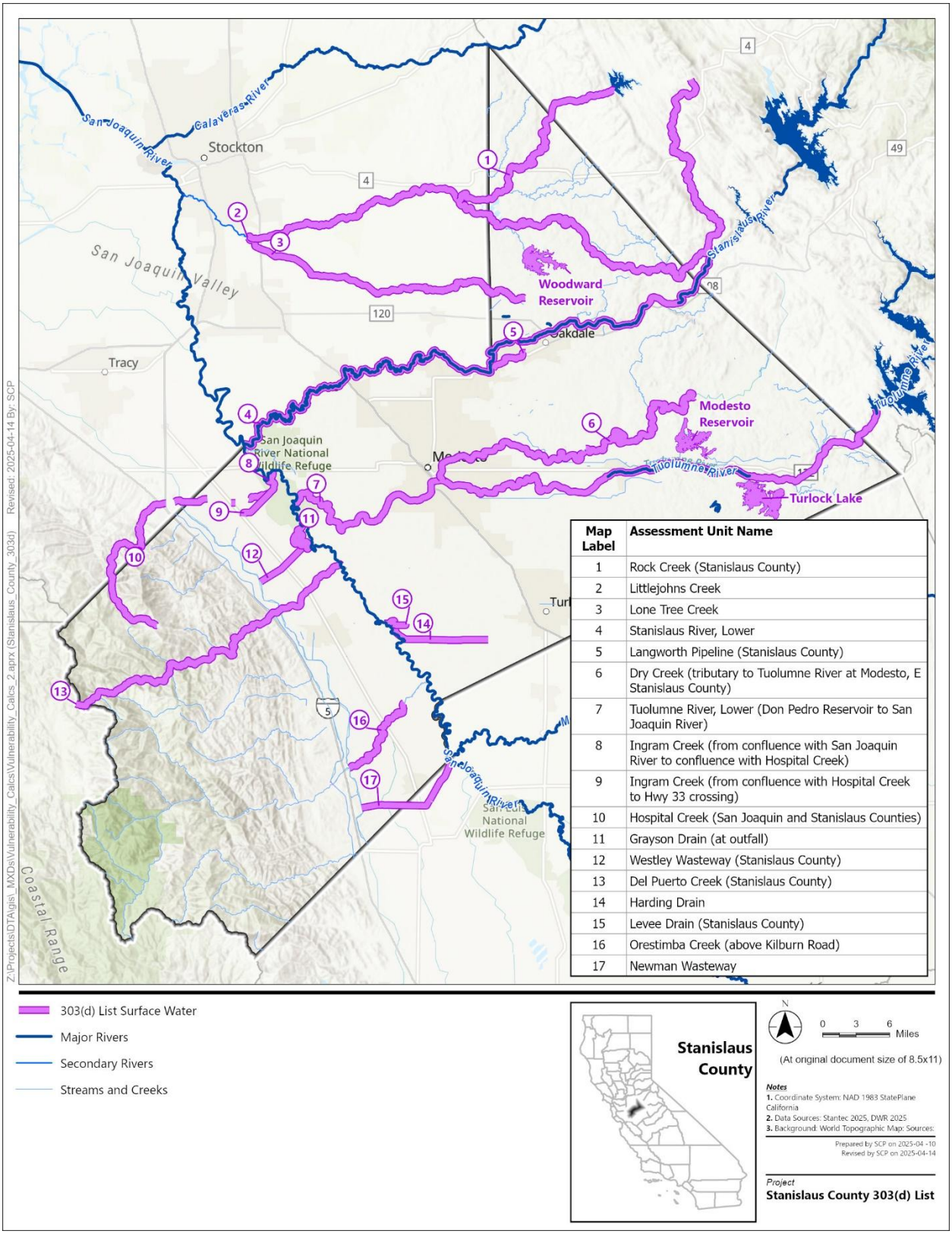


Figure 3-2. California's Clean Water Act Section 303(d) Water Bodies in Stanislaus County

3.3.3.2 Groundwater

Groundwater quality is highly variable and reliant on the quality of the water recharging the aquifer, the chemical changes that occur as surface water percolates to groundwater, and chemical changes that occur within the aquifer. Groundwater quality in the subbasin varies by location. Salinity can be naturally occurring or the result of human activity. Sources of salinity in the subbasin include Delta sediments, deep saline groundwater, and irrigation return water. Total dissolved solids (TDS) and chloride are commonly used to measure salinity. Elevated concentrations of other constituents, such as nitrate, arsenic, and point-source contaminants, are generally localized, not widespread, and generally related to natural sources or land use activities.

Groundwater quality in the County and its four subbasins—Eastern San Joaquin Subbasin (DWR Basin Number 5-022.01), Modesto Subbasin (DWR Basin Number 5-022.02), Turlock Subbasin (DWR Basin Number 5-022.03), and Delta-Mendota Subbasin (DWR Basin Number 5-022.07)—is generally suitable for all beneficial uses, most notably for drinking water uses that typically have the most restrictive standards for water quality. The following describes the groundwater quality networks and constituents of concern in the County.

Eastern San Joaquin Subbasin (DWR Basin Number 5-022.01)

The groundwater quality monitoring in the Eastern San Joaquin Subbasin is conducted through a representative groundwater well monitoring network, which is used to determine compliance with minimum thresholds and measurable objectives. The network monitoring for water quality test for TDS, chloride, and field parameters, including pH, electrical conductivity, and temperature. Other groundwater quality data are collected from publicly available sources and other ongoing monitoring programs (such as the Irrigated Lands Program [State Water Board 2025]) and evaluated for arsenic, nitrate, and other constituents of concern for informational purposes. In the Eastern San Joaquin Subbasin there are 21 representative monitoring wells. Three of these wells are within Stanislaus County jurisdiction and are operated by the City of Ripon (2 wells) and Oakdale Irrigation District (1 well). These 21 wells were selected based on their ability to represent conditions in the Eastern San Joquin Subbasin and indicate long-term, regional changes in groundwater quality conditions. Groundwater quality measurements are collected semi-annually. The representative monitoring network consists of a total of 21 monitoring wells, which is a density of 1.2 wells per 100 square miles.

Modesto Subbasin (DWR Basin Number 5-022.02)

Numerous regulated water quality monitoring programs exist in the Modesto Subbasin, providing data from hundreds of monitoring sites over time. The seven constituents of concern monitored in the subbasin are nitrate; boron; uranium; tetrachloroethene (PCE); gross alpha,1,2-; 1,2,3-trochloropropane (1,2,3-TCP); dibromochloropropane (DBCP), TDS, and arsenic. The monitoring network consists of drinking water supply wells, monitoring wells at regulated facilities, and monitoring sites associated with other regulatory water quality programs, such as the Groundwater Ambient Monitoring Assessment (GAMA) program. Data from two specific regulatory water quality programs, the Central Valley Salinity Alternatives for Long-Term Sustainability (CV-SALTS) and the Nitrate Control Program (implemented by the Valley Water Collaborative), are compiled for monitoring efforts. These two programs are regulated through the Central Valley Regional Water Quality Control Board and provide water quality data for nitrate and TDS in groundwater throughout the Modesto Subbasin.

Turlock Subbasin (DWR Basin Number 5-022.03)
Water quality data and potential constituents of concern were identified based on existing databases and programs. These include CV-SALTS datasets and the State Water Board Division of Drinking Water (DDW) water quality database. Additional data sources include GAMA wells and private (non-agency) agricultural wells located in the eastern portion of the subbasin; however, data is limited in this area. Potential constituents of concern identified in groundwater within the Turlock Subbasin include naturally occurring arsenic, uranium, manganese, sulfur, and TDS. Anthropogenic-sourced contamination includes nitrate; salinity (TDS); 1,2,3-TCP; PCE; and DBCP, all from various agricultural- or industrial-related land use.

Delta-Mendota Subbasin (DWR Basin Number 5-022.07)
Groundwater quality issues include non-point source constituents of concern and point-source contamination sites and discharges. The primary constituents discussed include arsenic; nitrate; 1,2,3-TCP; gross alpha radioactivity; TDS; and hexavalent chromium. These constituents were identified based on input from interested parties in the subbasin and were also informed by the recommendations made by the State Water Board during their 2022 review of GAMA data. There are 90 representative monitoring wells for water quality across the Delta-Mendota Subbasin. Eighty-two of these wells are existing wells, with the remaining eight to be constructed during GSP implementation. The representative monitoring well network includes nine public water system wells, and these are sampled and analyzed relative to drinking water quality standards. Also in the monitoring network there are 30 agricultural production wells (i.e., irrigation wells), domestic wells, industrial wells, and 32 dedicated monitoring wells. The wells are sampled as part of existing monitoring programs, such as Title 22, CV-SALTS, or the Irrigated Lands Program. In addition to the non-point-source groundwater quality concerns, there are over 500 potential point-source contamination sites located within the subbasin that historically or currently have the potential to influence shallow groundwater quality. These sites are mostly associated with military, industrial, or commercial land uses (e.g., gas stations).

3.3.4 Household Outages

Reported dry wells in California are based on the Dry Well Reports submitted by users online via the States Dry Well Reporting System (DWR 2025a). This dataset was accessed in March 2025. The DWR Dry Well Reporting System has received 152 reports of dry well in the County from 2014 to 2024. There were 9 reports in the Eastern San Joaquin Subbasin (DWR Basin Number 5-022.01), 54 reports in the Modesto Subbasin (DWR Basin Number 5-022.02), 76 reports in the Turlock Subbasin (DWR Basin Number 5-022.03), and 13 reports in the Delta-Mendota Subbasin (DWR Basin Number 5-022.07). In the County, the earliest reported outage was in October 2014, and the latest was in January 2024. Out of the 152 reports, 19 have a status of interim solutions, 1 has a status of outage, 23 have a status of resolved, and 109 that have a status of undefined. Refer to Figure 3-3 for location of these reported outages.

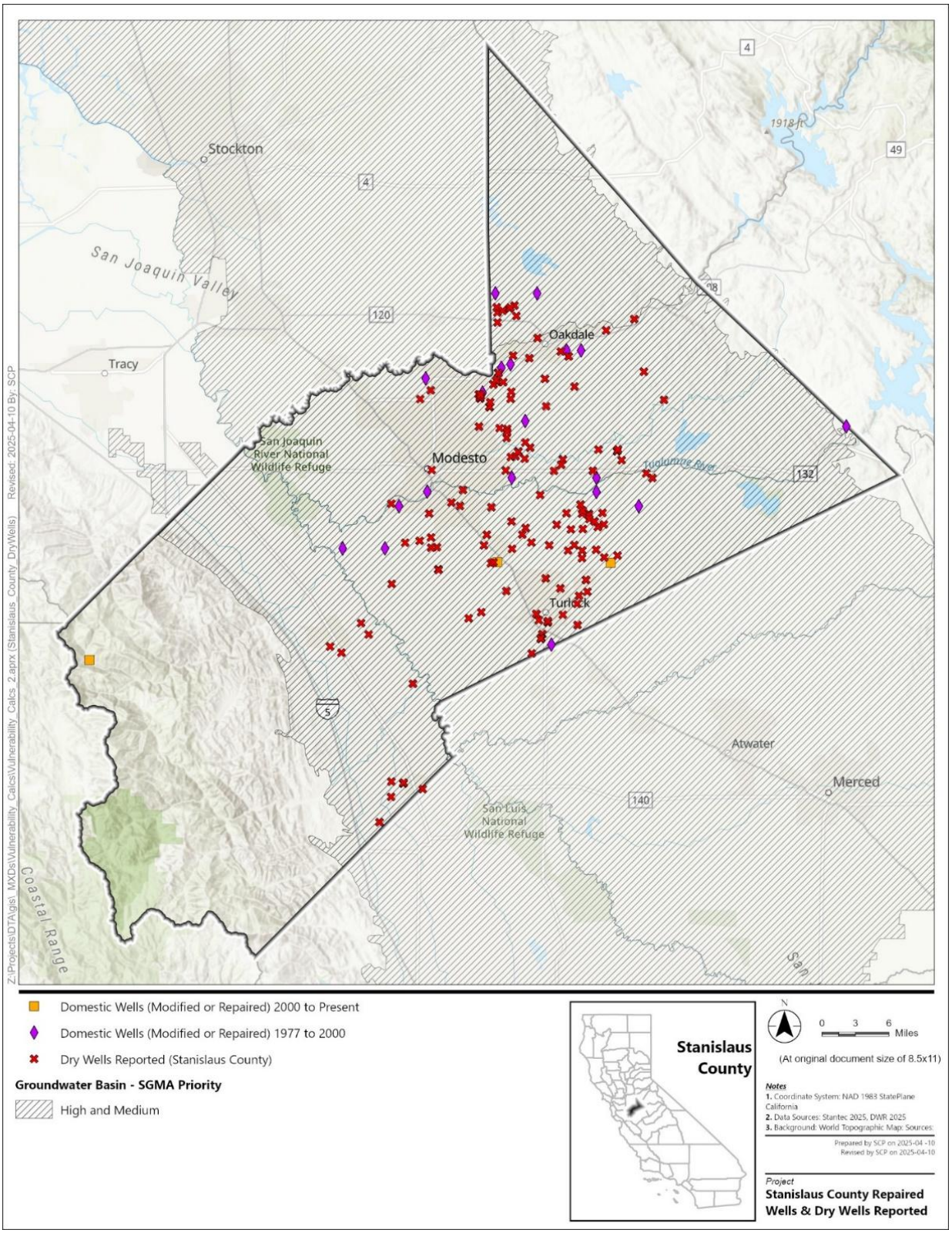


Figure 3-3. Dry Wells Reported in Stanislaus County

3.4 Risk Assessment Results

This section summarizes the risk assessment results, including the County's total physical and social vulnerability scores, followed by discussions of the individual indicators driving physical vulnerability, with higher values associated with greater physical and social vulnerability. The information was used to identify the regions of water supply shortage vulnerability described in Section 3.5.

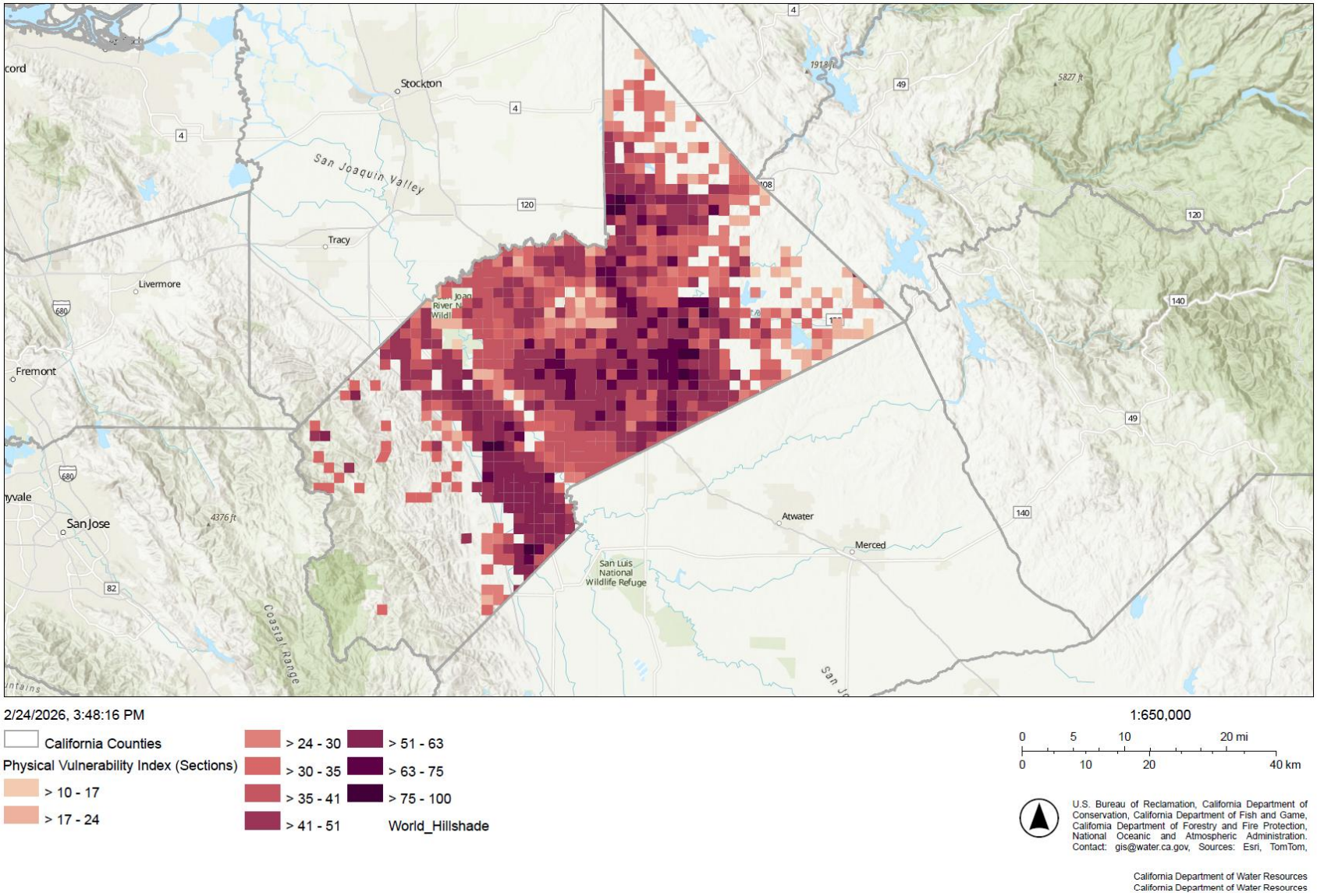
3.4.1 Total Physical Vulnerability and Social Vulnerability Scores

The total physical vulnerability score within the County is shown in Figure 3-4, with darker shaded areas (or PLSSs) indicating higher (worse) physical vulnerability scores. Unshaded areas indicate no domestic wells were located in that PLSS, and physical vulnerability was not scored. Physical and social vulnerability were scored for the entire State, but the figures in this County DRP show PLSSs only containing domestic wells. PLSSs with high physical vulnerability to water supply shortages are heavily concentrated throughout the County: in the western region of the County in the foothills of the Southern Coast Range, in the central region of the County around the cities of Modesto and Turlock, and in some areas in the eastern region of the County.

Figure 3-5 displays the intersection of physical vulnerability and location of domestic wells and SSWSs within the County. Dark brown shades indicate a higher presence of domestic wells within an area of high physical vulnerability scores. A blue area has a higher physical vulnerability score but minimal domestic wells, and an orange area has a high presence of domestic wells but low physical vulnerability score. This was used to determine where short-term response actions and long-term mitigation strategies are most needed because of their heightened vulnerability to water supply shortages. The areas with high physical vulnerability and a higher density of domestic wells include Newman, Patterson, Turlock, Oakdale, and Modesto. There are many isolated domestic wells with high physical vulnerability as well. Areas in the eastern region of the County have a higher density of domestic wells or SSWSs, but a lower physical vulnerability to water supply shortage compared to other parts of the County.

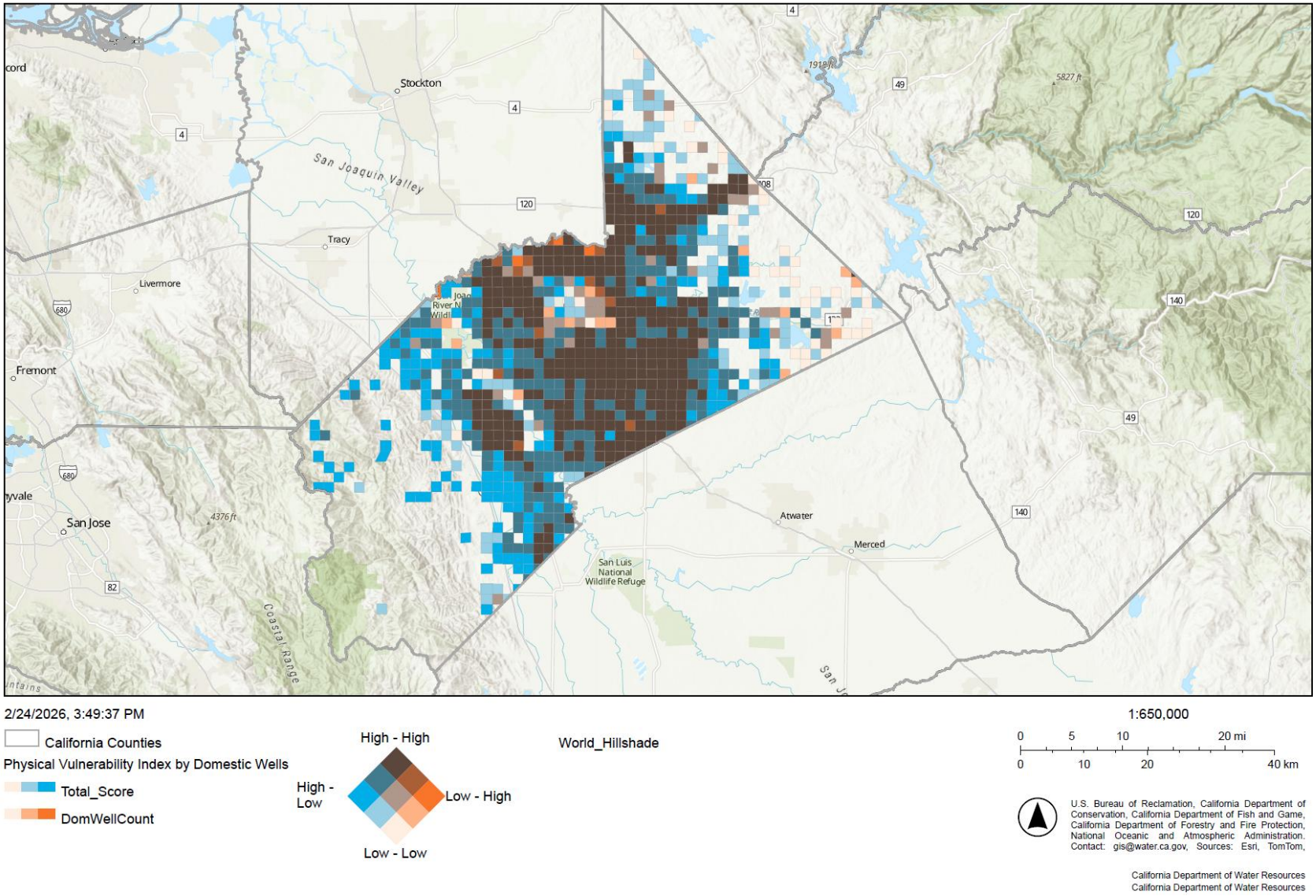
Social vulnerability is another important factor in assessing the risk of water supply shortage and what short-term response actions and long-term mitigation strategies would effectively mitigate this risk. Total social vulnerability scores in the County are depicted in Figure 3-6 with darker shaded areas indicating higher vulnerabilities. The social vulnerability index is divided into five equal groups (quintiles) ranging from low to high, with high representing the top 20 percent.

Comparing the social vulnerability scores in Figure 3-6 with the physical vulnerability scores in Figure 3-5 helps characterize how social vulnerability may overlap with the physical vulnerability of domestic wells and SSWSs. Most of the County has medium social vulnerability scores.



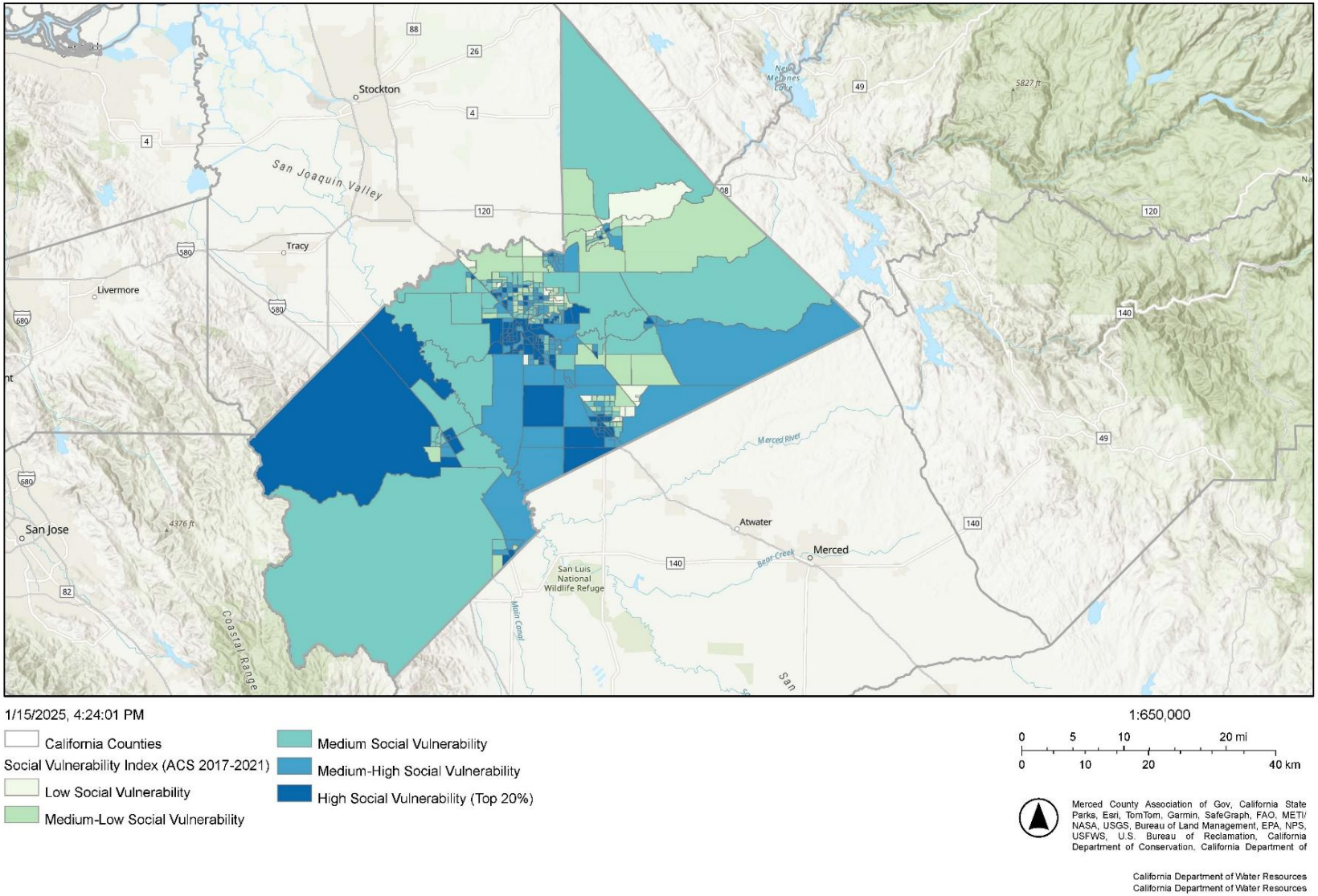
Source: DWR 2023.

Figure 3-4. Physical Vulnerability to Drought and Water Supply Shortage in Stanislaus County



Source: DWR 2023.

Figure 3-5. Intersection of Physical Vulnerability and Density of Domestic Wells and State Small Water Systems in Stanislaus County



Source: DWR 2023.

Figure 3-6. Social Vulnerability Score by Census Block Group in Stanislaus County

3.4.2 Physical Vulnerability Indicators

The risk assessment summarizes where water shortages within domestic wells and SSWSs could be more likely to occur. This section describes factors that are driving water shortage risk in greater detail. Identifying and characterizing these drivers of physical vulnerability helps the County and the WAC develop effective short-term response actions, long-term mitigation strategies, and their associated implementation.

Across the County, the primary indicators driving physical vulnerability vary between the alluvial basin and fractured rock areas.

3.4.2.1 Alluvial Basins

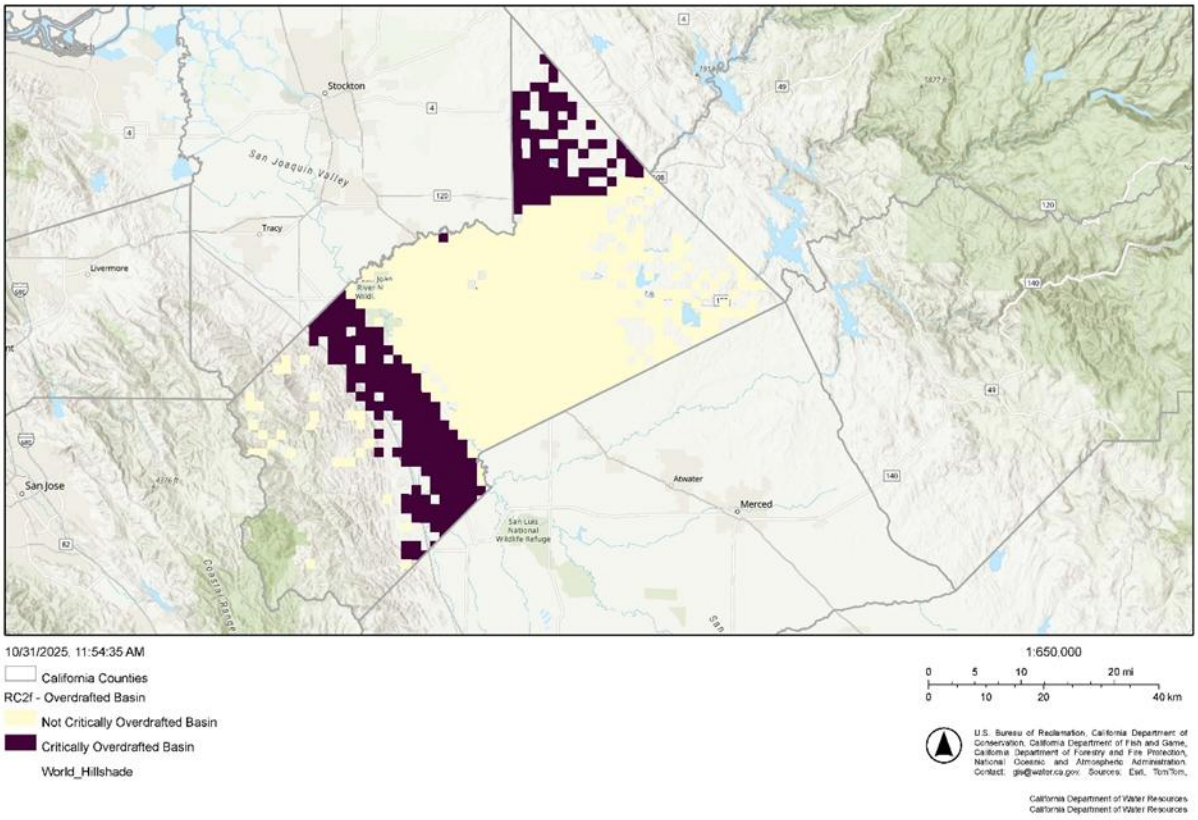
The three primary indicators (and associated indicator code from the DWR WSVE Tool) that drive physical vulnerability in the alluvial basins in Stanislaus County are:

- Presence of Critically Overdrafted Basins (RC2f)
- California State Water Resources Control Board 2024 Water Quality Risk (RC2i)
- Amount of Irrigated Agriculture (RC2j)

Details on these three indicators are included below, and information on all physical vulnerability indicators is summarized in Table 3-4.

Presence of Critically Overdrafted Basins

As defined by SGMA, the SJV – Eastern San Joquin Subbasin (DWR Basin Number 5-022.01) and SJV – Delta Mendota Subbasin (DWR Basin Number 5-022.07) are both critically overdrafted (Figure 3-7). A basin that is overdrafted means the rate of water extraction exceeds the natural replenishment rate. Critically overdrafted basins face many challenges that increase water supply vulnerability. This over-extraction reduces the immediate availability of water and diminishes the basin's resilience to droughts and climate change. Over extraction of groundwater compromises the basin's ability to sustain ecosystems, meet agricultural demands, and fulfill the needs of local communities. Furthermore, the impact extends to reduced streamflow, wetland degradation, and increased land subsidence, further impacting water supply availability.



Source: DWR 2023.

Figure 3-7. Presence of Critically Overdrafted Basins Indicator in Stanislaus County

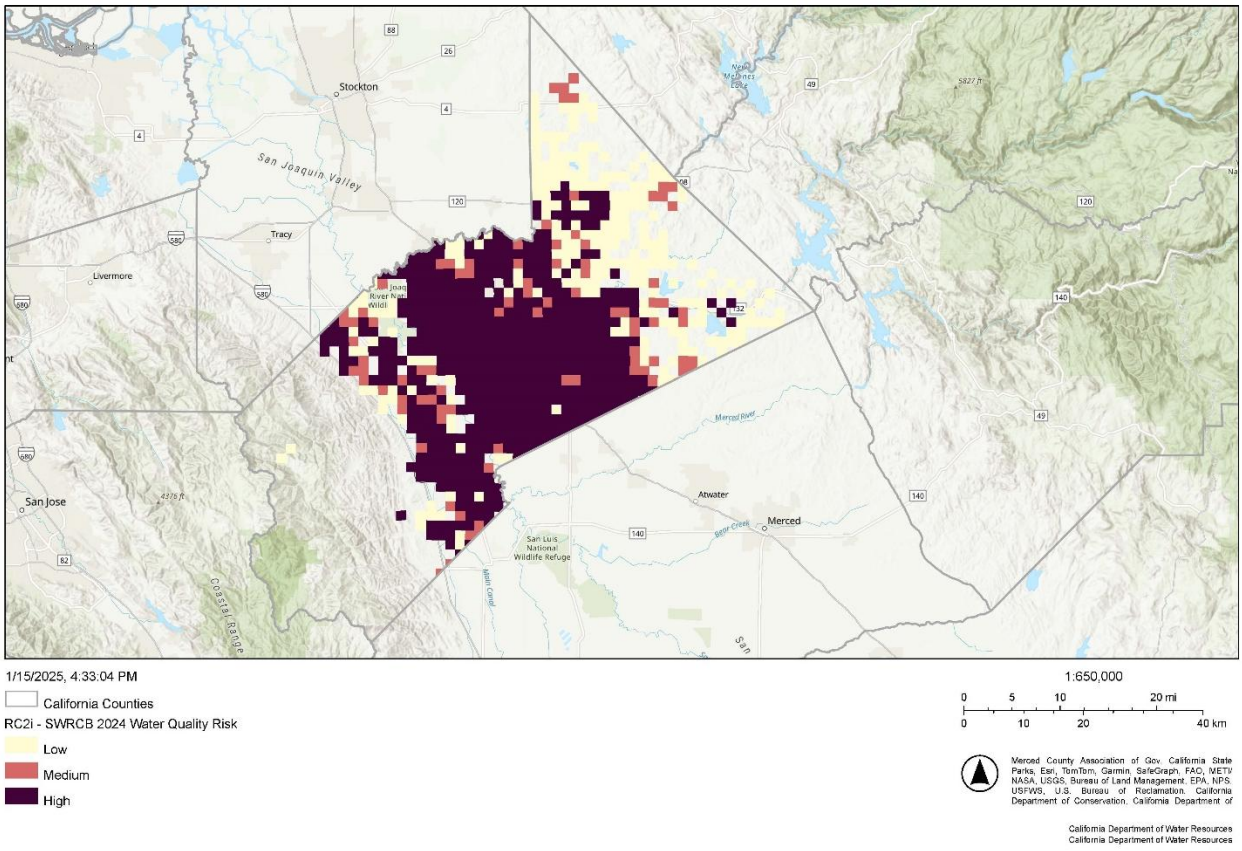
California State Water Resources Control Board 2024 Water Quality Risk

Figure 3-8 shows the groundwater water quality risk in the County based on the 2024 Safe and Affordable Funding for Equity and Resilience (SAFER) Needs Assessment, which was used to determine the vulnerability score (State Water Board 2024b). This indicator shows potential future water quality risk and does not reflect current or actual water quality conditions. High water quality risk areas are present within the County in the central portion and in some pockets in the eastern portion.

The presence of regulated constituents at elevated levels exceeding the prescribed thresholds increases the physical vulnerability of a water supply system. Such contaminants can compromise the safety and potability of the water, rendering it unfit for human consumption and various domestic uses. The contaminants may also impact the environment, affecting aquatic ecosystems, vegetation, and soil quality. Furthermore, they can cause infrastructure corrosion and damage, impact the reliability and longevity of water supply systems, and require costly repairs and maintenance efforts. These factors can all compound to render a domestic well or SSWS unable to deliver safe drinking water.

The groundwater water quality risk within the County was characterized using the 2024 SAFER Needs Assessment results. This SAFER Needs Assessment evaluated the 20-year average of groundwater quality data and the most recent reading from publicly available databases to compare concentrations of potential contaminants. The area was assigned a high water quality risk score if the long-term average or most recent reading for any potential contaminant was above the comparison concentration for any contaminant. The area was assigned a medium water quality risk score if the data was between

80 percent to 100 percent of the comparison concentration. Below 80 percent was assigned a low water quality risk score.



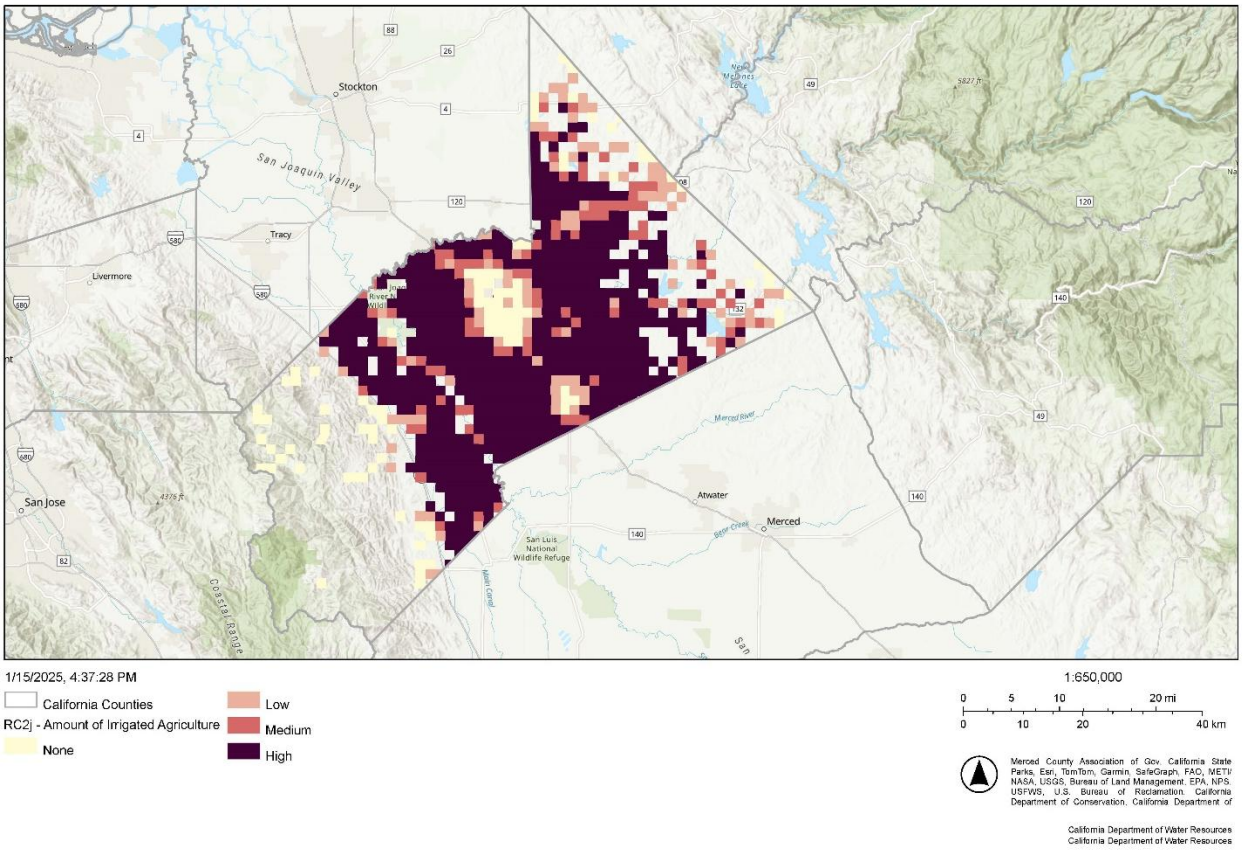
Source: DWR 2023.

Figure 3-8. California State Water Resources Control Board 2024 Water Quality Risk Indicator in Stanislaus County

Amount of Irrigated Agriculture

Figure 3-9 shows the percentage of land use as irrigated agriculture within the County in 2022. Throughout the County, a very high percentage of the land is used for irrigated agriculture. This extends from the base of the Southern Coast Range in the western portion, the areas around Modesto and Turlock in the central portion, and in areas in the eastern portion of the County.

Use of groundwater for agricultural water supplies increases the vulnerability of domestic wells and SSWSs which use the same source of groundwater, particularly during droughts or water shortage events. As competing demands intensify, the pressure on groundwater resources rises, leading to a higher risk of over-extraction and depletion. Domestic wells and SSWSs, often the only water supply for rural communities, become more vulnerable to water shortages. During droughts or water shortages, the reduced availability of surface water increases the pressure on limited groundwater resources.



Source: DWR 2023.

Figure 3-9. Percent of Land as Irrigation Agriculture Indicator in Stanislaus County

3.4.2.2 Fractured Rock Areas

The two primary indicators (and associated indicator code from the DWR WSVE Tool) that drive physical vulnerability in the fractured rock area in Stanislaus County are:

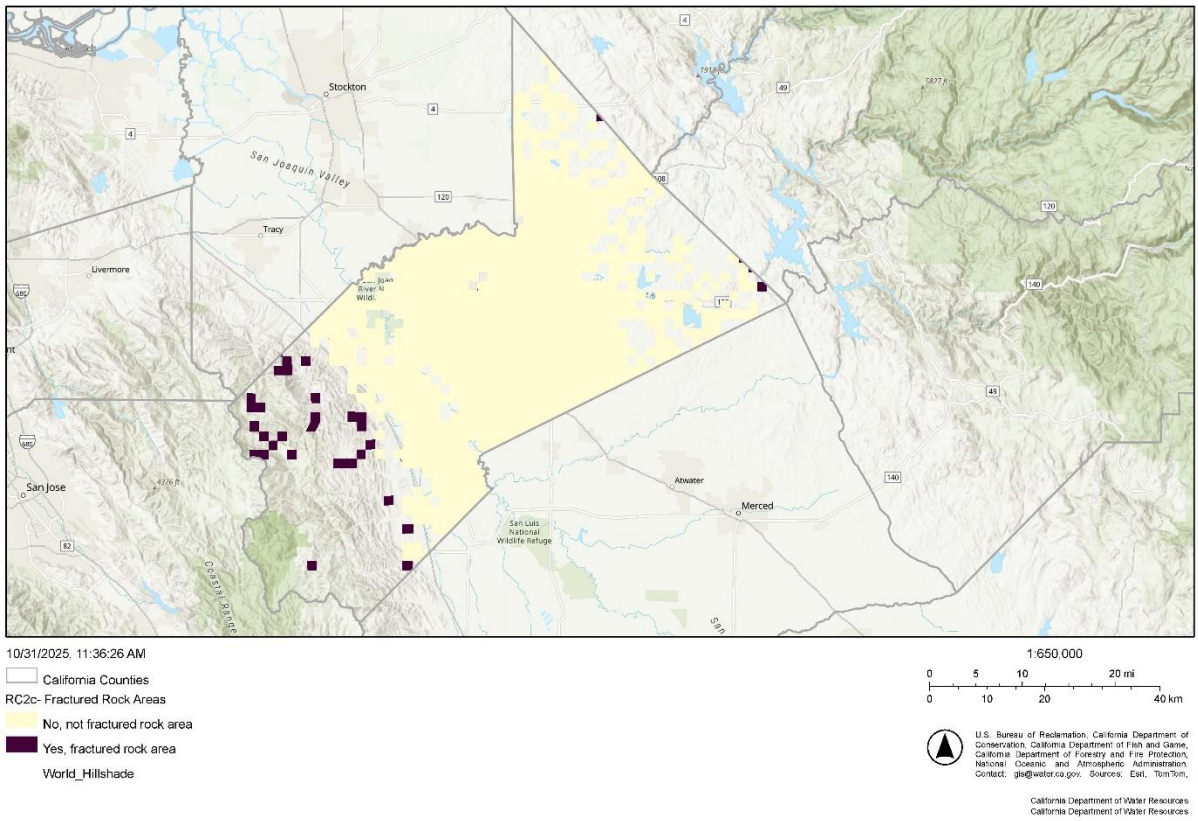
- Fractured Rock Area Competing Demand (RC3c)
- U.S. Forest Service Wildfire Hazard (RC2b)

Details on these two indicators are included below, and information on all physical vulnerability indicators is summarized in Table 3-4.

Fractured Rock Area Competing Demand

Two regions of Stanislaus County are characterized as fractured rock areas: the western region of Stanislaus County west of Interstate-5, and a few areas along the eastern border of Stanislaus County adjacent to Calaveras and Tuolumne counties. Fractured rock areas increase water supply vulnerability. Water supplies in these areas are complex to monitor, which thereby introduces uncertainty for those depending on them as a primary water source. The intricate network of fractures makes it difficult to gauge water quantity and sustainability accurately. This necessitates sophisticated monitoring approaches and comprehensive water management strategies to address uncertainties and enhance resilience in fractured rock environments. Such areas of Stanislaus County that are characterized by fractured rock basins and where domestic wells and SSWSs predominate may not have the resources to implement such monitoring measures.

The darker areas in Figure 3-12 show the presence of domestic wells in fractured rock areas. A higher density of domestic wells in these fractured rock areas indicates an area that is more vulnerable to experiencing well outages, particularly during dry periods. Dry periods are typically characterized by limited precipitation, reduced groundwater supply, and an increased demand for water, all of which increase susceptibility for dry wells. The demand from multiple wells in close proximity to one another can expedite the depletion of available groundwater and potentially lead to wells running dry or experiencing reduced water levels.



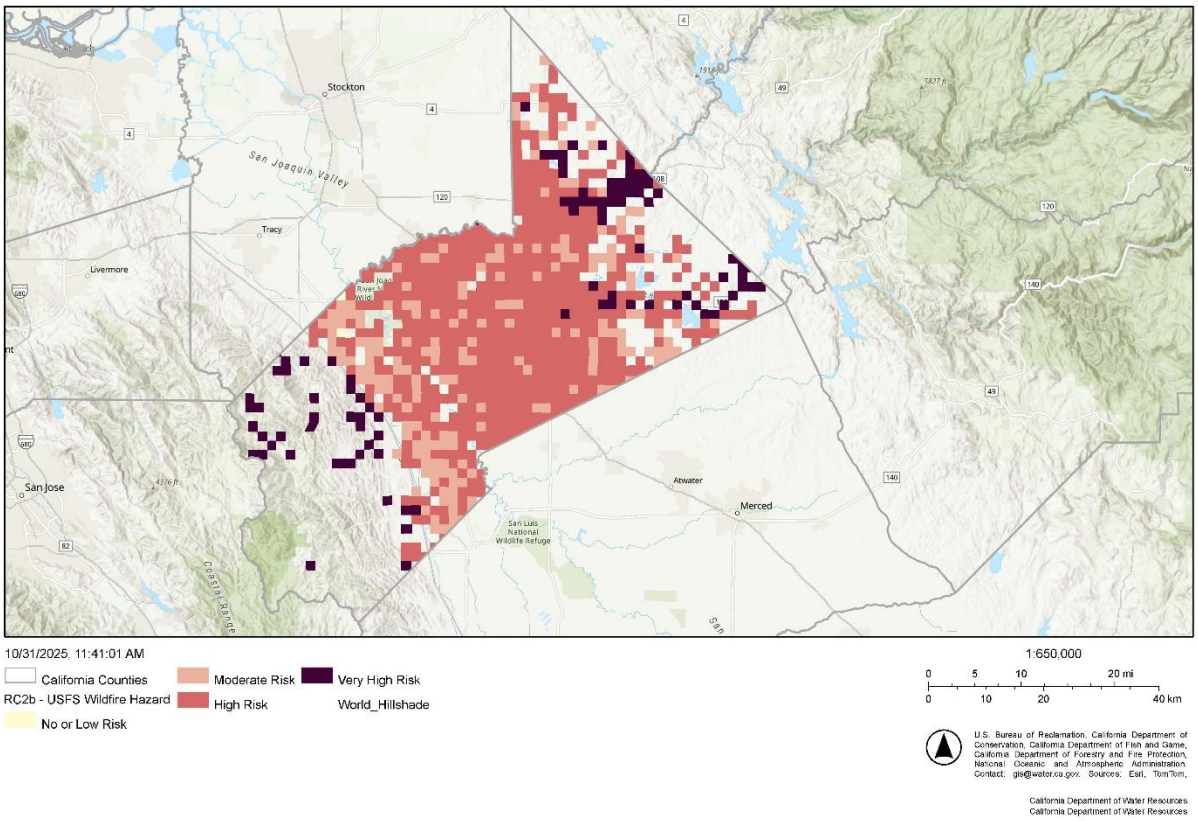
Source: DWR 2023.

Figure 3-10. Presence of Fractured Rock Areas Indicator in Stanislaus County

U.S. Forest Service Wildfire Hazard

The susceptibility of an area to wildfire is based on topography and ecological features that can characterize the risk of a wildfire occurring. Climate change increases the frequency and severity of wildfires, which are already a major risk to water supply. These wildfires damage or destroy natural infrastructure, such as watersheds and natural reaches, as well as built infrastructure, such as pipelines and reservoirs. Wildfire impacts can adversely impact watersheds, leading to increased sedimentation, altered water quality, and potential contamination. The heightened risk contributes to the physical vulnerability of water sources, including groundwater.

Figure 3-11 shows the wildfire hazard potential as determined by the U.S. Forest Service. In the fractured rock areas of the County, the hazard score is a mix of high and very high. Note that the figure only shows the wildfire hazard when there is a domestic well or SSWS within the PLSS. Areas without colored squares do not have a domestic well or SSWS within the PLSS.



Source: DWR 2023.

Figure 3-11. Wildfire Hazard Potential in Stanislaus County as Defined by the U.S. Forest Service where there is a Domestic Well or State Small Water System

Table 3-4. Summary of Observed Conditions for Physical Vulnerability Indicators in Stanislaus County

Physical Vulnerability Indicator and Code[1]	Observed Conditions
Indicators Related to Climate Change	
Absolute Projected Temperature shift (RC1a)	Projected change in the maximum temperature by the middle of century shows an increase of 1.5°C to 1.7°C (2.7°F to 3.0°F) in average temperatures. Increased temperatures could increase water supply demands from users, result in higher rates of evapotranspiration, or otherwise increase demand on supplies, thereby increasing vulnerability to drought and/or water shortage impacts.
Sea Level Rise Impacts Through Saltwater Intrusion into Coastal Aquifers (RC1b)	Water in the County is not tidally influenced and is not anticipated to experience saltwater intrusion.
Rescaled Climate Change Projections of Wildfire Risk by Mid-Century (RC1c)	County projections indicate moderate to severe increases in wildfire risk throughout the County by mid-century (2035-2064). The largest increase is projected for the western and eastern portion of the County, while the central portion of the County is anticipated to be the least affected. Despite negligible fire susceptibility in most areas, the projected increase in burning, even in small areas, warrants inclusion in the vulnerability assessment due to inherent high risks involved. Increasing wildfire frequency and severity can increase vulnerability of water sources.
Indicators Related to Current Environmental Conditions and Events	
2024 Precipitation (RC2a)	Areas where 2024 precipitation is less than 70% of the historical average are considered to have experienced a dry year. Conversely, if precipitation exceeded 70% of the historical average, an area was considered to have not experienced a dry year. Data from 2024 shows Stanislaus County did not experience a dry year. Data from California Water Watch indicates the maximum precipitation for the 2024–2025 water year, as of July 2025, is within 95 percent of the historical average precipitation[2]. Due to the observed historical pattern and the uncertainty associated with defining the water year until after winter precipitation season is over, this indicator is included in the vulnerability assessment.
Multiple Dry Years (RC2aa)	Data shows most of the County has been experiencing at least two dry years over the last five years (2020-2024), with the southern region experiencing three or more dry years and the northeastern region experiencing one dry year in this period. A higher number of recent dry years may increase the physical vulnerability of water supply conditions due to resource depletion and prolonged periods without sufficient water.
U.S. Forest Service Wildfire Hazard (RC2b)	The central portion of the County is assigned a mix of moderate to high hazard and the western and eastern portions of the County in the foothills area are assigned a mix of high to very high hazard. These levels of risk reflect the current wildfire risk and contribute to increased physical vulnerability for water sources in the County.

Physical Vulnerability Indicator and Code[1]	Observed Conditions
Fractured Rock Areas (RC2c)	Fractured rock is present across the western portion of the County in the Southern Coast Range and some small areas on the eastern border of the County. Water availability in fractured rock areas is more difficult to monitor and therefore is more uncertain for those relying on it as a source of water. Areas with fractured rock are considered to be at comparatively higher risk of water shortage due to high susceptibility to drought impacts.
SWRCB Water Quality Aquifer Risk (RC2i)	This index shows that groundwater likely accessed by domestic wells may contain concentrations of constituents above regulatory levels. It appears some regulated constituents are present at elevated concentrations in the wells scattered throughout the County that could increase physical vulnerability for different communities. These areas of high risk where domestic wells and SSWSs are present are primarily within the central region of the County, around Modesto and Turlock.
Subsidence (RC2d)	Minor subsidence has been reported in the alluvial basins in the County; however, no documentation of inelastic (irreversible) land subsidence related to groundwater pumping has been reported in the County. The rest of the County was either not in an alluvial basin or has no indication of subsidence. Due to high density of domestic wells where the minimal subsidence is observed, this indicator is also included in the vulnerability assessment.
Presence of Saltwater Intrusion (RC2e)	Water in the County is not tidally influenced and is not anticipated to experience saltwater intrusion.
Overdrafted Basin (RC2f)	According to the SGMA 2019 Basin Prioritization Dashboard, two subbasins in Stanislaus County are considered to be critically overdrafted[3]. SJV – Eastern San Joquin Subbasin (DWR Basin Number 5-022.01) and SJV – Delta Mendota Subbasin (DWR Basin Number 5-022.07) are both critically overdrafted and given a high SGMA priority. The other two subbasins, SJV – Modesto (DWR Basin Number 5-022.02) and SJV – Turlock (DWR Basin Number 5-022.03), are identified as high SGMA priority regions. A basin's priority is determined through priority points for eight components. A basin's total possible priority points range from zero to 40, with 0.5-point increments. For high priority subbasins, the total priority points range from 21 to 40. Both the SJV – Eastern San Joquin Subbasin (DWR Basin Number 5-022.01) and SJV – Delta Mendota Subbasin (DWR Basin Number 5-022.07) have 40 priority points, which is the highest priority point determination. The SJV – Modesto (DWR Basin Number 5-022.02) has 24.5 priority points and SJV – Turlock (DWR Basin Number 5-022.03) has 26 priority points, which is closer to the lower end of the high priority range. Overdrafted basins increase physical vulnerability to water shortage and drought.

Physical Vulnerability Indicator and Code[1]	Observed Conditions
Chronic Declining Water Levels (RC2g)	Information for groundwater levels is based on the DWR groundwater level database, which includes all groundwater level measurements collected for SGMA and the California Statewide Groundwater Elevation Monitoring (CASGEM) programs[4]. An analysis was done to determine whether each monitoring well has had increasing, decreasing, or stable trend based on the previous 20 years of records for spring measurements (taken between January and June). There are 144 monitoring wells located in Stanislaus County. Based on the 20-year groundwater level trends, 10 monitoring wells show a decreasing trend greater than 2.5 feet, 89 show a decreasing trend down to 2.5 feet, 44 monitoring wells show no trend, and 1 monitoring well shows an increasing trend up to 2.5 feet. The decline in groundwater levels has significant impacts on areas with small water systems and domestic wells, particularly in rural and remote regions that depend heavily on groundwater for drinking, irrigation, and daily needs. Since declining levels in groundwater indicate increased vulnerability and put wells at higher risk of shortage, this indicator was included.
Amount of Irrigated Agriculture (RC2j)	The County is heavily farmed, mostly in the central and eastern regions. The presence of agricultural activities could indicate competing demand for groundwater suppliers and water quality concerns, both of which could create higher vulnerability for domestic wells and SSWSs, especially during a drought or water shortage event.
Indicators Related to Infrastructure Susceptibility	
Domestic Well Susceptibility in Alluvial Basins (RC3a)	This factor analyzes locations where there are many susceptible wells to go dry if the current groundwater trends in the County continue. Data show a high likelihood of dry well susceptibility in some areas in the western portion of the County within the SJV Delta Mendota Basin; the central region of the County within the SJV Modesto Basin and SJV Turlock Basin; and the northern region of the County within the SJV Eastern San Joaquin Basin. Other areas of the County show an overall low likelihood of dry well susceptibility.
Fractured Rock Area Competing Demand (RC3c)	Higher density of domestic wells in a single square mile within a fractured rock area tends to create a higher susceptibility for outages and increase competing demands, especially in a dry period. The County's data shows that this condition partially exists in the foothills region.
Record of Shortages	
Reported Household Outage on Domestic Well (RC5)	Areas that have already experienced outages are more likely to experience it during future dry years, due to combinations of aquifer sensitivity/fluctuations and shallow wells. Due to the presence of a handful of reports in the County, this indicator is included in the assessment. There are several dry well reports throughout the County but are primarily in the alluvial groundwater basins. Evaluating the dry well data provides further insight into the nature of the reported well outages. The reported well outages occurred primarily during the spring and summer of 2014, 2015, 2021, 2022, and 2023, which were drought periods. This indicates the areas could be vulnerable to water supply shortages during future droughts.

Notes and Sources:
1. Abbreviations are included next to Indicator Name (i.e., “RC1a”) for clarity to underlying methodology
2. DWR 2024
3. DWR 2019
4. DWR 2025b

Key:
CASGEM = California Statewide Groundwater Elevation Monitoring
PLSS = Public Land Survey Section
SAFER = Safe and Affordable Funding for Equity and Resilience Program
SGMA = Sustainable Groundwater Management Act
SJV = San Joaquin Valley
SWRCB = State Water Resources Control Board
USFS = United States Forest Service

3.5 Risk Assessment Findings

The areas within the County with domestic wells and/or SSWSs that are vulnerable to water supply shortages, the drivers of those physical vulnerabilities, and the corresponding total social vulnerability scores are presented in Table 3-5 and shown in Figure 3-12.

For the purposes of this risk assessment analysis, Stanislaus County was divided into six subregion groupings based on SGMA basin boundaries and fractured rock areas. In the County, there are four subbasins: SJV – Eastern San Joaquin (DWR Basin 5-022.01), SJV – Modesto (DWR Basin 5-022.02), SJV – Turlock (DWR Basin 5-022.03), and SJV – Delta-Mendota (DWR Basin 5-022.07). These are considered four subregions and are referred to as SJV-Eastern San Joaquin, SJV-Modesto, SJV-Turlock, and SJV-Delta Mendota. The remainder of the County was divided into two subregions based on areas outside of the SGMA basin boundaries and including fractured rock areas. The area in the western part of Stanislaus County west of the SJV – Delta-Mendota subbasin is referred to as Non-Groundwater Basin West (Non-GWB: West). The areas along the eastern border of Stanislaus County are collectively referred to as Non-Groundwater Basin East (Non-GWB: East).

As an additional refinement for the risk assessment, a density-based clustering analysis was performed to highlight areas domestic well users and SSWSs are more concentrated and therefore face elevated risk during drought conditions and water shortage events (shown within black circles in Figure 3-12). The purpose of this analysis was not to identify the only areas with problems, but to pinpoint locations where reliance is both high and spatially concentrated, meaning large numbers of households could be affected simultaneously. Many parts of the County also face significant concerns even if they are not highlighted through this density analysis.

The analysis used data from DWR's WCR database, focusing on domestic wells. Locations of SSWSs, from the Stanislaus County database, were also included to provide additional context. A density threshold of approximately 100 wells within a 1-mile radius was applied to identify clusters. These areas were then associated with nearby communities, such as census-designated places or towns (both unincorporated and incorporated) to ensure the results were locally recognizable. Important caveats must be considered when interpreting the results. Many well records in the WCR database are tied to the center of the PLSS rather than parcel coordinates, which introduces uncertainty into density calculations. The dataset also contains gaps and, as a result, the clusters represent general areas where domestic wells and SSWSs are located close together, but they are not exact maps of where each well is or whether an individual well will experience problems. Domestic wells and SSWSs outside of the individual clusters remain vulnerable to water shortages.

The number of wells in a cluster is not the same everywhere in the County. Some clusters have many wells packed together, while others are more spread out. For this reason, it is more accurate to describe density separately for each cluster rather than using one average number for the whole County (Table 3-6). For example, some areas, such as Denair West, show a higher ratio of wells to land than others, such as Patterson, leading to different average well spacing. For this reason, per-cluster density estimates are provided in Table 3-6 rather than reporting a single County-wide average. This approach better reflects the diversity of conditions across the County and underscores that clusters are intended as a prioritization tool for identifying areas where the greatest number of domestic well and SSWS users could be affected at once.

The areas in the County with domestic wells and SSWSs that are vulnerable to a water supply shortage, the drivers of those physical vulnerabilities, and corresponding social vulnerability scores are presented in Table 3-5 and shown in Figure 3-12. These areas and vulnerabilities were used by the County and WAC to develop short-term response actions and long-term mitigation strategies for addressing water shortage vulnerabilities for domestic wells and SSWSs across the County.

Table 3-5. Summary of Risk Assessment Findings in Stanislaus County

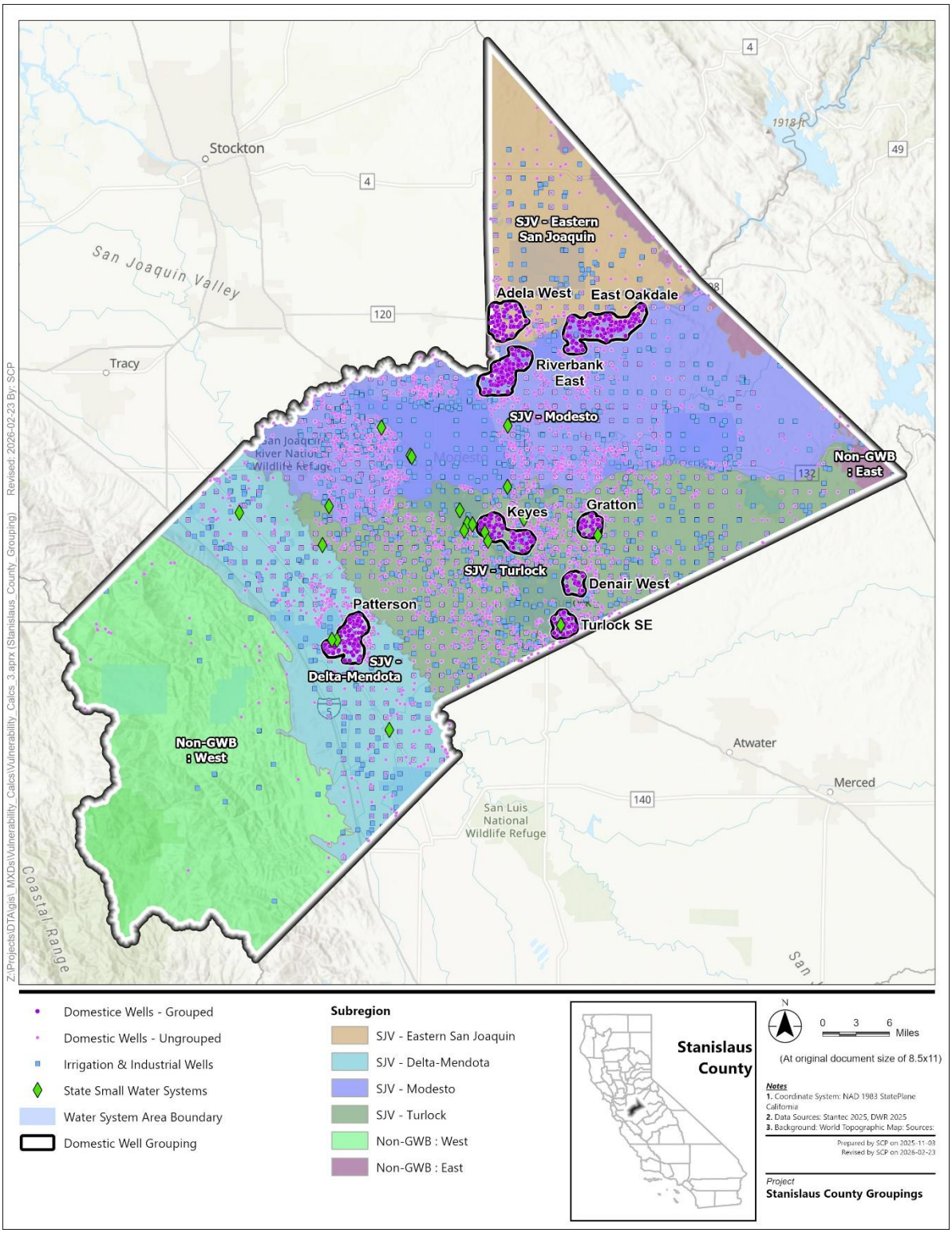
Area	Driving Physical Vulnerability Indicators[1]	Average Social Vulnerability Index[2]	Subregion Group[3]
Adela West	• Absolute Projected Temperature Change (RC1a) • Multiple Dry Years (RC2aa) • U.S. Forest Service Wildfire Hazard (RC2b) • Overdrafted Basin (RC2f) • Chronic Declining Water Levels (RC2g) • SWRCB Water Quality Aquifer Risk (RC2i) • Amount of Irrigated Agriculture (RC2j) • Domestic Well Susceptibility in Alluvial Basins (RC3a) • Reported Household Outage on Domestic Well (RC5a)	Medium-Low (35)	• SJV – Eastern San Joaquin (DWR Basin 5-022.01)
Denair West	• Absolute Projected Temperature Change (RC1a) • Multiple Dry Years (RC2aa) • U.S. Forest Service Wildfire Hazard (RC2b) • Chronic Declining Water Levels (RC2g) • SWRCB Water Quality Aquifer Risk (RC2i) • Amount of Irrigated Agriculture (RC2j) • Domestic Well Susceptibility in Alluvial Basins (RC3a) • Reported Household Outage on Domestic Well (RC5a)	Low (18)	• SJV – Turlock (DWR Basin 5-022.03)
East Oakdale	• Absolute Projected Temperature Change (RC1a) • Rescaled Climate Change Projections of Wildfire Risk by Mid-Century (RC1c) • Multiple Dry Years (RC2aa) • U.S. Forest Service Wildfire Hazard (RC2b) • Overdrafted Basin (RC2f) • Chronic Declining Water Levels (RC2g) • SWRCB Water Quality Aquifer Risk (RC2i) • Amount of Irrigated Agriculture (RC2j) • Domestic Well Susceptibility in Alluvial Basins (RC3a) • Reported Household Outage on Domestic Well (RC5a)	Medium-Low (28)	• SJV – Eastern San Joaquin (DWR Basin 5-022.01) • SJV – Modesto (DWR Basin 5-022.02)

Area	Driving Physical Vulnerability Indicators[1]	Average Social Vulnerability Index[2]	Subregion Group[3]
Gratton	• Absolute Projected Temperature Change (RC1a) • Multiple Dry Years (RC2aa) • U.S. Forest Service Wildfire Hazard (RC2b) • Chronic Declining Water Levels (RC2g) • SWRCB Water Quality Aquifer Risk (RC2i) • Amount of Irrigated Agriculture (RC2j) • Domestic Well Susceptibility in Alluvial Basins (RC3a) • Reported Household Outage on Domestic Well (RC5a)	Medium-Low (36)	• SJV – Turlock (DWR Basin 5-022.03)
Keyes	• Absolute Projected Temperature Change (RC1a) • Multiple Dry Years (RC2aa) • U.S. Forest Service Wildfire Hazard (RC2b) • Chronic Declining Water Levels (RC2g) • SWRCB Water Quality Aquifer Risk (RC2i) • Amount of Irrigated Agriculture (RC2j) • Domestic Well Susceptibility in Alluvial Basins (RC3a) • Reported Household Outage on Domestic Well (RC5a)	Medium (56)	• SJV – Turlock (DWR Basin 5-022.03)
Patterson	• Absolute Projected Temperature Change (RC1a) • Rescaled Climate Change Projections of Wildfire Risk by Mid-Century (RC1c) • Multiple Dry Years (RC2aa) • U.S. Forest Service Wildfire Hazard (RC2b) • Overdrafted Basin (RC2f) • Chronic Declining Water Levels (RC2g) • SWRCB Water Quality Aquifer Risk (RC2i) • Amount of Irrigated Agriculture (RC2j) • Domestic Well Susceptibility in Alluvial Basins (RC3a) • Reported Household Outage on Domestic Well (RC5a)	Medium-High (66)	• SJV – Delta-Mendota (DWR Basin 5-022.07)

Area	Driving Physical Vulnerability Indicators[1]	Average Social Vulnerability Index[2]	Subregion Group[3]
Riverbank East	• Absolute Projected Temperature Change (RC1a) • Rescaled Climate Change Projections of Wildfire Risk by Mid-Century (RC1c) • Multiple Dry Years (RC2aa) • U.S. Forest Service Wildfire Hazard (RC2b) • Chronic Declining Water Levels (RC2g) • SWRCB Water Quality Aquifer Risk (RC2i) • Amount of Irrigated Agriculture (RC2j) • Domestic Well Susceptibility in Alluvial Basins (RC3a) • Reported Household Outage on Domestic Well (RC5a)	Medium (55)	• SJV – Modesto (DWR Basin 5-022.02)
Turlock SE	• Absolute Projected Temperature Change (RC1a) • Multiple Dry Years (RC2aa) • U.S. Forest Service Wildfire Hazard (RC2b) • Chronic Declining Water Levels (RC2g) • SWRCB Water Quality Aquifer Risk (RC2i) • Amount of Irrigated Agriculture (RC2j) • Domestic Well Susceptibility in Alluvial Basins (RC3a) • Reported Household Outage on Domestic Well (RC5a)	Medium-High (71)	• SJV – Turlock (DWR Basin 5-022.03)

Notes:
1. Abbreviations are included next to Indicator Name (i.e., "RC1a") for clarity to underlying methodology
2. This is the average social vulnerability score per cluster area. See Figure 3-6 for the total social vulnerability score for Stanislaus County. The social vulnerability index is divided into five equal groups (quintiles) ranging from low to high, with high representing the highest social vulnerability. Numerical values for the five indices are: low (0–20), medium-low (20–40), medium (40–60), medium-high (60–80), high (80–100).
3. These regions reflect SGMA basins and HUC-8 groupings.

Key:
DWR = California Department of Water Resources
SE = south-east
SJV = San Joaquin Valley
SWRCB = California State Water Resources Control Board



Key: Non-GWB = non-groundwater basin (represents areas outside of a SGMA basin boundary); SE = south-east; SJV = San Joaquin Valley

Figure 3-12. Summary of Risk Assessment Findings Showing Areas with Water Shortage Vulnerability and Domestic Wells/State Small Water Systems in Stanislaus County

Table 3-6. Summary of Domestic Well Density-Based Clustering Analysis in Stanislaus County

Area	Subregion	Domestic Wells[1] (pre-1977)	Domestic Wells[1] (1977 to current)	Acreage[1,2]	Average Distance Between Wells[1] (feet)	Average Well Casing Depth[1] (feet)	Average Total Physical Vulnerability Score[3]
Adela West	SJV – Eastern San Joaquin	68	202	3,275	210	191	72
Denair West	SJV - Turlock	25	95	1,102	110	203	60
East Oakdale	SJV – Eastern San Joaquin and SJV – Modesto	94	403	5,744	178	218	50
Gratton	SJV – Turlock	10	108	1,236	180	223	71
Keyes	SJV – Turlock	48	209	3,181	219	169	58
Patterson	SJV – Delta-Mendota	8	226	3,725	348	229	66
Riverbank East	SJV – Modesto	82	292	3,945	185	157	51
Turlock SE	SJV – Turlock	47	93	1,412	170	168	56

Notes:
1. Information presented in Table 3-6 and Figure 3-12 are based on WCRs. Geographic information on WCRs may be inaccurate and/or place the well not at the actual well location. As a result, the number of domestic wells may be overestimated, and the placement of wells may not reflect actual locations.
2. Values are approximations due to the predominance of PLSS locations of wells.
3. Total physical vulnerability score ranges from 0 to 100, with a higher score indicating a worse physical vulnerability. See Figure 3-4 for the total physical vulnerability score for Stanislaus County.

Key:
SE = south-east
SJV = San Joaquin Valley

3.6 Risk Assessment Gaps

Understanding gaps in the risk assessment (1) helps identify physical and social vulnerabilities that may exist but are not effectively captured using the methodology applied and data available, (2) focuses future efforts to improve future risk assessments, and (3) allows communities to develop long-term continuous monitoring and improvement plans. This proactive approach helps build resilience over time. The risk assessment gaps described below were identified by the County, the WAC, and other stakeholders during the development of the County DRP.

- Domestic Well and SSWS Data: Total SSWSs in the County as reported by County staff differ from the information available from the State. County Staff can work with the state DDW to ensure state information is accurate, as verified in this assessment. County staff also noted that the domestic well information included in various state databases is inconsistent. Online

databases could be updated using Department of Water Resources Online System for Well Completion Reports data, corrections to WCRs, and local knowledge. County staff have indicated the need for some physical records to be digitized which can support efficient records requests and exchanges of information where applicable.

- County-specific Geographic Groupings: WAC members proposed a separate regional breakdown based on Bulletin 118 basins and fractured rock areas to characterize the physical vulnerability and social vulnerability unique to each area. WAC members noted that data could be more applicable if updated to reflect these regions.

4.0 Short-Term Response Actions

The risk assessment presented in Chapter 3 provided insight into County areas currently served by domestic wells and SSWSs that may be susceptible to droughts and water shortages, including potential impacts and affected populations. Based on the outcomes of the assessment, the WAC identified STRAs to include in the County DRP to help address the effects of water shortage emergencies that could occur in the vulnerable regions of the County. The actions are designed to meet immediate health and safety needs of impacted groups for events lasting up to 30 days. Daily, per-person drinking water supplies to meet health and safety needs draw from Center for Disease Control (CDC) guidelines provided through the Water, Sanitation, and Hygiene (WASH) Program, which estimates one gallon of water for drinking, cooking, brushing teeth, and other uses. This daily supply is anticipated to be greater during the summer months and households with pets. The STRAs may be modified, replaced, or extended depending on drought and water shortage conditions encountered.

This section describes the STRAs included in the County DRP and the Drought and Water Shortage Emergency Response Process developed as part of the County DRP to assist with implementing STRAs.

4.1 Legislative Requirements

SB 552 requires that each county develop a drought and water shortage plan that includes proposed interim solutions for SSWSs and domestic wells, per CWC Section 10609.70 [CWC 2021] (**bold face** added for emphasis as related to STRAs and this section of the County DRP):

> *(b) A county shall develop a plan that includes potential drought and water shortage risk and proposed interim and long-term solutions for state small water systems and domestic wells within the county's jurisdiction. The plan may be a stand-alone document or may be included as an element in an existing county plan, such as a local hazard mitigation plan, emergency operations plan, climate action plan, or general plan. A county shall consult with its drought task force or alternative coordinating process as established by this section in developing its plan. A county shall consider, at a minimum, all of the following in its plan:*
>
> *(1) Consolidations for existing water systems and domestic wells.*
>
> *(2) Domestic well drinking water mitigation programs.*
>
> ***(3) Provision of emergency and interim drinking water solutions.***
>
> *(4) An analysis of the steps necessary to implement the plan.*
>
> *(5) An analysis of local, state, and federal funding sources available to implement the plan*

4.2 Methodology to Identify Short-Term Response Actions

The WAC collaborated to identify and assess STRAs for inclusion in this County DRP. The selected STRAs are designed to respond to active drought and water shortage events lasting up to 30 days. The STRAs were developed through the following process:

1. The County's WAC created an initial STRA list based on water shortage vulnerabilities identified in the risk assessment (Chapter 3).
2. For each interim STRA, the WAC evaluated:
    a. whether the action can be provided through existing community and County resources.
    b. how the action is consistent with SB 552 and County policy.
    c. which County department or external agency would serve as Lead Entity to implement or manage the activity.
    d. which County department or external agency could serve as Supporting Entity to the Lead Entity for implementation.

4.2.1 Categories of Short-Term Response Actions

The STRAs are grouped into actions that align with CWC Section 10609.70(b)(3) [CWC 2021]:

- Emergency and Interim Drinking Water Solutions
    - Provides direct and immediate support to affected users
    - Provides drinking and potable water during a water shortage
    - Proactive measures to address drought conditions effectively in the short term
    - Fosters communication, involvement, and streamlining administrative processes of relevant County departments during water shortage conditions.
- Permit Streamlining and Coordination
    - Procedures and protocols to allow certain permit streamlining through better coordination; especially relevant for those permitted activities that could provide relief during ongoing water shortage conditions, including well construction, deepening, and rehabilitation.

4.3 Selected Short-Term Response Action

STRAs included in the County are summarized in Table 4-1 and described in this section. Most of these STRAs provide emergency and interim drinking water supplies via water filling stations or with packaged or bottled water. Another STRA includes expediting the well permitting approval process. A process for STRA implementation is presented in Section 4.7, while future efforts to address STRA implementation challenges and develop new STRAs are described in Chapter 6.

Table 4-1. Stanislaus County Short-Term Response Actions

ID	Short-Term Response Action Type	Short-Term Response Action Name	CWC Section[1]	Short-Term Response Action Description	Responsible Entity	Supporting Entity
STRA 01	Emergency and Interim Drinking Water Supplies	Packaged and Bottled Water Supplies	10609.70(b)(3)	County to provide outreach and develop agreements as necessary with vendors and specialized local emergency and assistance agencies, to identify, acquire, and distribute packaged or bottled water to domestic well and SSWS users in the event of an emergency.	County Groundwater Division	County Environmental Health Division, Self-Help Enterprises, Valley Water Collaborative, local GSAs
STRA 02	Emergency and Interim Drinking Water Supplies	Dedicated Water Filling Stations During a Water Shortage	10609.70(b)(3)	County to continue collaborating with local assistance agencies to assist in developing a network of emergency potable water supply stations/suppliers to be available in the event of a water shortage emergency. County to develop agreements as necessary to ensure network of water filling stations are adequate and have sufficient water supplies consistent with the estimated populations at-risk to shortage. County to maintain a list of approved water-hauling vendors, water well contractors, and qualified professionals, which can be provided to consumers who need such services.	County Environmental Resources	Valley Water Collaborative, County OES, local GSAs
STRA 03	Permit Streamlining and Coordination	Expedited Well Permitting	10609.70(b)(3)	County to prepare and implement expedited permit authorization for construction of replacement wells in the event of a water shortage emergency.	County Groundwater Division	County Environmental Health Division, local GSAs

Source:
1. CWC 2021.
Key:
County = Stanislaus County
CWC = California Water Code
GSA = Groundwater Sustainability Agency
SSWS = state small water system
STRA = Short-Term Response Action

4.4 Emergency and Interim Drinking Water Supplies

Emergency and interim drinking water supplies involve temporary water supplies until longer term water supplies are secured or the water shortage emergency ends. Emergency and interim drinking water supplies are used during water shortage events to meet basic health and safety needs. The volume of potable water for health and safety needs to follow CDC guidelines provided through the WASH Program (CDC 2025). The WASH Program advises emergency water supplies (drinking, cooking, brushing teeth, and other uses) to be 1 gallon of water per day for each person. These supplies may be higher for regions with higher temperatures and those households with pets.

4.4.1 Packaged and Bottled Water (STRA 01)

This solution is led by the County Groundwater Division and includes distribution of packaged or bottled water supplies (e.g., 1- to 5- gallon containers) to meet short-term health and safety needs of impacted communities. The solution is anticipated to be deployed for short-term events that impact 50 or fewer households served by a domestic well or SSWS. Implementation may be conducted in coordination with community-based organizations such as Self-Help Enterprises, Valley Water Collaborative, or a utility that has established a community resource center.[5] This solution may also be deployed in combination with other actions or as an interim measure prior to implementation of a LTMS/A. For each critical event, County Groundwater Division, in consultation with the PMT, should prepare a drinking water needs assessment that considers:

- estimated event duration
- affected geographic area
- number of people impacted and demographic profile
- accessibility of commercially available supplies from the event location (e.g., distance, socioeconomic barrier, physical barriers)
- point of distribution

Physical supplies of packaged and bottled water may be sourced through existing or future County inventories or commercial resources, as available. The County may also coordinate with adjoining counties to acquire and manage an inventory of packaged and bottled water supplies that can be used during emergencies (Section 4.6). Distribution of these supplies would be guided by an Emergency and Interim Drinking Water Distribution (EIDWD) Plan (Section 4.8).

4.4.2 Dedicated Water Filing Stations (STRA 02)

This solution is led by County Environmental Resources and includes providing water filling stations at one or more distribution points for households to bring containers to be filled. This solution is anticipated for short-term events that impact more than 50 households served by a domestic well or SSWS. The action may also be activated to supplement packaged water supplies in collaboration with community-based organizations such as Self-Help Enterprises, Valley Water Collaborative, or a community resource center established by an electrical utility. For each event, County Environmental

[5] Community resource centers are temporary facilities established by electrical utilities in response to a Public Safety Power Shutoff event. Such locations may include charging stations, snacks, bottled water, restrooms, and cell phone coverage, among other things.

Resources, in consultation with the PMT, would prepare a drinking water needs assessment that considers:

- estimated event duration
- affected geographic area
- number of people impacted and demographic profile
- accessibility of commercially available supplies from the event location (e.g., distance, socioeconomic barrier, physical barriers)
- equipment resources (e.g., bulk water tankers, mobile water tanks), as available
- bulk water source (e.g., nearest municipal and industrial provider, hospital, or other potable source)
- distribution location(s), hours of operations, and staffing requirements

4.5 Permit Streamlining and Coordination

The County may set up procedures and protocols to allow certain permit streamlining through better coordination. This is especially relevant for those permitted activities that could provide relief during ongoing water shortage conditions, including well construction, deepening, and rehabilitation. These permits are within the County's jurisdiction; thus, the County could develop procedures, protocols, and limitations for permit streamlining prior to drought or water shortage events with defined triggers for them to be activated when needed and deactivated when no longer needed.

4.5.1 Expedited Well Permitting (STRA 03)

Under drought and other water shortage events, groundwater wells that are comparatively shallower than other nearby wells can experience sudden failures, diminished reliability, or experience declining water quality. These failures of existing wells represent potential long-term impacts to health and safety of affected parties until the well is remediated or replaced.

This solution includes an evaluation of County Department of Environmental Resources Groundwater Division to prepare and implement actions that expedite approval of permits for new and modified groundwater wells. Streamlining may be achieved through improved coordination between County departments, redirecting staff resources to prioritize permit reviews during water shortages, and assisting well operators in connecting with licensed contractors who can respond on short notice. While GSAs do not issue well permits, they may play a role in facilitating or supporting expedited approvals for groundwater extraction, particularly for non-de minimis users. Importantly, this expedited process maintains all existing permitting criteria related to water supply, including standards for well proximity and water quality. The County Department of Environmental Resources retains the authority to expedite these permits regardless of whether a State or County drought emergency has been officially declared.

One barrier to the effectiveness of this STRA is the availability of C-57 licensed well drilling contractors within the region (CCR 2005). During periods of high demand, the availability of a well driller for emergency response may be limited. Where availability of well drillers is limited, the affected domestic well user(s) may be reliant on bottled or bulk water supplies for longer periods.

4.6 Partner Agency Agreements

Efficient implementation of STRAs requires coordination and cooperation with other entities beyond those within the County government. These can include pre-negotiated contracts and mutual aid agreements.

The acquisition of materials to implement this County DRP may be subject to local and State policies and regulations that govern their purchase. In the event of an emergency, counties can acquire materials via existing Emergency Procurement Policies that bypass competitive bidding where it is "necessary for the protection of public health, welfare, or safety" (PCC 2009). Exercise of this authority requires declaration of a local emergency as "a sudden, unexpected occurrence that poses a clear and imminent danger, requiring immediate action to prevent or mitigate the loss or impairment of life, health, property, or essential public services" (PCC 1994). These authorities, however, are time-limited and obligate counties to follow traditional procurement practices at the earliest practicable opportunity.

To allow the County to act quickly and maintain consistent resources during emergencies and interim water shortage events, the County may seek to establish pre-negotiated contracts and other related agreements that can be exercised during a recognized water shortage event. Such pre-negotiated contracts may involve private companies or other local public agencies, such as public water systems, to secure needed resources. While these pre-negotiated contracts and agreements enable the County to act swiftly during emergencies or water shortage events, their establishment, renewal, and ongoing management will comply with traditional procurement practices as required by local and State policies, except when emergency procurement authorities are temporarily invoked during a declared emergency.

Depending on requirements of other local public agencies, such agreements may include a memorandum of understanding or a mutual aid agreement. A mutual aid agreement is a pre-arranged understanding between two or more entities, often governing agencies or organizations, to provide resources and assistance to each other during emergencies and disasters. These agreements outline the terms for sharing personnel, equipment, facilities, and other resources that serve to enhance response capabilities when a single entity's resources are insufficient or reduce the cost of support delivery through pooling of resources among participants. Mutual aid agreements focused on public health and emergency response may be required for implementation of identified STRAs, depending on geographic location and response type.

Initial pre-negotiated contract and mutual aid agreements identified for this County DRP are outlined in Table 4-2.

Table 4-2. Pre-Negotiated Contract and Mutual Aid Agreements Recommended for Activation of Short-Term Response Actions included in the Stanislaus County Drought Resilience Plan

ID	Resource	Lead	Participating Agency	Action	Status
STRA 01	Packaged and Bottled Water Supplies	County Groundwater Division	County Environmental Health Division, Self-Help Enterprises, Valley Water Collaborative, local GSAs	Participate in agreements with GSAs to obtain emergency relief, recovery and support services. Develop RFP to solicit responses from commercial suppliers as needed. Other actions to be determined.	Pending
STRA 02	Dedicated Water Filling Stations During a Water Shortage	County Environmental Resources	Valley Water Collaborative, County OES, local GSAs	Develop RFP to solicit responses from commercial and municipal suppliers as needed. Other actions to be determined.	Pending
STRA 03	Expedited Well Permitting	County Groundwater Division	County Environmental Health Division, local GSAs	Redirecting staff resources to prioritize permit reviews during water shortages. Assisting well operators with licensed contractors. Other actions to be determined.	Pending

Key:
GSA = groundwater sustainability agency RFP = request for proposal
STRA = short-term response actions

4.7 Drought and Water Shortage Emergency Response Process

Implementation of the STRAs identified in this County DRP are promoted in reaction to an unplanned event, such as a disaster response (e.g., wildfire, chemical spill), or a potential event (e.g., localized and widespread well failures). This section describes the response process County staff would consider in relation to these types of events.

Unplanned events are those that result in a sudden loss of potable water supplies due to natural and human-caused disasters, such as earthquakes, fire, hazardous materials, floods, and other public health and safety threats. The selection of response actions to an event are informed by event circumstances, the availability of resources, the applicability of the response action(s), and other factors. For the purpose of this County DRP, it is anticipated that County staff would determine the appropriate implementation of one or more STRAs as part of a comprehensive response to that event pursuant to the County's Emergency Operations Plan.

Potential events are drought and water shortage events that can be anticipated through proactive monitoring of certain water supply indicators that can also serve as triggers for implementation or response actions. These indicators are information resources that County staff, in coordination with the WAC, may consider for selection of one of three County DRP Response stages, as described below.

County DRP Response Stages

- **Stage 1 - Monitoring:** No significant drought or water shortage risk is present, based on no statewide emergency drought regulations or executive order by the California governor being in effect. Focus is placed on preparedness, ongoing monitoring, and implementation of LTMS/A.
- **Stage 2 - Alert:** Water supplies are at risk due to ongoing drought or another disaster. This stage emphasizes STRA readiness, public communication, and coordination with emergency response partners to prepare communities for possible impacts.
- **Stage 3 - Critical Response:** A water shortage event is ongoing or imminent, which may be prompted by an emergency declaration at the local or State level. This stage triggers activation of STRAs and focuses on immediate response efforts to address essential water needs and mitigate further impacts.

An EIDWD Plan (Section 4.8) may be implemented as part of Stages 2 or 3 and can be determined to be activated as County staff deems necessary.

4.7.1 Water Supply Indicators and Triggers

Movement between DRP response stages is guided by a suite of indicators that include climate conditions, groundwater monitoring data, well permitting activity, and both natural and human-caused disasters. Three response stages have been established for County staff in consultation with the WAC and other interested parties to activate as part of the County DRP's implementation and in response to emergency water supply events.

It is anticipated that movement from one Response Stage to another would be based on findings of two or more of the currently identified indicators and other indicators that may be raised by County staff, the PMT, WAC members, and other interested parties. Typically, individuals or groups within the County monitor these indicators and, when thresholds are surpassed, the issue is elevated to the PMT for review. The PMT may then decide to involve the WAC, particularly in the event of a Critical Response stage, or as otherwise deemed necessary in the future.

Table 4-3 describes each indicator and triggers for changing the response stage. While input from each of these groups is essential, the final decision to escalate or de-escalate a response stage rests with the authority of County staff. The response stages are described as follows:

- **Stage 1 – Monitoring:** County staff have determined, based on analysis of water shortage indicators and consultation with other interested parties, that no significant drought or water shortage risk is present. No drought or water shortage declaration has been issued by the California governor, the State Water Board, or a GSA within the County's jurisdiction. Focus is placed on preparedness, ongoing monitoring, and implementation of LTMS/A.
- **Stage 2 – Alert:** County staff, in consultation with other interested parties, have identified an increased risk of water shortage based on one or more water shortage indicators meeting a pre-determined threshold or another water shortage event is expected. This stage emphasizes

STRA readiness, public communication, and coordination with emergency response partners to prepare communities for possible impacts. County staff may consider recommending to the WAC and the County Board that the Stanislaus County Water Conservation Ordinance be strictly enforced by Environmental Resources to focus on achieving immediate corrective behavior and preserving essential water resources.

- **Stage 3 – Critical Response:** County staff have determined a water shortage event is ongoing or imminent. This stage may be prompted by an emergency declaration at a local or state level. This stage triggers activation of STRAs and focuses on immediate response efforts to address essential water needs and mitigate further impacts. County staff may recommend domestic well and SSWS owners in affected regions voluntarily implement water conservation measures.

Table 4-4 provides a task list of activities County staff would conduct as part of each response stage. Implementation of this task is informed by the presence of water shortage indicators and triggers. These findings would be supported, where applicable, through engagement with the WAC, GSAs, and other interested parties. This task list is subject to change by County staff as an adaptive management strategy necessary to respond to factors and events that can cause water shortage conditions for domestic well and SSWS communities.

Table 4-3. Response Stage Indicators and Triggers

Indicator	Type	Indicator Description	Trigger Consideration When Going into the Alert Stage	Trigger Consideration When Going into the Critical Response Stage
Water Year Declaration	Annual	The Water Year Type is based on the amount of precipitation, using classifications that include Wet, Above Normal, Below Normal, Dry, and Critical Dry. These classifications are used to determine runoff indices for the Sacramento and San Joaquin Valleys. Dry and Critical Dry years can lead to increased groundwater demand in agricultural regions that rely on surface water supplies to meet irrigation demands. Groundwater recharge through precipitation is also reduced during periods of Dry and Critical Dry years.	Critical Dry year has been announced by DWR.	Two or more consecutive Critical Dry year announcements by DWR.
SGMA Annual Reports	Annual	Released by GSAs on or before April 1, these reports, among other things, provide a status report on the health of groundwater supplies within the GSA's jurisdiction, including changes in groundwater levels, subsidence, spring/fall groundwater elevation results, and other factors.[1]	Two or more consecutive years where minimum thresholds of importance (Lowering GW Levels, Reduction of Storage, and/or Degraded Quality) have been exceeded in domestic and SSWS communities. Consult with responsible GSAs.	GSAs project exceedance of minimum thresholds will continue for multiple years and impact domestic well and SSWS communities. Consult with responsible GSAs.
U.S. Drought Monitor	Periodic	The U.S. Drought Monitor integrates multiple indicators, such as precipitation, streamflow, and soil moisture.[2] These are applied to weekly assessments that reflect short- and long-term conditions to provide five drought intensity levels as described in Chapter 3 of the County DRP.	Exceptional Drought identified for 50 percent or more of land area in a single year.	Exceptional Drought identified for 50 percent or more of land area in two or more consecutive years.
Dry Well Reports	Periodic (quarterly)	DWR[3], County, and GSAs maintain websites for groundwater well owners and operators to report a dry well and find resources. The County additionally tracks permit applications for deepening of existing wells and installation of replacement ones. Well deepening and replacement wells are indicators of dry well conditions. These indicators assist agencies in identification of areas where groundwater levels may have declined and could indicate a risk to other nearby and similarly constructed groundwater wells.	Dry well reports and permits in a water supply region for replacement and deepening of existing wells exceed a 5-year rolling average by 50 percent.	Dry well reports and permits in a water supply region for replacement and deepening of existing wells exceed a 5-year rolling average by 100 percent.
Groundwater Well Permits	Periodic (monthly)	The County holds ministerial responsibility to issue permits for new, replacement, and modified/repaired wells. Permits for wells to be installed in SGMA-regulated groundwater basins are transmitted to overlying GSAs for informational purposes. Permits for replacement wells—where necessary to replace an otherwise functioning well—can serve as an indicator of localized dewatering. A permit to deepen a well via a modified/repaired well permit can also serve as an indicator of localized dewatering.	Replacement and replacement/repair permits for domestic wells, in a specific geography, exceed a 5-year rolling average by 100 percent.	Dry well reports and replacement/repair permits in a specific geography both exceed a 5-year rolling average by 100 percent.
Natural Disaster	Reactive	This can include wildfire and flooding. Each instance can result in a loss of water supply due, in part, to power supply outage or temporary contamination of groundwater during a flood.	Initiate evaluation of event, in coordination with other responsible parties, to determine potential at-risk community.	Implement response action consistent with local or State declaration, or other associated decision.
Human-Caused Hazard	Reactive	This can include chemical spills, groundwater contamination, and other similar hazards that limit the availability of potable water.	Evaluate, in coordination with other responsible parties, the extent of the potential risk to affected communities.	In coordination with other responsible parties, implement action applicable to identified event.
State/Federal Declaration	Reactive	This trigger can include a statewide drought declaration by the State Water Resources Control Board, an Executive Order by the State Governor, or a federal disaster declaration associated with a natural disaster or human-caused hazard.	Review declaration for applicability to County DRP.	Implement action consistent with declaration.

Source:
1. DWR 2025a
2. USDM 2025
3. DWR 2025b

Key:
County = Stanislaus County
DRP = drought resilience plan
DWR = California Department of Water Resources
GSA = Groundwater Sustainability Agency

GW = groundwater
SGMA = Sustainable Groundwater Management Act
SSWS = state small water system
U.S. = United States of America
USDM = United States Drought Monitor

Table 4-4. Water Shortage Emergency Response Process Task List

Response Stage	Description	Activity Description	Responsible Organization	Comment
Stage 1 - Monitoring	No major drought or potential for water shortage identified.	Annual and periodic indicator monitoring and reactive trigger response	County Department of Environmental Resources	County Department of Environmental Resources and its partner County departments conduct monitoring of indicators and triggers consistent with Table 4-1, and consults with the project coordination team, WAC, and other interested parties, as necessary.
		County DRP status memorandum	County Department of Environmental Resources	County Department of Environmental Resources, in consultation with project coordination team members with County DRP implementation responsibilities, prepares a memorandum that describes the status of STRAs, LTMS/As, and other related items. Task is completed in the first quarter of each year.
		Water Advisory Committee meeting	County Department of Environmental Resources	WAC meetings are held in January, May, and September, or as conditions merit. Meeting format is informed by annual and periodic indicators, active/anticipated reactive triggers, and the County DRP status memorandum.
		Website management	County Department of Environmental Resources	Annual website updates in advance of the WAC meeting, and periodic updates on an as-needed basis.
Stage 2 - Alert	Periodic and/or annual indicators or a reactive trigger is anticipated that demonstrate an elevated risk that water shortage may occur in one or more regions of the County.	STRA readiness	County Department of Environmental Resources	County Department of Environmental Resources, in coordination with project coordination team members and other responsible parties, confirms readiness of STRAs that could be deployed in response to observed water shortage risk.
		As-needed Water Advisory Committee meetings	County Department of Environmental Resources	County Department of Environmental Resources evaluates convening an as-needed WAC meeting to discuss identified water shortage risk and the readiness of appropriate STRAs. May include discussion to implement LTMS/As that may avoid STRA activation.
		Outreach to domestic well and SSWS communities on water shortage related information, including, but not limited to: • How to monitor domestic well health • Resources for when a well runs dry • County contact information • Information on water shortage conditions and conservation methods within the County	County Department of Environmental Resources	County departments conduct targeted communication and engagement activities for domestic well and SSWS communities within at-risk regions. Activities are conducted in coordination with PMT members, GSAs, and other interested parties, as applicable. Engagement may include website updates, social media posts, email distributions, and other methods of communication.
Stage 3 - Critical Response	Water shortage is occurring or is imminent	Interagency meeting	County Department of Environmental Resources	County Department of Environmental Resources engages partner County departments and other responsible agencies to evaluate severity and extent of the water shortage event. May include declaration of a local emergency by the County, allowing for exercise of Public Contract Code Section 10302(a).[1]
		Activate STRA(s)	County Department of Environmental Resources	County Department of Environmental Resources, in coordination with responsible agencies, prepares and implements event-specific EIDWD Plan. Agencies track and monitor costs for later cost recovery consistent with Public Contract Code Section 10302(a)[1].
		Water Advisory Committee meetings	County Department of Environmental Resources	County Department of Environmental Resources, in coordination with the project coordination team, organizes WAC meetings as required to respond to active water shortage event.

Source:
1. PPC 2009

Key:
County DRP = Stanislaus County Drought Resilience Plan
EIDWD = Emergency and Interim Drinking Water Distribution
GSA = groundwater sustainability agency
LTMS/A = Long-Term Mitigation Strategies/Actions
STRA = Short-Term Response Actions
WAC = Water Advisory Committee

4.8 Emergency and Interim Drinking Water Distribution Plan

The EIDWD Plan outlines the process for County staff to follow when distributing emergency and interim drinking water supplies to affected domestic well and SSWS communities. Table 4-5 shows the process County staff would follow in the event distribution of emergency or interim drinking water supplies is required due to a short-term water shortage event/emergency. Unless otherwise noted, implementation of these activities is subject to declaration of an emergency consistent with the County DRP or by direction of the County Board of Supervisors. This plan is implemented as part of Stage 3 – Critical Response of the County DRP (Table 4-4).

The information in Table 4-5 is not exhaustive and should be periodically reviewed and updated by County staff. This table may also help identify the types and locations of emergency water supplies in the event of a water shortage emergency outside the currently identified vulnerable domestic well and SSWS communities.

Table 4-5. Emergency and Interim Drinking Water Distribution Plan Summary

EIDWD Plan Component	Description
Lead Agency	County Environmental Resources manages implementation and oversight of the EIDWD Plan. Implementation of the EIDWD Plan may be led by County Environmental Resources or a designated County department, community group, or other designated entity. Implementation will be specifically tailored to on-the-ground conditions and the risk response requirements of the water shortage event. The lead entity for implementation will be assigned by County Environmental Resources, in consultation with the WAC, as applicable.
Activation	Activation of the EIDWD Plan is subject to recommendation by the County Environmental Resources. Activation is informed by an assessment conducted by the County Environmental Resources that includes: • trigger or cause of water shortage emergency (see Table 4-3 for drought and water shortage triggers to be considered in the assessment) • affected geographic area and demographics of the affected population • emergency and interim water supply type(s) • estimated duration of need County OES, following review of the assessment, may be engaged for cost-recovery, implementation support, and other factors, as required.
Notification	The County OES will manage, or direct in coordination with other parties, notification to the affected community on how and where to get emergency water supplies. The notification method may vary depending on the cause of the water shortage emergency (climate influenced, wildfire, power interruption, etc.) Anticipated notification methods include: • agency website: https://www.stancounty.com/er/groundwater/ • email • U.S. Mail • broadcast media (radio/television) • door hangers, fliers, information kiosks • public outreach meetings, and other existing meetings • hotline (311, other) Distribution of notifications may include coordination/collaboration with other partner agencies and organizations, such as: • neighborhood associations • non-profit organizations

EIDWD Plan Component	Description
	• schools, churches, and community groups Depending on the demographics of the affected community, information, materials, and other notifications may be required for non-English speaking communities. The County Environmental Resources, in consultation with the WAC and other parties, as necessary, will determine whether bilingual services are needed in support of water distribution activities.
Information Collection	When applicable, County Environmental Resources will collaborate with County OES in cost recovery. County Environmental Resources may also collect information to inform future emergency and interim drinking water distribution efforts. Such data collection would not include personal information and generally include: • number of people served by emergency supply, including age and household income • general geographic location of household • occupancy status (homeowner or tenant) • duration for which emergency supplies would maintain water needs • distance traveled to receive emergency supplies and mode of transportation • known condition of well; prior experiences with water supply shortages • others as identified, as needed

Key:
County OES = County Office of Emergency Services
EIDWD = Emergency and Interim Drinking Water Distribution
U.S. = United States of America
WAC = Water Advisory Committee

This page intentionally left blank.

5.0 Long-Term Mitigation Strategies

The risk assessment presented in Chapter 3 provides insight into County areas supplied by domestic wells and SSWSs that may be susceptible to droughts and water shortages, what may happen, and who may be impacted. Using that information, the WAC has identified LTMS/As to help address vulnerabilities in the County. While risks that impact the basic public health and safety of residents can be addressed through STRAs, LTMS/As mitigate and potentially prevent the conditions that lead to water shortage emergencies. The purpose of these LTMS/As is to reduce the vulnerability to drought and water shortage events and avoid or lessen the need to implement STRAs. Through implementation of LTMS/As, the County seeks to reduce the extent and cost of emergency response actions and promote activities that provide long-term water supply reliability for domestic well and SSWS communities. These LTMS/As are not exhaustive and are subject to modification as the County, its WAC, and other parties adaptively manage implementation actions in response to climate, water supply, County policy, and regulations.

5.1 Legislative Requirements

SB 552 requires that each county develop a drought and water shortage plan that covers long-term solutions for SSWS and domestic wells, per CWC Section 10609.70 [CWC 2021] (**bold face** added for emphasis as related to long-term mitigation strategies and actions and this section of the County DRP):

> *(b)* ***A county shall develop a plan that includes potential drought and water shortage risk and proposed interim*** *and long-term* ***solutions for state small water systems and domestic wells within the county's jurisdiction****. The plan may be a stand-alone document or may be included as an element in an existing county plan, such as a local hazard mitigation plan, emergency operations plan, climate action plan, or general plan. A county shall consult with its drought task force or alternative coordinating process as established by this section in developing its plan. A county shall consider,* ***at a minimum****, all of the following in its plan:*
>
> ***(1) Consolidations for existing water systems and domestic wells.***
>
> ***(2) Domestic well drinking water mitigation programs.***
>
> *(3) Provision of emergency and interim drinking water solutions.*
>
> *(4) An analysis of the steps necessary to implement the plan.*
>
> *(5) An analysis of local, state, and federal funding sources available to implement the plan*

5.2 Methodology to Identify and Select Long-Term Mitigation Strategies and Actions

Similar to STRA, the range of LTMS/As were prepared through a collaborative process with the WAC, see Table 5-1. The selected LTMS/As are designed to provide long-term solutions, if not preventative measures, to potential drought and water shortage events, thereby limiting the need to exercise STRAs. The LTMS/As were developed as a successor effort following development of the STRAs:

1. The County's WAC created an initial list of LTMS/As based on water shortages vulnerabilities identified in the Risk Assessment (Chapter 3).
2. For each interim LTMS/A, the WAC used the methodology applied for STRA development and considered how identified actions:
    a. can contribute to improved groundwater supply reliability for domestic well and SSWS communities.
    b. can transform how vulnerable communities experience water shortages, shifting from crisis management to crisis prevention.

These actions apply under six categories: System Consolidation (Section 5.3), Interties (Section 5.4), Drinking Water Well Mitigation Program (Section 5.5), Regional Water Infrastructure Investment (Section 5.6), Data Gaps (Section 5.7), and Emergency and Interim Drinking Water Supplies (Section 5.8). Each are described below. See Chapter 6 for a discussion on the status, anticipated schedule, and other implementation considerations for these actions.

Table 5-1. List of Long-Term Mitigation Strategies and Actions Included in the Stanislaus County Drought Resilience Plan

ID	Long-Term Mitigation Strategy or Action Type	Long-Term Mitigation Strategy and Action Name	CWC Section[1]	Long-Term Mitigation Strategy or Action Description	Responsible Entity	Supporting Entities
LTMS/A 01	System Consolidation	System Consolidation Planning	10609.70(b)(4)	County, in coordination with local and State agencies, to develop a detailed System Consolidation Plan that advances physical and/or managerial consolidation.	County Department of Environmental Resources	Environmental Health Division, Local GSAs, SWRCB
LTMS/A 02	Interties	SSWS Intertie, Emergency	10609.70(b)(3)	County will encourage consolidations and the installation of temporary interties between SSWS and/or public water systems in the event of a water shortage, where appropriate, to improve water service reliability. The County may facilitate the implementation of mutual aid agreements between water systems to minimize or mitigate impacts associated with emergency water shortage events.	County Groundwater Division	County Environmental Health, Local GSAs, Self-Help Enterprises, Valley Water Collaborative
LTMS/A 03	Interties	SSWS Intertie, Permanent	10609.70(b)(3)	County, in coordination and collaboration with public water systems, will encourage SSWSs to develop and install permanent interties with other SSWSs or public water systems in advance of a water shortage, where possible and appropriate.	County Groundwater Division	County Environmental Health, Local GSAs, Self-Help Enterprises, Valley Water Collaborative, Local Public Water Agencies

ID	Long-Term Mitigation Strategy or Action Type	Long-Term Mitigation Strategy and Action Name	CWC Section[1]	Long-Term Mitigation Strategy or Action Description	Responsible Entity	Supporting Entities
LTMS/A 04	Drinking Water Well Mitigation Program	Dry and Distressed Well Tracking	10609.70(b)(2)	County to update groundwater well permitting practices that support coordination with the State's Dry Well Reporting Program and other local programs. May include modification to well permitting to capture additional information associated with modification of existing wells (deepening, bulk water tanks, etc.) and installation of a replacement well. Advise applicants of well mitigation programs, where applicable.	County Groundwater Division	Local GSAs, DWR, NGOs
LTMS/A 05	Drinking Water Well Mitigation Program	Domestic Well Resource Support	10609.70(b)(2)	Provide, in coordination with other local and State public agencies, information to owners and operators of domestic wells and SSWSs to self-collect groundwater well samples for water quality testing and measure depth-to-water levels. Results would be provided to operators to understand conditions and recommend actions, if any. May include data maintained by SWRCB pursuant to HSC 116772 (added SB 200)(b)(1) and (b)(2).[2,3]	County Department of Environmental Resources	Environmental Health Division, Groundwater Division, Local GSAs, CDPR, DWR

ID	Long-Term Mitigation Strategy or Action Type	Long-Term Mitigation Strategy and Action Name	CWC Section[1]	Long-Term Mitigation Strategy or Action Description	Responsible Entity	Supporting Entities
LTMS/A 06	Drinking Water Well Mitigation Program	Alternative Supply Identification	10609.70(b)(2)	County, in coordination and collaboration with other local public agencies, to identify and evaluate potential alternative water supplies for identified at-risk communities through connection and treatment of non-potable resources, such as irrigation canals or springs.	County Department of Environmental Resources	Environmental Health Division, NGOs
LTMS/A 07	Drinking Water Well Mitigation Program	County DRP Website	10609.70(b)(2)	County to create and maintain a web portal that connects domestic well and SSWS communities with information related to drought and water shortage preparedness. Site may include links that connect with applicable County departments, other local public agencies, and State agencies; funding opportunities; water replacement resources; and other actions described in the County DRP.	County Department of Environmental Resources Groundwater Division	County OES, Water Advisory Committee
LTMS/A 08	Drinking Water Well Mitigation Program	Regional Groundwater Level Monitoring and Communication	10609.70(b)(2)	County to monitor and communicate (via social media, website, WAC meetings, etc.) regional groundwater levels in coordination and collaboration with groups and entities (e.g., GSAs, DWR) that have established charges and practices for well monitoring.	County Department of Environmental Resources Groundwater Division	Local GSAs, DWR

ID	Long-Term Mitigation Strategy or Action Type	Long-Term Mitigation Strategy and Action Name	CWC Section[1]	Long-Term Mitigation Strategy or Action Description	Responsible Entity	Supporting Entities
LTMS/A 09	Drinking Water Well Mitigation Program	Well Permitting Considering Future Growth	10609.70(b)(2)	County to implement existing policy such that the Planning Department evaluates specific plans, vacant land in unincorporated regions zoned for residential use, and other long-term development initiatives for groundwater basin or subbasin water demands at full build-out.	County Planning Department	County Department of Environmental Resources, Local GSAs
LTMS/A 10	Drinking Water Well Mitigation Program	County Planning Integration	10609.70(b)(4)	County to update its Multi-Jurisdictional Hazard Mitigation Plan, Emergency Operations Plan, and/or related documents to confirm interagency roles, responsibilities, and actions associated with implementation of the DRP.	County OES	County Planning Department, DWR
LTMS/A 11	Drinking Water Well Mitigation Program	Well Permitting Considering Impacts to Other Groundwater Users	10609.70(b)(2)	County to include coordination and collaboration with other entities, as applicable, for the review and authorization of new groundwater wells by including the potential to affect other nearby wells.	County Department of Environmental Resources Groundwater Division	Local GSAs
LTMS/A 12	Regional Water Infrastructure Investment	Regional Planning Integration	10609.70(b)(2)	County, in coordination with GSAs, IRWMP, and other associated groups, to identify and implement managed aquifer recharge, flood management, and other projects that support long-term water supply reliability for at-risk communities. May include adaptation of planned capital improvement projects of local agency partners to benefit at-risk communities.	County Department of Environmental Resources Groundwater Division	Local GSAs, local Public Water Agencies, County Public Works, County Planning Department, County OES, DWR

ID	Long-Term Mitigation Strategy or Action Type	Long-Term Mitigation Strategy and Action Name	CWC Section[1]	Long-Term Mitigation Strategy or Action Description	Responsible Entity	Supporting Entities
LTMS/A 13	Data Gaps	Dry Well Abandonment	10609.70(b)(2)	County to continue supporting formal abandonment of domestic groundwater wells that are no longer in operation and represent a potential risk to groundwater quality or other public safety concerns. Activity may be linked to issuance of replacement wells. Program may include analysis of WCRs issued prior to January 1, 1977 (i.e., assumes functional life of well has been exceeded due to age).	County Department of Environmental Resources	Environmental Health Division, Local GSAs
LTMS/A 14	Data Gaps	State Small Water System Monitoring	10609.70(b)(2)	County to continue to oversee SSWS well owner compliance with drinking water monitoring compliance with the California Safe Drinking Water Act pursuant to AB 664.[4]	County Department of Environmental Resources	Environmental Health Division
LTMS/A 15	Data Gaps	Evaluate and Update Well Completion Report Administrative Record	10609.70(b)(2)	The County will update WCR information related to geographic location, operations, and other relevant factors when errors are identified and corrected, where feasible. This includes updating records maintained in paper form by the County to the State registry, if applicable.	County Department of Environmental Resources Groundwater Division	DWR
LTMS/A 16	Data Gaps	Database Management System	10609.70(b)(2)	County, to amend database management systems (DMS) integrated with groundwater well permits issued by the County to include well construction details, water quality testing results, and	Environmental Health Division	Groundwater Division, SWRCB, DWR, local GSAs

ID	Long-Term Mitigation Strategy or Action Type	Long-Term Mitigation Strategy and Action Name	CWC Section[1]	Long-Term Mitigation Strategy or Action Description	Responsible Entity	Supporting Entities
				other metrics that track groundwater demands and trends. Database may serve as, among other things, a means to measure or mitigate cumulative impacts associated with modified or repaired wells, new wells, replacement wells, and amendments to County zoning.		
LTMS/A 17	Emergency and Interim Drinking Water Supplies	Water Hauling, Bulk Water for Temporary Tanks	10609.70(b)(3)	County to provide outreach and assist in the installation of temporary bulk water storage tanks. This includes ensuring policies and agreements are in place as needed for coordination with vendors, specialized local emergency and assistance agencies, and public water systems to provide temporary water supplies and resources to deliver temporary supplies.	County Groundwater Division	County Environmental Health Division, Self-Help Enterprises, Valley Water Collaborative, local GSAs

Sources:
1. CWC 2021
2. HSC 2019
3. Mooning 2019
4. Lee 2023

Key: AB 664 = Assembly Bill 664
County = Stanislaus County
County DRP = Stanislaus County Drought Resilience Plan
County OES = Stanislaus County Office of Emergency Services
CDPR = California Department of Pesticide Regulation
CWC = California Water Code
DER = Department of Environmental Resources
DMS = database management system
DWR = California Department of Water Resources
GSA = Groundwater Sustainability Agency
HSC = California Health and Safety Code
IRWMP = Integrated Regional Water Management Plan
LTMS/A = long-term mitigation strategies and actions
NGO = non-governmental organization
SB 200 = Senate Bill 200
SSWS = state small water system
SWRCB = California State Water Resources Control Board
WAC = Water Advisory Committee
WCR = well completion reports

5.3 System Consolidation (LTMS/A 01)

CWC Section 10609.70(b)(1) requires counties to consider support of system consolidation that would provide drought and water shortage protection to domestic well and SSWS communities as part of its County DRP (CWC 2021). In alignment with this requirement, this County DRP summarizes the two main types of system consolidation being considered:

1. **SSWS Annexation.** This approach involves the consolidation of two or more public water systems and includes the potential to annex nearby SSWSs as part of the larger effort. Such consolidation efforts could improve long-term water reliability and drought resilience, supported by feasibility studies, infrastructure planning, and coordination with nearby communities. These opportunistic annexations of SSWSs help extend safe and reliable water service to underserved areas while maximizing the value of infrastructure investments.
2. **Domestic Well Consolidation.** This strategy targets areas with high concentrations of domestic wells that are vulnerable to water shortages, particularly during drought. Consolidation into nearby public water systems or formation of new systems can offer more reliable and sustainable service. This DRP has identified priority regions where such consolidation may be feasible and encourages coordination with GSAs, DDW, and community partners to explore and implement these opportunities. Key factors to consider include proximity to existing infrastructure, system capacity, user willingness, and legal or regulatory constraints.

These consolidation efforts represent key opportunities to improve regional water reliability and resilience by consolidating and expanding service to nearby small systems and domestic well users. System consolidation strengthens drought resilience by expanding water supply portfolios, improving governance, and increasing overall water resilience. Additional information on implementation of the system consolidation LTMS/As is included in Chapter 6, including County roles, partner agencies, and details on next steps for County staff.

5.3.1 State Small Water System Consolidation Opportunities

This LTMS/A, subject to available funding and direction from the County Board of Supervisors, identifies community water system consolidation opportunities that are geographically near SSWSs (within 3 miles of receiving community water system boundaries) for potential annexation. While not currently part of active projects, these SSWSs integrating with a community water system represent opportunities to enhance regional water system resilience and long-term drought planning. Table 5-2 presents potential consolidation opportunities for SSWSs and community water systems as identified by this DRP. Consolidating SSWSs into more robust community water systems contributes directly to drought resilience by expanding access to reliable supply sources, supporting regional water management, and reducing the number of isolated systems at risk during prolonged water shortages.

Funding agencies could potentially prioritize projects that consolidate failing or non-compliant systems, provide regional benefits, improve public health, and support sustainable long-term operations. Including nearby SSWS in existing efforts may improve water reliability, address regional infrastructure needs, and increase eligibility for State drought and resilience funding.

The County may work with interested SSWS owners and receiving system operators to explore physical and managerial consolidation opportunities that improve water quality, system efficiency, and long-term viability. These conceptual opportunities will require further assessment of cost, operations, and community support. Coordination with DDW and partners, such as Self-Help Enterprises, will

support planning and implementation. These conceptual opportunities will require further assessment of cost, operations, and community support, but offer meaningful pathways to strengthen regional drought resilience and secure long-term water sustainability.

Table 5-2. State Small Water Systems Consolidation Opportunities

Joining System				Receiving System		
State Small Water System	**Connections**	**Distance to receiving system (miles)**	**2024 Water Quality Risk[1]**	**Public Water System**	**Connections**	**SAFER Results[2]**
Art Silva Dairy	6	1.1	High	City of Modesto	70,586	Not Assessed
B&C Zachariah	1	0	High	City of Ceres	11,881	Failing
Cardoza Water System	10	0	High	City of Modesto	70,586	Not Assessed
Davis Court	1	3.3	High	Denair Community Services District	1,711	Not At-Risk
Deevon Water Company	1	0	High	City of Modesto	70,586	Not Assessed
El Rancho Mobile Estates	8	0.7	High	Keyes Community Services District	1,436	Failing
El Amigo Motel	12	0	High	City of Turlock	19,332	Failing
Floyd Overholtzer Water System	1	0.6	Medium	City of Modesto	70,586	Not Assessed
3824 El Camino Road	1	0	High	City of Ceres	11,881	Failing
Ledbetter Water System	9	0	High	City of Ceres	11,881	Failing
Miller Apartments	1	0	High	City of Ceres	11,881	Failing
Pioneer Village Water System	12	0	High	City of Modesto	70,586	Not Assessed
Rohde Road Apartments	8	0	High	Keyes Community Services District	1,436	Failing
Shiloh River Resort	1	2.8	High	Stanislaus County Honor Farm	Unknown	Not Assessed
Camp Taylor	14	0	Not Assessed	Stanislaus County Honor Farm	Unknown	Not Assessed
Sperry Mobile Home Park	1	0	High	City of Patterson	7,109	Potentially At-Risk
Starn Farms Employee Housing	8	0.6	High	City of Hughson	2,236	Failing
Sun Dry Products	5	11.68	Not Assessed	Buehner Houses	13	At-Risk
Villa Las Flores	13	0	High	City of Patterson	7,109	Potentially At-Risk

Joining System				Receiving System		
State Small Water System	Connections	Distance to receiving system (miles)	2024 Water Quality Risk[1]	Public Water System	Connections	SAFER Results[2]
Walnut Grove Apartments	7	1.4	High	Crow Landing Community Services District	138	Not At-Risk

Sources:
1. State Water Board 2024a
2. State Water Board 2024b

5.3.2 Domestic Well Consolidation Opportunities

This LTMS/A, pursuant to available funding, direction of the County's Board of Supervisors, and associated program partners, identifies domestic well consolidation opportunities. While the County is home to numerous private and public water providers, approximately 1,507 domestic wells continue to operate within the boundaries of these water systems (Table 5-3, Figure 5-1).

For the purposes of this system consolidation opportunity analysis, Stanislaus County was divided into six subregion groupings based on SGMA basin boundaries and fractured rock areas. This is the same approach as described in the risk assessment analysis in Section 3.5. In the County, there are four subbasins: SJV – Eastern San Joaquin (DWR Basin 5-022.01), SJV – Modesto (DWR Basin 5-022.02), SJV – Turlock (DWR Basin 5-022.03), and SJV – Delta-Mendota (DWR Basin 5-022.07). These are considered four subregions and are referred to as SJV-Eastern San Joaquin, SJV-Modesto, SJV-Turlock, and SJV-Delta Mendota. The remainder of the County was divided into two subregions based on areas outside of the SGMA basin boundaries and including fractured rock areas. The area in the western part of Stanislaus County west of the SJV – Delta-Mendota subbasin is referred to as Non-Groundwater Basin West (Non-GWB: West). The areas along the eastern border of Stanislaus County are collectively referred to as Non-Groundwater Basin East (Non-GWB: East).

To better identify areas where domestic well consolidation may be feasible, an analysis was conducted considering existing domestic wells, pinpointing key focus areas for potential consolidation. These areas were determined through a multi-step spatial analysis process. First, wells located within the boundaries of public water systems were assigned the name of the system they intersected, and a summary table was developed to show the area of each water system and the number of wells constructed before and after 1977. For wells located outside these service areas but within groundwater basins, the distance in feet to the nearest other well was calculated. These wells were then analyzed using the Optimized Hot Spot Analysis tool in ArcGIS Pro, which identifies statistically significant clusters of high or low values—in this case, clusters of wells with shorter distances between each of them—indicating areas of higher well density. The resulting hot spot clusters were used to define boundaries around groups of wells with significantly low nearest-well distance. The remaining wells outside these clusters were categorized as part of an "Other Area," which was further subdivided based on geologic setting into "Fractured Rock" and "Alluvial Basin" areas. A final summary table was created to report the number of wells in each

group (both pre- and post-1977), the total area of each grouping, and the average distance between wells within the Alluvial Basin categories to provide additional insight into spatial distribution. There are more than 2,010 domestic wells concentrated in 8 distinct areas identified for domestic well consolidation within the County (Table 5-4, Figure 5-1).

Areas with such concentrations of domestic wells can lead to groundwater overdraft conditions during prolonged drought events, which can lead to comparatively shallow wells going dry. When the groundwater level drops, even by a moderate amount, many of these wells can go dry. This can result in widespread domestic well failures within high-concentration well communities (USGS 2018).

Consolidations can include annexation of domestic well communities with nearby community water systems or the creation of a new community water system. Note that such consolidation efforts require consideration of multiple factors, including sphere of influence of the supplying entity and its available water resources, whether place of use and water rights limit distribution to expanded service areas, willingness of beneficial users to join a public water system, and other factors. To evaluate the potential for such consolidation opportunities, the County will engage with GSAs that overlay these domestic well communities to determine potential measures that support consolidation or implement mitigation actions that limit potential occurrences caused by prolonged drought and other water shortage conditions.

At this conceptual stage, additional evaluation is suggested to understand the costs, operational needs, and willingness of participants. The County could coordinate closely with DDW and partners, such as Self-Help Enterprises, to support and guide the consolidation process.

Table 5-3. Domestic Wells Within the Boundaries of Public and Private Water Systems

Public Water System	Subregion	Domestic Well Count[1]	Pre-1977	Post-1977
5033 Pentecost	SJV – Modesto	1	0	1
California Transplants LLC	SJV – Delta-Mendota	1	0	1
Cerbo Frozen Foods	SJV – Delta-Mendota	4	1	3
City of Ceres	SJV – Turlock	52	22	30
City of Hughson	SJV – Turlock	29	22	7
City of Modesto	SJV – Modesto and SJV – Turlock	447	107	340
City of Modesto – Del Rio	SJV – Modesto	21	5	16
City of Modesto – Salida	SJV – Modesto	31	9	22
City of Modesto – South Turlock	SJV – Turlock	30	15	15
City of Newman – Water Department	SJV – Delta-Mendota	84	11	73
City of Oakdale	SJV – Modesto	128	35	93
City of Patterson	SJV – Delta-Mendota	49	3	46
City of Riverbank	SJV – Modesto	128	38	90
City of Turlock	SJV – Turlock	216	55	161
City of Waterford	SJV – Modesto	25	4	21
Charity Way Water System	SJV – Modesto	5	0	5
Country Villa Apartments	SJV – Turlock	1	0	1

Public Water System	Subregion	Domestic Well Count[1]	Pre-1977	Post-1977
Denair Community Services District	SJV – Turlock	55	16	39
Duarte Nursey Inc Water System	SJV – Turlock	2	0	2
Excell Center	SJV – Turlock	1	0	1
Floyd Overholtzer Water System	SJV – Modesto	4	0	4
Frank Raines Off-Vehicle Highway Park	Non-GWB: West	6	0	6
Hillsview Homes	SJV – Delta-Mendota	7	1	6
Keyes Community Services District	SJV – Turlock	10	2	8
Knights Ferry Community Services District	SJV – Eastern San Joaquin	13	0	13
La Grange Off-Vehicle Highway Park	SJV – Turlock	1	0	1
Lander Veterinary Clinic	SJV – Turlock	1	0	1
Lazy B Mobile Home Park	SJV – Modesto	1	0	1
Modesto Reservoir	SJV – Modesto	10	3	7
North Oaks Mutual Water Company	SJV – Eastern San Joaquin	73	13	60
Oasis Investments	SJV – Modesto	1	0	1
Oakdale Irrigation District – Oakdale Rural Water System #1	SJV – Modesto	2	0	2
One Stop Water System	SJV – Modesto	1	0	1
Pioneer Village Water System	SJV – Turlock	1	0	1
Riverdale Park Tract Community Services District	SJV – Turlock	1	0	1
Shiloh Mobile Home Park and Water System	SJV – Turlock	1	0	1
Stanislaus Regional Water Authority	SJV – Turlock	6	1	5
Storer Transportation	SJV – Modesto	1	0	1
Sun Dry Products-Water	SJV – Delta-Mendota	1	1	0
TDS California	SJV – Turlock	1	0	1
Waterford-Hickman	SJV – Turlock	2	0	2
Western Hills Water District/Diablo Gran	Non-GWB: West	1	0	1
Whiskey River Saloon	SJV – Eastern San Joaquin	1	0	1
Wood Colony Christian School	SJV – Modesto	1	0	1
Woodward Reservoir Water System	SJV – Eastern San Joaquin	50	7	43
	Total:	**1,507**	**356**	**1,151**

Note:

[1] Information presented in Table 5-3 and Figure 5-1 are based on WCRs. Geographic information on WCRs may be inaccurate and/or place the well not at the actual well location. As a result, the number of domestic wells may be overestimated, and the placement of wells may not reflect actual locations.

Key:

Non-GWB = non-groundwater basin (represents areas outside of a SGMA basin boundary)

SJV = San Joaquin Valley

WCR = well completion report

Table 5-4. Domestic Wells Groupings in the County

Group Area	Subregion	Approximate Domestic Well Count[1]	Pre-1977	Post-1977
Adela West	SJV – Eastern San Joaquin	270	68	202
Denair West	SJV – Turlock	120	25	95
East Oakdale	SJV – Eastern San Joaquin and SJV – Modesto	497	94	403
Gratton	SJV – Turlock	118	10	108
Keyes	SJV – Turlock	257	48	209
Patterson	SJV – Delta-Mendota	234	8	226
Riverbank East	SJV – Modesto	374	82	292
Turlock SE	SJV – Turlock	140	47	93
	Total:	**2,010**	**382**	**1,628**

Note:

[1] Information presented in Table 5-4 and Figure 5-1 are based on WCRs. Geographic information on WCRs may be inaccurate and/or place the well not at the actual well location. As a result, the number of domestic wells may be overestimated, and the placement of wells may not reflect actual locations.

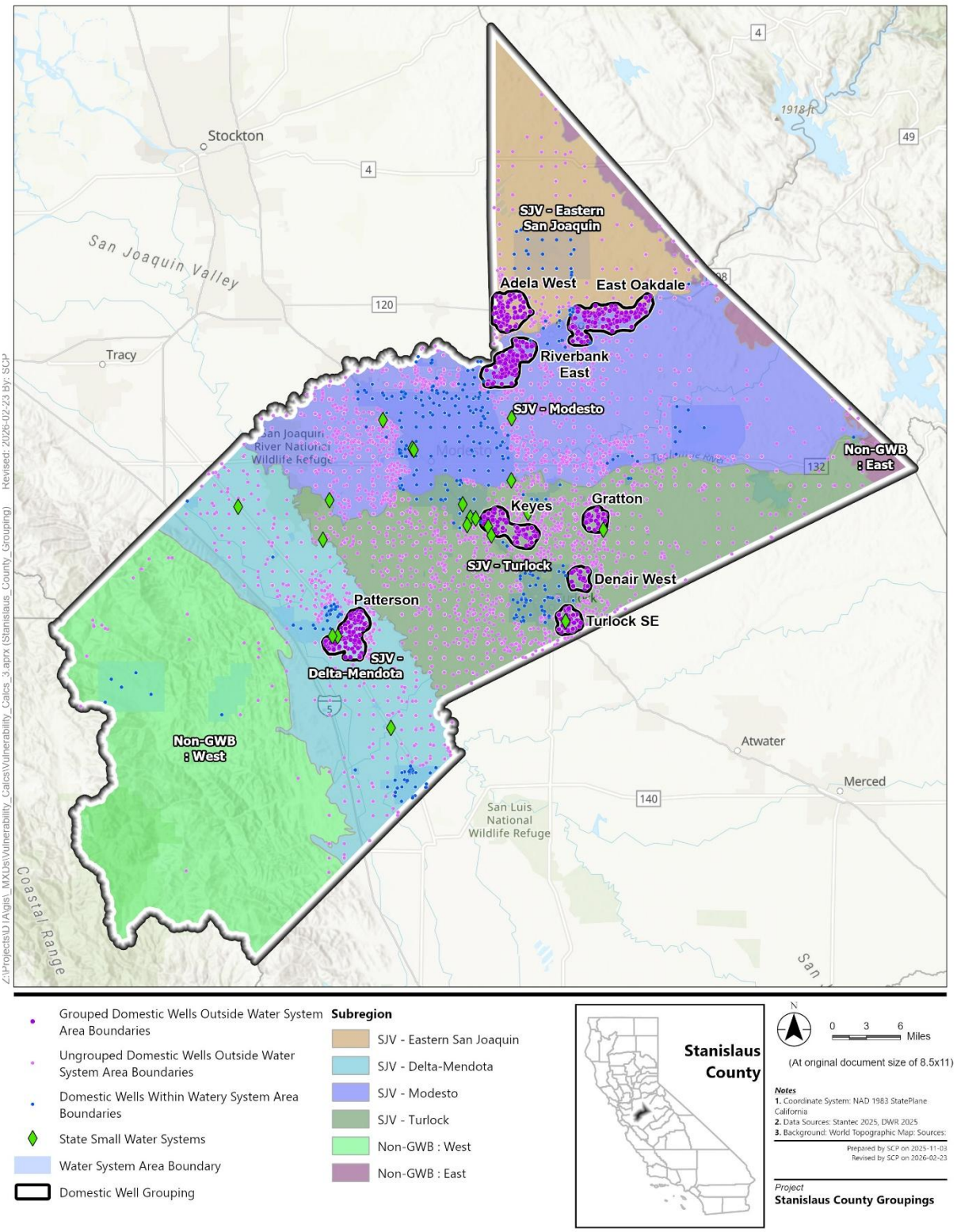
Key:

Non-GWB = non-groundwater basin (represents areas outside of a SGMA basin boundary)

SE = south-east

SJV = San Joaquin Valley

WCR = well completion report



Key: Non-GWB = non-groundwater basin (represents areas outside of a SGMA basin boundary); SE = south-east; SJV = San Joaquin Valley

Figure 5-1. Domestic Wells Within Water Service Areas and Unincorporated Regions

5.4 Interties

Interties are physical interconnection between water systems to permit the exchange or delivery of water between those systems. Activation of such an intertie for water sharing should be based on the terms and conditions of an operating agreement established between entities prior to the water shortage event. The following describes the potential for emergency and permanent interties between SSWSs or between a SSWS and public water systems.

5.4.1 SSWS Intertie, Emergency (LTMS/A 02)

An emergency intertie is an above-ground or shallow subsurface pipeline that temporarily connects two or more willing water systems in the event of a water supply emergency that risks basic health and safety of residents. County Groundwater Division is the lead entity for this LTMS/A, with support from County Environmental Health, local GSAs, Self-Help Enterprises, and Valley Water Collaborative. The County will encourage consolidations and the installation of emergency interties between SSWSs and/or public water systems, where appropriate, to improve water service reliability. As the County is not a water purveyor, its role is to serve as facilitator and convenor to assist in successful execution of such agreements. While the County does not have a direct role in constructing or operating interties, the County could assist in implementing these interties or in supporting their permitting and approval. The County may facilitate the implementation of mutual aid agreements between water systems to minimize or mitigate impacts associated with emergency water shortage events.

5.4.2 SSWS Intertie, Permanent (LTMS/A 03)

A permanent intertie would allow for connection between two or more willing water systems, not limited to water supply emergency use case. County Groundwater Division is the lead entity for this LTMS/A, with support from County Environmental Health, local GSAs, Self-Help Enterprises, and Valley Water Collaborative. The County will encourage consolidations and the installation of permanent interties between SSWSs and/or public water systems, where appropriate, to improve water service reliability. As the County is not a water purveyor, its role is to serve as facilitator and convenor to assist in successful execution of such agreements. While the County does not have a direct role in constructing or operating interties, the County could assist in implementing these interties or in supporting their permitting and approval. The County may facilitate the implementation of mutual aid agreements between water systems to minimize or mitigate impacts associated with emergency water shortage events.

5.5 Drinking Water Well Mitigation Program

CWC Section 10609.70(b)(2) requires counties to consider development of a drinking water well mitigation (DWWM) program focused on domestic well and SSWS communities as a component of its County DRP [CWC 2021]. The goal and objective of a DWWM Program is to provide technical and financial solutions that limit or respond to water shortage events that occur in domestic well and SSWS communities. The County works with the Groundwater Sustainability Agencies within the County to support established drinking water well mitigation programs that support the implementation of adopted groundwater sustainability plans.

A DWWM Program typically include four core elements:

1. Identifying wells that may be impacted through drought and water shortage events

2. Developing options for mitigation, including well repairs or replacements and other potential mitigation strategies
3. Implementing community-supported solutions in collaboration with other local and State agencies
4. Promoting and assisting with efforts to support well owners in monitoring for maintenance, reliability, and adaptation to changing conditions, and providing tools and resources to help groundwater dependent communities prepare for potential impacts to household water supplies should they occur.

Each of these core elements are components of well mitigation programs commonly included in GSPs by GSAs.

As described in Chapter 1, the County is home to numerous GSAs that have been established in four groundwater basins that are subject to SGMA. Consistent with CWC Section 10733.2(a)(1), DWR completes an evaluation of submitted GSPs and coordination agreements (where applicable) submitted by these GSAs (CWC 2015). Results of this evaluation are provided in a GSP determination letter that summarizes the department's findings of the submitted plan's adequacy to SGMA and any corrective actions, where identified. Below is a paraphrased summary of the GSP implementation progress associated with well mitigation needs identified by DWR for GSAs within the County's jurisdiction:

- **San Joquin Valley – Eastern San Joaquin Subbasin:** The Eastern San Joaquin GSP states that impacts to drinking water users were considered during the development of minimum thresholds and the established minimum thresholds will prevent a continued lowering of groundwater levels, which should be sufficiently protective of most shallow domestic well users. The GSP indicates that an adaptive management approach will be utilized, and if impacts to drinking water users are identified during GSP implementation, minimum thresholds could be revised or additional projects or management actions could be implemented. DWR staff recommended that impacts to drinking water users (i.e., shallow domestic wells and small water systems) be evaluated using updated modeling so that projected impacts can be used to guide future projects or management actions, if warranted. In the 2024 GSP Amendment, a dewatered domestic well mitigation program was added (ESJGA 2024). The program provides emergency, interim, and financial mitigation for domestic water supply wells that have been determined to have failed due to groundwater overdraft conditions occurring since January 1, 2015. The program was adopted by the Eastern San Joaquin Groundwater Authority in September 2024 and was implemented in 2025.
- **San Joaquin Valley – Modesto Subbasin:** DWR approved the GSP on February 27, 2025, and determined the details regarding the development of the dry well mitigation program are sufficient (DWR 2025a). In January 2026, the Stanislaus and Tuolumne Rivers Groundwater Basin Association approved a well mitigation plan which serves to provide mitigation for drinking water wells that have experienced adverse impacts due to declining groundwater levels during the SGMA implementation period (STRGBA 2026).
- **San Joaquin Valley – Turlock Subbasin:** The Turlock Subbasin GSP details the GSAs' commitment to developing and implementing a dry well mitigation plan to mitigate potential impacts to water supply wells. The 2024 GSP Annual Report included the adoption of a domestic well

mitigation program (DWR 2024). The program provides mitigation for drinking water wells that have experienced adverse impacts due to declining groundwater levels during the SGMA implementation period. The program was approved and implemented in January 2025. DWR approved the GSP on February 27, 2025, and determined the details regarding the development of the dry well mitigation program are sufficient (DWR 2025b).

- **San Joaquin Valley – Delta-Mendota Subbasin:** All 23 GSAs in the subbasin adopted a new, single, coordinated GSP (DWR 2025c). The GSP addresses "deficiencies" identified by DWR in March 2023 and was submitted to the State Water Resources Control Board in 2024 to determine if it meets the minimum requirements of the GSP regulations. The Well Mitigation Policy has been adopted by all the Subbasin GSAs and is included as Appendix N of the Delta-Mendota GSP. The Well Mitigation Policy considers impacts to domestic and small community water system wells and includes mitigation measures that are available to eligible domestic well users whose wells have gone dry due to groundwater levels dropping as a result of groundwater management in the subbasin. DWR determination of GSP sufficiency is still pending (as of November 2025).

Consistent with SGMA and SB 552, the County DWWM Program is to coordinate and collaborate with GSAs to conduct and implement well mitigation programs, where adopted and implemented by the GSAs within the County. This collaboration may additionally include engagement with GSAs to evaluate potential implementation of the LTMS/As identified in this County DRP.

5.5.1 Dry and Distressed Well Tracking (LTMS/A 04)

This LTMS/A focuses on the accuracy of dry well reports and tracking distressed wells. The availability and accuracy of this information is currently limited. The County Department of Environmental Resources existing well permitting practices require the contractor to indicate if it is a new well or replacement well and to indicate the type of well. The well assessment information does not require permittees to submit details regarding the cause of a failed well. While the State of California maintains a Dry Well Reporting Program for private domestic well operators to voluntarily report dry well conditions, awareness and use of the program is limited (DWR 2025d). Since 2005, this program has collected nearly 6,000 dry well reports (as of July 2025). As discussed in Section 3.3.4, 152 dry well reports in the County (from 2014 to 2024) have been reported to the State's database.

The County Department of Environmental Resources Groundwater Division will continue to work with licensed well drillers and DWR to ensure well completion reports are forwarded to the Well Completion Report Database maintained by DWR. The County will also update the well construction permit application to help identify drought-impacted wells.

5.5.2 Domestic Well Resource Support (LTMS/A 05)

This LTMS/A, pursuant to available funding, direction of the County's Board of Supervisors, and associated program partners, would provide domestic well monitoring support to owners of compromised domestic and SSWS groundwater wells. It is recognized that data on groundwater conditions for domestic wells is limited due to lack of routine monitoring. To address this, County staff could assist domestic well owners in collecting appropriate measurements and well completion information. This support may include connecting well owners with GSA resources or providing guidance on monitoring techniques. These efforts could be coordinated with underlaying GSAs or Watermasters,

as applicable. Data collected through this program would contribute to broader groundwater condition monitoring efforts and support related SGMA actions.

This effort addresses the growing need to ensure continued access to safe and reliable drinking water for vulnerable water users. Implementation may require sustained interagency coordination, targeted outreach to impacted communities, and long-term collaboration across diverse geographic and hydrogeologic settings. While the County would not provide direct funding to private individuals under this program at this time, it would work to connect residents to applicable programs and assistance opportunities available through GSAs, Watermasters, or other State and federal sources.

5.5.3 Alternative Supply Identification (LTMS/A 06)

Alternative water supplies are sources that may have been rejected for use in the past or new water supplies that residents may secure on a short-term basis in the event of regular water sources becoming scarce. The implementation of this activity is subject to available funding and County Board of Supervisor approval. The County Department of Environmental Resources is the lead entity, with support from the County Environmental Health Division. The County, in collaboration with State and other local agencies, could develop a list of potential alternative water sources for use during a water shortage emergency. The County would work with the State Water Board to establish the conditions under which these alternative water sources could be approved for emergency drinking water supplies.

5.5.4 County DRP Website (LTMS/A 07)

This LTMS/A, subject to available funding and direction from the County's Board of Supervisors and program partners, proposes to develop a centralized web portal for domestic well owners and SSWS operators. The County could build on its existing website to create a centralized web portal. The portal would consolidate key resources, such as emergency support services for water outage events, technical guidance, and links to external assistance programs (such as SAFER and State funding opportunities). It could also include links to California's Groundwater Live dashboard, California Water Watch, and the Dry Well Susceptibility Tool to provide access to well-related data to better understand local groundwater conditions, and to facilitate planning for potential well outages.

The County Department of Environmental Resources Groundwater Division would lead development and ongoing maintenance of the portal, ensuring its content remains current and responsive to user needs. Implementation may involve coordination with County departments, integration with existing platforms, and user testing to ensure accessibility and ease of use.

To enhance support for domestic well owners and SSWS operators, the web portal strategy will integrate and regularly update a comprehensive network of qualified vendors and County contacts, ensuring users have easy access to trusted professionals for well evaluations, rehabilitation, and replacements.

Additionally, the web portal will serve as a key platform for collaboration with groundwater basin regulators and GSAs to develop and implement targeted communication and engagement programs focused on educating the public and water users about water shortages and promoting conservation aligned with basin management goals. The County Department of Environmental Resources Groundwater Division could serve as the lead agency for this effort, coordinating with groundwater regulatory agencies to disseminate basin-specific outreach materials and messaging through multiple channels and local partnerships. The County OES would support by integrating outreach into emergency preparedness communications, and the County Administrative Office would assist with interagency

coordination and alignment with drought resilience efforts. The portal would provide a foundation for future expanded communication efforts in collaboration with public agencies, GSAs, County departments, DWR and the State Water Board to be implemented throughout further GSP development and implementation.

5.5.5 Regional Groundwater Level Monitoring and Communication (LTMS/A 08)

The regional groundwater level monitoring initiative involves collaborating with GSAs within the County's jurisdiction who track and report on groundwater levels consistent with their requirements under SGMA. This action focuses on regional coordination and communication related to groundwater availability.

County Department of Environmental Resources Groundwater Division will serve as lead coordinator with area GSAs on this action, which may include posting links to GSA websites and GSP Annual Reports on a County web portal (LTMS/A 07) to highlight current groundwater conditions and demonstrate progress in managing groundwater sustainably under SGMA. These GSP Annual Reports collectively provide a countywide summary of groundwater level trends in graphical and tabular formats. Incorporation of groundwater level data for areas not subject to SGMA could be incorporated, where available.

5.5.6 Well Permitting Considering Future Growth (LTMS/A 09)

When evaluating new development projects, the County Planning Department staff would include consultation with the County Groundwater Division to ensure that new developments that do not derive domestic water from pre-existing domestic and public water supply systems shall be required to have a documented water supply that does not adversely impact Stanislaus County water resources.

5.5.7 County Planning Integration (LTMS/A 10)

Many regional and County planning efforts intersect with the County DRP. Coordination by County staff within these other regional and County planning efforts will help ensure these plans consider domestic wells and SSWSs. For this LTMS/A, County OES staff will participate during the planning effort and provide the perspective of domestic well and SSWS communities. Section 6.3 and Table 6-3 detail the relevant regional planning efforts, current status, and intersection with domestic wells and SSWSs.

5.5.8 Well Permitting Considering Impacts to Other Groundwater Users (LTMS/A 11)

When permitting new or replacement wells, evaluating these permits through the lens of impacts to other groundwater users can help improve overall water supply reliability. Where applicable, when evaluating new permits, County Groundwater Division staff could include reviewing other materials to determine if a well permit could have the potential to affect other nearby wells.

5.6 Regional Water Infrastructure Investment (LTMS/A 12)

Regional water infrastructure projects can enhance the water supply reliability for many communities, including domestic wells and SSWSs. County staff could integrate regional planning and regional water infrastructure activities led by County departments and other local public agencies to help enhance the water supply reliability of domestic well and SSWS communities. County staff will monitor the status of regional projects and, as appropriate, engage with the lead entities to evaluate the opportunity for enhancing the reliability of domestic well and SSWS water supplies. County staff will also continue to monitor regional planning efforts for other regional water infrastructure opportunities. Additional

information on the near-term integration into regional planning or water infrastructure is included in Section 6.3.

5.7 Data Gaps

Data gaps related to domestic wells and SSWSs present a significant challenge for effective groundwater and drought resilience planning in the County. Incomplete or inconsistent data on well construction, groundwater conditions, and system vulnerabilities can delay emergency response, hinder resource coordination, and reduce the effectiveness of long-term planning efforts. The County DRP identifies several key areas where data collection and integration can be improved, including tracking and maintaining an accurate and accessible well inventory, WCR management efforts, and dry well abandonment identification. These efforts would require coordination with the Department of Water Resources, GSAs, and other partners to improve existing records, close critical information gaps, and enhance the County's ability to manage and protect groundwater resources over time.

5.7.1 Dry Well Abandonment (LTMS/A 13)

DWR established an online dry well reporting system for domestic well communities to report problems with their wells that impact their water supplies. County staff will monitor, via the publicly accessible online portal, information submitted in this system to assist in identifying areas with current or past water shortages that can help inform the potential for future water shortages. However, not all domestic well and SSWS owners with a dry or impacted well have submitted a dry well report. Many times, they will drill a new, deeper well without reporting the previously dry well. To address this data gap, County staff could update the well permit application so that the applicant can indicate if the new well is replacing a dry well.

County staff could coordinate with DWR to update information in the WCR to indicate if the new, deeper well is due to a failed well associated with declining water levels. This coordinated review and update of well-related information should be included in the WCR by a licensed C-57 well contractor, or other qualified professional and would help develop a more comprehensive understanding of dry wells and water shortage issues in the County.

5.7.2 State Small Water System Monitoring (LTMS/A 14)

The County Department of Environmental Resources staff would continue to oversee SSWS well owner compliance with drinking water monitoring compliance with California Safe Drinking Water Act pursuant to AB 664 (Lee 2023). These efforts include coordination with the County Environmental Health Division for management efforts.

5.7.3 Evaluate and Update Well Completion Report Administrative Record (LTMS/A 15)

This LTMS/A, subject to available funding and direction from the County's Board of Supervisors and program partners, proposes to coordinate with DWR, GSAs, and other relevant entities to review and update WCRs in the State and County databases, with a focus on improving geographic accuracy, correcting operational status, and addressing misclassified or inaccurately located wells. This effort would enhance the reliability of well data used in the County's Domestic Well Program and support the authorization process for new groundwater wells. DWR maintains an online public database of WCRs submitted to the State by well drillers. This database includes information such as well type, location, depth, year of installation, and address. The WSVE Tool uses this data to identify the locations of domestic wells, making it a key resource in the development of the County DRP. However, there are known gaps and limitations within the database. Some well locations may be inaccurately recorded,

appearing outside County boundaries or omitted altogether due to misclassification. Additionally, domestic wells that have been replaced or abandoned may still be listed as active.

To address these issues, the County Department of Environmental Resources Groundwater Division could coordinate with DWR, GSAs, and other relevant entities to review and update well completion reports with a particular focus on geographic accuracy, operational status, and other key factors. This effort would support the authorization process for new groundwater wells and address known data gaps, such as misclassified or inaccurately located wells and wells listed as active despite replacement or abandonment.

5.7.4 Database Management System (LTMS/A 16)

Currently, well and small system data are stored across multiple formats and locations, making it difficult to efficiently track, analyze, and update information. To address this data gap, County staff could establish or amend a centralized Database Management System that consolidates data from WCRs, dry well reports, SSWS monitoring, and related information and permitting records.

The database management system would allow for improved data accuracy, accessibility, and consistency across departments. Features would include standardized data entry fields, secure storage, and the ability to generate reports and mapping outputs to support planning and emergency response. County staff would regularly maintain and update the system to ensure integration of new data sources and corrections from field verification. By centralizing these datasets, the County would streamline information sharing, reduce duplication of effort, and better support long-term planning and monitoring of domestic well and SSWS vulnerabilities.

5.8 Emergency and Interim Drinking Water Supplies

Emergency and interim drinking water supplies involve establishing longer term water supplies during drought or the water shortage emergency ends. Emergency and interim drinking water supplies are used during water shortage events to meet basic health and safety needs. The volume of potable water for health and safety needs to follow CDC guidelines provided through the WASH Program (CDC 2025). The WASH Program advises emergency water supplies (drinking, cooking, brushing teeth, and other uses) to be 1 gallon of water per day for each person. These supplies may be higher for regions with higher temperatures and those households with pets.

5.8.1 Water Hauling, Bulk Water for Temporary Tanks (LTMS/A 17)

This solution is led by County Environmental Resources Groundwater Division and includes providing bulk water storage tanks. This solution is anticipated for long-term events that impact more than 50 households served by a domestic well or SSWS. The action may also be activated to supplement packaged water supplies or in coordination with community-based organizations such as Self-Help Enterprises, Valley Water Collaborative, or a community resource center established by an electrical utility. For each event, County Environmental Resources, in consultation with the PMT, would prepare a drinking water needs assessment that considers:

- estimated event duration
- affected geographic area
- number of people impacted and demographic profile

- accessibility of commercially available supplies from the event location (e.g., distance, socioeconomic barrier, physical barriers)
- equipment resources (e.g., bulk water tankers, mobile water tanks), as available
- bulk water source (e.g., nearest municipal and industrial provider, hospital, or other potable source)
- distribution location(s), hours of operations, and staffing requirements

Fulfillment of bulk water delivery may be provided by licensed commercial water haulers under contract with Stanislaus County or other certified resource. The temporary food-safe water distribution manifold may be provided by the commercial water hauler, qualified County staff, or other verified resource.

This page intentionally left blank.

6.0 Implementation Considerations

The STRAs and LTMS/As identified and described in Chapters 4 and 5 represent the range of in-progress and proposed activities. Implementation of these STRAs and LTMS/As often (1) falls under the authorities and jurisdictional responsibilities of separate County departments and other local and State public agencies, and (2) requires the involvement of other interested parties to improve effectiveness. To implement these STRAs and LTMS/As, and contribute to continued improvement of water supply reliability for domestic well and SSWS communities, this section describes the implementation steps designed to assist the County with:

- On-going water supply monitoring and inter-agency collaboration in support of implementation
- Outlining STRA and LTMS/A implementation responsibility, status, and resource needs
- Identifying opportunities to align the County DRP with other County policy and County and regional planning documents
- Adaptive management
- Identifying funding opportunities

6.1 Legislative Requirements

County DRP implementation of the actions and strategies is a requirement of SB 552. This section of SB 552 provides counties with steps for implementation of STRAs or LTMS/A to improve long-term drought resilience planning for SSWS and domestic wells. These are described per CWC Section 10609.70 [CWC 2021] (**bold face** added for emphasis as related to plan implementation and this section of the County DRP):

> *(b) A county shall develop a plan that includes potential drought and water shortage risk and proposed interim and long-term solutions for state small water systems and domestic wells within the county's jurisdiction. The plan may be a stand-alone document or may be included as an element in an existing county plan, such as a local hazard mitigation plan, emergency operations plan, climate action plan, or general plan. A county shall consult with its drought task force or alternative coordinating process as established by this section in developing its plan. A county shall consider, **at a minimum**, all of the following in its plan:*
>
> *(1) Consolidations for existing water systems and domestic wells.*
>
> *(2) Domestic well drinking water mitigation programs.*
>
> *(3) Provision of emergency and interim drinking water solutions.*
>
> ***(4) An analysis of the steps necessary to implement the plan.***
>
> ***(5) An analysis of local, state, and federal funding sources available to implement the plan.***

The WAC has incorporated an analysis of the necessary steps to implement the STRA and LTMS/A listed in this County DRP, along with an evaluation of local, State, and federal funding sources available to support its execution.

6.2 Implementation Roadmap

The County DRP describes existing and proposed STRAs and LTMS/As that, when executed, help the County meet its objectives under CWC Section 10609.70 (b)(1), (b)(2), and (b)(3) [CWC 2021]. Implementing these STRAs and LTMS/As will require resources and clear roles and responsibilities. The identified STRAs and LTMS/As include existing or new activities to be implemented under existing authorities and funding of County departments and activities dependent on appropriation of funds from local, State, or federal resources. This section presents the implementation roadmap for this County DRP, identification of ongoing monitoring and collaboration with County staff, and conduct of management oversight, prioritization, and resource identification needs.

6.2.1 Monitoring and Collaboration

Supply monitoring and interagency collaboration support County DRP implementation by evaluating water supply reliability and maintaining ongoing coordination and collaboration among County departments, related organizations, and the WAC. County staff will conduct a range of activities as described in Table 6-1. These activities may be superseded by the activities described in Section 4.8 if a drought or water shortage emergency has occurred.

In addition to monitoring and coordination, public outreach and communication will be supported through the County DRP website. The website will serve as a key platform to disseminate drought-related updates and resource materials, including the promotion of grant funding opportunities and technical assistance programs for domestic well and SSWS operators/owners.

Table 6-1. Stanislaus County Drought Resilience Plan Monitoring and Collaboration Activities

Activity	Description	Activity Lead	Timing
Water Advisory Committee Meeting	County staff to schedule and facilitate meetings throughout the year. These meetings focus on evaluating the status of the groundwater resources in the County to identify and develop programs and practices that ensure reliable and sustainable groundwater supply. Results of these meetings shall support County staff, in collaboration with its WAC, to identify potential activation of actions as described in this plan.	County Department of Environmental Resources, in coordination with Emergency Services	January, May, and September, or as conditions merit.
Water Supply Monitoring and Coordination	County Environmental Resources to regularly engage with agencies/ organizations that monitor physical risk factors and water supply conditions as associated with domestic well and SSWS communities (Section 4.7.1).	County Environmental Resources, in collaboration with County OES and County Planning	As-needed, April through November

Activity	Description	Activity Lead	Timing
GSA Basin Coordination on Annual Reports	County staff to meet with GSA managers and staff prior to the release of basin GSP Annual Reports (Water Code Section 10728).[1] This may include additional coordination based on water supply conditions.	County Environmental Resources	Monthly[2]
GSA Basin Coordination on Technical Groups	County staff to engage, where applicable, with GSA advisory or technical groups/committees where those activities assist to inform or implement actions that complement the County DRP.	County Environmental Resources	As needed
Drought Resilience Plan Website Update	County staff to update the website content and resource materials consistent with information developed in coordination with GSAs and implementation of actions identified in the County DRP. Website updates may also include information about available grant programs, timelines, and technical assistance for domestic well and SSWS owners/operators, including outreach materials, eligibility criteria, and points of contact. These updates will prioritize communication to high-risk or underserved communities.	County Environmental Resources	Ongoing

Sources:
1. CWC 2014
2. ESJGA 2025, STRGBA 2025, and Turlock 2025

Key:
CWC = California Water Code
DRP = Drought Resilience Plan
DWR = California Department of Water Resources
ESJGA = Eastern San Joaquin Groundwater Authority
GSA = Groundwater Sustainability Agency
GSP = Groundwater Sustainability Plan
OES = Office of Emergency Services
SSWS = state small water system
STRGBA = Stanislaus and Tuolumne Rivers Groundwater Basin Association
WAC = Water Advisory Committee

6.2.2 Oversight, Responsibilities, Priorities, and Resource Needs

Individual STRAs and LTMS/As identified in this County DRP have been assigned to individual County departments and agencies pursuant to each agency's regulatory and policy authorities. County Environmental Resources, as lead agency of the County DRP, shall provide administrative oversight and facilitate collaboration with responsible agencies for all implementation actions that fall outside of its regulatory and policy authorities.

Table 6-2 details the type, status, and lead of County DRP STRAs and LTMS/As. Activities described in this table are subject to modification based on climate conditions, engagement with the WAC, and other relevant factors. While activities have been assigned a near-, mid-, and long-term priority status, the pace of an activity's implementation schedule can be changed depending on various drivers, such as new regulations, climate conditions, and funding.

"Priority" is classified as:

- Near-term (in the next 2 years)
- Mid-term (within 2 to 5 years)
- Long-term (5 or more years in the future)

"Status" is classified as:

- Available
- In progress (for those currently being implemented)
- Proposed (for those that require additional resources)

The "Resource Requirement" columns specify if the STRAs and LTMS/As would require additional staff time, additional County budget, and external funds beyond what the County currently has available. These external funds could include grants, financing, Federal funding, and future State funding to support DRP implementation.

Beyond these implementation activities, County Environmental Resources will coordinate with the entities listed in Table 6-2 on mid-term and long-term priorities. The status of these mid- and long-term priorities, as well as the information in this table, will be reviewed at least annually in coordination with the WAC meeting.

Table 6-2. Stanislaus County Drought Resilience Plan Short-Term Response Action and Long-Term Mitigation Strategy and Action Implementation Summary

Action/Strategy ID and Name	Responsible Entity	Supporting Entities	Priority	Status	Resource Requirement		
					Additional Staff Time	County Budget	External Funds
STRA 01 / Packaged and Bottled Water Supplies	County Groundwater Division	County Environmental Health Division, Self-Help Enterprises, Valley Water Collaborative, local GSAs	Near-Term	Available	No	No	Yes
STRA 02 / Dedicated Water Filling Stations During a Water Shortage	County Environmental Resources	Valley Water Collaborative, County OES, local GSAs	Near-Term	In-Progress	Yes	No	Yes
STRA 03 / Expedited Well Permitting	County Groundwater Division	County Environmental Health Division, local GSAs	Near-Term	Available	No	No	No
LTMS/A 01/ System Consolidation Planning	County Department of Environmental Resources	Environmental Health Division, Local GSAs, SWRCB	Mid-Term	Proposed	Yes	No	Yes
LTMS/A 02 / SSWS Intertie, Emergency	County Groundwater Division	County Environmental Health, Local GSAs, Self-Help Enterprises, Valley Water Collaborative	Long-Term	Proposed	No	No	Yes
LTMS/A 03 / SSWS Intertie, Permanent	County Groundwater Division	County Environmental Health, Local GSAs, Self-Help Enterprises, Valley Water Collaborative, Local Public Water Agencies	Long-Term	Proposed	No	No	Yes

Action/Strategy ID and Name	Responsible Entity	Supporting Entities	Priority	Status	Resource Requirement		
					Additional Staff Time	County Budget	External Funds
LTMS/A 04 / Dry and Distressed Well Tracking	County Groundwater Division	Local GSAs, DWR, NGOs	Mid-Term	In-Progress	Yes	Yes	No
LTMS/A 05 / Domestic Well Resource Support	County Department of Environmental Resources	Environmental Health Division, Groundwater Division, Local GSAs, CDPR, DWR	Near-Term	In-Progress	Yes	Yes	No
LTMS/A 06 / Alternative Supply Identification	County Department of Environmental Resources	Environmental Health Division, NGOs	Long-Term	Proposed	Yes	No	Yes
LTMS/A 07 / County DRP Website	County Department of Environmental Resources Groundwater Division	County OES, Water Advisory Committee	Near-Term	Available	Yes	Yes	No
LTMS/A 08 / Regional Groundwater Level Monitoring and Communication	County Department of Environmental Resources Groundwater Division	Local GSAs, DWR	Long-Term	Proposed	Yes	Yes	No
LTMS/A 09 / Well Permitting Considering Future Growth	County Planning Department	County Department of Environmental Resources, Local GSAs	Long-Term	Available	No	Yes	No
LTMS/A 10 / County Planning Integration	County OES	County Planning Department, DWR	Long-Term	Proposed	Yes	Yes	No
LTMS/A 11 / Well Permitting Considering Impacts to Other Groundwater Users	County Department of Environmental Resources Groundwater Division	Local GSAs	Near-Term	In-Progress	Yes	Yes	No
LTMS/A 12 / Regional Planning Integration	County Department of Environmental Resources Groundwater Division	Local GSAs, local Public Water Agencies, County Public Works, County Planning Department, County OES, DWR	Near-Term	Available	Yes	No	No
LTMS/A 13 / Dry Well Abandonment	County Department of Environmental Resources	Environmental Health Division, Local GSAs	Mid-Term	In-Progress	Yes	Yes	No

Action/Strategy ID and Name	Responsible Entity	Supporting Entities	Priority	Status	Resource Requirement		
					Additional Staff Time	County Budget	External Funds
LTMS/A 14 / State Small Water System Monitoring	County Department of Environmental Resources	Environmental Health Division	Mid-Term	Proposed	Yes	Yes	Yes
LTMS/A 15 / Evaluate and Update Well Completion Report Administrative Record	County Department of Environmental Resources Groundwater Division	DWR	Near-Term	Proposed	Yes	No	Yes
LTMS/A 16 / Database Management System	County Department of Environmental Resources Environmental Health Division	Groundwater Division, SWRCB, DWR, local GSAs	Near-Term	Available	Yes	Yes	No
LTMS/A 17 / Water Hauling, Bulk Water for Temporary Tanks	County Groundwater Division	County Environmental Health Division, Self-Help Enterprises, Valley Water Collaborative, local GSAs	Near-Term	Available	Yes	No	Yes

Key:
County = Stanislaus County
County OES = Stanislaus County Office of Emergency Services
CDPR = California Department of Pesticide Regulation
DWR = California Department of Water Resources
GSA = groundwater sustainability agency
LTMS/A = long-term mitigation strategy and action
NGO = non-governmental organization
SSWS = state small water systems
STRA = short-term response action
SWRCB = California State Water Resources Control Board

6.3 Policy Alignment and Integration

While this County DRP is a stand-alone document, the information and actions contained in this document align and promote goals and objectives of other County and regional planning efforts applicable to water supply resilience in domestic well and SSWS communities. Table 6-3 describes other documents County staff will assess for opportunities to integrate actions included in the County DRP. This list of not exhaustive and is subject to revision through collaboration with the WAC and other interested parties.

Table 6-3. Stanislaus County Drought Resilience Plan Policy Alignment and Integration

Related Planning Effort	Release Date	Lead Agency	Relation to County DRP	Policy/Integration Action	Status
County General Plan[1]	August 23, 2016	Planning and Community Development Department	Elements on Conservation, Safety, and Environmental Justice planning for water supply reliability and climate adaptation—sustainable groundwater, mitigation planning and emergency preparedness, prioritizing vulnerable communities. Groundwater-related topics are included in the General provisions element.	Review risk assessment and consider STRA and LTMS/A during plan development. County staff to participate as needed when elements of the County General Plan are updated, with consideration of drought resilience actions and their relation to domestic wells and SSWS.	In-progress: updates to Land Use (Environmental Justice) and Safety (Climate Adaptation) Elements
Multi-Jurisdictional Hazard Mitigation Plan (MJHMP)[2]	October 13, 2022	County OES	Drought mitigation strategies and planning to ensure water supply reliability, groundwater recharge, and monitoring. Mutual attention to drought and water shortage impacts to protected water users.	Review components of risk assessment to MJHMP risk assessment process and integrate content from County DRP. In future updates, County staff will participate and contribute perspectives from domestic wells and SSWS.	MJHMPs are updated every 5 years pursuant to *Disaster Mitigation Act* of 2000.[3] MJHMP remains valid for five years (2022–2027).
Emergency Operations Plan (EOP)[4]	November 23, 2021	Sheriff's OES/Fire Warden	Countywide plan for drought mitigation, preparedness, strategies to address impacts, and water supply reliability. Risk assessment and STRA and LTMS/A support during EOP activation.	Integrate Emergency and Interim Water Distribution Plan as a component of EOP; update drought and water shortage, as necessary.	Active implementation. Supported by FEMA's Grant Program Directorate.
GSPs[5]: 1. Eastern San Joaquin 2. Modesto 3. Turlock 4. Delta-Mendota	2023 - 2025	GSAs	Risk assessment and local groundwater management strategies for monitoring, recharging, pumping allocations, well mitigation (Domestic Well Mitigation Program), stainability, and reliability.	County to continue close coordination with overlying GSAs for management of shared groundwater supplies. County to review GSPs for consistency with County DRP and General Plan pursuant to California Government Code Section 65352.5.[6]	Active implementations. Supported by Props 1 and 68 funding.

Related Planning Effort	Release Date	Lead Agency	Relation to County DRP	Policy/Integration Action	Status
IWRMPs 1. East Stanislaus IWRMP[7]	2018	East Stanislaus Regional Water Management Partnership, comprised of the Cities of Modesto, Hughson, Ceres, Turlock, and Waterford, and Stanislaus County	Regional water supply planning.	County staff will remain aware, and participate as needed, when the regional plan is updated. Review drought and water shortage emergencies for domestic well and SSWS communities of IRWMP.	In effect and active. Supported by Prop 1 funding.
UWMPs 1. City of Modesto and Modesto Irrigation District Joint 2020 UWMP[8] 2. Stanislaus Regional Water Authority 2020 UWMP[9]	1. June 22, 2021 2. October 2024	1. City of Modesto & Modesto Irrigation District 2. Stanislaus Regional Water Authority, a Joint Powers Authority established by Cities of Ceres and Turlock	Regional water supply planning.	Review drought and water shortage emergencies for domestic wells and SSWS communities as a component of UWMP.	In effect and active. Supported by State grants and loans

Source:
1. Stanislaus County 2016
2. Stanislaus County 2022
3. FEMA 2000
4. Stanislaus County 2021
5. DWR 2025a
6. GOV 2015
7. ESRWM 2018
8. MID 2021
9. SRWA 2024

Key:
DRP=drought resilience plan
DWR=Department of Water Resources
EOP = emergency operations plan
FEMA=Federal Emergency Management Agency
GSP=Groundwater Sustainability Plan
GSA-Groundwater Sustainability Agency
IWRMP=Irrigation Water Resources Management Plan
LTMS/A=long-term mitigation strategy and action
MJHMP=Multi-Jurisdictional Hazard Mitigation Plan
OES = Office of Emergency Services
Prop=Proposition
SSWS = state small water system
STRA=short-term response action
UWMP=Urban Water Management Plan

6.4 Adaptive Management

Regional groundwater supplies are highly reactive to population shifts, climatic variability, and other factors. Adapting this County DRP to these trends involves close coordination among County departments and other strategic partners, particularly overlying Groundwater Sustainability Agencies. County staff, in coordination with the WAC, anticipate a review and update of this County DRP every 5 years or in the event of substantive funding revealed through other regional planning efforts (see Table 6-3). Such changes may include, among other things, development of new, large-scale communities that would be dependent on groundwater, chronic long-term drought, and a change in groundwater Basin Prioritization levels through the DWR Bulletin 118. County Environmental Resources, in collaboration with the WAC, is responsible for initiating and coordinating the County DRP update.

Updates to the County DRP will include (1) reviewing the Risk Assessment findings in light of new and improved information that characterizes water supply vulnerability, (2) evaluating progress on STRA LTMS/A implementation, (3) updating any communications and outreach materials and information, (4) updating WAC details, and (5) revising the County DRP content to incorporate any changes. During this update, County Environmental Resources will report on these updates to the WAC to ensure transparent communication and coordination.

6.5 Funding Opportunities and Assistance Programs

As described in Table 6-2, this County DRP includes a variety of proposed activities that require appropriation of additional funds or other resources as approved by the County Board of Supervisors or through other State or federal sources. Receipt of these resources could involve a variety of activities both for County staff and domestic well and SSWS owners/operators, including plan administration, management, and updates; submitting funding applications and administering agreements; outreach and communications; coordination with other agencies and entities; WAC engagement; managing assistance programs; development and construction of infrastructure and associated operations, maintenance, repair, rehabilitation, and eventual replacement; and other efforts. Those activities require funding—both short-term for projects with a finite schedule (for example, design and construction of a new domestic well) and long-term for ongoing activities (for example, use and upkeep of that new well). As SB 552 does not provide funding for implementation activities, this DRP analyzed local, State, and federal funding sources available to implement the plan.

A combination of funding sources could be used to support County DRP implementation—such as generated revenue (e.g., rates and assessments), grants, loans, agency staff time, services provided by others (e.g., in-kind work, technical or training assistance through a State or federal agency)—with various agencies and entities involved in securing and administering each source. The availability of these internal and external funding sources will impact the success and timeliness of DRP implementation.

Although access to reliable funding is a hurdle faced by agencies and entities when implementing any program or project, domestic well and SSWS owners/operators are the most acutely impacted due to limited staff, reserves, and requirements of the implementing agencies. Agencies and entities may find that (1) it is cost- and resource-prohibitive to implement short-term response actions and long-term mitigation strategies and actions by themselves, (2) solutions frequently require participation or involvement of other entities, and (3) it is challenging to prepare for, navigate, apply for, and administer the various local, state, and federal funding mechanisms that could be available at any given time. These

system owners/operators will need assistance and support from the County and other agencies and entities.

Using the short-term response actions and long-term mitigation strategies and actions developed for the County (listed in Sections 4.3 and 5.2, respectively), this DRP includes an investigation and analysis of potential funding sources for implementation, as shown in Table 6-4. The analysis presented in this table will be used as basis for developing future funding strategies and is neither a complete nor an exhaustive list. Note that available funding sources are constantly changing, and funding needs, timing, and potential opportunities should be periodically reassessed.

In analyzing potential funding sources, the DRP identified the issues, topics, questions, and suggestions listed below.

- Administration: County Environmental Resources is anticipated to serve as a central coordinating agency. Staff and resources may need to be augmented through coordination and collaboration with fellow County departments and other partner agencies.
- Capacity: Staff resources are needed to monitor, track, and pursue funding, as well as administer awarded funds. Such costs may be considered separate, a local cost-share, or as funded through the grant (e.g., reimbursable).
- Funding Availability: Many State and federal programs are competitive and include income based- eligibility requirements. The County's General Plan is additionally limited and subject to competing demands. Pursuit of funding opportunities for STRA and LTMS/A actions contained in this County DRP are anticipated to require active involvement by the PMT and WAC to develop a competitive submittal.
- Adaptation: The direct impact or contribution of STRA and LTMS/A actions in this County DRP may vary based on climate conditions, population trends, and other dynamic factors. To improve the likelihood of securing funding, these actions should be adapted to align with specific grant evaluation criteria. Collaborating with partner agencies can also strengthen grant applications by demonstrating broader support and shared goals.

Table 6-4. Funding Opportunities and Assistance Programs for Drought Resilience Plan Implementation

Resource	Funding Agency	Description
General Fund	County	The County General Fund includes revenues such as sales and property tax. Use of these funds is discretionary and subject to approval by the Board of Supervisors.
Proposition 4: Safe Drinking Water, Wildfire Prevention, Drought Preparedness, and Clean Air Bond Act of 2024	multiple State agencies	Major categories with potential support for domestic well and SSWS communities include: • Safe Drinking Water, Drought, Flood, and Water Resilience • Wildfire and Forest Resilience
Sustainable Groundwater Management Grant Program	DWR	Provides GSAs with assistance and engagement support for preparation and implementation of GSPs.[1]
Countywide and Regional Funding Program	SWRCB	Direct funding to support SSWSs and domestic wells serving disadvantaged communities and low-income households.[2] Community outreach, domestic well testing, and interim and long-term solutions are eligible to receive funds.[3]
Drinking Water State Revolving Fund	SWRCB	Fund provides low-cost loans for planning, design, and construction of drinking water improvements to water systems and can be used to support system consolidation.[4]
Technical Assistance Funding Program	SWRCB	Provides technical assistance for small, disadvantaged communities to develop, fund, and implement eligible drinking water needs, including system consolidation support.[5]
Water and Environmental Program	USDA	Through the Rural Utilities Service Water and Environmental Programs, communities with populations of 10,000 or less can submit for funding support to construct water and wastewater facilities.[6] Such programs could support annexation of SSWS and domestic well communities as part of a multi-benefit project led by a WEP eligible public water system.

Source:
1. DWR 2025b
2. State Water Board 2025a
3. DWR 2025c
4. State Water Board 2025b
5. State Water Board 2025c
6. USDA 2025

Key:
County = Stanislaus County
DWR = California Department of Water Resources
GSA = Groundwater Sustainability Agency
GSP = Groundwater Sustainability Plan
SSWS = state small water system
SWRCB = California State Water Resources Control Board
USDA = United States Department of Agriculture
WEP = Water and Environmental Program

This page intentionally left blank.

7.0 References

7.1 Chapter 1 References

Bartow, J. Alan. 1991. The Cenozoic Evolution of the San Joaquin Valley, California: U.S. Geological Survey Professional Paper 1501. Available: https://pubs.usgs.gov/pp/1501/report.pdf

Burrow, K. R., Shelton, J. L., Hevesi, J. A., and Weissmann, G. S. 2004. Hydrogeologic Characterization of the Modesto Area, San Joaquin Valley, California: U.S. Geological Survey Scientific Investigations Report 2004-5232, 54p. Available: https://pubs.usgs.gov/sir/2004/5232/sir_2004-5232.pdf

CEC (California Energy Commission). 2021. California's Fourth Climate Change Assessment San Joaquin Valley Regional Report. Available: https://www.energy.ca.gov/sites/default/files/2022-01/CA4_CCA_SJ_Region_Eng_ada.pdf

CWC (California Water Code). 2021a. Section 10609.51. Available: https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=WAT&sectionNum=10609.51

CWC. 2021b. Section 10609.70. Available: https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=WAT&sectionNum=10609.70

CWC. 2021c. Section 10609.80. Available: https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=WAT&sectionNum=10609.80

DWR (California Department of Water Resources). 2023. County Drought Resilience Plan Guidebook. Available: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Water-Use-And-Efficiency/Urban-Water-Use-Efficiency/SB-552/DWR_Final_Guidebook_20230313_ADA_508_v5.pdf

DWR. 2024a. CDEC Station Locator, Modesto Irrigation District Office. Available: https://cdec.water.ca.gov/webgis/?appid=cdecstation

DWR. 2024b. CDEC Station Locator, Diablo Canyon. Available: https://cdec.water.ca.gov/webgis/?appid=cdecstation

DWR. 2024c. Modesto Subbasin GSP. Available: https://sgma.water.ca.gov/portal/gsp/all

DWR. 2024d. Turlock Subbasin GSP. Available: https://sgma.water.ca.gov/portal/gsp/all

DWR. 2025a. GSP Periodic Evaluations. Available: https://sgma.water.ca.gov/portal/gsp/periodiceval/

DWR. 2025b. GSP Status Summary. Available: https://sgma.water.ca.gov/portal/gsp/status

DWR. 2025c. Dry Well Reporting System. Available: https://mydrywatersupply.water.ca.gov/report/

Friedman. 2018. Assembly Bill 1668. Available: https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180AB1668

Hertzberg. 2018. Senate Bill 606. Available: https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180SB606

Hertzberg. 2021. Senate Bill 552. Available: https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202120220SB552

HSC (California Health and Safety Code). 1996. Section 116275. Available: https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=HSC&sectionNum=116275.

HSC. 2018. Section 116681. Available: https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=HSC&sectionNum=116681

ESJGA (Eastern San Joaquin Groundwater Authority). 2025. Available: https://www.esjgroundwater.org/

ETSGA (East Turlock Subbasin Groundwater Sustainability Agency). 2025. Available: https://turlockgroundwater.org/etsgsa

Historic Modesto. 2025. Native Americans of Stanislaus Region. Available: https://www.historicmodesto.com/Early%20History/Natives%20of%20Stanislaus/tribes.html

LCI (California Governor's Office of Land Use and Climate Innovation). 2025. Military Affairs. Available: https://lci.ca.gov/planning/land-use/military-affairs/

Stanislaus County. 2023. 2023 Stanislaus County Agricultural Report. Available: https://www.stanag.org/pdf/cropreport/cropreport2023.pdf

Stanislaus and Tuolumne Rivers Groundwater Basin Association (STRGBA). 2025. Available: https://www.strgba.org/

State Water Board (California State Water Resources Control Board). 2020. Public Drinking Water Watch. Available: https://sdwis.waterboards.ca.gov/PDWW/JSP/WaterSystems.jsp?PointOfContactType=none&number=&WaterSystemStatus=A&name=&county=Stanislaus

Turlock Subbasin. 2025. Available: https://turlockgroundwater.org

USCB (U.S. Census Bureau). 2023. 2022 American Community Survey 1-year estimates. Available: https://censusreporter.org/profiles/05000US06099-stanislaus-county-ca/

USCB. 2024. Quick Facts Stanislaus County 2020 Census. Available: https://www.census.gov/quickfacts/fact/table/stanislauscountycalifornia,CA/PST040224

USFWS (U.S. Fish and Wildlife Service). 2024. San Joaquin River National Wildlife Refuge. Available: https://www.fws.gov/refuge/san-joaquin-river

7.2 Chapter 2 References

CWC. 2021. Section 10609.70. Available: https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=WAT&sectionNum=10609.70

DWR. 2023a. County Drought Resilience Planning Assistance Program. Available: https://water.ca.gov/Programs/Water-Use-And-Efficiency/SB-552/County-Drought-Resilience-Planning-Assistance-Program

DWR. 2023b. Water Shortage Vulnerability Scoring and Tool. Available: https://water.ca.gov/Programs/Water-Use-And-Efficiency/SB-552/SB-552-Tool

DWR. 2025. Dry Well Reporting System. Available: https://mydrywatersupply.water.ca.gov/report/

Hertzberg. 2021. Senate Bill 552. Available: https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202120220SB552

Stanislaus County. 2014. Groundwater Ordinance Amendment to County Code Chapter 9.37. Available: https://www.stancounty.com/er/pdf/groundwater/chapter-9-37.pdf

Stanislaus County. 2025a. Water Advisory Committee (WAC). Available: https://www.stancounty.com/er/groundwater/wac.shtm

Stanislaus County. 2025b. Groundwater Resources. Available: https://www.stancounty.com/er/groundwater

Stanislaus County. 2025c. Groundwater Resources Report A Well Problem. Available: https://www.stancounty.com/er/groundwater/well-problem.shtm

7.3 Chapter 3 References

CNRA (California Natural Resources Agency). 2023. Water Shortage Vulnerability Technical Methods. Available: https://data.cnra.ca.gov/dataset/water-shortage-vulnerability-technical-methods

CEC (California Energy Commission). 2021. California's Fourth Climate Change Assessment San Joaquin Valley Regional Report. Available: https://www.energy.ca.gov/sites/default/files/2022-01/CA4_CCA_SJ_Region_Eng_ada.pdf

CWC. 2021. Section 10609.70. Available: https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=WAT&sectionNum=10609.70

DWR. 2019. SGMA Basin Prioritization Dashboard. Available: https://gis.water.ca.gov/app/bp-dashboard/final/

DWR. 2023. Water Shortage Vulnerability Scoring and Tool. Available: https://water.ca.gov/Programs/Water-Use-And-Efficiency/SB-552/SB-552-Tool

DWR, 2024. California Water Watch. https://cww.water.ca.gov/info?address=Stanislaus%20County,%20CA,%20USA

DWR. 2025a. Dry Well Reporting System. Available: https://mydrywell.water.ca.gov/report/

DWR. 2025b. California Statewide Groundwater Elevation Monitoring (CASGEM). Available: https://water.ca.gov/programs/groundwater-management/groundwater-elevation-monitoring--casgem

FEMA (Federal Emergency Management Agency). 2013. Local Mitigation Planning Handbook. Available: https://www.fema.gov/sites/default/files/2020-06/fema-local-mitigation-planning-handbook_03-2013.pdf

Fernandez-Bou, A.S., Ortiz-Partida, J.P., Pells, C., Classen-Rodriguez, L.M., Espinoza, V., Rodriguez-Flores, J.M., Booth, L. Burmistrova, J. Cai, A., Cairo, A., Capitman, J.A., Cole, S., Flores-Landeros, H., Guzman, A., Maskey, M.L., Martinez-Escobar, D., Sanchez-Perez, P.A., Valero-Fandino, J., Viers, J.H., Westerling, L., and Medellin-Azuara, J. 2021. Regional Report for the San Joaquin Valley Region on Impacts of Climate Change. California Natural Resources Agency. Publication number: SUM-CCCA4-2021-003. Available: https://climateassessment.ca.gov/regions/

Greene, Christina. 2018. "Broadening understandings of drought: the climate vulnerability of farmworkers and rural communities in California (USA)" (Revised and Resubmitted, 2018). Environmental Science & Policy. Available: https://doi.org/10.1016/j.envsci.2018.08.002

PPIC (Public Policy Institute of California). 2021. Droughts in California. Available: https://www.ppic.org/wp-content/uploads/droughts-in-california.pdf

State Water Board. 2024a. Section 303(d) list. Available: https://www.waterboards.ca.gov/water_issues/programs/tmdl/303d_listing.html

State Water Board. 2024b. Safe and Affordable Funding for Equity and Resilience. Available: https://www.waterboards.ca.gov/water_issues/programs/grants_loans/sustainable_water_solutions/safer.html

State Water Board. 2025. Irrigated Lands Regulatory Program. Available: https://www.waterboards.ca.gov/centralvalley/water_issues/irrigated_lands/

USDM (U.S. Drought Monitor). 2025. Stanislaus County (CA) Percent Area in U.S. Drought Monitor Categories. Available: https://droughtmonitor.unl.edu/DmData/Timeseries.aspx

7.4 Chapter 4 References

CCR (California Code of Regulations). 2005. Title 16, Division 8, Article 3 Classifications. Available: https://regulations.justia.com/states/california/title-16/division-8/article-3/

CDC (Center for Disease Control). 2025. Global Water, Sanitation, and Hygiene (WASH). Available: https://www.cdc.gov/global-water-sanitation-hygiene/about/index.html

CWC. 2021. Section 10609.70. Available: https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=WAT&sectionNum=10609.70

DWR. 2025a.Annual Reports. Available: https://sgma.water.ca.gov/portal/gspar/submitted

DWR. 2025b. Dry Well Reporting System. Available: https://mydrywell.water.ca.gov/report/

PPC (California Code, Public Contract Code). 1994. Public Contract Code Section 1102. Available: https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=PCC&sectionNum=1102

PPC. 2009. Public Contract Code Section 10302(a). Available: https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=PCC&sectionNum=10302.

USDM (U.S. Drought Monitor). 2025. Stanislaus County (CA) Percent Area in U.S. Drought Monitor Categories. Available: https://droughtmonitor.unl.edu/DmData/Timeseries.aspx

7.5 Chapter 5 References

CDC (Center for Disease Control). 2025. Global Water, Sanitation, and Hygiene (WASH). Available: https://www.cdc.gov/global-water-sanitation-hygiene/about/index.html

CWC. 2015. Section 10733. Available: https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=WAT&sectionNum=10733.

CWC. 2021. Section 10609.70. Available: https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=WAT&sectionNum=10609.70

DWR. 2024. 2024 GSP Annual Report Turlock Subbasin. Available: https://sgma.water.ca.gov/portal/gspar/preview/407

DWR. 2025a. DWR determination letter for the Modesto GSP, February 27, 2025. Available: https://sgma.water.ca.gov/portal/gsp/assessments/85

DWR. 2025b. DWR determination letter for the Turlock GSP, February 27, 2025. Available: https://sgma.water.ca.gov/portal/gsp/assessments/110

DWR. 2025c. GSP Status Summary. Available: https://sgma.water.ca.gov/portal/gsp/status

DWR. 2025d. Dry Well Reporting System. Available: https://mydrywell.water.ca.gov/report/

ESJGA (Eastern San Joaquin Grounwater Authority). 2024. 2024 Groundwater Sustainability Plan Amendment. Available: https://www.esjgroundwater.org/Resource-Information/GSP

HSC. 2019. Section 116772. Available: https://california.public.law/codes/health_and_safety_code_section_116772

Lee. 2023. Assembly Bill 664. Available: https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202320240AB664

Mooning. 2019. Senate Bill 200. Available: https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201920200SB200

STRGBA (Stanislaus and Tuolumne Rivers Groundwater Basin Association). 2026. Well Mitigation Plan. Available: https://www.strgba.org/faqs/well-mitigation-plan-and-management-actions/

State Water Board. 2024a. 2024 California Drinking Water Needs Assessment. Available: https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/needs.html

State Water Board. 2024b. Safe and Affordable Funding for Equity and Resilience. Available: https://www.waterboards.ca.gov/water_issues/programs/grants_loans/sustainable_water_solutions/safer.html

USGS (United States Geologic Survey). 2018. Water Science School Drought and Groundwater Levels. Available: https://www.usgs.gov/water-science-school/science/drought-and-groundwater-levels

7.6 Chapter 6 References

CWC. 2014 Section 10728. Available: https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=WAT&sectionNum=10728.

CWC. 2021. Section 10609.70. Available: https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=WAT&sectionNum=10609.70

DWR. 2025a. GSP Status Summary. Available: https://sgma.water.ca.gov/portal/gsp/status

DWR. 2025b. Sustainable Groundwater Management Grant Program. Available: https://water.ca.gov/Work-With-Us/Grants-And-Loans/Sustainable-Groundwater

DWR. 2025c. DAC and EDA Mapping Tools. Available: https://gis.water.ca.gov/app/dacs/

ESJGA (Eastern San Joaquin Groundwater Authority). 2025. Meetings and Outreach. Available: https://www.esjgroundwater.org/Stay-Informed/Meetings-Outreach

ESRWM (East Stanislaus Regional Water Management). 2018. East Stanislaus IRWMP. Available: https://www.eaststanirwm.org/

FEMA. 2000. Disaster Mitigation Act of 2000. Available: https://www.fema.gov/sites/default/files/2020-11/fema_disaster-mitigation-act-of-2000_10-30-2000.pdf

GOV (California Government Code). 2015. Section 65352.5. Available: https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=GOV&sectionNum=65352.5

MID (Modesto Irrigation District). 2021. City of Modesto & Modesto Irrigation District Joint Urban Water Management Plan. Available: https://www.mid.org/water/drinking-water/joint-urban-water-management-plan/

SRWA (Stanislaus Regional Water Authority). 2024. 2020 Urban Water Management Plan. Available: https://www.stanrwa.com/files/a39453b69/Stanislaus+Regional+Water+Authority+2020+Urban+Water+Management+Plan+-+October+2024.pdf

STRGBA (Stanislaus and Tuolumne Rivers Groundwater Basin Association). 2025. Meetings and Agenda. Available: https://www.strgba.org/meetings-workshops/meetings-agendas/

Stanislaus County. 2016. Stanislaus County General Plan. Available: https://www.stancounty.com/planning/pl/general-plan.shtm

Stanislaus County. 2021. Stanislaus County Emergency Operations Plan. Available: https://oes.stancounty.gov/divisions/emergency-management/planning-and-preparedness

Stanislaus County. 2022. Multi-Jurisdictional Hazard Mitigation Plan. Available: https://oes.stancounty.gov/divisions/emergency-management/multi-jurisdictional-hazard-mitigation-plan

State Water Board. 2025a. Countywide and Regional Funding Programs. Available: https://www.waterboards.ca.gov/safer/funding_solicitation.html#:~:text=Background/Overview,and%20management%20of%20these%20programs.

State Water Board. 2025b. Drinking Water State Revolving Fund. Available: https://www.waterboards.ca.gov/drinking_water/services/funding/SRF.html

State Water Board. 2025c. SAFER Drinking Water Technical Assistance Funding Program. Available: https://www.waterboards.ca.gov/water_issues/programs/grants_loans/tech_asst_funding.html

Turlock (Turlock Groundwater). 2025. Available: https://turlockgroundwater.org/

USDA (United States Department of Agriculture). 2025. Water and Environmental Programs. Available: https://www.rd.usda.gov/programs-services/water-environmental-programs

This page intentionally left blank.